SUSTAINABILITY ASSESSMENT INVESTIGATION REPORT

For the

Weltevreden Project on Weltevreden 381 JT,

Portions 15 & 16, in the

MPUMALANGA PROVINCE

NORTHERN COAL (PTY) LTD

JULY 2009

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EXECUTIVE SUMMARY

Mining activities associated with the proposed Northern Coal Weltevreden Project may have a number of biophysical, social and economic impacts on the receiving environment. Digby Wells and Associates (DWA) were requested to compile a concise Sustainability Assessment Investigation Report (SAIR) for the proposed Weltevreden Project as part of the Environmental Impact Assessment (EIA) and Environmental Management Plan (EMP).

The concept of sustainable development has become an important objective of decision makers in the mining industry, playing a significant role in impact assessments and environmental management. Due to the fact that the proposed project area is located in an area with high agricultural potential and is surrounded by sensitive wetlands, the impact on the natural and biophysical environment will be negative and highly significant. The impact on soils is considered as most significant and irreplaceable and may affect food security and production over the long term.

The socio-economic impact on the proposed project area and surroundings, however, are primarily beneficial and may create employment, training and education opportunities to local communities, whilst supporting the provincial and national economy through trade and commerce. If the appropriate environmental mitigation measures are implemented and stringent management guidelines are followed, the possibility for sustainable development may be viable.

Cumulative impacts already have a significant impact on the agricultural environment in the Mpumalanga Province. Due to increasing threats of cumulative impacts on high potential soil in the region, it should be considered to implement a bioregional development plan to protect certain areas for farming to avoid the loss of the agricultural industry. If the proposed project area falls inside the boundaries of the protected area earmarked for agricultural development, the mining company needs to consider finding alternative coal sources.

If it is decided to proceed with the proposed mining project, and the Mining Right Application is approved, a number of mitigation measures and management plans must be implemented to ensure long term success of the mining project.

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1 PROJECT OVERVIEW

1.1 Introduction

Mining companies are increasingly enhancing their commitment towards sustainability and the long-term economic, social and environmental health of the communities in which they operate. In order to maximise the profitability of these operations and enhance the business case for sustainability, the planning for sustainability must begin at the mining design phase and continue until after decommissioning and closure phases. The concept of sustainable development has become an important objective of decision makers in the mining industry, which plays a significant part in impacts assessments and environmental management. Sustainable development specialists need to take into account the specific nature of the biophysical, social and economic environment within which they are providing input. For the purpose of the Weltevreden Sustainability Assessment Investigation (SAI), this study will investigates the potential long term sustainability of coal mining in relation to the agricultural industry.

1.2 Overview

Mpumalanga produces more than 80% of the country's coal and remains the largest production region for forestry and agriculture. Mining, manufacturing and electricity generation contribute to 41.4% of the province's Gross Domestic Product (GDP), with the remainder contributions being from government services, agriculture, forestry and related industries. Mpumalanga is the fourth-biggest contributor to the South Africa's GDP and the economy of this province is continuing to grow due to an increasing demand for electricity and coal resources. Integrated economic growth and optimum production is essential in the sustainable growth of any province, but the development of one sector should not be at a cost of another. It is therefore important to develop the extensive coal and mineral reserves of the Mpumalanga Province in harmony with the needs of the environment and not at risk of the depletion of sustainable agricultural and environmental resources. The Northern Coal Weltevreden Project area is located within the Witbank coal field, on the farm Weltevreden 381 JT, situated 25km south of Belfast in the Mpumalanga Province in an area with high agricultural potential near wetlands and sensitive water sources.

Although the proposed Weltevreden Project area is not a formally protected area, it is vital to protect its agricultural potential status and conserve wetlands as well as surrounding environments, where possible. If the proposed Weltevreden Project goes ahead, direct and indirect impacts will affect surrounding water resources, air, soils and surrounding agricultural potential of the area.

In the holistic assessment of long term sustainability of the proposed Weltevreden Project, it is expected that it may have a positive economic effect but negative environmental impact on the local environment. Together with other mining operations and industrial developments in the area, anticipated impacts resulting from the proposed Weltevreden Project will have a significantly negative cumulative impact on the biophysical environment. The SAI report evaluates potential negative (cost) and positive impacts (benefits) of the proposed Weltevreden Project to determine if the project may contribute to sustainable development in the area, including economic efficiency, social justice and environmental integrity.

1.3 Project Description

The Northern Coal Weltevreden project area falls within the Emakhazeni (Highlands) Local Municipality and the Nkangala District Municipality. The mining site of portion 15 & 16 of the farm Weltevreden 381 JT is accessible from the R 33 towards Belfast which links to the N4 (Figure 1-1).

The Northern Coal Weltevreden Project aims to mine the No. 2 Seam of the Witbank coal field. The seam thickness varies from 1.2m in the north of the mining area to 4.15m in the south west. The mining method will be undertaken truck and shovel roll over method at a strip ratio of 5:1. Roll over mining or strip mining is undertaken by creating an initial cut or strip which is mined out. When mining moves in a forward direction of the second strip, the overburden from the second strip is backfilled into the initial cut. The overburden form the initial cut is then used to backfill the final cut.

Approximately 187.51ha will be disturbed which equates to approximately 38% of the total project area. The opencast mining will be undertaken in three phases or sections which will result in three consecutive pits.

Figure 1-2 illustrates the division of the proposed opencast area into three pits, as well as the direction of mining. Mining will be undertaken in this manner in order to stay out side of the 100 year flood lines of the intermittent stream that runs through the

project area and outside of a 100m buffer zone around the stream in accordance to DWAF Regulation 704. The total ROM coal to be extracted is estimated at 7.512Mt during the LoM of approximately 7 years. The coal does not require beneficiation and there will therefore be no by-product that will require disposal. Extracted coal will be crushed and placed on a ROM stock pile which will not exceed 5 000 tonnes. ROM coal will then be transported off site. The mining activities associated with the proposed Weltevreden Project will have a number of biophysical, social and economic impacts on the receiving environment.

This SAI will form an integrated part of the Environmental Impact Assessment (EIA) and Environmental Management Plan (EMP) report that will be submitted to DME in support of the Mining Right Application.

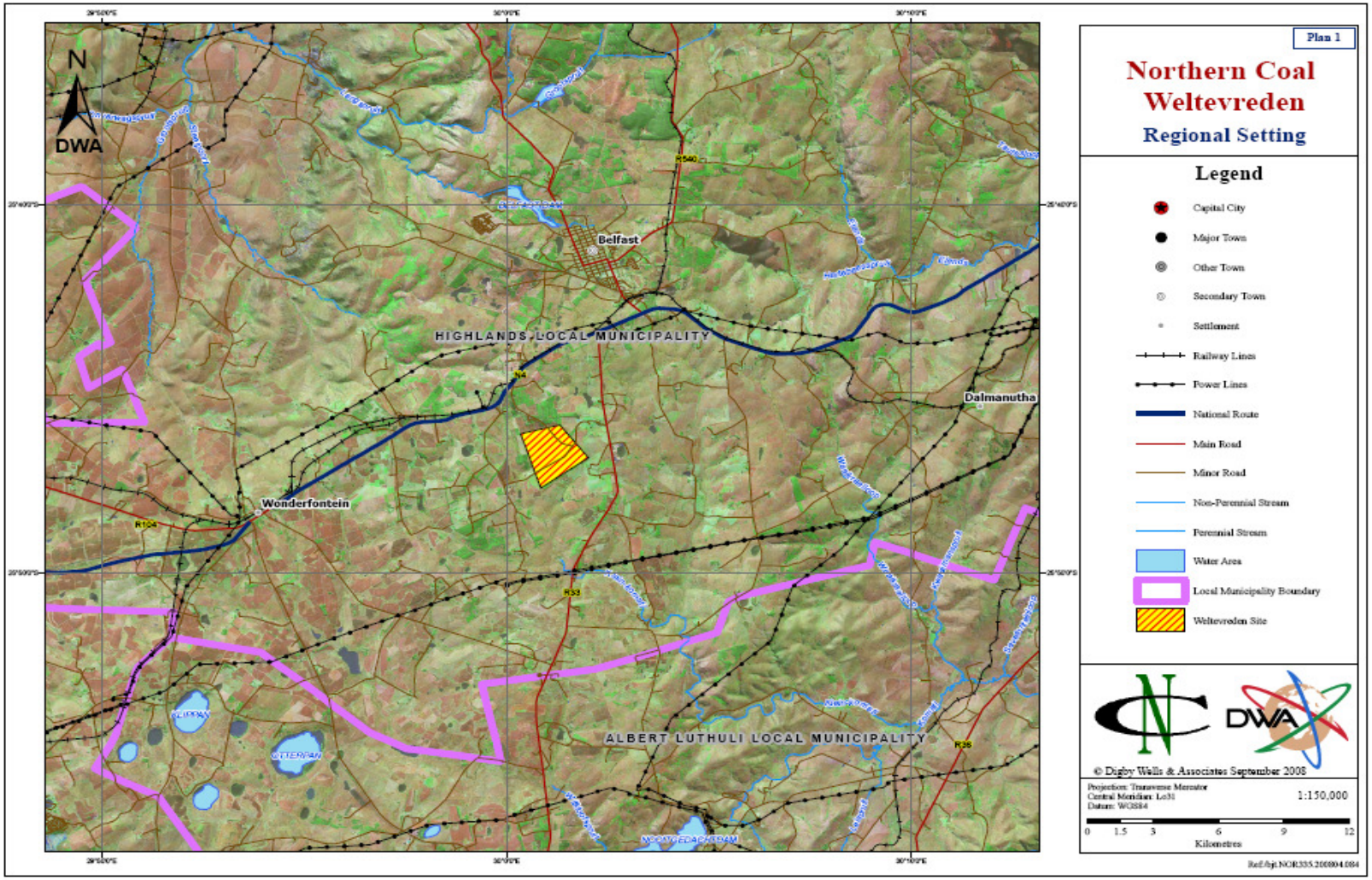

Figure 1-1: Proposed Project Location (not to scale)

