



water & forestry

Department:
Water Affairs and Forestry
REPUBLIC OF SOUTH AFRICA

Water Reconciliation Strategy Study for the Kwazulu-Natal Coastal Metropolitan Areas

Third Study Steering Committee Meeting

11 August 2008

An aerial photograph of a large dam structure spanning a wide river. The dam has multiple spillways with water cascading down. To the left, a coastline with a sandy beach and waves is visible. The image is overlaid with a semi-transparent circular graphic on the left side. The word "INTRODUCTION" is centered in a bold, orange, italicized font.

INTRODUCTION

AGENDA

- 1. Welcome & Introduction**
- 2. Attendance and Apologies**
- 3. Acceptance of Agenda**
- 4. Approval of Minutes**
- 5. Matters Arising**
- 6. Stakeholder Engagement**
- 7. Version 1 Strategy**
- 8. Immediate Response Strategy for Growing Demands**

TEA BREAK

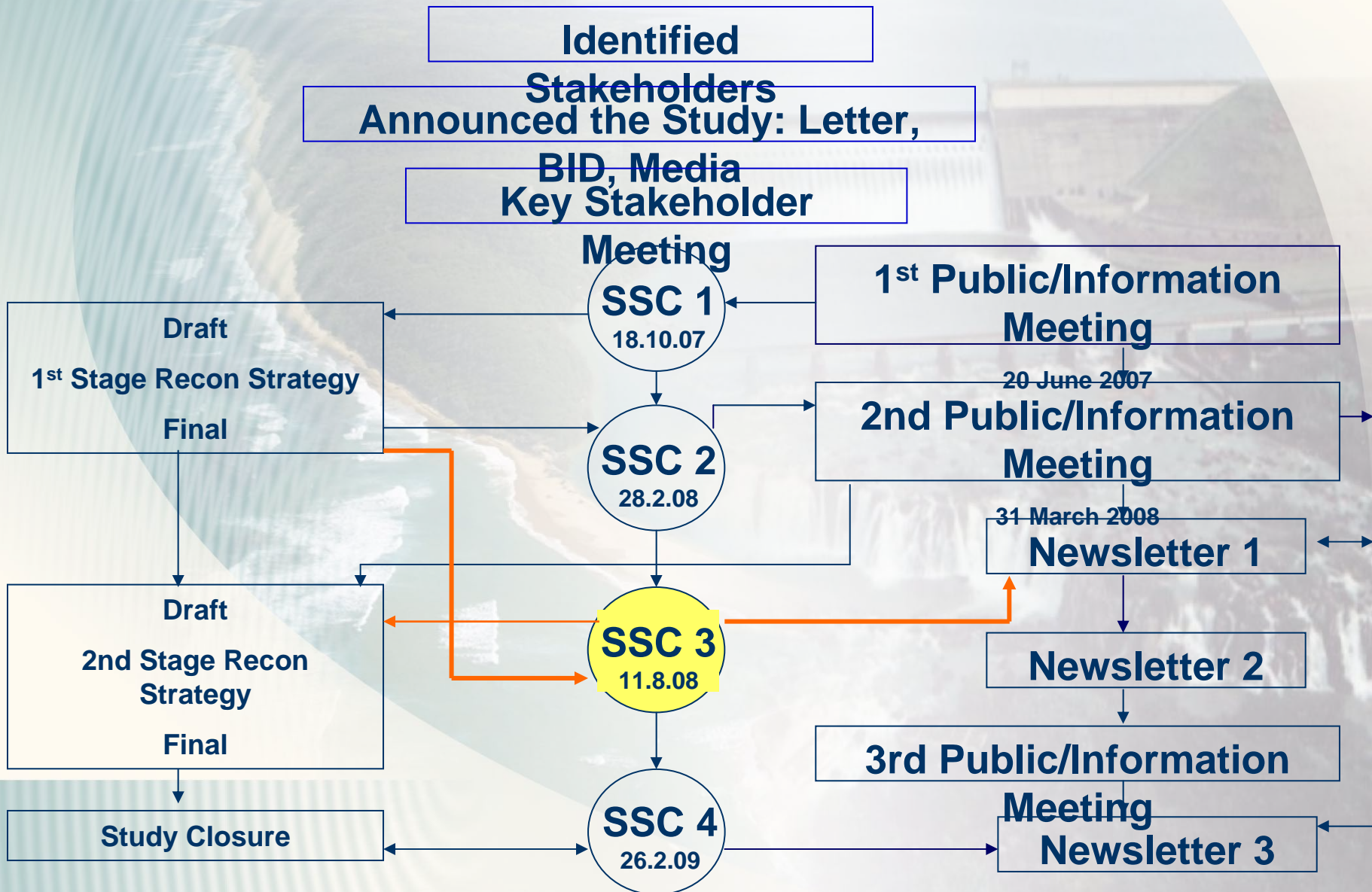
- 9. Discussions & Comments**
- 10. Re-use Activities Overview – 2nd Stage Strategy**
- 11. General**
- 12. Closure & Next Meeting Date**

LUNCH

An aerial photograph of a large dam and reservoir. The dam is a long, low structure with a spillway on the right side. The reservoir is a large body of water with a sandy beach on the left side. The image is overlaid with a large, semi-transparent circular graphic that has a wavy, ripple-like pattern. The text "STAKEHOLDER ENGAGEMENT" is centered over the image in a bold, orange, italicized font.

***STAKEHOLDER
ENGAGEMENT***

Process of Stakeholder Engagement



Levels of Involvement

- **Study Technical Committee**

To provide technical input to the study, to ensure linkages between existing projects are made, to ensure study covers most crucial elements

- **Study Steering Committee**

To give guidance in steering the study by providing advisory support to the study team, identifying problems and / or problem areas in the study as well as sensitive technical and political issues

- **Interested Parties**

To raise issues, concerns and ideas for consideration as the study progresses

Public Engagement

- **Database consists of 350 stakeholders**
- **SSC list consists of 67 members**
- **Minutes of all SSC up to date**
- **Minutes of 2nd Public Meeting in draft**
- **Issues and Response report**
- **Input, issues, challenges considered in study**
- **First Stage Reconciliation Strategy Report**
- **Immediate Response Strategy for Growing Demands in the KZN Coastal Metropolitan Areas**

MEMBERSHIP OF SSC

- **National and Provincial Government**

DEAT; DoA; DWAF (Nat and Prov), Office of Premier; Departments: Agriculture & Environmental Affairs; Local Government & Traditional Affairs; Econ Development

- **Local Government**

eThekweni, Msunduzi, uMgungundlovu, Ugu, iLembe municipalities

- **Research and Universities**

University of KZN; SA Sugarcane Research Institute

- **Organised Business and Industry**

Dbn Chamber of Commerce & Industry; PMB Chamber of Business

- **Parastatals**

Umgeni Water

- **NGOs and CBOs**

Wildlife and Environmental Society of SA (WESSA); KwaNaLoga; Catchment Management Fora; Siyanyuka Communications; Sakhakuyekubekuhle

- **Organised Commercial Forestry**

Forestry SA (FSA)

- **Conservancy**

Blythedale Conservancy & KZN Wildlife; Ezemvelo KZN Wildlife; KZN Conservancies Ass

- **Organised Agriculture**

SA Sugar Association (SASA); KZN Agricultural Union (KWANALU); Nat African Farmers Union of SA (NAFU)

An aerial photograph of a large dam structure spanning a wide river. The dam has multiple spillways with water cascading down. To the left, a coastline with a sandy beach and waves is visible. The image is overlaid with a semi-transparent circular graphic on the left side and a dark teal gradient at the bottom. The text "Thank you" is centered in a bold, italicized, dark blue font.

