




IS PARTIAL TREATMENT OF ACID MINE DRAINAGE WORTHWHILE UNDER THE PREVAILING CIRCUMSTANCES?

IAIA CONFERENCE

August 2014

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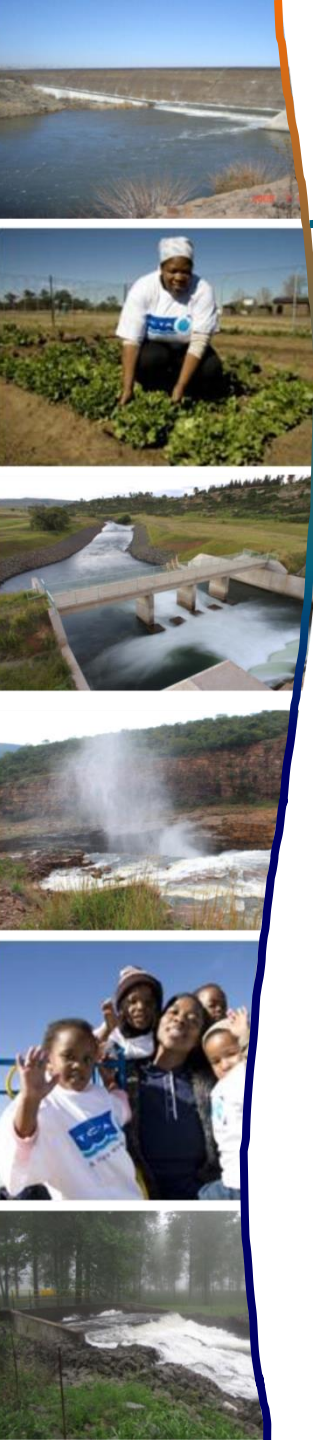
Content

- What is Acid Mine Drainage (AMD)
- Consequences of AMD on environment
- Where the problem is
- Response to the problem
- Treatment of AMD
- Progress at this point
- Link between short and long term



