TOPOGRAPHY AND VISUAL INPUT FOR THE PROPOSED SASOL SYFERFONTEIN BLOCK 4 EXTENSION PROJECT

SASOL MINING (PTY) LTD

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Report Title: **TOPOGRAPHY AND VISUAL INPUT FOR THE PROPOSED SASOL SYFERFONTEIN BLOCK 4 EXTENSION PROJECT**

Project Number: **SAS1744**

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1 INTRODUCTION

Topography is the study of the earth's surface and it includes both natural and man-made features. The Collins English Dictionary (2003) describes topography as:

- The study or detailed description of the surface features of a region (Earth Sciences / Physical Geography);
- The detailed mapping of the configuration of a region (Earth Sciences / Physical Geography);
- The landforms or surface configuration of a region (Earth Sciences / Physical Geography);
- The surveying of a region's surface features (Mathematics & Measurements / Surveying); and
- The study or description of any object.

For the purpose of this study, the topography will be conceptualised as the landforms and surface configuration of the landscape.

A Visual Impact Assessment (VIA) study involves a systematic analysis of potential impacts to scenery and views resulting from a proposed development. These potential impacts can be described as either positive or negative impacts. There are three issues which need to be addressed when conducting this study:

- Spatial issues include where the development is visible from or, more specifically, what or whom it is visible to;
- Quantitative issues include how much of the development is visible, how much of the surrounding area is affected, and to what degree; and
- Qualitative issues include the visual character of the development and its compatibility with its surroundings (Fels, 1992).

A VIA is a specialist study performed to identify the visual impacts of a proposed project on the surrounding landscape. Thereafter, it investigates the means available to mitigate the effects of such impacts prior to implementation of any development (Macaulay, 1988). Other aspects considered are the visual, scenic and cultural components of the environment which can be seen as resources, much like any other resource, which has a value to individuals, to society and to the economy of the region (Oberholzer, 2005).

This report describes the topography and visual / aesthetic character of the receiving environment and the expected topographical and visual impacts of the proposed Syferfontein Block 4 Project. A full topography and visual impact assessment was not deemed necessary due to the proposed underground mining activities with no construction of surface infrastructure within the project area. The scope of work was therefore a desktop study to provide input for the Environmental Impact Assessment (EIA).

1.1 Study Area

Sasol Mining (Pty) Ltd is proposing to extend the existing Syferfontein Mine into the adjacent Block 4 area; which lies to the west of the current mine. The proposed Syferfontein Block 4 underground coal mine is located on the following farm portions:

- Langsloot 99 IS portions 16 & 17;
- Dieplaagte 123 IS portions 1 & 7;
- Wildebeestfontein 122 IS portions 1, 3, 4, 7, 10, 13, 14, 17 & 18;
- Zondagsfontein 124 IS portions 1, 2, 3, 4, 5, 6, 7, 8, 9 & 21;
- Zondagskraal 125 IS portions 2, 15 & 24; and
- Vaalbank 96 IS portion 2.

The proposed Project area is situated in the Govan Mbeki Local Municipality in Gert Sibande District Municipality, Mpumalanga Province, South Africa; and covers an area of 5224.68 hectares (ha). Kinross is the closest town to the proposed Project area and is located approximately 1.4 km south west of the proposed Project area boundary. Evander and Secunda are the next two secondary towns closest to the proposed Block 4 Project area, approximately 4 km and 8.8 km in a southern and south easterly direction respectively. The N17 is the nearest national route and overlaps with certain portions of the southern boundary of the proposed Project area. The R547 main road runs though the proposed Project area in a north-south direction and there are other minor roads that intersect it (Plan 1). The Vaalbankspruit River flows along the northern part of the proposed Project area in a westerly direction. Several non-perennial streams, dams and non-perennial pans are dispersed in the Project area.

1.2 Terms of Reference

Digby Wells Environmental (Digby Wells) was appointed by Sasol Mining (Pty) Ltd as an independent environmental consultant to undertake the social and environmental aspects required for the EIA phase for the proposed Syferfontein Block 4 Project. The environmental considerations for this study include the compilation of a Topography and Visual EIA input for the proposed Sasol Syferfontein Block 4 Project area.