Thank you

VERSION 1 STRATEGY

- **Document was distributed on 29/07/2008 for comments**
- **Request for comments**
- **Submit written comments to:**
 - **Rachelle Seymore**
Tel: 021 556-3617
Cell: 082 9414 752
E-mail: rseymore@telkomsa.net
 - **Pieter van Rooyen**
E-mail: pieterv@wrp.co.za

An aerial photograph of a coastal region, showing a large dam structure across a wide river. The water is turbulent, creating white rapids. The surrounding landscape is a mix of green vegetation and brownish terrain. The image is overlaid with a semi-transparent circular graphic on the left side.

IMMEDIATE RESPONSE STRATEGY FOR GROWING DEMANDS IN THE KZN COASTAL METRO AREAS

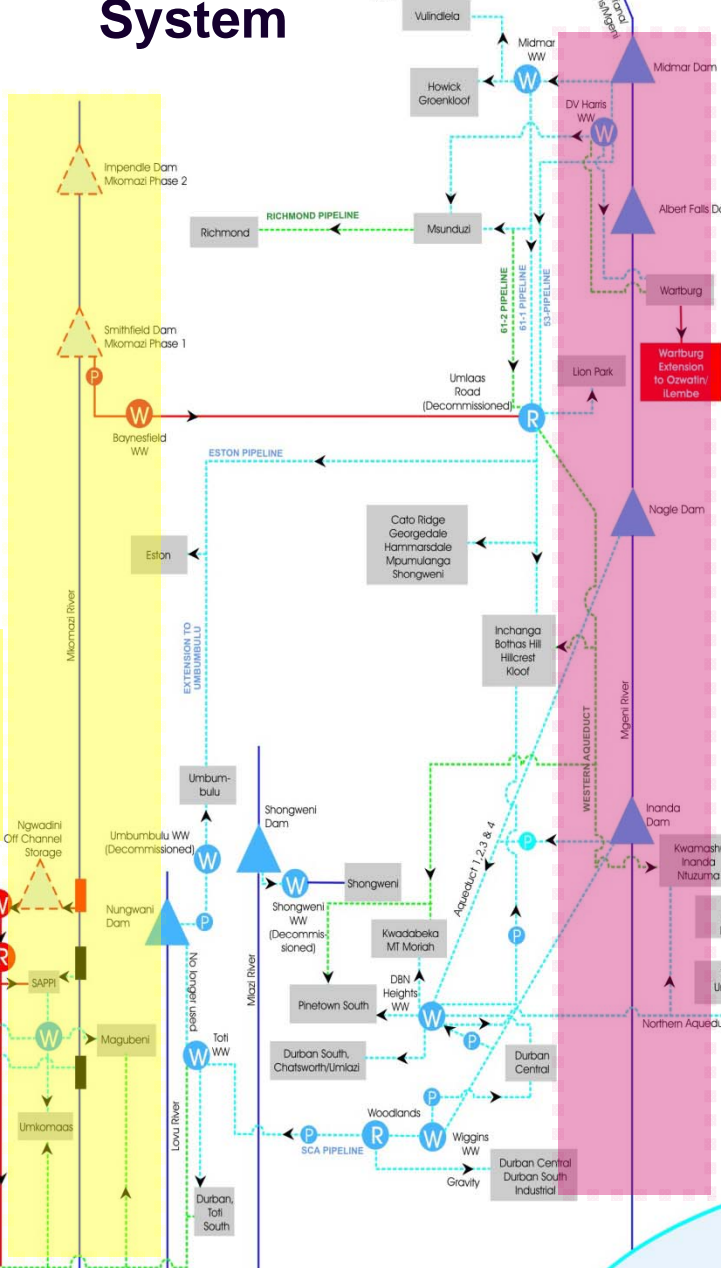
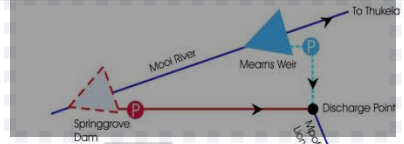
Overview of Strategy

Mooi River System

LEGEND:

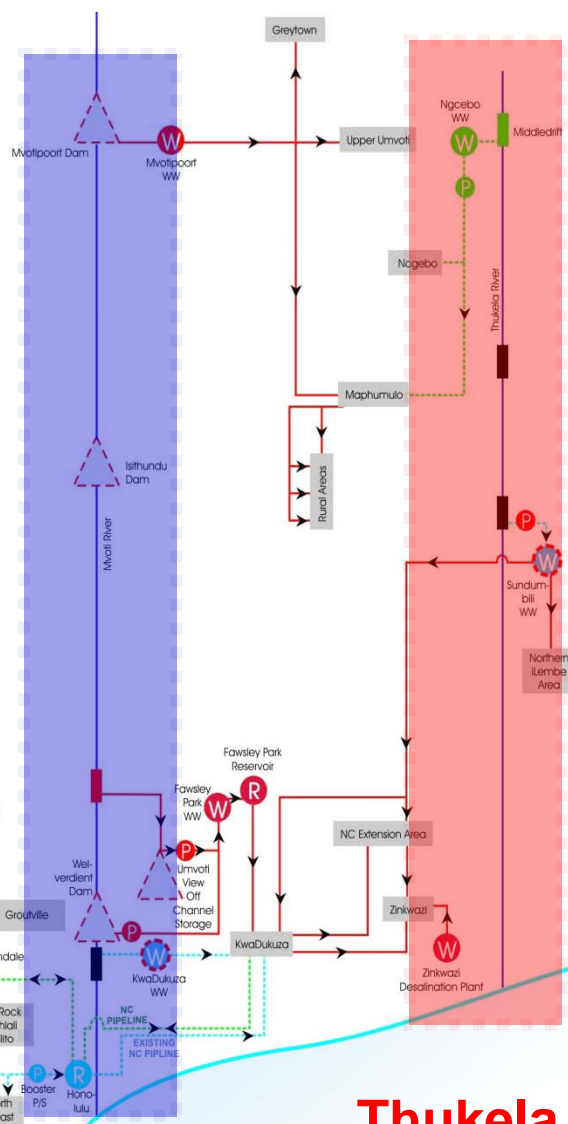
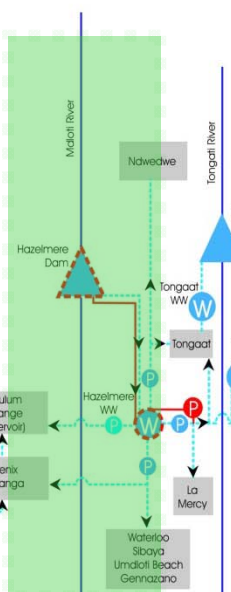
- Catchment Boundary
- Proposed Abstraction Point
- Abstraction Point
- Proposed Reservoir
- Reservoir
- Proposed Pumpstation
- Pumpstation
- Pipeline/Canal
- Proposed Pipeline/Canal
- Under construction & starting 2007/08
- Water Purification Plant
- Proposed Water Purification Plant
- Reservoir
- Proposed Reservoir
- Demand Centre
- Water Flow
- River

Note:
The North Coast proposed infrastructure represents a number of options that will not necessarily all be implemented

