

Landau Colliery - Navigation West

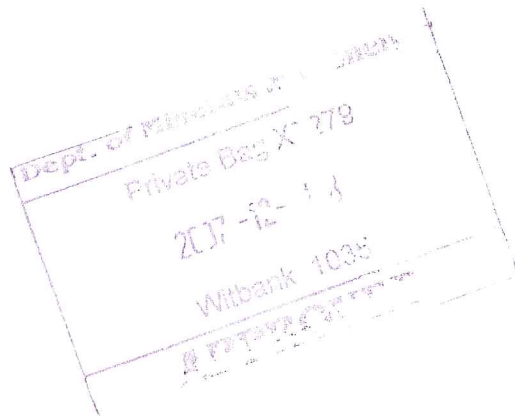
<u>Company Operating Costs</u>		<u>Quantity</u>	<u>Unit</u>	<u>Rate</u>	<u>Total</u>
Project Management	=	1	Item	R 500,000.00	R 500,000.00
		<u>Quantity</u>	<u>Unit</u>	<u>Rate</u>	<u>Total</u>
Maintenance & Monitoring (5 years)	=	1	Item	R 5,700,000.00	R 5,700,000.00
				<b>TOTAL</b>	<b><u><u>R 6,200,000.00</u></u></b>

DEPT. OF MINERALS AND ENERGY  
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2017-12-13  
Witbank 1035  
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# ATTACHMENT 1

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## Navigation West Section Mine Plan (February 2007)



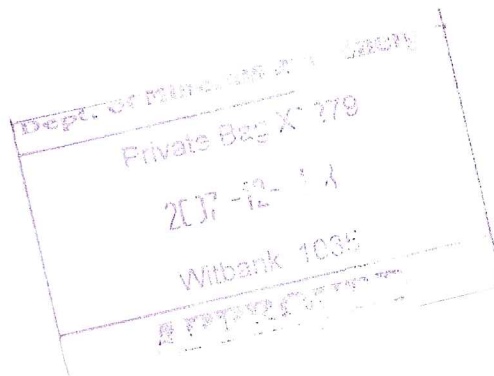




# ATTACHMENT 2

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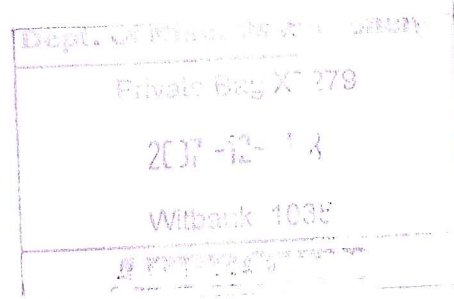
## Material Balance Report







## Anglo Coal Divisional Mine Planning



### Note for the record

To : W. Grant

From : B. Van de Steen

Cc : M. Campbell, G. Stenzel, B. Ncube, M. Aken, F. Nkosi, C. Barnard, D. Nebbe

Date : 15 January 2007

Subject : **Material Balance Navigation West**

An exercise was carried out to look at the post mining material balance in the Navigation West northern pit. Besides looking at the net swell (Fig. 1) itself, the "post-swell topography" was merged into the (virgin) surrounds (Fig. 2).

The exercise indicates that there is a clear excess of material in the East and a shortage of material in the West. On average there is an excess of material, with the average elevation being 1.3m above the original surface (range : -1.9 m to +4.1 m)

The following parameters were used:

Swell factor softs 1.2

Swell factor hards and discards 1.3

Discard: based on yield and 8% slimes which are not returned to the pit

Please note that the surface created should **not** be considered as the post mining topography. The dragline will carry material away from its figure 8 node (probably a ramp), excess material will end up at the end of the cut (at both ends), and although the post-swell topography shows an almost free-draining picture, these end of cut spoils, if left untouched, are likely to form a barrier for the effective drainage of the area. The ramps and the figure of 8 node will remain a depression unless appropriate measures are taken to infill them. In the exercise, it is also assumed that the material is swelled in situ, i.e. no lateral movement of the material. Boxcut spoils and final void do therefore not feature.