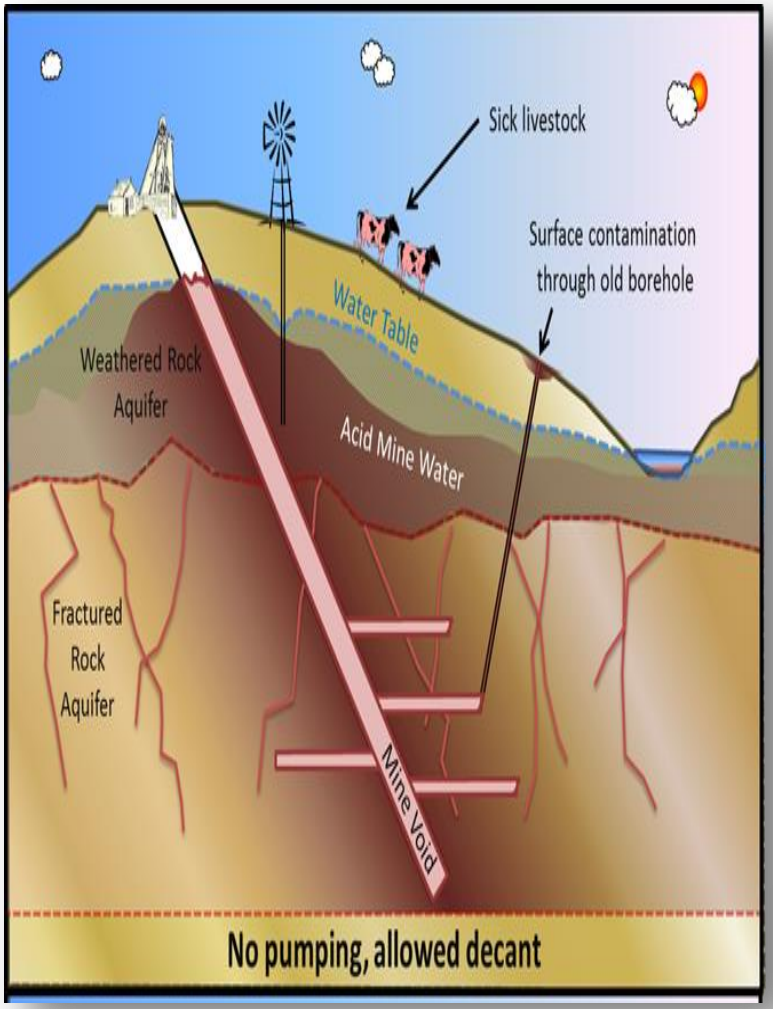
What is AMD

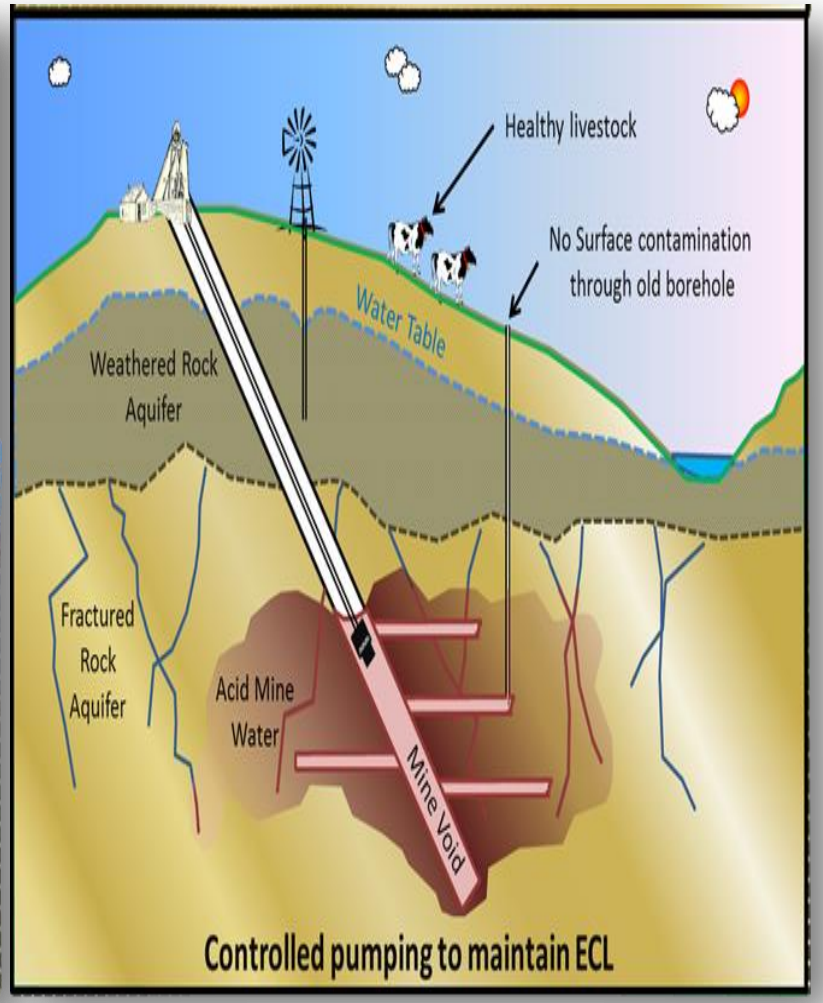
- 120 years of deep level gold mining which reduced and then ceased;
- From 1997 flooding of the mine voids;
- Acidification of the water through contact with the rock;
- Rising acidic water levels;
- Decant started in West Rand in 2002; and,
- Similar decant was anticipated in Central & Eastern Basins






