


VAAL RIVER STRATEGY STEERING COMMITTEE: 19 OCTOBER 2011

**IMPLEMENTATION
OF THE
VAAL RIVER SYSTEM
INTEGRATED WATER QUALITY MANAGEMENT
STRATEGY**

REPORT BY J.J. VAN WYK



1. IWQM STRATEGY IMPLEMENTATION

- 1.1 Strategy aim
- 1.2 WQ status & trends
- 1.3 Progress

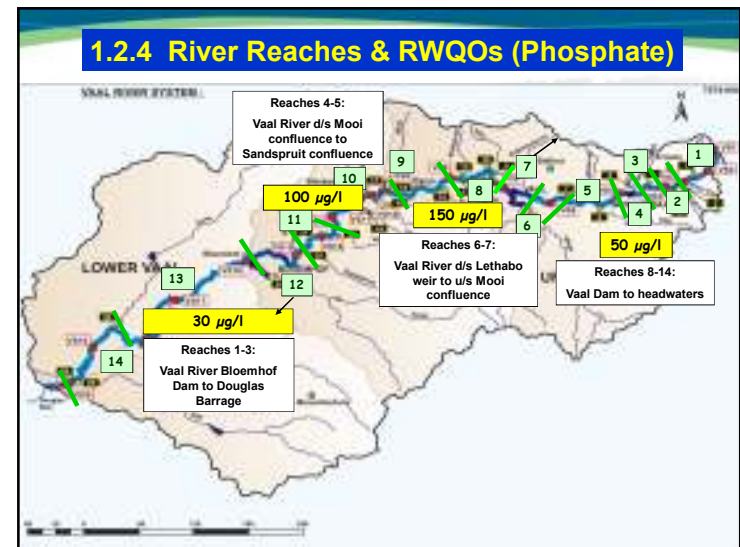
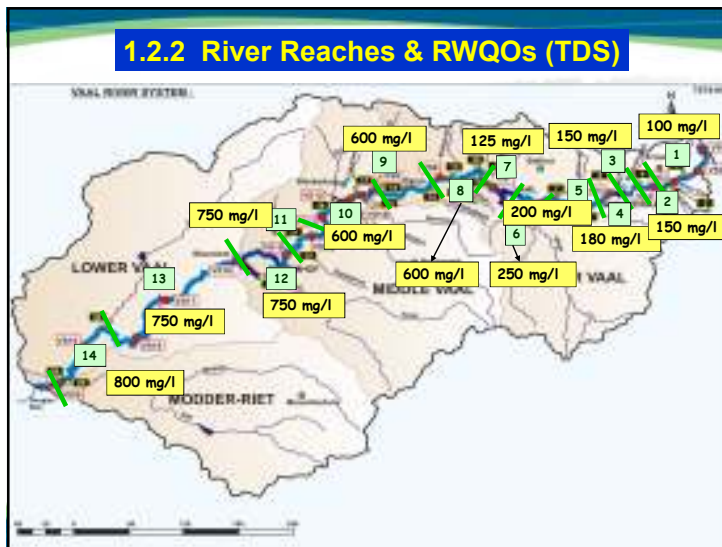
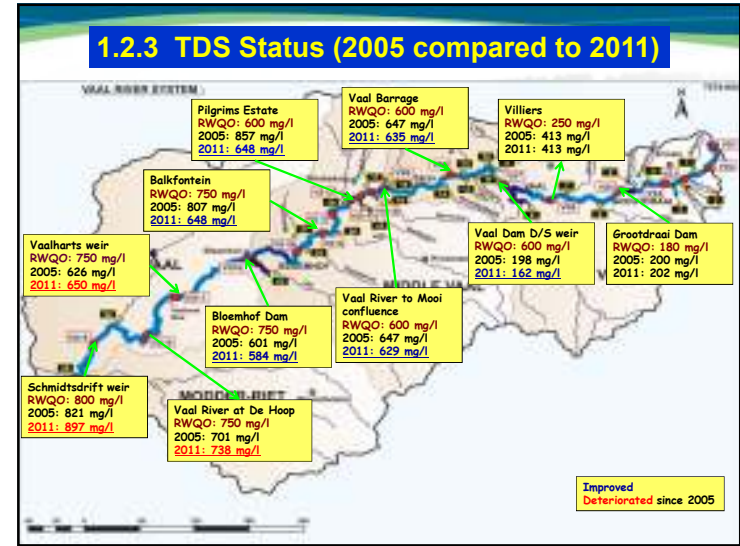
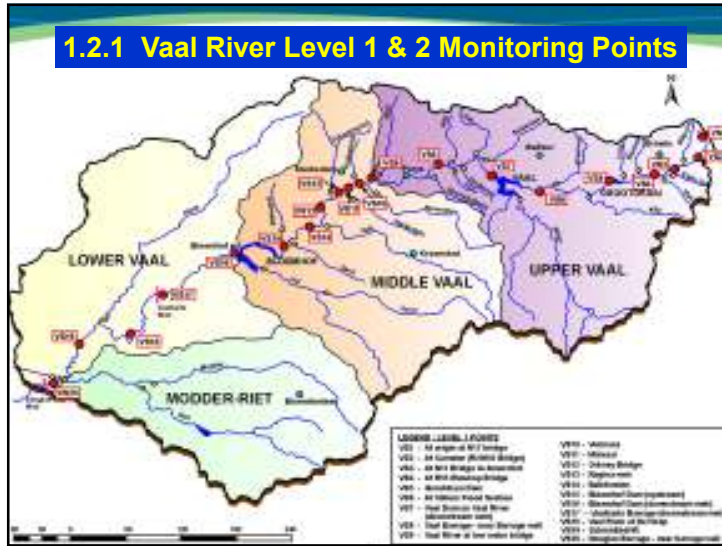
REPORT-BACK STRUCTURE