It is required that the EIA, Environmental Management Plan (EMP) and associated studies be conducted to fulfil the requirements of the following local legislation:

- Mineral and Petroleum Resources Development Act, 28 of 2002 (MPRDA);
- National Environmental Management Act, Act No. 107 of 1998 (NEMA);
- National Environmental Management Waste Act, Act 59 of 2008 (NEMWA); and
- National Water Act, Act No 36 of 1998 (NWA).

1.3 Expertise of the Specialist

A Curriculum Vitae (CV) and declaration of independence is attached in Appendix B.

1.4 Aims and Objectives

The aim of this topography and visual input is to describe the topography and visual / aesthetic character of the proposed Project area and surrounding landscape. The following objectives have been identified to achieve this aim:

- Examine aerial photography available for the proposed Project area (CD: NGI 2009);
- Create and examine topographical and slope intensity models in ArcGIS;
- Identify potential visual receptors;
- Determine and discuss the potential topographic and visual impacts; and
- Describe the topography and visual / aesthetic character of the receiving environment as an input into the EIA report.

2 METHODOLOGY

A desktop study was conducted to evaluate the topography and visual character of the receiving environment. Chief Directorate: National Geospatial Information (CD: NGI) aerial photography (flown in 2009) of the area was examined to determine the surface features. The available vector data was used to determine the relative location of the features surrounding the proposed Project area. A topographical model was created using ArcGIS 3D Analyst Extension. The model was created using five metre contour relief data with spot height and trig beacon data to increase the accuracy of the topographical model.

The resultant topographical model was used as an input to create a slope model using the Slope Tool of the ArcGIS 3D Analyst Extension. The slope model indicates the slope degree and was classified using the Equal Interval method. The information gathered from the above desktop study forms the basis of this report.

CD: NGI aerial photographs of the proposed Project area together with Google Earth and research of literature on the proposed Project area conducted by other environmental consultants was used to characterise the landscape and to investigate the visual characteristics of the receiving environment. Potential visual receptors were identified in an attempt to quantify the sensitivity / impact of the proposed Project.

3 RESULTS AND DISCUSSION

3.1 Topography

This report assesses both physical and man-made features that make up the topography of the proposed Project area. The topographical model indicates that the elevation of the proposed Project area ranges from approximately 1680 metres above mean sea level

(mamsl) in the south to 1580 mamsl in the north. The proposed Project area is situated on a relatively high-lying area surrounded by mildly undulating topography. Plan 2 illustrates the topography of the area.

The majority of the proposed Project area is characterised by slopes of 0 – 4°; slopes of 5 – 12° occur across the eastern and western parts of the proposed Project area. There are also isolated areas with slightly steeper slopes of between 13 – 20° that occur on the north east, east, and south west of the proposed Project area, as illustrated in Plan 3.

The surface features identified from the aerial photography within the proposed Project area include farm houses, roads, agricultural areas, dams / lakes, perennial streams along the northern and eastern parts of the Project boundary and non-perennial streams within the proposed Project area. The Dwars-in-die-Wegspruit and Vaalbankspruit streams drain in a northerly direction. Wetlands occur within the proposed Project area along the Dwars-in-die-Wegspruit and the Vaalbankspruit, making it a relatively sensitive area with ecological importance in this regard. The aerial photographs, as well as pictures taken on site (Figure 1) also illustrate the existence of a small town (Kinross) adjacent to the south western boundary of the proposed Project area.