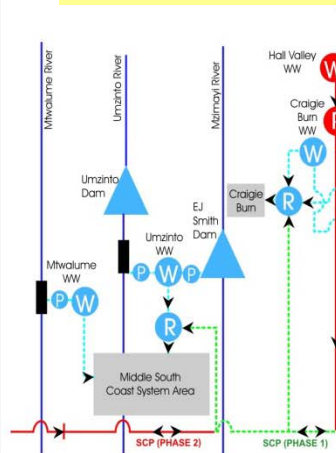


Mgeni River System

Mdloti River System



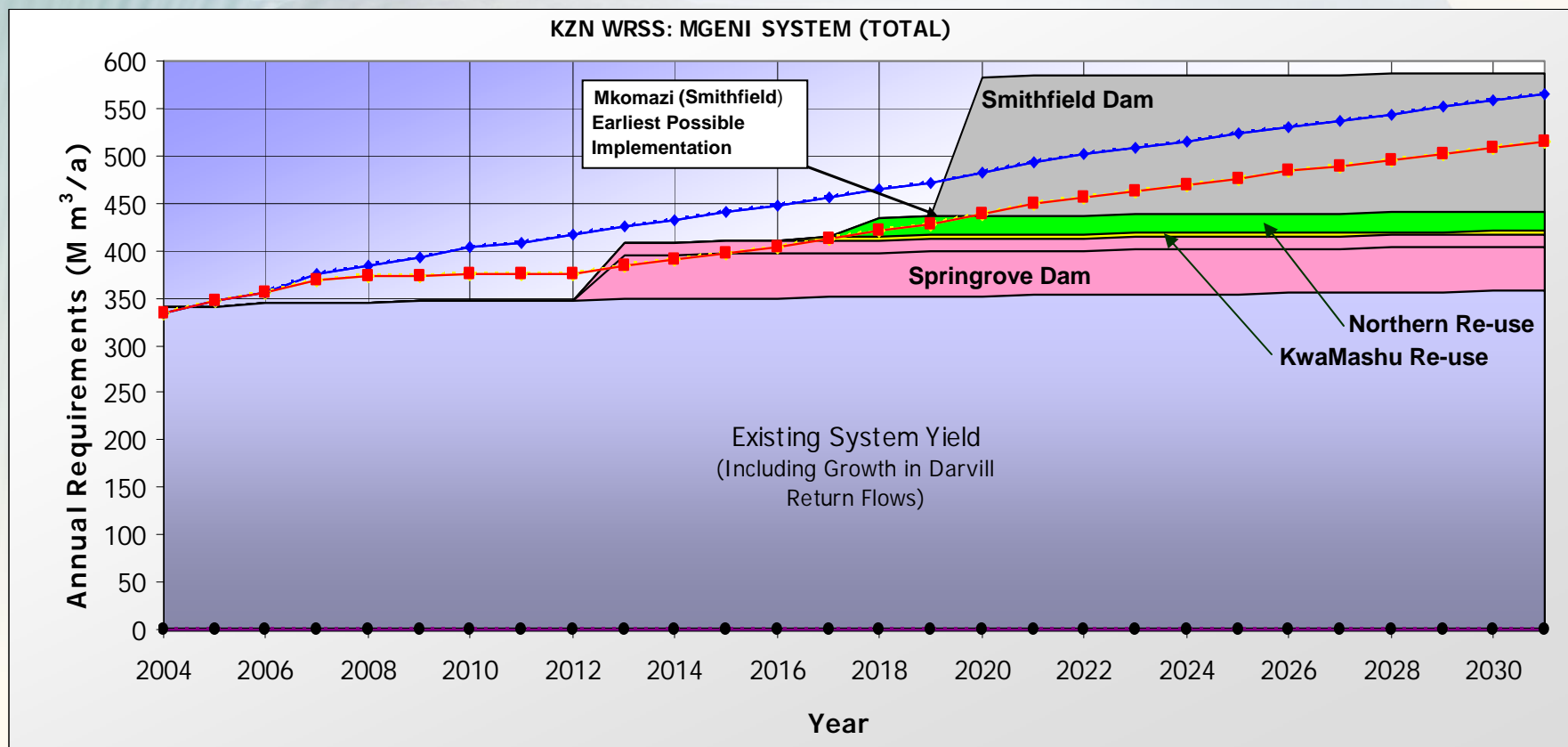
Mkomazi River System



Thukela River System

Myoti River System

Mgeni System Water Balance

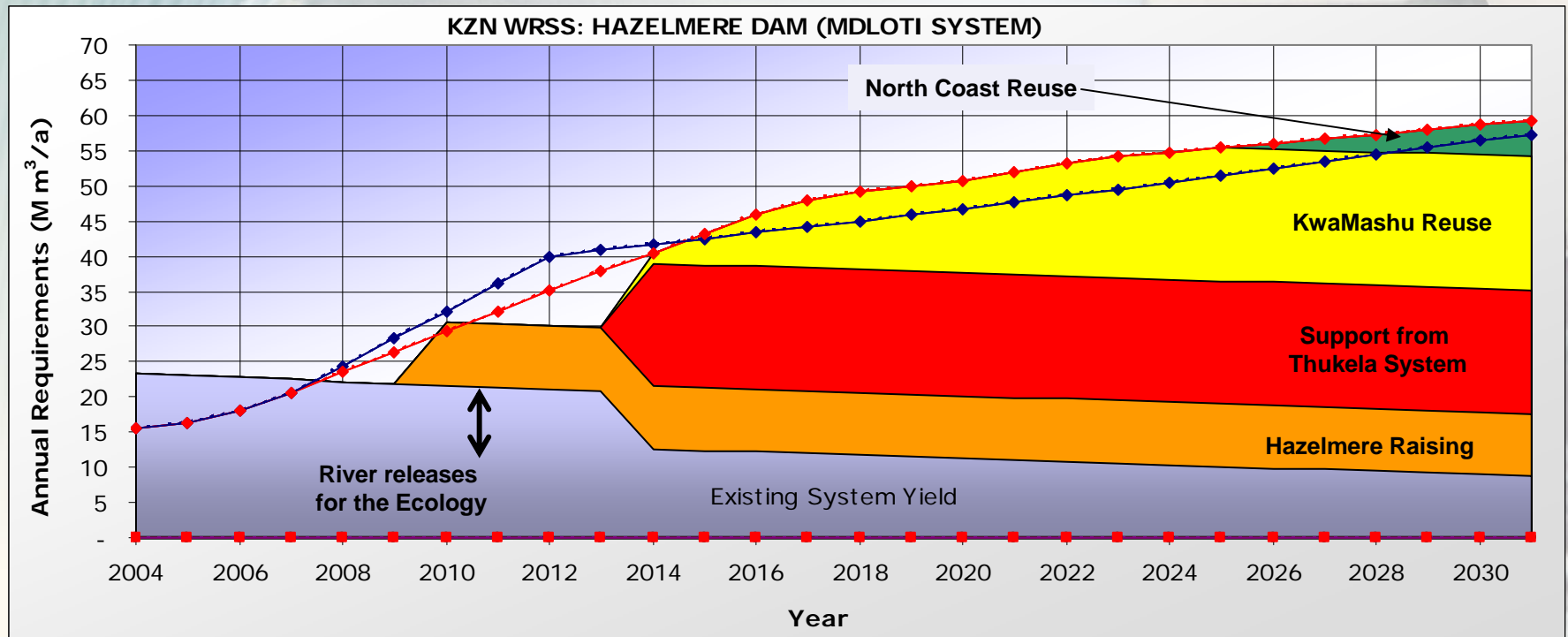


Water Requirement Scenarios:

Scenario A: No further WC/WDM measures

Scenario A1: Scenario A with waste management over 5 years

Mdloti System Water Balance



Water Requirement Scenarios:

Scenario M-A: Ethekwini Scenario A + Illembe Master Plan

Scenario M-B: Umgeni Water Scenario, excluding pending and conceptual planned developments

Strategy Conclusions

- **Current demands exceed existing yield**
- **WC/WDM essential intervention**
- **Significant treated effluent volumes available for re-use**
- **Immediate implementation of:**
 - **Spring Grove Dam and transfer infrastructure**
 - **Raising of Hazelmere Dam**
- **Both the Lower Thukela Scheme and Mvoti River Development Option can support the northern areas**

The background of the slide features a large, semi-transparent image of a dam and a river. The dam is a long, low structure with multiple spillways, and the river flows through it, creating white water. The image is overlaid with a light blue circular graphic element on the left side.

