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EXXARO RESOURCES LTD

NBC Belfast Ecological Baseline and Impact Assessment

Submitted to:
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0001

REPORT

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Golder Associates

Executive Summary

Golder Associates Africa (Pty) Ltd was contracted by Exxaro Resources LTD to conduct a baseline assessment and ecological impact assessment of the terrestrial, wetland and aquatic ecosystems associated with their NBC: Belfast Coal Project.

Dry and wet season terrestrial ecological baseline assessments, including a desktop study were conducted. Literature and other widely accepted resources were interrogated to determine fauna and flora that were previously recorded or that may potentially occur within the study area.

Few mammal species, particularly the larger mammals are expected to still occur in the study area. Fifty nine mammal species were found to potentially occur in the area. This included two Endangered, two Vulnerable and seven Near Threatened species. Bird species previously recorded in the grid squares 2529DD and 2530CC number 397 species. Except for 28 of those, all are Protected Game in terms of the Mpumalanga Nature Conservation Act. In terms of the IUCN Red Data criteria, four are listed as Critical, one Endangered, 13 Vulnerable and 21 Near Threatened. The Department of Environmental Affairs and Tourism Threatened and Protected Species Regulations list three Endangered, eight Vulnerable and one Protected. The Blue Crane (*Anthropoides paradisea*) and Southern Crowned Crane (*Balearica regulorum*) were actually recorded within the study site during the field surveys and both species can be expected to utilise cultivated lands in the study area for foraging. Thirteen reptiles and 15 amphibians could potentially occur within the study area. None of these are listed according to the IUCN as Red Data species, but two species of skink and two species of gecko are protected and may be found in the study area.

The study area is situated within the Eastern Highveld Grassland Vegetation Type (Mapping Unit Gm 12; Mucina and Rutherford. 2006) with conservation status indicated as Endangered and the conservation target is set at 24%. By 2006, some 44% was already transformed and only a small portion of this vegetation type is conserved in statutory nature reserves (Mucina and Rutherford, 2006). The study site contains areas of Disturbed Grassland, Cultivated Land, Wooded Area, areas of Human Settlement and areas classified as “Other”. For the purpose of this study aquatic areas such as streams, wetland and dams are included in the last category. The grassland areas are impacted by agricultural activity such as grazing and pasture for harvesting grass for livestock feeds. Cultivated lands are used mostly for cultivating maize and the wooded areas are mostly windbreaks although some small scale agro-forestry is practiced. The patches of land used for human settlement are the only areas of land regarded as not suitable habitat for natural biodiversity.

The terrestrial ecosystems found within the study area are generally considered to be of low ecological integrity. Although these ecosystems may still provide suitable habitat for a number of Red Data animal and plant species and form part of the drivers of the wetland and aquatic ecosystems.

A total of 22 sampling sites were selected to represent the aquatic ecosystems of the project area. Of these, eight sites were located on main aquatic systems which traverse the project area (The Leeubankspruit, Klein-komati River, and the Driehoekspruit). The remaining 14 sites were located in pans throughout the project area. The wetland sites were selected to co-inside with the aquatic sites where possible.

The following wetland types were found to be associated with the study area

- Hillslope seepage wetlands feeding a water course;
- Valley bottom wetland with a well defined stream channel;
- Valley bottom wetland with no clearly defined channel;
- Hillslope seep not feeding a watercourse; and
- Endorheic pans.

In the valley bottom wetlands and seepage wetlands dominant vegetation consists mainly of *Sporobolus africanus, Arundinella nepalensis, Arundinella nepalensis, Monocymbium ceresiiforme, Eragrosits gummiflua Bulbostylis hispidula*, *Oxalis* spp*., Nasturtium officinal, Crassula natans, Helichrysum aureonitens, Stoebe vulgaris, Schoenoplectus corymbosus,* and *Cyperus oxycarpus*. The pan systems hosted species such as *Cladium mariscus, Eriocaulon* spp., *Typha capensis, Juncus effuses, Leersia hexandra, Eutricularia stilaris,* and *Schoenoplectus paliducola.* Exotic species posing a threat to the wetland systems are *Acacia mearnsii, Acacia decurrens, Eucalyptus* spp., *Populus canescens*, *Bidens pilosa* and *Verbena bonariensis*.

Several small mammal species were identified such as Antbear, Serval, Bushpig, Water Mongoose and the Clawless Otter. Common bird species identified were Yellowbilled duck, Redbilled teal, Spurwinged goose, Egyptian goose, Blacksmith plover, Reed cormorant, Little grebe, Hadeda ibis, Cape shoveler, Purple swamphen, Sacred ibis, African spoonbill, Great white egret, White throated swallow, Cape wagtail and Redknobbed coots. The Hottentot teal identified is ranging on the edge of its distribution area. The Blue korhaan was also recorded several times during the survey. This bird is endemic to South Africa and parts of Lesotho, and is listed as Near Threatened on the IUCN Red List.

The biodiversity of the Driehoekspruit was found to not usually be sensitive to flow and habitat modifications. The headwaters of the Kleinkomati River are mostly not ecologically important and sensitive at any scale. However, the area downstream in the Kleinkomati River was rated as having a Moderate to High ecological importance and sensitivity, thus having biodiversity less sensitive to very sensitive to flow and habitat modifications and playing a role in moderating the quantity and quality of water of major rivers. The source of the Leeuwbankspruit was rated as having biodiversity not usually sensitive to flow and habitat modifications and playing a small role in moderating the quantity and quality of water of major rivers. The ecological importance and sensitivity of the pans ranged from Low/marginal to High, with the majority being Moderate.

The majority of the wetlands of the Driehoekspruit are moderately modified with some loss of natural habitat. The majority of the wetlands of the source of the Kleinkomati River are moderately modified with some loss of natural habitat. The middle reaches, within the project area, of Kleinkomati River was rated as having a Very low present ecological status (falling outside of the acceptable range), little habitat and function remain in this area. The area further downstream, however, was less impacted and obtained a Moderate to High present ecological state.

The source of the Leeuwbankspruit ranged from Very low to Very high depending on the amount of agricultural impact upon each of the tributaries. From the confluence of the three uppermost tributaries the remainder of the Leeuwbankspruit within the project area obtained a High present ecological score. The present ecological status of the pans and isolated hillslope seep zones ranged from Low to Very high, with the majority being High.

The poorest diversity (Using Shannons Diversity Index was recorded in the Driehoekspruit wetlands with average diversity status results encountered in the wetlands occurring in the Leeuwbankspruit and the Klein-komati River. The highest diversity was recorded in the Hillslope seep wetland at KS 16.

The Wetland Index of Habitat Integrity was applied to the three main valley bottom wetland with a clear channel that drains the study area. These systems can be described according to the standard DWAF ecological categories as C to C/D, indicating moderate modifications with a large loss of natural habitat, biota and basic ecosystem functions

The Driehoekspruit scored High for natural services, where the other two systems attained moderate natural services scores. Nine of the 15 pans received a high natural services rating, and the remaining six a moderate services rating. The Hillsope seep wetland attained a high score.

The Driehoekspruit and Kleinkomati River attained moderate scores for human services, while the Leeubankspruit attained a low score. Nine of the 15 pans and the hillslope seep received a low human services rating, two pans received a moderate score and the remaining four a very low services rating.

During the aquatic assessment work conducted was based on generally accepted aquatic assessment methods and includes planning, characterization, (description of ecological status, identification of problems and important environmental components), data generation (sample collection and handling, laboratory and field analyses, data handling), evaluation (quality control and assurance), as well as information generation components (data analyses, reporting and information utilization). Components were separated into the aquatic baseline assessment and aquatic ecological impact assessment. In order to enable a characterization of the general integrity of the aquatic environment, certain ecological indicators were selected to represent each of the responding habitat and stressor components involved in the aquatic environment.