An estimate of the final void was made as well, assuming a 37 degrees angle of repose of the spoils, a vertical highwall in the coal and the hards, a 60 degrees batter in the softs, a 40m cut width with a 2m coal void (Fig. 3). With a total final void length of 2020m, the average depth, coal thickness and post mining material balance for the cut was used to estimate the volume of the final void. The approximate volume of the final void, using the above assumptions, is approximately 2 991 000 m<sup>3</sup>. The volume of material in the 3 main boxcuts (initial boxcut, cut 60 and cut 66), is, after swell, estimated at approximately 2 258 100 m<sup>3</sup>. The boxcuts in cut 60 and in cut 66 are only scheduled to be dug in 2012 and 2014 respectively.

The in situ volume of material contained in the initial boxcut is approximately 147 600 m<sup>3</sup> of hards and 410 000 m<sup>3</sup> of softs (excluding topsoil). After swelling, and excluding the topsoil, the initial boxcut spoils represent 686 900 m<sup>3</sup>. Whether this volume will suffice to build a visual berm will depend on the height and the width of the required berm.

To avoid trapping the run off water behind the end of cut spoils in the West, the material spoiled at the end of the cut (western side) might have to be moved as well. If it is assumed that all the material in the small boxcut extensions as well as the material in the last 20m before the end of the previous cut will be spoiled outside the pit boundary, an additional volume of well over 300 000 m<sup>3</sup> (in situ) has to be moved in the first 11 cuts (cut 37 to cut 47), very little if any material in the next 11 cuts (shortening of the pit from cut 48 to 58), and another 155 000 m<sup>3</sup> in the last 14 cuts (cut 59 to 73).

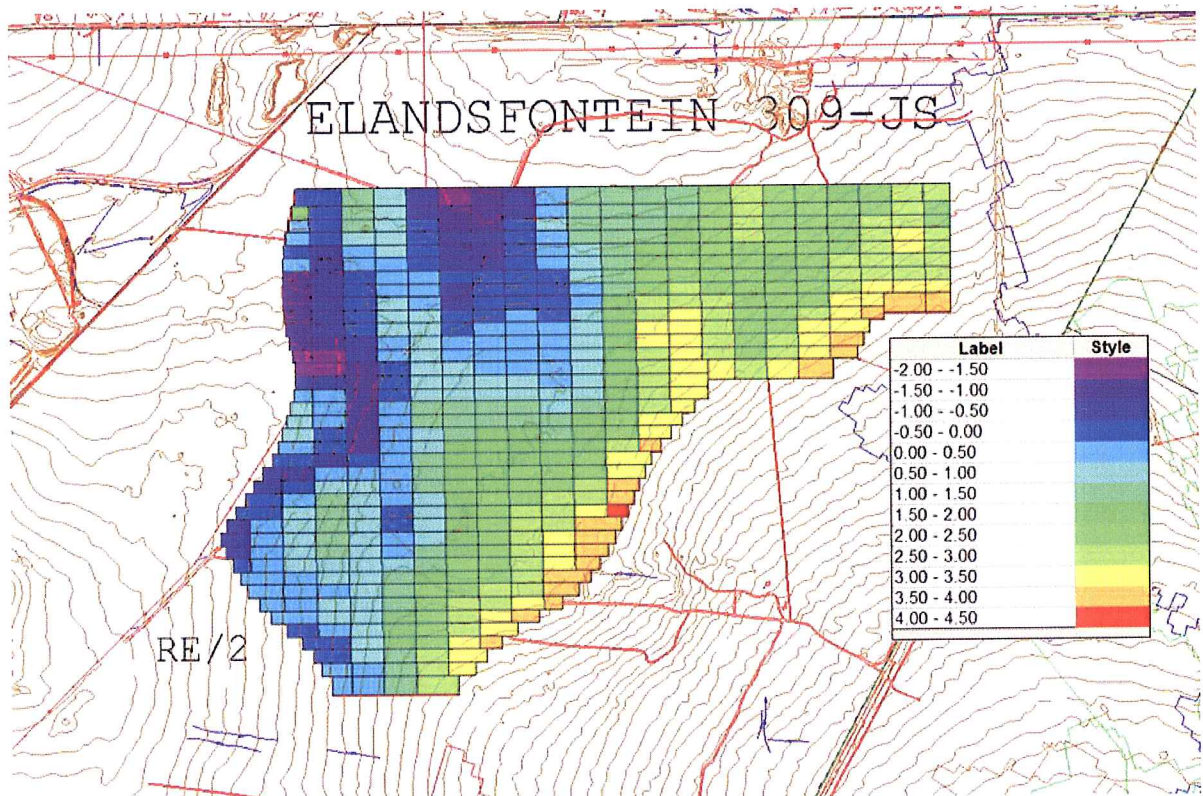
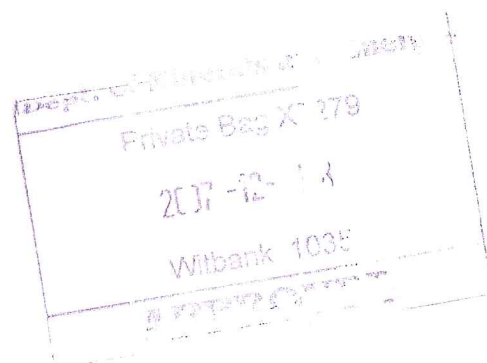