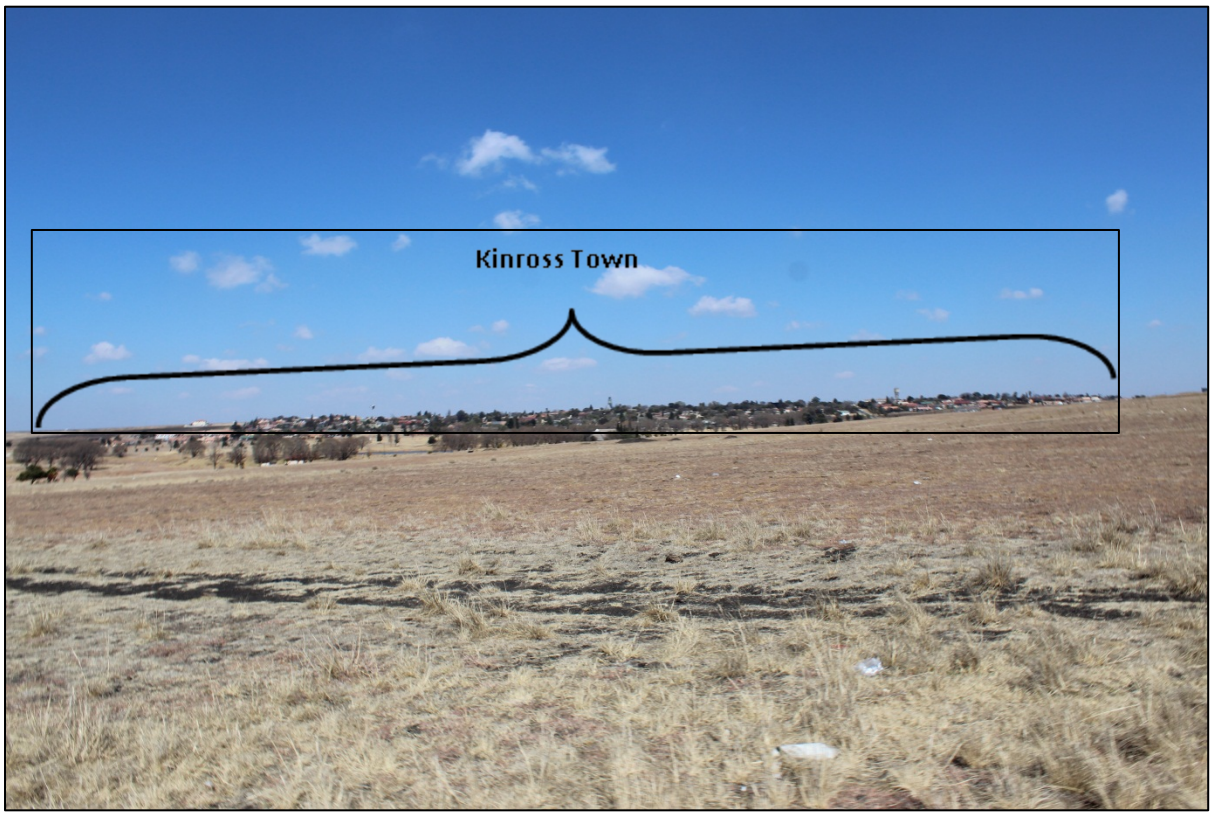

Figure 1: Location of Kinross town adjacent to the proposed Project boundary

Most of the landscape within the proposed Project area has been transformed by agricultural activities. Land use in the area is mining and mixed agriculture consisting of mainly maize cropping and large and small livestock farming. Vegetation in the area is that of the Themeda Veld / Turf Highveld (Acocks, 1988). The general landscape characteristic of this

vegetation type is that of a slightly undulating topography, with valley bottom wetlands and perennial / non-perennial streams. Figure 2 illustrates the topography and associated vegetation in the proposed Project area.

Figure 2: Topography and vegetation of the proposed Syferfontein Block 4 Project area

It is estimated that underground mining activities in the proposed Syferfontein Block 4 area will occur at a depth of between 60 and 150 metres (m) below the surface. If underground mining occurs this close to the surface and insufficient pillars are left to support the surface then subsidence could result. This subsidence would have an impact on the topography. Therefore the risk associated with the occurrence of subsidence will be increased.

The proposed Syferfontein Block 4 Project will have a negligible impact on topography therefore it was not necessary to conduct a topography impact assessment.