What is AMD





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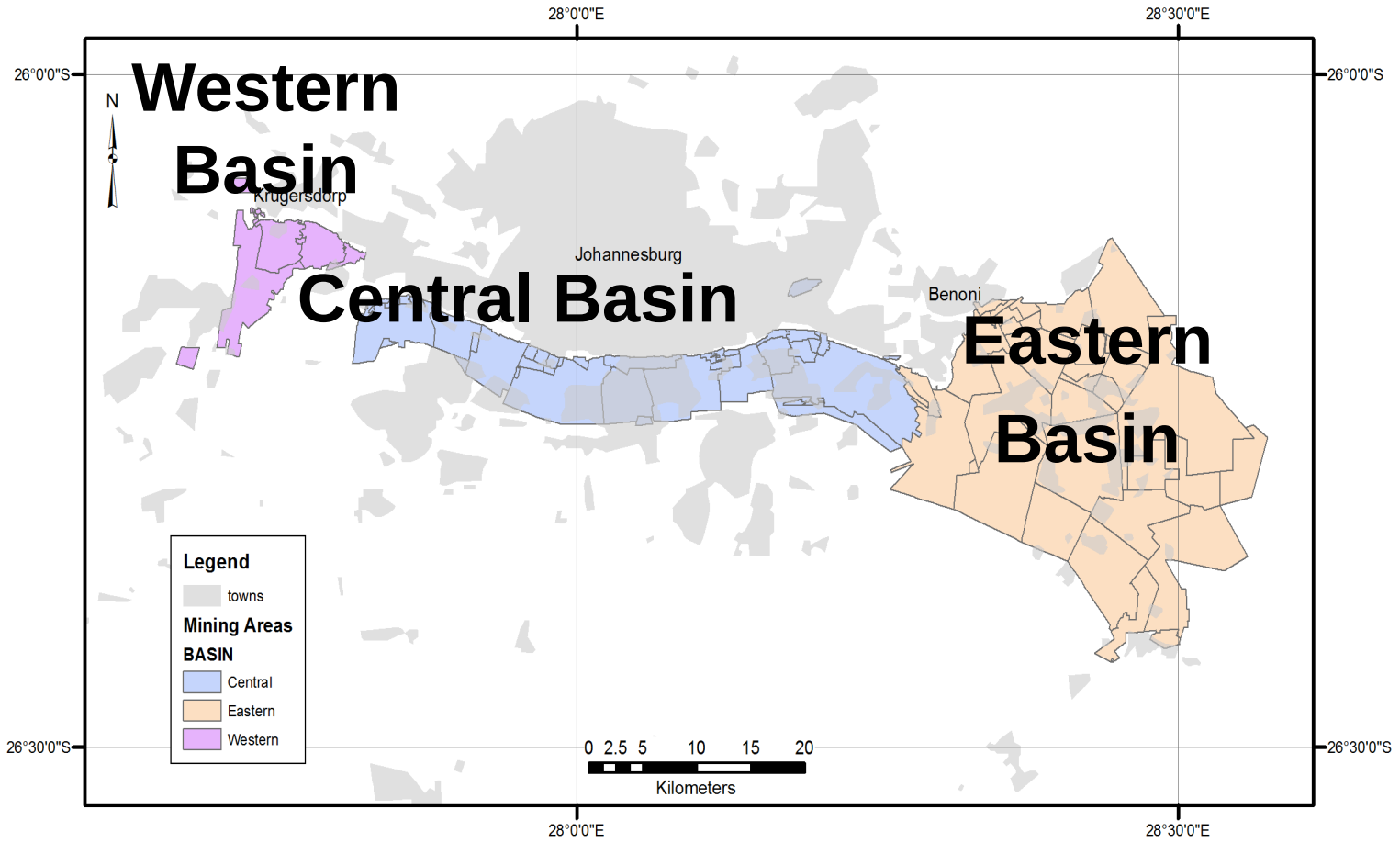
Consequences of AMD

- Contamination of groundwater resources
- Flooding of underground infrastructure
- Stimulation of seismicity
- Serious negative ecological impacts
- Regional impacts on major river systems
- Localised flooding in low lying areas






