



# SELECT COMMITTEE ON LAND AND ENVIRONMENTAL AFFAIRS

## BRIEFING ON ACID MINE DRAINAGE IN THE GAUTENG PROVINCE

24 AUGUST 2010



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# Content of the Presentation

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- The Witwatersrand AMD Challenge
- Progress
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# Introduction

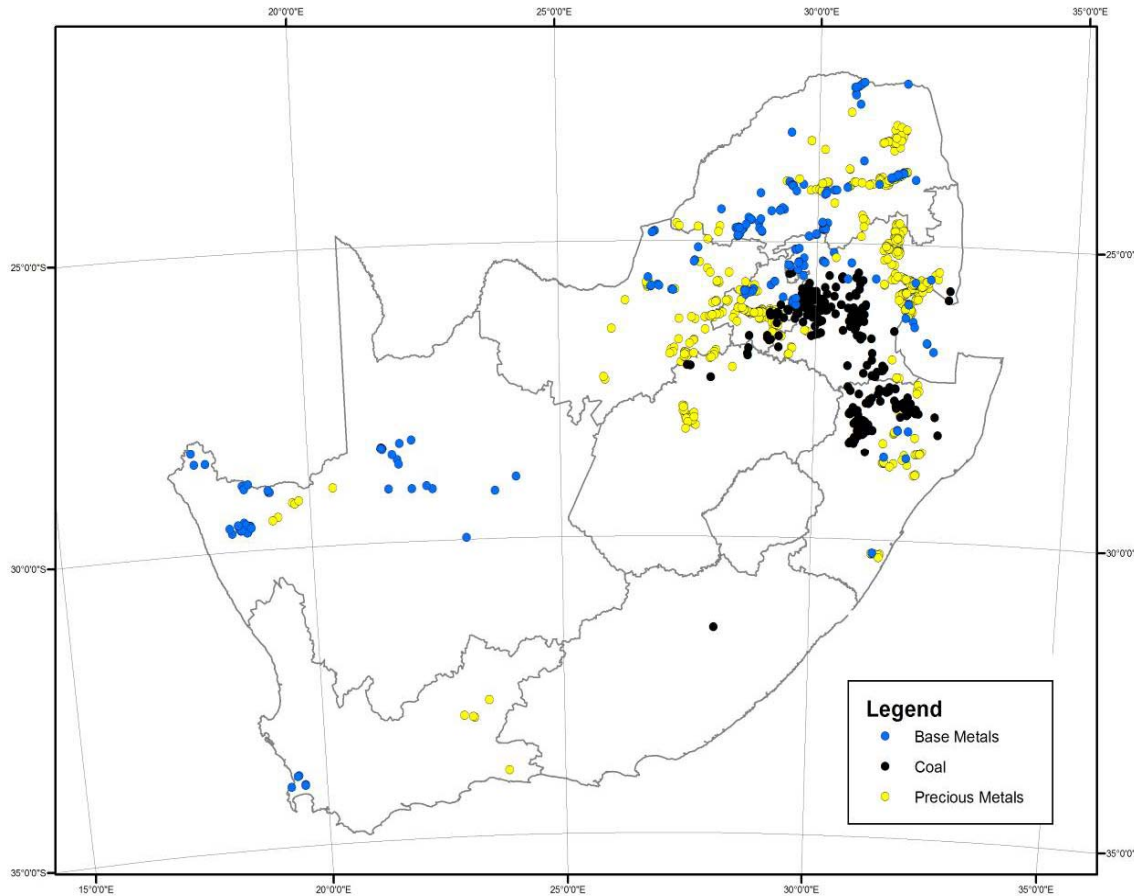
- Gold mining in SA started more than 100 years ago;
- De-watering to explore reserves;
- No legislation to protect water and environment
- 100 Years later gold reserves depleted;
- Re-watering taking place;
- Newly formed voids filling up;
- AMD formation;
- Integrity of geology; and
- Decanting.