Fig. 1: Net swell Navigation West (northern part).





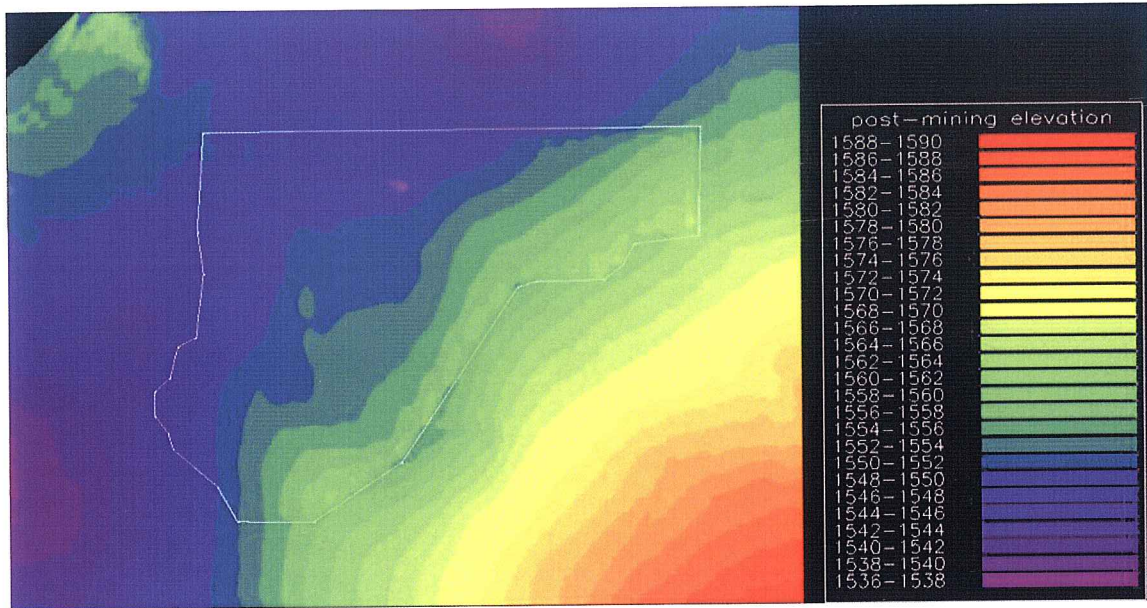


Fig. 2: Post-swell topography, merged into the virgin surrounding topography. Note the ridge along the western boundary. The white indicates the pit outline. Outside the white line, the original DTM points were used to generate the contour map; inside the white line the calculated elevations were used.

