ENVIRONMENTAL IMPACT ASSESSMENT PROCESS
DRAFT SCOPING REPORT

PROPOSED ESTABLISHMENT OF A COAL-FIRED POWER PLANT AND ASSOCIATED INFRASTRUCTURE AT TRANSALLOYS NEAR EMALAHLENI, MPUMALANGA PROVINCE

(DEA Ref No: 14/12/16/3/3/3/97)

DRAFT SCOPING REPORT FOR PUBLIC REVIEW

Prepared for:

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PROJECT DETAILS

DEA Reference No.	:	14/12/16/3/3/3/97
Title	:	Environmental Impact Assessment Process Draft Scoping Report: Proposed Establishment Of A Coal-Fired Power Station And Associated Infrastructure at Transalloys near Emalahleni, Mpumalanga Province
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Project Developer	:	Transalloys (Pty) Ltd
Report Status	:	Draft Scoping Report for comment
Submission Date	:	25 November 2013

When used as a reference this report should be cited as: Savannah Environmental (2013) Final Scoping Report: Proposed Establishment of a Coal-Fired Power Station and Associated Infrastructure at Transalloys near Emalahleni, Mpumalanga Province

PURPOSE OF THE SCOPING REPORT

As part of the project planning and feasibility studies and as per environmental legal requirements, Transalloys is currently facilitating an Environmental Impact Assessment (EIA) process to determine the environmental feasibility of constructing a 150MW power plant to accommodate their existing and future energy needs. Transalloys has appointed Savannah Environmental, as independent environmental consultants, to undertake the EIA. The EIA process is being undertaken in accordance with the requirements of the National Environmental Management Act (NEMA; Act No. 107 of 1998).

In terms of NEMA, the Scoping Report is submitted to the competent authority (i.e. the National Department of Environmental Affairs (DEA)) for decision-making on the proposed project. The Scoping Report is also intended to provide sufficient background information to other non-statutory parties, the general public, organisations and local communities in order to obtain their commentary and input on the proposed development. The Scoping Phase of the EIA process identifies and describes potential issues associated with the proposed project, and defines the extent of the studies required within the EIA Phase of the process. The EIA Phase will assess those identified potential environmental impacts and benefits associated with all phases of the project including design, construction, operation and decommissioning, and will recommend appropriate mitigation measures for potentially significant environmental impacts.

The Scoping Report consists of eight sections:

» **Chapter 1** provides background to the proposed coal-fired power station and the environmental impact assessment.
» **Chapter 2** describes the scope of the proposed project.
» **Chapter 3** outlines the process which was followed during the Scoping Phase of the process.
» **Chapter 4** describes the existing biophysical and socio-economic environment affected by the proposed project.
» **Chapter 5** provides an evaluation of the potential issues and impacts associated with the proposed project.
» **Chapter 6** presents the conclusions of the scoping evaluation.
» **Chapter 7** describes the Plan of Study for EIA.
» **Chapter 8** provides references used to compile the Scoping Report.

The release of a draft Scoping Report provided stakeholders with an opportunity to verify that the issues they have raised to date have been captured and adequately considered within the study. This Final Scoping Report incorporates all comments received prior to submission to the National Department of Environmental Affairs (DEA).

PUBLIC REVIEW PERIOD FOR THE DRAFT SCOPING REPORT

Members of the public, local communities and stakeholders are invited to comment on this Draft Scoping Report made available for public review and comment at the following locations from **25 November 2013 – 22 January 2014:**

» Transalloys reception area
» Clewer Primary School (Clewer)
» Witbank Public Library (Emalahleni Main Library)
» www.savannahSA.com

PUBLIC FEEDBACK MEETING

In order to facilitate comments on the draft Scoping report and provide feedback on the findings of the studies undertaken, a public feedback meeting will be held during the review period for the Draft Scoping Report as follows:

» Date: 28 November 2013
» Time: 18:00
» Venue: Clewer Primary School, Robertson Crescent, Clewer

SUMMARY

Background and Project Overview

Transalloys (Pty) Ltd, a producer of export grade Siliconmanganese, as an energy intensive electricity user, proposes to develop a Coal-Fired Power Plant and associated infrastructure adjacent to its smelter complex near Emalahleni, Mpumalanga Province. The proposed power plant will have a generating capacity of up to 150 MW in order to meet Transalloys' current electricity demands and future expansion requirements. The development of the power plant project would mean that Transalloys would become independent of the Eskom electricity grid.

Siting: Due to the availability of existing land around the Transalloys smelter complex, five potential site alternatives located within or directly adjacent to this complex have been identified for the potential siting of the proposed power plant and associated infrastructure. The five site alternatives are located over the following farm portions:

» Portions 25, 26, 33, 34, 35, 36 and 37 of the Farm Elandsfontein 309 JS
» Portions 20, 24 and 38 of the Farm Schoongezicht 308 JS

Fuel: Transalloys is situated in close proximity to existing coal mines (including the Landau, Kleinkoppie and Goedehoop Colleries) which have an abundance of coal and discard coal which is unsuitable for use by Eskom, the use of which is made possible by the type of coal-burning technology proposed for this project (refer below). The proposed power plant is therefore considered to be well situated in terms of the supply of fuel to the proposed power plant.

Technology: The components of the proposed power station and the associated infrastructure are discussed in detail in Chapter 2. The proposed power plant will make use of Circulating Fluidised Bed (CFB) boiler technology (a proven coal-burning technology yet to be implemented in South Africa) which allows for the use of low-grade coal and coal discards as fuel in the energy generation process. CFB technology also allows for improved emissions over conventional coal-fired power stations in South Africa due to the fuel burning process, as will be discussed later in this Scoping Report.

Water supply: Water is a limiting factor within the study area and the country. The proposed power plant will therefore be designed using dry cooling technology in order to significantly reduce the consumption of water. Water is proposed to be conveyed from the Anglo American Water Treatment Plant situated approximately 9km from the site, necessitating the construction of a raw water supply pipeline between

Transalloys and the water treatment plant.

Existing infrastructure: Electricity generated by the captive power plant will be fed directly into the Transalloys smelter complex for consumption. From the direction of Witbank, the Transalloys – Witbank Trac 132kV power line feeds into the Eskom Transalloys substation before becoming the HSV One – Transalloys 1 132kV power line feeding into the HSV One Substation located at Evraz Highveld Steel and Vanadium. The existing grid connection therefore does allow for the distribution of the generated electricity to other potential users should the need be identified.

EIA Process – Scoping Phase

The Scoping Report for the proposed project has been undertaken in accordance with the EIA Regulations published in Government Notice 33306 of 18 June 2010, in terms of Section 24(5) of the National Environmental Management Act (NEMA; Act No 107 of 1998).

This Scoping Report is aimed at detailing the nature and extent of this proposed power station and associated infrastructure, identifying potential issues associated with the proposed project, and defining the extent of studies required within the EIA. This was achieved through an evaluation of the proposed project, involving the project proponent, specialist consultants, and a consultation process with key stakeholders, relevant government authorities and interested and affected parties (I&APs). In accordance with the requirements of the EIA Regulations, feasible project-specific alternatives (including the "do nothing" option) have been identified for consideration within the EIA process (refer to Chapter 7).

The conclusions and recommendations of this Scoping Report are the result of desktop evaluations of impacts identified by the different environmental specialists, review of existing information, limited on-site inspections, and the parallel public participation process. The public consultation process is extensive and every effort is being made to include representatives of all stakeholder groupings in the study area and the Mpumalanga Province.

The National Department of Environmental Affairs (DEA) is the competent authority for this project. An application for authorisation has been accepted by DEA (under Application Reference number 14/12/16/3/3/3/97).

The scoping phase for the proposed project forms part of the EIA process and has been undertaken in accordance with the EIA Regulations. The Scoping Report aimed to identify potential issues associated with the proposed project, and define the extent of studies required within the EIA. This was achieved through an

evaluation of the proposed project involving specialists with expertise relevant to the nature of the project and the study area, the project proponent, as well as a consultation process with key stakeholders which includes both relevant government authorities and interested and affected parties (I&APs).

Evaluation of the Proposed Project

Technical feasibility: The project is considered to be technically feasible based on the following:

- Location of Transalloys within close proximity to coal reserves
- Abundance of low grade coal including coal discards of a quality below Eskom rejection limits or export but which can be utilised in a Circulating Fluidised Bed boiler as proposed for the power plant
- Coal can be supplied via overland conveyors from the mines in the area to the power station, reducing the potential logistical cost associated with rail and truck transport
- The use of Circulating Fluidised Bed boiler technology is key to the use of low grade coal in the power generation process and the control of emissions
- Existing electrical infrastructure facilitating connection and distribution of generated electricity directly to Transalloys
- Abundance of surplus mine water in the area and availability of raw water supply to the project
- The use of ash produced in the combustion process in the cement and construction industries eliminating the need for large disposal sites.

Development footprint: The project will require the development of a power station over an area of approximately 10ha and associated infrastructure over an area of approximately 30ha. The water pipeline from EWRP to Transalloys will be approximately 9km in length and the overland coal conveyor will be approximately 3.5km in length.

Technology alternatives: The use of Circulating Fluidised Bed is expected to result in improved emissions (over conventional pulverised coal fired boiler technology) in line with the standards of the IFC. Furthermore the following benefits from the use of CFB technology are anticipated:

- The sourcing of discard coal or waste coal for use in the firing process
- This could in turn lead to a reduction of coal discard dumps in the area and associated positive impacts
- The use of dry-cooling technology will reduce the water requirements of the plant
- In-bed capturing or neutralisation of sulphur

through introduction of limestone directly into the bed leading to a significant reduction of SO_2.
- » Low burning temperatures resulting in limited formation of NOx gases.
- » Generation of gypsum as a by-product for use in construction and cement manufacturing

Site alternatives: Five potential site alternatives have been identified and evaluated through the scoping study for the development of the project. Site Alternative 5 situated between Transalloys and EVRAZ Highveld Steel and Vanadium is the most preferred site from an air quality, ecological, surface water, noise and visual perspective however the potential implications of a pending application for a prospecting right (coal mining) and pursuant mining right over a portion of Site Alternative 5 must be evaluated as this could potentially render a large portion of this site undevelopable for a coal-fired power station.

