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Department:
Water and Sanitation
REPUBLIC OF SOUTH AFRICA

2030 NDP
NATIONAL DEVELOPMENT PLAN
Our Future - make it work

DWS Regulatory Framework: A Focus on Mine Impacted Water

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BACKGROUND (1)

- Mining activity has and continues to be key to South Africa's economic growth; however, it has also resulted in significant water quality challenges in particular acid mine drainage (AMD).
- The country is facing several challenges regarding the management of mine water.
- The Mpumalanga province is plagued by mine-impacted water polluting the streams, this could be attributed to ownerless mines. Additionally, pollution control works meant to manage mine-impacted waters are in a state of decay due to vandalism.
- The Gauteng province is faced with heavily polluted mine water due to pyrite that is associated with gold mining. The province is also faced with rising levels of mine-impacted water leading to decants.
- In the Kwa-Zulu Natal region, there are a lot of coal mines that are abandoned and left to decant.
- In Limpopo, especially in the Lephalale area coal mining is prevalent mainly due to the production of electricity via coal-fired power stations. These coal fields are responsible for the production of mine-influenced water with a high Sodium signature. The mines in the west and east of Limpopo impact the Olifants river catchment which is a tributary of the Limpopo river basin.

BACKGROUND (2)

- Mining is regulated by the DMR in terms of MPRDA, 2002
- DWS has a particular interest in the water management aspects associated with mining
- Mines utilise vast quantities of water in their mining and beneficiation processes. In addition, they also have significant negative impacts on water quality.
- Due to the large number of abandoned and ownerless mines in the South Africa, DWS is faced with legal and financially responsibility to address water related impact.
- Both the DMR, DFFE and the DWS must therefore exercise control over the environmental impact of mining activities in order to satisfy the requirements of their respective mandates.
- Co-operation between the DMR, DFFE and the DWS in this regard is in the best interest of these Departments as well as the mining industry.
- Sustainable development is key in ensuring that human needs are satisfied within the limits of the Earth's carrying capacity.
- Sustainability can however not be achieved without a strong regulatory framework.
- Environmental law has over the past years evolved to give effect to the concept of sustainability and SA laws has been hailed as one of the most progressive laws in the world

ENVIRONMENTAL REGULATORY FRAMEWORK: THE CONSTITUTION

Section 24 : Environment

Everyone has the right to an environment that is not harmful to their health or well-being; and to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that :

- prevent pollution and ecological degradation;
- promote conservation; and
- secure ecologically sustainable development and use of natural resources while
- promoting justifiable economic and social development.

Section 32: Access to Information

Everyone has the right of access to records or/and information held by the state and any information held by another person and that is required for the exercise or protection of any rights.

The Constitution of RSA 1996

Section 40: Spheres of Government

Section 40(1) of the constitution: *In the Republic, government is constituted as national, provincial and local spheres of government which are **distinctive**, **interdependent** and **interrelated***

27. Health care, food, water and social security

Everyone has the right to have access to

health care services, including reproductive health care;

sufficient food and **water;** and

social security, including, if they are unable to support themselves and their dependents, appropriate social assistance.

ENVIRONMENTAL REGULATORY FRAMEWORK: SUPPORTING ENVIRONMENTAL ACTS

National Water Act No 36 of 1998
Hazardous Substances Act No. 15 of 1989
Mineral and Petroleum Resources Development Act, No 28 of 2002 (MPRDA)
National Environmental Management Act No 107 of 1998 (NEMA)
National Environmental Management: Air Quality Act No.39 of 2004 (NEM: AQA)
National Environmental Management: Biodiversity Act No 10 of 2004 (NEM:BA)
National Environmental Management: Protection Areas Act No 57 of 2003 (NEM:PA)
National Environmental Management : Waste Act No 59 of 2008 (NEM:WA)

Key Environmental Regulatory Authorities:

- DFFE
- DMRE
- DWS

NEMA plays a crucial role in providing for co-operative environmental governance.