3.2 Visual / Aesthetic Character

The visual / aesthetic character of the receiving environment was described in terms of the topography and vegetation. The proposed Project area is predominantly characterized by cultivated land, interlaced with perennial / non-perennial streams and associated wetlands. Mining activities occur at the adjacent Syferfontein Colliery and in the immediate vicinity of the Project area The Matla and Kriel power stations can be distinguished on the horizon (Figure 3). At night the stations become the focus of attention as their lights dominate the nightscape.

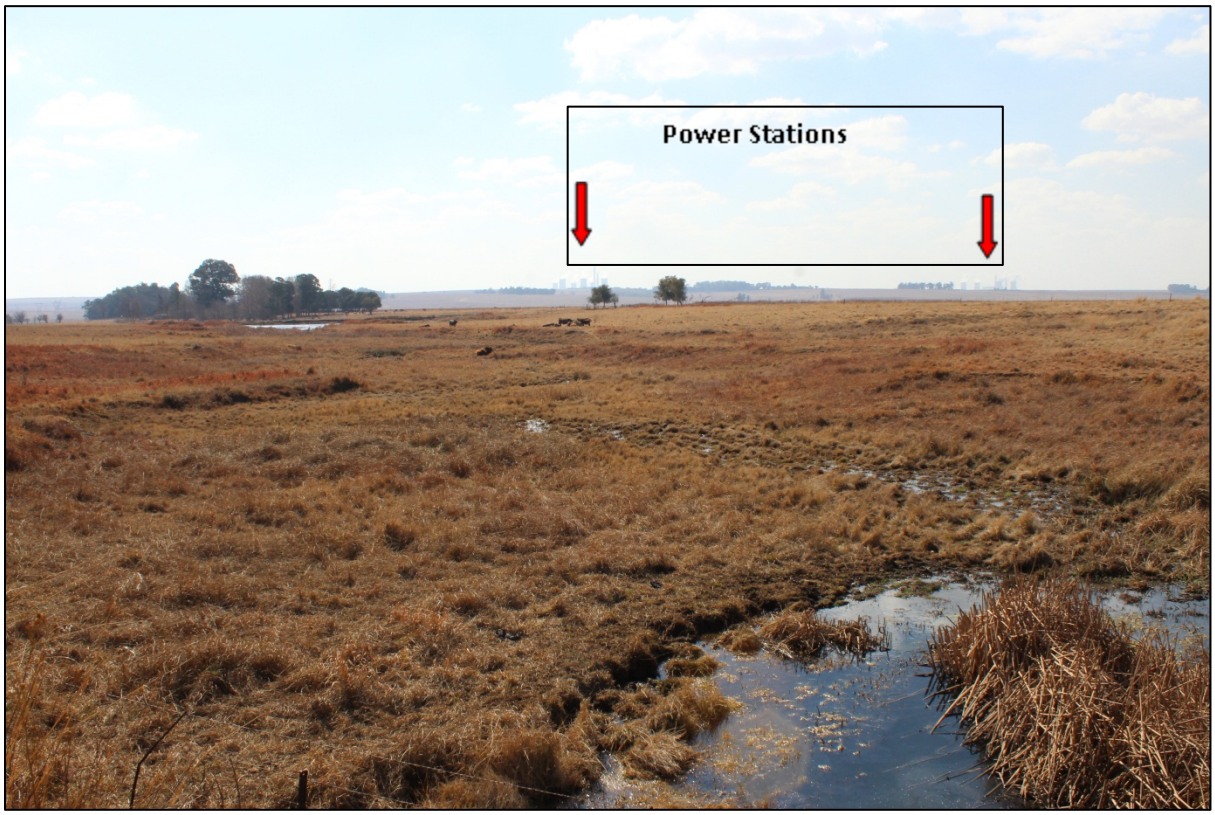

Figure 3: Location of power stations near the proposed Block 4 Project area

The proposed development of the Syferfontein Block 4 Project will have very minimal impacts on the visual / aesthetic character of the surrounding environment because the proposed development is an underground mine, there is already an existing operational mine adjacent to it and the area is already known as a “mining area”. The infrastructure of the Matla and Kriel power stations also dominates the landscape (Figure 3) and takes away / transforms the sense of place. The proposed Project is situated in an already disturbed landscape; therefore it will not have much influence on the visual character of the area. The expected visual impact of the proposed Project was categorised based on the type of receiving environment and the type of development as detailed in Table 1 (Oberholzer, 2005). This table provides an indication of the visual impacts that can typically be expected for different types of developments in relation to the nature of the receiving environment. According to Oberholzer (2005), the proposed Block 4 Project is classified as a **Category 5**

