



the federation for a sustainable environment

Environment, Agriculture and Rural Development Portfolio Committee

Pollution Summit

Restoring Air, Water and Environmental Integrity in Gauteng: From Oversight to Action

19 & 20 September 2026

Mariette Liefferink

Mining Waste

End of Mission Statement by the UN Special Rapporteur on Toxics and Human Rights, Marcos A. Orellana, on his visit to South Africa, 31 July to 11 August 2023. Pretoria, 11 August 2023

- **“South Africa faces the crude legacy of pre-1994 environmental racism. This abhorrent practice entailed the intentional siting of landfills and polluting industries along racial lines and in low-income and migrant communities. The legacy of pervasive air and water pollution to this day is disproportionately impacting marginalized and poor communities. The challenges to overcoming the legacy of environmental racism are enormous, and they are compounded by structural inequality, widespread poverty, unemployment, corruption, a severe energy crisis and new environmental threats such as the climate emergency.**
- “The mining industry, particularly gold mining, has for many decades contributed to South Africa’s economic development. Its legacy also includes more than 6,152 ownerless or derelict mines and mine dumps in the country. These abandoned mines and tailings pose a significant threat to human health and the environment.
- “In the pre-1994 era, the mining industry’s discriminatory practices subjected black South Africans to unsafe working conditions and hunger wages. Today, poor Black communities in South Africa continue to bear the brunt of the negative health and environmental impacts of mining.
- “In Gauteng, I visited the Witwatersrand mining basin. (The visit was facilitated by the FSE.) I saw mountains of mining waste dumps known as “tailings dams or dumps” that contain heavy metals. In Witwatersrand, the ore contains uranium. Nearby communities inhale the radioactive dust particles as they are blown by the wind. Due to contaminated soils, crops are unable to grow.
- “In addition to toxic dust and tailings dumps, mining operations create acid mine drainage. The mixture of fluids that make up acid mine drainage is highly toxic. It seeps and contaminates waters that communities use for irrigation, watering livestock, spiritual rituals, and other domestic and recreational purposes.
- “In South Africa, mining operations are highly regulated with a set of mandatory processes and authorizations. **However, informational deficits, meaningful public participation, and enforcement remain major challenges. Often, remediation upon mine closures is lost in the poor enforcement of legislation. The result is a landscape scarred by abandoned mines and tailing dumps and acid mine drainage. The result is the widespread infringement of the basic rights of neighbouring communities.**

MINING

As early as 1987, the US Environmental Protection Agency recognised that “.....*problems related to mining waste may be rated as second only to global warming and stratospheric ozone depletion in terms of ecological risk.*”

The release to the environment of mining waste can result in profound, generally irreversible destruction of ecosystems.”



References: CSIR. Briefing Note August 2009. Acid Mine Drainage in South Africa. Dr. Pat Manders. Director, Natural Resources and the Environment.

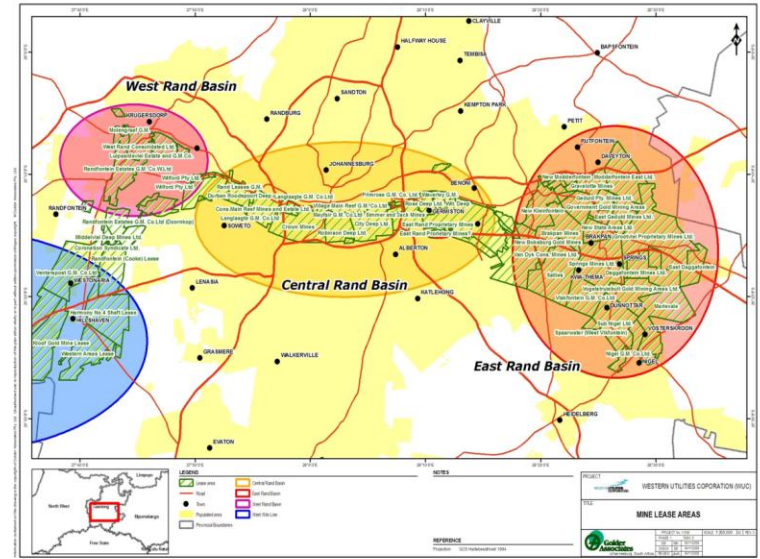
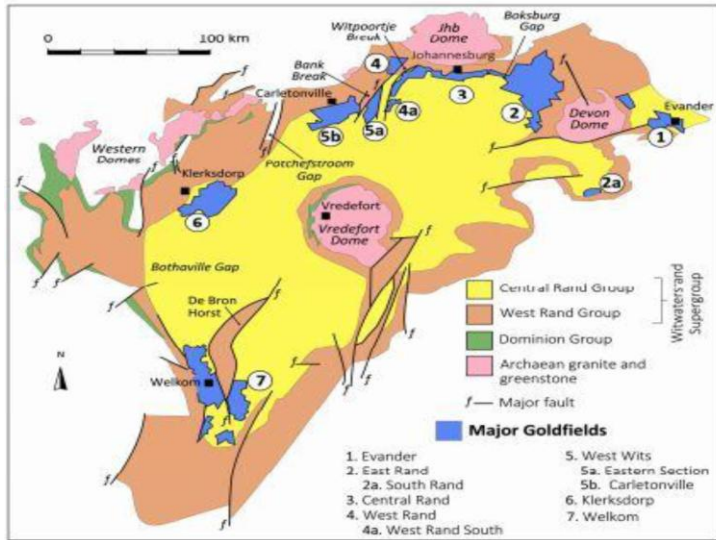
European Environmental Bureau (EEB). 2000. The environmental performance of the mining industry and the action necessary to strengthen European legislation in the wake of the Tisza-Danube pollution. EEB Document no 2000/016.

Tailings Storage Facilities

- Tailings Storage Facilities (TSFs) are **engineered structures** that are designed to **contain tailings/waste** (residue following the extraction of valuable material from metal ore processing) and to manage **associated water**.
- TSFs are among the **largest dams and structures in the world, and will stand in perpetuity**.
- A catastrophic release of a large amount of tailings could lead to long term environmental damage with huge cleanup costs.
- **If poorly designed, constructed or managed, tailings storage facilities represent a significant risk to local communities and ecosystems, especially in downstream environments.**



Witwatersrand Mining Basin*



- The Witwatersrand has been mined for more than a century.
- It is the world's largest gold and uranium mining basin with the extraction, from more than 120 mines,
- of 43 500 tons of gold in one century and
- 73 000 tons of uranium between 1953 and 1995, which led to a legacy of some **400 km² of mine tailings dams** and
- **6 billion tons of pyrite tailings containing 600 000 tons of uranium.**

*The Witwatersrand Mining Basin includes the Far East Basin, Central Rand Basin, Western Basin, Far Western Basin, KOSH and the Free State gold mines.

Reference: Chevrel, S, Croukamp, L, Bourguignon, A & Cottard, F 2008, A Remote Sensing and GIS Based Integrated Approach for Risk Based Prioritization of Gold Tailings Facilities — Witwatersrand, South Africa, in A Fourie, M Tibbett, I Weiersbye & P Dye (eds), Proceedings of the Third International Seminar on Mine Closure, Australian Centre for Geomechanics, Perth, pp. 639–650.

Three main issues relating to Mine Residue Areas (MRAs) located in Gauteng have been identified, namely:

- 1) air-quality, with particular reference to dust pollution from MRAs (including radioactive dust);
- 2) water-flux and water-quality, with special note of the current controversy around AMD; and
- 3) geotechnical safety concerns related to the dangers of ground instability and collapse above abandoned mine workings and also around open, unsealed mine shafts that present a danger to nearby settlements.

Reference: Department of Agriculture and Rural Development 2011, Feasibility Study on Reclamation of Mine Residue Areas for Development Purposes: Phase II Strategy and Implementation Plan, Technical report no. 788/06/01/2011, Gauteng.



- *“As a consequence of the uraniferous nature of the ore, Witwatersrand tailings and other mining residues often contain significantly elevated concentrations of uranium and its daughter radionuclides, with the decay series of U^{238} being dominant”.*

Reference: Coetzee, H 2008, Radiometric Surveying in the Vicinity of Witwatersrand Gold Mines, in A Fourie, M Tibbett, I Weiersbye & P Dye (eds), Proceedings of the Third International Seminar on Mine Closure, Australian Centre for Geomechanics, Perth, pp.617–630.