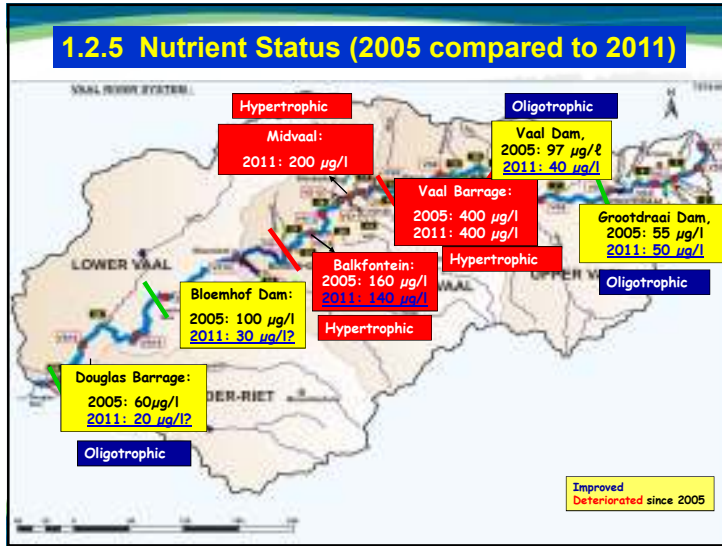
- 1. IWQM Strategy Implementation
- 2. AMD – Short-Term Interventions
- 3. AMD – Feasibility Study for a long-term solution

Progress since the last meeting:
13 April 2011

1.1 Strategy aim

- ▶ **Maintaining or improving the WQ** of the water resources within the System for the benefit of all recognized water users and beneficial water uses in order to assist in securing ecologically sustainable development, while also promoting justifiable social and economic development;
- ▶ Managing the water resources of the System in order to **comply with the determined integrated RWQOs**;
- ▶ Controlling the **salinity, eutrophication and microbiological contamination** levels in the System, and major tributaries, as the key WQ issues identified;
- ▶ **Improving source management** controls and measures as a means to limit and control point and diffuse sources that significantly impact on the water resources of the System; and
- ▶ Improving management of the water resources of the System by more effective **monitoring, assessment, reporting and management participation**.





2. AMD – SHORT-TERM INTERVENTIONS

- 2.1 Background & Introduction
- 2.2 Progress since Cabinet approved the “AMD Report”
- 2.3 Recent developments & progress
- 2.4 Update on mine water status per basin
- 2.5 Risk management
- 2.6 Way forward

(Marius Keet)

- ### 1.3 Progress
- Salinity Modelling;
 - IWQM Strategy for the Orange River Basin;
 - Acid Mine Drainage;
 - Mine water management (GN 704);
 - Waste Discharge Charge System (WDCS); and
 - Waste Discharge Standards.

