



KWAZULU-NATAL COASTAL METROPOLITAN AREA WATER SUPPLY SYSTEM
Strategy Steering Committee (SSC) for the Implementation and Maintenance of the
Reconciliation Strategy

MEETING 4: PROGRESS REPORT

March 2012

1. INTRODUCTION

The fourth meeting of the Strategy Steering Committee (SSC) is scheduled for Wednesday, 14 March 2012 to discuss the further progress made with regard to the implementation of the Water Reconciliation Strategy for the KwaZulu-Natal Coastal Metropolitan Areas, and to discuss recent developments in the supply challenges that exist in the area with regard to implementation.

A summary of the progress to date with the implementation of the main strategies between the previous SSC meeting of September 2011 and the upcoming meeting is presented in this report. The progress with the various aspects of the strategy was supplied by the responsible authorities as follows:-

- The Department of Water Affairs (DWA) supplied information on the water balances with input from Umgeni Water.
- DWA provided input on the progress with the Mooi Mgeni Transfer Scheme, Hazelmere Dam Raising, Mkomazi Scheme and the Mvoti Scheme.
- eThekweni Municipality supplied information on the progress with the re-use of treated sewage effluent.
- Umgeni Water provided information on progress with the Lower Thukela transfer scheme, upgrade of the North Coast water infrastructure and the desalination of seawater options.

2. PROBLEMS WITH WATER SUPPLY

The water situation in the KwaZulu-Natal Coastal Metropolitan Area is such that the water use already exceeds the assured supply of water. This poses a challenge in water security for this metropolitan area. The late rainfall over the last summer season has kept the major supply dams full and has prevented water restrictions from being imposed in the short term. Simulations of the water supply system show that this situation will change quickly with water restrictions being needed in the event of a dry year.

The Reconciliation Strategy for the KwaZulu-Natal Coastal Metropolitan Area Water Supply System (**Figure 1**) identifies, prioritises and confirms the essential interventions necessary to meet the water requirements of the area for the next twenty five years (Department of Water Affairs, 2009). The strategy was developed by DWA in close collaboration with the eThekweni Municipality, Umgeni Water, other municipalities and stakeholders.

The major infrastructure projects are progressing steadily and as priority interventions will address water shortages projected over the short term.

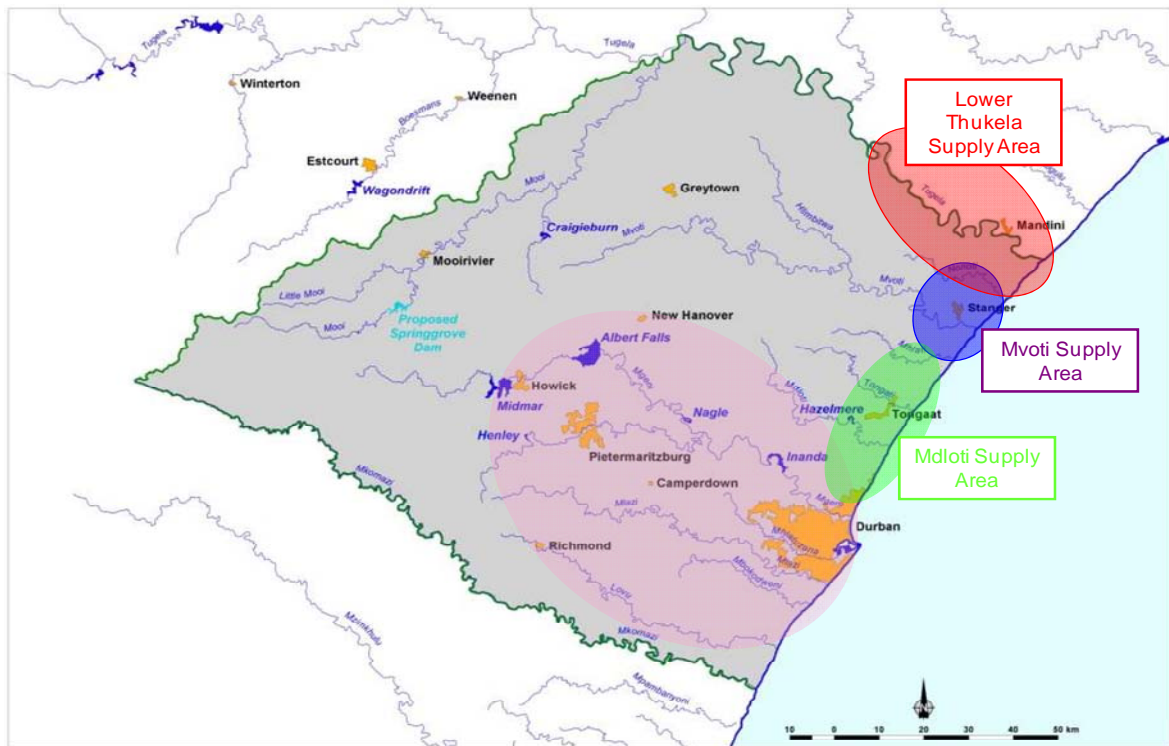


Figure 1: KwaZulu-Natal Coastal Metropolitan area (Pietermaritzburg to Durban from the west to east and from KwaDukuza in the north to Amanzimtoti in the south)