- *“The gold ores of the Witwatersrand contain appreciable concentrations of uranium and its radioactive progeny. Mining has resulted in the dispersal of radioactive material into the environment via windblown dust, waterborne sediment and the sorption and precipitation of radioactivity from water into sediment bodies.”*

Reference: Coetzee, H & van Tonder, D 2008, Draft Regional Mine Closure Strategy for the West Rand Goldfield, Council of Geosciences, report no. 2008-0253, Pretoria.

- *“Analysis of recent monitoring campaign data has confirmed multiple occurrences of quartz rich inhalable dust in residential settings at levels that exceed occupational health standards.”*

Reference: Kneen, MA, Ojelede, ME & Annegarn, HJ 2015, ‘Housing and population sprawl near tailings storage facilities in the Witwatersrand: 1952 to current’, South African Journal of Science, vol. 111.

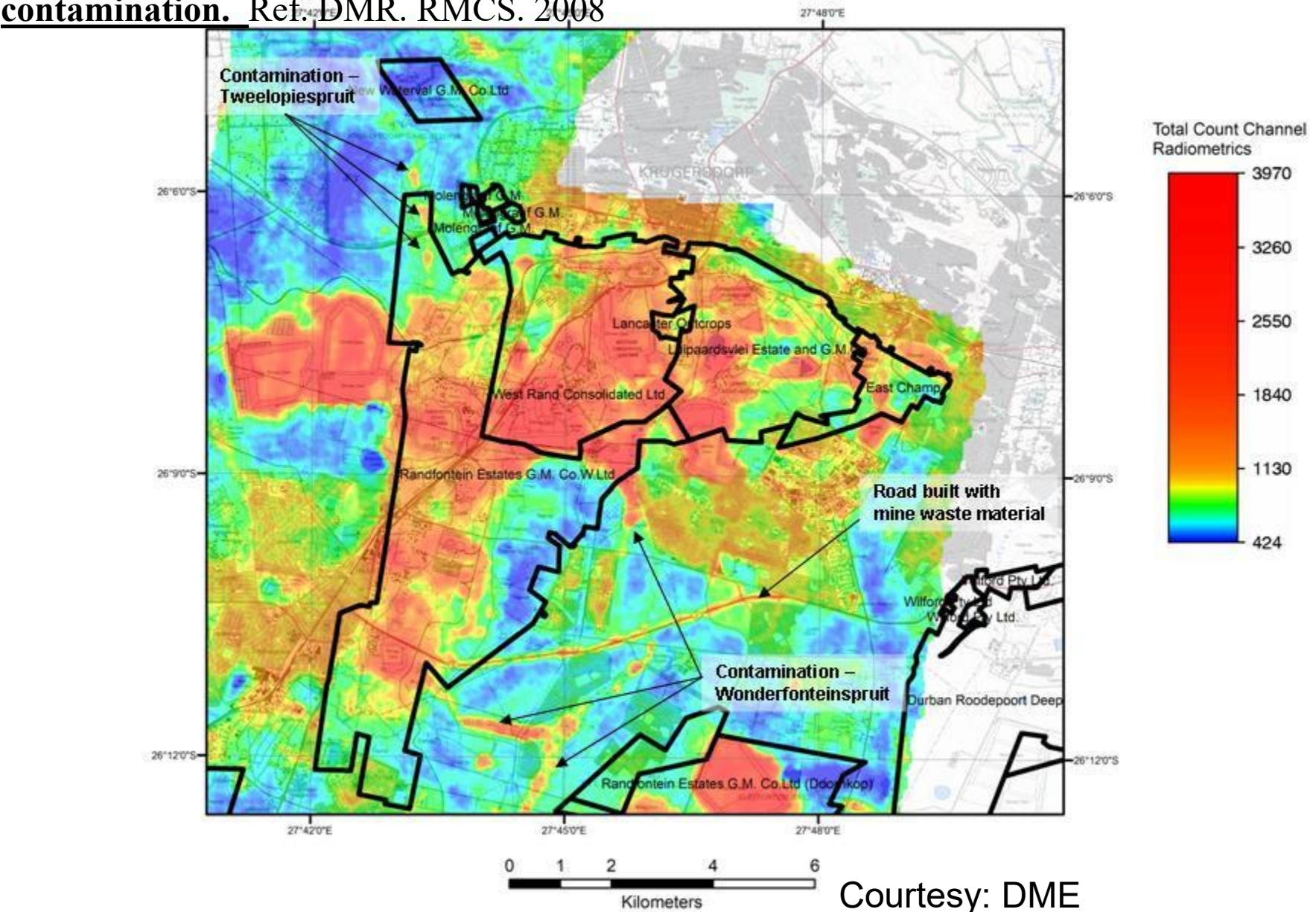
•“The assessments of effective doses of **radioactivity** to the public in the Wonderfonteinspruit Catchment Area did not comprise the so-called ‘air-pathways’ by which significant radiation exposure can occur in the surroundings of mining legacies, due to:

- ❑ **Inhalation** of Rn-222 daughter nuclides from radon emissions of desiccated water storage dams (e.g. Tudor dam) and slimes dams.
- ❑ The inhalation of contaminated dust generated by wind erosion from these objects, and
- ❑ The **contamination of agricultural crop** (pasture, vegetables) by the deposition of radioactive dust particles, which can cause considerable dose contributions via **ingestion**.

- “ ...“during the sampling strong dust emissions from slimes dams during wind events were observed.
- “Due to the small particle size of the slimes, particulate matter can be transported over relatively long distances to agriculturally used land in this surroundings.
- “It has to be mentioned that the deposition of radioactively contaminated dust on leaves of vegetable and forage plants can cause radiation exposures exceeding those from the “inhalation of contaminated dust” substantially, being in the order of dose contribution of the so-called ‘water pathways’”.

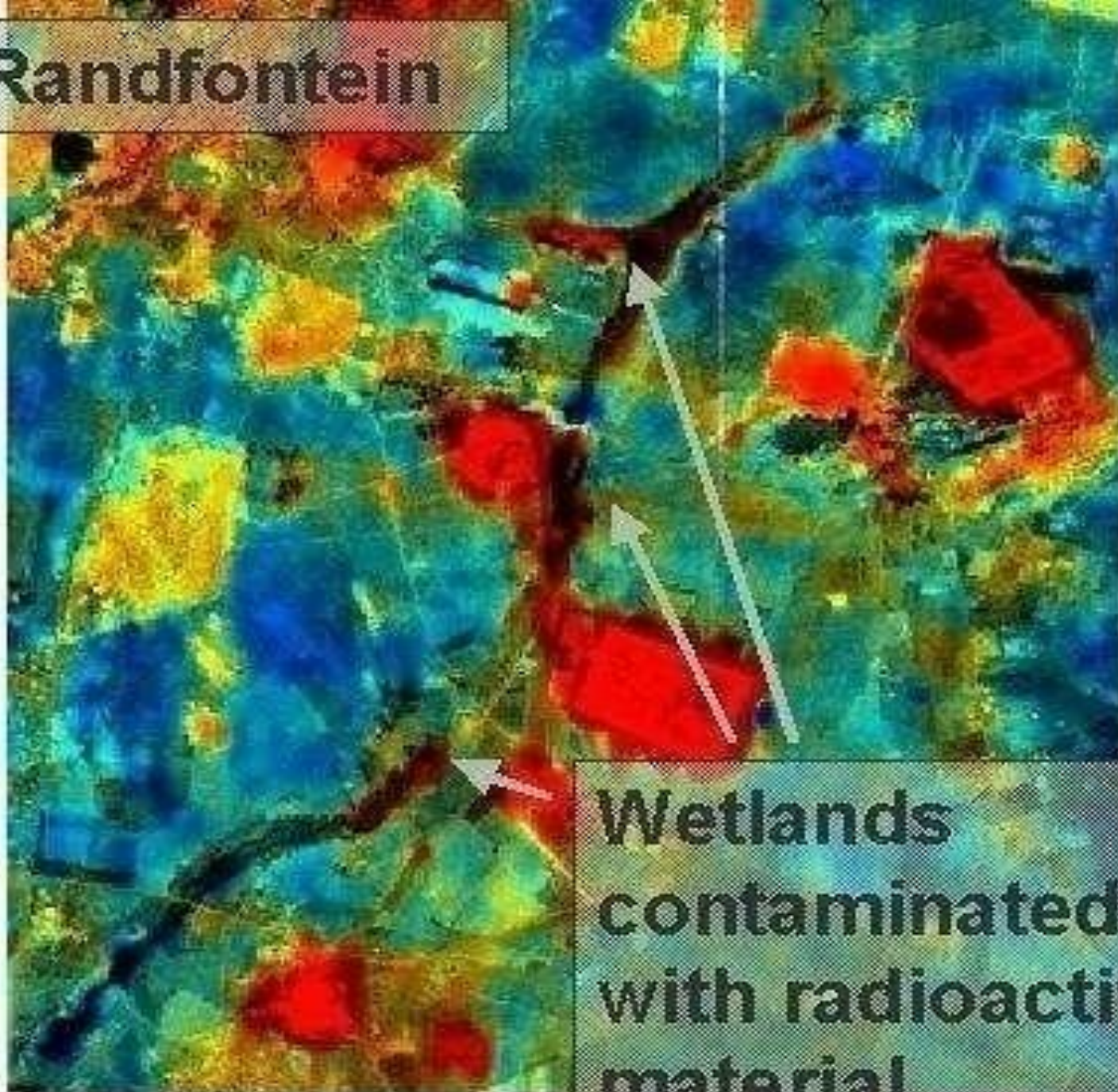
Reference: National Nuclear Regulator 2007, Radiological Impacts of the Mining Activities to the Public in the Wonderfonteinspruit Catchment Area, report TR-RRD-07-0006.