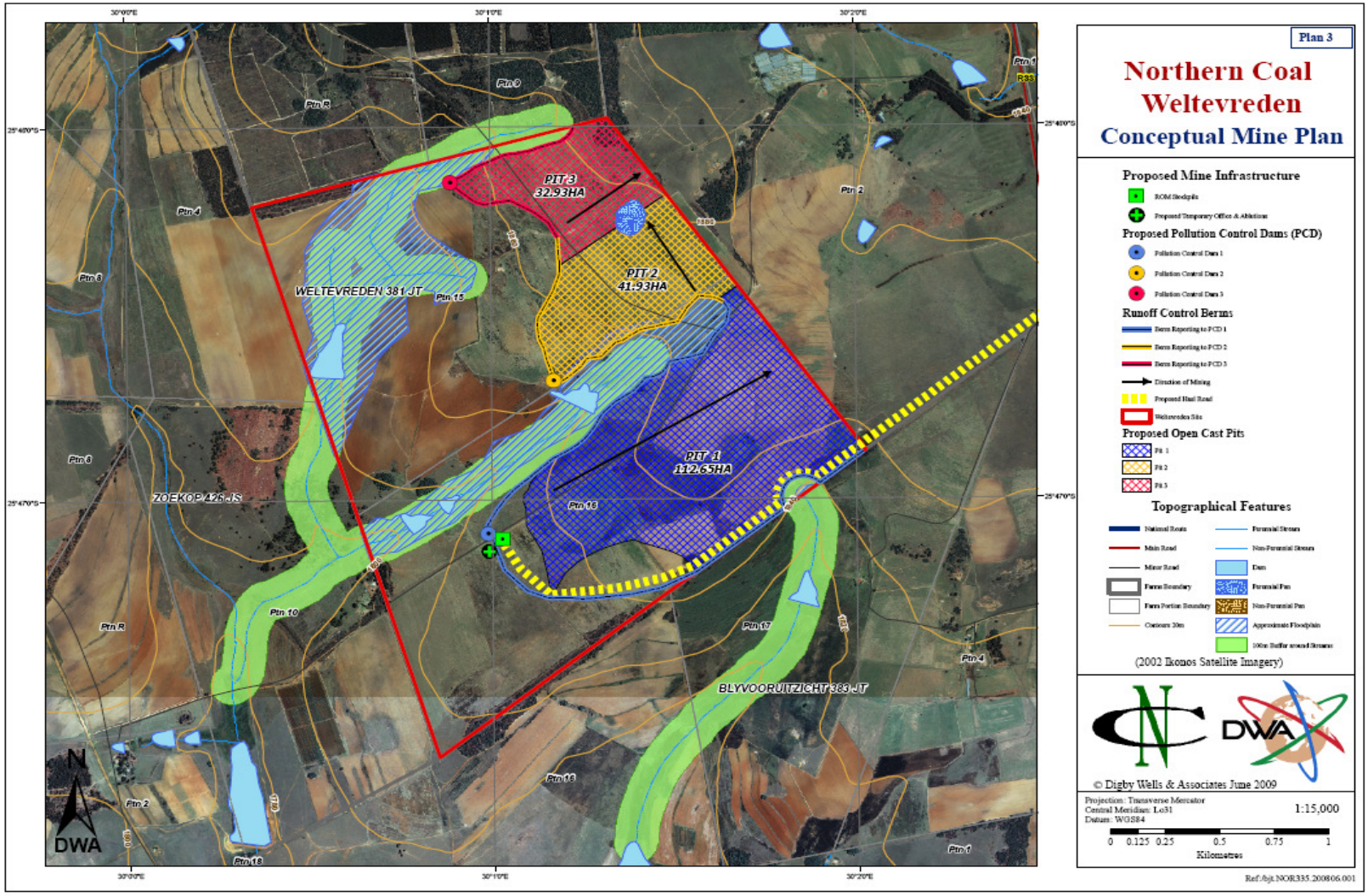

Figure 1-2: Conceptual Mine Plan (not to scale)

2 METHODOLOGY

The methodology for the SAI report was aimed at evaluating the long-term economic, social and environmental sustainability of the mining and agricultural industry in the proposed project area. The following methodologies have been utilised:

2.1 Socio- Economic Environment

The MPRDA states that all mining companies are required to determine the characteristics of their socio-economic environment and to identify the likely impacts of mining operations on this environment. DWA adopted the following methodology to acquire socio-economic data for the proposed project:

Phase 1: Research and Literature Review: Basic literature reviews were undertaken to gain a background understanding and insight into the current socio-economic status of the proposed mine area, including the evaluation of primary and secondary sources of information such as government statistics and the Local Municipality Integrated Development Plan (IDP) document.

Phase 2: Social Consultation: A site visit was conducted by DWA to obtain more information on the surrounding settlements or community structures that could be affected by the mining project. A DWA social consultant went to site on 20th June 2009 till 23rd June 2009 to consult with the farm labourers present at that time. Key informant interviews were undertaken to gather local views and perceptions related to the project. The bulk of the information was gathered by means of a semi-structured questionnaire, which covered the general population, social organisation, education and skills, general health, economic activities and employment, amongst others. No formal household survey was undertaken, thus no new local statistics were recorded for the local municipal profile.

Two separate social consultations took place; first was with the farm labourers residing on Willie Pretorius's farm Zoekop portion 1 and the second with the labourers residing on Theresilda Lotter's property Weltevreden 381 JT portion 16. On Monday the 22 of June a separate meeting was held with Mr JM Nkosi. Information was gathered from the Emakhazeni Local Municipality with the assistance of Mr Naill Carroll.

2.2 Agricultural-Economic Environment

The basic function of economic specialist input in the EIA process is to assist in the determination of whether a project will enhance net societal welfare. The methodology of the agricultural-economic assessment was based on a combination of literature reviews and empirical evaluations, including three phases:

Phase 1: Research and Literature Review

Research and literature reviews were incorporated into the theoretical approach towards agricultural analysis and production, as well as the basic analysis of markets and industry knowledge. The Market Valuation of Physical Effects (MVPE) was used MVPE is a concise method of valuating environmental change through the observation of physical changes in an environment and estimating the impact it will have on the value of goods and services (OECD, 1995). In combination with the MVPE Approach, 'opportunity costs' were also considered opportunity cost is the net benefit that would have been yielded by the next best alternative (i.e. agriculture) and often need not involve monetary values (Van Zyl, de Wit and Leiman, 2005). The principles of MVPE and opportunity costs were therefore integrated and assessed in terms of the costs and benefits of the proposed mining project versus current land use (agriculture). Exact market values and financials have not been included in this study. This was partially due to the variability and fluctuation of markets and uncertainties of specific input costs.

Phase 2: Social Consultation

A number of farmers and/or land owners were contacted to create a baseline for the agricultural-economic environment and associated trends in the proposed project area. Questions were directed at gaining more information relating to the approximate size of the farm, main economic activities on the farm and land capability, amongst others.

Phase 3: Data Analysis and Impact Assessment

The data gathered for the baseline agricultural-economic assessment was integrated and evaluated in context of the proposed Weltevreden Project and in accordance with the relevant guidelines and methodologies prescribed by DWA.

3 DESCRIPTION OF AFFECTED ENVIRONMENT

3.1 Natural Environment

Climate

The proposed project area is characterised by moderate summers, cold winters and summer rainfall. The average rainfall in the target area is 768 mm per annum and distribution and total rainfall is typical of the Highveld region, characterised by thunderstorms in the summer. Temperatures are also typical of what could be expected in the Highveld region, although lower temperatures could be expected on the high lying regions. The area of Belfast experiences an average daily maximum temperature of 21˚C. Temperature variations are experienced with seasonal changes with the average summer maximum temperature of 25˚C which drops to 15˚C during the winter months. The minimum temperatures in the area can drop to below 0˚C during the winter months. Climate data described was obtained from the Belfast weather station (05170412) from 2005 to 2007 and described in more detail in the EIA/EMP report in order to give a description of the climate in the area.

Soil, land capability and land use

DWA appointed Rehab Green Monitoring Consultants cc to conduct a soil, land capability and land use assessment of the proposed coal mining operations. The full report is attached as an appendix in the EIA/EMP report, which is available on request. During the soil, land capability and land use assessment, a total of 13 soil types were identified, based on dominant soil form and effective soil depth. Red and yellow, well- to moderately drained soils with arable land capability and moderate to high agricultural potential comprises 71.71% (362.68 ha) of the surveyed area. These soils consists of soils types Hu1, Hu2, Hu3, Cv1, Av1 and Gc1. Shallow, yellow brown and stony soils with grazing land capability and moderate to low agricultural potential comprises 16.43% (67.83 ha) of the surveyed area. These soils consists of soils types Gc2, Dr2, Ms/R and Hu/R.

Wetlands

Temporary wetland zones dominated by the Dresden soil type (Dr1) comprises 4.28% (21.63 ha) of the surveyed area. Seasonal wetland zones dominated by the Longlands soil type (Lo1) comprises 10.26% (51.91 ha) and permanent wetland zones dominated

by the Katspruit soil type (Ka) comprises 0.33% (1.67 ha) of the surveyed area (Rehab Green Monitoring Consultants CC, 2009). According to Rehab Green CC (2009), the delineated wetland areas in the proposed project area plays a significant part in the ecosystem which is already largely disturbed by agricultural activities. The wetland areas function as surface drainage systems, an important habitat and a mechanism to recharge the ground water system as well as open water sources downstream.