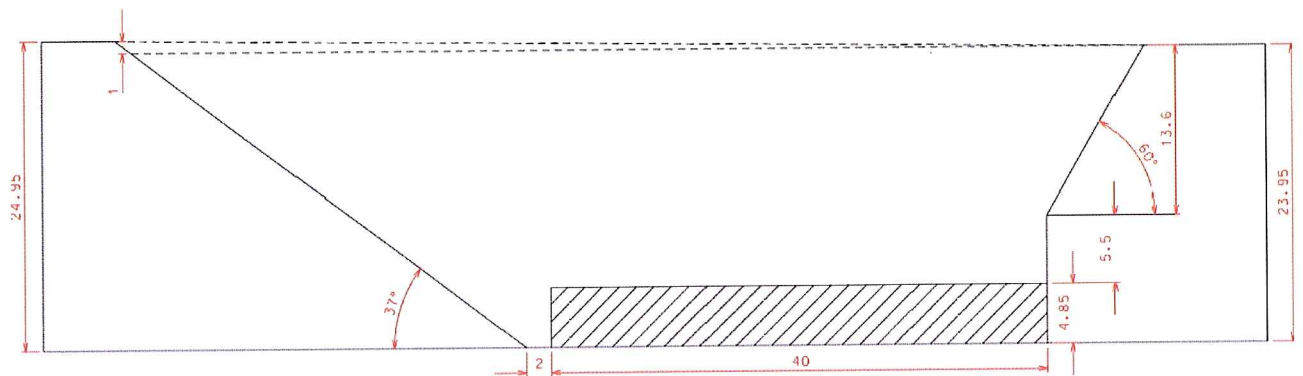


Fig. 3: Dimensions used for the estimation of the final void.

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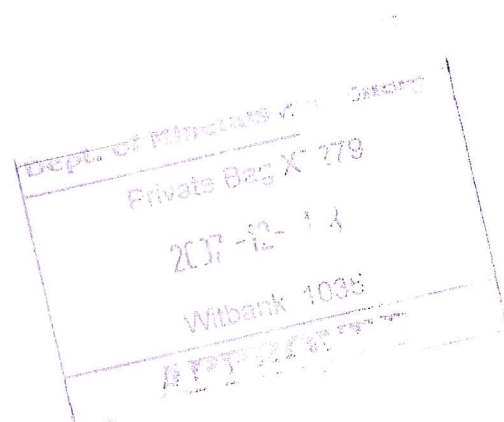
Bart Van de Steen  
 Senior Divisional Mine Planning Engineer

## ATTACHMENT 3

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### Map showing the surface water monitoring points at Navigation West Section

(Extracted from the report titled, "*Landau Colliery. Water Quality Assessment Report*", for the period May 2005 – August 2005, compiled by Clean Stream Scientific Services).





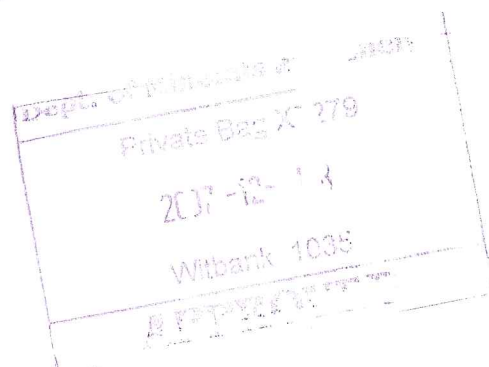


## ATTACHMENT 4

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### Map Showing the Groundwater Monitoring Points at Navigation West Section

(Extracted from the report titled, "*Landau Colliery Navigation West Project Report on Geohydrological Investigation as part of the EMPR*", with Reference Number 400385/04, dated February 2007, compiled by Clean Stream Groundwater Services.).





