24 April 2012 Project No. 99500

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PROPOSED NEW OPENCAST COAL MINE ON GROENVLEI AND LAKENVLEI

REVIEW COMMENTS ON THE GEOHYDROLOGICAL REPORT.

Dear Leon

This letter provides a short overview of the "Geohydrological Report for the Proposed Opencast Mining Operation on the Farm Groenvlei and a Portion of the Farm Lakenvlei" prepared by Geo Pollution Technologies Gauteng,. The report ref. is MeGR-11-158 dated June 2011.

The review has been prepared at the request of Leon Krynauw, a property owner in the same area as the proposed mining development.

1.0 LOCATION OF PROPOSED MINE

The proposed William Patrick Bower (WPB) opencast is located on portion 12 of the farm Lakenvlei 355JT and in the far NW corner of the farm Groenvlei 353JT. The proposed open pit itself will be approximately 75ha in extent with a SW-NE axis. The depth of the pit is not mentioned in the report; however, it is judged from the depth to water table and reported drawdown anticipated that the pit will be about 30m deep. The pit footprint lies between 3 abandoned (small) coal mines.

The proposed mine area lies on the watershed between B41A (Olifants catchment) and X21F (Nkomati catchment). The Elandsfonteinspruit lies approximately 1km to the east of the mine area and flows south traversing Groenvlei. An unnamed drainage line rises on Lakenvlei within the mining area and flows south joining the Elandsfonteinspruit on portion 17 of Groenvlei.

The elevation of the opencast mine is about 1900mamsl and is located some 5km N and upslope of the property owned by Leon Krynauw, which lies at an elevation below 1800mamsl.

2.0 BASIS OF REPORT

The report reviewed describes the geological and hydrogeological situation at the mine and immediately surrounding area. Impacts on the surface and groundwater are described for the operational, decommissioning and post mining phases. The impact assessment has been prepared on the basis of a desk study of available information, a hydrocensus of 8 boreholes and 2 surface water bodies, analyses of water samples collected from the boreholes and surface water, ABA of one sample collected from an

unknown exploration corehole, and numerical groundwater flow and solute transport modelling using Modflow. No field work (beyond the hydrocensus and sampling) was done.

3.0 BRIEF OVERVIEW OF THE REPORT FINDINGS

- The hydrocensus covers an area approximately 2km around the mine site. Importantly no boreholes were surveyed to the south of the proposed mine.
- The area is characterised by shallow <12m water table.
- The analyses of the water samples collected indicate the water is generally Class 1 (SANS 241:2006), with poorer quality in the area of the old coal workings.
- The aquifer is classified as comprising a minor aquifer system, with medium vulnerability requiring a medium level of protection. The classifications are based upon the DWA classification system and are realistic.
- The rock and tailings material (overburden) are described as non-acid generating. This is based upon one rock sample on which Acid Base Accounting (ABA) and Nett Acid Generation (NAG) tests were carried out. Drawing this conclusion from one test result implies a high level of uncertainty; this is noted in the report and a more extensive geochemical study is recommended. The mitigation actions recommended in the report assumes AMD will occur.
- The life of mine is not stated.
- A mine plan showing annual depth development of the open pit over the footprint was not available to assist with the numerical modelling.
- Numerical modelling has been undertaken using Modflow, a finite difference modelling code, widely used for groundwater studies.
- The Modflow model covers an area of 131km^2. The model boundaries selected are sufficiently far from the open pit to not influence the results obtained from the mining. The model comprises 3 layers and is based upon a suitable conceptual hydrogeological model.
- Inflow into the pit during the operational phase has been calculated as 638m^3/d based upon the assumption that the entire opencast is dewatered. This is a worst case situation. It appears the flow modelling has been undertaken using a steady state simulation, although this is not stated.
- A maximum of 22m of water level drawdown is predicted at the pit. The cone of depression is calculated as extending approximately 1km from the pit perimeter.
- During the operational phase no groundwater quality impacts are anticipated since the groundwater flow will be towards the pit.
- After closure the pit water levels will recover in the pit. With no mitigation it is reported that decant will occur in the SE portion of the pit footprint at a rate of between 80 and 120m^3/d. The quality of the decant is not reported but according to the contamination modelling could well be in excess of 600mg/l as SO4.
- Modelling of plume development and groundwater quality impacts during the post mining phase has been undertaken using SO_4 as a marker. A starting SO_4 concentration of 2 000mg/l has been assumed from the flooded pit. This would appear to be a realistic concentration.
- The plume development is shown as following the topographic gradient migrating mostly to the SE. The maximum extent of the plume is between 1 and 1.5km SE towards the Elandsfonteinspruit after about 50 years. The slow spread of the plume is due to the low permeability of the aquifer strata. A critical assumption made is that there are no preferential flow paths.
- The impact assessment rating for the mine is given as 85 (High impact) with no mitigation and 56 (medium impact) with mitigation.