DWS REGULATORY APPROACH

Water Resource Management Principles:

- National government is the custodian of water resources
- The development, apportionment, management and use of water is carried out using the criteria of public interest, sustainability, equity and efficiency of use.
- All people will have equal access to water
- Quantity and quality are interdependent and will be managed as such

Water Services Principles

- All people have the right to potable water and sanitary services. Infrastructure should be supplied
- Water management will be consistent with aims and approaches of local government
- The provision of water services will be consistent with water resource management

TOOLS FOR WATER MANAGEMENT IN MINE AREAS

Acts

- NEMA,
- MPRDA,
- NWA,

Policies & Regulations

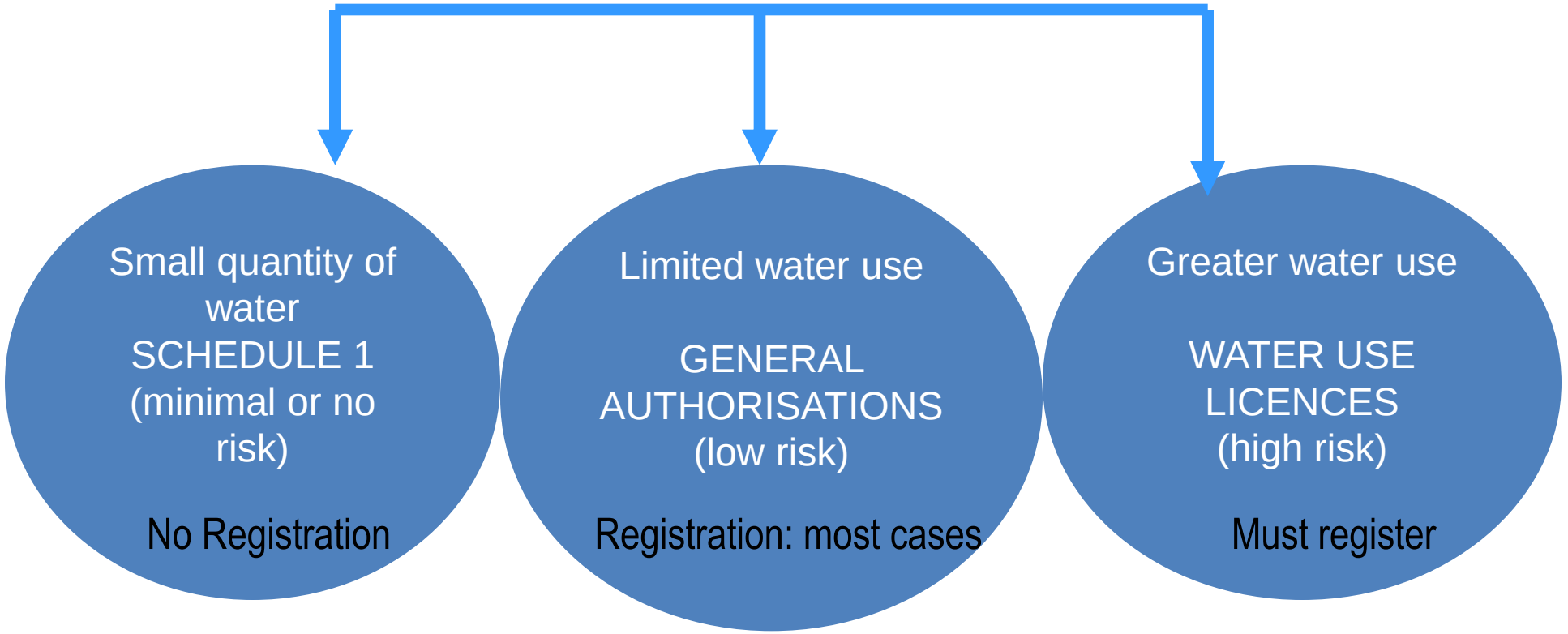
- IWQM Policy (Draft)
- Approved Mine Water Policy 2022
- GN 704, 1999 (under Review)

