water affairs
Department:
Water Affairs
REPUBLIC OF SOUTH AFRICA

Implementation and Maintenance of the Water Reconciliation Strategy for the KwaZulu-Natal Coastal Metropolitan Areas

Assessment of Water Supply Options for North Coast (Plan B for Hazelmere Dam raising)

14 MARCH 2012

WHY THE ASSESSMENT?

- Stability problems related to raising of Hazelmere Dam
  - Resulting in increased capital costs R160 to R370 million
  - Longer implementation time frame – extra year
- Hazelmere Dam costs and time frames comparable to other augmentation options
- Presented to TSG – requested a review of the reconciliation of Mdloti and Mvoti Systems

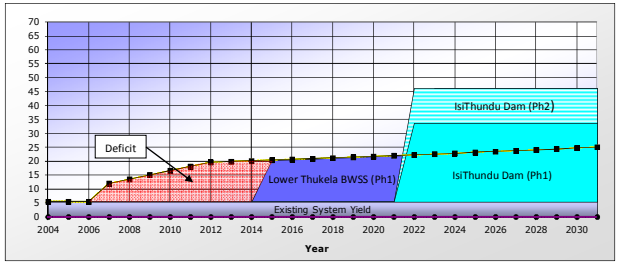
OBJECTIVES OF THE ASSESSMENT

- High level assessment of reconciliation strategy of the Mdloti and Mvoti Systems using identified schemes and available cost information
- Present findings to SSC to recommend a way forward

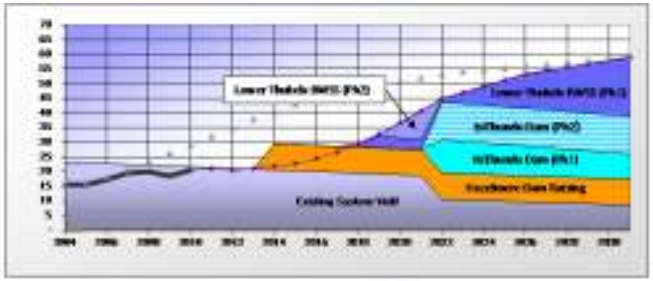
AVAILABLE SCHEMES

- Raising of Hazelmere Dam – Detailed design
- Mvoti River Development (Isithundu Dam) – Feasibility Study - 2000
- Phase 1 and 2 of Lower Thukela BWSS – Detailed design – 2011/12 – Umgeni Water
- Seawater desalination – planning level/pre-feasibility
- Re-use treated sewage effluent – Feasibility Study - 2010

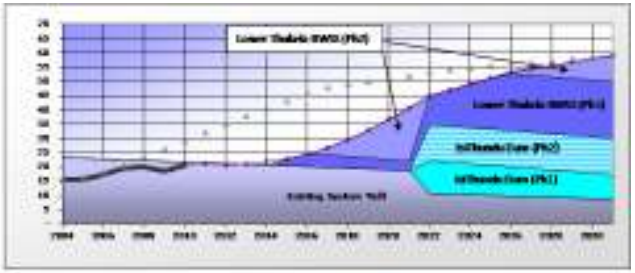
WATER BALANCE SITUATION - MVOTI



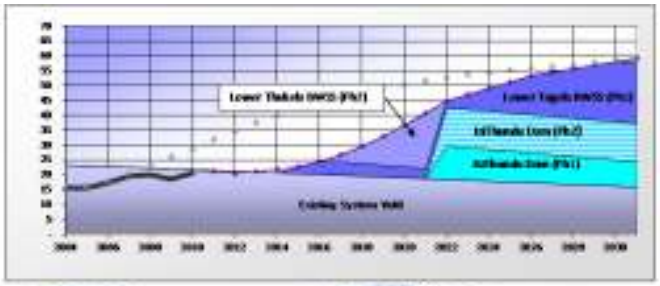
WATER BALANCE SITUATION – MDLOTI – HAZELMERE DAM RAISING