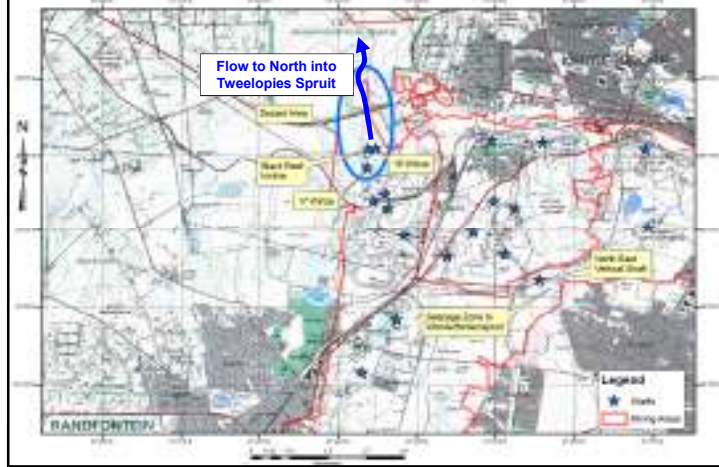
2.1.1 Background & Introduction

AMD Report entitled:

“Mine Water Management in the Witwatersrand Gold Fields with Special Emphasis on Acid Mine Drainage”

submitted to IMC on 15 December 2010 and approved by Cabinet on 9 February 2011

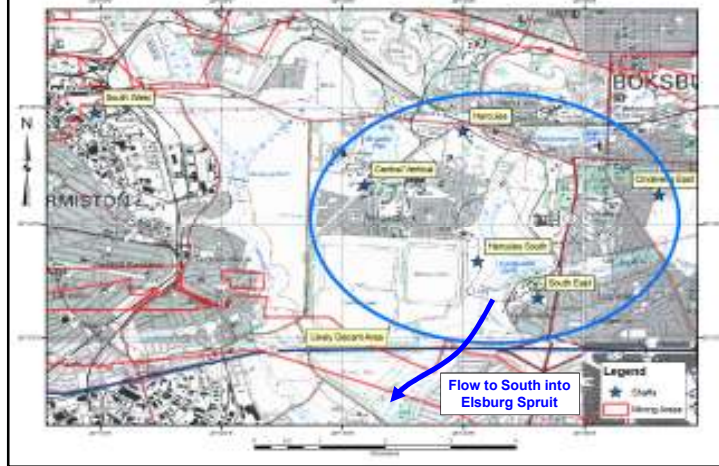
2.1.2 Decant points – Western Basin



2.1.4 Likely decant points – Eastern Basin



2.1.3 Likely decant points – Central Basin



2.2 Progress since Cabinet approved the "AMD Report" (1)

TCTA appointed on 6th April 2011 to:

- ✓ Install pumps for pumping underground mine water;
- ✓ Construct treatment plant in each Basin (consider upgrade of existing plants);
- ✓ Install infrastructure to convey treated water to nearby watercourses;
- ✓ Facilitate a model for operation of pumps and treatment plants (DWA to assume responsibility for operations & maintenance of pumps & treatment plants); and
- ✓ Establish institutional arrangements & processes to ensure meaningful participation.

2.2 Progress since Cabinet approved the "AMD Report" (2)

Discussions between DWA & TCTA with mining industry to:

- Assess available infrastructure;
- Understand situation per basin;
- Identify areas for co-operation;
- Evaluate potential solutions proposed by mining industry; and
- Explore potential for institutional arrangements & legal frameworks.

TCTA has appointed BKS Pty Ltd and Golder & Associates Africa to conduct a Due Diligence Review on available infrastructure and potential solutions.

2.3 Recent developments & progress (2)

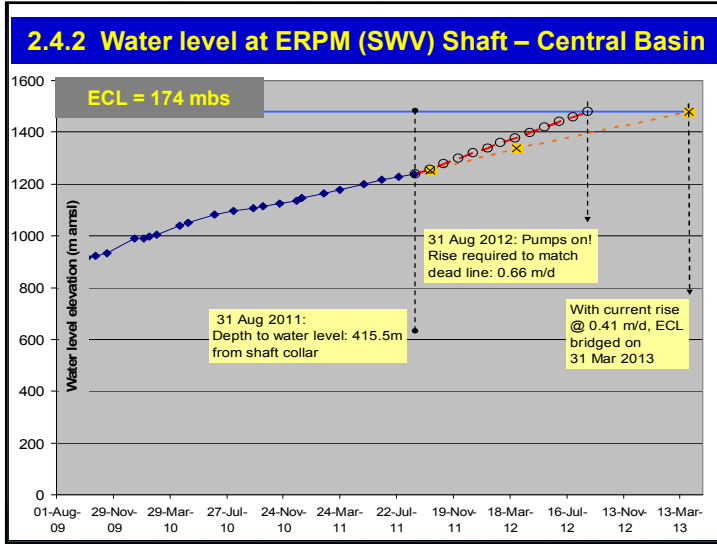
- Potential users for treated mine water identified in Western and Central Basins;
- DWA & TCTA have met with liquidators to understand the situation at the Grootvlei Mine (ex Pamodzi Gold) in the Eastern Basin;
- BA and EIA processes have commenced;
- Engagement with I & APs has commenced; and
- ECL finalized for all three Basins.