Regulatory Instruments

- Water Use Authorizations
- Waste Discharge Standards

- BPGs
- IWWMPs
- WDCS
- Self-Regulation Tools

THERE ARE THREE TYPES OF WATER USE AUTHORISATIONS



Increasing risk of impact on the water resource

COMPLIANCE MONITORING AND ENFORCEMENT (CME)

- To Determine a facility's status of compliance with relevant legal and technical requirements in terms of legislation and authorisation conditions
- Conformance to authorisation conditions incl self regulation requirements (collect evidence in support of further action (follow up/enforcement)
- visible public presence
- To enforce compliance

Enforcement Tools

ENABLING THE CIRCULAR ECONOMY OF MINE IMPACTED WATER

Challenges with Mine Impacted Water

- Chemicals, heavy metals, and acid into water bodies, making them unsuitable for human consumption or agricultural use and affecting aquatic life negatively.

However Mine Impacted Water can also be used as a resource:

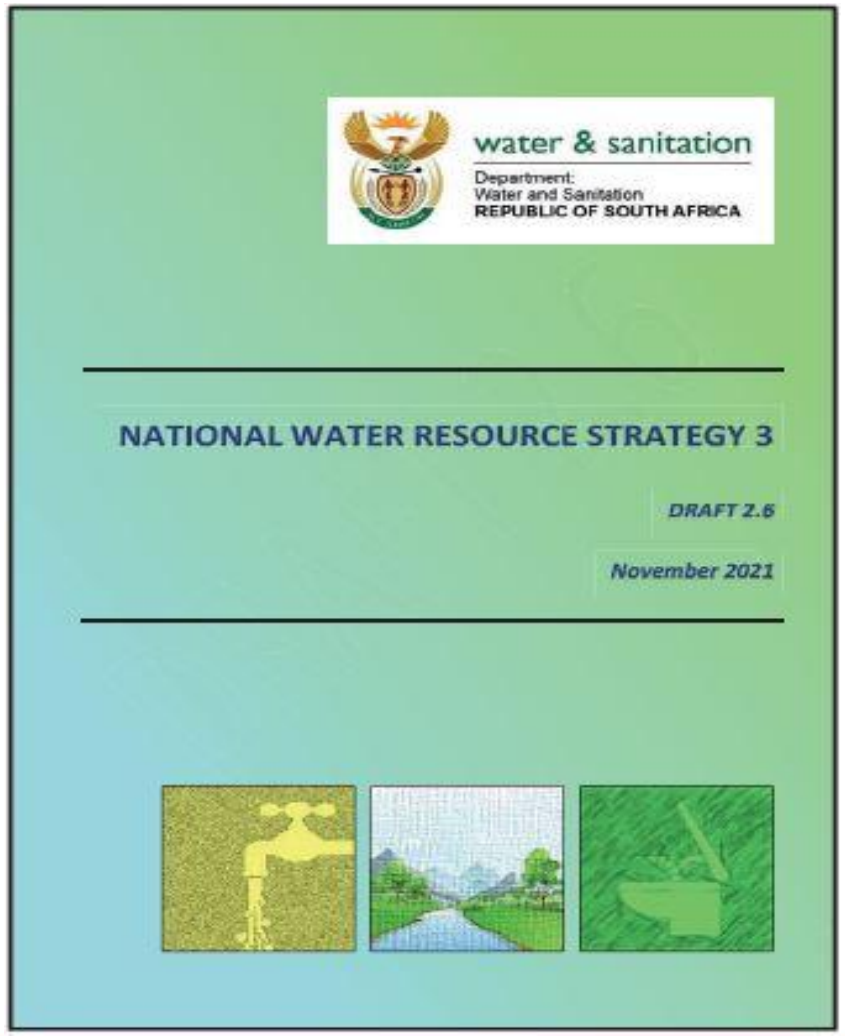
- Mine-impacted water can be a renewable resource, especially when managed in a sustainable way.
- With appropriate treatment, mine-impacted water can be used for irrigation, industrial processes, and even in some cases, for domestic use after further treatment.
- Water extracted from mines during dewatering operations can be treated and potentially reused for other purposes.