3. WATER BALANCES

The water balances depicting the water reconciliation situation in the Mgeni, Mvoti and Mdloti River Systems were updated with recent water requirement projections and the latest implementation schedule of the interventions as shown in the subsequent figures. The graphs indicate how the water requirements compare with the available resources and also the augmentations required to meet the future water requirements over the planning period.

3.1 Mgeni River System

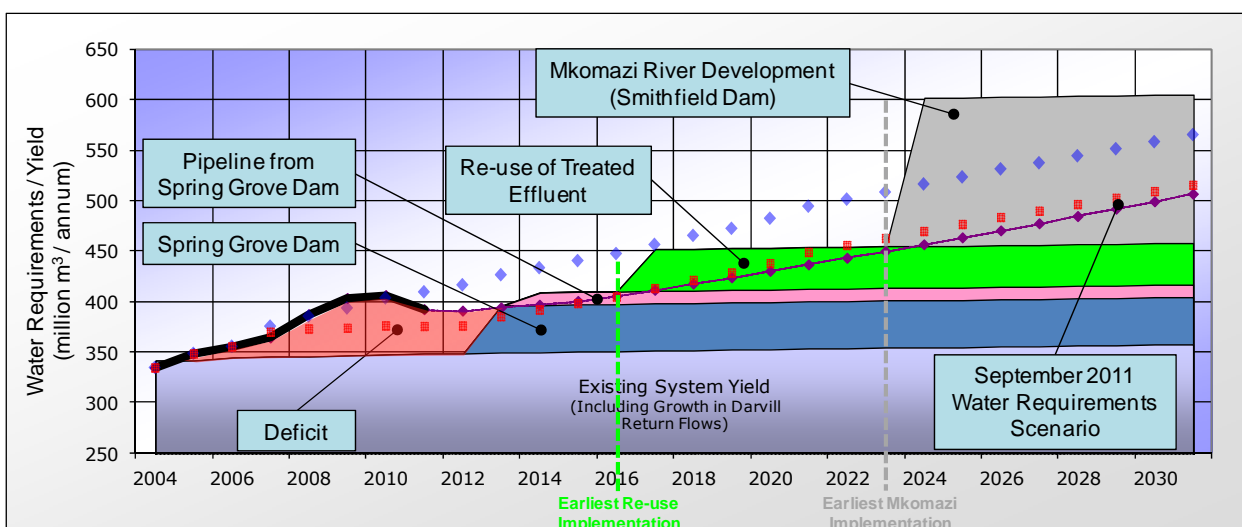


Figure 2: Water reconciliation situation in the Mgeni River System (September 2011)

The water balance for the Mgeni River System remains the same as discussed at the previous SSC meeting of 27 September 2011. No new water requirement or actual water use information was available to warrant an update of the water balance. The system status is as per that depicted in Figure 2.

Figure 2 shows the following:-

- The solid black line up to the year 2011 represents the actual water use.
- The dotted blue curve represents the high water requirement projection scenario without further Water Conservation and Water Demand Management (WC/WDM) as applied in the reconciliation strategy of August 2009.
- The dotted red curve represents the high water requirement projection scenario with further WC/WDM applied in the reconciliation strategy of August 2009.
- The purple line represents the revised water requirement projection scenario provided by Umgeni Water after consultation with the municipalities dated August 2011. This scenario incorporated the planned WC/WDM interventions of eThekweni Municipality.
- The red shaded areas indicate where the water requirement exceeds the yield of the system and deficits in supply and high risk of water restrictions will be experienced.
- The blue and pink areas represent the yield of the two phases of Spring Grove Dam added onto the existing yield of the Mgeni River System.
- The green area represents the planned re-use volume of treated sewage effluent.
- The increase in yield of the proposed Mkomazi River development and water transfer scheme (Smithfield Dam) is indicated by the grey area, showing sufficient water can be made available to the system to supply the projected water requirements beyond the year 2030.

