

TO:	Taryn Bigwood	DATE:	21 January 2013
FROM:	Barbara Wessels	JOB NO:	
RE:	SEKOKO WATERBERG COLLIERY REHAB AND MONITORING PLAN		

1 TERMS OF REFERENCE

1.1 Desktop Review and Setting Objectives

All information applicable to the site will be reviewed. This will include a review of the existing Environmental Impact Assessment and Environmental Management Plan (EIA/EMP) Report for the project area as well as any specialist studies that have been conducted on the site. The information review will enable the setting of objectives for rehabilitation and environmental monitoring.

These objectives will take into consideration the following:

- Rehabilitation plan
 - Post-mining landforms and soil;
 - Hydrology;
 - Waste material characteristics; and
 - Biodiversity aspects.
- Environmental monitoring
 - Location of mining activities in proximity to surface and groundwater resources;
 - Identification of sensitive receptors in the vicinity of the mine; and
 - Legal requirements in terms of environmental monitoring.

1.2 Rehabilitation Plan

1.2.1 Terms of Reference

All relevant legislation pertaining to the rehabilitation plan will be researched thoroughly to ensure all policies and regulations are met and applied.

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1.2.2 Desktop Soil Assessment

The desktop review of the soils will enable objectives to be set for the stripping and stockpiling of topsoil and subsoil types as well as for the stockpiling of overburden. The information in the EIA and EMP will be used for the desktop review as well as other literature available for the area.

1.2.3 Desktop Vegetation Assessment

The desktop review of the vegetation will enable objectives to be set for the use of appropriate vegetation species for the re-vegetation of the soil (topsoil and subsoil) stockpiles (to conserve soil quality and prevent erosion) and the rehabilitation of soil stockpiles, as well as for appropriate use of vegetation for concurrent and final void rehabilitation.

A re-vegetation plan will be compiled explaining the species composition to be used during re-vegetation as well as a schedule listing the maintenance and management required to ensure sustainable growth.

1.2.4 Water Management Plan

As part of the rehabilitation plan, a review and monitoring of the water management plan (action for implementation during all phases of mining) has to be conducted on an ongoing basis. This is to ensure that the management of water is in line with the Best Practice Guidelines (BPGs) series developed by the Department of Water Affairs (DWA). Of the series, the most relevant guidelines are:

- Pollution prevention and minimisation of impacts;
- Water management measures for mine closure; and
- Storm water management.

The key principle applicable is the minimisation of the dirty area and minimisation of the clean area to ensure that surface water runoff reporting to the catchment is of acceptable quality and quantity. It will also ensure that monitoring is implemented to detect any impacts as they arise and that mitigation measures, and that the environment is left in a state that best resembles pre-mining conditions.

An annual audit of the monitoring reports and the water related EMP commitments should be conducted.

1.2.5 Rehabilitation Cost Assessment

The specialist studies that have been conducted on the project area during the EIA will be used to provide data relating to rehabilitation, closure and aftercare costs. Where the studies are insufficient recommendations will be made with regard to the type of studies to be conducted based on the site visit.

The specialist studies will enable the determination of current and possible future environmental liabilities as well as provide solutions on how to mitigate these liabilities. The specialist studies required will be established once phase one has taken place, however, it is

envisaged that the studies described below would need to take place to accurately determine all environmental liabilities.

The liability assessment undertaken as part of the EIA process will be used as the basis to update and assess the rehabilitation costs to make sure all the relevant areas are covered. The costs will be divided into specific areas and each area will have a specific cost assigned to it for rehabilitation. Please note that the following is required for the assessment:

- All plans that exist for the operations will be updated and electronic copies provided to Digby Wells in a format that can be used with ArcGIS (dxf. shp.);
- All infrastructure including roads will be measured from plans, if necessary, and have costs calculated for their removal;
- An accurate current mine plan will be available to allow the determination of opencast areas;
- An annual site visit and audit of the water monitoring reports should be conducted as well as a review of the EMP commitments related to water management;
- We do not foresee that any additional detailed specialist studies will be needed, however should these be required these will be budgeted for separately; and
- All reports detailing actions to be taken at areas of contamination and for water treatment costs will be made available. Where these are not available a best guess estimate for all these areas will be made.

1.2.6 GIS Mapping

To provide detailed costs, plans need to be generated for the assessment. Where plans cannot be generated in an electronic format, satellite photos and orthophotos will be used if available.

GIS will be utilised to prepare plans to represent the findings of the various assessments. Plans will then be developed, which display areas where certain rehabilitation activities will take place. These detailed plans will inform the physical rehabilitation process on site.