Potential environmental impacts include:

- » Potential air quality impacts from the proposed power station due to emissions. This is partially mitigated through the use of Circulating Fluidised Bed technology allowing for reduced emissions due to the occurrence of the site within the Highveld Priority Area.
- » Potential cumulative air quality impacts due to existing power stations and other mining and industrial activities in the area.
- » Potential contaminated storm water run-off from the coal storage stockyard and contaminated runoff from the ash dam polluting watercourses and wetlands unless appropriately retained on the site.
- » Potential noise impacts of the proposed facility on Noise Sensitive Developments in the surrounding areas.
- » The potential visual impact of the proposed facility taking into account the visual resource sensitivity of the area around Transalloys.

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DEFINITIONS AND TERMINOLOGY

Alternatives: Alternatives are different means of meeting the general purpose and need of a proposed activity. Alternatives may include location or site alternatives, activity alternatives, process or technology alternatives, temporal alternatives or the 'do nothing' alternative.

Cumulative impacts: Impacts that result from the incremental impact of the proposed activity on a common resource when added to the impacts of other past, present or reasonably foreseeable future activities (e.g. discharges of nutrients and heated water to a river that combine to cause algal bloom and subsequent loss of dissolved oxygen that is greater than the additive impacts of each pollutant). Cumulative impacts can occur from the collective impacts of individual minor actions over a period of time and can include both direct and indirect impacts.

Direct impacts: Impacts that are caused directly by the activity and generally occur at the same time and at the place of the activity (e.g. noise generated by blasting operations on the site of the activity). These impacts are usually associated with the construction, operation or maintenance of an activity and are generally obvious and quantifiable

'Do nothing' alternative: The 'do nothing' alternative is the option of not undertaking the proposed activity or any of its alternatives. The 'do nothing' alternative also provides the baseline against which the impacts of other alternatives should be compared.

Endangered species: Taxa in danger of extinction and whose survival is unlikely if the causal factors continue operating. Included here are taxa whose numbers of individuals have been reduced to a critical level or whose habitats have been so drastically reduced that they are deemed to be in immediate danger of extinction.

Endemic: An "endemic" is a species that grows in a particular area (is endemic to that region) and has a restricted distribution. It is only found in a particular place. Whether something is endemic or not depends on the geographical boundaries of the area in question and the area can be defined at different scales.

Environment: the surroundings within which humans exist and that are made up of:

i. the land, water and atmosphere of the earth;
ii. micro-organisms, plant and animal life;
iii. any part or combination of (i) and (ii) and the interrelationships among and between them; and

iv. the physical, chemical, aesthetic and cultural properties and conditions of the foregoing that influence human health and well-being.

Environmental Impact: An action or series of actions that have an effect on the environment.

Environmental Impact Assessment: Environmental Impact Assessment (EIA), as defined in the NEMA EIA Regulations and in relation to an application to which scoping must be applied, means the process of collecting, organising, analysing, interpreting and communicating information that is relevant to the consideration of that application.

Environmental management: Ensuring that environmental concerns are included in all stages of development, so that development is sustainable and does not exceed the carrying capacity of the environment.

Environmental management programme: An operational plan that organises and co-ordinates mitigation, rehabilitation and monitoring measures in order to guide the implementation of a proposal and its on-going maintenance after implementation.

Indigenous: All biological organisms that occurred naturally within the study area prior to 1800

Indirect impacts: Indirect or induced changes that may occur as a result of the activity (e.g. the reduction of water in a stream that supply water to a reservoir that supply water to the activity). These types of impacts include all the potential impacts that do not manifest immediately when the activity is undertaken or which occur at a different place as a result of the activity.

Interested and Affected Party: Individuals or groups concerned with or affected by an activity and its consequences. These include the authorities, local communities, investors, work force, consumers, environmental interest groups and the general public.

Rare species: Taxa with small world populations that are not at present Endangered or Vulnerable, but are at risk as some unexpected threat could easily cause a critical decline. These taxa are usually localised within restricted geographical areas or habitats or are thinly scattered over a more extensive range. This category was termed Critically Rare by Hall and Veldhuis (1985) to distinguish it from the more generally used word "rare".

Red data species: Species listed in terms of the International Union for Conservation of Nature and Natural Resources (IUCN) Red List of Threatened Species, and/or in terms of the South African Red Data list. In terms of the South African Red Data list, species are classified as being extinct, endangered, vulnerable, rare, indeterminate, insufficiently known or not threatened (see other definitions within this glossary).

Significant impact: An impact that by its magnitude, duration, intensity or probability of occurrence may have a notable effect on one or more aspects of the environment.

ABBREVIATIONS AND ACRONYMS

BID	Background Information Document
CBOs	Community Based Organisations
CO_2	Carbon dioxide
MDEDET	Mpumalanga Department of Economic Development, Environment and Tourism
DEA	National Department of Environmental Affairs
DME	Department of Minerals and Energy
DOT	Department of Transport
DWAF	Department of Water Affairs and Forestry
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
GIS	Geographical Information Systems
GG	Government Gazette
GN	Government Notice
I&AP	Interested and Affected Party
IDP	Integrated Development Plan
km^2	Square kilometres
kV	Kilovolt
m^2	Square meters
MW	Mega Watt
NEMA	National Environmental Management Act (Act No 107 of 1998)
NERSA	National Energy Regulator of South Africa
NHRA	National Heritage Resources Act (Act No 25 of 1999)
NGOs	Non-Governmental Organisations
NWA	National Water Act (Act No 36 of 1998)
SAHRA	South African Heritage Resources Agency
SANBI	South African National Biodiversity Institute
SANRAL	South African National Roads Agency Limited
SDF	Spatial Development Framework

INTRODUCTION CHAPTER 1

Transalloys (Pty) Ltd, a producer of export grade Siliconmanganese, as an energy intensive electricity user, proposes to develop a Coal-Fired Power Plant and associated infrastructure adjacent to its smelter complex near Emalahleni, Mpumalanga Province. The proposed power plant will have a generating capacity of up to 150 MW in order to meet Transalloys' current electricity demands and future expansion requirements. The development of the power plant project would mean that Transalloys would become independent of the Eskom electricity grid.

This Scoping Report evaluates this proposed project and consists of eight chapters, which include:

» **Chapter 1** provides background to the proposed coal-fired power plant and the environmental impact assessment.
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1.1. Project Overview

The proposed coal-fired power plant, proposed to be located adjacent to the Transalloys smelter complex will have a generating capacity of up to 150 MW in order to meet Transalloys' current electricity demands and future expansion requirements. The Transalloys smelter complex is located approximately 8km west of Emalahleni, south of the N4 highway and north of Clewer, in the Emalahleni Local Municipality within the greater Nkangala District Municipality of the Mpumalanga Province. The proposed site location was identified as being technically feasible based on the following considerations:

Siting: Due to the availability of existing land around the Transalloys smelter complex, five potential site alternatives located within or directly adjacent to this complex have been identified for the potential siting of the proposed power plant

and associated infrastructure (refer to **Figure 1.1**). The five site alternatives are located over the following farm portions:

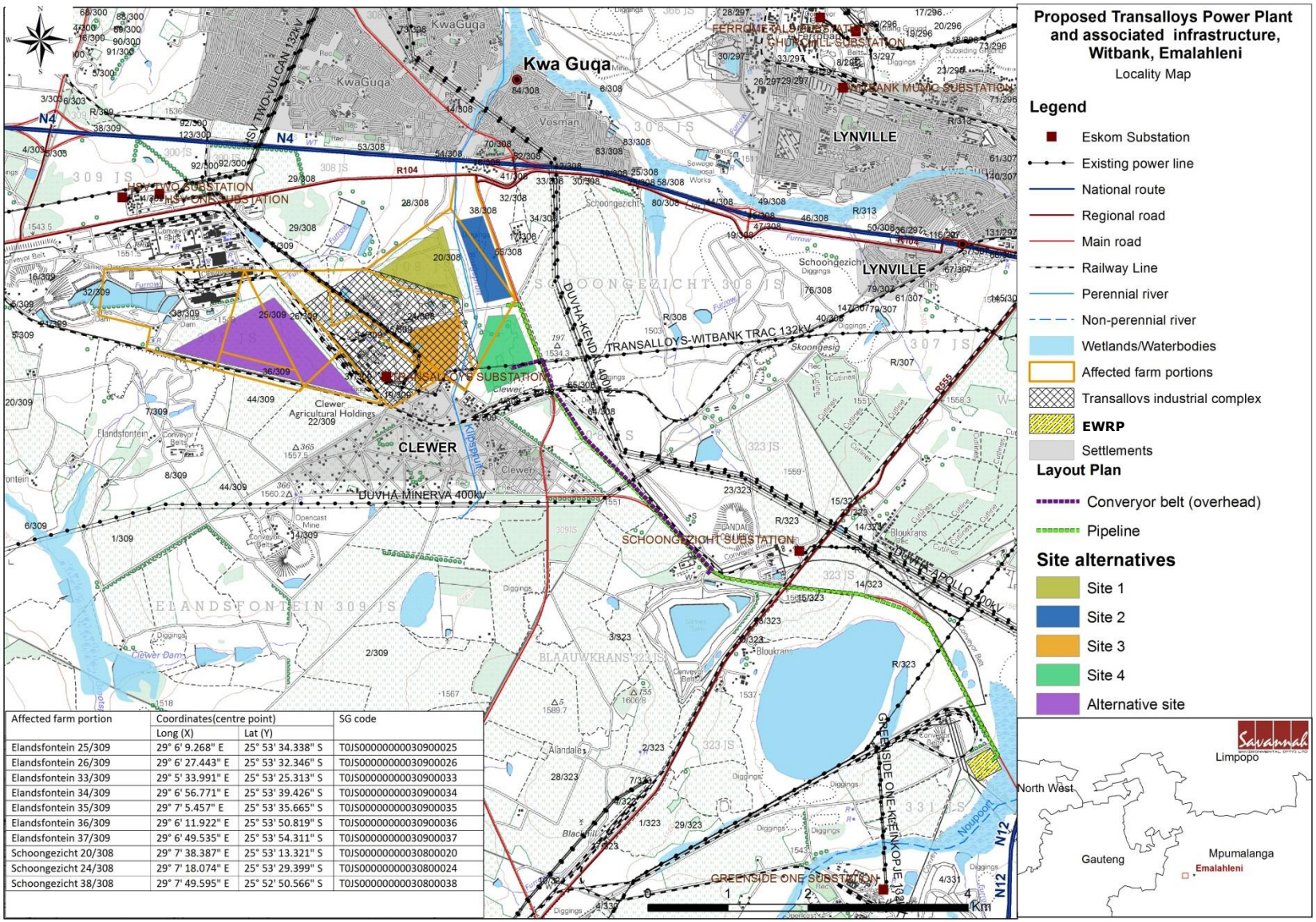
» Portions 25, 26, 33, 34, 35, 36 and 37 of the Farm Elandsfontein 309 JS
» Portions 20, 24 and 38 of the Farm Schoongezicht 308 JS

Fuel: Transalloys is situated in close proximity to existing coal mines (including the Landau, Kleinkoppie and Goedehoop Colleries) which have an abundance of coal and discard coal which is unsuitable for use by Eskom, the use of which is made possible by the type of coal-burning technology proposed for this project (refer below). The proposed power plant is therefore considered to be well situated in terms of the supply of fuel to the proposed power plant.