Aquatic sampling was conducted in September and December 2009. The results of these wet and dry season surveys can be summarised as follows:

- Flow characteristics:
  - Due to the dry conditions during the Septermber 2009 survey, limited flow was recorded within the rivers and streams within the project area. Many of the pan sites were dry. Flow increased during the December 2009 survey as well as the inundation of the pan sites. Sites PAN12 was still dry during the December 2009 survey.
- Water quality:
  - The *in situ* parameters measured indicated that the water quality was within normally expected values at all of the sites. Increased flow due to recent rainfall and increased temparatures during the December 2009 survey reflected in the water quality results.
- Habitat:
  - Habitats of the sites within the project area indicated existing impacts and modified conditions due to agriculture and cattle impacts at all of the sites;
  - Sites in the upper Driehoekspruit and in the pans, PAN3, PAN7 and PAN11 indicated the least modified habitat conditions, and near natural conditions; and
  - Habitat availability to aquatic macroinvertebrates indicated that poor availability was present at both sites within the Driehoekspruit. This was considered a result of poor flowing habitat availability at site DS05 and poor vegetation and flow habitats at site DS14. Habitat availability increased during the December 2009 survey, due to increased flow. The downstream sites on the Klein-komati River indicated adequate habitat availability and the downstream site in the Leeuwbankspruit indicated good habitat availability Habitat availability increased during the December 2009 survey due to increased flow.
- Biota:
  - Aquatic macroinvertebrates in the river sites indicated very good biotic integrity at most of the sites except at one site in the upper Driehoekspruit which indicated largely impaired conditions. This was considered to be natural due to the fact that this site was predominantly a wetland area with minimal flow. The aquatic macroinvertebrate results corresponded with the IHAS results, except at site KS22, which indicated water quality impacts and a decrease in biotic integrity;
  - Based on the Univariate Diversity Indices (UDIs) the highest levels of taxa richness and diversity were recorded at PAN03, PAN04, PAN08 and PAN13. The lowest levels of taxa richness and diversity were recorded at PAN05 and PAN01;
  - The lowest levels of evenness were also recorded at PAN05 and PAN01 suggesting that these sites have been subject to high levels of anthropogenic impacts. The highest levels of evenness were

recorded at PAN13, PAN03 and PAN04 suggesting that these sites have only been exposed to low levels of anthropogenic stress or that equilibrium has been reached after past impacts;

- Hierarchical Cluster analysis and Non-metric Multi-dimensional Scaling (NMDS) ordination of the aquatic macroinvertebrate revealed five groups of sites. The ANOSIM results confirmed that significant differences exist between the groups ($R > 0.75$);
- Sites PAN08 and PAN13 showed very low levels of similarity with the remaining sites;
- Ichthyofauna of the project area indicated that largely modified conditions were present in comparison to the expected fish species. One indigenous fish species (*Barbus anoplus*) was sampled throughout the project area. At site KS21, another indigenous fish species (*Pseudocrenilabrus philander*) as well as the highly invasive and exotic bass species *Micropterus salmoides* were sampled;
- *B. anoplus* may represent a range of species and is therefore considered to be of importance as it may represent unidentified subspecies within the upper tributaries of the Klein-komati River and further downstream in the Komati catchment. This may have significance for biodiversity of fish populations within Southern Africa; and
- The presence of *M. salmoides* in the project area is considered to be of significance and may explain the poor fish species diversity in the area. Impacts as a result of the project may give rise to an increase in the population of *M. salmoides* and may further reduce the indigenous fish populations.

Aspects of the aquatic ecosystems that may be of ecological importance or of critical conservation value due to specific ecological sensitivity or due to widespread loss of habitat within the national or regional context included the following:

- Unique pans based on the presence of bioto (aquatic macroinvertebrates)
  - Pans PAN3, PAN7 and PAN11 are the only three pans in the project area with Choncostraca, Ostracoda and Copopoda macroinvertebrate groups. These three macroinvertebrate groups are unique to pans and temporary aquatic ecosystems within Southern Africa. These pans are considered to be of importance within the context of the project area due to the presence of these macroinvertebrate groups because of the food they provide to certain bird species that may use these pans along their migrational routes. Although not listed as endangered within the IUCN lists, temporary pans and freshwater ecosystems are under threat (Davis and Day, 1998), and thus the unique species such as the Choncostraca, Ostracoda and Copopoda macroinvertebrate groups and those that depend on them for food or survival are therefore also under threat.
- Unique habitat types
  - Site PAN11 is considered to be unique based on physical characteristics. This site indicated the highest EC and TDS values and the physical characteristics observed on site were unique to this pan only, within the project area. Shallow water depths and an oily, opaque water column with a hard substrate, typical of ephemeral, endorheic pans were observed. This site had typical pan macroinvertebrates. Thus this pan is considered to be of significance for migrational birds such as the Greater Flamingo (*Phoenicopterus roseus*) and the Lesser Flamingo (*Phoenicopterus minor*) both of which are IUCN list species.
- Aquatic biodiversity
  - The Choncostraca, Ostracoda and Copopoda macroinvertebrate groups are considered to be of biodiversity importance within the project area as these macroinvertebrates are unique to temporary systems within Southern Africa. These groups may represent unique, rare or endangered species and should therefore be considered as important within the context of the project area.

- *B. anoplus*, as discussed previously, may represent a range of fish species and is therefore considered to be of importance within the project area. This may have significance for biodiversity of fish populations within Southern Africa.

In order to assess the impacts of the proposed development on the ecosystem, the following components were included:

- Identification of possible impacts of the proposed project on the receiving aquatic, wetland and terrestrial ecosystems;
- Review of the existing South African legislation;
- Investigation into the potential impedance of migratory species;
- Assessment of the significance impact of the proposed development on the receiving ecosystems;
- Recommendation of mitigation measures to deal with significant impacts; and
- Identification of aspects which may require further study.

From the results of the impact assessment, the following conclusions were made:

- The identified impacts to the aquatic and wetland ecosystems and pans consisted of impacts to the water quality, habitats and biotic components;
- Water quality impacts on the project area are rated as moderate to high before mitigations but were reduced to low for most of the impacts associated with the sites after mitigation, except for the loss of pans within the coal reserve and the contamination of the groundwater due to the mining activities;
- Aquatic, wetland and pan habitat impacts are rated as high, except for dust generation and transportation, which was rated as medium, before mitigation but were reduced in some cases to moderate to low significance after mitigations;
- Biotic impacts were rated as moderate to high before mitigations but after mitigations, which consisted of mostly water quality and habitat impact mitigations, the impacts are rated low to moderate, with the exception of the high impact of loss of biodiversity due to loss of natural resources; and

Based on the significance assessment of the identified impacts, the following items were highlighted as being the primary impacts where mitigations should be focused:

- Groundwater impacts to the aquatic ecosystems of the project area;
- Surface water impacts to the aquatic ecosystems of the project area; and
- Impacts to pans PAN7 and PAN11.

Based on the conclusion and highlighted impacts of the project, the following main recommendations were made:

- Move the plant site to outside of the catchment buffer of site PAN08 and off the wetland areas;
- Conduct long-term bi-annual biomonitoring of ecosystems including water quality, habitats, riparian vegetation, diatoms, aquatic macroinvertebrates, fish, as well as terrestrial fauna and flora;
- Develop and implement a Biodiversity Action Plan (BAP) for the project area once the seasonal baseline dataset is complete;
- Conduct Red data rescue operations for fauna and flora that may be lost or degraded during construction and operational phases;

- Construct a nursery for sensitive or Red data floral species which should be managed by a sub-contracted horticulturist; and

Negotiate with landowners to gain access to properties not assessed during the baseline assessment in order to complete the study for the entire project area.