A water balance update for the Mgeni System was however done to understand the load shift implications between the upper and lower Mgeni Systems. Updated modelling and risk analysis for the KZN coastal water supply area was done based on additional scenarios using the Water Resource Planning model (WRPM). The upper Mgeni System included Midmar Dam with support from the Mooi (Spring Grove/Midmar); while the Lower Mgeni System included the area from Albert Falls to Nagle and Inanda Dams.

The scenarios used in the modelling for the water balance update are described in **Table 1**.

Table 1: Scenarios assessed for the Mgeni System water balance update (load shift)

Scenarios	Description	Purpose
Verification	March 2011 Water Requirements.	Verify WRPM against previous results (May 2011 Annual Operating Analysis. UW)
1	September 2011 Requirements. Spring Grove Dam: <ul style="list-style-type: none"> • 1st Impounding May 2014. • MMTS Phase 2B delivery May 2015. 	Projected risk of restriction with Mooi-Mgeni Transfer Scheme Implemented.
2	Scenario 1 with: eThekweni Direct Re-use (41 million m ³ /annum, Water Delivery May 2016)	Evaluate projected risk of restrictions against criteria & serve as reference to compare implications of load shift scenario.
3 (preliminary results)	Scenario 2 with: <ul style="list-style-type: none"> • Darvill Re-use (21.9 mill. m³/a, Delivery 2014). • Implementation of Western Aqueduct with load shift scenario of eThekweni. 	Compare system behaviour against Scenario 2.

The following conclusions were drawn from the WRPM Scenario Results:

- Direct Re-use (Scenario 2 vs. Scenario 1) reduces the risk of restrictions, however, the restriction criteria were still violated until the year 2020 (or beyond?).
- The particular load shift scenario (Scenario 3) causes imbalance between Upper and Lower Mgeni System.
- Unacceptable uncontrolled failures occurs with both Midmar and Spring Grove dams depleted for Scenario 3 at >95% exceedance probability.

The results of the analysis and the recommendations will be presented and discussed at the upcoming SSC meeting.