3.2 Socio-Economic Environment

Provincial & Regional:

The primary economic activities in the Mpumalanga Province entail mining, manufacturing, electricity generation, agriculture, forestry and tourism. The mining sector relies mostly on coal mining, with more that 84% of South Africa's total coal production originating in the Mpumalanga Province (Mpumalanga SOE, 2003). Due to an increasing demand for electricity and minerals, economic growth in Mpumalanga is steadily growing, particularly in the energy and mining sectors. The Mpumalanga Province is divided into three municipal districts (Gert Sibande District, Nkangala District and Ehlanzeni District), which are further subdivided into 17 local municipalities. Some areas in the province are characterised by various service deficiencies, poverty and unemployment (South Africa Info, 2009). The poverty rate in Mpumalanga, determined by households earning less than R800 per month in 2005, was 51% while 83.9% of households had access to piped water. Over 3.2 million people (approximately 87%) did not have access to a medical aid and depended on the public health system. Although primary health care expenditure has doubled over the past few years, it is still the lowest in South Africa. However, the province has achieved intra-provincial equity with all three districts having very similar per capita expenditure (Kalay Moodley, 2008). The above statistics resemble a predominantly impoverished black rural society that is in need of development.

The proposed mining project is located within the Emakhazeni Local Municipality approximately 4km north east of Belfast. The gender ratio in the municipal region is equal as 51% of the population comprises of females whilst 49% of the population is male. The most dominant languages spoken within the municipality are SiSwati (33%), IsiNdebele (23%) and IsiZulu (16%). Approximately 43% of the population is

economically active whilst the overall unemployment amounted to 18% with the economically inactive population standing at 39%. The per capita income of employed people per month is approximately R1700. The majority (54.5%) of the population earns less than R800 per month whilst 21.4% earns between R801 and R1600. Only 24% of the population earns more than R1600 per month, indicating that there is a reliance on social assistance. Employment according to the major types of industry in the municipality are Agriculture and forestry, wholesale and retail trade, private households and community and social services also contribute to a lesser extent. Figure 4-1 shows the sectoral employment for the municipality.

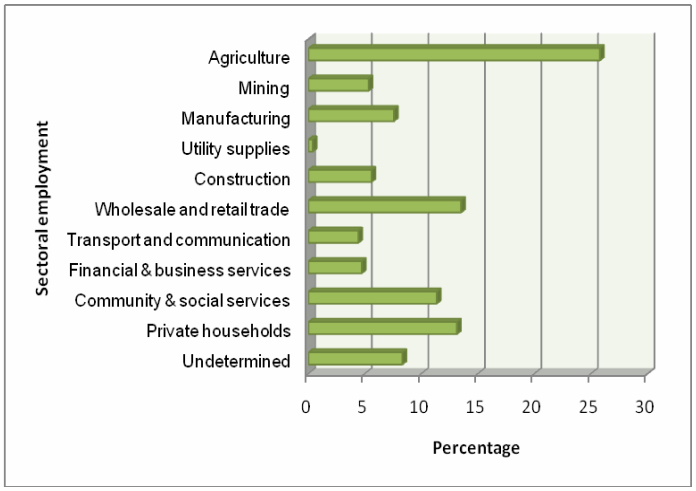

Figure 3-1: Sectoral employment for the municipality

Local:

Table 4-1 provides the land owner information of portion 15 and 16 of the Farm Weltevreden 381 JT and Table 4-2 gives the information of the adjacent land owners to the operation. The location of farms and landowners mentioned below can be seen in Figure 4-2.

Table 3-1: Landowner details of the project area

Farm Name	Portion	Landowner
Weltevreden 381 JT	15	Ms. Therésilda S. Lotter
Weltevreden 381 JT	16	Ms. Therésilda S. Lotter

Table 3-2: Adjacent landowners to the Weltevreden Project

Farm Name	Portion	Landowner
Weltevreden 381 JT	2	Ms. Therésilda S. Lotter
Weltevreden 381 JT	9	Sameul Johannes Lundall
Weltevreden 381 JT	RE	Sameul Johannes Lundall
Zoekop 426 JT	10	Jacobus Philippus Pretorius
Weltevreden 381 JT	4	André Viljoen
Blyvooruitzicht 383 JT	16	Willem Pieter Pretorius
Blyvooruitzicht 383 JT	17	Jozef Benjamin Kotzé

As outlined in the socio-economic methodology, two separate social consultations took place. The first was with the farm labourers residing on Willie Pretorius's farm Zoekop portion 1 and the second with the labourers residing on Theresilda lotter's property Weltevreden 381 JT portion 16. The results are discussed in the following section:

First Interview (Saturday 20 June 2009)

Emma Mahlangu's homestead on Zoekop (portion 1); Attendees: Ms E Mahlangu, Ms S Mahlangu, Mr. J Skhosana, Mr. A Skhosana and 3 three additional attendees (unidentified)

Population

A small community of farm labourers comprising of approximately 16 household/families reside on Zoekop (portion 1). The majority of these people work for Mr W. Pretorius and some of the labourers have been living here since 1985. A number of individuals are not employed by the farm and are working elsewhere in Belfast or surrounding farms. The loss of employment on the farm has led to the decrease in the number of people living in the area in the last two years. New comers are awarded a house by the farmer upon securing employment. There are no informal settlers on the farm and there has been no resettlement. There are no known land claims over the Zoekop farm but Mr Nico Mphahlelwa reported that some individuals

have a claim on land on the farm Paardeplaats (4km from Zoekop); this statement has not been verified.

Education

The highest level of education attained by the few educated farm labourers is a matriculation certificate. The majority of community members are un-educated or have received very little education. Currently, the majority of children attend either the primary school or one of the two secondary schools located close to the settlement namely Nhlupheko Primary school, Morelig Secondary School and Khayalami Secondary in Siyathuthuka Township, Belfast.

Health

The most common diseases in the settlement are respiratory related (chest infections), gastro-intestinal related (diarrhoea) and HIV/AIDS; the major cause of death being HIV/AIDS. Most of the people indicated that they consult medical practitioners and a few still consult traditional healers. There are no known medicinal plants growing in the area. The nearest clinic is located in Belfast and the nearest hospital in Carolina. A mobile clinic visits the settlement once a month.

Infrastructure and Services

The national highway (N4) is located close to the farm and is currently being upgraded. Approximately 12km outside of Belfast travelling towards Middelburg along the N4 is the Easterlings gravel road, which is in good condition. There are no accessible natural water sources in the area such as rivers in close proximity to the settlement. Water is obtained from taps which the Municipality supplies. The water is sufficient and clean. Apart from occasional diarrhoea cases, there is no water born diseases reported. Lavatories are all pit latrines (i.e. no flush toilets in any of the households). There is a common understanding and respect for one another among the community and crime is not an issue. The nearest police station is the Belfast police station located in Belfast.

Culture

The people living in this settlement are of mixed ethnic backgrounds, majority being Ndebele, followed by the Zulu and siSwati people. Cultural traditions are still highly regarded and observed among the groups and initiation schools are still being attended

by the Ndebele people. The most common religious affiliation Catholic and a church was built by the farmer for the community. The local cemetery is located south west from the settlement.

Second Interview (Saturday 21 June 2009)

Mr. Mhlanga's household Weltevreden 381 JT (portion 16); Attendees: Mr. Mhlanga, Mr. Masango, Mr. Simon Masango, Ms Masiteng, Mr. Shabangu, Ms Masemula, Ms Mavis Mahlangu and Mr. A Mahlangu

Population

This community is made up of scattered households on portion 16 of the farm Weltevreden 381 JT; consisting of approximately eight households in total, made up of about six people on average per household. There are no land claims over this land as far as the interviewees know. The location of their settlement is close to the project area, situated a few kilometres south of the project area. Subsequent to the passing away of the farm owner, Mr Louis Lotter, the majority of farm labourers moved out in search of new employment. Some of the families stated they have been living in this particular area for more than 20 years. The property falls under councillor Shakes Sibanyoni of the African National Congress (ANC) and under the Wonderfontein Community Association, a committee formed with its mandate being the protection of farm worker's rights against exploitation by farmers and mines in the area. The primary source of income in the community is from agricultural (on a neighbouring farm). Others are employed as petrol attendants in Belfast while others farm small backyard gardens for subsistence and selling any excess produce.

Education

The highest level of education among the farm labourer community seems to be matriculation and the majority attended up to Secondary School. There currently one primary and one secondary school in the area catering for the educational needs of the children namely Bloemplaas Primary School and Khayalami Secondary school. The nearest tertiary institutions are located in Witbank, Nelspruit and Pretoria.

Health

Similar to the first settlement, the most common diseases in the settlement are respiratory related (chest infections), gastro-intestinal related (diarrhoea) and

HIV/AIDS; the major cause of death being HIV/AIDS. Most of the people in this settlement consult medical practitioners rather than their traditional counterparts; it is felt the medical practitioners are better equipped to assist with diagnosis in comparison to traditional healers. The nearest clinics and hospitals are in Belfast, Carolina and Witbank and the only other medical contact this community receives is from a mobile clinic that occasionally visits the area to treat patients with minor aliments. More serious illnesses are referred to hospitals or clinics.