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1.0 INTRODUCTION

Exxaro Coal Mpumalanga (Pty) Ltd [referred to as Exxaro] is a subsidiary of Exxaro Coal (Pty) Ltd and is owned by Exxaro Resources Limited. Exxaro operates a coal mining complex in the province of Mpumalanga which is situated between the towns of Carolina and Belfast. This complex is referred to as the North Block Complex (NBC) and consists of the Glisa and Strathae coal mines as well as the Eerstelingsfontein and Belfast coal projects. The complex uses both underground and opencast mining methods and employs 250 people to produce 3 million tons per annum (Mtpa) of thermal coal for both the domestic and export markets. The complex has a reserve base of 43.8 million tons (Mt) and a resource of 52.6 Mt (excluding the Belfast project). As part of the NBC, Exxaro is in the process of assessing the feasibility of the Belfast Project, situated some 10 km southwest of Belfast in Mpumalanga. The Belfast Project entails the development of an opencast mine to produce 2.0 Mtpa of coal for Eskom and 1.5 Mtpa of A-grade thermal coal for export markets. Exxaro submitted a mining right application for the mining of coal near Belfast in Mpumalanga to the Department of Minerals and Energy (DME), Mpumalanga Province, which was accepted on 10 July 2009 [MP 30/5/1/2/2/431 MR]. As per Regulations 49, 50 and 51 of the Mineral Petroleum Resources Development Act, 2002 [MPRDA] (Act No. 28 of 2002), Exxaro must submit a Scoping Report, Environmental Impact Assessment (EIA) and Environmental Management Programme (EMP).

Golder Associates Africa (Pty) Ltd was contracted by Exxaro Resources LTD to conduct a specialist aquatic, wetland, and terrestrial baseline and impact assessment for the proposed Northern Block Complex (NBC) Belfast Coal project.

This document details the findings of Baseline Ecological survey and the Environmental Impact Assessment based on these findings.

The study site covers an area in extent of approximately 5819.18 hectares (ha) on various portions of the farms Zoekop 426JS, Leeuwbank 427 JS and Blyvooruitzicht 383 in the Magisterial district of Belfast in Mpumalanga (Table 1 and Figure 1). Continuous rehabilitation will take place and the active mining area will in all likelihood not exceed 200 ha at any time.

Table 1: Description of the Mining Area

Farm Name	Portion	Deed Number	Owner
Zoekop 426 JS	Remaining Extent (RE)	T 108970 / 1997	HJW Pretorius
	Portion 1	T 38438 / 1990	WP Pretorius
	RE Portion 2	T 108970 / 1997	HJW Pretorius
	RE Portion 3	T 17060 / 1997	Soekop Trust
	RE Portion 4	T 3358 / 1990	A Viljoen
	Portion 5	T 10909 / 1985	EC Botha
	Portion 6	T 53815 / 1986	GL Roos
	RE Portion 7	T 79636 / 189	WP Pretorius
	Portion 8	T 16689 / 1982	JH Gerrits
	Portion 9	T 53815 / 1986	GL Roos

Farm Name	Portion	Deed Number	Owner
	RE Portion 11	T 14481 / 2008	Zoekop Farmers Trust
	Portion 12	T 38438 / 1990	WP Pretorius
	RE Portion 13	T 77921 / 2003	Eyesizwe Coal (Pty) Ltd
	RE Portion 14	T 17438 / 1995	Victory Fellowship World & Outreach Centre Church
	Portion 15	T 10909 / 1985	CJ Botha
	Portion 16	T 142225 / 2004	Soekop Trust
	Portion 21	T 16398 / 1992	Transnet Ltd
Leeuwbank 427 JS	Portion of the RE	T 44235 / 1980	LG Roos
	Portion of RE of Portion 2	T 23347 / 2003	PV van Wyk
	Portion 3	T 13090 / 1968	BCE Viljoen
	Portion of RE of Portion 4	T 5 188 / 1988	LG Roos
	Portion of Portion 5	T 40298 / 1975	LG Roos
	Portion of Portion 6	T 40298 / 1975	LG Roos
	Portion 7	T 31222 / 1991	CJ Burger
	Portion 8	T 31222 / 1991	CJ Burger
	RE Portion	9 T 46510 / 2001	Hooggenoeg Boerdery cc
	Portion 10	T 84645 / 1989	CJ Burger
	Portion 11	T 10909 / 1985	JC Botha
	Portion 15	T 46510 / 2001	Hooggenoeg Boerdery cc
	Portion 16	T 113513 / 2000	Beestepan Boerdery (Pty) Ltd
Blyvooruitzicht 383 JT	RE Portion 2	T 101146 / 1993	WP & JP Pretorius Trust
	RE Portion 6	T 15402 / 1987	CJ Burger
	RE Portion 7	T 101146 / 1993	WP & JP Pretorius Trust
	RE Portion 8	T 101146 /	WP & JP Pretorius Trust

Farm Name	Portion	Deed Number	Owner
		1993	
	Portion 9	T 8150 / 1996	WP Pretorius
	RE Portion 10	T 62917 / 1987	WP Pretorius