An airborne radiometric survey of the WR and FWR was done for DWAF . Interpretation of the data show many of the residential areas fall within areas of high risk of radioactivity contamination. Ref.DMR. RMCS. 2008



Courtesy: DME

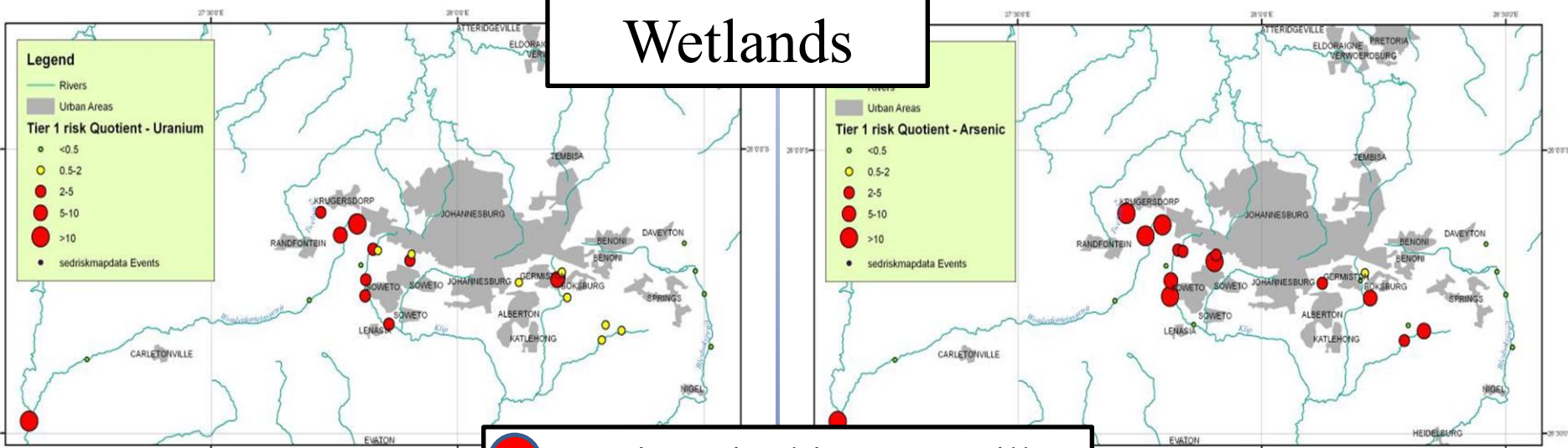
Randfontein



Reference: WRC
1214/1/06

**Wetlands
contaminated
with radioactive
material**

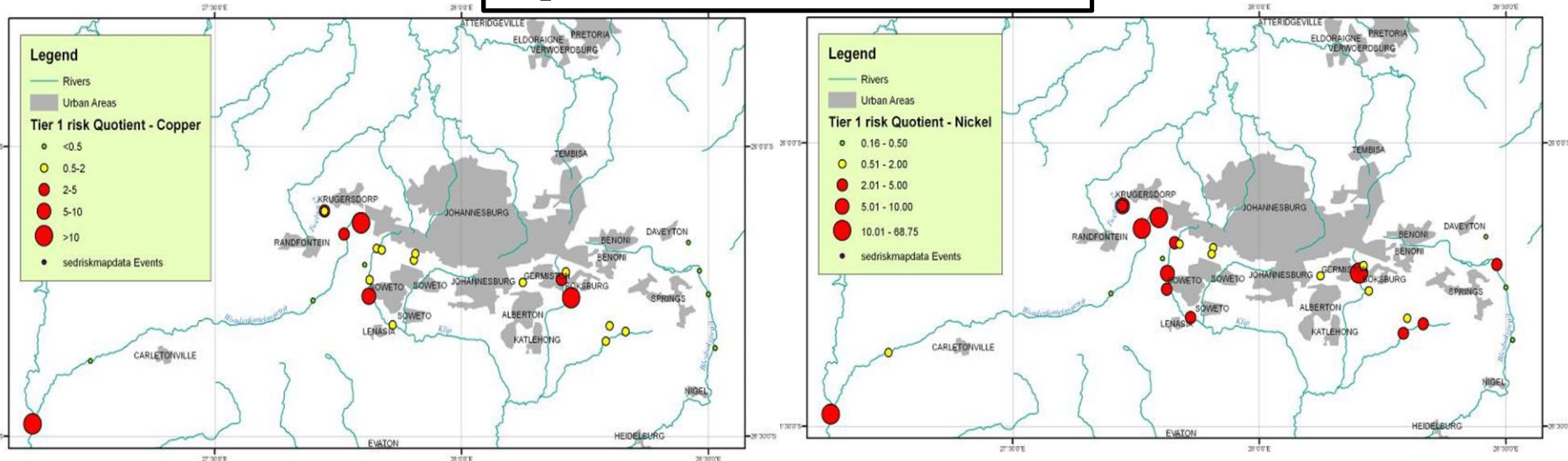
Wetlands



Uranium

Quotients in this range will represent an environmental risk

Arsenic



Copper

Nickel

Contamination of wetlands by Witwatersrand gold mines – processes and the economic potential of gold in wetlands. Council for Geoscience Report No. 2005-0106

Exposure Pathways

“It is estimated that 25 percent of the population in Johannesburg and Ekurhuleni live in informal settlements and approximately one quarter of them 400,000 people, are in the mining belt. The settlements range from 100 to 40,000 people, with the largest communities in Ekurhuleni.”

