WATERBERG COALFIELDS

Land of plenty?

The abundance of coal reserves in the Waterberg is well known but the area presents serious challenges such as water scarcity, complex geology and high mining costs.

For some time now, the Waterberg coalfield has been described as a viable solution to South Africa’s depleting coal resources.

As the fourth largest coal reserve in the world, geologists and miners have only touched the tip of the iceberg of what the Waterberg has to offer. Estimates put the Waterberg coal reserves at approximately 75 billion tonnes, making up 40% of South Africa’s remaining coal reserves.

Soon, the Waterberg is likely to find itself in a situation where the mining industry, the media, government departments and environmentalists will be in heated debates on the future of this ecologically sensitive area.

WATER WOES

The first critical consideration for the Waterberg area is, ironically, the lack of water. Water is piped from the Vaal system to the Crocodile River catchment area, which incorporates the Waterberg, to supplement the water obtained from the local water resources such as the Mokololo Dam, Mogalakwena River basin and the Olifants River, but the existing water infrastructure will not cope with demand if rapid migration to the area should occur.

“The Waterberg has major challenges in terms of water supply. It is extremely dry and there isn’t enough water in the catchment to sustain mining activities,” says Peter Shepherd, partner and principal hydrologist at mining consultants SRK, specialists in mineral exploration, mine planning and production.

According to Shepherd the possibility of inter-basin transfers have been substantially looked at for the region, and in his opinion, remains the only solution for mining enablement in the area.

Projects from both the Olifants River and the Hartebeespoort Dam have been on the cards.

The Olifants River originates near Bethal in the Highveld region of Mpumalanga. The river initially flows northwards before curving in an easterly direction through the Kruger National Park and into Mozambique, where it joins the Limpopo River.

The Olifants River catchment area
will be influenced by the construction of the De Hoop Dam in the Steelpoort valley, which will effectively increase its yield through the abstraction of water from the Steelpoort River to boost water supply for mining and agricultural activity in the Waterberg.

"Construction of the De Hoop Dam alone won’t quite get us to an adequate water supply for the Waterberg area, because it is a long way and there simply isn’t enough," says Shepherd.

The other solution being considered is to bring water from the Hartbeespoort Dam, as well as excess water from the platinum mines (surplus underground water on the western limb), into the Limpopo catchment area.

"Hartbeespoort Dam essentially comprises sewage water from Gauteng. It is one of the few water sources in the country with an increasing yield – as Johannesburg and Pretoria expands, the bigger the additional water supply to the dam, which can be used elsewhere," says Shepherd.

Additional water will most likely be made available from Hartbeespoort Dam and surrounding platinum mines, if the project moves from feasibility into fruition.

Because it is sewerage water, the composition of the water is organic in nature, with little salt and metals content. Treatment of the water will, therefore, be relatively easy and quite suitable for mining and processing purposes, he explains.
**COMPETING FOR NATURAL RESOURCES**

The many water constraints and challenges may force more collaboration between players in the Waterberg, although a study by the Centre for Sustainability in Mining & Industry (CSMI) in partnership with the Coaltech Research Association, proves that this is not the case.

The paper, *Sustainable development of the Waterberg Coalfields: Scenarios for Optimal Settlement Patterns*, found that cooperation between the platinum and coal mines is entirely absent, as they compete for the same water allocations in the area.

As more players flock to the Waterberg, competition for water allocation will only increase, and the regulators will need to get their act together to avoid potential catastrophes.

First-mover advantage is vital from an investor point of view but with the luxury of entering any unchartered territory it also comes at a price.

This was typically the case with Coal of Africa’s Vele mine, in the equally water-challenged, environmentally sensitive Tulii basin coalfield, where legal disputes over water licences caused the company significant amounts of money and reputational harm.

The Limpopo River basin contains an aquifer, a rock base of the old river basin, now filled with sand. The river normally runs in the sand below the surface. Although the river appears dry from an aerial view, there is water in the sandy surface aquifer, where farmers extract water via boreholes.

Vele CEO Riaan van der Merwe says it is vital to protect the river basin and surface aquifer in the region. The Vele operations team will access a second aquifer, an underground saline aquifer, through underground mining. The two aquifers are separated by a thick mudstone layer in the rock strata, which causes an impervious layer for surface water.

As Vele’s underground mine gets established, the operations team will start pumping water from the underground saline aquifer and use it in the plant process.

“Essentially the mine design is based on not affecting the river basin and surface aquifer and, in time, reduce the requirement for freshwater from the river by reusing the saline underground aquifer in the plant,” Van der Merwe explains.

“Although underground aquifers are a potential source, in my opinion it will not be enough to sustain a series of coal mines in the Waterberg in the long-term,” says Shepherd. “The only viable solution to address the water scarcity of the Waterberg coalfields is an inter-basin water transfer.”

Of course, environmentalists are debating the validity of inter-basin transfers, and whether it should be deemed the most appropriate solution for water scarcity. “Removing water from its basin of origin can have devastating environmental consequences. Both aquatic and terrestrial environments may be affected. Aquatic degradation includes harm to in-stream flows, wetlands, water quality, riparian habitat and to aesthetic qualities,” writes Logan Hollers in a paper highlighting the...
underlying flaws of inter-basin transfers.

South Africa is a water-scarce country and the change in flow between basins may negatively affect sources. Secondly, the type of water that is brought in, may differ from the water being used, and all this needs to be considered, says Shepherd.

The issue between the Department of Mineral Resources (DMR) and the Department of Water Affairs in terms of what constitutes “an environmentally sensitive area” and which laws apply, has long not been resolved. This will also affect the speed and plausibility with which projects come on-stream in the future.

“The DMR must only issue licences for areas that can be mined without impacting rivers or wetlands. Buffers on wetlands are critical for the future of the Waterberg area,” Shepherd adds.

**COMPLEX GEOLOGY**

Water scarcity is not the only challenge that the Waterberg faces. The Waterberg coalfield is characterised by an upper 60m thick sequence of intercalated mudstone and coal bands known as the Grootgeluk Formation, and a lower 55m thick sequence on more discreet seams of the Goedgedacht Formation (Vryheid Fm), similar in nature to those of the central basin of Mpumalanga.

“The upper zones are more erratic and extraction of these coal zones is not as straightforward as mining Mpumalanga-type seams (Lower Vryheid Fm),” says Sello Nzama, senior geologist at SRK. Due to the complex nature of this coalfield, especially in the upper zones, Grootgeluk Mine of Exxaro developed a standard stratigraphic naming nomenclature for these zones which reflect the cyclical nature of peat formation within the coalfield.

“Low grades, high ash content and low yields are characteristic of these resources, making it commercially less attractive and less versatile than the Mpumalanga coalfields and this impacts on the mining method to be applied,” he says.

The nature of the coalfield requires high capacity process plant which implies high capital injection.

“These challenges will need junior exploration and mining companies in the area to use more collaborative approaches. It will need the sharing of ideas and solutions and even syndicating services,” says Nzama.

“Specific beneficiation strategies may need to be developed for specific product requirements.

However, coal washing is likely to require huge amounts of water which is not readily available in the region so dry processing might have to be further investigated.”

The Waterberg coalfield has potential to become a significant mining and industrial centre in South Africa. But its future hinges on critical decisions by government, and careful planning and execution by all parties involved.

Water availability is the primary component to enable mining in the area, together with the need for a combination of conventional mining methods to exploit the accessible coal resources, coupled with alternative technologies for more complex geological zones.