2.3 Recent developments & progress (1)

- ▶ TCTA concluded Due Diligence Review for all 3 Basins (7 Jul 2011);
- ▶ Short-term treatment solution for each Basin has been conceptualized;
- ▶ **Immediate (emergency) solution** approved for the Western Basin. Planned for commissioning by Nov - Dec 2011, and will improve discharge of treated mine water from 12 MI/day to 32 MI/day;
- ▶ **Short-term solution for Western Basin** at advanced stage of design. Immediate (emergency) solution and short-term solution will achieve combined output of up to 60 MI/day until ECL attained; and
- ▶ Surface and groundwater monitoring systems in place with further improvements/ expansion planned to support short-term interventions.

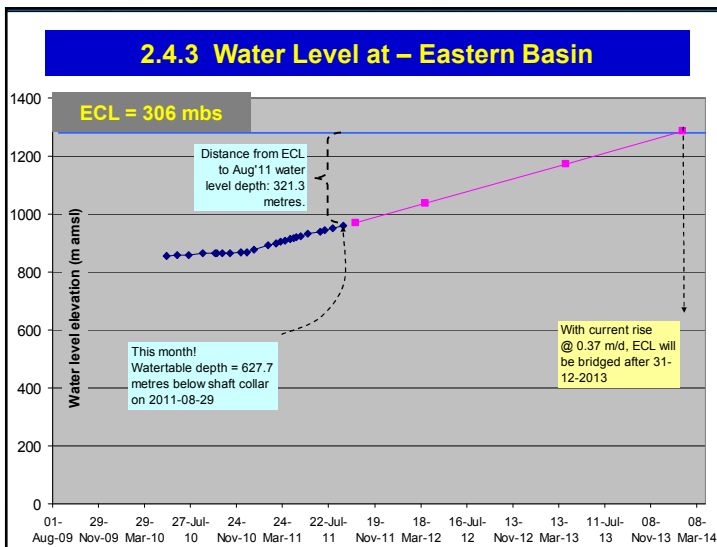
2.4.1 Current mine water status per basin

Basin	Mine water level (mbs)	ECL (mbs)	Estimated date to ECL
Eastern	628	306	Dec 2013
Central	415	174	Aug 2012 – Mar 2013
Western	At surface	160	ECL currently breached resulting in surface overflow



2.5 Risk management (1)

Risk / Challenge	Response
Budget	Request for funding submitted to NT R 924 million CAPEX required
Private sector exploiting potential solutions ("money-making")	Regulators to identify and manage according to legislation/ policies
Timeframes	TCTA formulated implementation plan with realistic target dates
Reputational risk	Media statements to keep public and key stakeholders informed
Identification of suitable entity to operate and maintain infrastructure	A Service Provider to perform operations and maintenance of short-term solutions will be appointed soon by means of a Directive.
Lack of reliable monitoring data	Monitoring Committee established to ensure strategic monitoring programmes to support interventions in all Basins



2.5 Risk management (2)

Risk / Challenge	Response
Regulatory matters (e.g. environmental authorisations/ EIAs/ water uses for implementing proposed solutions)	Authorities Task Team established to assist TCTA to review and expedite required authorisations
Mining industry distancing themselves from liabilities	<ul style="list-style-type: none"> DMR to ensure Regional Mine Closure Strategies are active Mines to revise EMPs to address environmental liability DWA to consider invoking Sections 19 and 20 of the NWA
Impact of neutralised mine water discharge into water courses. Also no costs recovered with discharge of neutralized mine water.	<ul style="list-style-type: none"> Impact similar to qualities discharged during periods of active mining Releases from Vaal Dam to ensure acceptable water quality By 2014, salt loading will be removed (Vaal Reconciliation Strategy) Users of neutralized mine water to be identified.