IMMEDIATE RESPONSE STRATEGY FOR GROWING DEMANDS IN THE KZN COASTAL METRO AREAS

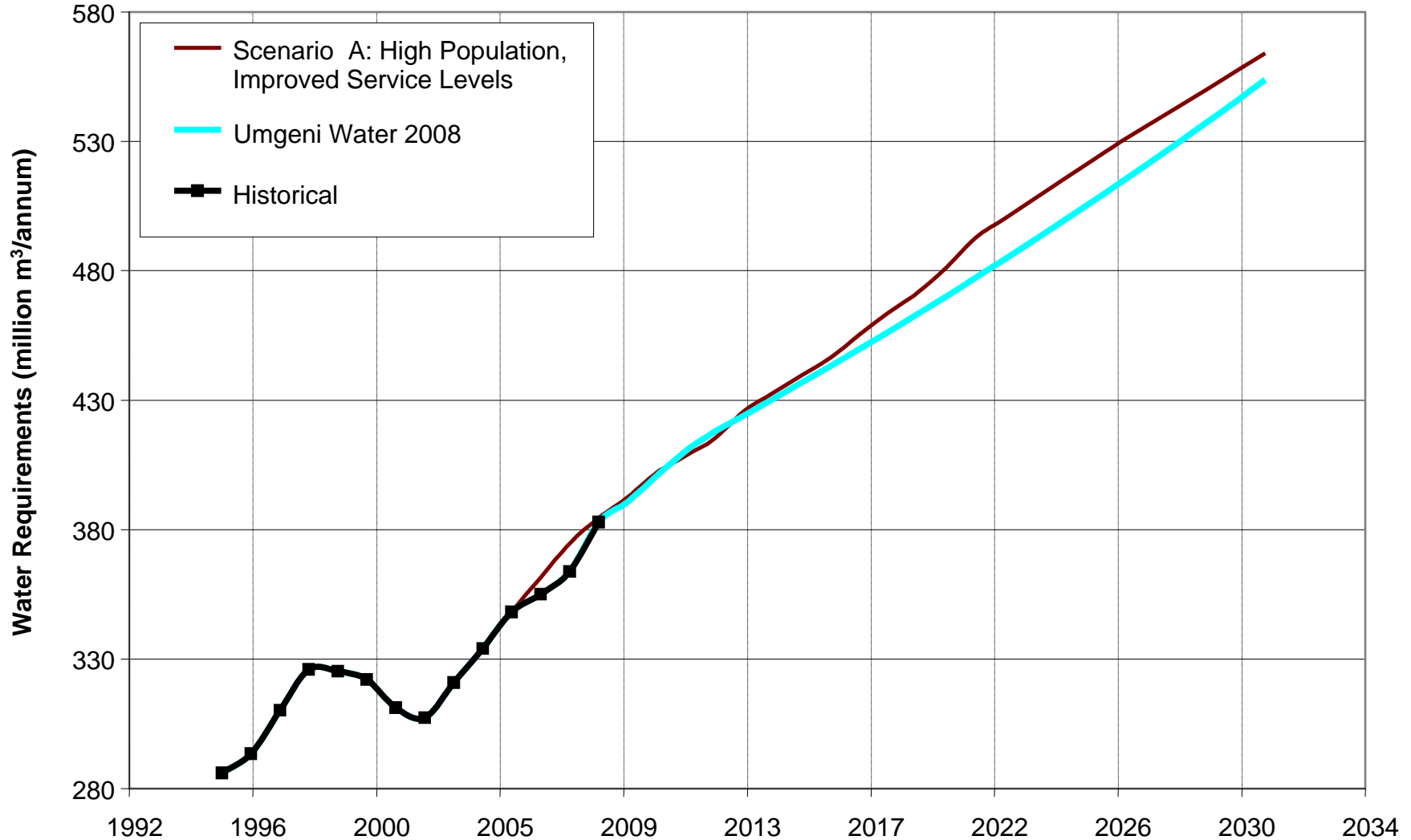
Current Water Supply Situation: Mooi- Mgeni River System

***(Results of Risk Assessment Undertaken by
Umgeni Water)***

Scenario Analysis Description

- **Basic Assumptions:**
 - **Umgeni Water 2008 Water Requirement Scenario.**
 - **Reservoir starting storages - 1 May 2008.**
 - **Basic Operating Rule from 1999 analysis.**
 - **Updated Mooi River System – 2005 study.**
 - **Drought curtailments – applying user priority definition.**

Mgeni System: Urban Water Requirement Scenarios



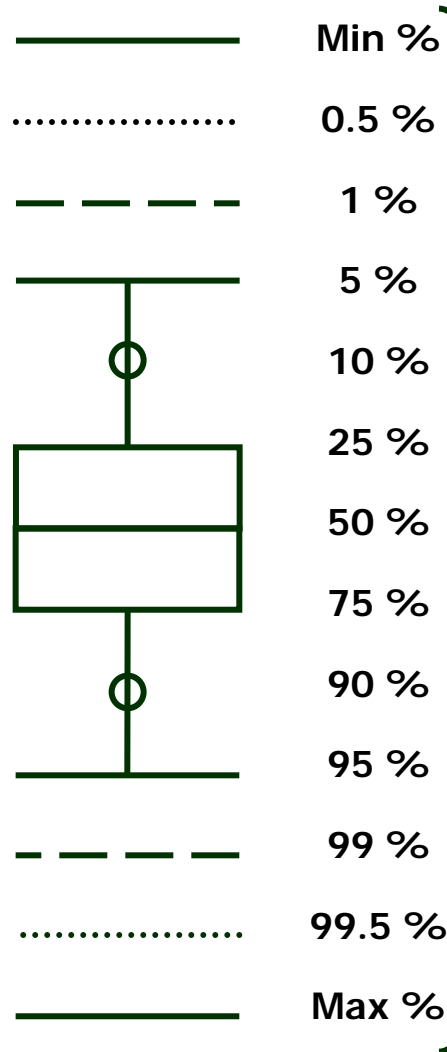
Scenario Analysis Description

- **Scenario A:**
 - **No curtailments implemented.**
 - **Determine timing and risk of supply failures.**
 - **Illustrate the need for curtailments.**
- **Scenario B:**
 - **Implementation of drought curtailment rule.**
 - **Objectives , to protect against failure in water supply (empty reservoirs)**

An aerial photograph of a large dam and reservoir. The dam is a long, low structure with a spillway on the right side. The reservoir is a large body of water with a sandy beach on the left side. The image is overlaid with a large, semi-transparent circular graphic that has a wavy, ripple-like pattern. The text "RESULTS FOR SCENARIO A" is centered over the image in a bold, orange, italicized font.