Infrastructure and Services

All the houses in this settlement are a combination of mud huts and a few brick built homes built by the farm labourers themselves without any assistance from the farmer. In total working on an average of at least four structures in a single household there are approximately 26 to 30 built structures in total. Four of the families have cattle and sheep enclosures and almost all the households have chicken runs. The people in this settlement obtain their water from a borehole located centrally to several of the households. This water is pumped by hand from the ground and is stored in buckets for use. It was reported the water is sufficient but occasionally comes up heavily silted and undrinkable. The police station servicing this area is located in Belfast, but there are only minor crimes that take place such as theft of livestock.

Culture

Similar to the neighbouring settlement interviewed, this community is of mixed ethnic backgrounds, majority being Ndebele, followed by the Zulu then the siSwati people and practice cultural traditions such as initiation. They attend the same church built by Mr W. Pretorius on the neighbouring farm.

In conclusion, it seems that both consulted communities have no major objections towards the proposed Weltevreden Project as they feel it will create employment, create opportunities and improve Emakhazeni Municipality in general. Potential negative impacts perceived include the loss of the land which they have lived on for many years, concerns regarding resettlement and noise from blasting. These impacts should be minimised and mitigated where possible. Effective consultation and feedback from the proposed Weltevreden Project and Northern Coal should be implemented and positive impacts such as employment and training opportunities should be optimised.

3.3 Agricultural-Economic Environment

Provincial & Regional:

Mining and prospecting applications currently cover approximately 32.8% of the land in Mpumalanga classified as irreplaceable, 45.4% of land is classified as highly significant and 36.5% of land classified as important and necessary in the Mpumalanga Biodiversity Conservation Plan (Mail & Guardian, 2009). The sheer magnitude of mining right applications and operations in the province evidently threatens its biodiversity and in some instances could prove a threat to water security in South Africa. Pans and wetlands are crucial for the hydrological integrity of one of South Africa's important water-producing areas, comprising the headwaters of three major river systems: the Pongola, Usutu and Vaal River systems (Mail & Guardian, 2009). In June 2009, Angus Burns, coordinator of the Enkangala Grassland Project, highlighted the importance of economic growth and development, but pointed out that only 6% of employment comes from mining whereas more than 20% of the employment in the area comes from agriculture. Some of the regional agricultural practices are more compatible with biodiversity conservation than mining and is crucial to protect areas of agricultural significance.

Two main agricultural activities are normally at stake when developments encroach on high potential soil, these are dry land crop planting and grazing. There is a general perception that although attempts are made by mining houses to rehabilitate mined areas that these attempts are generally less than successful. Soil capability and therefore land capability and suitability of reclaimed land is degraded from pre mining natural capabilities to man made post mining land capabilities needing special management and care.

Local:

The proposed mining activities of the Weltevreden Project will be undertaken on portion 15 and 16 of the Farm Weltevreden 381 JT, covering a total area of 513.8ha in size. The proposed project area is located in an area with high agricultural potential due to a combination of high potential and fertile soil, climate and close proximity to markets (Figure 4-2 and Figure 4-3).

The main economic activity in the proposed project area is agriculture, providing employment to the communities, supporting local and regional production, as well as food security. The majority of the area surveyed during the soils and land capability study is utilized for maize production, which comprises 51.99% (262.93 ha) of the surveyed area. Areas permanently used for grazing purposes (mainly cattle farming) comprises 33.85% (171.20 ha) of the surveyed, which is also reflected in the Land Cover Map (Figure 4-4). The maize fields have been cultivated for many years, as derived from the 1:50 000 topographical map of the study area. Crop yields vary from farm to farm and between different fields on the same farm, due to varying characteristics of soil types. This includes variations in effective soil depth, texture, water holding capacity, annual precipitation and farm management. Crop yields are therefore strongly correlated with soil properties (Rehab Green Monitoring Consultants CC, 2009). Long term average crop yields have been estimated according to the various soil types and associated properties, assuming an average precipitation between 650 and 750 mm per annum (Rehab Green Monitoring Consultants CC, 2009). Results are presented in Table 4-3.

Table 3-3: Historical agricultural production

Product	Soil Types	Derived soil potential	Potential Yield (tons/ha/annum)
Maize (Dry land)	Hu1, Hu2	High	4 – 6
	Hu3, Cv1, Av1, Gc1	Moderate	3 – 4
Soybeans (Dry land)	Hu1, Hu2	High	1.8 – 2.2
	Hu3, Cv1, Av1, Gc1	Moderate	1.5 – 2

An organic cherry farm, located downstream from the proposed project area, may also be affected by the proposed mining activities. Climatic and soil requirements for cherries include cold and long winter weather conditions with a long dormancy period of 7°C or below. Cherries prefer regions with a cool spring and a mild summer, as well as good, deep, friable well-drained soil with a pH between 5, 5 and 6, 5 (Department of Agriculture, 2008, Cherries). Potential impacts resulting from the proposed Weltevreden Project is discussed in more detail in the next section, followed by the long term sustainability assessment of coal mining versus the agricultural industry in this area.

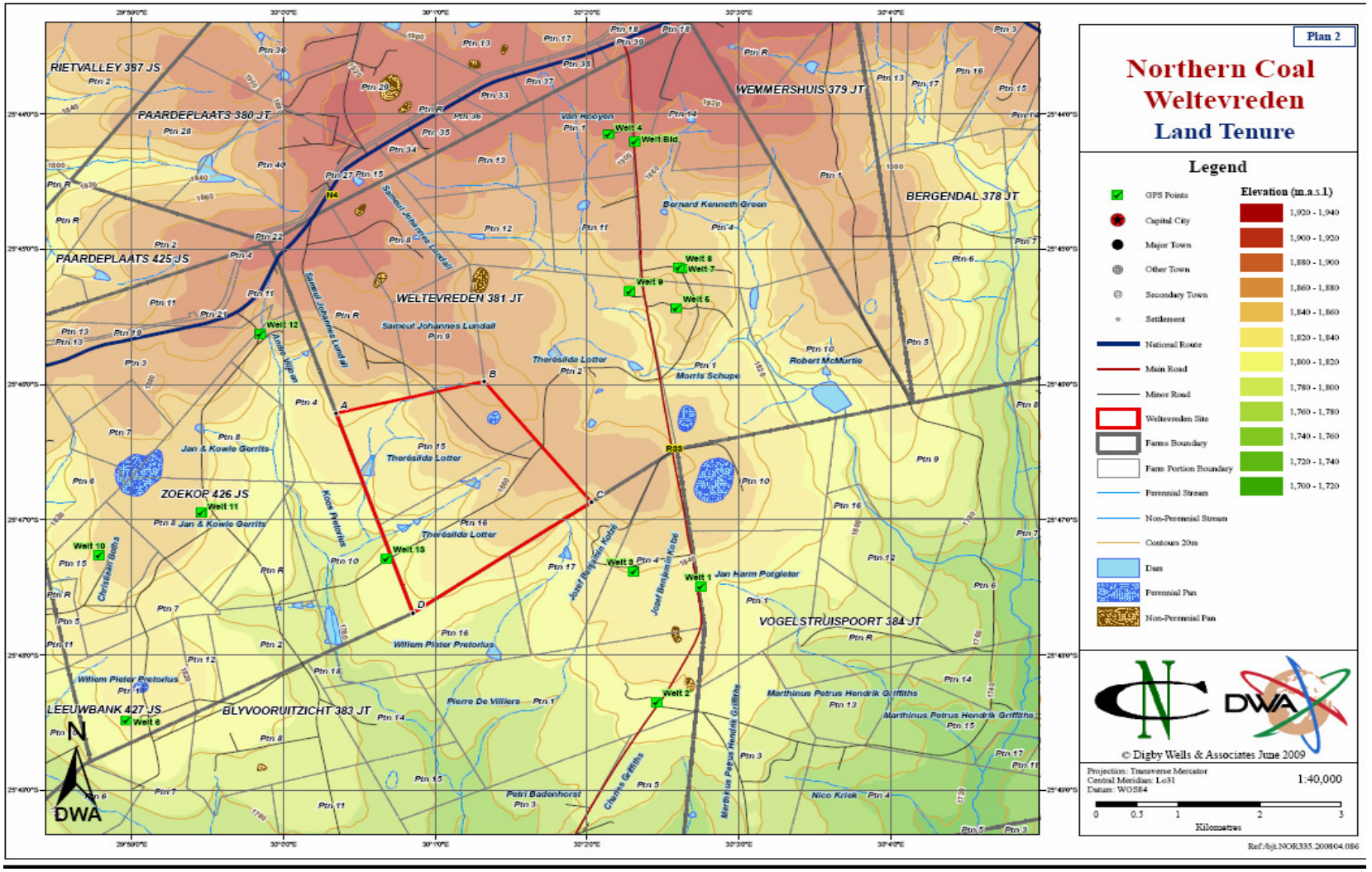

Figure 3-2: Land tenure Map (not to scale)