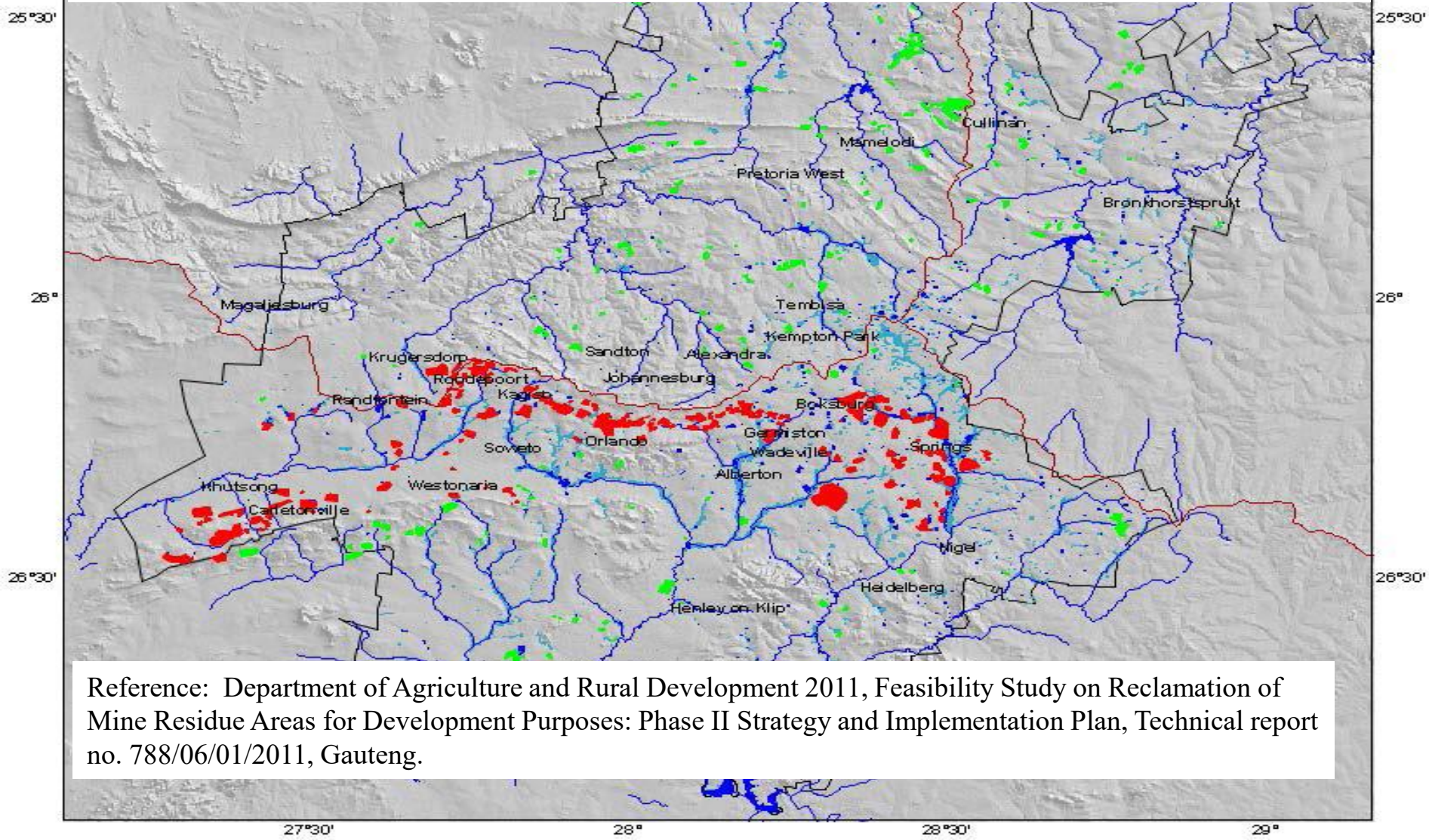
Reference: Tang, D & Watkins, A 2011, ‘Ecologies of Gold: The Past and Future Mining Landscapes of Johannesburg’, Place Journal, <https://placesjournal.org/article/ecologies-of-gold-mining-landscapes-of-johannesburg/?cn-reloaded=1#0>

Photo: Courtesy – Stephan du Toit.



The majority of MRAs are radioactive (See Figure 1-2, red polygons) because the Witwatersrand gold-bearing ores contain almost ten times the amount of uranium than gold.

Radioactive (red), MRAs in Gauteng, on sun-shaded SRTM topography. The concentration of radioactive MRAs in the Witwatersrand headwater areas of the Vaal catchment is evident, with some overlap into the Limpopo (Crocodile West) headwaters near Krugersdorp.



Reference: Department of Agriculture and Rural Development 2011, Feasibility Study on Reclamation of Mine Residue Areas for Development Purposes: Phase II Strategy and Implementation Plan, Technical report no. 788/06/01/2011, Gauteng.

Exposure Pathways



Source: Federation for a Sustainable Environment. Supplied by: Natasha Griffiths

Exposure Pathways



Photo: Francois van Vuuren

Exposure Pathways



- There has been a historical migration of generally elevated radioactive levels to the urban areas of Johannesburg central business district (CBD) indicating the use of dump and waste material for **building purposes** as well as downstream plumes in wetlands areas.

Reference: Esterhuyse, S, van Tonder, DM, Coetzee, H & Mafanya, T, 2008, Draft Regional Mine Closure Strategy for the East Rand Goldfield, Council of Geoscience, report no. 2008-0176, Pretoria.



“The comparison between cattle tissue samples from the experimental and control group revealed that nickel, zinc, selenium, lead and uranium concentrations all reveal a practically significant difference.

“The uranium concentration in the cattle samples from the experimental group was 126.75 times higher in the liver, **4350 times higher in the kidney**, 47.75 times higher in the spleen, 31.6 times higher in the muscle tissue, 60 times higher in the bone and 129 times higher in the hair than that of the cattle samples from the control group. “

•A holistic view on the impact of gold and uranium mining on the Wonderfonteinspruit”. David Hamman 2012

Exposure Pathways



Source: Sunday Times



NATIONAL NUCLEAR REGULATOR

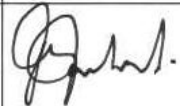
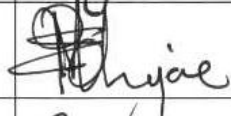
For the protection of persons, property and the environment
against nuclear damage

PLN-SARA-15-012

PLAN FOR REMEDIATION OF CONTAMINATED SITES

Rev. 0

APPROVAL RECORD

	Name	Designation	Signature	Date
Prepared	A Joubert	Principal Specialist: SARA: ERP		30/09/2015
	O Phillips	Senior Manager: SARA		30/09/2015
Reviewed	P Mohajane	PM: NORM		30/09/2015
Recommended for Approval by	A Joubert	Principal Specialist: SARA: ERP		30/09/2015
Approved	O Phillips	Senior Manager: SARA		30/09/2015



Acid Mine Drainage (AMD)

- AMD – established phenomenon in Witwatersrand since 1903.
- The post-closure **decant of AMD** is an **enormous threat**, and this could become worse if remedial activities are delayed or not implemented.

Reference: R Scott. WRC Report No 486/1/95; CSIR. Briefing Note August 2009. Acid Mine Drainage in South Africa. Dr. Pat Manders. Director, Natural Resources and the Environment.

MINE WATER POLLUTION - ACID MINE DECANT, EFFLUENT AND
TREATMENT: A CONSIDERATION OF KEY EMERGING ISSUES THAT
MAY IMPACT THE STATE OF THE ENVIRONMENT

Prepared by Dr Susan Oelofse

CSIR, Natural Resources and the Environment

Paper prepared for:

Department of Environmental Affairs and Tourism (DEAT)

Directorate: Information Management

Health Risks of Acid Mine Drainage (AMD)