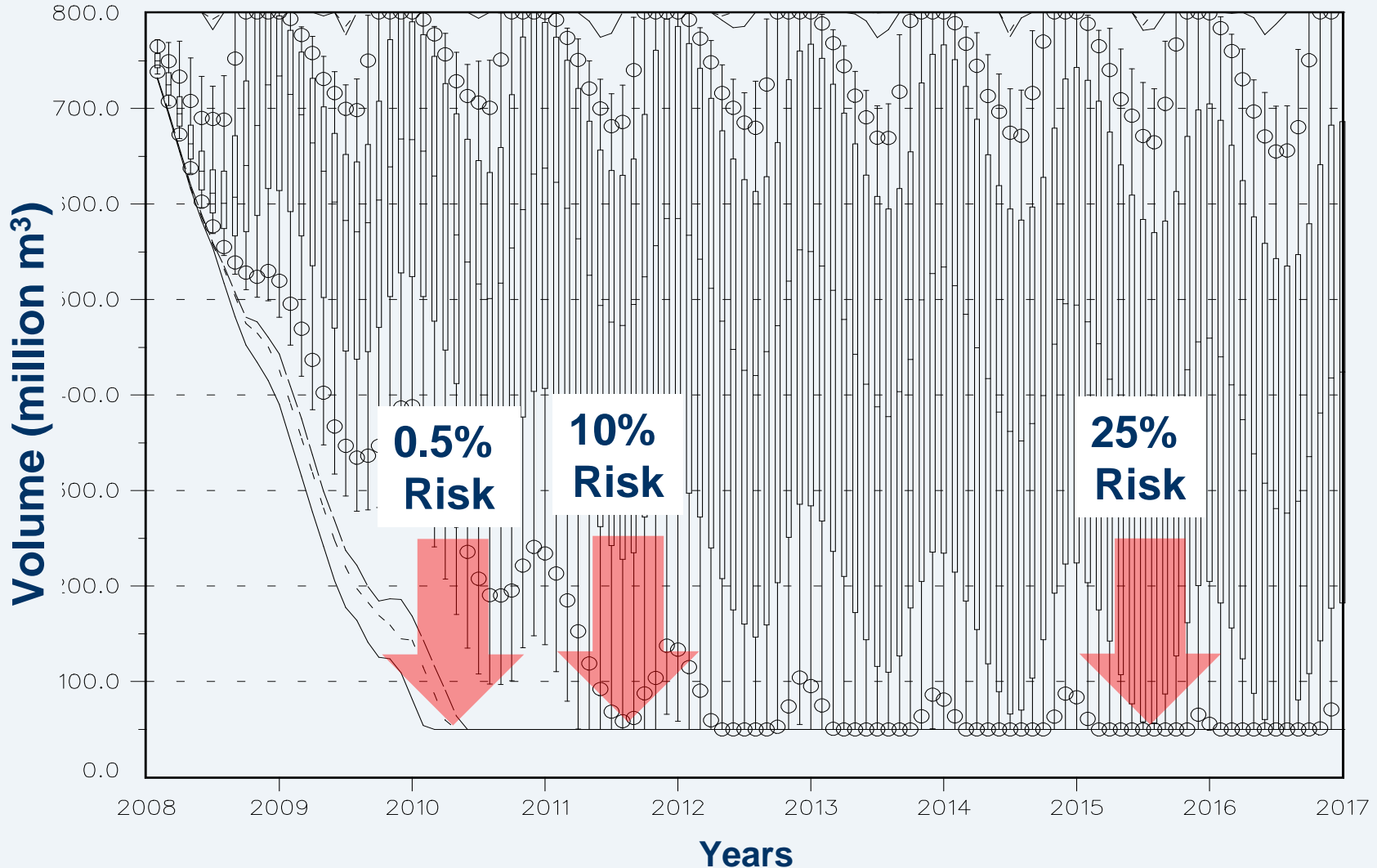
RESULTS FOR SCENARIO A

Definition of Box Plot



Percentage of
sequence results
exceeding given
value

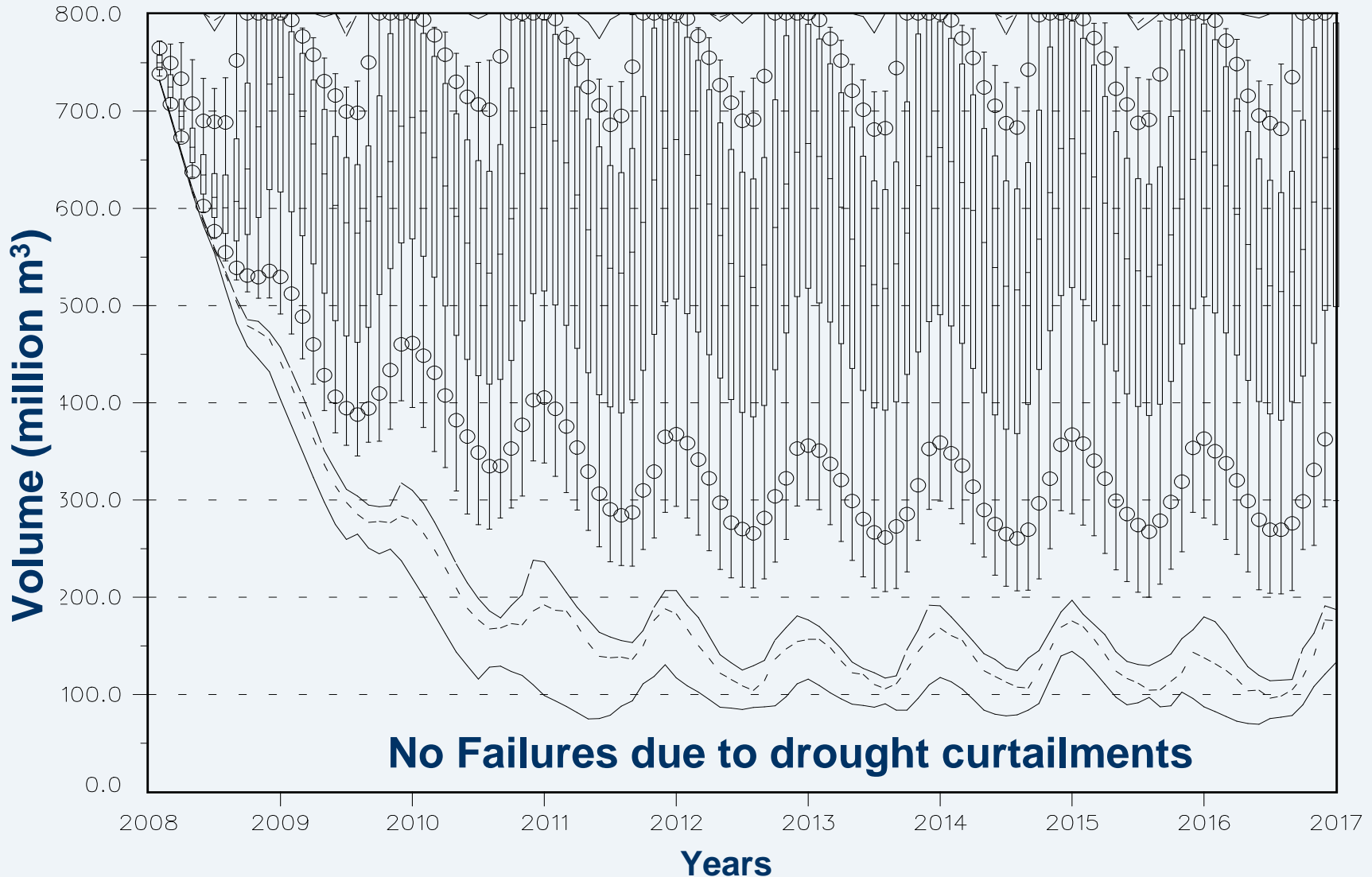
Mgeni System Reservoirs: Monthly Volume Projections - Scenario A



An aerial photograph of a large dam and reservoir. The dam is a long, concrete structure with a spillway on the right side. The reservoir is a large body of water extending to the left. The surrounding landscape is hilly and green. The text "RESULTS FOR SCENARIO B" is overlaid in the center of the image.