Where is the problem



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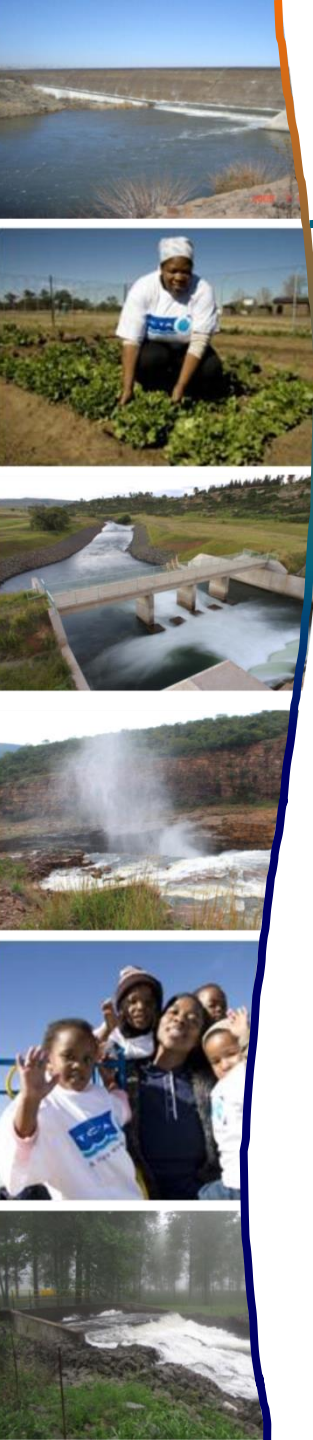
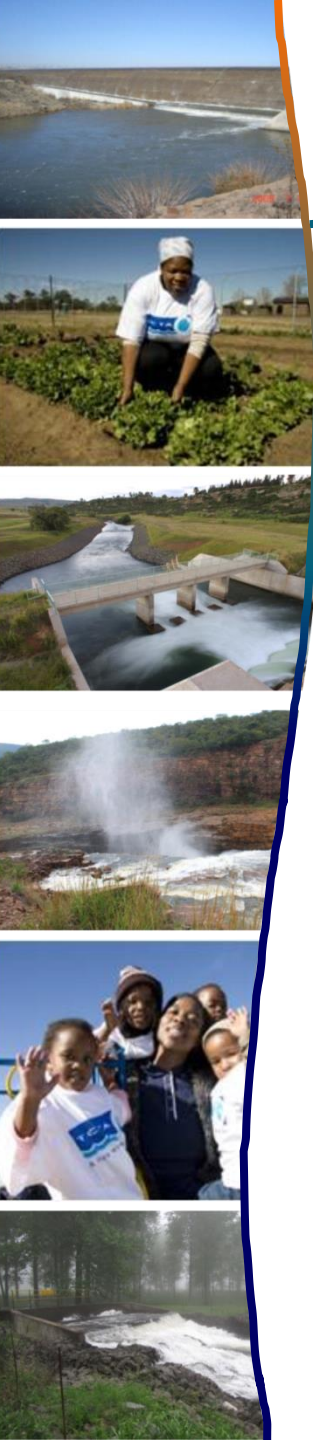


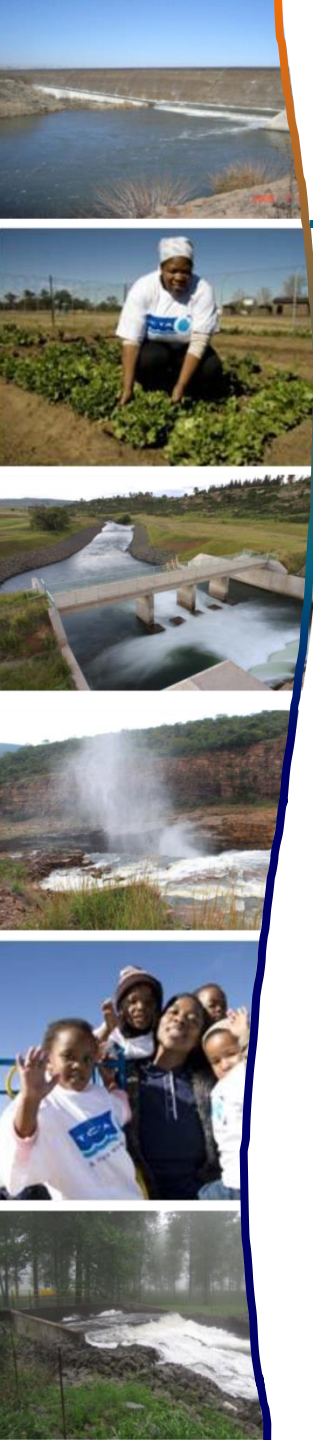
Response to the problem

- 2010 – Inter-Ministerial Committee (IMC) established
- Appointed a team of experts to investigate and make recommendations
- Draft report to Cabinet in February 2011
  - Series of recommendations
    - Implement immediate and short term interventions to pump and neutralise AMD