2.6 Way Forward

- ➔ Monitoring systems to be upgraded to assist with decision making;
- ➔ TCTA to implement immediate (emergency) engineering solutions in Western Basin;
- ➔ TCTA to implement short-term solutions in all 3 basins;
- ➔ Consultation with I&APS to be improved;
- ➔ Authorization process for all water users to be finalized;
- ➔ Feasibility Study for long-term use of Wits mine water should be speeded up. Appointment of PSP underway;
- ➔ Ensure proper engagement with Provincial and Local Government;
- ➔ Service provider to be appointed for operations and maintenance of short-term solutions;
- ➔ Reporting on progress to the IMC and Cabinet; and
- ➔ **Additional funding of R700 million required from National Treasury to ensure implementation of short term measures. (R225 million already available for 2011/12 and 2012/13).**

3.1.1 IWQM Strategy – Interim & Long Term (1)

Interim:

- Allows for the release of semi-treated AMD to the Vaal River system after neutralisation & metal removal;
- Dilution releases required from Vaal Dam to comply with the 600 mg/l TDS operating rule set for the Vaal Barrage;
- “Dilution water” used downstream;
- **However, the interim scenario will not be sustainable in the long run !!!**

3. AMD – FEASIBILITY STUDY FOR A LONG TERM SOLUTION

3.1 IWQM Strategy – Interim & long-term

3.2 The “hard reality”

3.3 The short-term solution

3.4 Character of the ideal solution

3.5 Envisaged study

3.6 Conclusion

3.1.2 Vaal River system transfers & return-flows

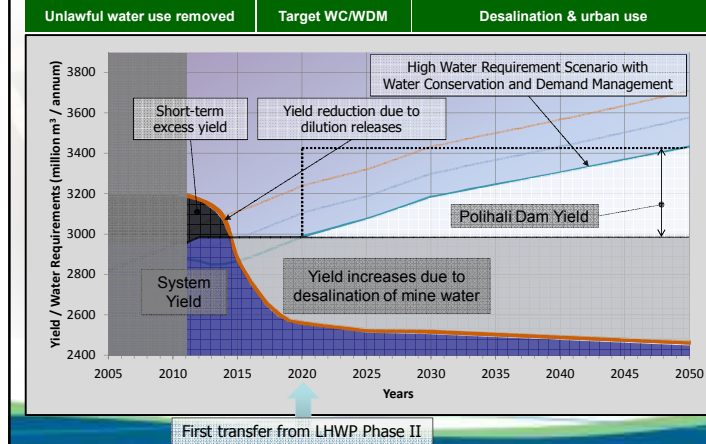


3.1.3 IWQM Strategy – Interim & Long Term (2)

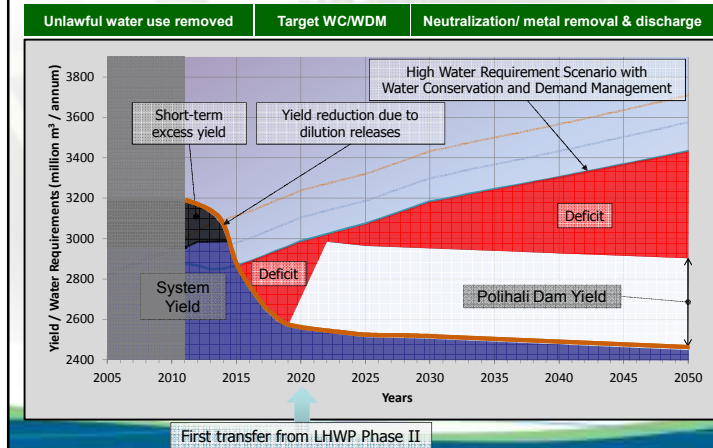
In the long run:

- The return flow volumes from WWTWs are to steadily increase over time;
- Excess “dilution” water in the Vaal River main stem will build up in Bloemhof Dam;
- Salt loading to be curtailed, by first removing the AMD induced salinisation;
- Lowering the demand for dilution releases; &
- Delaying the implementation of costly future water supply augmentation options !!!

3.1.5 Vaal River system water balance: Long run



3.1.4 Vaal River system water balance: Interim



3.1.6 Modeling results: Cascading TDS values

Point	Scenario		RWQOs:TDS 95%tile (mg/l)
	A	B	
Vaal Barrage	825	569	600
Midvaal off-take	748	622	600
Sedibeng off-take	859	648	600
Bloemhof Dam	813	602	750
Vaal Harts Weir	832	629	750
Klipspruit	1240	596	600
Suikerbosrand	1075	651	650

- Scenario A (Interim) – Discharge of semi-treated AMD to the Vaal River system after neutralisation & metal removal; &
- Scenario B (Long run) – Desalination of underground mine water and re-use.



