



WATER AND LAND

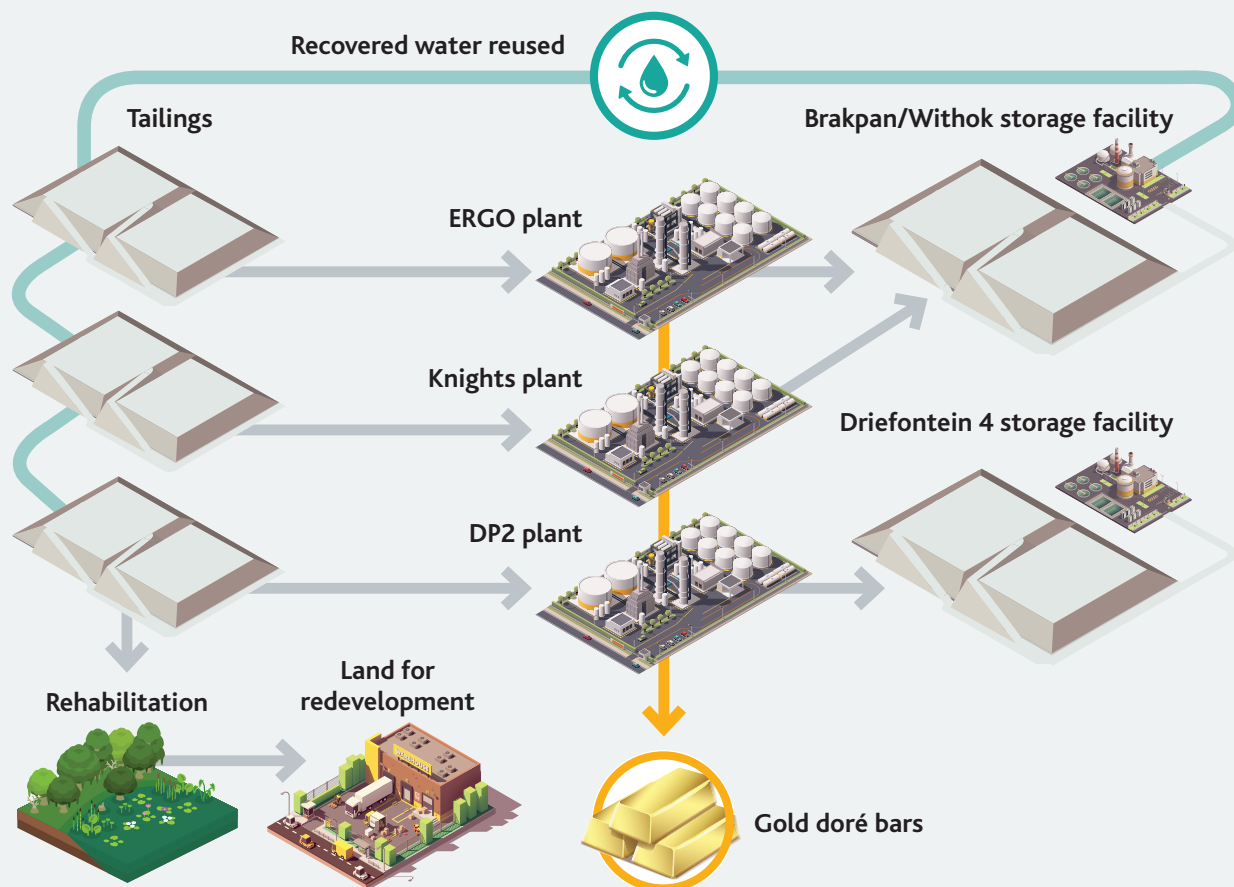
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Note: Grootvlei is provided as a landmark, but is not part of the DRDGOLD/Ergo footprint

ABOUT DRDGOLD

DRDGOLD (JSE, NYSE: DRD) is the oldest, continuously listed companies on the Johannesburg Stock Exchange (JSE) still in business and has a secondary listing on the New York Stock Exchange (NYSE). It is the only company in South Africa focused solely on the retreatment of surface gold tailings. The Company has two major production footprints. Besides FWGR to the west, there is Ergo, a major surface gold tailings retreatment operation extending from central Johannesburg to Ekurhuleni in the east.

WHAT WE DO



LOOKING BACK

Although the primary focus of the gold mines on the reefs of the Witwatersrand was the extraction of gold, the reefs mined contained more than just gold. Consequently, contained in the mine tailings left behind by these mines, besides gold, is an array of common metals such as uranium, cobalt, copper, nickel, mercury, zinc, manganese, vanadium, silver and chromium.

These metals and minerals are by-and-large inert and occur at concentrations that, if they remain contained in well managed tailings storage facilities, seldom challenge the standards in the South African National Standard (SANS) 241 Drinking Water Specification. If they become concentrated however, either via leaching through seepage

or water run-off, they could pose a risk to the wellbeing of surrounding communities, the natural environment and underground water sources. The term used to describe heavy metals that have been activated in this way is acid mine drainage (AMD).