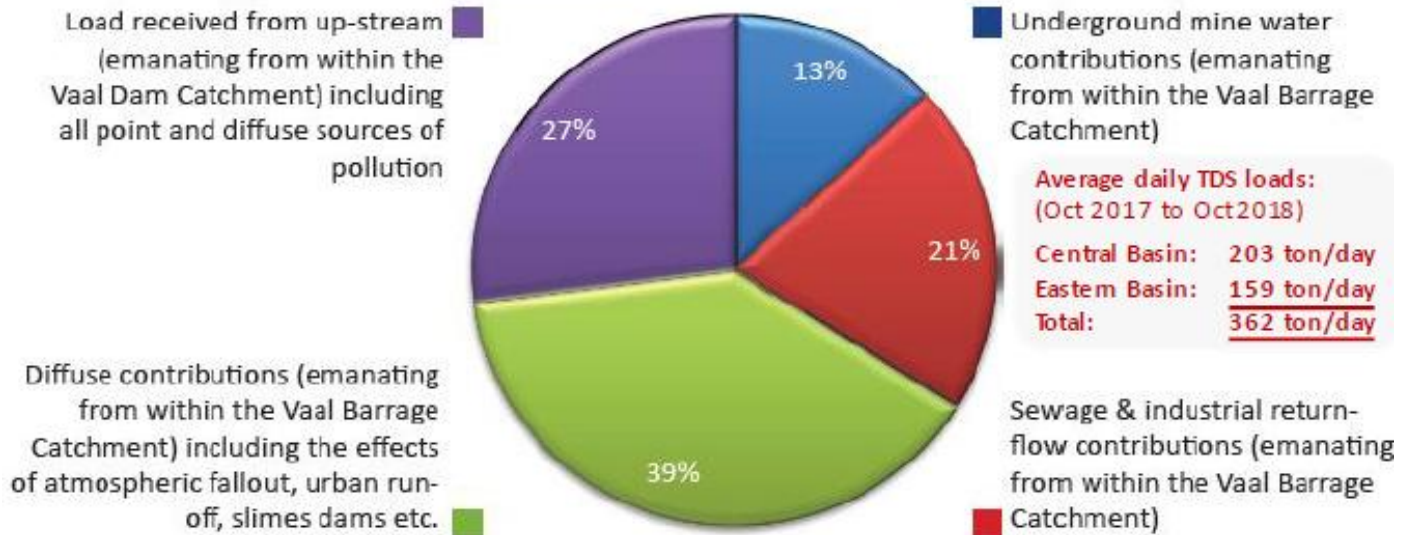
- AMD is characterized by low pH (high acidity), high salinity levels, elevated concentrations of sulphate, iron, aluminium and manganese, raised levels of toxic heavy metals such as cadmium, cobalt, copper, molybdenum and zinc, and possibly even radionuclides.
- A high confidence study of the fate and pathway of heavy metals and radionuclides associated with mine decant and AMD should be undertaken. This study will reveal where the pollution is traveling and if there is human risk involved, and therefore where management intervention is required.
- In addition a high confidence epidemiological study of off-mine populations impacted by mining activities is required. To date there are no reliable data on human-related impacts associated with mining activities.
- AMD is not only associated with surface and groundwater pollution, but is also responsible for the degradation of soil quality, aquatic habitats and for allowing heavy metals to seep into the environment
- Long-term exposure to AMD polluted drinking water may lead to increased rates of cancer, decreased cognitive function and appearance of skin lesions. Heavy metals in drinking water could compromise the neural development of the fetus which can result in mental retardation.

CONTINUATION OF THE INTEGRATED VAAL RIVER SYSTEM RECONCILIATION STRATEGY STUDY (PHASE 2): STRATEGY STEERING COMMITTEE

Presented by: JJ VAN WYK

Date: 13 March 2019

RELATIVE SALT LOADS REPORTING TO THE VAAL BARRAGE (2009)



AMD – Current Treatment

- The Feasibility Study was completed in 2013 and at the time it was proposed that the Long Term Solution (desalination by means of reverse osmosis or ion exchange) should be implemented by 2014/2015 to the address elevated Total Dissolved Solid concentrations (362 tons per day) in and below the Vaal Barrage.
- The Long Term Solution of AMD has been provisionally deferred (2040) due to fiscal limitations and to allow for the recalibration of the salinity and hydrology models of the Vaal.
- The short term treatment is merely a pH adjustment. In most cases the metals in AMD will precipitate out of solution when the pH is adjusted upwards. The metals of course have not disappeared but they have changed to a different oxidation state – from soluble to a solid form. The process can be reversed and the metal mobilised, should the water become acidic.

Closure Loopholes: Care and Maintenance, Liquidation, “Pass the Parcel”, Complex Corporate Structures