- What is DWS doing to enable this?

NATIONAL WATER RESOURCE STRATEGY 3

Vision 2030 Theme	Targets and Actions for Vision 2030	Water and Sanitation Sector Programme and Alignment
	Complete Lesotho Highlands Water Project Phase 2 by 2026	• Project prioritised by DWS and the Trans-Caledon Tunnel Authority (TCTA)
	Comprehensive management strategy including an investment programme for water resource development, bulk supply and wastewater management for major centres with reviews every five years	• Water infrastructure investment framework • Regional Bulk Infrastructure Programme • Green Drop assessment • Blue Drop assessment • No Drop assessment • Long term solution for legacy AMD

To balance supply and demand, South Africa must move from the current water mix which is strongly dominated by surface water, with some groundwater and return flows to a water mix that includes increased groundwater use and storm water harvesting as well as reuse, desalination and treated acid mine drainage (AMD).



MINE WATER POLICY 2022

- **Purpose**:
  - To provide the DWS position on Mine Water Management
  - To provide measures on protection of water resources due to prospective, operational and historical mining activities

- **Scope of the Policy:**
  - Sets principles to improve water resource protection due to mine water impacts
  - Guided by existing legislative frameworks on water resource management
  - Policy provides relevant and appropriate legislative remedy in order to foster proactive Mine Water Management
  - Policy principles read in conjunction with Constitution and NWA

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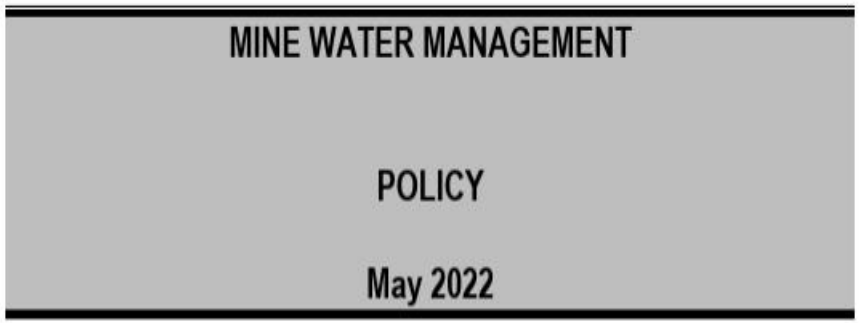

MINE WATER POLICY 2022

Operational Mines

- Policy Principle 1: Integrated Approach to Mine Closure
- Policy Principle 2: Apportionment of Liabilities
- Policy Principle 3: Optimum Use of Appropriate and Cost Effective Technology
- 7: Re-use of Treated Mine Water, Including AMD

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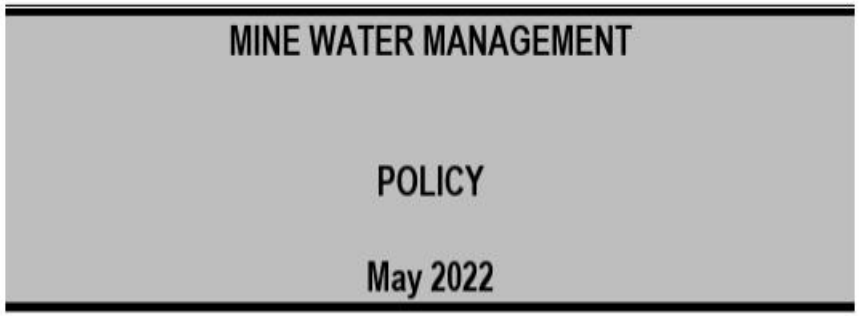
Abandoned, Historic & Ownerless Mines