Technology: The components of the proposed power station and the associated infrastructure are discussed in detail in Chapter 2. The proposed power plant will make use of Circulating Fluidised Bed (CFB) boiler technology (a proven coal-burning technology yet to be implemented in South Africa) which allows for the use of low-grade coal and coal discards as fuel in the energy generation process. CFB technology also allows for improved emissions over conventional coal-fired power stations in South Africa due to the fuel burning process, as will be discussed later in this Scoping Report.

Water supply: Water is a limiting factor within the study area and the country. The proposed power plant will therefore be designed using dry cooling technology in order to significantly reduce the consumption of water. Water is proposed to be conveyed from the Anglo American Water Treatment Plant situated approximately 9km from the site, necessitating the construction of a raw water supply pipeline between Transalloys and the water treatment plant (refer to **Figure 1.1**.

Existing infrastructure: Electricity generated by the captive power plant will be fed directly into the Transalloys smelter complex for consumption. From the direction of Witbank, the Transalloys – Witbank Trac 132kV power line feeds into the Eskom Transalloys substation before becoming the HSV One – Transalloys 1 132kV power line feeding into the HSV One Substation located at Evraz Highveld Steel and Vanadium. The existing grid connection therefore does allow for the distribution of the generated electricity to other potential users should the need be identified.



Affected farm portion	Coordinates(centre point)		SG code
	Long (X)	Lat (Y)	
Elandsfontein 25/309	29° 6' 9.268" E	25° 53' 34.338" S	T0JS00000000030900025
Elandsfontein 26/309	29° 6' 27.443" E	25° 53' 32.346" S	T0JS00000000030900026
Elandsfontein 33/309	29° 5' 33.991" E	25° 53' 25.313" S	T0JS00000000030900033
Elandsfontein 34/309	29° 6' 56.771" E	25° 53' 39.426" S	T0JS00000000030900034
Elandsfontein 35/309	29° 7' 5.457" E	25° 53' 35.665" S	T0JS00000000030900035
Elandsfontein 36/309	29° 6' 11.922" E	25° 53' 50.819" S	T0JS00000000030900036
Elandsfontein 37/309	29° 6' 49.535" E	25° 53' 54.311" S	T0JS00000000030900037
Schoongezicht 20/308	29° 7' 38.387" E	25° 53' 13.321" S	T0JS00000000030800020
Schoongezicht 24/308	29° 7' 18.074" E	25° 53' 29.399" S	T0JS00000000030800024
Schoongezicht 38/308	29° 7' 49.595" E	25° 52' 50.566" S	T0JS00000000030800038

Figure 1.1: Locality map showing the alternative sites for the establishment of the Transalloys Coal-Fired Power Plant, Mpumalanga Province

The following infrastructure is associated with the proposed project, which has a total footprint requirement of approximately 40 hectares:

Power station (footprint of approximately 10ha)

1. Main Plant House for one 150MW unit
2. Auxiliary plant buildings, including administration building and warehouse
3. 250 meter high stack
4. Other operational support buildings
5. Maintenance workshops and storage facilities including electrical and instrument workshops and stores, and machine shop
6. Laboratory area for both routine testing and specialised analysis and investigation
7. Access roads
8. High voltage yard

Associated infrastructure (footprint of approximately 30ha)

1. In-plant coal unloading area and storage area
2. Lime storage area
3. Overland coal conveyors, from identified coal discard dumps in the area
4. Water supply pipeline to convey water from the Anglo American Water Treatment Plant
5. Amenities including potable water, sanitary and sewer utilities
6. Electrical utility interconnection and telephone utilities
7. Sewage treatment plant
8. Access road and internal roads
9. Ash disposal facility
10. Ash disposal facility runoff ponds
11. Water storage reservoir for raw water supply
12. Raw water treatment plant
13. Zero effluent/evaporation ponds
14. Recycling pond

The above power station components and associated infrastructure are discussed in detail in Chapter 2 of this Scoping Report.

1.2. The Need and Desirability for the Proposed Coal-Fired Power Station

1.2.1 National Perspective - National Development Plan 2030

In its introduction, the National Development Plan (NDP) states "The National Development Plan aims to eliminate poverty and reduce inequality by 2030. South Africa can realise these goals by drawing on the energies of its people, growing an inclusive economy, building capabilities, enhancing the capacity of the state, and promoting leadership and partnerships throughout society".

Section 4 of the NDP, Economy infrastructure – The foundation of social and economic development, contains a section on the energy sector. Based on a review of this section the following points are regarded as relevant to the proposed project.

» South Africa needs to maintain and expand its electricity, water, transport and telecommunications infrastructure in order to support economic growth and social development goals. Given the government's limited finances, private funding will need to be sourced.
» South Africa has a relatively good core network of national economic infrastructure. The challenge is to maintain and expand it to address the demands of the growing economy. In the transport and energy sectors – dominated by state-owned enterprises – the economy has already been constrained by inadequate investment and ineffective operation and maintenance of existing infrastructure.
» Current investment levels are insufficient and maintenance programmes are lagging. The government needs to better coordinate collaborative investment by businesses and provincial and local government into key infrastructure projects investments.
» Innovation and technology for cleaner coal use. There is potential to increase the efficiency of coal conversion, and any new coal power investments should incorporate the latest technology.

Under the heading "The Energy Sector: Empowering South Africa", the NDP notes that the plan envisages that, by 2030, South Africa will have an energy sector that promotes: Economic growth and development through adequate investment in energy infrastructure. The section also notes that South Africa is very dependent on coal. It is the country's largest economically recoverable energy resource and among its three top mineral export earners. Internationally, South Africa ranks fifth as a coal producer and exporter. Domestically, coal is used to produce over 70% of primary energy, more than 90% of electricity and a third of liquid fuels. As a result, South Africa is a significant emitter of carbon dioxide, which contributes to climate change.

However, adequate supply is a key concern, especially for electricity and liquid fuels. South Africa experienced multiple power failures between 2005 and 2008, resulting in lower economic growth and widespread inconvenience. Even though the 2009 recession depressed demand, the supply-demand balance remains tight.

While the focus of the NDP is on meeting the energy needs of South Africa as a whole, the development of a coal-fired power plant by Transalloys to meet its own energy needs reduces the demand on the national grid and in so doing benefits South Africa as a whole. It also supports the objectives set out in the NDP of involving the private sector in the supply of energy.

1.2.2 Regional perspective

Transalloys commissioned a high level desktop investigation in 2013 to inform the technical and bankable feasibility of the proposed power plant project. The study concluded that several key advantages exist which directly inform the need and desirability of the project, the primary advantages being:

- » Proximity to the coal resource
- » Raw water surplus from mines in the area
- » The availability of suitable boiler technology for improved emissions results within the context of air quality challenges within the Highveld Priority Area
- » Direct connection to the existing electricity infrastructure (Transalloys substation and associated power lines), the existence of which will transpire in significant cost advantages.

1.3. Requirement for an Environmental Impact Assessment Process

The construction and operation of the proposed Transalloys Power Plant and associated infrastructure is subject to the requirements of the Environmental Impact Assessment Regulations (EIA Regulations) of June 2010 published in terms of Section 24(5) of the National Environmental Management Act (NEMA, No 107 of 1998). In terms of Government Notice 718 published in terms of the NEM: Waste Act No. 59 of 2008, a waste licence is also required for waste management activities proposed to be undertaken. An EIA process is required to be undertaken in support of this application. Therefore, an integrated environmental authorisation process is being undertaken for the project. This section provides a brief overview of EIA Regulations and their application to this project. In terms of the National Water Act No 36 of 1998 a Water Use Licence will also be applied for. In terms of the National Environmental Management: Air Quality Act (Act 39 of 2004) an Atmospheric Emissions License (AEL) is also

required. The approach to undertaking this process is detailed in Chapter 3 of this report.

NEMA is national legislation that provides for the authorisation of certain controlled activities known as "listed activities". In terms of Section 24(1) of NEMA, the potential impact on the environment associated with these listed activities must be considered, investigated, assessed and reported on to the competent authority (the decision-maker) charged by NEMA with granting of the relevant environmental authorisation. As this is a power generation project, the National Department of Environmental Affairs (DEA) is the competent authority. Therefore, Transalloys requires authorisation from the National Department of Environmental Affairs (DEA), in consultation with the Mpumalanga Department of Economic Development, Environment and Tourism (MDEDET) for the undertaking of the proposed project. In order to obtain this authorisation, Transalloys acknowledges the need for comprehensive, independent environmental studies to be undertaken in accordance with the EIA Regulations of June 2010 (as amended). An integrated application for authorisation and waste licence has been submitted to DEA, and the project has been assigned Application Reference number **14/12/16/3/3/3/97**.

The need to comply with the requirements of the EIA Regulations ensures that decision-makers are provided the opportunity to consider the potential environmental impacts of a project early in the project development process, and assess if environmental impacts can be avoided, minimised or mitigated to acceptable levels. Comprehensive, independent environmental studies are required to be undertaken in accordance with the EIA Regulations to provide the competent authority with sufficient information in order for an informed decision to be taken regarding the project. Transalloys has appointed Savannah Environmental (Pty) Ltd, as independent Environmental Assessment Consultants, to conduct the required Environmental Impact Assessment (EIA) process for the proposed project.

An EIA is an effective planning and decision-making tool for the project proponent. It allows the environmental consequences resulting from a facility during its establishment, operation and decommissioning to be identified and appropriately managed. It provides the opportunity for the developer to be forewarned of potential environmental issues, and allows for resolution of the issue(s) reported on in the Scoping and EIA reports as well as dialogue with affected parties.

In terms of sections 24 and 24D of the National Environmental Management Act (Act No 107 of 1998), as read with Government Notices R543 (Regulations 20–25), R544 and R545 (as amended), environmental Authorisation is required for

various activities associated with the proposed Project. The activities that will be applied for are summarized in Table 1.1.