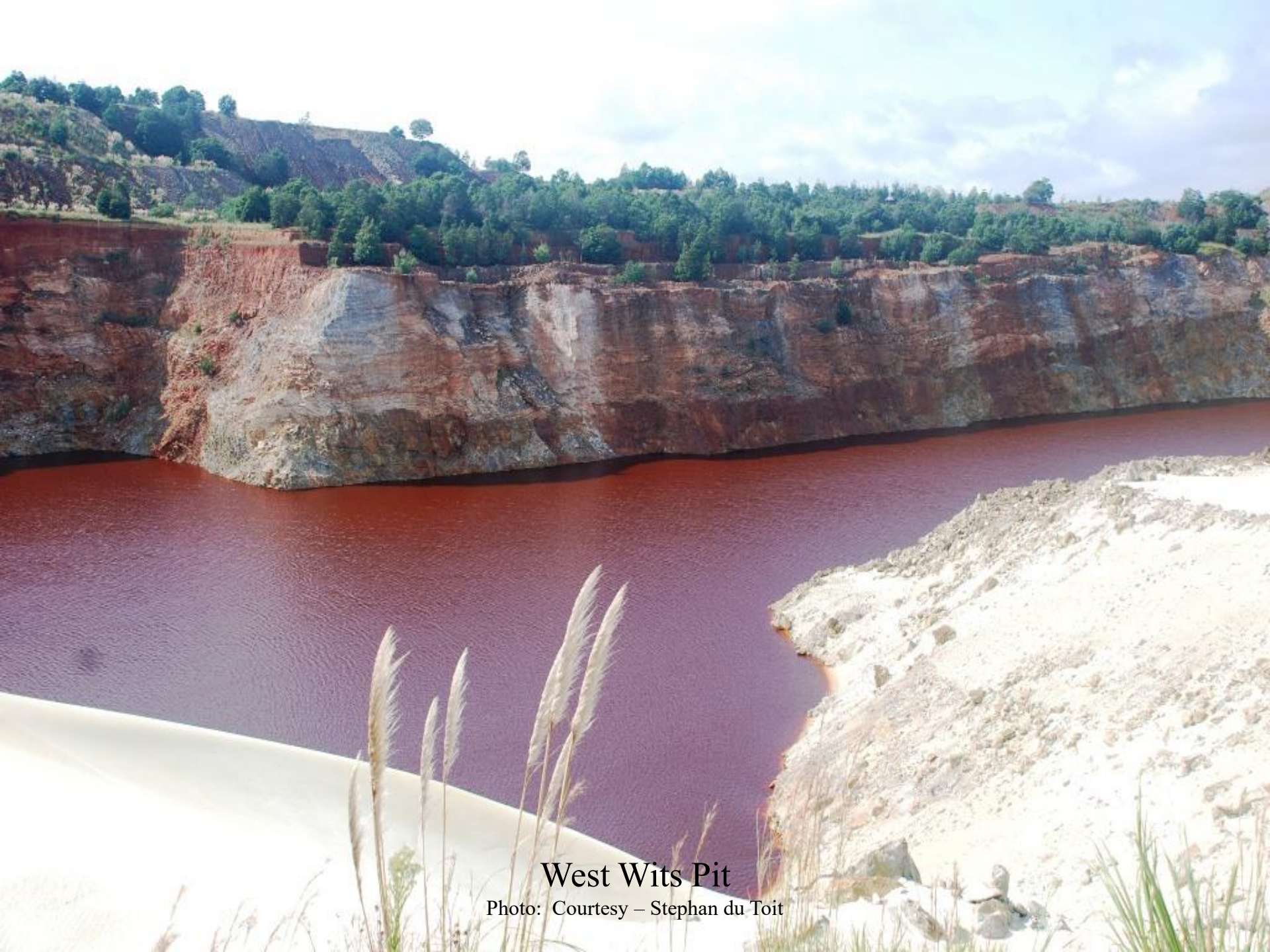
Source: Mark Olalde



Courtesy: WGFilm

Open Pits Emerald/Monarch Cluster





West Wits Pit

Photo: Courtesy – Stephan du Toit

Parliamentary Portfolio Committee on Mineral Resources

Findings

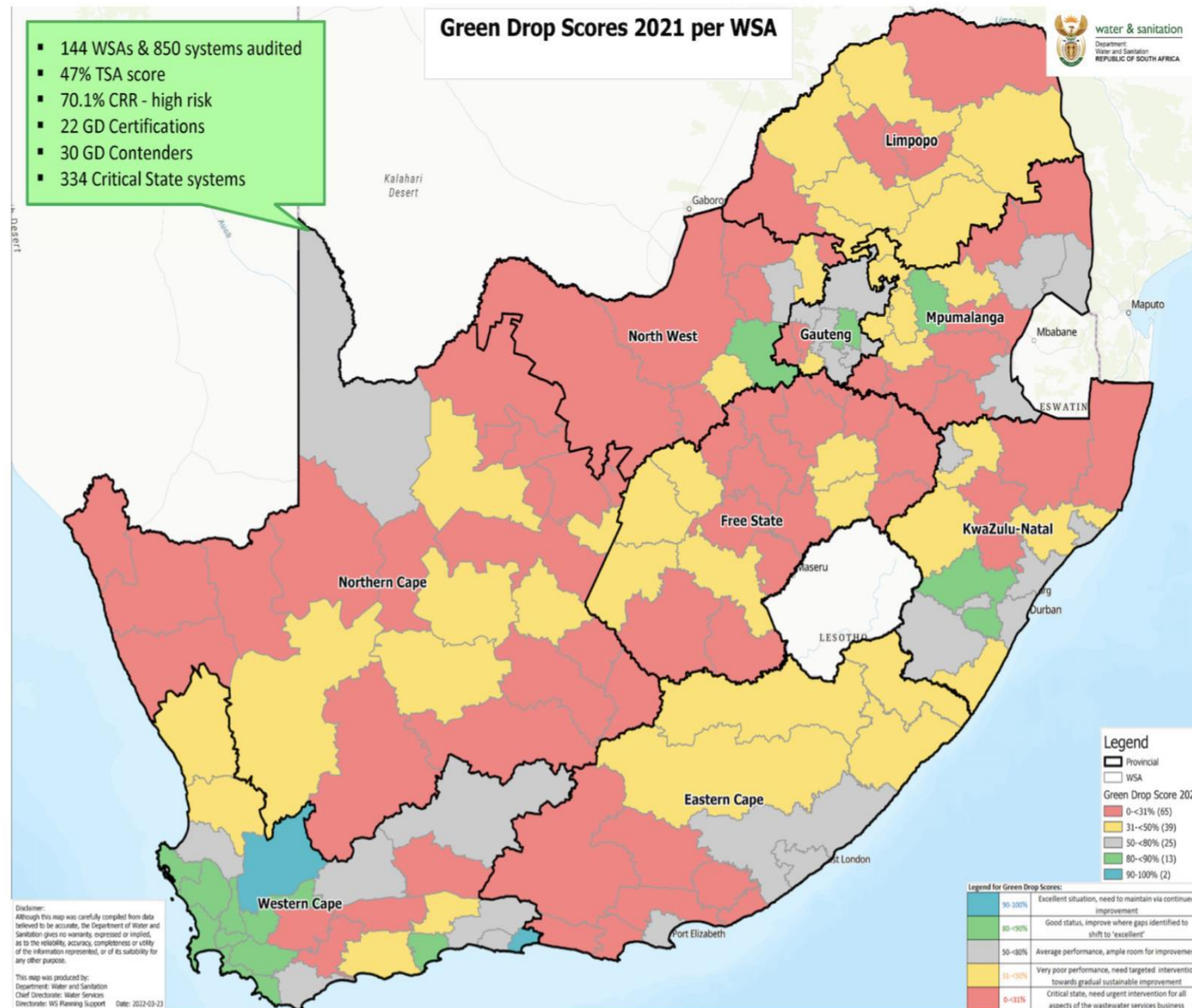
- **It is clear that some mining companies are still operating without adequate financial provision for repairing damage caused to the environment by mining activities, if they suddenly close.**
- Neither Shiva Uranium (Pty) Ltd and Mintails Mining SA (Pty) Ltd has saved all the money they were supposed to set aside under the law to pay for environmental rehabilitation. The shortfalls are R36.6-million for Shiva and **R460-million for Mintails.**
- **The DMR has failed to implement effectively and carry out the intentions of Parliament to ensure that all mines rehabilitate the damage they cause**
- **The DMR allowed Mintails to operate between 2012 and 2018, despite the fact that the Department had never approved the environmental management plans of the mine and had never issued the company with a mining right under the law.**
- DMR must report on what efforts they have made to hold directors and shareholders of Shiva and Mintails liable for the environmental debts of these failed ventures.
- The DMR must actively ensure that the licensing of mines goes with responsibility and accountability.

Sewage Pollution

Sewage contamination of water resources

- According to the NATIONAL WATER AND SANITATION MASTER PLAN (2018):
 - 56% of WWTW are in a poor or critical condition. 2022 Green Drop Report: 334 systems (40%) in a critical state 64% of systems in poor or critical state. The 2022 full Green Drop and 2023 Green Drop progress assessment report provided evidence of a rapid decline in the performance of municipal wastewater treatment systems and effluent quality this means that s sewage pollution is worsening rapidly in SA.
 - More than 50% of SA's wetland have been lost, and of those that remain, 33% are in a poor ecological condition.
 - Between 1999 and 2011 the extent of main river in SA classified as have a poor ecological condition increased by 500%, with some rivers pushed beyond the point of recovery.

Figure 3: Green Drop Scores in 2021 by water services authority



Wastewater systems

2022 Green Drop Report:
334 out of a total of 850 wastewater systems (40%) in 90 municipalities in a critical state of performance (30% in 2013)

Wastewater systems with critical or poor state of performance result in pollution through discharging partially treated or untreated water into rivers and the environment

2023 Green Drop Progress Assessment Report indicated further decline



Cradle of Humankind World Heritage Site

OBERHOLZER WWTP : 9.5ML

W W T W	Month	pH	Limit	Electrical conductivity (Ms/m)	Limit	Suspended Solids (mg/l)	Limit	Nitrite and Nitrate as N(mg/l)	Limit	Ortho-phosphate as P(mg/l)	Limit	Chemical Oxygen Demand (mg/l)	Limit	Free and Saline Ammonia as Limit	Limit	Faecal coliform (count/100ml)	Limit	12 Month Average
O	Mar-20	7.60	5.5-9.5	62.2	150	8.8	25	26.6	15	4.37	10	12	75	8.81	3	320	0	
B	Apr-20	7.8	5.5-9.5	78	150	22	25	2.7	15	3.8	10	112	75	11	3	0	0	
E	May-20	7.2	5.5-9.5	84	150	46	25	2.7	15	4.4	10	155.5	75	23.7	3	THTC	0	
R	Jun-20	7.3	5.5-9.5	74	150	17	25	2.6	15	3	10	172	75	13	3	THTC	0	
H	28-Jul-20	7.1	5.5-9.5	99	150	81	25	0.6	15	4.4	10	374.5	75	40.2	3	THTC	0	
O	4-Aug-20	7.2	5.5-9.5	89	150	91	25	0	15	3.5	10	337.9	75	29.5	3	THTC	0	
L	29-Sep-20	6.9	5.5-9.5	89	150	168	25	0.7	15	3	10	407	75	37	3	THTC	0	
Z	17-Oct-20	7.1	5.5-9.5	83	150	79	25	0.6	15	3.2	10	339.1	75	30.2	3	THTC	0	
E	17-Nov-20	7.3	5.5-9.5	89	150	35	25	0.9	15	2.9	10	194.4	75	19.2	3	0	0	
R	15-Dec-20	7.3	5.5-9.5	68	150	35	25	1.1	15	3.3	10	109.6	75	26.5	3	0	0	
	26-Jan-21	7.5	5.5-9.5	19	150	24	25	3.1	15	5.1	10	42.2	75	12.9	3	THTC	0	
	16-Feb-21	7.1	5.5-9.5	70	150	35	25	1.0	15	2.6	10	134.1	75	20.8	3	0	0	
	12 OF 12	100%	12 OF 12	100%	4 OF 12	33.30%	11 OF 12	100%	12 OF 12	100%	1 OF 12	8.30%	0 OF 12	0%	4 OF 12	33.30%	59%	