- Policy Principle 1: Government Accountability: Mine Water management including AMD



REGULATION GN 704 REVISION

- Address impacts from mines and associated activities on the water resources
- Ensure that systems are in place at all mines to enable effective management of impacts of mining on the water resources
- Ensure consistent and sustainable implementation of water management hierarchy at all mining facilities that have a potential to impact on the water resources over the full life cycle of the mine
- To give effect to the BPG and Mine Water Policy
- Encourage Re-use and desalination of Mine Impacted Water
- Enable piloting of research projects and technologies

(4 June 1999 - to date)

NATIONAL WATER ACT 36 OF 1998

(Gazette No. 19182, Notice No. 1091. See Act for commencement dates)

REGULATIONS ON USE OF WATER FOR MINING AND RELATED ACTIVITIES AIMED AT THE PROTECTION OF WATER RESOURCES

Published under Government Notice 704 in Government Gazette 20119. Commencement date: 4 June 1999.

The Minister of Water Affairs and Forestry has, under the powers vested in him by 26(1)(b), (g) and (i) of the National Water Act, 1998, (Act No. 36 of 1998), made the regulations contained in the Schedule in respect of use of water for mining and related activities aimed at the protection of water resources.

EXPLANATORY NOTE

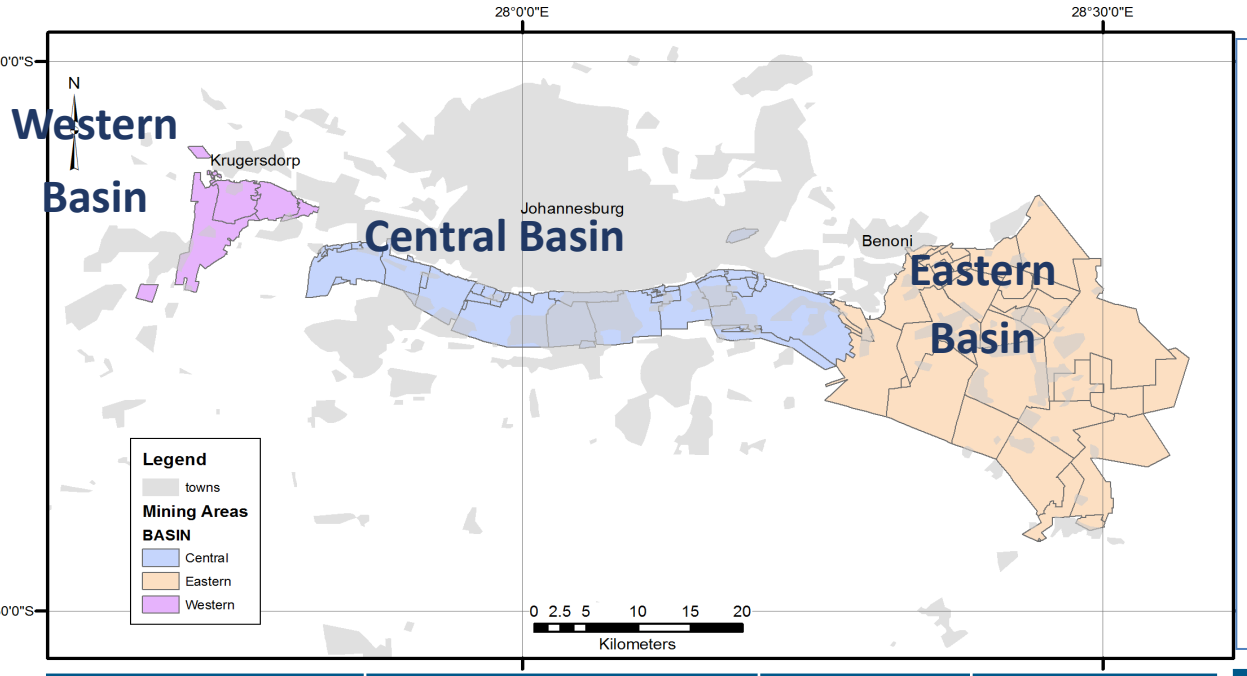
The Minister of Water Affairs and Forestry is responsible for the protection, use, development, conservation, management and control of the water resources of South Africa on a sustainable basis. The requirements prescribed in terms of the regulations must be seen as minimum requirements to fulfill this goal.