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# Potentially AMD Producing Mines in South Africa



- Affected industries
  - Gold
  - Coal
  - Base metals
- Affected areas
  - Witwatersrand and other goldfields
  - Coalfields (Mpumalanga, KZN)
  - O’Kiep Copper District





# Concerns and Risks Associated with AMD (1)

- AMD associated with low PH, high sulphate, elevated levels of heavy metals, radio activity;
- Biggest environmental challenge ever;
- Negative impacts on quality of water resources (Ground and Surface); and
- Flooding and Decanting







# Concerns and Risks Associated with AMD

## (2)

- **Inter mine migration of mine water is threatening operational safety;**
- **Derelict and ownerless mines may become the responsibility of the state;**
- **Instability of geology (sinkhole formation);**
- **Seismic effects; and**
- **Negative effect on ecosystems, and**
- **Cradle of Humankind heritage site may be endangered.**





# The Witwatersrand Acid Mine Drainage Challenge



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# The Witwatersrand AMD Challenge

- **Witwatersrand divided into 4 underground Basins;**
- **Eastern Basin; Nigel to Germiston;**
- **Central Basin; Germiston to Roodepoort (including Johannesburg);**
- **Western Basin; Krugersdorp to Randfontein; and**
- **Far Western Basin; Westonarea to Carletonville.**