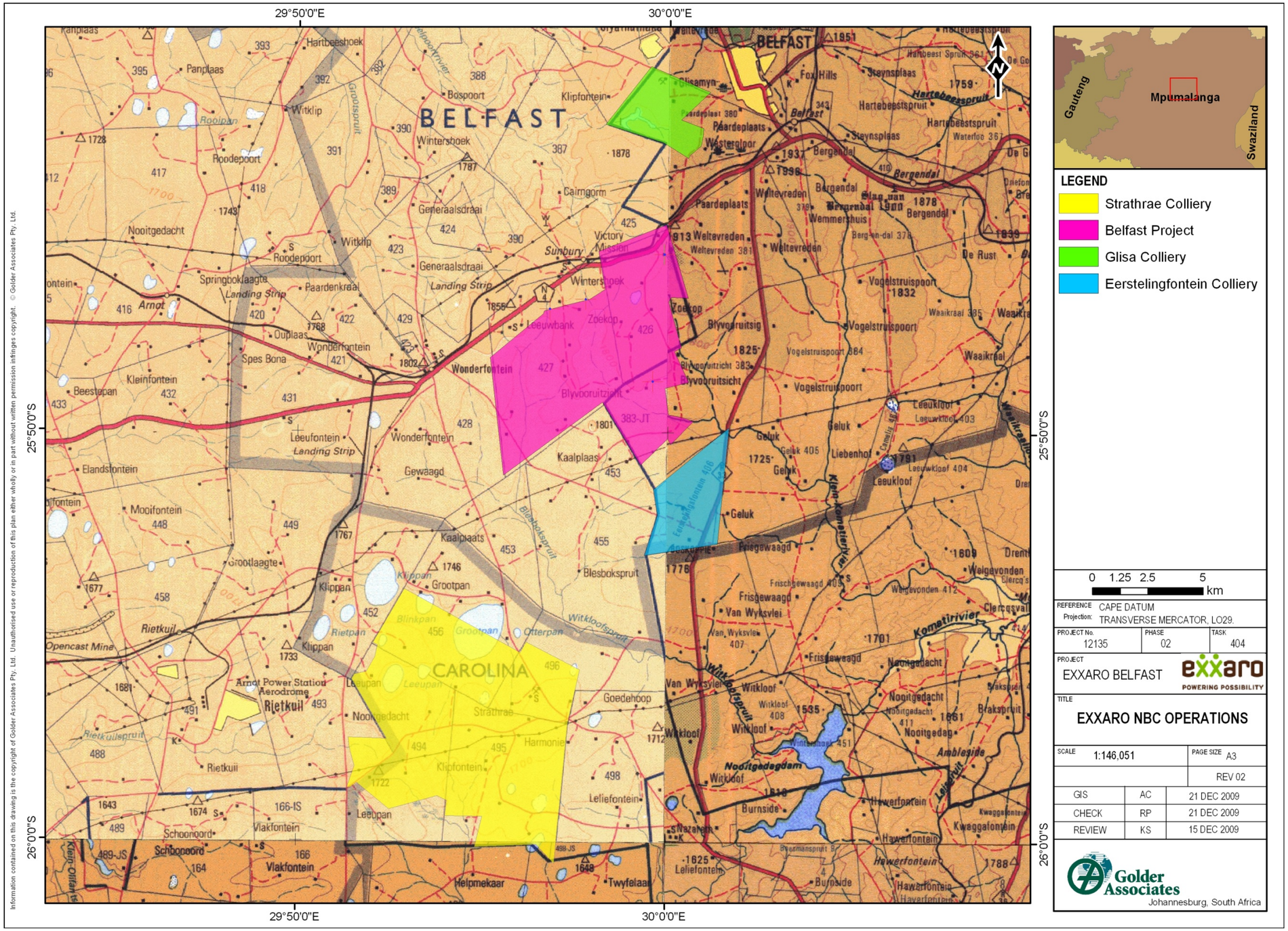

Figure 1: Regional map of the study area showing the Exxaro NBC operation

2.0 DESCRIPTION OF THE PROJECT

The planned life-of-mine consists of two years for the construction of Phase 1, followed by a 30-year operational (production) phase, and four years for decommissioning, closure, rehabilitation, monitoring and maintenance.

2.1 Construction Phase

This phase will take place over 2 years. The construction phase will include, but may not be limited to the following activities:

2.1.1 Infrastructure Development

- Construction of surfaced access roads and internal roads, as well as un-surfaced haul roads and surfaced parking areas;
- Construction of crushing and screening plant;
- Construction of a materials handling plant;
- Construction of buildings including:
  - A guard house;
  - Office blocks;
  - Weighbridge and weighbridge office;
  - Change-houses;
  - Plant and mine workshops; and
  - Laboratory.
- Explosives magazine;
- Railway siding and load-out facility;
- Diesel storage area;
- Process water pipeline
- Co-disposal facility;
- Boreholes;
- Fire water reticulation, process water reticulation and internal potable water reticulation and internal sewer reticulation, and electrical reticulation;
- Sewage purification plant;
- Storm water channels and pollution control dams;
- Silt traps;
- Washing bays;
- Water treatment and purification plants;
- Process water dam and return water dam;

- Fencing; and
- River diversions / crossings.

2.1.2 Mine Development

- Pre-stripping of topsoil and overburden for the first box-cut;
- Establishment of initial box-cut;
- Stocking of overburden and topsoil at the final void positions; and
- Establishment of coal handling stockpiles.

2.2 Mining Phase

The Belfast reserves consist of two mining areas separated by a small stream. The western area has better quality raw coal than the eastern area. A-grade coal can be produced from the western area, and a P58 (5800 kCal/kg) or B-grade from the eastern area. The quality of the raw coal also deteriorates in a northerly direction to such an extent that it is only economically viable to produce a B grade coal from the northern areas.

The Phase 1 mining will commence in the south to produce coal for Eskom. Mining operations will then be expanded in Phase 2 to supply Eskom and the export markets. It is planned to mine the eastern and western areas at the same time to achieve the correct product mix. Mining and batch washing of different quality coal will take place to maximize product yields. The position of the plant and infrastructure will only be finalised after the completion of the site selection studies as part of the EIA. The general direction of mining will be from south to north. The proposed mining sequence is illustrated in Figure 2 below.

An initial boxcut will be established during the construction phase of the project. Topsoil and overburden from the initial boxcut area will be stockpiled at the final void positions. Opencast mining will take place using a conventional truck and shovel operation, assisted by roll-over dozing, to allow for continuous backfilling and rehabilitation of the mined-out area. The expected mining conditions are good, due to the favorable geology and good storm water drainage.

The final void will be backfilled with the overburden from the initial boxcut. Rehabilitation and final closure will take place on a continuous basis and be completed two years after the completion of mining.Mining will take place on a 24-hour day, 7-day week basis, for which the required authorization will be applied for. The diagrams, shown in Figure 3, numbered from 1 to 12, constitute a schematic representation of the mining process after the first four cuts, at which stage a steady state will have been reached. As can be seen from the diagram the following generic actions involved, are sequenced as follows:

- Stripping of topsoil;
- Removing sub-soil;
- Drilling and blasting overburden;
- Loading and hauling the top off;
- Dozing the roll over;
- Cleaning the top of the coal;
- Digging trenches to prevent contamination;
- Drilling and blasting coal;
- Loading and hauling coal, and
- Starting with next cut.