Table 1.1: Summary of the GN R 544, 545 & 546, listed activities number and short description of the activities that require authorisation under NEMA

Notice and Activity no	Listed Activity description	Project relevance
GN R 544 (Listing Notice 1)		
Activity 2 of GN R 544	*The construction of facilities or infrastructure for the storage of ore or coal that requires an atmospheric emissions licence in terms of the National Environmental Management: Air Quality Act (Act No.39 of 2004).*	An in-plant coal stockyard of approximately 20 000m² will be required. Refer to Section 2 of this report.
Activity 9 of GN R 544	*The construction of facilities exceeding 1000 metres in length for the bulk transport of water, sewage or stormwater, with an internal diameter of 0,36m or more or with a peak throughput of 120 litres per second or more excluding where such facilities occur within a road reserve or further than 32m from a watercourse.*	Raw water to the power station will be supplied via a pipeline from the Anglo American Water (Emalahleni Water Reclamation Plant) EWRP) located approximately 9km from the site. The pipeline route falls within a road reserve however watercourses or surface water features may be located along the route, but have not been identified during the Scoping phase. Refer to Section 2.
Activity 10(a) of GN R 544	*The construction of facilities or infrastructure for the transmission and distribution of electricity outside urban areas or industrial complexes with a capacity of more than 33kV but less than 275kV*	The evacuation or distribution of the electricity from the power plant to the industrial complex will be required via substations or power lines which may fall outside of the existing Transalloys industrial complex and will be more than 33kV but less than 275kV, the proposed alignment of which still needs to be determined.
Activity 11 of GN R 544	*The construction of bulk stormwater outlet structures, buildings exceeding 50 square metres in size; or infrastructure or structures covering 50 square metres or more where such construction occurs within a watercourse or within 32 metres of a watercourse, measures from the edge of a watercourse, excluding where such construction will occur behind the development setback line.*	The siting of the power plant and associated infrastructure may be located within 32m of the Brugspruit and associated tributary and wetlands. In addition, the proposed pipeline and access roads may cross drainage lines or watercourses (refer to Section 4).

Notice and Activity no	Listed Activity description	Project relevance
Activity 13 of GN R 544	*The construction of facilities or infrastructure for the storage, or for the storage and handling, of a dangerous good, where such storage occurs in containers with a combined capacity of 80, but not exceeding 500 cubic metres.*	Containers for the bulk storage of dangerous goods (fuels etc.) may be required during the construction phase of the project.
Activity 22 of GN R 544	*The construction of a road, outside urban areas, (i) with a reserve wider than 13.5 metres or, (ii) where no road reserve exists where the road is wider than 8 metres.*	Access roads wider than 8m may need to be constructed from the access point to the power station. Such routes are not yet defined and will be determined during the EIA phase.
GN R 545 (Listing Notice 2)		
Activity 1 of GN R 545	*The construction of facilities or infrastructure, for the generation of electricity where the electricity output is 20 megawatts or more.*	The power plant will have a generating capacity of 150 megawatts.
Activity 5 of GN R 545	*The construction of facilities or infrastructure for any process or activity which requires a permit or license in terms of national or provincial legislation governing the generation or release of emissions, pollution or effluent and which is not identified in Notice No. 544 of 2010 or included in the list of waste management activities published in terms of section 19 of the National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) in which case that Act will apply.*	Construction of combustion installations (Category 1) and solid fuel combustion installations (Subcategory 1.1) constitute listed activities identified in GN 248 of 31 March 2010, in terms of Section 21 of the National Environmental Management: Air Quality Act (NEMA: AQA, Act 39 of 2004) and require that an application for an Atmospheric Emissions License (AEL) be made to the licensing authority (Nkangala District Municipality).
Activity 12 of GN R 545	*The construction of facilities or infrastructure for the offstream storage of water, including dams and reservoirs, with a combined capacity of 50000 cubic metres or more, unless such storage falls within the ambit of activity 19 of Notice 545 of 2010.*	Water storage reservoirs and recycling ponds will be required which may exceed 50 000 cubic meters and is to be determined during the EIA Phase.
Activity 15 of GN R 545	*Physical alteration of undeveloped, vacant or derelict land for residential, retail, commercial, recreational, industrial or institutional use where the total area to be transformed is 20 hectares or more.*	The power station including associated infrastructure will be approximately 40 hectares in extent. Five site alternatives are evaluated for the siting of this infrastructure (refer to Section 2).
GN R 546 (Listing Notice 3)		
Activity 13 of	The clearance of an area of 1 hectare or more of	The status of vegetation on the

Notice and Activity no	Listed Activity description	Project relevance
GN R 546	vegetation where 75% or more of the vegetative cover constitutes indigenous vegetation (iii) in an urban area (dd) on the watercourse side of the development setback line or within 100m from the edge of a watercourse where no such setback line has been determined.	site will be determined during the EIA but may comprise of 75% indigenous vegetation within 100m from a watercourse depending on the selected site alternative (refer to Section 2 and 4).
Activity 14 of GN R 546	Clearing an area of 5 ha or more of 75% of indigenous vegetation in all areas outside urban areas.	The status of vegetation on the site will be determined during the EIA but may comprise 75% indigenous vegetation outside urban areas (refer to Section 4).

In terms of Government Notice 718 published in terms of the NEM: Waste Act, a waste license is required for waste management activities listed in Table 1.2.

Table 1.2: Summary of the GN 718, listed activities number and short description of the waste activities that requires authorizations under the Waste Act

Activity in terms of GN 718	Activity description	Project relevance
Category A, Activity 11	The treatment of effluent, wastewater, or sewage with an annual throughput capacity of more than 2 000 cubic metres but less than 15 000 cubic metres.	A sewage treatment plant with the capacity to process more than 2000m^3 but less than 15000m^3 of wastewater will be required. Refer to Section 2.
Category B, Activity 1	The storage including temporary storage of hazardous waste in lagoons	Wastewater/ pollution control dams for the storage / control of waste water will be required, the storage capacity and location of which will depend on the selected site alternative.
Category B, Activity 9	The disposal of any quantity of hazardous waste to land	A 15 hectare coal ash dump or disposal facility will be required for the disposal of ash.
Category B, Activity 11	The construction of facilities for activities listed in Category B of this Schedule	Construction of an ash dump

This report documents the scoping evaluation of the potential environmental impacts associated with the construction and operation of a coal-fired power station and associated infrastructure adjacent to the existing Transalloys smelter complex near Emalahleni. This scoping study forms part of the EIA process and

was conducted in accordance with the requirements of the EIA Regulations of June 2010 and in terms of Section 24(5) of the National Environmental Management Act (NEMA; Act No 107 of 1998), in support of the NEMA and waste licence applications for the proposed project.

1.4. Objectives of the Scoping Phase

The Scoping Phase of the EIA process refers to the process of identifying potential issues associated with the proposed project, and defining the extent of studies required within the EIA Phase. This is achieved through an evaluation of the proposed project, involving the project proponent, specialists with experience in EIAs for similar projects, and a public consultation process with key stakeholders (including government authorities) and interested and affected parties (I&APs).

In accordance with the EIA Regulations, the main purpose of the Scoping Phase is to focus the environmental assessment in order to ensure that only potentially significant issues and reasonable and feasible alternatives are examined in the EIA Phase. The Draft Scoping Report provides stakeholders with an opportunity to verify that the issues they have raised through the process to date have been captured and adequately considered, and provides a further opportunity for additional key issues for consideration to be raised. The Final Scoping Report will incorporate all issues and responses raised during the public review of the Draft Scoping Report prior to submission to DEA.

1.5. Details of Environmental Assessment Practitioner and Expertise to conduct the Scoping and EIA

Savannah Environmental was contracted by Transalloys as an independent consultant to undertake an Environmental Impact Assessment (EIA) for the proposed project, as required by the NEMA EIA Regulations of June 2010. Neither Savannah Environmental, nor any of its specialist sub-consultants on this project are subsidiaries of / or affiliated to Transalloys. Furthermore, Savannah Environmental does not have any interests in secondary developments that may arise out of the authorisation of the proposed project.

The Savannah Environmental staff and sub-consultants have acquired considerable experience in environmental assessment and environmental management over the last 15 years, and have been actively involved in undertaking environmental studies for a wide variety of projects throughout South Africa. Strong competencies have been developed in project management of environmental EIA processes, as well as strategic environmental assessment and compliance advice, and the identification of environmental management solutions and mitigation/risk minimising measures. Savannah Environmental has

successfully completed various EIAs for transmission power lines, as well as EIAs for several substations, distribution power lines and power generation projects for Eskom Holdings Limited and Independent Power Producers such as Exxaro Resources.

The Environmental Assessment Practitioners (EAPs) responsible for the EIA process for this project from Savannah Environmental are:

Jo-Anne Thomas is the lead EAP on the project. She is a registered Professional Natural Scientist (in the practice of environmental science) with the South African Council for Natural Scientific Professions. She has gained extensive knowledge and experience on potential environmental impacts associated with electricity generation and transmission projects through her involvement in related EIA processes over the past fifteen (15) years. She has successfully managed and undertaken EIA processes for electricity generation projects throughout South Africa. She is supported by Steven Ingle (principle author of this Environmental Scoping Report), Sheila Muniongo and Gabriele Wood from Savannah Environmental. Curricula vitae for the Savannah Environmental project team consultants are included in Appendix A.

In order to adequately identify and assess potential environmental impacts as well as evaluate alternatives, Savannah Environmental has appointed several specialist consultants to conduct specialist studies, as required. Details of these specialist studies are included in Chapter 3. The curricula vitae for the EIA specialist consultants are also included in Appendix A.

PROJECT DESCRIPTION AND ALTERNATIVES CHAPTER 2

This Chapter of the Scoping Report provides a description of the following:

1. The Transalloys Smelter Complex and existing environmental authorisations and licenses held by Transalloys.
2. The project site alternatives considered for the development of the power plant.
3. A description of the technology alternatives for the development of the coal-fired power plant.
4. A description of the power station components and associated infrastructure. Please note that the description of the components are indicative at this stage and aimed at enabling the reader to obtain a basic understanding of the proposed project. Detailed technology and specifications for the power station will be provided in the EIA phase of the process once further detail has been confirmed by the developer.
5. A description of the proposed technology.

2.1 BACKGROUND OF THE TRANSALLOYS SMELTER COMPLEX

2.2.1 Location and access

The Transalloys complex is situated approximately 8km west of Emalahleni and within 1km south-east of Evraz Highveld Steel and Vanadium, a producer of steel and vanadium products. The Clewer town and smallholdings are located directly south of Transalloys. Transalloys is situated on Portions of the Farm Elandsfontein 309 JS and portions of the Farm Schoongezicht 308 JS. The coordinates for Transalloys are 25° 55' 54" S ; 29° 07' 03" E. Access to Transalloys is facilitated via Bailey Avenue which in turn provides access to all five alternative sites for the siting of the proposed power plant discussed in Section 2.2.