WATER BALANCE SITUATION – MDLOTI – LOWER THUKELA BWSS - EWR



WATER BALANCE SITUATION – MDLOTI – LOWER THUKELA BWSS – NO EWR



Lower Thukela Water Availability

- 45 million m^3/year available yield (recon strategy)
  - 40 million m^3/year to Lower Thukela BWSS
  - 5 million m^3/year to upgrade of Sundumbili WTP
- 32 million m^3/year unused allocation for Mhlatuze Water

WATER BALANCE SITUATION – MDLOTI – DESALINATION/RE-USE

ECONOMIC ANALYSIS

ASSUMPTIONS:

- January 2012 base date and costs
- Analysis period 2012 to 2031
- Electricity at R0.6/kwh – no increase during analysis period
- URV for supply scenarios calculated at 6%, 8% and 10%

SCHEME COSTS

Scenario	Capital Cost (million R)	Annual Opex	Time to implement (years)	Yield (million m3/a)
Raise Hazelmere Dam	370	R0.9 million	3	8.9
Mvoti Phase 1 and 2	1396	R8.3 million R0.28/m3	10	40.8
Lower Thukela Phase 1	900	R2.25 million R0.48/m3	Implemented by December 2014	20
Lower Thukela Phase 2	300	R0.75 million R0.48/m3	2	20
Seawater desalination	350 – desal plant 70 – pipe and pump station	R3.90/m3 – plant R0.32/m3 pumping R1.1 million	5	8.9
Direct re-use treated WWTW effluent	211 – plant 83 – pipeline pump station	R4.40/m3 – plant R0.93/m3 – pump and maintenance	5	8.9

DIRECT RE-USE TREATED WWTW EFFLUENT

WWTW	2011		2016		2021		2031	
	million m³/year	ML/d	million m³/year	ML/d	million m³/year	ML/d	million m³/year	ML/d
Northern	20.6	56	21.5	59	22.6	62	23.5	64
Kwa Mashu	25.5	70	27.5	75	29	80	29.6	81
Phoenix	11.1	31	15.4	42	18.4	50	20.8	57
New Mdloti	4.0	11	8.9	24	11.7	32	13.3	36
Total	61.2	168	73.3	200	81.7	224	87.2	238
80% recovery for direct re-use								
Northern	16.5	44.8	17.2	47.2	18.1	49.6	18.8	51.2
Kwa Mashu	20.4	56.0	22.0	60.0	23.2	64.0	23.7	64.8
Phoenix	8.9	24.8	12.3	33.6	14.7	40.0	16.6	45.6
New Mdloti	3.2	8.8	7.1	19.2	9.4	25.6	10.6	28.8
Total	49.0	134.4	58.6	160.0	65.4	179.2	69.8	190.4

Scheme timing

Scenario	Element	Delivery Date
1 Raised Hazelmere Dam	Raised Hazelmere Dam	December 2014
	Lower Thukela BWSS Phase 1	December 2014
	Lower Thukela BWSS Phase 2	December 2019
	Isithundu Dam	December 2022
2-Lower Thukela BWSS Phase 1 and 2	Thukela BWSS Phase 1	December 2014
	Thukela BWSS Phase 2	December 2016
	Isithundu Dam	December 2022
3- Seawater desalination plant replacing yield of Hazelmere Dam raising	Desalination plant	December 2016
	Thukela BWSS Phase 1	December 2014
	Thukela BWSS Phase 2	December 2019
	Isithundu Dam	December 2022
4 – Re-use of treated sewage effluent from Phoenix WWTW to replace yield of Hazelmere Dam raising	Re-use plant	December 2016
	Thukela BWSS Phase 1	December 2014
	Thukela BWSS Phase 2	December 2019
	Isithundu Dam	December 2022

URVs (R/m3)

Scenario	6%	8%	10%
1 – Hazelmere Dam	7.37	8.31	9.33
2-Lower Thukela BWSS	6.50	7.26	8.09
3-Seawater desal	7.77	8.69	9.69
4-Direct re-use WWTW	7.67	8.54	9.47

CONCLUSIONS

- Lower Thukela BWSS has lowest URV
- URV for desal, re-use and Hazelmere Dam raising are similar
- Different levels of confidence in cost information
- Lower Thukela BWSS Phase 2 suggested?
- Supply needs optimisation – Hazelmere Dam raising, Isithundu Dam phasing, desal, re-use