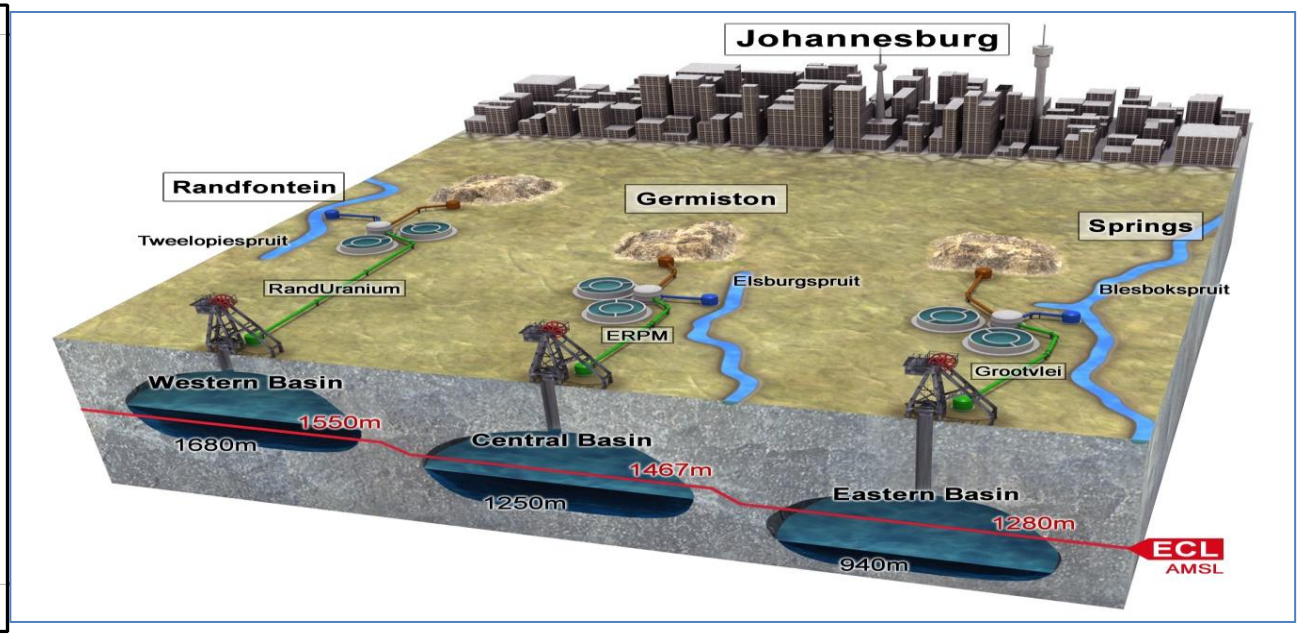
PROJECTS CURRENTLY IN PLACE

- Projects with Coaltech using mine impacted water for irrigation as part of mine closure (14 Projects in progress) including
  - Irrigation of natrophile grass species
  - Carbon farming model for rehabilitated land
  - Carbon capture, footprint reduction & offsetting through postclosure and use
  - Phytomining and hyperaccumulation
  - oiatom based pan idex for AMD impacted wetlands