Figure 2.1: Transalloys entrance

2.2.2 Production capacity and energy requirements

Transalloys is a manufacturer of Siliconmanganese for world markets. Production capacity is approximately 180 000 tonnes per annum. Siliconmanganese (SiMn) is produced by five submerged arc furnaces which results in an energy demand of approximately 137 MVA.

2.2.3 Manufacturing process

Standard grade SiMn contains 15.5% to 16.5% of silicon, 65% to 67% of manganese and a maximum of 2% carbon. Raw materials are fed from a common raw material handling system into three sets of day bins, from where the individual furnace recipes are batched and conveyed into the furnace bins. The furnaces are tapped at regular intervals and the alloy is separated from the slag before being cast into layer casting beds. After a cooling period of ± 3 days, the material is removed from the casting beds and fed into a crushing and screening plant. The different size fractions are separated and stockpiled or dispatched to ports for export, or collected by local customers. SiMn is used, *inter alia* as a grain refiner and for de-oxidation in the steel manufacturing process. (Source: http://www.transalloys.co.za/about.html).

Figure 2.2: View of Transalloys smelter complex taken from the south west

2.2.4 Grid connection

The Eskom Transalloys substation is situated within the Trasnsalloys industrial complex. Power from the proposed power plant will need to be evacuated into this substation via an overhead power line. Existing power lines traverse Transalloys' property. From the direction of Witbank, the *Transalloys – Witbank Trac 132kV* power line feeds into the *Transalloys substation* before becoming the *HSV One – Transalloys 1 132kV* power line feeding into *the HSV One Substation* located at Evraz Highveld Steel and Vanadium to the north west (refer to Figure 2.3).

2.2.5 Existing environmental approvals and plans

Transalloys is required to be environmentally compliant in terms of the following environmental approvals specific to the existing manufacturing operations:

- » Water Use License (dated 05/2011)
- » Waste Management License (dated 10/2011)
- » Atmospheric Pollution Prevention Act (APPA) Certificate (dated 03/2010)

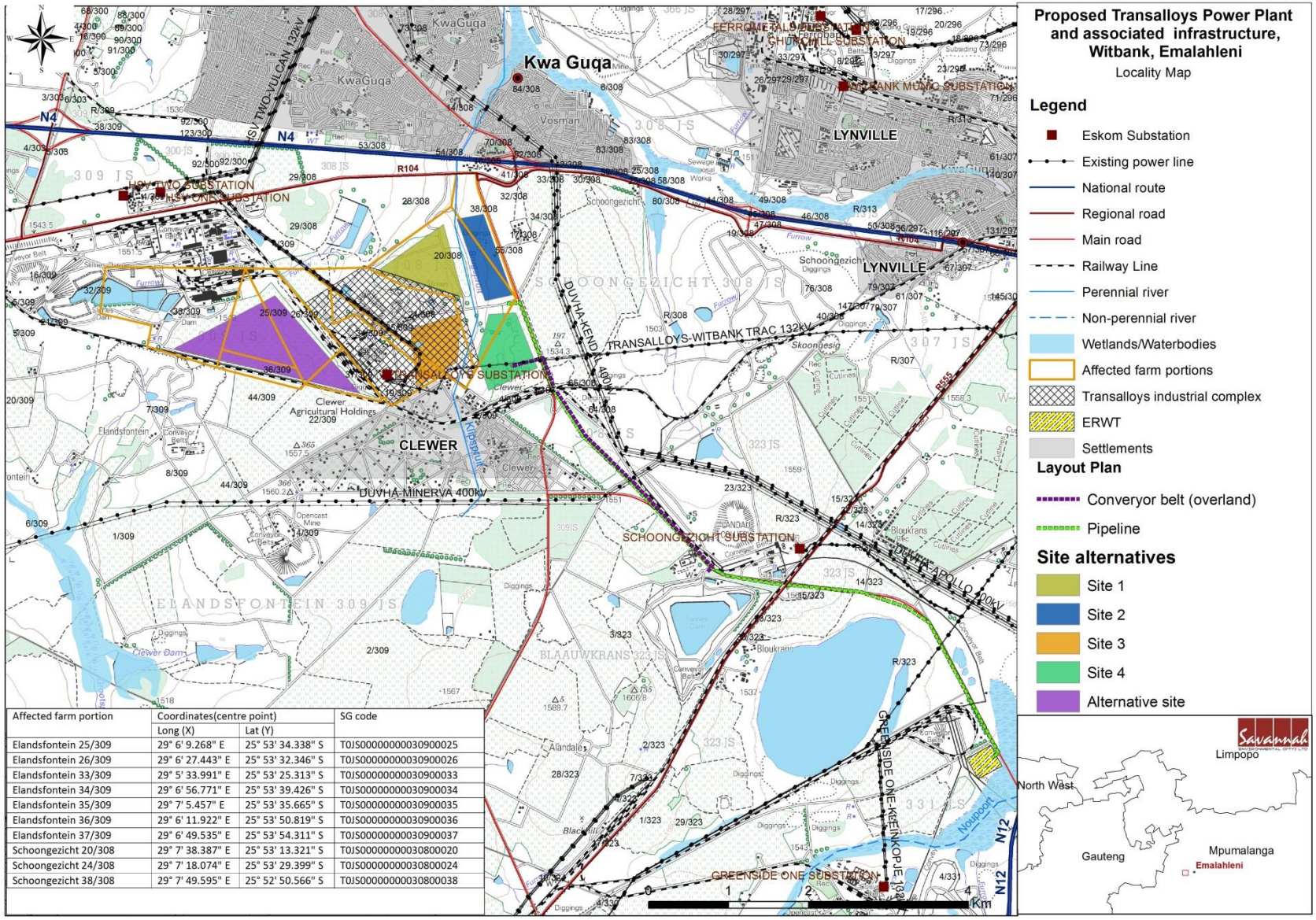
Transalloys is included in the list of industries operating in the HPA who have provided an emission reduction plan, indicating the air quality improvements that would be undertaken as part of fulfilling the "duty of care "principle (*source: Highveld Priority Area Air Quality Management Plan*).

2.2 SITE ALTERNATIVES CONSIDERED FOR THE SITING OF THE POWER PLANT

The power plant is proposed to be located on a technically and environmentally suitable site adjacent to the existing Transalloys smelter complex. Five potential siting options (refer to Figure 2.3) are available and have been identified according to the following technical criteria:

- » Land owned by Transalloys or considered based on consent from landowner
- » Space considerations
- » Proximity to coal and water resources
- » Grid connection potential

A description of each site alternative is provided below. Sites 1 - 4 are situated on Transalloys-owned property while site alternative 5 is situated on land owned by Evraz Highveld Steel and Vanadium.



Affected farm portion	Coordinates(centre point)		SG code
	Long (X)	Lat (Y)	
Elandsfontein 25/309	29° 6' 9.268" E	25° 53' 34.338" S	T0JS00000000030900025
Elandsfontein 26/309	29° 6' 27.443" E	25° 53' 32.346" S	T0JS00000000030900026
Elandsfontein 33/309	29° 5' 33.991" E	25° 53' 25.313" S	T0JS00000000030900033
Elandsfontein 34/309	29° 6' 56.771" E	25° 53' 39.426" S	T0JS00000000030900034
Elandsfontein 35/309	29° 7' 5.457" E	25° 53' 35.665" S	T0JS00000000030900035
Elandsfontein 36/309	29° 6' 11.922" E	25° 53' 50.819" S	T0JS00000000030900036
Elandsfontein 37/309	29° 6' 49.535" E	25° 53' 54.311" S	T0JS00000000030900037
Schoongezicht 20/308	29° 7' 38.387" E	25° 53' 13.321" S	T0JS00000000030800020
Schoongezicht 24/308	29° 7' 18.074" E	25° 53' 29.399" S	T0JS00000000030800024
Schoongezicht 38/308	29° 7' 49.595" E	25° 52' 50.566" S	T0JS00000000030800038

Figure 2.3: Locality map indicating project site alternatives, water pipeline route from ERWP and conveyor route from Landau Colliery

2.2.1 Site Alternative 1

Site alternative 1 is located north-east of the Transalloys slimes dams on old agricultural fields nestled between the confluence of the Brugspruit river and tributary of the Brugspruit which form the northern and eastern boundaries of the site. The site is approximately 46 ha in extent and potentially of sufficient size to accommodate the facility while allowing for environmental sensitivities which may be identified. The site is situated at coordinates 25° 53' 09'' S ; 29° 07' 28'' E.

Figure 2.4: General character of site alternative 1 showing grasslands. Photo taken in the direction of the Brugspruit

2.2.2 Site Alternative 2

Site alternative 2 is approximately 38ha in extent and located east of the Transalloys smelter complex on open grasslands. The site is situated immediately adjacent to the smelter complex and falls entirely within the industrial complex's boundary. The site is traversed by an overhead power line and is the second closest to the Eskom Transalloys substation (after site 5) allowing for a short grid connection. Space constriants may exist on the site due to the activities of Transalloys extending over sections of the site (return water dams, borrowing activities, etc). The site is situated at coordinates 25° 53' 42'' S ; 29° 07' 26'' E.

Figure 2.5: General character of site alternative 2 showing grassland and overhead power line crossing the site

2.2.3 Site Alternative 3

Site alternative 3 is located between the R547 (Baily Avenue), which forms the eastern boundary, and the Brugspruit, which forms the western boundary. It comprises of grassland and a few clusters of planted trees. The site is approximately 48ha in extent and potentially of sufficient size to accommodate the proposed facility while allowing for environmental sensitivities which may be identified to be avoided. The site is traversed by an overhead power line which could facilitate the export of the generated power and further presents a vertical disturbance in the landscape. The site is situated at coordinates 25° 53' 43'' S ; 29° 08' 03'' E.

Figure 2.6: General character of site alternative 3 showing grassland and a stand of trees adjacent to the Brugspruit in the right of the picture

2.2.4 Site Alternative 4

Site alternative 4 is approximately 37ha in extent and also located between the R547, which forms the eastern boundary, and the Brugspruit, which forms the western boundary, just further north of site 3. This site consists of open grasslands and a few planted trees, with some disturbance (quarry/borrow pit) and one built-structure present on the site. Grazing currently occurs on this site. The site is situated at coordinates 25° 53' 05'' S ; 29° 07' 53'' E.