3.2 Mvoti River System

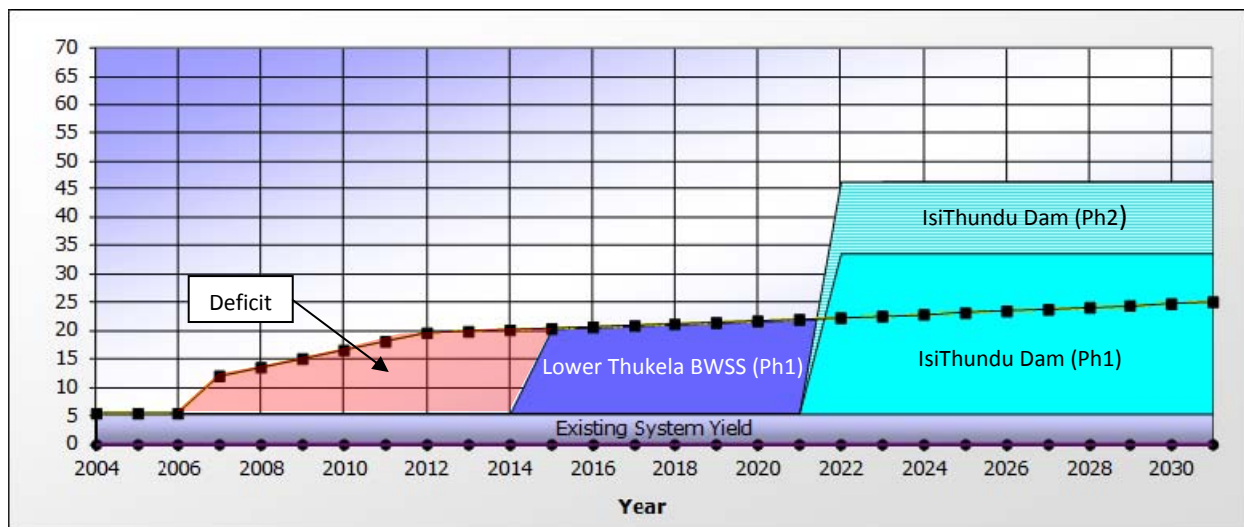


Figure 3: Water reconciliation situation in the Mvoti River System

Figure 3 shows the following:-

- The black line represents the water requirement projection for the Mvoti River System. The curve was adopted from the KZN Recon Strategy and was originally derived from the Water and Sanitation Master Plan for the iLembe District Municipality.
- The red shaded area indicates where the water requirements exceed the yield of the system and deficits in supply and a high risk of water restrictions will be experienced.
- The blue area represents the support that the Lower Thukela Bulk Water Supply Scheme (BWSS) Phase 1 will provide to the system. According to Umgeni Water (UW), the initial phase of the Lower Thukela BWSS (20 million m³/a or 55 MI/day) has been scheduled to be completed in December 2014. The scheme has been designed for a larger capacity 40 million m³/a (110 MI/d) and can be upgraded to this capacity (from 20 million m³/a to 40 million m³/a) in 18 months.
- The light blue area represents the additional yield provided by the Mvoti River Development Project (IsiThundu Dam) from the year 2022 onwards. The total yield of IsiThundu Dam is 28.1 million m³/a and 40.8 million m³/a for Phase 1 (light blue) and Phase 2 (hatched light blue) respectively. The illustrated surplus yield from the IsiThundu Dam can be used to support the Mdloti System.

Figure 3 highlights the following:-

- There is a high risk of water restrictions until the Lower Thukela BWSS is scheduled to deliver water to the Mvoti River System.

- Once the Mvoti River Development (IsiThundu Dam) has been developed, support is no longer required from the Lower Thukela BWSS and surplus yield is also available to support the Mdloti River System.

3.3 Mdloti River System

The water balance for the Mdloti System as developed in the reconciliation strategy is shown in Figure 4 which shows the raising of Hazelmere Dam as the first scheme to be implemented. Since the development of the strategy, DWA has reviewed the dam raising and found that the geotechnical conditions are such that the dam would require stabilizing with cables or bulk concrete if the dam is to be raised. This increases the cost of the dam from R 160 million to R 370 million and extends the implementation period to a year. The cost of the scheme is now comparable with other augmentation options such as Phase 2 of the Lower Thukela BWSS. The reconciliation of the Mdloti System without Hazelmere Dam is shown in Figure 5.

A preliminary financial assessment of the reconciliation strategy using available costing information is being undertaken to re-assess the augmentation options for the Mdloti System. The results of this will be presented at the SSC meeting.

3.3.1 Mdloti River System (including Hazelmere Dam Raising)

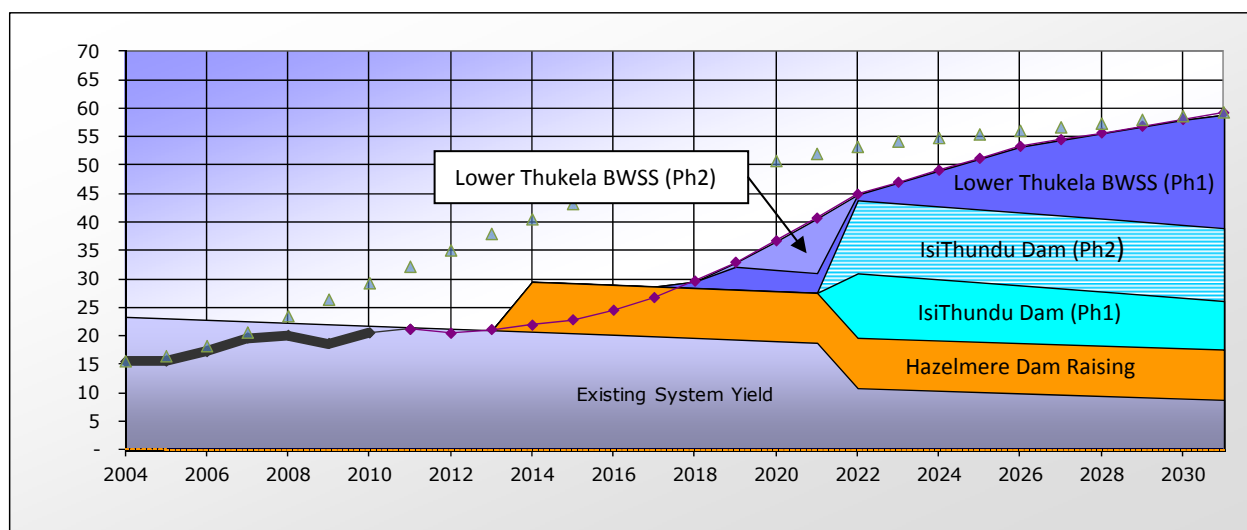


Figure 4: Water reconciliation situation in the Mdloti River System (including Hazelmere Dam Raising)

Figure 4 shows the following:-

- The purple line represents the latest water requirement projection for the Mdloti River System, provided by Umgeni Water (September 2011) and the grey dotted line represents the previous projection used in the KZN Recon Study (Umgeni Water 2007).
- The decrease in the existing system yield is as a result of gradual siltation that reduces the storage capacity of Hazelmere Dam.
- The orange area represents the additional yield (9.8 million m³/annum) provided by the raising of Hazelmere Dam in 2014.
- The blue area represents the support that the Lower Thukela BWSS will provide to the system. Over the 2018 and 2022 period, the Lower Thukela BWSS supports both the Mvoti and the Mdloti Systems and operates at maximum capacity of the scheme (Phase 1) and Phase 2 is required to support the Mdloti System in order to avoid a deficit situation in this period.
- The light blue area represents the surplus yield available from the Mvoti system (IsiThundu Dam) to support the Mdloti system from the year 2022 onwards.