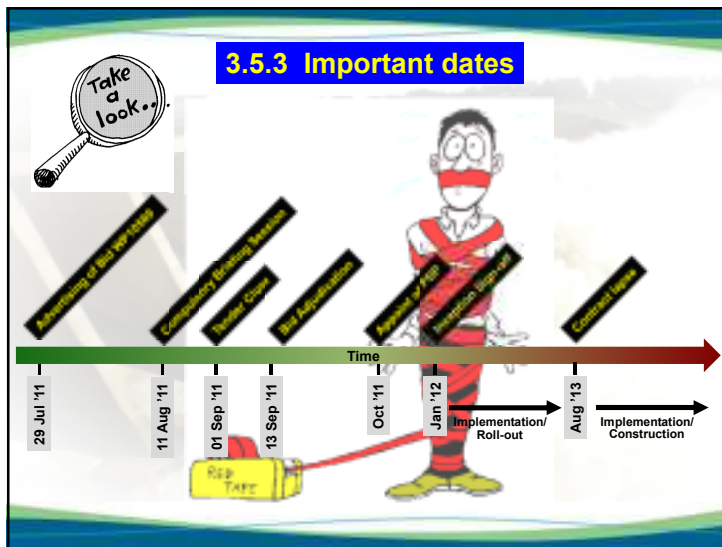
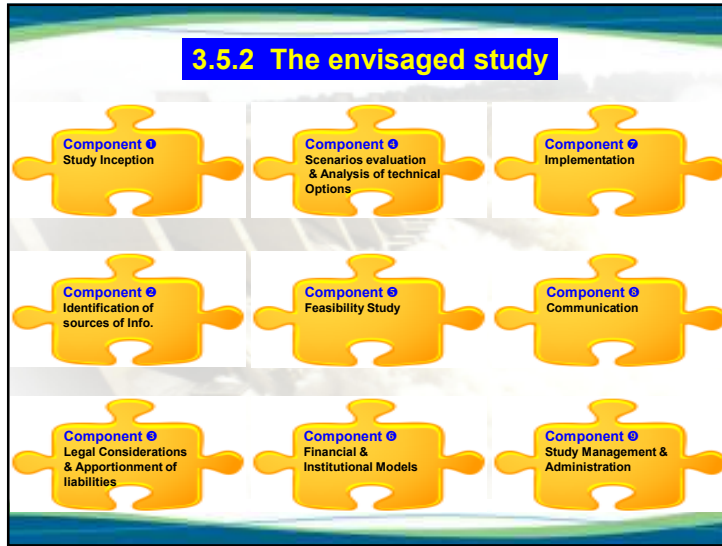
- ### 3.4 Characteristics of the ideal solution
- ☺ Suitable technology;
 - ☺ Limited waste products (preferably with an economic value);
 - ☺ Eliminate underground mine water related salt-loading;
 - ☺ Appropriate institutional model;
 - ☺ Appropriate economic model;
 - ☺ Financially sustainable (without a subsidy from the fiscus);
 - ☺ Legally sound;
 - ☺ Acceptable risk profile;
 - ☺ Public buy-in;
 - ☺ Social benefit;
 - ☺ Protect the environment;
 - ☺ Mechanism to facilitate mine closure; &
 - ☺ **"Self-sustainable" SOLUTION.**

3.3 The "Short Term" solution

→ Pump & Semi-treatment;
 → Budget allocation of R 225 Mil;
 → Estimate of ±R 900 Mil;

→ DBSA & IDC willing to fund;
 → Require a feasible financial model;
 → No Feasibility Study done yet !!!

- ### 3.5.1 Study goal
- 🎯 Consider the **short-term operational measures implemented up to study inception** in the study area;
 - 🎯 Do a **gap analysis and address short-term priority needs** in respect of water resource planning and management interventions as per the recommendations of the Team of Experts for the study area;
 - 🎯 Investigate and recommend a **feasible long-term solution** to the AMD problems emerging in the study area, in order to ensure long term water supply security and continuous fitness for use of Vaal River water.



- ### 3.6 Conclusion
- ▶ The proposed long term AMD strategy will:
 - Address the immediate risk of water restrictions;
 - Delay costly future augmentation schemes;
 - Promote efficient use of water; &
 - Improve water quality to meet the RWQOs in tributaries and Vaal River main stem;
 - ▶ The modelled water quality improvement is supported by observed improvements in water quality since pumping stopped;
 - ▶ **A feasible solution (technically sound, economically viable, institutional feasible, legally acceptable) needs to be sought as a matter of great urgency.**