development (Table 2). The receiving environment can be described as areas or routes of low scenic, cultural or historical significance / disturbed and it is therefore expected that the proposed Block 4 Project will have a **high visual impact** on the receiving environment. The outcome of the expected visual impact is based on guidelines highlighted by Oberholzer, 2005.

Table 1: Categorisation of expected visual impact (adapted from Oberholzer, 2005)

Type of Environment	Type of Development (Low to High Intensity)				
	Category 1 Development	**Category 2 Development**	**Category 3 Development**	**Category 4 Development**	**Category 5 Development**
Protected / wild areas of international, national, or regional significance	Moderate visual impact expected	High visual impact expected	High visual impact expected	Very high visual impact expected	Very high visual impact expected
Areas or routes of high scenic, cultural or historical significance	Minimal visual impact expected	Moderate visual impact expected	High visual impact expected	High visual impact expected	Very high visual impact expected
Areas or routes of medium scenic, cultural or historical significance	Little or no visual impact expected	Minimal visual impact expected	Moderate visual impact expected	High visual impact expected	High visual impact expected
Areas or routes of low scenic, cultural or historical significance / disturbed	Little or no visual impact expected. Possible benefits	Little or no visual impact expected	Minimal visual impact expected	Moderate visual impact expected	**High visual impact expected**
Disturbed or degraded sites / run-down urban areas / wasteland	Little or no visual impact expected. Possible benefits	Little or no visual impact expected. Possible benefits	Little or no visual impact expected	Minimal visual impact expected	Moderate visual impact expected

Table 2: Key to categorisation of development (adapted from Oberholzer, 2005)

Type of Development	Examples of Development
Category 1	Nature reserves, nature-related recreation, camping, picnicking, trails and minimal visitor facilities
Category 2	Low-key recreation / resort / residential type development, small-scale agriculture / nurseries, narrow roads and small-scale infrastructure
Category 3	Low density resort / residential type development, golf or polo estates, low to medium-scale infrastructure
Category 4	Medium density residential development, sports facilities, small-scale commercial facilities / office parks, one-stop petrol stations, light industry, medium-scale infrastructure
Category 5	High density township / residential development, retail and office complexes, industrial facilities, refineries, treatment plants, power stations, wind energy farms, power lines, freeways, toll roads, large-scale infrastructure generally. Large-scale development of agricultural land and commercial tree plantations. **Quarrying and mining activities with related processing plants**

The proposed Block 4 Project will be conducting underground mining activities with no surface infrastructure within the proposed Project area. This means that there will be no changes in the visual landscape of this area; therefore the proposed Project will have a negligible visual impact; contrary to the expected visual impact highlighted in Table 1. Due to this factor, it was deemed not necessary to run the viewshed model for the proposed Project, as there will be no visual receptors affected by the mining activities. As a result, there is no impact assessment conducted for the visual component of this report.

4 CONCLUSION

The proposed Block 4 Project will be conducting underground mining activities with no surface infrastructure within the Project boundary. With regards to topographic impacts resulting from underground mining activities; it is estimated that underground mining will occur at a depth of between 60 and 150m below the surface; therefore the risk associated with the occurrence of subsidence may occur if proper mitigation measures are not followed. The proposed Project is also expected to have minimal visual impacts because there will be no changes in the visual landscape which would affect the visibility of the proposed Project. In conclusion, there will be negligible topographic or visual impacts arising from the proposed Project.

5 REFERENCES

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Appendix A: Plans

Plan 1: Regional Setting

Plan 2: Topography Model

Plan 3: Slope Model

Appendix B: CV and Declaration of Independence