- It was proposed that the Ecological Water Requirements (EWR) is introduced once support to the Mdloti is available from IsiThundu Dam. As a result the EWR releases were only imposed from the year 2022 onwards, which is illustrated by a sudden drop in yield in the year 2022.

Figure 4 highlights the following:-

- The revised water projections (Umgeni Water September 2011) indicate a lower water requirement than previous projection (Umgeni Water 2007).
- No supply deficit situation exists throughout the projection period provided that the augmentation schemes are implemented as illustrated.
- The Lower Thukela BWSS supports both the Mvoti and Mdloti systems up to 2022, when IsiThudu Dam has been implemented. During this period Phase 2 of the Lower Thukela BWSS is required to ensure that no deficits exist. Once the IsiThundu Dam has been implemented, only the initial phase of the Lower Thukela BWSS is required over the remaining planning period.

3.3.2 Mdloti River System (excluding Hazelmere Dam Raising)

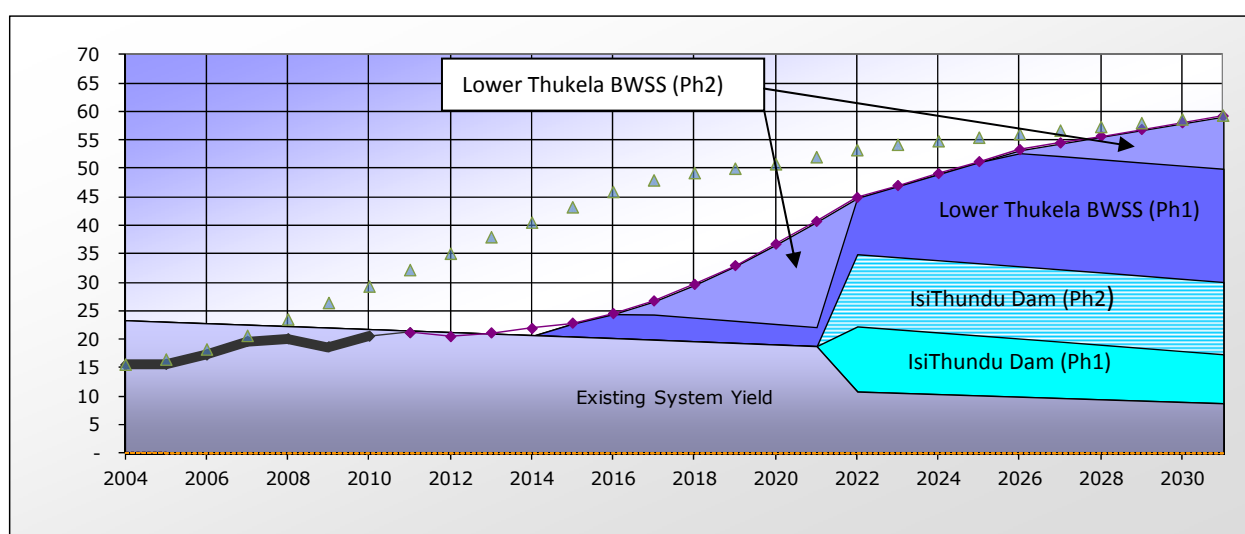


Figure 5: Water reconciliation situation in the Mdloti River System (excluding Hazelmere Dam Raising)

Figure 5 shows the following:-

- The orange area representing the additional yield provided by the Raising of Hazelmere Dam has been removed.
- The water requirements slightly exceed the yield of the system in 2014. The deficit volume is however very small.
- The blue area represents the support that the Lower BWSS will provide to the Mdloti system. Over the 2016 (2 years earlier as a result of Hazelmere Dam not being raised) to 2022 period, the Lower Thukela BWSS supports both the Mvoti and the Mdloti Systems and Phase 1 and Phase 2 of the scheme are required to support the Mdloti System in order to avoid a deficit situation in this period. Support from Phase 2 is again required in 2026 when Phase 1 reaches the maximum capacity
- The light blue area represents the surplus yield available from the Mvoti system (IsiThundu Dam) to support the Mdloti system from the year 2022 onwards.