Figure 2.7: General character of site alternative 4 showing grazed grasslands

2.2.5 Site Alternative 5

Site Alternative 5 is located between the Transalloys smelter complex and the Evraz Highveld Steelworks on an agricultural field. It consists of Portions 25, 26, 33, 36 and 37 of the Farm Elandsfontein 309 JS and is owned by Evraz Highveld Steel. The site is approximately 113ha in extent and is the largest of the five sites under consideration. The site is bordered by a railway line (including shunting yard) and Transalloys industrial complex to the east, a railway line and agricultural and mining activities to the south and west, and the Evraz Highveld Steelworks to the north.

This portion of land is currently used for agricultural purposes (maize crops) however the land was dormant at the time of the site visit conducted. There is a pending application for a coal mining prospecting right over Portion 25 of the Farm Elandsfontein 309 (central portion of the site).

The site is favourably located as it is situated within close proximity (within 500m) of the Eskom Transalloys substation, allowing for the shortest grid connection. The site is situated at coordinates 25° 53′ 39″ S ; 29° 06′ 15″ E.

Figure 2.8: General character of site alternative 5 showing untendered agricultural field. Photo taken in the direction of Evraz Highveld Steelworks

2.3 RESOURCE REQUIREMENTS AND COMPONENTS OF THE PROPOSED PROJECT

This section of the Scoping Report provides a description of the project resource requirements and components and provides detail on the following:

- Fuel supply and use
- Water supply and use
- The power plant components and infrastructure

2.3.1 Fuel supply, conveyance and consumption

Fuel quality and supply: Coal is proposed to be sourced from various nearby coal mines located in close proximity to Transalloys, three of which are operated by Anglo American and two of which are opencast mines. Coal mines from which coal can be sourced include the discard coal dumps of the Landau, Kleinkoppie and Goedehoop Colleries. Initially discard coal will be sourced from the Landau Colliery. Preliminary information indicates heating values of between 10-16 MJ/kg and sulphur levels below 2 percent on average. This coal quality is below the Eskom rejection limit which requires 18 MJ/kg and sulphur levels below 1 percent. The Circulating Fluidised Bed (CFB) boiler technology (refer to Section 2.4.2) to be employed by Transalloys allows for the use of low grade coal and coal discards in the energy generation process with resultant limited emissions.

Coal conveyance: Coal is proposed to be conveyed via an overland conveyor system from the Landau Colliery to the proposed Transalloys power plant (over a distance of approximately 4km) as depicted in Figure 2.9. The conveyor belt will leave the Landau Colliery and run adjacent to Apex Road for the first kilometre, then continues on Anglo's land before running parallel to Bailey Avenue for a short distance before entering the Transalloys complex.

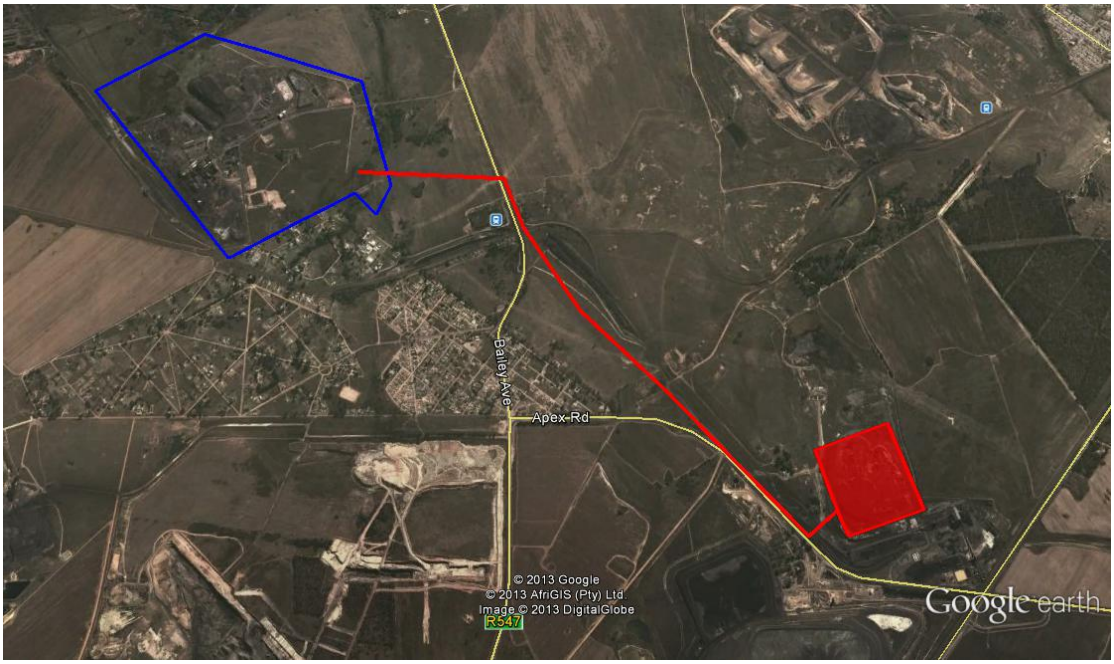


Figure 2.9: Conveyor belt route (red line) from Landau Colliery (red square) to Transalloys (blue line) adjacent to Apex Road and Bailey Avenue

Coal storage: Coal will be stored in an in-plant stockyard which will be approximately 2ha in extent.

2.3.2 Water supply and requirements

Water supply: The surrounding coal mines produce a surplus of water in the area due to coal mining activities. Raw water is proposed to be conveyed via pipeline from the Emalahleni Water Reclamation Plant (EWRP) commissioned by Anglo American, which is located approximately 9km from Transalloys and the proposed power station sites (refer to Figure 2.10). EWRP desalinates rising underground water from Anglo Thermal Coal's Landau, Greenside and Kleinkopje collieries and currently supplies the local municipality with water.

Water requirements: The required volumes for the power plant are anticipated to be in the region of 550m^3 of raw water per day. Following treatment of the raw water supply at a raw water plant at the proposed power station, service water requirements will be in the region of 473m^3, which will further require demineralisation through a reverse osmosis plant. The water requirements of the power plant are reduced by the dry cooling technology proposed to be utilised (refer to Section 2.5.3).

Figure 2.10: Water pipeline route (orange line) from ERWP to Transalloys adjacent to Apex Road before aligning with proposed overland conveyor route at Landau Colliery and then with Bailey Avenue and terminating at Transalloys

2.3.3 Power station and associated infrastructure

The main components of the power plant which will have a footprint of approximately 10 ha include the following:

» Main Plant House for one 150MW unit
» Auxiliary plant buildings, including administration building and warehouse
» 250 meter high stack
» Other operational support buildings
» Maintenance workshops and storage facilities including electrical and instrument workshops and stores, and machine shop
» Laboratory area for both routine testing and specialised analysis and investigation
» Access roads
» High voltage yard

The associated infrastructure which will have a footprint of approximately 30ha are as follows:

» In-plant coal stock yard and storage (2ha) – coal is to be conveyed via overland conveyor and trucks from nearby coal mines.
» Lime storage area (1 500m²)
» Overland coal conveyors – from identified coal discard dumps in the area
» Water supply pipeline (temporary or permanent)
» Amenities including potable water, sanitary and sewer utilities
» Electrical utility interconnection and telephone utilities
» Sewage treatment plant (216m²)
» Access road and internal roads
» Ash dump (15 ha for the first 5 years of operation)
» Ash dump runoff ponds (0.2 ha each)
» Water storage reservoir for raw water supply
» Raw water treatment plant
» Zero effluent/evaporation ponds (total of 10ha in 3 separate ponds)
» Recycling pond (1 ha).

Figure 2.11: Conceptual illustration of the proposed power station

2.4 TECHNOLOGY ALTERNATIVES

The majority of South Africa's electricity is generated by thermal power stations, which use coal (a natural resource) as fuel for electricity production. The majority of these power stations are located within the Mpumalanga Province.

Transalloys is situated within an air quality hot spot within the Highveld Priority Area (HPA), declared a priority area due to elevated SO_2, PM_{10} and Ozone concentrations above ambient standards. As discussed in this section of the report, the proposed power plant will make use of Circulating Fluidised Bed boiler (CFB) technology. The use of CFB technology in the proposed power plant is considered fundamental for the abatement of air emissions and overall success of the project due to ambient air quality concerns within the HPA. Other technologies considered by Transalloys include the construction of a gas-fired power plant, however the details and feasibility of this option have not been fully investigated and will be considered during the EIA phase if considered feasible.

The description of Conventional Pulverised Coal Boiler Technology (Section 2.4.1) is for comparative purposes to CFB technology (refer to Section 2.4.2) only and is not considered to be a viable technology alternative for Transalloys.

2.4.1 Conventional Pulverised Coal Boiler Technology

Eskom operates 11 power stations in the Highveld Priority Area (HPA) with a nominal generating capacity of 35 075 MW (*source: Highveld Priority Area Air Quality Management Plan*). Eskom typically employs conventional Pulverised Coal boiler technology (PC) in its power stations in the HPA.

Figure 2.12 below illustrates how electricity is typically produced at a coal-fired power station[1]. Please note that the process illustrated below is representative of conventional power station technology employed in South Africa by Eskom which results in export of the generated capacity to the national grid.