City of Johannesburg Quarterly Water Quality Status of the Rietspruit														91 Oct 2025 - 31 Dec 2025			
Joburg																	
Sample Point		Sample Point Description		Conductivity	Chloride	Calcium	Magnesium	Sulphate	Ammonium	Nitrate	Nitrite	Ortho-phosphate	Chemical Oxygen Demand	Free and Saline Ammonia	Faecal coliform	12 Month Average	
001	20° 24.2828' S	27° 48.051' E	Rietspruit, Upstream of Emmerloo Water	1	1.000	4.0	20	5.0	1.000	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				2	1.150	4.0	20	5.0	1.000	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00
002	20° 24.2828' S	27° 48.051' E	Rietspruit, Downstream of Emmerloo Water	1	1.000	1.1	1.0	3.0	2.0	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				2	1.000	1.1	1.0	3.0	2.0	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00
003	20° 24.2828' S	27° 48.051' E	Rietspruit, Downstream of Emmerloo Water	1	1.000	1.1	1.0	3.0	2.0	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				2	1.000	1.1	1.0	3.0	2.0	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00
004	20° 24.2828' S	27° 48.051' E	Rietspruit, Downstream of Emmerloo Water	1	1.000	1.1	1.0	3.0	2.0	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				2	1.000	1.1	1.0	3.0	2.0	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00
005	20° 24.2828' S	27° 48.051' E	Rietspruit, Downstream of Emmerloo Water	1	1.000	1.1	1.0	3.0	2.0	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				2	1.000	1.1	1.0	3.0	2.0	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00
006	20° 24.2828' S	27° 48.051' E	Rietspruit, Downstream of Emmerloo Water	1	1.000	1.1	1.0	3.0	2.0	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				2	1.000	1.1	1.0	3.0	2.0	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00
007	20° 24.2828' S	27° 48.051' E	Rietspruit, Downstream of Emmerloo Water	1	1.000	1.1	1.0	3.0	2.0	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				2	1.000	1.1	1.0	3.0	2.0	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00
008	20° 24.2828' S	27° 48.051' E	Rietspruit, Downstream of Emmerloo Water	1	1.000	1.1	1.0	3.0	2.0	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				2	1.000	1.1	1.0	3.0	2.0	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00
009	20° 24.2828' S	27° 48.051' E	Rietspruit, Downstream of Emmerloo Water	1	1.000	1.1	1.0	3.0	2.0	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				2	1.000	1.1	1.0	3.0	2.0	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00
010	20° 24.2828' S	27° 48.051' E	Rietspruit, Downstream of Emmerloo Water	1	1.000	1.1	1.0	3.0	2.0	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				2	1.000	1.1	1.0	3.0	2.0	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00
011	20° 24.2828' S	27° 48.051' E	Rietspruit, Downstream of Emmerloo Water	1	1.000	1.1	1.0	3.0	2.0	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				2	1.000	1.1	1.0	3.0	2.0	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00
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				2	1.000	1.1	1.0	3.0	2.0	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00
013	20° 24.2828' S	27° 48.051' E	Rietspruit, Downstream of Emmerloo Water	1	1.000	1.1	1.0	3.0	2.0	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				2	1.000	1.1	1.0	3.0	2.0	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00
014	20° 24.2828' S	27° 48.051' E	Rietspruit, Downstream of Emmerloo Water	1	1.000	1.1	1.0	3.0	2.0	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				2	1.000	1.1	1.0	3.0	2.0	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00
015	20° 24.2828' S	27° 48.051' E	Rietspruit, Downstream of Emmerloo Water	1	1.000	1.1	1.0	3.0	2.0	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				2	1.000	1.1	1.0	3.0	2.0	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00
016	20° 24.2828' S	27° 48.051' E	Rietspruit, Downstream of Emmerloo Water	1	1.000	1.1	1.0	3.0	2.0	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				2	1.000	1.1	1.0	3.0	2.0	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00
017	20° 24.2828' S	27° 48.051' E	Rietspruit, Downstream of Emmerloo Water	1	1.000	1.1	1.0	3.0	2.0	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				2	1.000	1.1	1.0	3.0	2.0	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00
018	20° 24.2828' S	27° 48.051' E	Rietspruit, Downstream of Emmerloo Water	1	1.000	1.1	1.0	3.0	2.0	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				2	1.000	1.1	1.0	3.0	2.0	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00
019	20° 24.2828' S	27° 48.051' E	Rietspruit, Downstream of Emmerloo Water	1	1.000	1.1	1.0	3.0	2.0	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				2	1.000	1.1	1.0	3.0	2.0	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00
020	20° 24.2828' S	27° 48.051' E	Rietspruit, Downstream of Emmerloo Water	1	1.000	1.1	1.0	3.0	2.0	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				2	1.000	1.1	1.0	3.0	2.0	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00
021	20° 24.2828' S	27° 48.051' E	Rietspruit, Downstream of Emmerloo Water	1	1.000	1.1	1.0	3.0	2.0	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				2	1.000	1.1	1.0	3.0	2.0	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00
022	20° 24.2828' S	27° 48.051' E	Rietspruit, Downstream of Emmerloo Water	1	1.000	1.1	1.0	3.0	2.0	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				2	1.000	1.1	1.0	3.0	2.0	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00
023	20° 24.2828' S	27° 48.051' E	Rietspruit, Downstream of Emmerloo Water	1	1.000	1.1	1.0	3.0	2.0	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				2	1.000	1.1	1.0	3.0	2.0	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00
024	20° 24.2828' S	27° 48.051' E	Rietspruit, Downstream of Emmerloo Water	1	1.000	1.1	1.0	3.0	2.0	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				2	1.000	1.1	1.0	3.0	2.0	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00
025	20° 24.2828' S	27° 48.051' E	Rietspruit, Downstream of Emmerloo Water	1	1.000	1.1	1.0	3.0	2.0	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				2	1.000	1.1	1.0	3.0	2.0	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00
026	20° 24.2828' S	27° 48.051' E	Rietspruit, Downstream of Emmerloo Water	1	1.000	1.1	1.0	3.0	2.0	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				2	1.000	1.1	1.0	3.0	2.0	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00
027	20° 24.2828' S	27° 48.051' E	Rietspruit, Downstream of Emmerloo Water	1	1.000	1.1	1.0	3.0	2.0	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				2	1.000	1.1	1.0	3.0	2.0	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00
028	20° 24.2828' S	27° 48.051' E	Rietspruit, Downstream of Emmerloo Water	1	1.000	1.1	1.0	3.0	2.0	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				2	1.000	1.1	1.0	3.0	2.0	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00
029	20° 24.2828' S	27° 48.051' E	Rietspruit, Downstream of Emmerloo Water	1	1.000	1.1	1.0	3.0	2.0	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				2	1.000	1.1	1.0	3.0	2.0	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00
030	20° 24.2828' S	27° 48.051' E	Rietspruit, Downstream of Emmerloo Water	1	1.000	1.1	1.0	3.0	2.0	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				2	1.000	1.1	1.0	3.0	2.0	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00
031	20° 24.2828' S	27° 48.051' E	Rietspruit, Downstream of Emmerloo Water	1	1.000	1.1	1.0	3.0	2.0	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				2	1.000	1.1	1.0	3.0	2.0	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00
032	20° 24.2828' S	27° 48.051' E	Rietspruit, Downstream of Emmerloo Water	1	1.000	1.1	1.0	3.0	2.0	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				2	1.000	1.1	1.0	3.0	2.0	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00
033	20° 24.2828' S	27° 48.051' E	Rietspruit, Downstream of Emmerloo Water	1	1.000	1.1	1.0	3.0	2.0	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				2	1.000	1.1	1.0	3.0	2.0	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00
034	20° 24.2828' S	27° 48.051' E	Rietspruit, Downstream of Emmerloo Water	1	1.000	1.1	1.0	3.0	2.0	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				2	1.000	1.1	1.0	3.0	2.0	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00
035	20° 24.2828' S	27° 48.051' E	Rietspruit, Downstream of Emmerloo Water	1	1.000	1.1	1.0	3.0	2.0	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				2	1.000	1.1	1.0	3.0	2.0	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00
036	20° 24.2828' S	27° 48.051' E	Rietspruit, Downstream of Emmerloo Water	1	1.000	1.1	1.0	3.0	2.0	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				2	1.000	1.1	1.0	3.0	2.0	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00
037	20° 24.2828' S	27° 48.051' E	Rietspruit, Downstream of Emmerloo Water	1	1.000	1.1	1.0	3.0	2.0	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				2	1.000	1.1	1.0	3.0	2.0	0.000							