Figure 5 highlights the following:-

- The additional yield that would have been provided by Hazelmere Dam Raising is now provided by the Lower Thukela River BWSS i.e. additional load placed on the scheme. As a result more support is required from the Lower Thukela BWSS than in the scenario where Hazelmere Dam is raised. Due

to the larger support volumes required from the Lower Thukela BWSS, Phase 2 of the scheme is required earlier (2016 (earliest implementation date) as opposed to 2018) and is also required after IsiThundu Dam has been implemented, from 2026 onwards.

4 IMPLEMENTATION OF THE STRATEGY

4.3 Water Conservation and Water Demand Management

WC/WDM has been identified as an immediate action to deal with water shortages in the area. Even if completely successful, WC/WDM measures will not be sufficient to ensure sufficient future water availability in the area and further significant interventions are required.

Water Conservation and Water Demand Management initiatives of the eThekweni, iLembe, Ugu and Msunduzi municipalities have resulted in a significant saving of water in the KwaZulu-Natal coastal Metropolitan area which was reported on at the last meeting in September 2011. Due to the water savings achieved, the future demand is now estimated to be lower. This has resulted in shortening the water supply deficit period to by three years to 2013.

WC/WDM measures being implemented in the municipalities are showing promising results in terms of non revenue water reduction and reduction of water leaks.

The sustainability of the WC/WDM efforts is a concern. Budget cut-backs to fund further WC/WDM initiatives remain a major concern of the municipalities in the area, as it is evident that saving water through WC/WDM is paying off.

No details were made available by the municipalities on the progress with WC/WDM measures over the period September 2011 to March 2012 at the time of preparation of this report.

4.2 Spring Grove Dam and transfer system

Background

- Mooi Mgeni Transfer Scheme 2 (MMTS-2) will augment the water supply of the Mgeni System.
- The full scheme will increase the current system yield by 60 million m³/a.
- The scheme consists of the Spring Grove Dam (MMTS-2A) and conveyance infrastructure (MMTS-2B)
- The Trans Caledon Transfer Authority (TCTA) has been instructed to implement the scheme on behalf of the Department of Water Affairs (DWA).

Progress

- Construction was initiated in February 2011. Construction is going well.
- Water supply agreement with DWA and Umgeni Water was signed in March 2011.
- An issue related to the EMP regarding the number of trucks permitted on the provincial road may cause a delay in construction (delay in delivery of construction material). The TCTA is addressing the issue with the Department of Environment Affairs to relax the EMP thereby allowing an increase in the number of trucks permitted (30 to 60).
- Delay will result in a cost implication (contractor).

With respect to the transfer pipeline (MMTS Phase 2B):

- The appeal on the transfer pipeline route was upheld.
- This requires the EIA process to be redone. An environmental practitioner has been appointed in this regard.
- Construction of the pipeline should start early 2013 with water delivery expected by end 2014.

4.3 Raising of Hazelmere Dam

Background

- The project will augment the water supply to the KwaZulu-Natal North Coast (Mdloti to Thukela) and sustain irrigation downstream of the dam.
- The project entails the raising of Hazelmere Dam by installing radial gates to increase the gross storage capacity from 23.9 million m³ to 43.7 million m³.
- The storage capacity of the dam has been greatly reduced by sedimentation (2010: 11.4 million m³) with the corresponding reduction of the yield.

Progress

- The raising of Hazelmere Dam was the first augmentation scheme to be implemented due to the comparatively low capital cost and the time frame in which the raising can be implemented.
- Since the development of the initial reconciliation strategy, DWA has identified geotechnical issues related to the stability of the Hazelmere Dam wall if the dam were to be raised.
- This has resulted in an increase in the capital cost to raise the dam wall and an increase in the implementation time frame.
- This makes the raising of Hazelmere Dam less attractive and potentially comparable to the other augmentation schemes.
- The DWA is in the process of assessing the situation – drillers are on site to establish the founding condition (approximately 3 months to do so).
- Depending on the results and the solution selected this will impact on the viability of the dam raising option.
- This has an impact on the water supply schemes considered, and the implications need to be unpacked. The best solution will have to be determined.

4.4 North Coast pipeline and Hazelmere Supply Infrastructure

Background

Extensive current and proposed future developments within the North Coast region have necessitated the augmentation of the entire North Coast Supply System. The following projects are being planned or implemented as part of this augmentation. These include:

- A pipeline has been constructed from Avondale Reservoir to Honolulu reservoir,
- A pipeline is currently being constructed to augment the North Coast Supply System from Honolulu Reservoir to Mvoti Balancing Reservoirs,
- A pipeline is planned to augment the line from Hazelmere WTP to La Mercy bifurcation,
- A new raw water pipeline is planned from the Hazelmere Dam to the Hazelmere WTP, and
- The Hazelmere WTP will be upgraded from 45Ml/d to 75Ml/d.