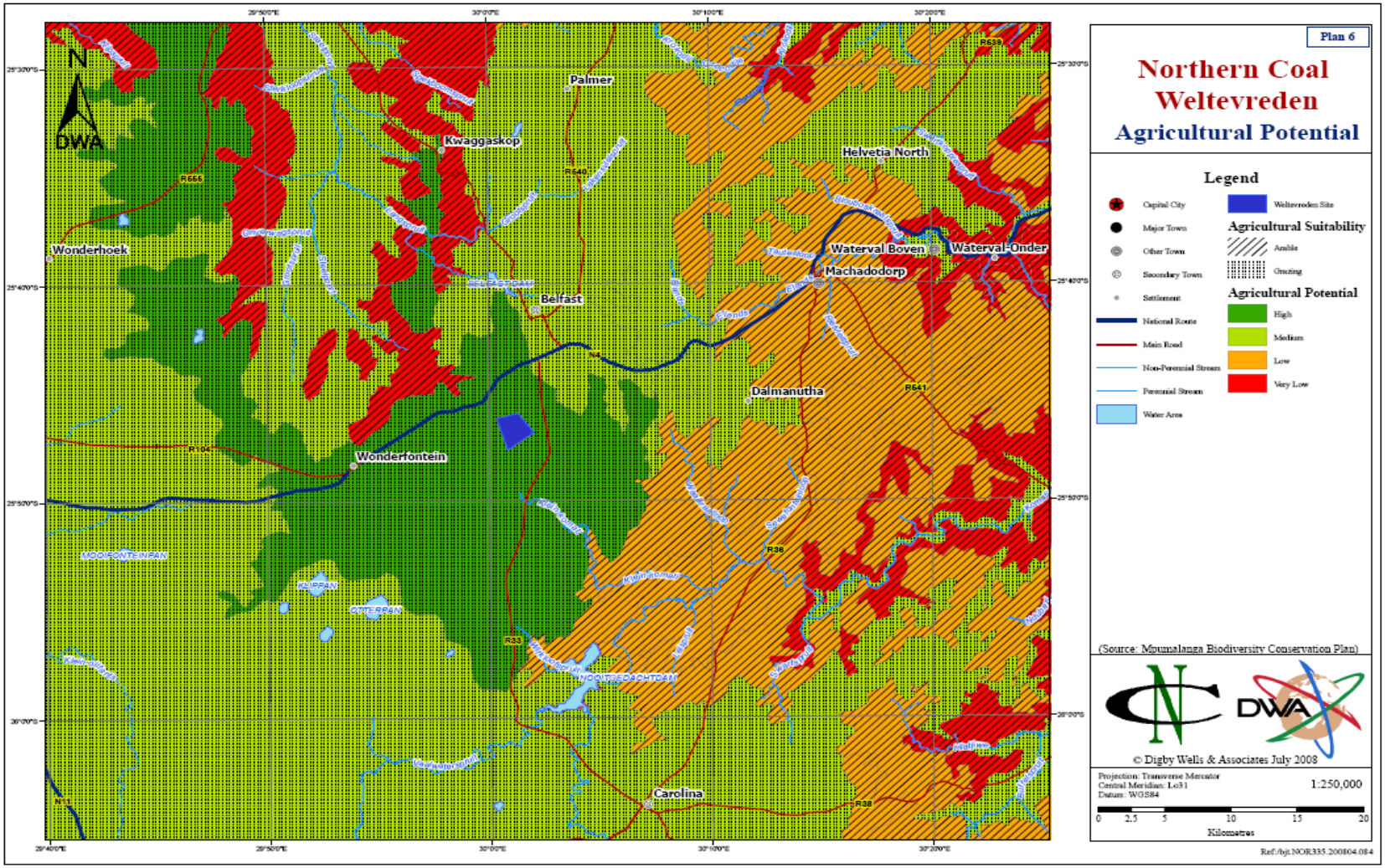

Figure 3-3: Agricultural potential and Land capability map (not to scale)

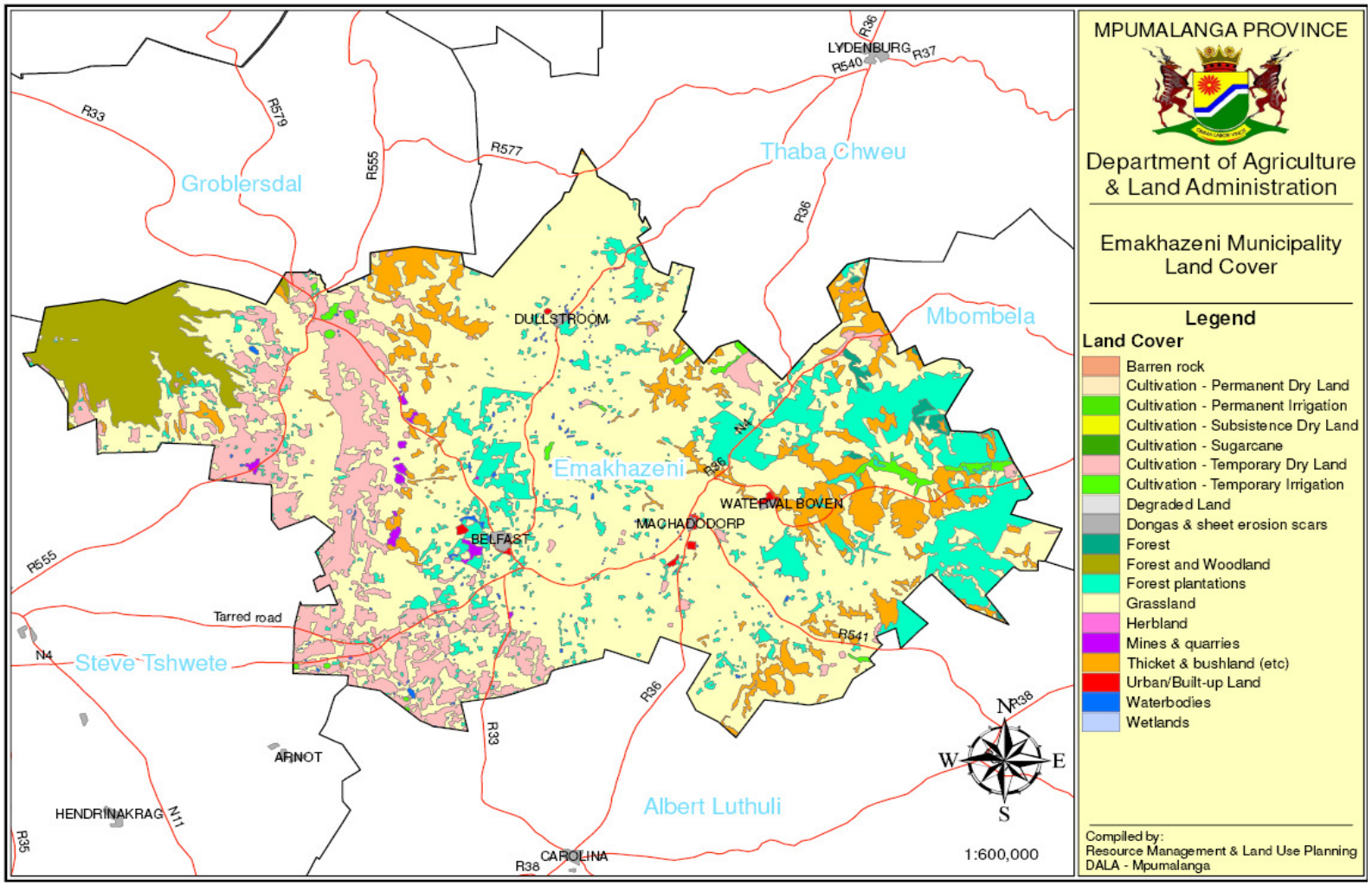

Figure 3-4: Land Cover Map (not to scale)

4 ENVIRONMENTAL IMPACT ASSESSMENT

4.1 Project Activities

The following table provides a summary of the main mining activities that will occur with in each mining phase, which may have an impact on the environment.

Table 4-1: Summary of main mining activities

Phase		Activity
Construction Phase	1	Construction of hydrocarbon storage facility
	2	Removal of topsoil
	3	Construction of haul roads
	4	Construction of offices and change houses
	5	Construction of pollution control dams
	6	Construction of storm water diversion berms
	7	Construction of portable crusher plant
	8	Construction of a workshop
	9	Placement 11kw electrical line
	10	Blasting
	11	Development of initial open cast cuts
	12	Stockpiling of soil and overburden from initial cuts
Operational Phase	13	Transportation of coal
	114	Use and maintenance of haul roads
	15	Domestic and industrial waste storage and removal
	16	Hazardous waste storage and removal

	17	Operation of portable ablutions
	18	Operation of fuel depot
	19	Operation of pollution control dam & storm water management systems
	20	Removal of overburden and backfilling
	21	Mining process removal of coal
	22	Crushing of coal
	23	ROM coal Stockpile
	24	Maintenance of equipment
	25	Rehabilitation as mining progresses
Decommissioning & Closure Phase	26	Removal of all infrastructure
	27	Filling of final void
	28	Spreading of sub-soils and topsoil
	29	Re-vegetation of disturbed areas
	30	Profiling and contouring of the area to preserve natural drainage lines
	31	Environmental monitoring of decommissioning activities

4.2 Assessment of potential Socio-Economic Impacts

Social impacts can be defined as the consequences of any action that changes the way a community lives, works, relates to one another, organises themselves and functions as individuals and members of society. Based on the proposed mining activities outlined in Table 5-2, certain aspects of the MVPE approach was used and integrated to estimate the physical effect of environmental change on the receptor (receiving environment), to identify the change (cause), and to determine what differences this will make to the output (impact) and to estimate the value (significance/severity) of this change in output or cost, where applicable (OECD, 1995).