[1] http://www.eskom.co.za/content/CO_0002CoalFirePSRev4.pdf

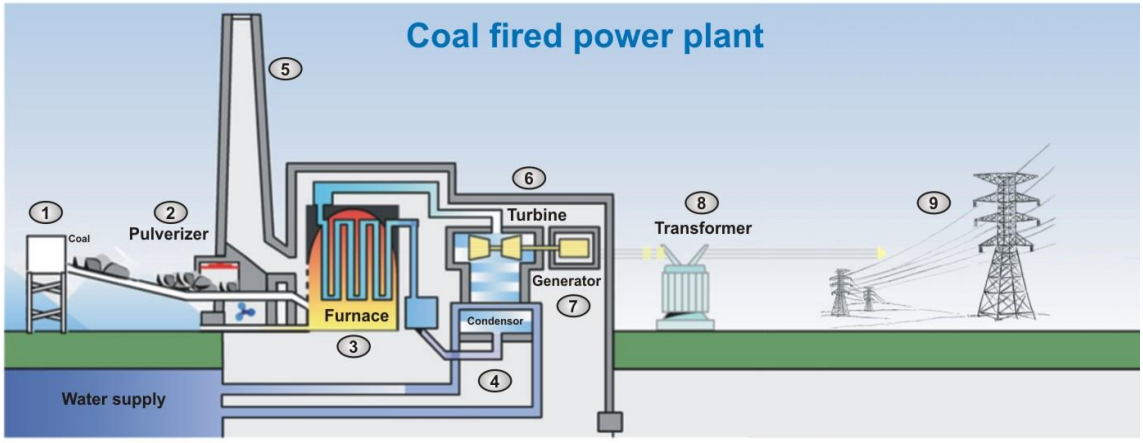


Figure 2.12: Illustration of a Pulverised Coal boiler technology coal-fired power station (sourced from http://qwickstep.com/search/coal-fire-power-plant.htm)

Based on Figure 2.12, the basic process for electricity generation at a conventional coal-fired power station can be described as follows (numbers relate to those indicated on Figure 2.1):

1. **Fuel**: Coal is sourced from a mine, and taken to the coal stockyard and then to the coal bunkers via conveyor belts.
2. **Pulverizer:** The coal is then ground into a fine powder to facilitate ease of burning.
3. **Boiler and Furnace:** The powdered coal is blown into the furnace by air, where it ignites. Oil is used to ignite the boiler. An array of tubes forms the boiler walls. Demineralised (pure) water enters the boiler tubes via pipes. The heat which is released from the burning coal is absorbed by the tubes which convert the water into steam.
4. **Condensation and Cooling:** The spent steam goes into a condenser (brass tubes). The brass tubes are filled with water. The spent steam comes into contact with the cold outer surfaces of the condenser tubes and condensation of the steam to a liquid state (water) occurs. This water is then pumped back to the boiler for reheating. The water cooling method could be wet-cooling or indirect or direct dry-cooling. Wet-cooling (cooling towers) is the most efficient cooling method; however dry-cooling is designed to conserve water. In the event that wet-cooling will be used at the power station, warm water from the condensers is piped to cooling towers. The warm water releases its heat in the upward draught of cold air created by the shape of the cooling towers. The cooled water is re-circulated to the condensers.
5. **Smoke Stacks:** Gases that are released from combustion in the furnaces, are filtered and then released into the atmosphere through smoke stacks.

6. **Turbine**: The high pressure steam is piped to turbines. The steam passes through the turbine blades, causing the blades to turn. The movement of the steam through the turbines causes the thermal (heat) energy to be converted to mechanical energy.
7. **Generator:** The turbine is linked to the rotor of the generator. The rotor is an electromagnet which spins inside large coils of copper to generate electricity (alternating current (AC)), which is essentially what is produced by a power station.
8. **Transformer:** This is an electrical device by which AC current of one voltage is increased or stepped up (normally to 400 kV) and the current flow is reduced.
9. **Transmission:** The electricity is then fed into the Eskom integrated power grid for distribution and usage.

2.4.2 Circulating Fluidised Bed Boiler Technology

Fluidised bed combustion (FBC) is a proven technology used for power plants with widespread application internationally but very limited application in South Africa.

There are different designs of FBCs, namely two major groups, atmospheric systems (FBC) and pressurised systems (PFBC), and two minor subgroups, bubbling (BFB) and circulating fluidised bed (CFB)[2]. The technology has proven to be well suited to burning fuels that are difficult to ignite, such as petroleum coke and anthracite, low quality fuels like high ash coals and coal mine wastes, and fuels with highly variable heat content, including biomass and mixtures of fuels. The technology therefore has the ability to utilise a wide range of fuels, which makes it the most suited technology to utilise low quality coal with high ash content found at various discard coal dumps in the broader study area.

Fluidised beds suspend solid fuel (such as coal / biomass) on upward-blowing jets of air during the combustion process. It results in a turbulent mixing of gas and solids. vThe tumbling action, much like a bubbling fluid, provides effective chemical reactions and heat transfer. The CFB has a cyclone filter to separate solid material from the hot flue gases which leave the exhaust of the furnace The solids from the filter are re-circulated into the bed.

The technology burns fuel at temperatures of 760°C to 930°C, a range where nitrogen oxide formation is lower than in traditional pulverized coal units. CFB technology also reduces the amount of sulphur emitted in the form of sulphur

[2] (http://en.wikipedia.org/wiki/Fluidized_bed_combustion).

dioxide emissions. Limestone can be added to capture sulphur and prevent its release to the atmosphere as sulphur dioxide.

The following is a basic description of the process flow for the generation of electricity from coal at the proposed power plant from the sourcing and conveyance of fuel to the distribution of electricity to the Transalloys complex utilising CFB boiler technology (refer to Figure 2.13):

1. **Fuel:** Coal will be conveyed to the power plant via overland conveyor or transported by trucks and stored at the coal stockyard. When required by the boiler, a stacker reclaimer serves coal onto a conveyor system which transports the coal to the day silos next to the boiler. The coal is then drawn from the day silos directly into the furnace for combustion.

2. **CFB Boiler:** Fluidised beds consist of a bed of sand which is heated up and fluidised by passing streams of air through the sand. Solid fuel (such as coal or biomass) is introduced to the hot suspended sand on upward-blowing jets of air and the solid fuels starts to combust. The result is a turbulent mixing of gas and solids. The tumbling action provides effective chemical reactions and heat transfer. The CFB has a cyclone filter to separate the sand and coarse particles from the hot flue gases which leaves the exhaust of the furnace. Due to the design of the CFB, limestone can be injected directly into the bed where it neutralises most of the sulphur which is released from the fuel during combustion leading to very low Sulphur Dioxide (SO_2) emissions.

3. **Smoke Stacks:** Gases that are released from combustion in the furnaces, are filtered and then released into the atmosphere through smoke stacks.

4. **Cooling:** The proposed power plant will be designed with dry cooling technology in order to significantly reduce water consumption. The power station will therefore require a raw water supply of approximately 550 m^3/day. A pre-treatment system will treat this water to generate service water of some 473 m^3/day and a wastewater stream of 77 m^3/day.

5. **Flue Gas Desulphurisation:** SO_2 emissions from the power plant will be controlled by means of limestone injection in the combustion zone of the CFB boilers. Limestone will be delivered to the power plant by trucks from a source yet to be determined. The estimated limestone consumption is dependent on the total sulphur present in the coal, but will be in the region of 125 kt per annum for a coal containing 2% sulphur. The in-bed capturing of sulphur by adding limestone to the boiler combustion chamber eliminates the need for external flue gas desulphurisation and

due to low combustion temperatures, a resultant reduction in the formation of NO_x (nitric oxide and nitrogen oxide) occurs.

6. **Turbine:** The high pressure steam generated through the power generation process is piped to turbines. The steam passes through the turbine blades, causing the blades to turn. The movement of the steam through the turbines causes the thermal (heat) energy to be converted to mechanical energy.

7. **Generator:** The turbine is linked to the rotor of a generator. The rotor is an electromagnet which spins inside large coils of copper to generate electricity (alternating current (AC)), which is essentially what is produced by a power station.

8. **Transformer:** This is an electrical device by which AC current of one voltage is increased or stepped up and the current flow is reduced.

9. **Transmission:** The electricity is then fed into a high voltage yard and then fed into the Transalloys complex.

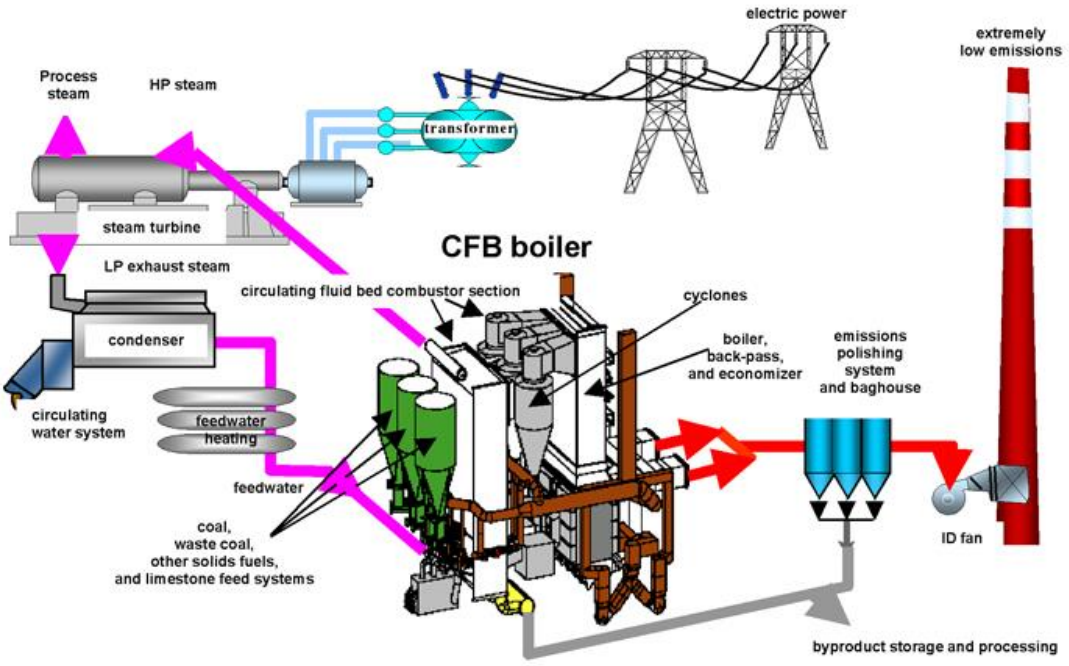


Figure 2.13: Illustration of CFB technology in the generation of electricity

2.4.3 Gas-Fired Power Plant

Other technologies considered by Transalloys include the construction of a gas-fired power plant, which may be comprised of the simple-cycle or combined cycle

variety. The details and feasibility of this option have not been fully investigated and will be considered during the EIA phase is considered feasible for the project.

2.5 PROJECT ALTERNATIVES

"Alternatives", in relation to a proposed activity, means different ways of meeting the general purposes and requirements of the activity, which may include alternatives to:

» The property on which, or location where, it is proposed to undertake the activity;
» The type of activity to be undertaken;
» The design or layout of the activity;
» The technology to be used in the activity; and
» The operational aspects of the activity.

These alternatives are briefly discussed below.