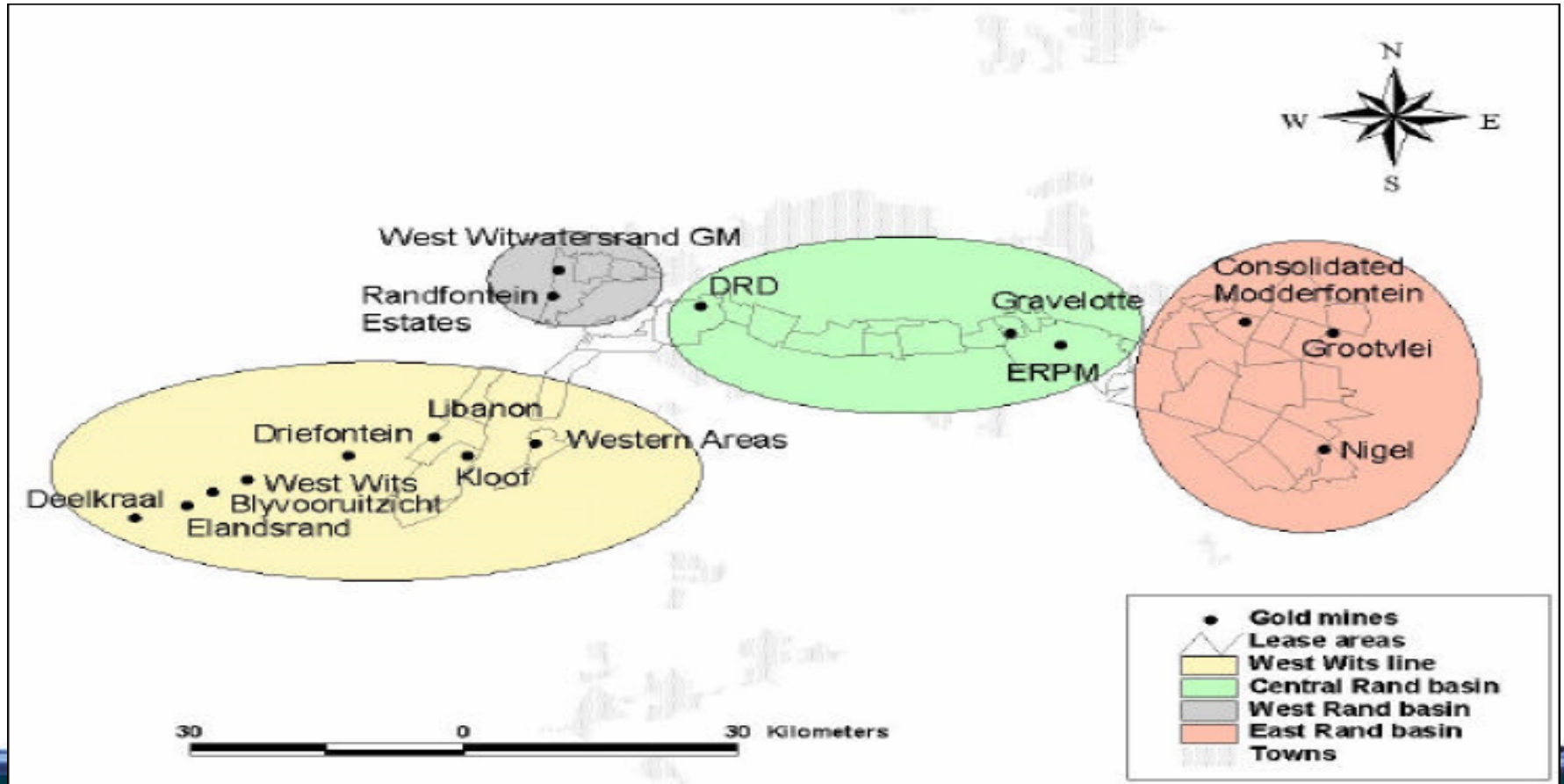


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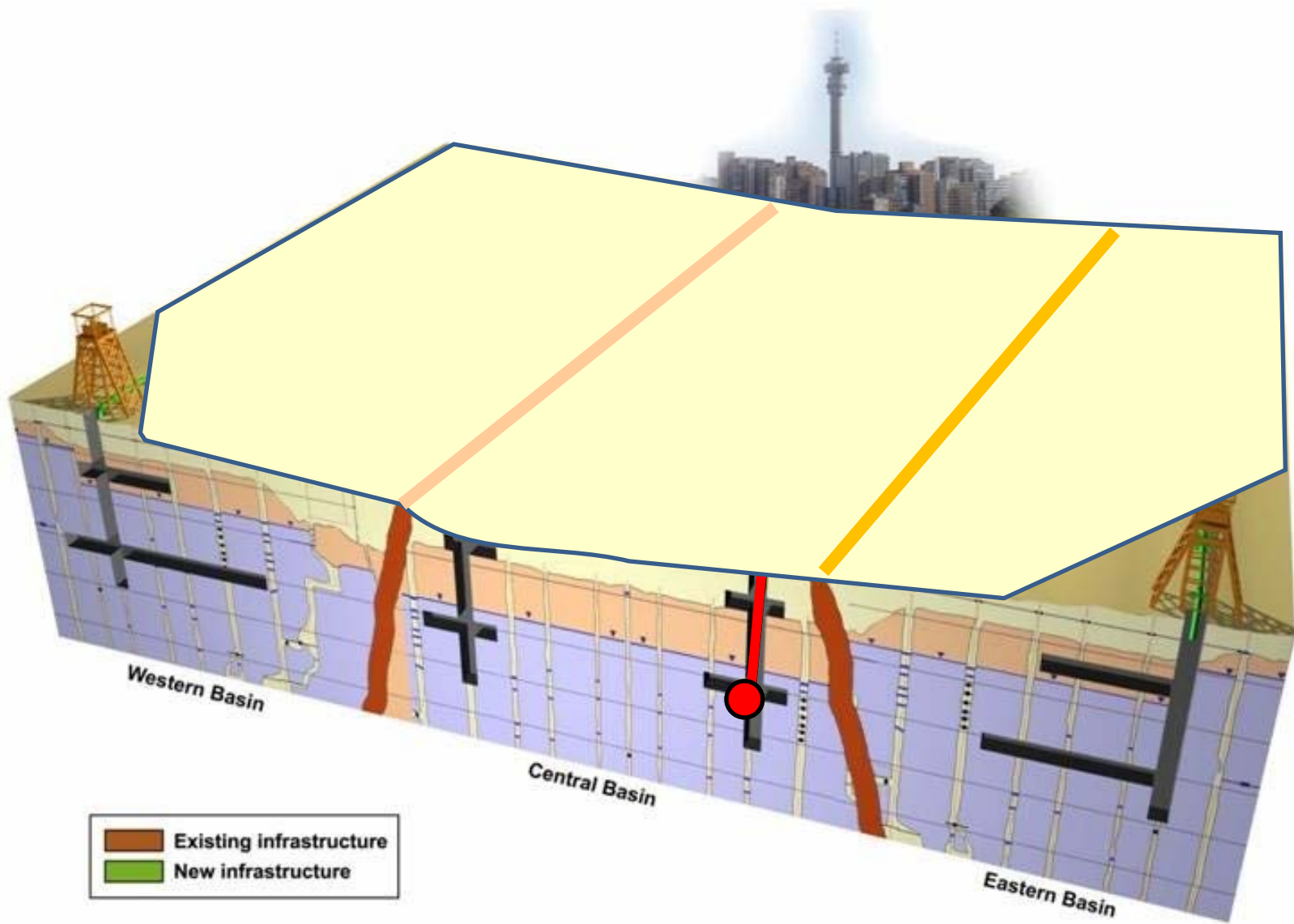
# Major Mining Basins in the Witwatersrand