Table 4-2: Assessment of potential socio-economic impacts (MVPE)

Aspect (Receptor)	Cause (Change)	Effect/Impact (Output)	Significance & Severity (before mitigation) (Value)
Regional & local Socio-Economic Environment	Pre-construction Phase, Construction Phase & Operational Phase	The mine's SLP will be integrated into the Emakhazeni IDP through serving on the local LED Management Committee and assist in implementing LED projects and/or programmes identified in the IDPs, in partnership with local government, business and affected communities.	Positive (medium)
Regional & local Socio-Economic Environment	Construction Phase & Operational Phase	The proposed operation on Weltevreden 381 JT will likely influence development opportunities within the Emakhazeni Local Municipality contributing towards the local economy through the continuation of a number of employment and income generating opportunities for local suppliers and other beneficiaries in the area and a demand for services from nearby towns.	Positive (medium)
Community and Employees	Construction Phase & Operational Phase	A Sustainable Development (SD) Plan has been prepared by Northern Coal to provide a framework for initiatives that promote the sustainability of employee households, as well as that of the host community, described in more detail in the SLP Report.	Positive (medium)
Community	Construction Phase & Operational Phase	Northern Coal, in consultation with the Municipality has identified the upgrade of the Umneli Primary School as its LED Project. The mine will be responsible for the upgrade of the current facilities, as well as the purchase of facilities and equipment (i.e. sports and laboratory equipment). The mine will purchase required learning materials.	Positive (medium)

Employees	Construction Phase & Operational Phase	The Weltevreden SLP will seek to improve the conditions of health, nutrition and accommodation of it employees, as required by the Mining Charter and the MPRDA.	Positive (medium)
Employees & Community	Construction Phase & Operational Phase	Appropriate levels of Historically Disadvantages South Africans (HDSA) and local procurement will be met from the outset of the operation.	Positive (medium)
Community	Construction Phase & Operational Phase	There may be a lack of skills and capacity amongst targeted individuals and communities who have been earmarked to benefit from Weltevreden's LED projects. Target communities may be at risk of being bypassed by livelihood and development opportunities that are created, due to vested interests by certain parties involved in the SLP processes.	Negative (medium)
Community	Construction Phase & Operational Phase	Opencast mining will have a negative impact on the socio-economic environment by removing cultivated land from active production and by increasing the level of noise and dust in the area.	Negative (medium)
Economic Viability	Construction Phase, Operational Phase Decommissioning & Closure	The projected annual capital that would be available for Broad Based Black Economic Empowerment via Northern Coal's Trust is 1.5 million per year, for the life of the Weltevreden Mine. The proposed operation will continue for a period of eight years, after which the further viability of the mine will be re-assessed.	Positive (medium)
Employees	Decommissioning & Closure	Retrenchment will be necessary during the decommissioning and closure phases.	Negative (medium-high)

4.3 Assessment of potential Agricultural-Economic impacts

Potential impacts on the agricultural-economic environment primarily result from the secondary effects of negative changes in the environment that causes land degradation. The most important generic land degradation issues include soil erosion, contamination (pollution) of soil, poor rehabilitation practices after land is disturbed, over-utilisation of resources, surface/groundwater pollution and a loss of production and bio-diversity value when land is transformed. Negative impacts on the environment affect the natural resources that agriculture depends on and in turn, this may lead to direct or indirect affects on agricultural production or output. Approximately 180ha will be directly impacted by mining activities and more than 520ha of land with high agricultural potential may be indirectly affected by mining activities during the construction, operational and decommissioning phases in the proposed Weltevreden Project area.

Opencast mining impacts on soil

Soil formation is a slow process and soil formation factors namely climate, parent material, slope, micro organisms and time all work in combination to form specific soil types exhibiting specific soil properties such as clay content and porosity. Such soil properties provide water holding capacity and nutrient holding capacities which are important in crop production. Over time, soil bulk density also comes into equilibrium with environmental conditions in the presence of organic matter allowing successful vegetation growth. Opencast mining removes the soil and overburden in layers. The A horizon is especially important because it is considered to be the most microbiologically active part of the soil where most plant roots are established. Microbes convert organic material into plant nutrients and nutrients into different plant available ionic species through cycles (e.g. carbon cycle, nitrogen cycle, sulphur cycle). Disturbing the equilibrium by removing soil horizons influences all soil physical and chemical properties.

Based on the mining activities outlined in Table 5-3, elements of the MVPE approach were utilised and integrated to estimate the physical effect of environmental change on the receptor (receiving environment), to identify the change (cause), to determine what differences this will make to the output (effect or impact) and to estimate the value (significance/severity) of change in output/cost, where relevant (OECD, 1995).

Table 4-3: Assessment of potential agricultural-economic impacts

Aspect (Receptor)	Cause (Change)	Effect (Output)	Significance & Severity (before mitigation)
Soil	Construction Phase & Operational Phase	Top soil is removed first, then sub soil and lastly overburden and stored on stockpiles. Soil removal destroys the natural sequence of soil horizons, formed over millennia. Overburden can contain high quantities of salts. Once the overburden is disturbed, chemical and physical weathering sets in and potentially large quantities of salts can be released into the environment. Weathering of sulphur containing minerals may also acidify the environment.	Negative (medium)
Soil	Construction Phase & Operational Phase	Movement on site from machinery and clearing of vegetation may contribute to soil erosion and soil compaction.	Negative (medium)
Soil	Construction Phase & Operational Phase	Fuel and lubricant spills from construction machinery may negatively affect soil quality.	Negative (medium)
Soil	Operational Phase	The most significant impacts on soil during the operational phase include the erosion of soil, the loss of soil fertility as a result of erosion, the contamination of soil via dirty water spillages and hydrocarbons. Vehicle movement will also result in soil compaction which impacts on soil structure. The removal and replacement of soils during rehabilitation may lead to the mixing of soils horizons and deterioration of soil quality.	Negative (medium)
Soil	Decommissioning & Closure	Replacement of soil stripped prior to opencast mining and rehabilitation may remedy recover some of the negative impacts occurred in previous mining phases.	Neutral (medium)

Surface Water	Construction Phase & Operational Phase	Removal of vegetation and movement of soils will allow erosion to take place and silt could be added to the surface water environment. There is also the possibility of hydrocarbon spills affecting surface water quality. As a water scarce area, any water sourced from local dams and streams will reduce overall yield from local water resources.	Negative (medium-high)
Groundwater	Construction Phase & Operational Phase	Most construction work will utilise water from boreholes and therefore impacts on groundwater quantity is expected. Potable water will most likely be obtained from groundwater. Accidental hydrocarbon spillages may negatively affect groundwater quality, if seepage occurs into the groundwater.	Negative (medium)
Groundwater	Operational Phase	Aquifers within the mining area will be dewatered during, and possibly after, mining, while the opencast workings will also alter the nature of the aquifers, providing a primary aquifer in the way of the rehabilitated spoils. The qualitative impact will occur due to the mixing of the various water types and the potential for Acid Mine Drainage (AMD). Boreholes and springs in the opencast areas will be destroyed.	Negative (medium)
Flora	Decommissioning & Closure	The impact on flora will be negative as soil and land is stripped. The areas will be rehabilitated and vegetation may be restored. Monitoring will be required to ensure invasive species do not become established and to ensure that erosion is minimised and the slopes are of a suitable angle to allow for adequate drainage. During the decommissioning phase all remaining vegetation will be cleared from site. Grasses may be planted in the interim to prevent soil erosion and dust pollution but the area will not be returned to a fully rehabilitated state.	Negative (medium-high)

4.4 Cumulative impacts

Overview

Cumulative impacts can arise from one or more activities over a period of time. A cumulative impact may result in an *additive impact* i.e. where it adds to the impact which is caused by other similar impacts or it may result from an *interactive impact* i.e. where a cumulative impact is caused by different impacts that combine to form a new kind of impact. In the context of the proposed Weltevreden Project, the cumulative impacts on the agricultural-economic environment are a combination of *additive impacts* (combined coal mining impacts in the surrounding region) and *interactive impacts* (together with other environmental impacts resulting from various industries). According to James Harris, DA councillor for Secunda, agricultural production in the greater Mpumalanga area has already fallen by 60%. The Beeld Newspaper (17/04/2009, Elise Tempelhoff) reported that farming organisations were established in five areas including Delmas, Ermelo, Belfast, Carolina and Standerton, to oppose new mining developments in the region. These forums were established primarily to prevent agriculture from disappearing in the area. Dr Koos Pretorius, member of the Federation for a Sustainable Environment and land owner in Belfast, raised his concerns about the polluted water in the Witbank and Middelburg dams. It is claimed that due to increased mining activities in the area, the water is not feasible for irrigation purposes anymore. The combined negative impacts on the surrounding environment of Weltevreden 381 JT are considered of medium-high significance due to the high agricultural potential of this region and the reliance of the community on employment from the agriculture industry.

Soils

The cumulative impact on soils in the proposed project area can increase should new industrial, commercial and mining operations commence in the area. Opencast coal mining involves the removal and stockpiling of topsoil which leads to mixing of soil types and horizons, soil compaction, as well as changes to soil structure and fertility, ultimately resulting in the increased erodibility and loss of topsoil to wind and water erosion. Similarly, unsustainable agricultural practices can lead to a reduction in soil fertility and the compaction of soil layers. The risk of soil contamination by both activities is correspondingly high, as vehicles and equipment used in agriculture or

mining spills hydrocarbons and lubricants. Combined with additional industrial development in the area, the impacts will be far ranging, resulting in soil erosion, siltation of local streams, loss of arable areas and the lack of sufficient topsoil for effective rehabilitation of opencast areas. The cumulative impacts on soils are therefore of high severity and will occur on a regional scale. The impacts will last beyond closure of the mine and are almost certain to occur. The impact severity is therefore of medium-high significance.

Land Capability & Land Use

The region in which the proposed mining operations are to take place is characterised by high potential agricultural soils and large areas are covered with wetlands, playing a valuable role in the sustenance of ecological systems. In addition, opencast coal mining activities in the region are exerting pressure on topsoil as limited and valuable resource. It is for this reason that the land capability of the region has been severely affected and future mining activities further threatens to reduce land capability in the region. The cumulative impacts on land capability are of high severity and will occur on a regional scale. The impacts will last well beyond closure of the mine and is more than likely to occur. The cumulative impacts is therefore of medium-high significance.