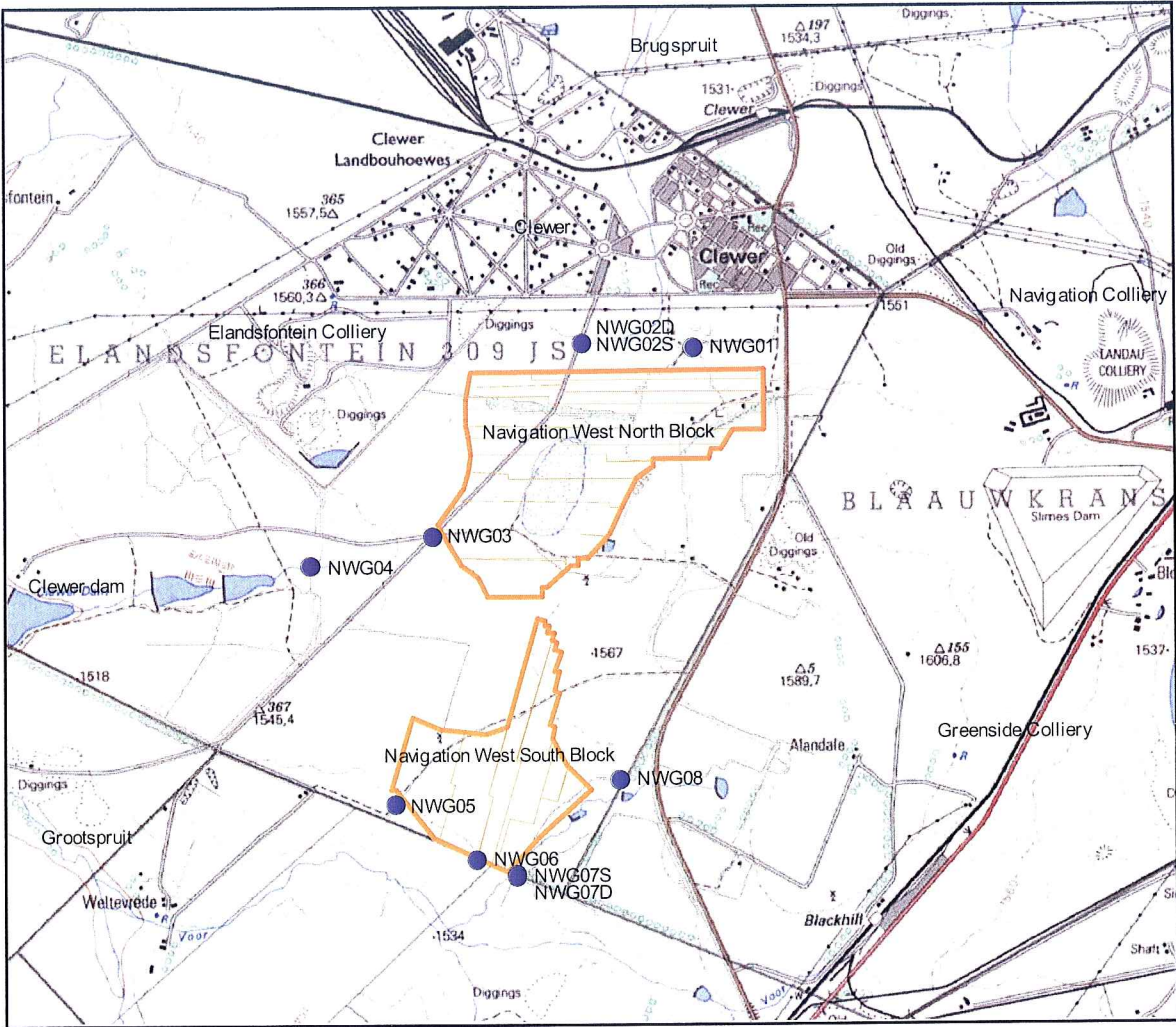


Figure 2.1-1: Groundwater monitoring/testing points around Navigation West project

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