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# The Big Picture





# Situation in the Eastern Basin (1)

- **Aurora Gold at Grootvlei the last mine pumping in the basin**
- **Water level is currently +/- 700 m below the surface but the basin is filling up due to insufficient pumping**
- **Financial problems are limiting pumping and treatment**
- **Pumping station can be flooded in 30 days if stopped**
- **Decanting then probable in the town of Nigel**



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## Situation in the Eastern Basin (2)

- Grootvlei Mine pumping 50 Mega liters per day (ML/d) (supposed to pump +/- 108 ML/d to maintain water balance)
- Erratic treatment taking place
- Wetland down stream of discharge point act as passive treatment system but only removing suspended solids<sup>12</sup>







## Situation in the Eastern Basin (3)

- Active monitoring by DWA (varying from daily-weekly) to assess situation
- The DWA has opened a criminal case against Aurora
- Matter under investigation by SAPS and DWA (Compliance Monitoring & Enforcement)





# Situation in the Central Basin (1)

- **Since October 2008 pumping has stopped due to safety risks**
- **Surface decant & groundwater contamination in 17 months**
- **Location of eventual uncontrolled future AMD is unpredictable**
- **Uncontrolled groundwater contamination and decanting below Johannesburg CBD will be impossible to contain**
- **Considerable damage and disruption could be caused if no intervention measures.**



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# Situation in the Central Basin (2)

- Rate of rise in Basin being monitored by mines and verified by Geosciences
- Seismic monitoring done by Geosciences
- Current rate of rise 0,35 metres per day but can go up to 0,9 metres in summer
- Water level in Basin 558 meters below surface on 13 August 2010 (measured at South West vertical)