Wetlands

The wetlands excluded from the opencast area are sensitive due to pollution within these zones that may cumulatively impact on water sources far beyond the mining area. Stripping of topsoil to the specified depths as stated in the report is crucial. Failure of the implementation of proper rehabilitation of high standards will result in failure to restore soil potential, land capability and land use close to pre-mining conditions. This implies deterioration of the most important natural resource which provides national food security. Proper stockpiling of soil types on stockpiles or berms as specified is crucial. Failure to shape spoils to the original topography and elevation occurs at almost all mines in South Africa and is one of the main reason for degradation of post-mining land capability and deterioration of rehabilitated land shortly after rehabilitation took place. Proper management of the total rehabilitation process starting at the planning phase up to supervision of the dozer operators is the key to successful rehabilitation and so-called sustainable development.

5 SUSTAINABILITY ASSESSMENT

5.1 Triple Bottom Line

The goal of sustainability is contained in the Triple Bottom Line (TBL) approach, expanding the traditional reporting framework to consider ecological and social performance, in addition to financial performance (Wikipedia, 2009). The concept of TBL is based on shared responsibility from all stakeholders, which includes anyone who is influenced, either directly or indirectly, by the actions of a developer. The triple bottom line is made up of social, economic and environmental elements, also known as the "*people, planet, profit*" approach.

As a means of helping to focus the sustainability debate in South Africa, the Johannesburg Stock Exchange (JSE) has developed criteria to measure the triple bottom line performance of companies in the FTSE/JSE All Share Index, with the aim of compiling an Index comprising those companies that pass the Criteria requirements. The Social Responsibility Index (SRI) further offers a sustainability benchmark, recognising those listed companies incorporating sustainability principles into their everyday business practices and to serve as a tool for investors to assess companies on a broader base. The aim is for companies to use the index criteria as a South African standard against which good triple bottom line practices are measured (JSE SRI, 2009). During construction and operation, the Northern Coal Weltevreden Mine should consider integrating the SRI into their day-to-day operations.

In the pre-development context of the proposed Weltevreden Project, the triple bottom line approach can be used to assess potential impacts on the different receiving environments Table 5-4. Evidently, both mining and agricultural activities impact on soil quality and water quality and quantity; however, agricultural activities are less destructive and soils are relatively easily reclaimed. Opencast mining activities are much more destructive towards the soils and geology and very difficult to reclaim, especially compaction once soil has been replaced. Therefore care must be taken during the reclamation process to prevent compaction on the one hand and to replace soil volumes back to a representative pre-mining soil and land capability while emulating the pre mining landscape.

Table 5-1: Triple Bottom Line Approach

Aspect	*People* (Social)	*Planet* (Environment)	*Profit* (Economy)	*Time-frame*
Agriculture (No mining option)	The agricultural industry is currently the main regional employer, including long term seasonal employment with relatively low wages. Generally, minimum wages for farm workers in Urban areas for March 2007 – February 2008 is R5.34 per hour, or R 1,041 per month, and in Rural areas (March 2007 – February 2008) it is estimated at R5.07 per hour, or R 989 per month.	Agricultural activities are focused on the production of food and generally cause less severe impacts to the environment than industrial development. Impacts can be divided into physical and chemical impacts on soil which are limited to the soil surface, normally considered to be the top soil of 300 – 350 mm of a soil profile. Grazing can potentially physically impact the soil surface due to compaction by animals while overgrazing may expose the soil surface to water runoff and therefore erosion. Cultivation of the soil is the main agricultural impact and physically deteriorates soil structure through the loss of organic matter as well as through compaction by machines. Cultivation quickens the breakdown and therefore loss of organic matter in soil. Overgrazing results in less available recyclable vegetation material to supplement soil organic matter content. Losing soil organic matter through cultivation or losing recyclable vegetation through overgrazing, increases the erosion potential of soils. The use of fertilisers, increased water utilisation and animal waste may affect the quality and quantity of surface and groundwater moderately.	Due to increased demands and support from authorities, agriculture is expected to grow in the region over the years; there are however, a few pertinent risks to the economic profitability of agriculture such as fluctuating markets, unstable economy, escalating fuel costs, transformation of land and climate change, resulting in a lower turnover on the short term. The current agricultural industry supports a profitable maize and cattle farming, as well as a cherry cultivation industry	Favourable Long term Sustainability Potential (50 years/ more)

Opencast Coal Mining	The proposed project may potentially create less than 50 full time jobs, including short-medium term employment that provides skills development and higher wages. Increased influx of foreign labourers could lead to social unrest and an additional influx of foreign workers. Minimum wage for surface miners in the coal mining industry estimates at R3 000 a month, and surface miners earns approximately R2 850 a month. Additional social impacts are outlined in Table 5-2.	There are a number of adverse environmental effects of coal mining on the environment such as the release of green house gasses, increased dust, Acid Mine Drainage, noise pollution, as well as the potential destruction wetlands, which will directly and indirectly affect more 520ha of arable land. Potential for contamination of local groundwater from oxidation of coal may occur and mining may also impact on local aquifers and surrounding water users. Additional Environmental aspects are outlined in Table 5-2 of the SAI report and described in more detail in the Environmental Impact Assessment and Management Plan (EIA/EMP), 2009	The total ROM coal to be extracted is estimated at 7.512 Mt during the LoM of approximately 7 years. Mining will contribute towards South Africa's foreign revenue through the generation of income and expenditure by employees. This will stimulate the local and national economy with a high turnover over short term. In terms of employment, skills creation and monetary terms, mining may contribute towards the regional economy,	Short – Medium term Sustainability Potential (8 years)

5.2 Discussion

Due to the fact that the proposed project area is located in an area classified as high potential soil, surrounded by sensitive wetlands, the impact on the natural and biophysical environment will be negative. The impact on soils is considered as highly significant and irreplaceable. Subsequently, local and national food security may be affected in the long term if the agricultural potential of the soils are altered.

Conversely, the socio-economic impact on the proposed project area and surroundings are primarily beneficial and may create employment, training and education opportunities to local communities, whilst supporting the provincial and national economy through trade and commerce. If the correct environmental mitigation measures are implemented and stringent management guidelines are followed, the possibility for sustainable development may be viable. The successful implementation of environmental management plans cannot be guaranteed and the risk for mismanagement remains.

Cumulative impacts of mining already have a significant impact on the agricultural environment in the Mpumalanga Province and secondary effects from these impacts may negatively affect the socio-economic environment. Due to increasing threats of cumulative impacts on high potential soil in the region, it should be considered to implement a bioregional development plan to protect certain areas for farming to avoid the disappearance of the agricultural industry. If this area is earmarked for protection for agricultural development, the mining company will need to consider finding alternative coal resources in areas consisting of lower agricultural potential soils. However, a comprehensive bioregional development plan has not been implemented in this area yet.

If it is decided to proceed with the proposed mining project, and the Mining Right Application is approved, a number of mitigation measures and management plans must be implemented to ensure long term success of the mining project, as outlined in the Environmental Management Plan (EMP) and the Social and Labour Plan (SLP). Due to the highly significant impact on soils, a number of mitigation measures have been highlighted in the next section.

5.3 Mitigation measures

After the impact identification process, it is essential to evaluate applicable mitigation and management measures to ensure the environmental management of the proposed project is sustainable. The ultimate goal of sustainable development and effective environmental management is to:

- Promote economic development while not adversely impairing the natural environment for present and future generations; and
- Ensure that actions taken by the present generation are not detrimental to the health, wellbeing and economic opportunities of future generations.

If the Weltevreden Project goes ahead, a number of mitigation management measures need to be implemented to minimise the severity of the impacts on the surrounding environment. For the purpose of the SAI report, mitigation measures will primarily be focussed on impacts relating to soils, outlined in Table 6-1.

Table 5-2: Potential Mitigation Measures

Aspect	Possible Mitigation
Soil	Considering the importance and time it takes for the formation of the soil properties then it is clear that managing soil stockpiles properly should have a high priority in opencast mining operations. Topsoil should be stored separately from sub soil because it contains more nutrients and microbes than subsoil. The stockpiles can also not be higher than 2 – 3 m in height because aeration is then compromised which in turn influences microbial activity. Allowing subsoil to contaminate top soil dilutes the nutrient and organic matter content causing soil infertility. Infertility imbalances then have to be rectified using costly fertilizers. More important than chemical imbalances which can be easily restored at cost, is soil compaction and volumes of replacement during soil reclamation. Heavy mining equipment is used during soil reclamation and soil is compacted beyond agricultural potential rehabilitation leaving behind areas of low soil and land capabilities. Such areas have limited land use options but specialised management needs.
Soil	Deciding on and monitoring soil quality indicators during rehabilitation can greatly improve the chances of rehabilitating soil to a sustainable resource. The

Aspect	Possible Mitigation
	following actions should form part of any activity impacting on soil quality and sustainability: • Visual soil assessment by a specialist; and • Soil quality monitoring system Visual assessment should include specialist scoring of water ponding, plant vigour, yield, tilth, earthworms, runoff, ease of tillage, soil color, soil aroma, soil structure and cloddiness. Soil quality monitoring should include, bulk density, infiltration rate, water holding capacity, electrical conductivity, pH, soil nitrate and microbial activity
Soil	Organic matter must be added back into the soil, topsoil should be mixed with organic material and placed back last to a depth of at least 300 mm over subsoil. Continuous visual and soil quality monitoring as mentioned under soil quality indicators above should ensure that the best possible soil rehabilitation procedure is followed. Vehicle movements must be restricted on freshly dumped soil to prevent compaction as far as possible.