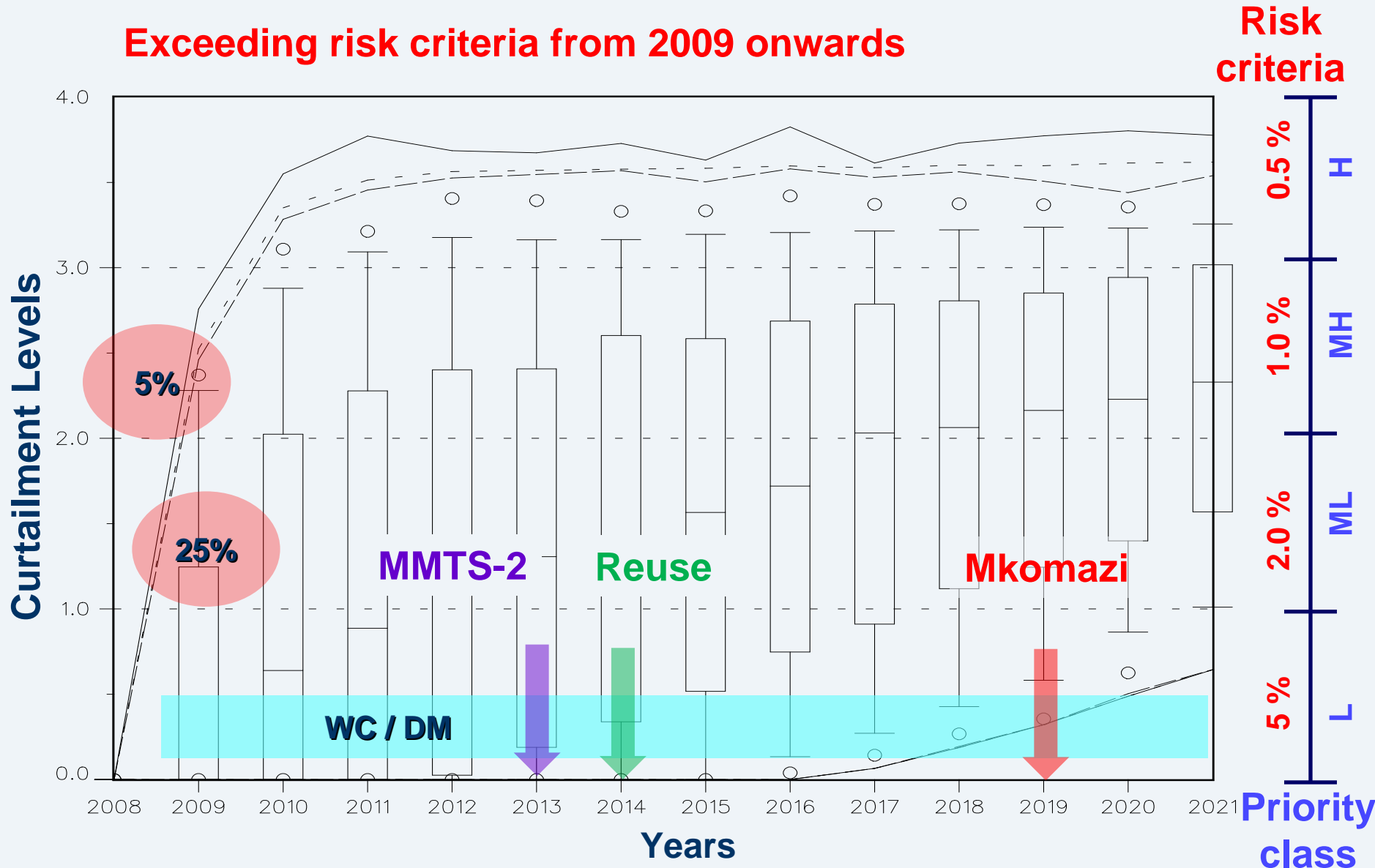
RESULTS FOR SCENARIO B

Mgeni System Reservoirs: Monthly Volume Projections - Scenario B



Mooi-Mgeni System: Curtailment Levels - Scenario B

Exceeding risk criteria from 2009 onwards



Interpretation of Curtailment Results

- **2009: 5% risk of a Level 2 curtailment - (23% of the water requirements)**
- **2010: 5% risk of a Level 3 curtailment - (30% of the water requirements)**
- **2011: 50% risk of a level 1 curtailment**
- **2017: 100% risk of curtailment**

Drought Restriction estimates for implementation May 2009

Percent of Mean Annual Runoff (MAR)	Percent of Demand Curtailed
79%	11%
60%	22%

An aerial photograph of a coastal region, showing a large dam structure with multiple spillways. The water is cascading down the spillways, creating white foam. The surrounding landscape includes green vegetation and a sandy beach area. The image is overlaid with a semi-transparent circular graphic on the left side.

***IMMEDIATE RESPONSE STRATEGY
FOR GROWING DEMANDS IN THE
KZN COASTAL METRO AREAS***

Proposed Action

Proposed Actions (1 of 4)

- 1. Constitute a System Operation Management Forum and promote active involvement in the operational management of the Mgeni and Mdloti river systems among the relevant institutions.**

Action: Regional Office

Timing: August 2008

- 2. Ethekwini and the other municipalities implement further WC/WDM measures. A detailed action plan must be developed urgently.**

Action: Ethekwini, Ilembe, Msinduzi

Timing: End 2008

- 3. Rainwater harvesting should be actively encouraged.**

Action: All

Timing: Ongoing

Proposed Actions (2 of 4)

- 4. Implement the Mooi-Mgeni Transfer Scheme (Spring Grove Dam and transfer system). The Department has recently directed the Trans-Caledon Tunnel Authority (TCTA) to implement Phase-2 of the Mooi-Mgeni Transfer Scheme (MMTS-2 - Spring Grove Dam and associated transfer infrastructure).**

Action: NWRIB/TCTA

Timing: Immediate

- 5. Complete the study on the raising of Hazelmere Dam and implement.**

Action: D: OA, NWRIB

Timing: Immediate

- 6. Implement the North Coast Pipeline for short term support to KwaDukuza and long term support to the Mdloti System (bi-directional pipeline).**

Action: Umgeni Water

Timing: 2009

Proposed Actions (3 of 4)

- 7. Commission a feasibility study of the Thukela and Mvoti systems for supply to the Northern Areas.**

Action: D: OA

Timing: Begin study January 2009

- 8. Commission a feasibility study for water re-use options for supply to the North Coast and Mgeni River System (consider current and future wastewater sources).**

Action: eThekweni Metro

Timing: Begin study January 2009

- 9. Proceed with the Feasibility Study of the Mkomazi River Transfer Scheme.**

Action: D: OA

Timing: Begin study January 2009

Proposed Actions (4 of 4)

- 10. Convert the Study Steering Committee into a Strategy Steering Committee as soon as the Reconciliation Strategy has been finalised.**