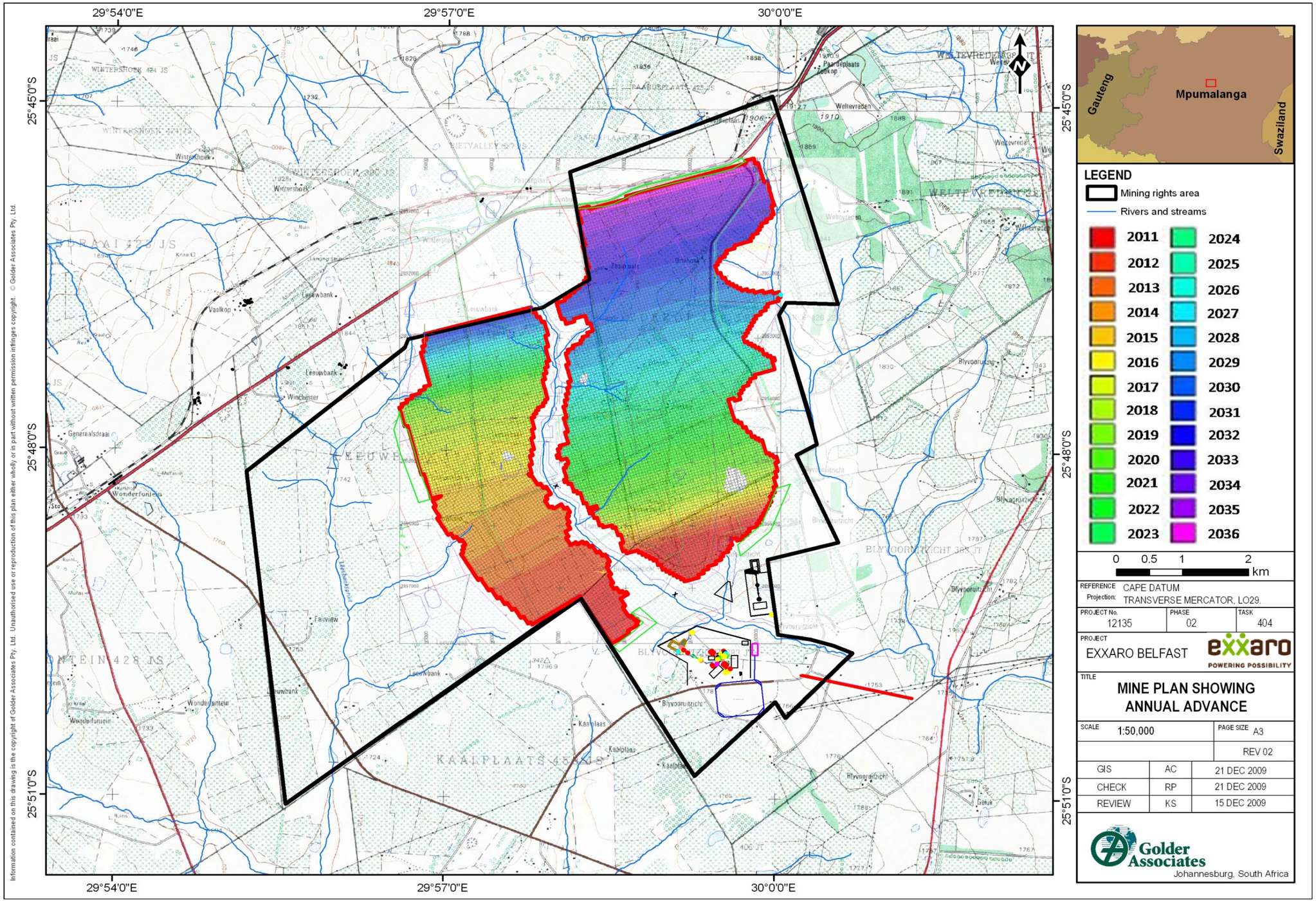

Figure 2: Mine plan showing annual advance

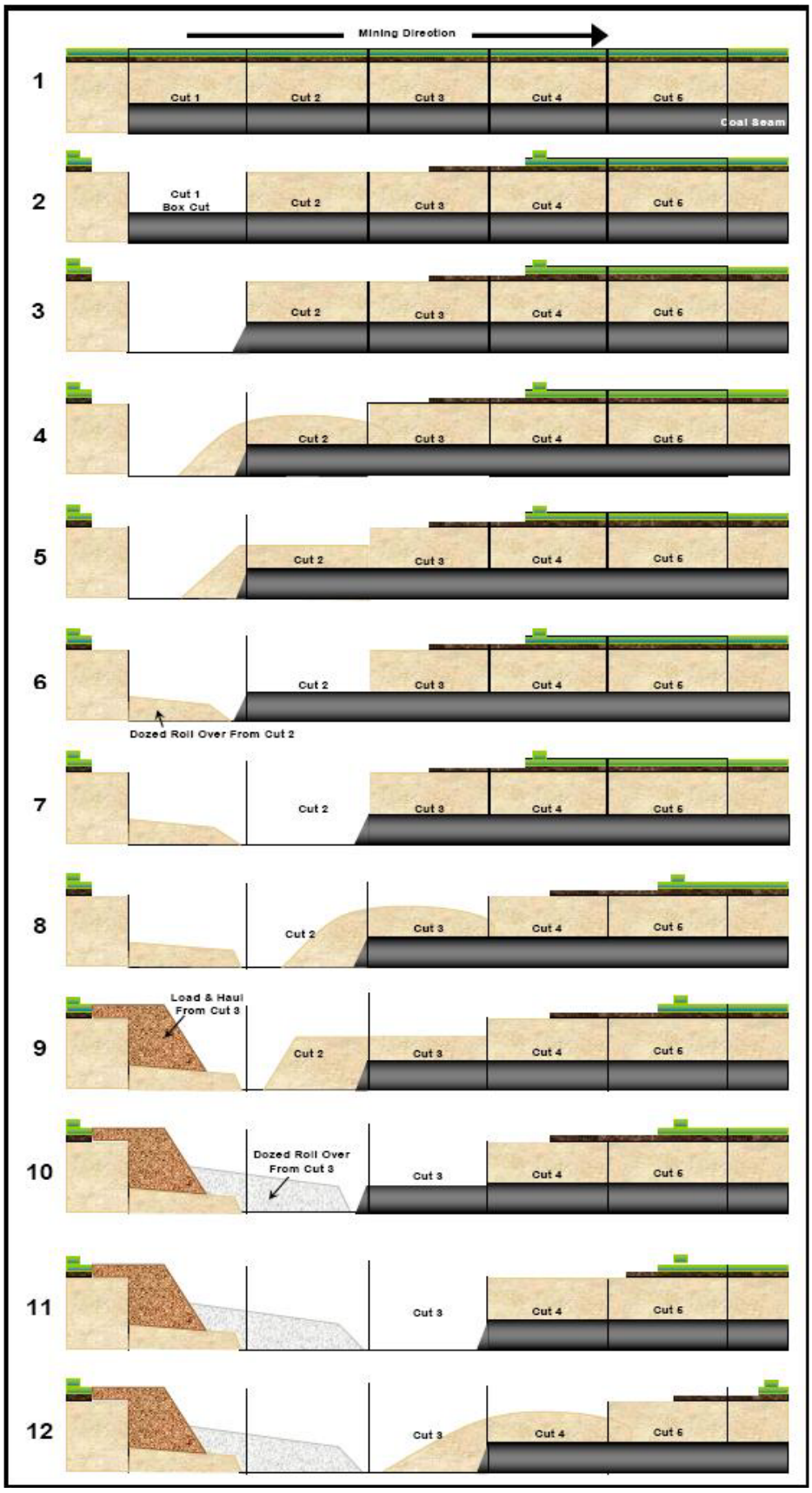

Figure 3: Steps 1-12 of mining method

2.3 Processing Phase

Processing of raw coal in the plant will follow the conventional and proven dense medium separation route, but also do gravity concentration using spirals on the fine fraction or fine DMS cyclone. This project involves a greenfields coal washing plant to produce both export quality and local Eskom product coal. Phase 1 (Figure 4 will consist of crushing and screening the ROM to produce an Eskom product while Phase 2 (Figure 5) will consist of crushing, screening and washing the coal to produce A / B-grade and Eskom products.

The plant will be designed for a feed rate of 5 million tons per annum. The ROM feed (-1000 mm) from the open pit will be tipped and crushed to -50 mm through a crushing and screening plant. The crushing and screening plant will consist of a primary double roll crusher, feeding a secondary double roll crusher, in closed circuit with a classifying screen at 50 mm. The secondary crushing circuit is a closed circuit to ensure proper top size control.

The crushed ROM will then stockpiled on a normal conical stockpile from where it will be fed over vibrating feeders to the coal wash plant at a maximum rate of 805 tons per hour. Three fractions will be screened out, -50 mm +12mm, -12 +1 mm and –1 mm and fed to the dense medium cyclones and fines sections. Beneficiation to 14% ash (air dried) product for export purposes will take place in the plant.

Conventional dense medium cyclone circuit will beneficiate the -50 mm +1.5 mm material. The minus 1.5 mm +0.1 mm fraction will be beneficiated using spirals. The minus 0.1 mm slimes fraction will report to the co-disposal site or to the Eskom product.

The undersize from the desliming screens will be fed to the desliming cyclones with the overflow reporting to the thickener and the underflow to the spiral plant. The product will be dewatered through fine coal centrifuges and the discard on a dewatering screen. The thickener underflow will be fed to the filter plant, producing a filter cake. The filtrate will recycle back to the thickener allowing a closed water circuit plant.

The final product is a minus 50 mm A-grade steam coal for export through the Phase V expansion of RBCT and an Eskom grade coal for local supply. The plant has also been designed to produce a Bgrade coal if warranted by market conditions.

Export product will be collected on a conveyor and transported to a transfer point likewise power station product. The filter cake will have a separate conveyor onto a ground stockpile. The discard will be discharged into a discard bin to be trucked away by the operation.

The product will initially be transported from the mine to Eskom power stations by road. The Department of Transport has given approval for the use of the public road for the transportation of the coal as it is currently used by another mining company for this purpose. In Phase 2, the A / B-grade and Eskom product will be transported via conveyor from the plant to the new Belfast loop siding to be loaded onto 100 x 85 ton wagon trains. The local coal will be transported to Eskom sites while the export coal will be transported via Transnet to RBCT.

The plant and coal transportation systems will be operated on a 24-hour day, 7-day week basis, with scheduled maintenance shifts. The position of the plant will only be finalised after the completion of the site selection studies that are required as part of the EIA.