- Several realistic mitigation interventions are recommended to reduce impacts. These include setting up a baseline monitoring programme.

4.0 COMMENTS ON REPORT

The report is well written. It covers all aspect normally considered in preparing an impact assessment. The report acknowledges the limitations inherent in the information gathered and makes recommendations for additional studies, update of the modelling and refinement of the impact assessment and mitigation options, once this information is available.

The report is based upon limited data and the findings. The impact assessment and mitigation recommendations made are preliminary.

Further work is required to confirm the impacts, as recommended by the report authors. This work should include:

- a rigorous geochemical assessment,
- extension of the hydrocensus to the south,
- a thorough definition of the structural network and identification of preferential flow paths,
- drilling and test pumping of boreholes in and around the mining area. These boreholes would then be used for baseline and long term monitoring,
- updating of the numerical model with the new information and final mine plans
- review and confirmation of the mitigation actions.

5.0 HIGH RISK ASPECTS RELATED TO GROUNDWATER AND SURFACE WATER IMPACTS

A number of high risk aspects were identified in the evaluation of the geohydrological report , that could impact on the proposed project sustainability from an environmental and water resources perspective:

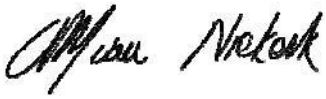
- Project location – the proposed project is located at the headwaters of two significant catchments, the Olifants River catchment and the Nkomati catchment. The Nkomati catchment has not been impacted by coal mining operations and this proposed mining development presents a specific threat to a relative pristine water resource. The catchment water resource at the headquarters is particularly sensitive since little if any assimilative capacity exists due to the small base flows and the high and unbuffered water quality of the local streams. Even a small amount of mining related pollution would have a significant impact on the downstream water resource and will probably impact the natural aquatic environment and other sensitive water users.

- Mine water quality - Little geochemical information is available to indicate whether acid mine drainage (AMD) would be produced by the proposed project. This is a key consideration in the proposed mining development. The limited work done on a single rock sample is not representative of the full geological column and could be misleading. It is, however significant to note that the single water quality sample taken at the proposed mine site is already acidic (Table 6).
- If any form of acid mine drainage is generated, it would mobilise the full spectrum of very undesirable pollutants including metals, with potentially devastating impacts on the downstream ground and surface water resources. The poor and deteriorating water quality of the streams and rivers in the Highveld and Belfast coalfields area is testimony to this.
- Mine water balance - The water modelling for the mining and post mining scenarios is based on the DWA weather station located at Nooitgedacht Dam. This weather station is remote from the proposed project site and it is recommended to source climate data from a local weather station. The local rainfall

records indicate a higher rainfall and lower evaporation compared to Nooitgedacht Dam. This will result in a higher ingress and recharge of water to the project area and increased mine water production. Also, the post mining scenario water modelling is based on an assumption of 15% Mean Annual Rainfall (MAR) recharged to the rehabilitated mined areas. This is optimistic and the range of recharge to rehabilitated opencast mining in the Highveld Coalfields area is in the range of 15 to 25% of MAR. It is our opinion that the post mining excess water production is under estimated and needs confirmation.

The single biggest water resource and environmental issue remains the production of a subsurface or surface decant of acid mine drainage from the mining area. The evidence in the Highveld Coalfields area is that all opencast mining operations produce excess and decant water of poor quality over time. The local water environment has no assimilative capacity to receive mine water, except if treated to a very high level corresponding to the current background water quality. Even in the scenario of treating excess and decant mine water for discharge, several impacts will remain for a very long time: a) unnatural stream flow patterns are set up due to the unnatural pattern of recharged to mined areas, compared to the natural seasonal surface run-off pattern, b) change in the seasonal temperature profile in the local streams which could have an impact on the aquatic and fish life, c) change in the natural chemistry of the water which is still an aspect poorly understood by aquatic chemists and limnologists.

GOLDER ASSOCIATES AFRICA (PTY) LTD.



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