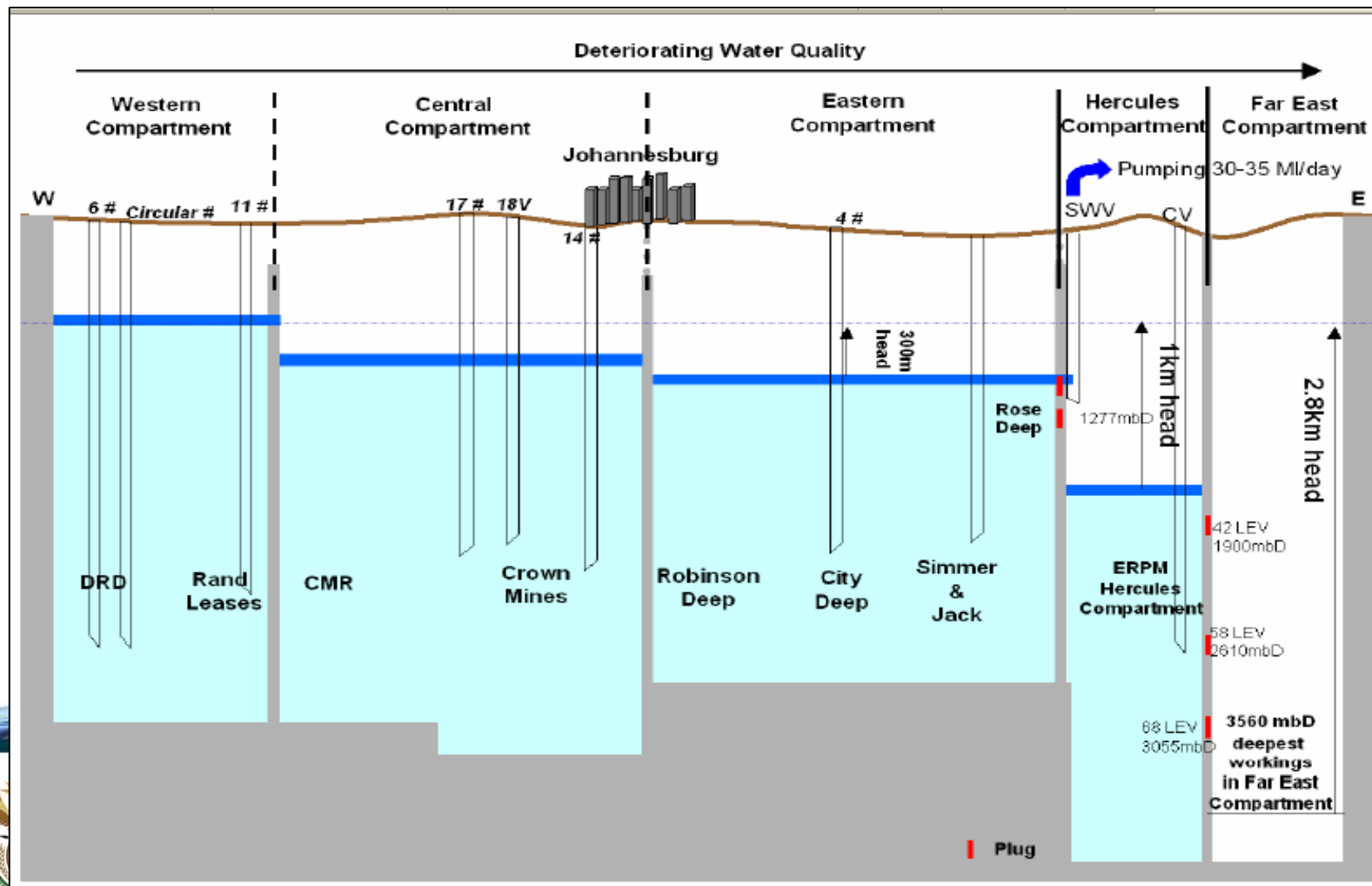


# Situation in the Central Basin (3)

- New pumping station and upgrades to the high density sludge treatment works are urgently required
- According to information available 13 Months lead time required to implement
- Mines would like to secure their reserves at 400 m below
- The Environmental Critical Level (water level determined to protect water and environmental resources) is recommended at 150 m below surface