Many of the historic dumps that DRDGOLD targets for reclamation were not built to contemporary standards of environmental governance. In fact, many of these dumps have been long defunct and are sources of groundwater seepage.

Dumps harking back to the early days of mining were also created mostly in low lying areas – the carts in which mine waste was transported were pulled by animals, typically donkeys and mules, and pulling a heavy, full cart downhill to a disposal site, and a lighter, empty cart back up, was simply more efficient. The fact that these lower-lying areas were often in wetlands or in water courses was seemingly of little concern in those days.

In more recent times, in the era just before and after the Second World War, and on the mines further away from Johannesburg towards the West Rand, it was considered good practice to build tailings storage facilities (TSFs) over dolomitic land. By then volume throughput had significantly increased and mine tailings were finer due to the introduction of ball mills. More material that did not 'stack' as competently as the coarser material from older mills had to be stored and getting water off and out of these tailings dams was a priority.

The dolomites, it was thought, provided better drainage, allowing water to seep out and away from tailings dams, making them safer and more stable. Tailings dams located on these dolomitic areas now pose an ever-increasing risk as AMD seeping out and into the ground below increases the erosion of below-ground karst (soluble) formations which, in turn, could lead to the formation of sinkholes and ground subsidence.

DRDGOLD'S BUSINESS MODEL

DRDGOLD's entire business model is premised on the removal of old, defunct mine dumps. In doing so, the sources of seepage are removed, and the contamination of underground water is significantly reduced. Eventually and over time, as more dumps are removed, seepage will reduce, and the quality of groundwater will improve.

It is estimated that, just in terms of dumps targeted by Ergo for retreatment, once all these have been reprocessed, groundwater seepage could reduce by as much as 3.7 million m³ per year. This is the equivalent of just over 10 000 m³/day over the Witwatersrand area, resulting in a significant reduction in groundwater contamination. Added to this and based on a sulphate leachate concentration of 2 000 mg/l from mine dumps, sulphate salt loading of underground aquifers could reduce by up to 7 400 tonnes per year.

This process is not without its challenges, though. The economic feasibility of retreating old mine waste depends on very significant economies of scale. To achieve the required throughput rate, old tailings are mined hydraulically. Water is delivered through high-pressure jets into the side of the mine

dump to – in sequential 'slices' – dislodge mine waste and turn it into a slurry. From there, it is pumped through a network of pipelines to a reclamation plant. After treatment, the resulting waste is pumped via pipeline, to a permanent tailings storage facility (TSF).

This entire process requires strict water circuit management protocols to make sure that all process water and slurry remain contained. Water is kept in a closed circuit and managed from a centralised water reticulation facility. The same applies to water on TSFs – all of it is contained by way of return water dams and evaporation ponds that are integrated into the centralised water reticulation system.

In recent times, due to the climate change-related increase in the severity of rainfall, the design and management lay-out of reclamation sites have also been adapted to enable us to separate 'clean' and 'dirty' water and to contain storm-water run-off, all aimed at preventing water from flowing into the natural environment.

Below is a photograph of a reclamation site that depicts the mine 'face' in the foreground and the containment paddocks and trenches set up to do the separation and containment of water. These measures are supplemented by a system of return water dams, settling ponds and evaporation dams, designed to contain water borne metals and salts.



4L50 concurrent rehabilitation area: clearing to natural ground level and onsite water containment paddocks



Lined return water dam at Brakpan/Withok TSF with cladded and vegetated side wall of the TSF in the background



Part of silt trap at Brakpan/Withok return water dam

Finally, in contrast to historic methods of tailings storage, our process offers a more benign approach to environmental considerations, both in terms of the characteristics of the residue tailings we produce and in terms of water management practice. In respect of the former, part of our gold extraction process involves increasing the pH of throughput material to above 9.5. As a result, the residue tailings we produce are far more basic than the typical acidic tailings found in historic dumps.

In respect of the latter, the practice followed in the early days of mining of allowing surplus water drawn from TSFs to flow into the surrounding environment (in all fairness, relying in certain instances on the establishment of bio-filters to reduce the effect of decant) has now been replaced by a system of strict water-balance controls. At its core, this practice is all about containing water and not allowing it to flow into the natural environment:

- Surplus water on TSFs is decanted from the pool on top of the dam to return water dams
- Drainage of excess water from the rest of the dam is performed through an extensive series of below-surface drains of various designs that intercept and capture run-off via a system of berms and launders
- This is pumped to the return water dams and, as mentioned above, the return water dam system is integrated into the rest of the water circuit and all the water that ends up there is pumped back to the operations for re-use

In addition, cladding TSFs with a layer of top-soil and rock, and then establishing natural indigenous vegetation in the cladded layer, minimises run-off and prevents dust from being blown off the facility. It also assists in keeping the metals in the facility inert, preventing them from leeching through the dam. Ground water seepage from the facility is intercepted by scavenger bore-holes around the TSF and pumped into the return water dams for re-use.