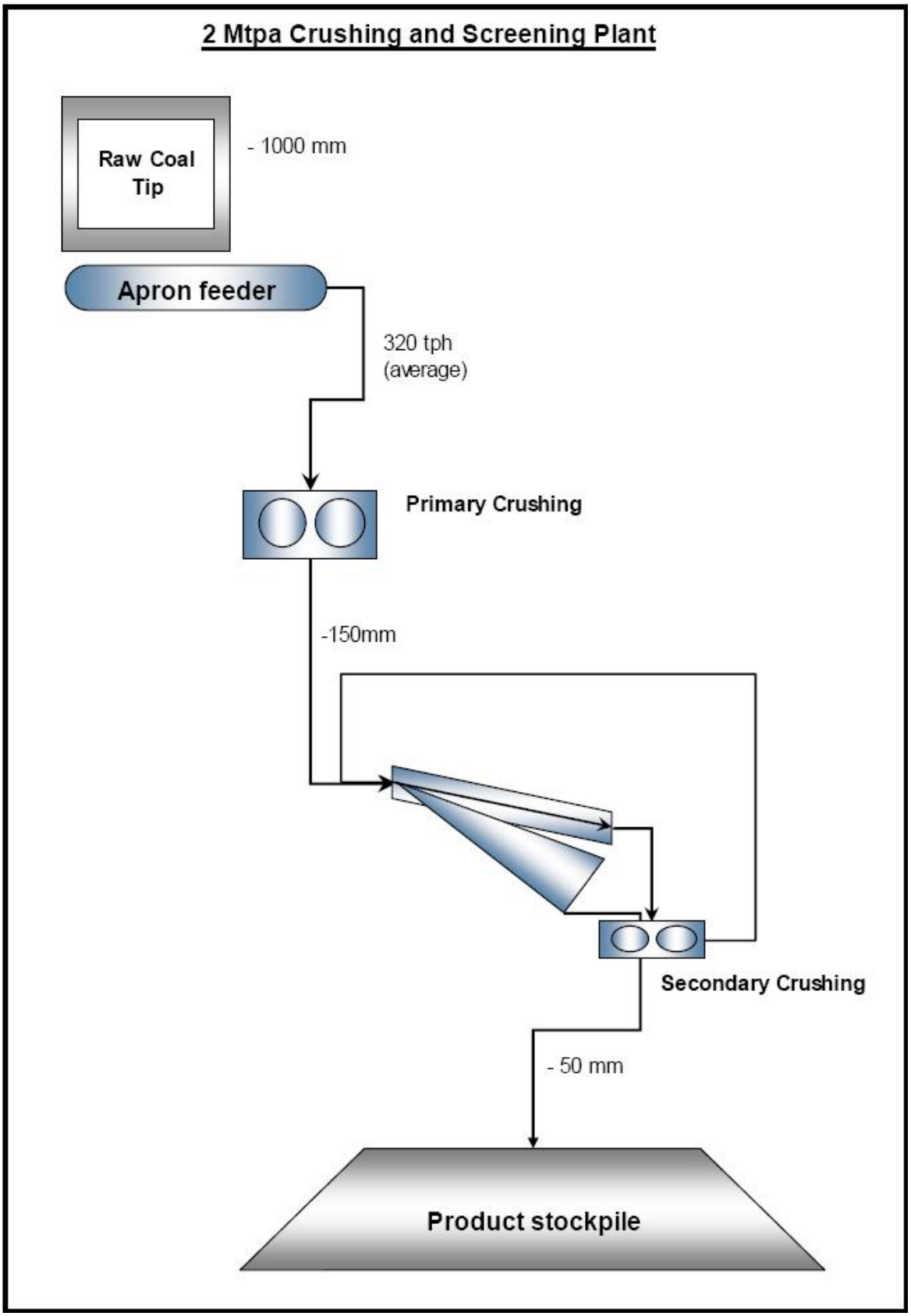

Figure 4: Flow Screen illustrating Phase 1 Processing

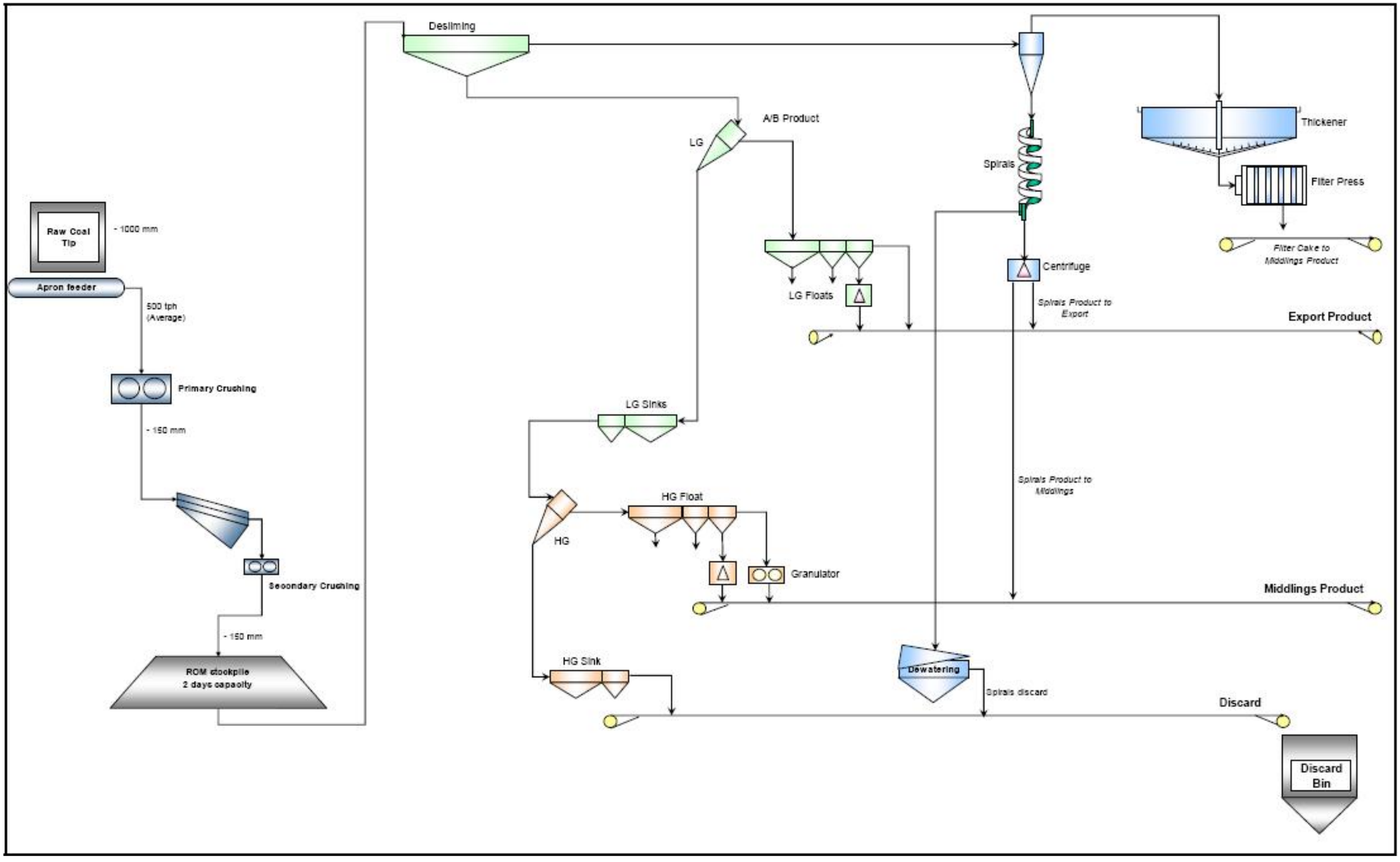

Figure 5: Flow Screen illustrating Phase 2 Processing

2.4 Decommissioning Phase

The decommissioning phase will take place over approximately four (4) years, and will be undertaken in three (3) phases, namely decommissioning, and maintenance and monitoring. The decommissioning phase will include, but may not be limited to the following activities:

- Notifying the DME of the intention to close the operation;
- Scaling down of the operation;
- Implementing the SLP retrenchment plan; and
- Retrenching the non-essential workforce.
- The closure and rehabilitation phase will include, but may not be limited to the following activities:
- Dismantling of processing plant and related structures;
- Demolition of:
  - Steel buildings and structures;
  - Reinforced concrete buildings and structures;
  - Administration facilities and housing.
- Rehabilitation of access roads;
- Opencast rehabilitation;
- Fencing off pit areas;
- Rehabilitation of overburden, spoil and process plant waste;
- General surface rehabilitation;
- Waste removal; and
- Water management.