Action: D: NWRP and SSC

Timing: Immediate

Strategy Steering Committee

Objectives

- **To ensure that the scenario assumptions are monitored against actual data and that the strategy be updated accordingly;**
- **To monitor and co-ordinate the implementation of the interventions and related actions proposed in the strategy. (Include quantity and quality related measures);**
- **To recommend planning activities that will ensure reconciliation of requirements and available supply in the Mgeni and Mdlotu Systems supply area;**
- **To identify water quality related planning activities that are necessary to improve and sustain the water quality in the Systems.**

Proposed Functions of the SSC (1 of 2)

Strategy Steering Committee Functions	Water Resource Management Area
Monitor water requirements and return flows against the scenarios and recommend when updating of the scenarios are required.	Water Services
Monitor water quality at key locations in the system and recommend appropriate interventions.	Water Quality Management
Review the projected water balance of the system annually and recommend updates to the strategy.	Integrated Water Resource Management
Review the date when the decision should be taken to proceed with the implementation of an infrastructural augmentation scheme and advise DWAF accordingly.	Integrated Water Resource Management
Track Water Conservation and Demand Management Measures.	Water Use Efficiency
Liaise with provincial and local departments involved in development planning for alignment of strategies.	Development Planning and Scenario Alignment.

Proposed Functions of the SSC (2 of 2)

Strategy Steering Committee Functions	Water Resource Management Area
<p>Dissemination of information:</p> <ul style="list-style-type: none">• Establish annual liaison for information exchange.• Communicate reconciliation strategy information to political decision makers.• Liaison with System Operation Management Forum.• Present strategy to managers of institutions.• Provide information for DWAF and other institution websites.• Liaison with relevant Water Forums	Stakeholder Engagement
Establish supporting workgroups to fulfil administration and technical functions to the Strategy Steering Committee.	Institutional Support

Water Reconciliation Strategy Study for the Kwazulu-Natal Coastal Metropolitan Areas

Water Quality and Re-use Task

11 August 2008



Re-use WWTP effluent

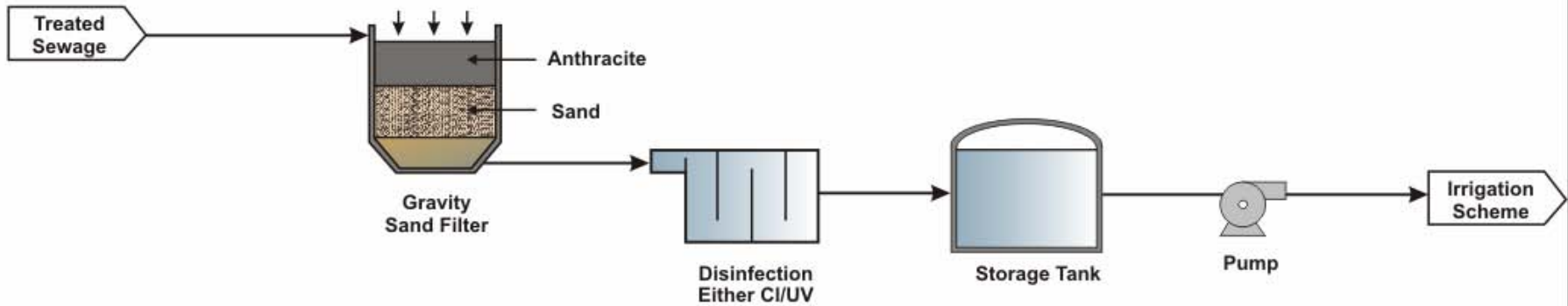
- **Considered three re-use cases**
 - **Re-use for irrigation**
 - **Removal of phosphorus to discharge into a dam for re-use**
 - **Treatment to potable standard for direct re-use**

Re-use WWTP effluent

- **Treatment technology for irrigation**
 - **Treated STP still contains pathogens**
 - **Protect farm workers against infection by water borne diseases**
 - **Foods that can be eaten raw (not processed)**
 - **Adopted a conservative approach**
 - **Filtration and disinfection**
 - **Need to remove SS so can disinfect**

Re-use - Irrigation

8783-001

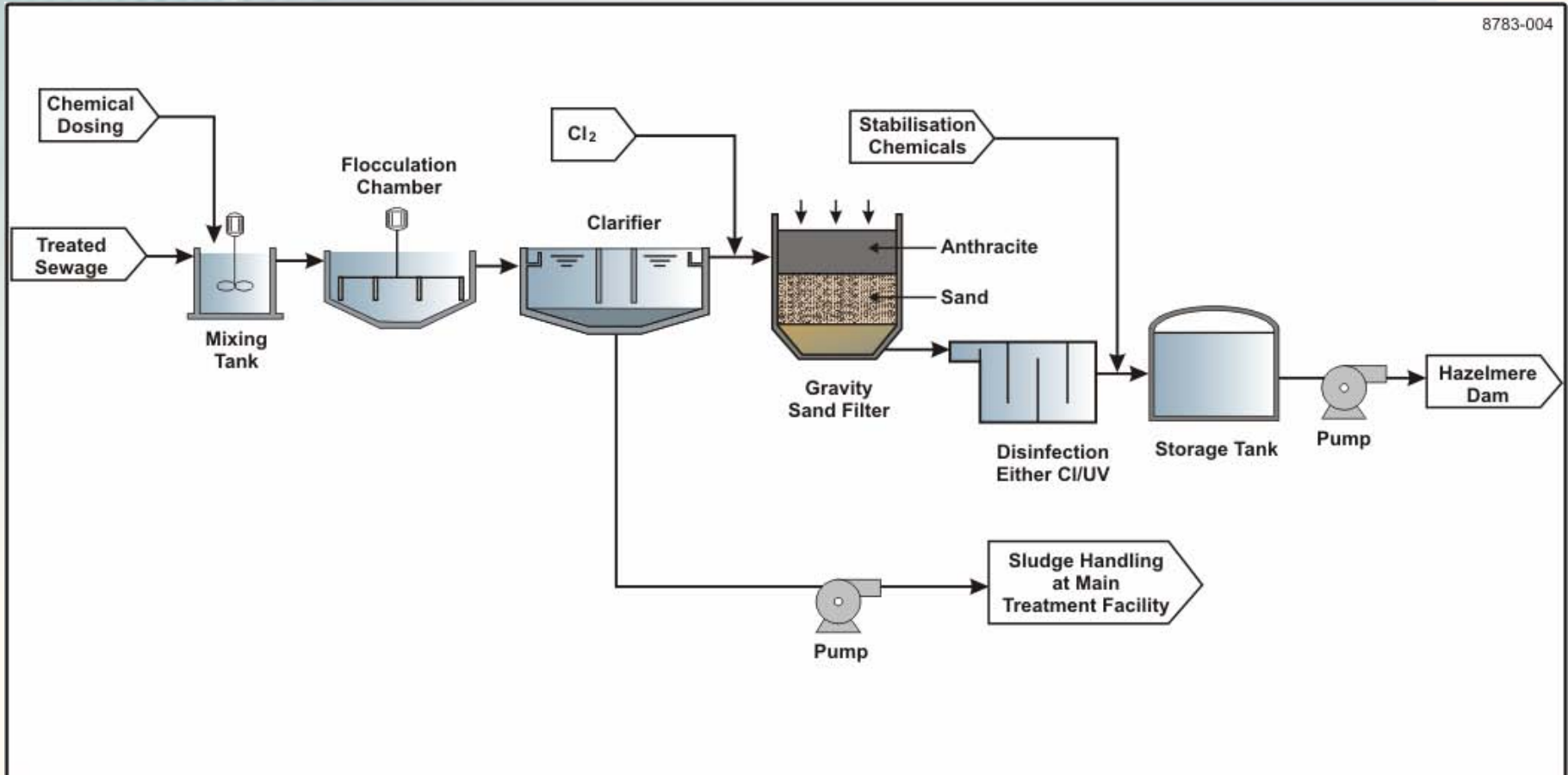


Re-use WWTP effluent

- **Treatment technology for discharge to dam**
 - **Remove P so that we do not change trophic status of dam**
 - **Originally costed to remove Phosphorus (P) to 0.1 mg/L**
 - **Initial assessment of impact on dams showed that trophic state changes from mesotrophic to eutrophic average P increases to above 0.025 mg/L**
 - **Need to increase P removal to 0.035 mg/L**
 - **Add extra chemicals and filtration step to improve to 0.035 mg/L**

