REPORT ON THE NEW MINE ACCESS ROAD ROUTE DETERMINATION FOR VELE COLLIERY

DATE: 20 JANUARY 2010

COMPILED BY

RAUBEX (PTY) LTD
P.O.BOX 3722, BLOEMFONTEIN, 9300
TEL: 051 4062000

FOR

COAL OF AFRICA LIMITED
P.O.BOX 1401, KELVIN, 2054
TEL: 011 7854518

Vele Colliery Mine Access Road: Route Determination

Introduction

Vele Colliery lies approximately 35km east of Musina along the R572 Pont Drift Road. An access road to the coal processing facility has to be constructed as no formal existing road infrastructure exists on the property, except for informal farm roads, that is capable of carrying the expected generated traffic from the mine.

The flat to rolling terrain found on the mine property is typical of the Limpopo Valley with the occasional rock outcrops. North of the Erfrust/Bergen-op-Zoom border fence, a rock ridge spans from the west to east, dipping down to the eastern border of the property.

There are no perennial rivers or streams on the property, except for the Limpopo River on its northern border. The dry stream beds on the property only flow during heavy rain events. The run-off period of these are very short, but can be very intense during the characteristic thunderstorms of the area.

A quick desktop study using 1:50000 topographical maps and aerial photographs were done to decide which 2 routes to be used for further detail investigation. The main criteria used for the decision was distance, grades and ease of construction. The same access point from the R572 was used for both alternatives, in order to adhere to the “line-of-sight” criteria stipulated by the Roads Agency Limpopo (RAL) regulations.

- Alternative 1: Shortest distance to processing facility although some steep gradients may be expected;
- Alternative 2: No steep gradients and easiest to construct although a longer distance.

The detailed investigation of the 2 routes in order to determine the preferred route from a constructability and economic perspective has been based on the following aspects:

- Traffic ;
- Material availability;
- Drainage;
- Topography and gradients;
- Environmental aspects and obstructions;
- Economics.

Traffic

The traffic volume used for the design of the 2 routes is based on the projected maximum product output of the mine that has to be transported to Musina on heavy vehicles as well as generated passenger vehicles and busse to and from the mine. This road will be a private road and thus no public traffic generation has been taken into the design. The designs are based on:

- Average Daily Traffic (ADT) of 420 vehicles per day per direction;
- 85% of Heavy Motor Vehicles (HMV);
- Design hourly volume taken as 15% of ADT with 60:40 directional split.

A design speed of 60km/h has been used to minimize the need for very flat gradients and vehicle emissions associated with heavy vehicles.

Material availability

All gravel would be sourced from the future mine dumps or within the new road reserve. Gravel from the mine dumps will only be available 6 months after start of road construction and therefore a balanced cut-to-fill design approach needs to be adopted to utilize the gravel within the road reserve.

Drainage

The drainage design for both routes was done to determine the culvert sizing using a 1:20 year design flood period, 342mm/year mean annual rainfall and 62mm/hr maximum rainfall intensity. No pipes or portal culverts lower than 600mm has been considered due to the maintenance and silting issues around small drainage structures. Adequate cover over these structures determines the height which the road needs to be lifted above natural ground level. These minimum values have been as the starting point for the balanced cut-to-fill design.

Topography and gradients

The rolling topography along Alternative 1 resulted in a well balanced cut-to-fill design and some of the steep gradients were brought down significantly. All the drainage structures were

accommodated. Provision was made to crush some of the anticipated hard rock cuttings into a well graded gravel material to be used in the upper layers of the road pavement.

The flat topography along Alternative 2 resulted in a huge shortfall of material in the cut-to-fill balance calculations. This will mean the gravel has to be imported from the mine dumps and will lead to delays in the construction period pushing the completion date beyond acceptable dates. This route also crosses more streams than Alternative 1 and therefore the minimum heights for the installation of culverts dictated the road height.

Environmental aspects and obstructions

A similar cut-to-fill exercise has been done for the (potential) future railway line to utilize gravel within the rail reserve. The preferred route fell into close proximity of Alternative 1 and it was therefore decided to keep the rail and road within the same reserve. Very little had to be changed to the road design to adopt this decision. This would have the benefit that no additional areas need to be cleared and only one corridor be made to the processing facility.

Huge sensitive trees, eg. Baobab, causing an obstruction has been accommodated in both the route alignments. Smaller trees will be carefully removed and replanted under supervision of the Appointed Environmental Consultant.

The intersections for both Alternatives have been designed with curves taking the access road behind the dense Mopani bush in an attempt to conceal the road reserve leading to the mine.

Economics

The construction of Alternative 2 is a very simple process and will entail the road being constructed in a fill situation. What makes this route very expensive is that the gravel material will have to be hauled over an average distance of 10km from the mine dumps. This haulage cost outstrips the cost of the ease of construction and therefore makes this Alternative very expensive. The delays in the availability of gravel from the mine dumps also creates a high cost risk in that the completion date of the road will be extended beyond the date product will be ready for transportation.

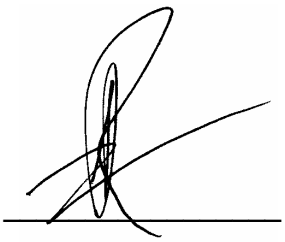
The construction of Alternative 1 is more complex than that of Alternative 2 due to the excavations from the hard cuttings and crushing. The shorter 4km average haul for the cut-to-fill works has a huge effect on the cost saving. The shorter route length also contributes to a cost saving and all of these factors put together makes this route the more economical viable route.

Conclusion

Due to the high risk involved with the material availability from the mine dumps for the construction of Alternative 2 it will be unwise to recommend this route. The cost of construction will be very high due to the haulage distance from the mine dumps and the route being 700m longer than Alternative 1.

It is recommended that Alternative 1 be put forward as the preferred route. This recommendation is based on:

- The well balanced cut-to-fill design optimizes material usage and shorter material haul distances;
- The single rail (potential) and road corridor;
- Fewer required drainage structures;
- All the above factors resulting in the route being most economic route to construct.



Gert Rautenbach
B.Eng (Civil)