The maintenance and monitoring phase will include, but may not be limited to the following activities:

- Fertilization of rehabilitated areas;
- Surface water quality monitoring;
- Groundwater quality monitoring;
- Fauna and flora monitoring;
- Alien and invasive plant species monitoring and control;
- General maintenance, including rehabilitation of cracks and subsidence;
- Annual environmental performance assessment report development;
- Environmental closure report development; and
- Annual environmental aspect reporting and final closure application development and motivation.

3.0 OBJECTIVES

The objectives of the ecological baseline and impact assessment will be discussed under the respective terrestrial, wetland, and aquatic components.

3.1 Terrestrial

The objectives for the terrestrial study were as follows:

Fauna

- Conduct a desktop review of available literature and information to:
  - Obtain lists of possible fauna species that are likely to occur on site; and
  - Identify endangered/Red Data fauna species that could occur in the area.
- Conduct dry and wet season field surveys to:
  - Identify terrestrial fauna linked to the veld types and vegetation communities in the study area;
  - Identify and record dominant terrestrial species (birds, mammals, reptiles, amphibians and invertebrates) as required by the Mpumalanga Parks and Tourism Agency's minimum requirements;
  - Record Red Data or protected species found on site; and
  - Identify exotic species.
- Identify possible impacts, as well as cumulative impacts of the proposed project on the terrestrial ecosystems for the three phases of the project; and
- Compile of a Biodiversity Action Plan once seasonal surveys are complete for the study area with specific reference to sensitive areas, habitats or species found to occur within the area once the dry and wet season surveys are completed.

Flora

- Conduct a desktop review of available literature and information including PRECIS data to:
  - Obtain lists of possible floral species that are likely to occur on site; and
  - Identify endangered/Red Data floral species that could occur in the area.
- Conduct dry and wet season field surveys in accordance with the minimum requirements for flora studies as stipulated by the Mpumalanga Parks and Tourism Agency;
- Compare seasonal changes within the vegetation structure;
- Compile a list of species found to be present within the project area;
- Identify possible impacts, as well as cumulative impacts of the proposed project on the terrestrial ecosystems for the three phases of the project;
- Develop a strategy to relocate Red Data/endangered or protected species;
- Develop a strategy to manage alien and invasive species and to introduce indigenous species for rehabilitation; and
- Development of a management plan to manage, protected and monitor red data and important species.

3.2 Wetland

The objectives for the wetlands study were as follows:

- Gather catchment information related to the study area;
- Delineate and classify the wetlands within the study area;
- Characterise the flora found in the wetlands;
- Assess the wetlands Present Ecological Status (PES);
- Assess the wetlands Ecological Importance and Sensitivity (EIS);
- Assess the wetlands integrity using the wetlands Index of Habitat Integrity (IHI);
- Assess the ecosystem services supplied by the wetlands to both the human and natural receptors;
- Identify anticipated impacts, as well as cumulative impacts of the proposed project on the wetland ecosystems for the three phases of the project and assess the significance thereof; and
- Propose possible mitigation measures for the identified impacts.

3.3 Aquatic

The objectives for the aquatic study were as follows:

- Characterise the current status of the aquatic ecosystems associated with the development in terms of selected ecological indicators and to identify specific important ecological attributes;
- Identify anticipated impacts, as well as cumulative impacts of the proposed project on the aquatic ecosystems for the three phases of the project and assess the significance thereof; and
- Propose possible mitigation measures for the identified impacts.

4.0 LEGISLATION

It is the objective of the Impact Assessment to ensure the project compliance with the following current South African legislation:

The National Water Act, 1998 (Act No. 36 of 1998)

In the National Water Act (NWA), use of water is no longer limited to consumptive use, such as the abstraction of water, but includes non-consumptive activities that may have an impact on the resource quality. These “water uses”, which require authorization (usually in the form of a license) are given in Section 21 of the NWA, and include:

- (a) taking water from a water resource;
- (b) storing water;
- (c) impeding or diverting the flow of water in a watercourse;
- (d) engaging in a stream flow reduction activity contemplated in section 36;
- (e) engaging in a controlled activity identified as such in section 37(1) or declared under section 38(1); and
- (i) altering the bed, banks, course or characteristics of a watercourse.

The Environmental Conservation Act, 1989 (No. 73 of 1989)

In terms of Regulations (Section 21, Schedule 1, No.1 (j) published in Government Gazette No. 18261, 5 September 1997, in terms of the Environmental Conservation Act, 1989 (ECA), appropriate environmental investigations (EIA's) are mandatory before approval will be given by the relevant authority.

The National Environmental Management Act (Act 107 of 1998)

The National Environmental Management Act (NEMA) (Act 107 of 1998), in terms of Regulation 386, Activity 1 (m) gazetted in terms of Section 24, a basic assessment is required to be conducted before approval for any in-stream alteration or activity is granted.

The National Environmental Management Biodiversity Act (Act 10 of 2004)

The National Environmental Management Biodiversity Act (NEMBA) (Act 10 of 2004), in terms of Regulation 57 (1) restricts the activity involving a specimen of a listed or protected species. This includes an activity:

- (a) which is of a nature that may negatively impact on the survival of a listed, threatened or protected species

Mineral Petroleum Resources Development Act, 2002 [MPRDA] (Act No. 28 of 2002)

As per Regulations 49, 50 and 51 of the Mineral Petroleum Resources Development Act, 2002 [MPRDA] (Act No. 28 of 2002), Exxaro must submit a Scoping Report, Environmental Impact Assessment (EIA) and Environmental Management Programme (EMP).

Thus, in terms of the above-mentioned current South African legislations, the alteration of any in-stream activity within a watercourse, which could theoretically impede, increase or reduce river flow, modify habitats or alter the supporting function of the aquatic ecosystem, is listed as a water use, and would require a license. If the structure or activity is of a nature that may negatively impact on the survival of a listed, threatened or protected species, the granting of the water license should be conditional on providing mitigations to ensure the survival of the species. A baseline assessment as well as an impact assessment of the proposed area is thus required, prior to the approval of the proposed project.

Mpumalanga Nature Conservation Act (Act 10 of 1998)

With regards to Section 69 (1)(a) and Section 69(1)(b) that specifically stipulate plant species protected within the Mpumalanga province. All of these specie should be submitted to the Mpumalanga Tourism and Parks Agency as stated in the Mpumalanga Tourism and Parks Agency Requirements for biodiversity Assessments.

5.0 STUDY AREA

The entire study site is situated within one vegetation type, described by Mucina and Rutherford (2006) as Eastern Highveld Grassland. This vegetation type corresponds partially with Bankenveld and North-eastern Sandy Highveld according to the Acocks (1975) and also Moist Sandy Highveld Grassland as described by Low and Rebelo (1996).

This vegetation type occurs within the Gauteng and Mpumalanga Provinces on the plains in the areas between Belfast in the East and the eastern side of Johannesburg in the West and southwards to Bethal, Ermelo and West of Piet Retief. Altitude ranges from as low as 1300 up to 1780 metres above mean sea level. The climate features strongly seasonal summer rainfall with very dry winters with mean annual precipitation of 650-900 mm that averages at 726 mm. Frost can occur between 13 to 42 days per annum (Mucina & Rutherford, 2006).