As explained in more detail below, the containment and re-use of water in this way meets 70% of the water requirements of the Ergo operations. Water is distributed over a network of pipelines that take water back to reclamation sites, in certain instances more than 30 kilometres away.



ENVIRONMENTAL SUSTAINABILITY AND OUR WATER CONSUMPTION

South Africa is a semi-arid country and its ability to consistently deliver potable water to its inhabitants is limited. Operationally, if our operations were to rely on potable water to meet the requirements of the business, our risk exposure would be intolerably high, and running out of water would be a very significant and real existential risk. Added to this, and from the perspective of environmental stewardship, the mere thought of using potable water at the rate required by our operations in an essentially industrial process, is simply unimaginable.

As a result, for many years now, DRDGOLD has been carefully tracking potable water usage, significantly increasing the use of grey water and systematically integrating its water circuit to ensure that no water is wasted. In 2017, when the central water reticulation plant at the Ergo operation was completed, we had developed the ability to deliver water to all corners of the business and return it through a fully integrated, closed system.

Now, just over 70% of all process water makeup at Ergo is drawn from water returned from the Brakpan/Withok TSF to our various reclamation sites by way of return-water columns. A further 5% of our process water top-up needs are from treated underground AMD, drawn from a facility operated by the Trans Caledonian Tunnel Authority (TCTA) on a site provided by our group subsidiary, East Rand Proprietary Mines Limited (ERPM).

Ekurhuleni Metropolitan Municipality's wastewater treatment facility at Rondebult supplies a further 1% to 2%, depending on the rate at which water flows into the waste facility, and another 15% is from lakes and dams in the region that capture the inflow of seasonal rain and storm water inflows, harvested in terms of the requisite extraction licences. Potable water is only used in processes where the sensitivity of equipment requires it, and for certain early-stage irrigation to settle in newly established vegetation on TSFs.

Far West Gold Recoveries (FWGR) gets roughly 40% of its water by way of return water from its TSF, Driefontein No. 4. The balance of its water requirements is grey water from the de-watering of underground mine workings. Potable water consumption is very limited and used only for drinking water, ablutions and the mixing of flocculant.



SUSTAINABLE LAND USE

The reclamation of mine dumps for reprocessing benefits not only the quality of water in and under the reclamation site, but also plays a role in sustainable land use. Over the decades as mining continued, a city grew around the mining settlement that became Johannesburg.

Now, more than a century on, virtually all former mining sites are enclosed by residential and industrial areas. In some instances, communities were forcibly moved by the apartheid authorities to newly established areas situated very close to historic dumps while, post-democracy, the rate of influx of people to the city and a seemingly more relaxed approach on the part of the authorities to the establishment of human settlements near historic dumps, resulted in the mushrooming of communities in very close proximity to mine dumps.

Either way, the standards of governance in terms of tailings management and land reclamation have had to be adapted. Now, the cladding and vegetation of permanent storage facilities are completed to a standard far exceeding the standards that were used in the 1950s when it was assumed that no-one would be living within 500 metres of mine dumps. Similarly, the removal of dumps would be meaningless if it were simply to be replaced by another equally unappealing situation, for example, the dumping of refuse or an illegal invasion, to name but two scenarios.

In order for society and the environment to truly benefit from our efforts, we take sustainable land use, post clean-up, very seriously. Once all the mine waste is removed, the top layer of soil is lifted to the extent required, and an application for clearance is submitted to the National Nuclear Regulator

(NNR). In what follows and before returning the property to the owner, the site is sculpted, profiled and grid paddocks established to promote the settling in of natural vegetation and to manage surface water and dust.

In line with our goal to promote sustainable land use and to ensure that the irritation of living next to a mine dump is not replaced by another equally bothersome situation as described above, we proactively engage the owner in anticipation of hand-over to promote the seamless development of the land.

After several decades of lying under a mine dump some sites are, because of ground and soil quality and conditions, not suitable for residential use. All the sites that we have reclaimed though have been benefited to standards that pass the scrutiny of the NNR and that comply at the very least with the standards for light industrial or commercial use. From the early days of Edgardale in Selby to the more recent Inland Port, Mennels and S & J Industrial Park (adjacent the Geldenhuys interchange), many areas that lay sterilised underneath mine dumps for decades have now been redeveloped and put to beneficial use.

Our Company has for many years considered multi-dimensional sustainable development value-add as key to its strategic ambitions. We are as serious about our social and environmental dividend as we are about our financial return. The pursuit of commercial success by producing gold from waste, while cleaning up old mine waste sites and, in so doing, improving the quality of the conditions in which the people around our operations live, are outcomes and activities that strongly resonate with this multi-layered value pursuit.

Our ambition is to retreat all the tailings under our control, forming part of our resource make-up. We will continue to strive to do this in a way that not only adds economic value, but that also improves the quality of life of those that live nearby through environmental restoration.



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