- Research Projects with WRC on re-using mine impacted water in agriculture and green hydrogen production
- Emalahleni Water Reclamation Plant
- The three Acid Mine Drainage Treatment Plants as a directive from the IMC to address the AMD challenges in the Witwaterand area

Witwatersrand Gold Mining Areas





Witwatersrand Gold Mining Area	Location	Mine Lease Area	Underground Mine Void Volumes
Central Basin	Germiston, Johannesburg & Roodeport	251 km2	**280Mm3 at ECL**
Eastern Basin	Boksburg, Brakpan, Springs & Nigel	768 km2	**400Mm3 at ECL**
Western Basin	Krugersdorp, Witkpoortjie & Randfontein	57 km2	**43Mm3 at ECL**
Far Western Basin	Westonaria & Carletonville		

Witwatersrand Gold Mining Area	Cost	Commissioning & Start-up date	ECL (m amsl)	Rationale
Central Basin AMD Plant	R 2.3 billion	September 2014	**1467**	Set for protection of weathered and fractured aquifers within the basin
Eastern Basin AMD Plant		August 2016	**1280**	Set to protect the dolomitic ground water resources
Western Basin AMD Plant –		August 2012	**1550**	Set for protection of dolomitic groundwater resources at the cradle of humankind World

WESTERN BASIN

- First decant in West Rand - September 2002
- TCTA refurbished an existing plant – Operated by Sibanye Stillwater
- Treatment increases pH and reduces heavy metals such as Fe.
- Treating 35 Ml/d which is released into the Tweelopiesspruit
- ECL at 150 meters below ground level (mbgl).
- Current level = 3 mbgl (High rainfall, Zama Zamas removal of plugs & not enough capacity)
- Void only ever dropped to a max of 11 mbgl over the past 7 years

CENTRAL BASIN

- Treatment plant utilising the HDS treatment process
- Operational since May 2014. Operated by Nafasi Water Pty (Ltd)
- Treats 84 Million litres(Ml)/day at maximum operation
- Treats 72 Ml/d normal operation in order to drop void
- Discharges into Elsburgspruit
- ECL 126 mbgl
- Current level: 45,46 mbgl
- Current pumping capacity 70 Ml/d – due to discharge line scaling reducing capacity.

- Treatment plant utilising the HDS treatment process
- Treats 108 Million litres(Ml)/day at maximum operation
- Treats 94 Ml/d normal operation in order to drop void
- Operational since Sept 2016. Operated by Nafasi Water Pty (Ltd)
- Treated water released into Blesbokspruit
- Sludge deposited back into shaft (Grootvlei 4 shaft)
- ECL 120 mgbl

WHERE ARE WE NOW WITH THE PLANTS

- Western Basin: the plant is operated close to its design capacity but has not been able to lower the water level in the mine void to an environmentally acceptable level
- Central Basin: the plant has operated below its design capacity, resulting in a rise in water level in the mine void
- Eastern Basin: Repeated equipment failures have resulted in the plant operating substantially below its long-term design capacity
- The environmental critical levels recommended in the 2011 Team of Experts' Report were conservative, due to the limited information available at that time. Information collated since the commissioning of the short-term intervention has been used to recommend the relaxation of the environmental critical levels (ECLs) to shallower depth
- Possible groundwater contamination, water quality in the mine voids and the receiving surface and groundwater resources must continue to be monitored
- Improved ecological state of the water resources, Blesbokspruit regaining its RAMSAR status
- Ingress Control - DMRE-led (through CGS) intervention aimed at reducing water migration into mine voids to minimize AMD generation

CONCLUSION

- Current Environmental Legislation can solve SA's water quality challenges!
- Need to continue exploring new technologies
- But the government cannot do it alone
- Need more Public Private Partnerships to unlock the Mine Water Circular Economy
  - Create more jobs
  - Improve food security
  - Reduce water demand – and explore re-use as part of the water mix

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