The geology of Land type Ad1 in the northern part of the study area can be described as Shale and Sandstone and grit of the Ecca Group, Karoo Sequence. The geology of Land type Ba21 in the southern portion of the study area can consist of the following formations: Quartzite and shale of the Steenkampsberg Formation, Pretoria Group; Sandstone and shale of the Ecca group; Basalt and pyroxene hornfels of the Dullstroom Formation, Pretoria Group; Tillite and shale of the Dwyka Formation or Diabase. Soils of Landtype Ad1 can consist of Red/yellow apedal freely drained soils or yellow dystophic and/or mesotrophic

soils whilst Landtype Ba21 can contain Plinthic catena: dystrophic and/or mesotrophic soils; widespread red soils or rarely upland duplex and margalitic soils (Mucina & Rutherford, 2006).

The conservation status of this vegetation type is Endangered and the conservation target is 24%. By 2006 some 44% was already transformed primarily by cultivation, plantations, mining, urbanisation and building of dams(Mucina & Rutherford, 2006). No serious invasions are reported, although *Acacia mearnsii* can become dominant in disturbed sites. Erosion is generally low. Only a small part of this vegetaion type is conserved in the statutory nature reserves Nooitgedachtdam - and Jerichodam Nature Reserve of the Mpumalanga Tourism and Parks Agency and in Private Nature Reserves such as Holkranse, Kransbank and (Mucina & Rutherford, 2006)

With reference to the Mpumalanga Biodiversity Conservation Plan (MBCP) terrestrial biodiversity assessment shown in Figure 8 the project falls mostly on areas classified as No Natural Habitat Remaining with small areas classified as Least Concern. The areas classified as No Habitat Remaining are areas in which natural vegetation has been lost. It includes all land transformed by urban / industrial development and cultivation. Biodiversity is irreversibly changed, reduced to levels that are virtually dysfunctional. These landscapes have only residual or negative effects on the functioning of natural ecosystems. Important plant species of this vegetation type are given in Appendix E.

The areas Classified as Least Concern have biodiversity value in the form of natural vegetation cover. Although they are not currently required in order to meet biodiversity targets, they do contribute significantly to functioning ecosystems, including ecological connectivity **Error! Reference source not found.**(Farrar & Lötter, 2007). A relatively small portion of the project falls within an area classified as Important and Necessary. Biodiversity in this category is relatively intact. It represents the areas which most efficiently contribute to meeting biodiversity targets and minimise landuse conflict. If biodiversity is lost from these areas, larger areas will be required elsewhere for targets to be met. This category allows some flexibility and there are options for development (Farrar & Lötter, 2007). There is a small section of the site that falls within an area Classified as Highly Significant (Farrar & Lötter, 2007). Highly significant areas are those where biodiversity has been heavily compromised and very few options remain to meet biodiversity targets. Natural vegetation cover in these areas should be maintained or restored. Any significant habitat loss may cause these areas to become irreplaceable. Approved developments or changes in land use must be compatible with conservation objectives, e.g. well managed livestock grazing. If development is unavoidable, such land uses must be made sufficiently dispersed and/or small scale, so as to be biodiversity friendly. Decisions on landuse changes will require a biodiversity specialist study as part of the EIA (Farrar & Lötter, 2007).

According to the Mpumalanga Biodiversity Conservation Plan (MBCP) (Ferrar & Lotter, 2007) the study area falls within an area that is rated as being highly significant and Important and Necessary for the aquatic assessments (Figure 9). This assessment is based on its high biodiversity value and unique wetland systems outside any formal Protected Areas network. The Klein-komati River wetland system falls within the highly significant rating as per the MBCP (Figure 9).

The Belfast site is an undeveloped coal resource situated approximately 10 km southwest of Belfast in Mpumalanga. The study area covers the farms Leeuwbank 427JS, Zoekop 426JS, Blyvooruitzicht 383JT and Paardeplaasts 425JSand falls into two water management areas, mainly the Inkomati (WMA 5), with the northern boundary extending into the Olifants (WMA 4). This area is drained by three quaternary catchments, these being X11D, X11C and B41A (Figure 10).

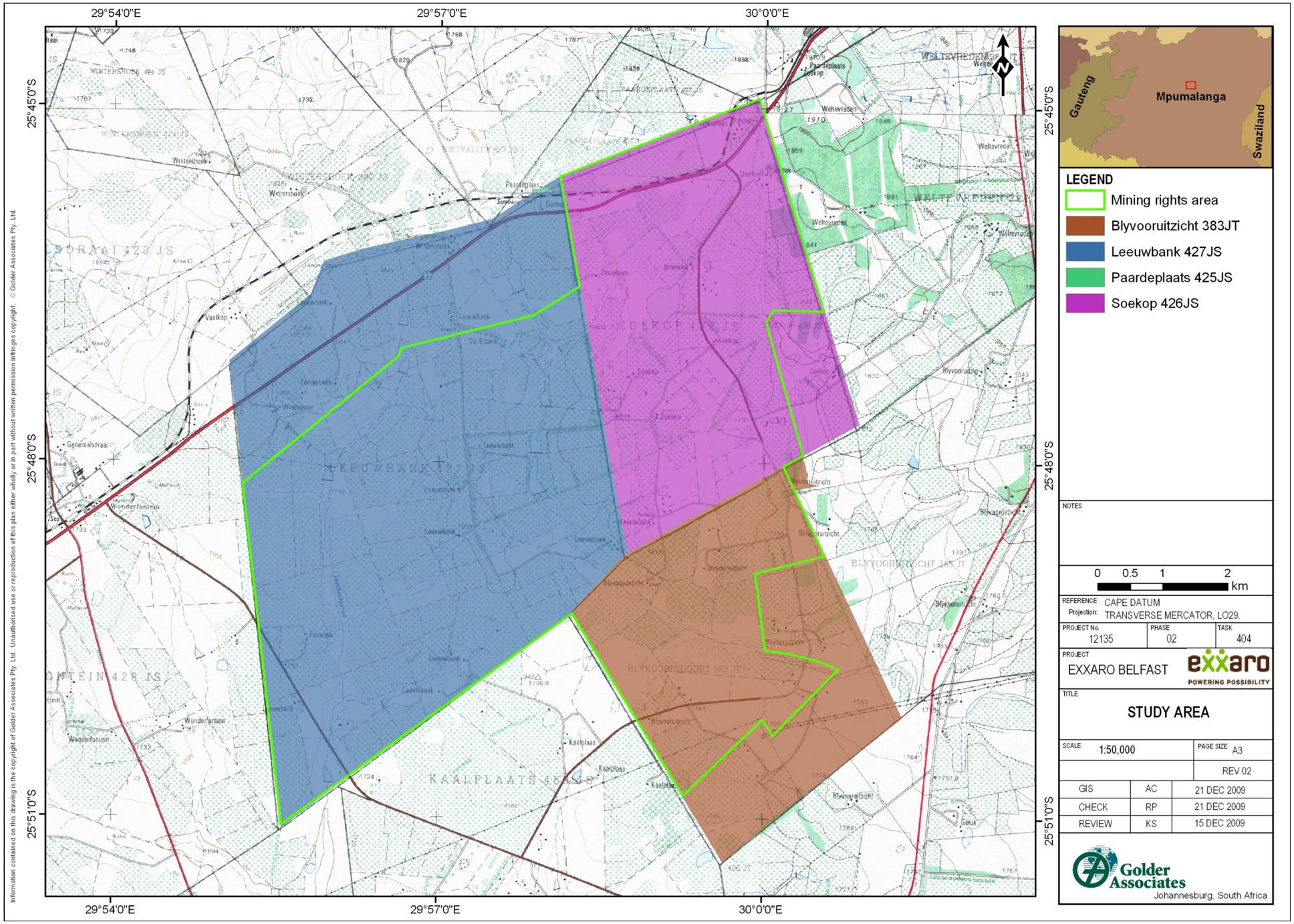

Figure 6: Map showing the Belfast study area