1.2.7 Topography Assessment

The desktop topography assessment will determine water management structures for construction, to ensure surface water runoff from the site occurs in a controlled manner (by maximising the clean and minimising the dirty areas respectively) and to ensure the geomorphological evolution including that of erosion, deposition and alluvial transport rates are taken into account while setting the objectives for the rehabilitation plan. The future flow of water and future landforms after rehabilitation will be assessed and will help inform the rehabilitation plan.

Using GIS, the pre-mining topography will be plotted against the mining topography in order to determine the post-mining topography. This is needed to ensure that the post-mining topography is as close as possible to the original topography of the area and that the final landform is stable. In order to complete this exercise accurately, the volumes of overburden

dumps expected for each year of open cast mining is required as well as the Life of Mine (LoM) plan.

1.2.8 Soil Rehabilitation plan

The mine rehabilitation plan will contain the following important soil information including:

- Location of soil types that can be stripped and stockpiled together and stripping depths of different soil types;
- A time schedule which links up with the LoM plan will be compiled for the first 20 years of mining (open cast). The schedule will explain which areas should be stripped or rehabilitated at certain times together with soil management measures, soil depths, stripping ratios and the costs associated with the various activities; and
- An interactive soil map will be created which links the schedule with the topography assessment and indicates suitable stockpile locations.

Progressive monitoring of the stripping, stockpiling, shaping of spoil surfaces, backfilling and replacing of topsoil will need to take place to ensure successful post-mining land and soil reclamation. Assessing post-mining soil characteristics and associated land capability and land uses is necessary, but lack the opportunity to correct failures during the rehabilitation process.

Progressive monitoring should take place on at least a quarterly basis and should involve the following:

- Inspection of stripping depths;
- Inspection of stockpiles to check degradation and/or pollution;
- Inspection of spoil surfaces before replacing soil to ensure that pre-mined topography is emulated;
- Random inspection of soil thickness on rehabilitated sections;
- Fertility analysis and amelioration procedures prior to re-vegetation; and
- Evaluating and readjusting the rehabilitation plan.

1.2.9 Rehabilitation Plan Compilation

The information gathered during the site visit as well as existing data will be utilised to complete the conceptual rehabilitation plan. The rehabilitation plan will detail the following:

- Specific actions to be undertaken during construction, operation, decommissioning and closure phases of the mining operation;
- Soil and overburden materials handling, to ensure that materials favourable to vegetation establishment, as well as potential problem materials (such as acid generating, high metal level, saline soils or potentially dispersive material), are placed in the correct sequence;
- Topsoil and subsoil handling procedures, especially those designed to conserve plant, nutrients and soil biota;

- Soil amelioration techniques to create conditions favourable for growth, such as the application of lime or gypsum;
- Any techniques for conserving and reusing vegetation, including mulch, brush matting for erosion protection and introduction of seed and log piles for fauna habitat;
- Landscaping procedures, including the construction of erosion control and water management structures;
- Post mining topography plan;
- Vegetation establishment techniques;
- Weed control measures prior to and following rehabilitation;
- Fertilizer application; and
- Follow-up planting and maintenance programs.

The plan provisions will be time-bound and will take into account opportunities for progressive rehabilitation and closure. From a biodiversity conservation and re-establishment perspective, it is particularly important that the extent of planned disturbed areas is minimised at any point in time. The rehabilitation plan should be reviewed periodically as further information on site conditions becomes available and as new rehabilitation procedures are developed.

The plan will also detail a re-vegetation program, which will include details of topsoil sources, stripping depths, volumes, handling methods, placement and scheduling. Areas where soil amelioration is needed will be mapped, and details of what is required described. It will describe what plant species and vegetation communities should be established, so that the most appropriate species are used.

From the topography assessment details in terms of the construction of stable landforms will be compiled. Landform stability is essential for the long-term sustainability of rehabilitation. Poorly constructed landforms can result in erosion that severely affects both the re-vegetation and downstream biodiversity.

The rehabilitation plan will also address soil handling, including the volumes and handling equipment needed, re-spreading depth and any follow-up treatment (such as scarifying prior to seeding). The types and methods of application of nutrients will be based on the soil characterisation studies.

1.3 Environmental Monitoring Programme

An environmental monitoring programme will be compiled taking the following environmental aspects into consideration:

- Surface water;
- Groundwater;
- Aquatic ecology;
- Fauna;
- Flora;

- Dust fall out; and
- Noise.

The findings from the specialist studies undertaken during the EIA/EMP phase and other information available for the project area will be used to compile the monitoring programme and propose the locations of the relevant monitoring points. The various monitoring programmes will consider relevant legislative requirements, Best Practise Guidelines and the proximity of water resources and sensitive receptors to the mine.

No additional site assessments will take place for this project.