TCTA Directive

- Ministerial directive – 6 April 2011
- Emergency works in Witwatersrand gold fields comprising:
  - Installation of pumps
  - Construction of water treatment plants
  - Release treated water into river system
- Obtain environmental and regulatory approvals



Design Criteria

- Design lifespan
  - 30 to 50 years
- Low maintenance pumps
- Technology
  - High Density Sludge Plant (HDS)
- Plant capacity:
  - Cope with high inflows
- Site selection:
  - Accommodate long-term solution






Design Criteria

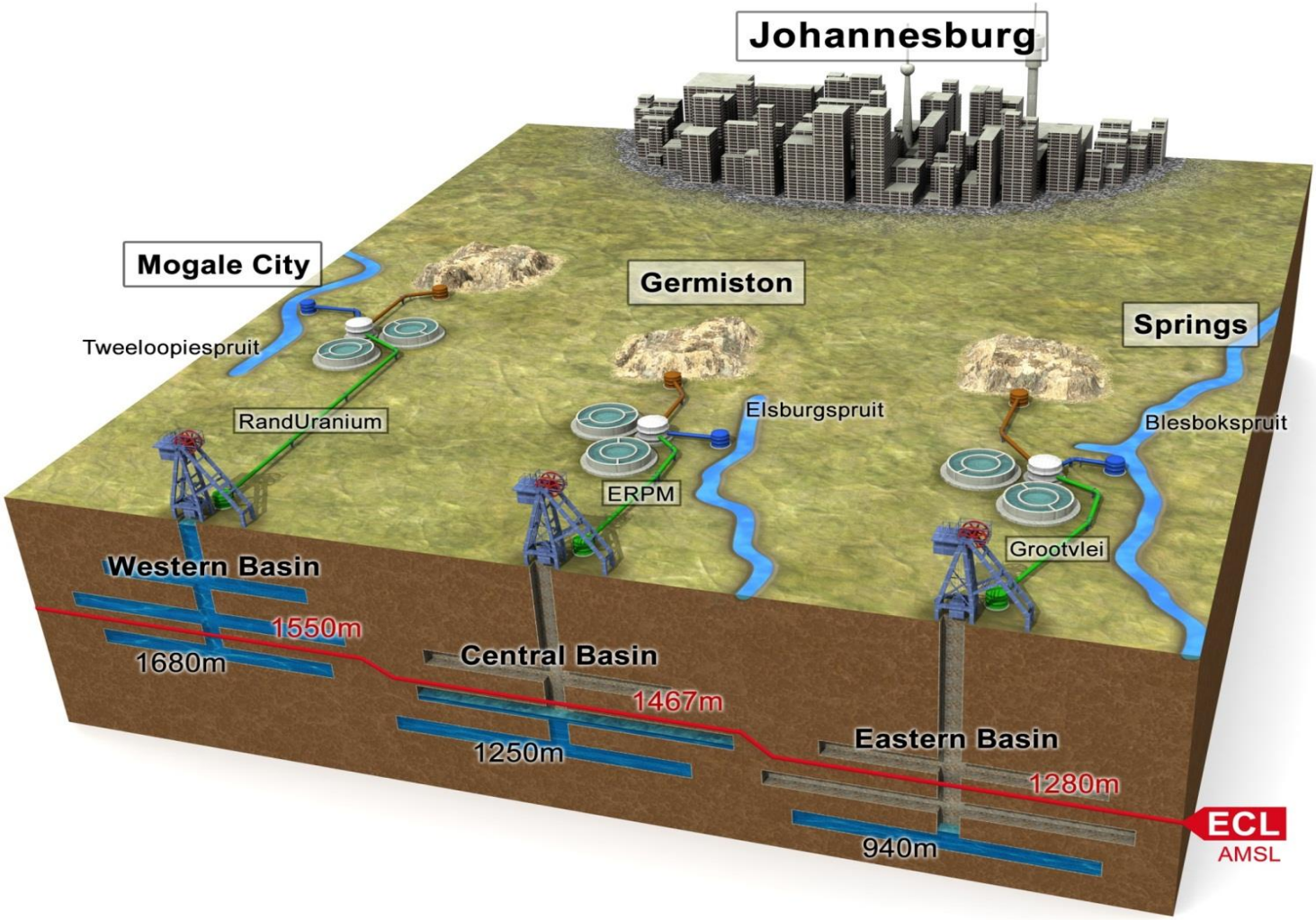
- Design water quality

Water Quality Variable	Average water quality across all three Basins	HDS plant effluent standard
Sulphates	4344 mg/ℓ	2400 mg/ℓ
pH	4	6-9
Iron	768 mg/ℓ	<1 mg/ℓ
Aluminium	35 mg/ℓ	<1 mg/ℓ
Manganese	127 mg/ℓ	<3 mg/ℓ
Uranium	0.2 mg/ℓ	0.05 mg/ℓ






Treatment of AMD



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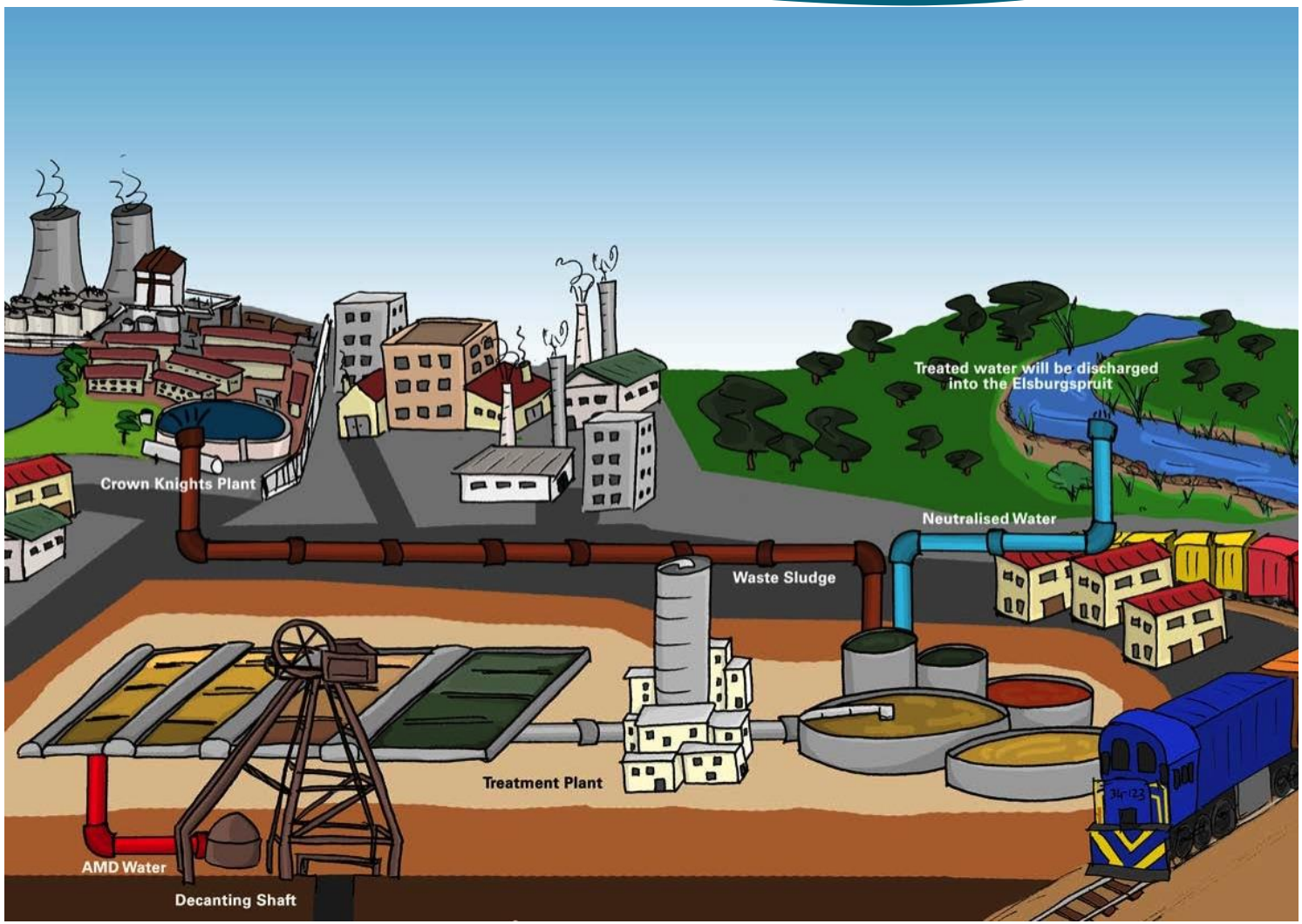
Treatment Facility: Central Basin