Re-use WWTP effluent

8783-004

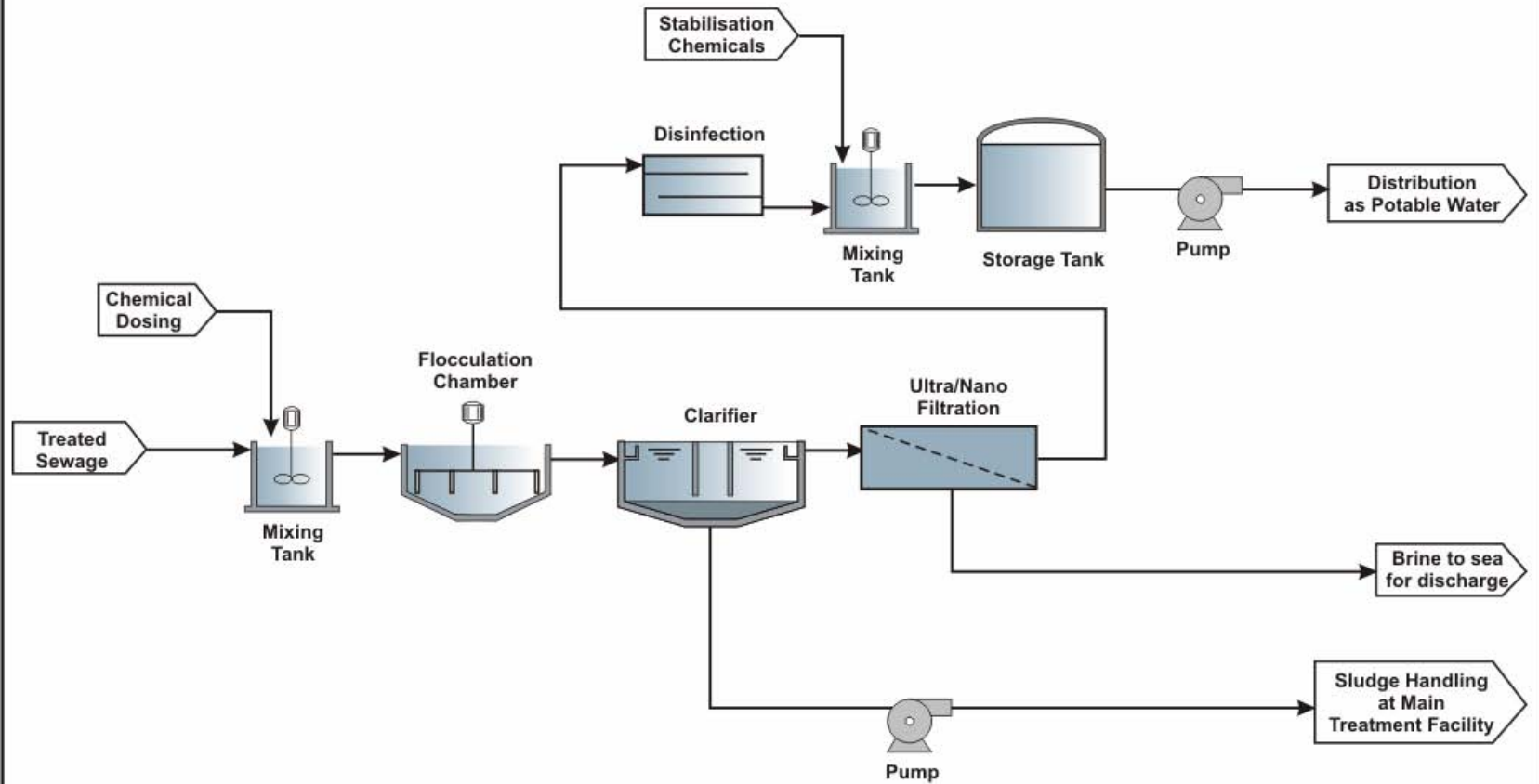


Re-use WWTP effluent

- **Treatment technology to potable standard for direct re-use**
 - **Industrial component should preferably be less than 10% of influent**
 - **Need to exclude organics/SS for disinfection (Trihalomethanes)**
 - **Exclude pathogens using multiple barriers**
 - **Produces brine which has to be disposed. Looking at disposal through the sea outfalls – Do not have costs at this stage therefore not included in URV**

Re-use WWTP effluent

8783-003



Re-use WWTP effluent

- **WWTP Analysed**

Plant	Capacity
Verulam	6.5 ML/d (2.4 million m³/a)
Tongaat Total	8 ML/d (2.9 million m³/a)
Phoenix	14 ML/d (5.1 million m³/a)
Kwa Mashu	63 ML/d (23.0 million m³/a)
Northern	54 ML/d (19.7 million m³/a)

Re-use WWTP effluent

- **Assumptions on cost calculations**
 - **WWTP are performing according to specifications**
 - **Costs are pre-feasibility level at +/- 20%**
 - **Costs in 2008 Rands**
 - **Costs do not include the supply infrastructure to deliver to users**

An aerial photograph of a large dam and reservoir. The dam is a long, low structure with multiple spillways. The reservoir is a large body of water with some rocky areas. The image is overlaid with a large, semi-transparent circular graphic that has a light blue and white gradient. The text is overlaid on this graphic.

***RE-USE ACTIVITIES OVERVIEW –
SECOND STAGE STRATEGY***

***Proposed Preparatory Work for Re-use
Feasibility Studies***

Proposed Scope for Second Stage

- **Audit WWTW selected for re-use in terms of infrastructure and consistency of performance**
- **Confirm industrial contribution to sewage**
- **Carry out a water quality profile on treated effluent-emerging pollutant types**
- **Refine conceptual design and costs**
- **Do some quantitative modelling on eutrophication impact on Inanda and Hazelmere Dams**
- **Assess salt buildup potential in system**
- **Include desalination results from Umgeni Water Study**
- **Design monitoring program if required**
- **Revisit estuary requirements if available**
- **Provide input to TOR for feasibility studies**

Preliminary thoughts on feasibility study TOR

- **Public participation in terms of re-use acceptance**
- **Run EIA started once sufficient project definition available**
- **Water use licencing**
- **More detailed design work on additional treatment at WWTW to get to +/- 10% costs**
- **Detailed modelling on receiving water dams**
- **Develop institutional models to run plants**

An aerial photograph of a large dam and reservoir, with a circular graphic overlay on the left side. The text is overlaid on this image.

RE-USE ACTIVITIES OVERVIEW – SECOND STAGE STRATEGY

***Involvement of Water Services Providers in
Re-use Investigations and Implementation***

(Meeting Discussion)