Progress

- Honolulu to Mvoti Balancing Reservoir Pipeline:
 - Pipeline contract was completed in October 2010
 - The construction of the pipe bridge is approximately 85% complete
 - The programme for the booster pump station still to be determined once the land issue is resolved
- Hazelmere Raw water Pipeline: Construction tender is being evaluated
- Hazelmere WTP Upgrade: Construction tender has been advertised
- Hazelmere to Bifurcation Pipeline & Pump Station: Contractor appointed to construct the pipeline. Pipe has been ordered.

- Environmental Authorisation has been obtained

Way forward

- Honolulu to Mvoti Balancing Reservoir Pipeline:
 - Construction of the pipe bridge is practically complete
 - Resolve land issues and completed pump station
 - Hazelmere supply infrastructure
- Complete the upgrade of:
 - Raw water pipeline from dam to waterworks (2013)
 - Upgrade of Hazelmere WTP to 75MI/day (December 2013)
 - Upgrade Hazelmere to Bifurcation Pipeline and Pump Station (December 2012)

4.5 Mkomazi River Transfer Scheme

- The Professional Service Provider for the technical studies on the Mkomazi was appointed on 1 December 2011).
- Feasibility Study started October 2011 (end September 2016)
- EIA (including estuary): Started December 2011 (end September 2016)
- Detailed design: Start October 2016 (end September 2018)
- Construction: October 2018 (end October 2022)
- Water delivery: January 2023

4.6 Lower Thukela Bulk Water Supply Scheme

Background

This scheme is planned to abstract water from the lower reaches of the Thukela River near the SAPPI Mill, for treatment at a regional water treatment plant situated in close proximity. Potable water will be delivered southwards to local developments and rural communities and will link into the existing North Coast Supply System. Potable water will also be delivered northwards to the Mandini Municipality area for developments.

Progress

- Environmental Impact Assessment report submitted to the authorities January 2012 and was made available for public comment
- Professional Service Provider appointed for design July 2011
- Design split up into a number of contracts
- Design of gravity pipeline completed in March 2012
- Design of other components on going
- Design of the WTW is 80% complete

Way Forward

- Environmental Authorisation expected in July 2012
- Need to obtain all necessary DWA licences and approvals before construction and abstractions can commence. Submission March 2012.
- Construction of the gravity pipeline to start in August 2012
- Design of all components approximately 35% complete
- Weir must be constructed over at least two dry seasons
- Target deadlines for final completion:
 - Gravity Pipeline (Mvoti Reservoir to Darnall) – November 2013

- LTBWSS Phase 1 - December 2014

4.7 Mvoti River Development

- Feasibility Study to start February 2012 (end February 2016)
- EIA (including estuary): Start January 2012 (end January 2016)
- Detailed design: Start April 2016 (end March 2018)
- Construction: June 2018 (end June 2021)
- Water delivery: January 2022

4.8 Re-use of treated sewage effluent

- The Mgeni Estuary Reserve study has been completed
- eThekweni has had to renew the application for an EIA with the Province. There were delays in this process due to COP 17.
- The EIA process was initiated in November 2011.
- First public notice for EIA was published end January/early February 2012
- Supportive actions – everybody should register as I & APs – organisation and individual. Letters of support would be of benefit to the process.

Way Forward

- EIA process and approval: November 2011 to November 2012
- Tender / adjudication: January to July 2013
- Tender award, financing and site establishment: July 2013 to June 2014
- Construction and Commissioning: July 2014 to June 2016
- Water Delivery: July 2016

4.9 Desalination of seawater option

The projected demand of the Mgeni Inland and Central systems is greater than the assured yield that the system can generate. Umgeni Water is currently investigating the possibility of augmenting the supply to the Mgeni System through one or more large scale desalination plants. These plants would serve water to the coastal areas of KwaZulu-Natal thus feeding up water currently allocated by the Mgeni System.

Project Progress

- Professional Service Provider appointed to undertake the detailed feasibility study January 2012
- Site visits were held at both sites to confirm suitability of the sites
- Southern site seems feasible
- Northern site may have environmental impacts and these are to be discussed with an environmental expert
- An alternative northern site will be confirmed in March
- Water quality monitoring equipment and buoys have been ordered

Way Forward

- Initial geotechnical investigation to be undertaken in April 2012 to confirm site suitability
- Tender for Environmental Impact Assessment – April 2011
- Appointment of Environmental Assessment Practitioner to undertake the EIA – June 2012
- Planned completion for the Detailed Feasibility Study – June 2013

4.10 Management of System Operation

Further to the above interventions, a Systems Operations Committee has been established that is focused on improving system management and managing water restrictions in the area in the event of a drought. The next committee meeting is scheduled for 13 March 2012 and a report back will be provided at the SSC meeting of 14 March 2012.

