Appendix D

Soils

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SCOPING REPORT OF THE SOIL, LAND USE AND LAND CAPABILITY STUDY FOR THE LEEUWPAN PROJECT

PREPARED FOR

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1. Baseline Description

1.1. Land type

A map was compiled using the site boundaries and land type spatial data obtained from the database of the ARC's Institute for Soil, Climate and Water. The map indicated that the study area consist of three land types i.e. Ba2, Bb3 and Ea15.

The farms Weltevreden 227IR (Portion 7), Moabsvelden 248IR (Portions1,4,5 and 6), Rietkuil 249IR as well as the largest parts of Wolvenfontein 224 IR and Witklip 232IR fall into the Bb3 land type. Land Type Bb3 is dominated by moderately deep to deep well-drained soils with plinthic character at depth on the higher lying areas. In the lower lying areas the soils are bleached, poorly drained sandy clay loam to clay. This land type is dominated by yellow-brown and bleached soil profiles and red soil forms are not widespread in this zone.

The farms Goedgedacht 228 IR, Leeuwpan 246 IR and the northern part of Kenbar 257IR fall into the Ba2 land type. Land Types Ba2 also consists of the same moderately deep to deep well-drained soils with plinthic character at depth but red soil forms dominate this land type.

Witklip 232 IR and Wolvenfontein 244 IR contains sections of land of Land Type Ea15. Land Type Ea15 consists of soil forms with significant clay accumulation and includes vertic, melanic and red structured soil forms. Table 1 summarises the areas of each land type on the proposed site.

Table 1 – Land Type Data

Land Type	Area (ha)	Geology
Bb3	2 542	Shale, sandstone, clay, conglomerate, limestone and marl of the Ecca Group, shale and tillite of the Dwyka Formation, Karoo Sequence, dolerite, occasional Ventersdorp lava, Witwatersrand quartzite and slate, dolomite
Ba2	830	Shale and sandstone of the Ecca Group, Karoo Sequence, dolerite, granite and gneiss
Ea15	145	Alluvium; dolerite; sandstone and shale of the Ecca Group, Karoo Sequence

1.2. Soil properties

Reviewing soil maps of the area indicated that the following soil forms were present on site before disturbance by mining activities: Hutton, Bainsvlei, Clovelly, Avalon, Glencoe, Sepane, Longlands, Kroonstad, Westleigh, Rensburg, Katspruit and Dresden soil forms. A small section on the far western side of the site contains more structured soils of the Sterkspruit, Bonheim and Estcourt forms. However, only small sections of the original soil profiles are left around the mining areas. The soil profiles on the farm Rietkuil 249 IR are still present and these consist out of Hutton, Bainsvlei, Clovelly, Avalon, Glencoe, Sepane, Longlands, Kroonstad, Westleigh, Rensburg and Katspruit soil forms.

1.3. Land use

The area has got a high agricultural potential. Land outside areas being actively mined, are used for irrigated crop production, dryland crop production, grazing and farming infrastructure. The rest of the land is used for mining and mining infrastructure.

1.4. Land capability

Areas not yet disturbed by mining activities have arable and grazing land capability. Some rehabilitated areas may already have wilderness land capability but areas not sufficiently rehabilitated yet and active mining areas have industrial land capability.

2. Potential impacts as a result of the proposed Mukulu project

2.1. Potential impacts on soil

The proposed project may impact on soil in the following ways:

- The removal of vegetation (crops and veld grass) may lead to soil erosion caused by wind and water movement over the soil surface.
- Topsoil will be stripped and stockpiled which will cause the major disturbance to the functionality and productivity of the soil and may also result in a loss of topsoil.

- Chemical soil pollution may occur as a result of oil and fuel spills as well as cement and other construction materials.
- Acidification of soil as result of the coal mining processes is also a significant impact.
- Soil compaction will be a potential impact, especially in areas where construction vehicles will drive.

2.2. Potential impacts on land use

The main impact on land use will be the change of land use from crop production and cattle farming to that of mining. The proposed project will also impact negatively on irrigated crop production on the farm Rietkuil 249 IR. The cumulative impact on land use is that large portions of land that was previously used for crop production in the region are converted into open cast mines which result in loss of agricultural land use on a regional scale.

2.3. Potential impacts on land capability

The land capability of the areas where the proposed mining infrastructure will be constructed will change from arable and grazing land capability to industrial. Should the area not be rehabilitated again to pre-mining land capability after mining operations have ceased, the land capability may be reduced to wilderness. Areas with wetland land capability may be affected by the proposed activities when the source of the groundwater and/or surface water is impacted upon.

3. Plan of study

A desktop study of existing maps and broad soil classes will be conducted to establish broad baseline conditions and areas of environmental sensitivity as well as old mining areas and areas currently being mined. Once the areas still undisturbed by mining activities have been determined, a detailed soil survey (150 m x 150 m) will be conducted in these areas. Observations will be made regarding soil texture, depth of soil, soil structure, organic matter content and slope of the area. The soil characteristics of each

sample point will be noted and logged with a global positioning system. Soil samples for chemical analysis will be taken at certain sampling points and at each point both topsoil (0-300mm) and subsoil (300-600mm) will be sampled.

The soils will be described using the S.A. Soil Classification Taxonomic System (Soil Classification Working Group, 1991) published as memoirs on the Agricultural Natural Resources of South Africa No.15. Soils will be grouped into classes with relatively similar soil properties and pedogenesis. A cold 10% hydrochloric acid solution will be used on site to test for the presence of carbonates in the soil.

All streams, drainage lines, wetlands and pans within the surface area of Exxaro Leeuwpan Coal will be surveyed in order to conduct detailed wetland delineation. These soil surveys will also be conducted within the adjacent wetlands in order to determine the boundaries of the wetlands based on soil classification.

The rehabilitated area will also be surveyed in order to determine the current physical and chemical properties of the soil included recommendations to improve the status of soils and the grass cover. The chemical soil analysis will focus on the organic carbon content of the soil as well as the presence of sulphates and other pollutants. This part of the study will include the analysis of 6 samples.

The capability of the land will be defined using the information obtained during the soil investigation. The results from the soil survey results will be used in conjunction with the Chamber of Mines method and the system developed by Camp to interpret the capability of the land. During the assessment of the land, the economic and ecological implications of the mining operation will be described as well as the steps that need to be followed for rehabilitation. The result of this study will be a report on the land capability, which will be integrated into the soils report, the EIA and EMP reports.

The land uses of the entire surface area of Exxaro Leeuwpan Coal will be defined by analyses of aerial photos and by means of ground references during the soil survey to be able to define all existing land uses and describe how the identified land uses may be affected by the present, past and future mining operation and/or mining related infrastructure development.