Although these measures may minimise and mitigate anticipated impacts resulting from mining activities, it is uncertain if the high agricultural potential status of the project area could ever be restored to its former state after rehabilitation and post-closure.

6 POTENTIAL PROJECT ALTERNATIVES

6.1 Coal Resource Alternative

The coal resource to be mined, as part of the proposed Weltevreden Project, is located within the Witbank coal field. The Witbank coal field is part of the Central Basin coal reserves which falls predominantly within the Mpumalanga province. This area is the central supply area for the Eskom power stations in the vicinity. Mining of low grade coal, that meets Eskom specification, is required in order for Eskom to meet increasing power demands across the country. In terms of resource alternatives, the Waterberg coal field is becoming and important future resource for meeting future coal requirements. Currently this resource is constrained as an alternative resource site. The Waterberg coalfield lies far from the industrial centres of the country and lacks significant infrastructure for its development. However, as Eskom expands operations in the Waterberg, this area will need to be considered more closely as a future resource alternative. As Eskom commissions the construction of new power stations in the region it would act as a catalyst for further development as there would be an ensured market for the low grade coal situated close to the coal reserve.

6.2 Mining alternatives

The nature of the coal seams determines the preferred mining method. The location of the feasible coal determines the location of the mining operation. These two factors limit mining alternatives that are available. The only possible alternative available will be the no mining option. The depth of the overburden does not allow underground mining to take place. The No. 2 seam is the only seam on the property of economic value. The tonnage of the resource and the life of mine will indicate the optimal mining rate; this in turn will inform the mining method. Drag line operations, or large scale mining will not be feasible.

Land use alternatives

When considering the allocation of land for development and in deciding the authorisation application, the agricultural implications must be considered together with the environmental, cultural and socio-economic aspects. In particular, prime quality land should normally be protected against permanent development or irreversible damage.

Consideration of land use alternatives is one of the cornerstones of good planning. Land use decisions must be evaluated in terms of sustainability, broadly defined as balancing environmental, economic and social equity concerns. The primary land use categories that encompass basic functions are residential, commercial, industrial, recreational, institutional, and agricultural uses. Land use is determined by a number of factors. These include climate, resources, population growth, economic activity and topography. When considering a new development for an area, it is required that other land use alternatives are considered to ensure that the development is justified and viable. In the project area, present land use includes agriculture, residential, business, recreational, and cattle farming. Alternative land use of the area that could also be viable is low cost housing.

Agriculture is the only current land use alternative and currently involves the production of maize. The remaining extent of the property is currently not utilised. The land may also be used for additional agricultural purposes such as grazing. Alternatively the land may be returned to its natural status which may hold possible eco-tourism benefits, however due to the adjacent land predominantly being used for agricultural purposes, eco-tourism in the area is an unlikely option. Stock farming and cropping are the most suitable land uses for the site apart from coal mining. There are, however, a number of impacts that stock farming could have on the environment. The first such impact is overgrazing. Animals physically damage plants by eating, cutting, bruising and breaking plants. If this is not managed this could result in severe soil erosion. Another impact is that of soil disturbance. Animals alter the structure of soils by chipping or loosening the soil surface, or they may compact the soil depending on its moisture. Agricultural activities also impact chemically on the soils. Because arable agriculture is focussed on crop production large quantities of plant nutrients and chemical control agents are introduced into the environment through fertilization and spray programmes.

Though the loosening of the soil can be advantageous, excessive soil loosening can cause soil loss through wind and water erosion. When soils are moist, they can easily be compacted through hoof action. This causes a loss of soil structure, which causes the reduction in infiltration, aeration and water holding capacity. General conditions for plant growth will become less favourable. These impacts are likely to be insignificant if correct management is applied.

The use of this land for stock farming compared to mining is less economical as mining produces greater value, far quicker than stock farming per unit area of land. Stock farming is extensive with large amounts of land needed to sustain the livestock. This not only means that more land will be subject to the impacts associated with this type of farming but also that it will be using more land than the mining operations with less economical gain per hectare used. Stock farming, however, provides income and food for the local population. Due to the finite nature of minerals (coal) stock farming is also more sustainable than mining as it can continue infinitum if the correct management programmes are followed.

Crop farming results in whole areas of vegetation and the fauna dependant on them being destroyed for the areas under cultivation. The impacts may spread from the site if pesticides and herbicides are used which may wash off from the cultivated area. It is likely that a few years after crop farming has ceased vegetation diversity will recover and return to its former state over time if excessive erosion has not occurred. To ensure sustainability from crop production point of view, soil reclamation of the opencast area should strive to reclaim at least the same portion of the opencast area back to pre-mining arable soil and land capability. The remaining part should be reclaimed back to grazing. Agricultural related chemical impacts on the environment can be localised (field/farm) or catchment related. Localised impacts may be field specific such as soil acidification. Catchment related impacts such as pollution of surface and or groundwater through leaching and movement of unused nitrogen can happen as a result of over fertilization. In addition to nitrogen pollution of surface and subsurface water phosphourus (P) and organic chemicals can also pollute surface water. Water P pollution is caused through the movement of sediment containing P through erosion into surface waters while injudicious use of insecticides and pesticides may introduce an additional chemical load into the environment. In the project area, although the soils lend themselves in some areas to crop farming, lack of adequate rain results in predominantly subsistence farming only, and limited commercial potential. Topographical disturbance may occur if contour drains are not constructed.

The cumulative impact on the environment from agricultural activities can be highly significant. The use of fertilisers and pesticides can impact on local water sources and cause pollution.

Dust and noise during ploughing and planting can be a nuisance factor, particularly with other agricultural or mining activities in the area. If more areas are used for agriculture, there will be a loss of natural habitats and biodiversity. Cumulative impacts are therefore negative overall and the impacts are dependant on the scale of farming. Agriculture, in the form of crop production and grazing, can impact negatively, to some degree, on the environment. Agriculture does, however, provide a food source for communities. Mining will have an impact on the environment but the benefits of mining include socio-economic upliftment, provision of jobs, foreign currency and local economic development.

6.3 Mining design alternatives

The mine planning has taken into consideration alternative opencast development and process of mining the coal. The alternative to one extensive pit is to mine the reserve in three pits which will allow for the preservation of the stream that cuts through the opencast area. Infrastructure alternatives include having temporary required facilities on site, reducing the impact on receiving environment from the development.

6.4 No mining option

The current land use is one of agriculture, where land is planted to crops or pastures for grazing. The no-mining option will result in the continuation of such land use. Although economically viable, the continuation of agriculture will not provide the level of short-term economic growth to the area that mining would offer, such as increased employment, greater economic input into the local economy allowing better development of the towns and surrounding areas, and greater socio-economic stability. After mine closure and rehabilitation of mined areas, the land capability may return to its current state allowing the continuance of agricultural practices. The mine will also promote sustainable local economic development. The mine will also give communities the skills required to remain economically viable and successful after mine closure.

Not mining the coal reserves available on Weltevreden 381 JT will prevent the use of a valuable coal reserve for the generation of electricity at a time where a much-publicised inability to generate enough electricity to sustain economic growth exists. Northern Coal will furthermore lose their rights to mine the coal to the State, rights for which they have invested extensive time and resources, and as the resource can be

economically mined additional applicants will in all likelihood apply for the mineral rights for the property.

7 KNOWLEDGE GAPS

At a national level there is no single unified economic development or planning policy relevant to economic inputs or sustainable development for the EIA process. Each governmental department has its own approach and philosophy towards sustainable development, which may result in conflict. In support of the Bioregional Planning Framework of the Western Cape, it is necessary to institute planning and management systems in the Mpumalanga Province that would facilitate a balanced integration of conservation and development interests in land-use and settlement planning. Biodiversity conservation is a prerequisite for sustainable development and for biodiversity conservation to succeed; the maintenance of environmental integrity must be one of the primary determinants of land-use planning (Van Zyl, de Wit and Leiman, 2005). The bioregional planning approach supplements the statutory spatial planning process by providing a spatial and theoretical framework for the integration of social, environmental and economic criteria in local planning initiatives. In the absence of clear bioregional planning policies and guidelines in the Belfast area, the local Municipality should identify priority areas for conservation and their placement within a supportive planning framework of buffer and transition areas.

Due to the fact that this SAI report does not include a full Social Impact Assessment (SIA) or Agricultural-Economic Analysis, the socio-economic impacts associated with the project have not been assessed individually in great detail. The local socio-economic conditions have been assessed through a number of key informant interviews with the nearby settlement and potentially affected farmers only. Consultation with farmers was restricted to the two directly affected farmers and one farmer in close proximity to the site.

As a result of certain time constraints and lack of response from consulted I&APs, this SAI report only represents the baseline perspective of the actual socio-economic and agricultural-economic environment. By reason of the fluctuation of markets and variation of input costs of individual farmers, the exact market values have not been financially calculated (ZAR) for this study.

8 CONCLUSION

Although it is important to develop the extensive coal and mineral reserves of South Africa, it should not be developed at risk of a sustainable agricultural future. In theory, agriculture is more sustainable than mining due to the non-renewable nature of minerals (coal). In the holistic economic, social and environmental assessment of the long term sustainability of the proposed Weltevreden Project; however, it is expected that the proposed project will have a positive effect on the socio-economic environment (short term) but a negative environmental impact (long term) on the natural environment. In combination with other negative impacts resulting from mining operations and industrial development in the area, anticipated cumulative impacts resulting from the proposed Weltevreden Project may have a significant effect on the natural and socio-economic environment, specifically on the agricultural industry in the Belfast area.

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