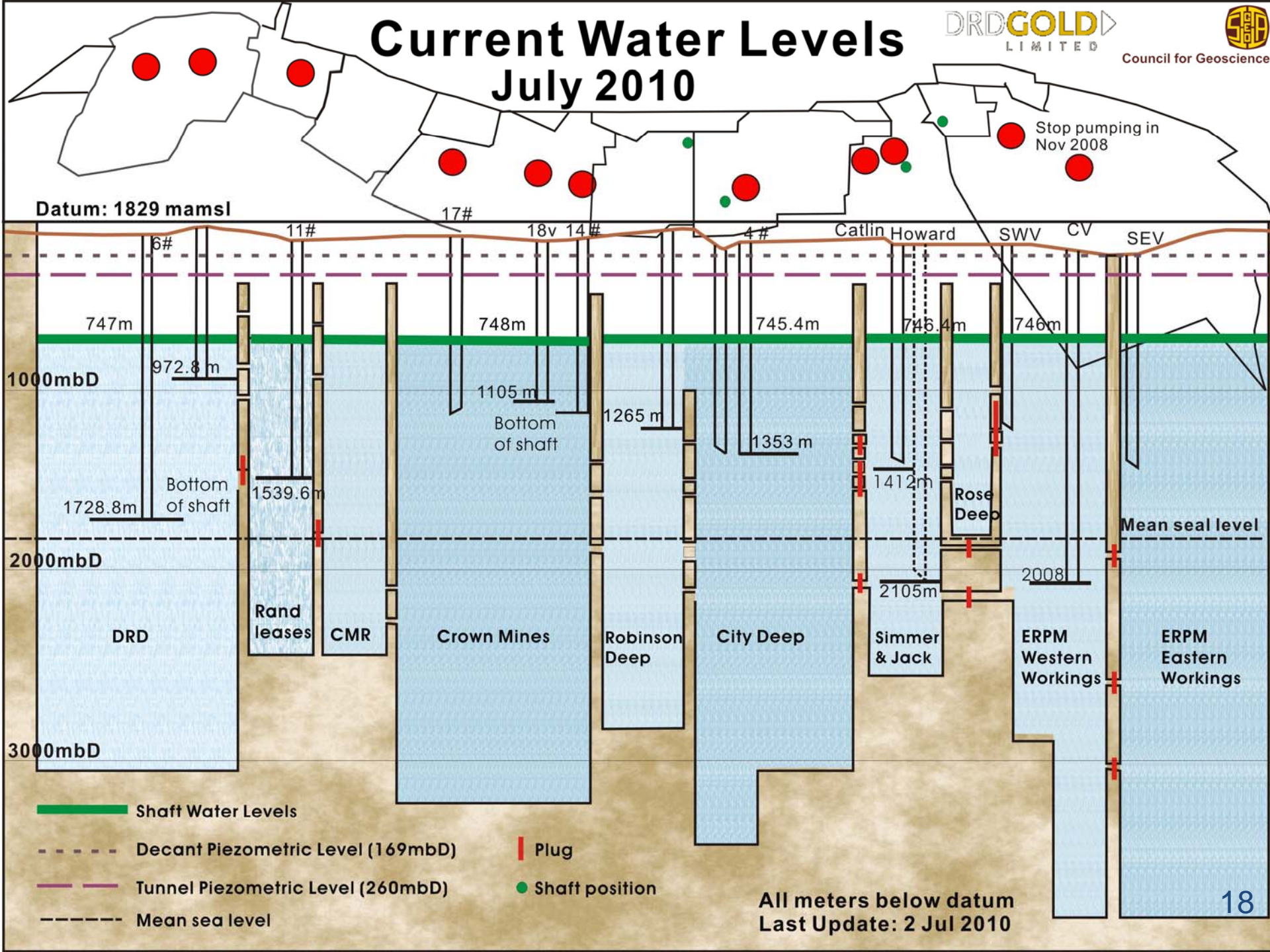


# Central Basin Water Levels During Pumping (pre-October 2008)





# Current Water Levels July 2010



Datum: 1829 mamsl

Stop pumping in Nov 2008

1000mbD

2000mbD

3000mbD

DRD

Rand leases

CMR

Crown Mines

Robinson Deep

City Deep

Simmer & Jack

ERPM Western Workings

ERPM Eastern Workings

Shaft Water Levels

Decant Piezometric Level (169mbD)

Tunnel Piezometric Level (260mbD)

Mean sea level

Plug

Shaft position

All meters below datum  
Last Update: 2 Jul 2010

# Situation in the Western Basin (1)

- AMD started decanting in 2002, mostly ownerless mines
- Department issued directives to pump and treat
- Only Rand Uranium and Mogale Gold are operational
- Pumping & treatment capacity limited to 12,5 MI AMD treated partially and discharged into Tweelopies Spruit per day
- Heritage site at Sterkfontein, “Cradle of Humankind” threatened.



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# Situation in the Western Basin (2)

- Heavy rains since January 2010 resulted in uncontrolled AMD decant of +/- 25 MI/d untreated AMD decanting into Tweelopies Spruit and polluting dolomites
- DWA intervened by allocating R6,9 M over three months period
- Lack of treatment capacity compelled in- stream (lime) treatment as short term intervention; and
- Resulting in sludge formation in Tweelopies Spruit.







# Situation in the Western Basin (3)

- Currently uncontrolled AMD decant of +/- 5 to 9 Mega liters per day channelized through wetland to reduce impact;
- Concerns about rainy season without any treatment of uncontrolled AMD into Tweelopies;
- DWA investigating solutions for interim treatment of uncontrolled decant from Western Basin.





# Progress (1)

- **Mines established section 21 companies to address AMD**
- **Mines through the Western Utilities Corporation (WUC) made a proposal to the GTT to address AMD management**
- **Proposal not accepted by DWA due to inter alia; financial support required to subsidize private company to enable profit making; and**



# Progress (2)

- **Mines requested to submit a new proposal to deal with short medium and long term sustainable solutions**
- **14 July 2010; Mines submitted new proposal to deal with AMD**
- **Proposal currently under review**