The assessment of the system indicates that it presently has higher volumes than predicted. No water restrictions are foreseen for the near future.

5 UPDATE OF STRATEGY

The augmentation schemes and measures identified in the 2009 Reconciliation Strategy have not changed. No new supply options have been identified at this stage, however the decision on whether to continue with Hazelmore Dam as an option may change this. The key to the successful implementation of the strategy is meeting the target dates for the various phases of the augmentation schemes. The revised set of dates is given in Table 2.

Table 2: Target dates of activities for augmentation schemes identified

MAIN SCHEME	Start Date	End Date
Mooi Mgeni Transfer Scheme Phase 2 A		
Spring Grove Dam		
Construction	Feb 2011	May 2013
Impounding	Nov 2012	March 2013
Water Delivery via MMTS-1	March 2013	March 2013
Upgrade Mearns Pump Station and pipeline (3,2 m ³ /s)	Oct 2011	Nov 2012
Mooi Mgeni Transfer Scheme Phase 2 B		
Pipeline & Pump station		
EIA (Transfer pipeline & measuring weir on Little Mooi River)	Oct 2011	Nov 2012
Detailed Design	Jan 2012	Nov 2012
Construction	Jan 2013	Dec 2014
Delivery via MMTS-2B (1.8 m ³ /s)		Dec 2014
Hazelmere Dam Raising (DWA)		
Appointment civil consultant	Sept 2011	Sept 2011
Tender for gates and manufacturers appointment on hold		
Preliminary design work/geotech to confirm best raising option	Feb 2012	Jun 2012
Decision to continue with Hazelmore Dam as an option	July 2012	Aug 2012
Finalise design/tenders	Sep 2012	Dec 2012
Construction	Jan 2013	Sep 2014
Delivery		Sep 2014
Mkomazi Scheme (DWA)		
Feasibility Study	Oct 2011	Sept 2016
EIA (including estuary)	Dec 2011	Sept 2016
Detailed Design	Oct 2016	Sept 2018
Construction	Oct 2018	Oct 2022
Delivery		Jan 2023
Mvoti River Scheme (DWA)		
Feasibility Study	Feb 2012	Feb 2016
EIA (including estuary)	Jan 2012	Jan 2016
Detailed Design	April 2016	Mar 2018
Construction	June 2018	June 2021
Delivery		Jan 2022
Lower Thukela Transfer (Umgeni Water)		
Feasibility Study		31 July 2011
Detailed Design	1 Aug 2011	31 May 2012
Construction	1 Jul 2012	31 Mar 2015
Delivery		31 Dec 2014
North Coast pipeline and Hazelmore Dam infrastructure upgrades (Umgeni Water)		
Construction North Coast Pipeline to Honolulu reservoir		31 Dec 2010
Construction North Coast pipeline Honolulu to Mvoti Balancing Reservoir		31 Dec 2011
Construction of Honolulu to Mvoti Pump Station		31 July 2013
Construction of the Hazelmore to La Mercy Bifurcation Pipeline	01 Feb 2012	30 Nov 2012
Raw water pipeline from Hazelmore Dam to Hazelmore WTW		31 Dec 2013

MAIN SCHEME	Start Date	End Date
Upgrade Hazelmere WTW		30 Nov 2014
Upgrade Hazelmere Dam		31 Dec 2013
Desalination (Umgeni Water)		
Site Selection	1 Sep 2010	31 Jul 2011
Feasibility Study	15 Jan 2012	31 July 2013
Re-use treated sewage effluent (eThekweni Metro)		
PSP for Mgeni Estuary reserve appointed		March 2011
Results of Mgeni Estuary workshop		Sept 2011
DWA decision		Awaited
EIA process and approval	Nov 2011	Nov 2012
Tender preparation and adjudication	Jan 2013	July 2013
Tender award, financing and site establishment	July 2013	June 2014
Construction and commissioning	July 2014	June 2016
Water delivery		July 2016

6 GENERAL INFORMATION

Detailed progress reports on the water resource management strategies can be found at the following link:
<http://www.dwa.gov.za/Projects/KZNWRMS/documents.aspx>.

The Study Manager for the project is Mr. Niel Van Wyk, Chief Engineer at the Directorate: National Water Resource Planning (East).

The next meeting of the SSC is on 14 March 2012.