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Results IS : Western Basin

- Immediate solution
  - The treatment plant was upgraded
  - 33 ML/d treated from 10 ML/d
  - Water quality improved
  - Uncontrolled decanting of AMD stopped but came back.






Results IS : Western Basin

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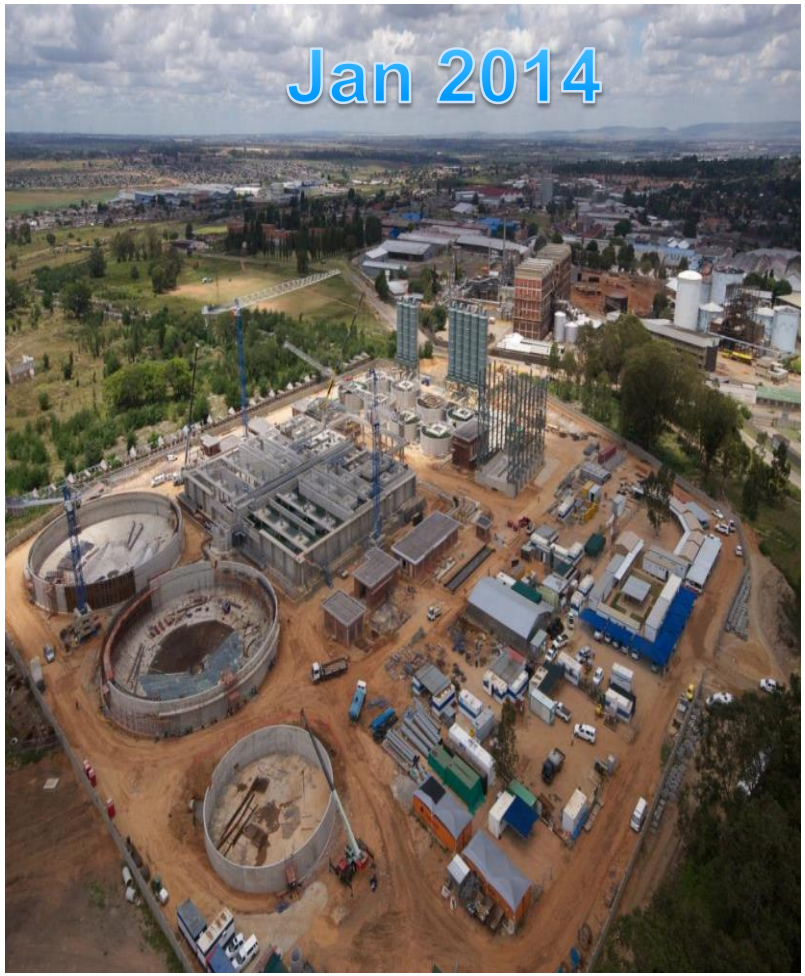
Results STS : Western Basin