Water Quality Guidelines

1	0.5	10	1 Jan to 31 Mar 2025
2	0.5	10	1 Apr to 30 Jun 2025
3	0.5	10	1 Jul to 31 Sep 2025
4	0.5	10	1 Oct to 31 Dec 2025

MERAFONG CITY LOCAL MUNICIPALITY

WATER AND SANITATION

MERAFONG Water Quality Data Challenges and Interventions

DWS WONDERFONTEIN FORUM

2 MARCH 2021



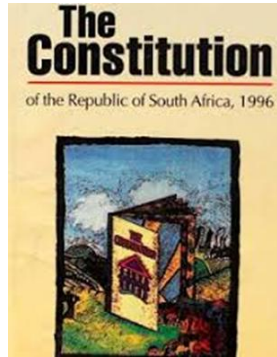
Sewage Pollution

- Report by the SAHRC: Gauteng Provincial Inquiry Into the Sewage Problem of the Vaal River (2021)
- Report by the SAHRC: Report of the Gauteng Provincial Inquiry into the Sewage Pollution of the City of Tshwane's Rivers and the Roodeplaat Dam (2021)

***“The Commission therefore recommends that the situation regarding failing WWTWs in South Africa and its consequent pollution of South Africa’s water resources be declared a national disaster, in accordance with the DMA.*”**

LEGAL MATRIX

Bill of Rights



- Section 24: Everyone has the right to an environment that is not harmful to health and wellbeing.

While Section 24(a) focuses on the "here and now," it is supported by Section 24(b), which requires the government to protect the environment for future generations through conservation and the prevention of ecological degradation.

Key Enabling Legislation

The National Environmental Management Act, 107 of 1998 (NEMA)

PRINCIPLES

- **Disturbance of ecosystems, loss of biological diversity, pollution and degradation of the environment and disturbance of sites that constitute the nation's cultural heritage should be avoided.** Where they cannot be altogether avoided, should be minimised and remedied.
- **Waste should be avoided.** Where it cannot be altogether avoided, it should be minimised and re-used or recycled where possible and otherwise disposed of in a responsible manner.
- A **risk-averse and cautious approach** should be applied, which takes into account the limits of current knowledge about the consequences of decisions and actions.
- **The polluter pays;** i.e. the costs of preventing, controlling and remedying pollution and environmental degradation rest with those responsible for harming the environment.

The failure to observe any of these principles could serve as a basis for court action. The NEMA provides that any person or group of persons may seek 'appropriate relief' from a court of law in respect of any breach or threatened breach of any provision of NEMA including a principle contained in chapter 1.

KEY ENABLING LEGISLATION



Section 28 of NEMA: Duty of care and remediation of environmental damage

“(1) Every person who causes, has caused or may cause **significant pollution or environment** must take reasonable measures to prevent such pollution or degradation from occurring, continuing or recurring...”

The duty to take reasonable measures to prevent significant pollution or degradation of the environment from occurring, continuing or recurring (“the duty of care”) also applies to pollution that occurred before NEMA commenced; to pollution that might arise at a different time from the actual activity that caused the contamination and to pollution that may arise following an action that changes pre-existing contamination.

It is therefore no defence to say that the pollution is historic, indirect or underlying – the responsibility to take reasonable steps remains.

Section 34 of NEMA makes provision for:

Both ‘firms’ (including companies and partnerships) and their ‘directors’ (including board members, executive committees or other managing bodies or companies or members of close corporations or of partnerships) to be held liable, in their personal capacities, for environmental crimes.

KEY ENABLING LEGISLATION

- **The National Environmental Management Waste Act, 59 of 2008 (NEM:WA)**

Residue stockpiles and residue deposits, and extraction activities in residue stockpiles fall within the ambit of the NEM:WA.

“Mine”, used as a verb in the MPRDA does not include extraction activities in residue stockpiles.

Extraction of minerals from residue stockpiles constitutes processing that does not require a separate mining permit.

General Duty of Care

Any "holder of **waste**" has a legal obligation to take all reasonable measures to prevent waste from causing a nuisance (noise, odour, or visual impacts) or endangering health and the environment. This includes:

- Investigating and assessing the impact of their waste.
- Managing waste so it does not cause pollution or ecological degradation.



MINING KEY ENABLING LEGISLATION

The National Water Act, 36 of 1998



“19 (1) An owner of land, a person in control of land or a person who occupies or uses the land on which-

- i. Any activity or process is or was performed or undertaken; or
- ii. Any other situation exists, which causes, has cause or is likely to cause pollution*of a water resource, must take all reasonable measures to prevent any such pollution from occurring, continuing or recurring.

***Pollution** means the direct or indirect alteration of the physical, chemical or biological properties of a water resource so as to make it less fit for any beneficial purpose for which it may reasonably be expected to be used; or harmful or potentially harmful to the welfare, health or safety of human beings, aquatic or nonaquatic organisms, resource quality or property.

MINING

Enabling Legislation

Regulations on Use of Water for Mining and Related Activities Aimed at the protection of Water Resources GN.R 704 of 4 June 1999

These regulations set minimum requirements for mine water management to prevent pollution and ensure sustainable use.

Key Requirements of GN.R 704

- **Clean Water:** Must be diverted away from dirty areas and unpolluted runoff should be routed to natural watercourses.
- **Dirty Water:** All water arising from "dirty areas" (including seepage and runoff from residue deposits) must be collected, contained, and recycled as far as practicable.
- **No residue deposits, dams, or reservoirs** may be placed within the **1:100 year flood-line** or within 100 metres of a watercourse or borehole.
- Water systems must be designed to handle a 1:50 year flood event without spilling between clean and dirty systems.
- Dams or tailings facilities in dirty systems must maintain a minimum **freeboard of 0.8 metres** above the full supply level.
- **Prevent water containing waste** from entering any water resource through flow or seepage.
- **Effectively fence off dams** containing toxic substances and display warning signs.
- Notify the Department of Water and Sanitation (DWS) at least 14 days before starting new activities or ceasing operations.

MINING AND ENVIRONMENTAL RIGHTS

ENABLING LEGISLATION

National Nuclear Regulator Act, 47 of 1998

- 22. (1) Any person wishing to engage in any action described in section 2(1)(c)(any action which is capable of causing nuclear damage) may apply in the prescribed format to the chief executive for a **certificate of registration or a certificate of exemption**.
- “nuclear damage” means
 - (a) any injury to or the death or any sickness or disease of a person;
 - (b) other damage. including any damage to or any loss of use of property or damage to the environment which is attributable to ionizing radiation.

Mining Closure

Mineral and Petroleum Resources Development (MPRD) Regulations

The closure of a mining operation incorporates a process which must start at the commencement of the operation and continue throughout the life of the mine.

Risks must be quantified and managed proactively.

The land is to be rehabilitated to its natural state or to a predetermined and agreed standard or land use which conforms with the concept of sustainable development.

Since they are the ultimate recipients of potential, ongoing and historical pollution and the potential future land users, the MPRD Regulations require that IAPs must be involved in the agreements regarding future land use of affected areas and thus in the decisions regarding the establishment of objectives for such future land use, as well as in discussing the alternatives for engineering interventions, where decisions regarding such options will affect the future land use.

A holder of a mining right must apply for a closure certificate upon lapsing or abandonment of his right, cessation of mining operations or relinquishment of any portion of land to which the right relates.

Within 180 days complete and submit a prescribed closing plan including an environmental risk report to DMRE Regional Manager.

- Immediate harm to human health and safety must be eliminated
- Groundwater must be fit for current and future domestic and other uses consistent with agreed current and future land use
- Surface water must be fit for current and future basic human needs and aquatic ecosystems requirements
- Risks of harm to non-aquatic organisms (vegetation) must be eliminated
- Soil (property) must be fit for use consistent with current and future land use

Mining

Financial Provision

National Environmental Management Act (107/1998): Regulations pertaining to the Financial Provision for Prospecting, Exploration, Mining or Production Operations

Scope of financial provision

5. An applicant or holder of right or permit must make financial provision for—

(c) remediation and management of latent or residual environmental impacts which may **become known in future, including the pumping and treatment of polluted or extraneous water.**