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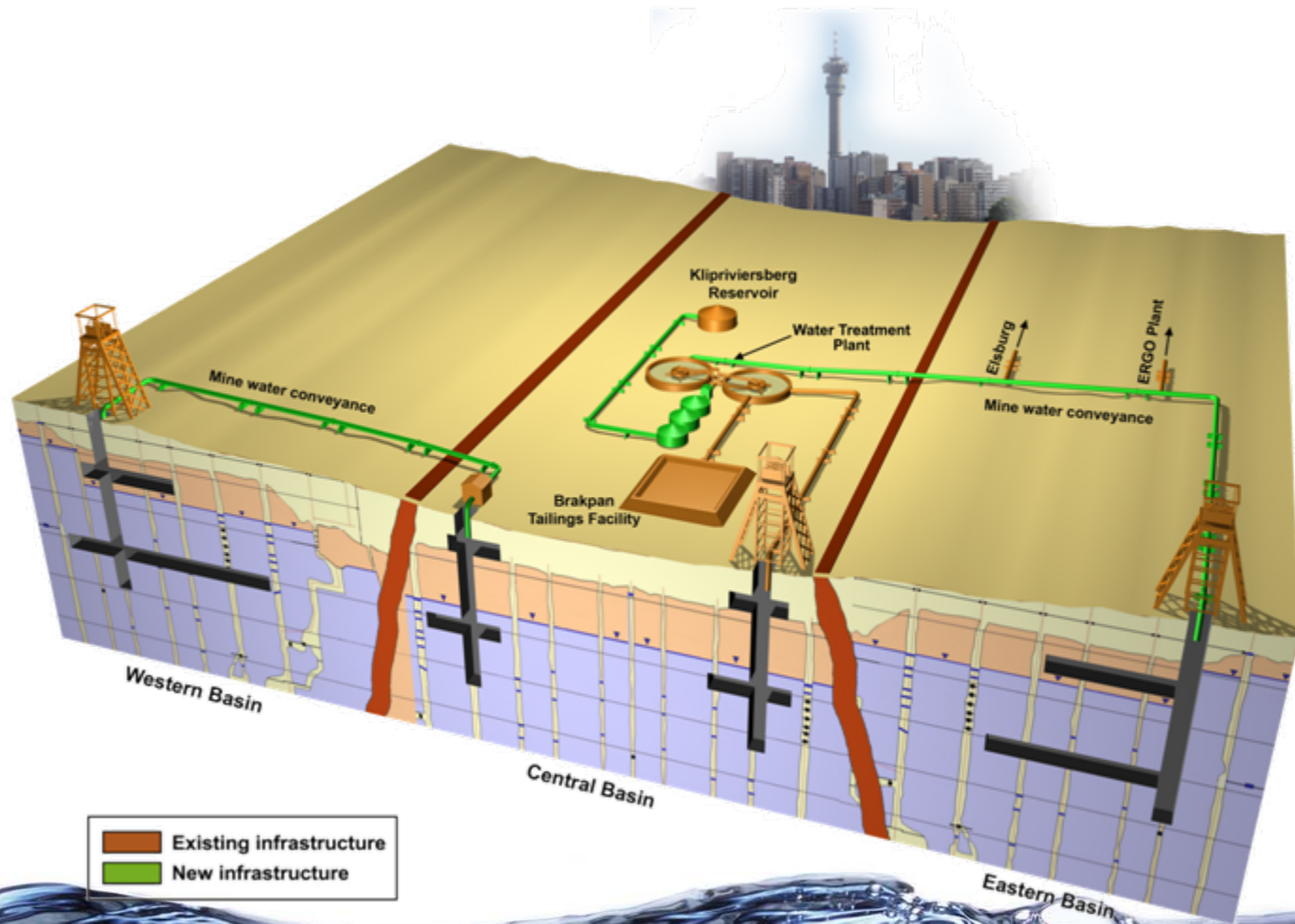
# Proposal under review (1)

- First emergency phase:
  - AMD to be pumped from the Western Basin via a short pipeline to the Central Basin
  - Pump station to be built in Central Basin
  - Existing dysfunctional central high density sludge treatment (HDS) works to be refurbished
  - Treatment to same level as before pumping ceased in 2008



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# Proposal under review (2)

- Emergency phase to be part of second / long term phase
  - Effluent to be treated to required or potable standards by 2014
  - This to ensure adequate water supply of acceptable quality in the Vaal River system
- First phase to be implemented as a matter of urgency to allow for the containment of the situation in protecting resources.







# Integrated Approach

- AMD challenge to be addressed by Mining Industry and Government collectively
- Minister requested a Centre of convergence
- Invitation to all relevant Ministers to discuss roles and responsibilities between Departments
- Ministers meeting to be scheduled within weeks
- Technical Task Team consisting of experts to be established.
- Cabinet endorsed the above approach.



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# Conclusion

- **Serious challenges to deal with AMD but involvement already on highest level.**
- **Collective decisions need to be taken faster. (integrated approach, centre of convergence)**
- **Effective monitoring to ensure pro-active intervention when required**
- **Partnership with mines to be well defined**
- **Ensure proper regulation**





# Thank You



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