- Short - term solution
  - Construction commencing in August 2014






Results: Central Basin



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Shaft and silos

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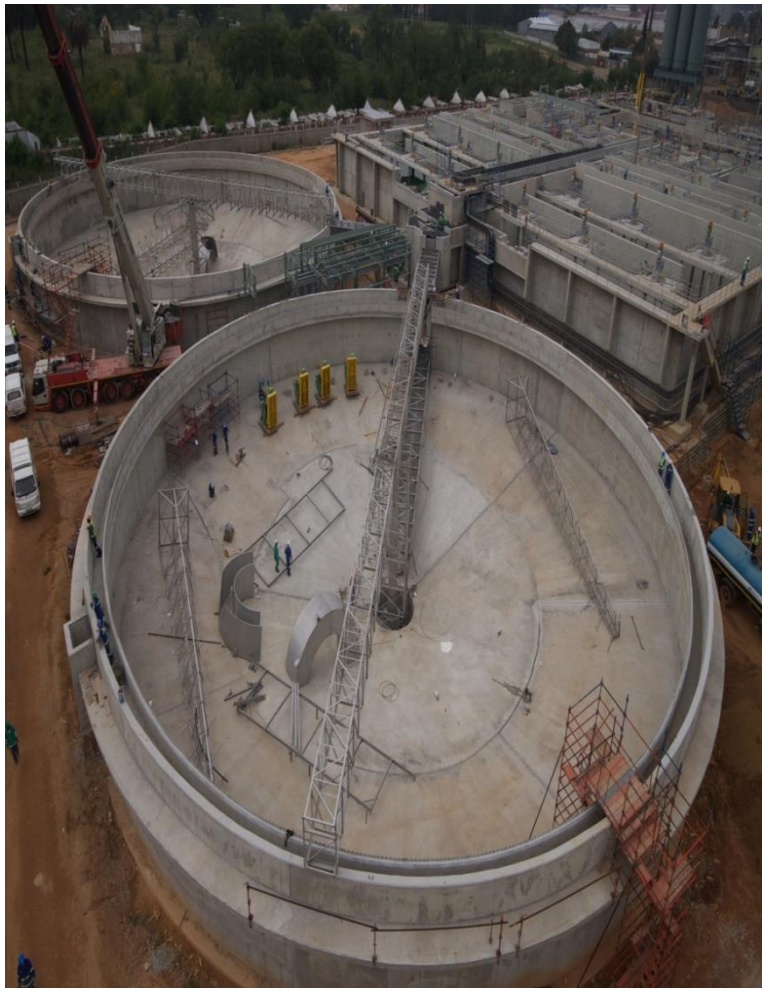
Reactors and thickeners



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Treated water tank and flocculent plant

- Trial operation started in May 2014

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Eastern Basin : Grootvlei Shaft 3

- Construction at Grootvlei shaft commenced in June 2014 : Estimated 18 months

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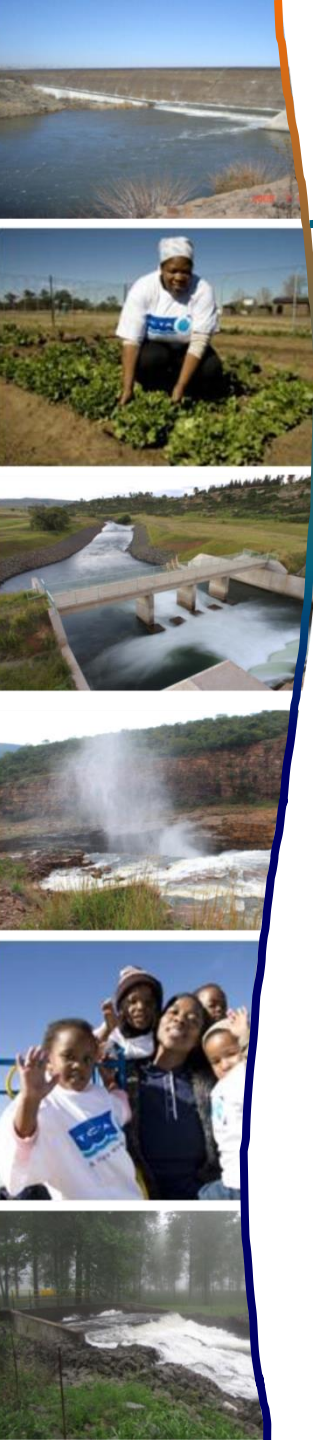

Short Term link to the Long Term

- The short term intervention will be integrated into the long term solution:
  - Pump water from mine void
  - Pre-treat through HDS
  - Make water available for further treatment






Conclusion

- The HDS treatment is a worthwhile process since:
  - Water quality is better than raw AMD
  - Decanting will be stopped
  - Underground and surface resources will be protected






Thank you

Questions …

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