2.5.1 Site Alternatives

Site alternatives are considered in Section 2.2. The preferred site will be identified based on environmental suitability or compatibility as well as technical considerations. In determining the most environmentally suitable site alternative, the following environmental factors have been considered (through specialist input) and are addressed in Chapter 4 of this Scoping Report:

» Air quality receptors
» Ecological receptors (flora and fauna)
» Proximity to water resources (watercourses and wetlands)
» Noise receptors
» Visual receptors
» Social receptors

2.5.2 Design or Layout Alternatives

Layout alternatives are not available at this stage in the process, and will be addressed in the EIA phase should any environmental sensitivities or constraints exist on the selected site. A layout of the power station and associated infrastructure (pipeline alignments, power line alignments, fuel conveyor alignment, access roads etc.) will be provided by Transalloys in the EIA phase such that a site-specific environmental assessment can be made as part of the detailed studies which form part of this phase of the EIA process. The purpose of considering layout alternatives as part of the EIA is to inform the design of the facility in relation to the best-practical environmental options (BPEO).

2.5.3 Technology Alternatives

Power station: Technology alternatives to be considered in the EIA phase include the use of either CFB boiler technology or gas-fired combustion technology. The use of CFB is preferred due to the abundance of coal mines in the area with significant coal discard dumps. The feasibility of a gas-fired power plant has yet to be confirmed by Transalloys.

Dry cooling technology: The proposed plant will be designed as a dry cooling plant to minimise the water requirements of the proposed power plant. Two technologies are relevant in this regard:

In a direct dry cooling system, the steam from the turbines goes to dry-cooling element or a heat exchanger. Fans are used to blow air over the condenser causing water vapour to change into liquid. The liquid (water) is pumped back to the boiler for re-use. No cooling towers are needed for this system; therefore water loss by evaporation is prevented. Associated issues include increased noise levels as a result of the additional fans required.

For an indirect dry-cooling system, cooling tower and cooling water (from a water resource) is required. Warm water from the condensers is pumped to cooling towers. Within the cooling tower, bundles of cooling elements are arranged in rings. Cooling water is sent into the elements and cooled water returns to the condenser for re-use. This system prevents water loss by evaporation, as it is a closed system. Associated issues include additional visual impacts associated with the large cooling towers required.

The selection of preferred cooling technology will be considered during the EIA phase.

2.5.4 Operational Alternatives – Pollution Control

Due to environmental and health impacts that could pose a risk during the operation of the coal-fired power station, methods are considered for ash (waste) management and air emissions control.

Ash management: The ash management system will either use wet-ashing (with water added) or dry-ashing (no water used). The impacts of these two different systems will be considered in the EIA process. Above-ground ash dumping (where ash is stacked in an ash dump within the power station area and the ash dump is rehabilitated (using topsoil and vegetation)) will be used.

Air Emission Control: CFB technology burns fuel at temperatures of 760°C to 930°C, a range where nitrogen oxide formation is lower than in traditional pulverized coal unit. CFB technology allows for the injection of limestone directly into the bed where it neutralises most of the sulphur which is released from the fuel during combustion leading to very low Sulphur Dioxide (SO_2) emissions. The options or alternatives for the sourcing of the limestone is under investigation by Transalloys and will be considered during the EIA phase.

2.6 CONSTRUCTION OF A COAL-FIRED POWER PLANT

Construction of a 150MW coal-fired power plant could take between 1 to 2 years. The construction activity involves the following:

» Prior to initiating construction, a number of surveys will be required including, but not limited to a geotechnical survey, a traffic / transportation study etc.
» Access roads will need to be established to the site from the Transalloys industrial complex.
» Site preparation activities will include clearance of vegetation and excavations for foundations. These activities will require the stripping of topsoil, which will need to be stockpiled, backfilled and/or spread on site.
» Thereafter civil works will take place which involves concrete works for structures such as foundations, the production unit (which houses the turbines, generator and so forth), stacks, cooling towers (if applicable), substation and associated infrastructure.
» Mechanical and electrical work will then follow.
» Ancillary infrastructure such as office buildings, pipeline (to convey water from ERWP), conveyor belt (to convey coal from the Landau Colliery), and a power line linking to the electricity transmission grid will be established.
» As construction is completed in an area, and as all construction equipment is removed from the site, the site will be rehabilitated where practical and reasonable[3].

2.7 OPERATION OF A COAL-FIRED POWER PLANT

Prior to the operation of the power station, testing and trials will need to be undertaken. It is not known at this stage exactly how many people will be responsible for the operation, monitoring and maintenance of the power plant. It

[3]http://www.eskom.co.za/live/monster.php?URL=%2Fcontent%2FCO_0003BuildCoalPSRev4.pdf&Src=Item+28).

is anticipated that there will be full time security, maintenance and control room staff required at the power plant.

In order to operate a coal-fired power plant, resources are required (input), and processes and outputs occur from the electricity generation process. This concept is outlined in Figure 2.14.

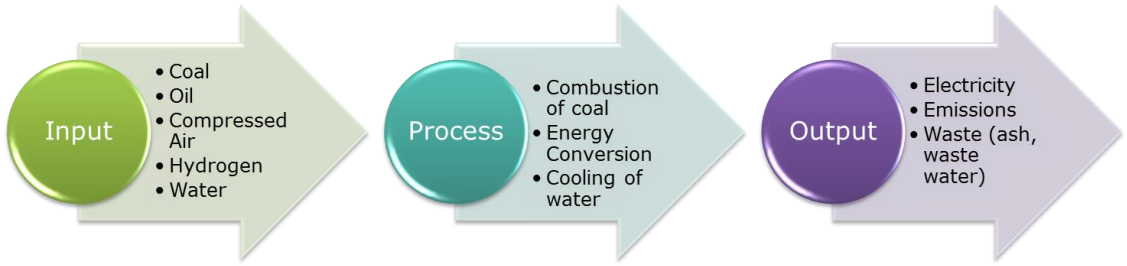


Figure 2.14: Resources (input), processes and outputs (waste) for a coal-fired power plant

Figure 2.14 illustrates that in order to operate a coal-fired power plant, natural resources such as coal and water will be required. For combustion of the coal, air and hydrogen are also required. Water is required in the power generation process – it is converted to steam (condensation) for energy conversion (from thermal energy (heat) to mechanical energy). Water is also used for cooling in a wet-cooled power station; however the Transalloys power plant will make use of dry cooling technology to reduce water requirements. The output of the process is electricity as well as waste and by-products. The power plant will operate for 24 hours a day and 7 days a week.

2.7.1 Waste products and by-products

The following waste products or by-products are expected to be generated by the operation of the power station:

Ash: Ash (coarse ash and fine ash) is a waste product from burning coal that requires constant disposal, and as such large volumes of ash are generated from a coal-fired power plant. A dedicated ash disposal site will form part of the power station complex.

Gypsum: The CFB process allows for the introduction of limestone into the process for the abatement of SO_2. The capturing of SO_2 forms gypsum, which presents itself as a solid and is removed from the process along with the ash. Gypsum is removed as a by-product which can be used in the construction industry.

Emissions: The burning of coal results in air emissions (carbon dioxide, oxides of sulphur, oxides of nitrogen, mercury and other elements into the atmosphere via smoke / flue stacks).

The footprint required for the waste management activity associated with the power station is estimated to be maximum of 28ha. This area includes:

» The ash dumps;
» Ash dump runoff ponds;
» Sewage treatment plant;
» Recycle pond; and
» Solid waste bins

Estimated daily waste quantities (hazardous and non-hazardous) that are expected to be produced by the power plant have not been determined at this stage and further information will be provided during the EIA phase.

2.8 DECOMMISIONING OF A COAL-FIRED POWER PLANT

The lifespan of the proposed coal-fired power station is more than 30 years. Equipment associated with this facility would only be decommissioned once it has reached the end of its economic life or is no longer required. It is most likely that decommissioning activities of the infrastructure of the facility discussed in this EIA would comprise the disassembly and disposal of the infrastructure. Decommissioning activities will involve disassembly of the production units and ancillary infrastructure, demolishing of buildings, removal of hazardous waste and rehabilitation of the ash dumps and site.

APPROACH TO UNDERTAKING THE SCOPING PHASE AND LEGAL CONTEXT CHAPTER 3

An Environmental Impact Assessment (EIA) process is being undertaken in support of the application for Environmental Authorisation and Waste License for the proposed Transalloys power plant and associated infrastructure. An EIA refers to that process (dictated by the EIA Regulations) which involves the identification of and assessment of direct, indirect and cumulative environmental impacts associated with a proposed project. The EIA process comprises two phases: i.e. **Scoping Phase** and **EIA Phase**. The EIA process culminates in the submission of an EIA Report (including an environmental management programme (EMPr)) to the competent authority for decision-making. The EIA process is illustrated below:

The Scoping Phase of the EIA process being undertaken for the proposed Transalloys power plant and associated infrastructure has been undertaken in accordance with the EIA Regulations published in Government Notice 543 of June 2010 (as amended), in terms of Section 24(5) of the National Environmental Management Act (NEMA; Act No 107 of 1998).

This scoping process aimed at identifying potential issues associated with all components of the proposed project, and defining the extent of studies required within the EIA. This was achieved through an evaluation of the proposed project involving specialists with expertise relevant to the nature of the project and the study area, the project proponent, as well as on-going consultation process with key stakeholders (including relevant government authorities) and interested and affected parties (I&APs). This section of the report serves to outline the process which was followed during the Scoping Phase of the EIA process.

3.1 Objectives of the Scoping Phase

This Scoping Phase aimed to:

» Identify and evaluate potential environmental (biophysical and social) impacts and benefits of all phases of the proposed development (including design, construction, operation and decommissioning) within the broader study area through a desk-top review of existing baseline data and specialist studies;
» Define the scope of studies to be undertaken within the EIA process;
» Provide the authorities with sufficient information in order to make a decision regarding the scope of issues to be addressed in the EIA process, as well as regarding the scope and extent of specialist studies that will be required to be undertaken as part of the EIA Phase of the process; and
» Identify potentially sensitive environmental features and areas on the site to inform the preliminary design process of the power station and associated infrastructure.

Within this context, the objectives of this Scoping Phase are to:

» Describe the scope and nature of the proposed activities;
» Describe the reasonable and feasible project-specific alternatives to be considered through the EIA process, including the "no go" option;
» Identify and evaluate key environmental issues/impacts associated with the proposed project, and through a process of broad-based consultation with stakeholders, I&AP and desk-top specialist studies identify those issues to be addressed in more detail in the Impact Assessment Phase of the EIA process, as well as potentially sensitive environmental features and areas which should be considered in the preliminary design phase.
» Conduct an open, participatory and transparent public involvement process and facilitate the inclusion of I&AP and stakeholders' concerns regarding the proposed project into the decision-making process.

3.2 Overview of the Scoping Phase

Key tasks undertaken within the scoping phase which are in line with the requirements of the EIA Regulations of June 2010 are illustrated in Figure 3.1.

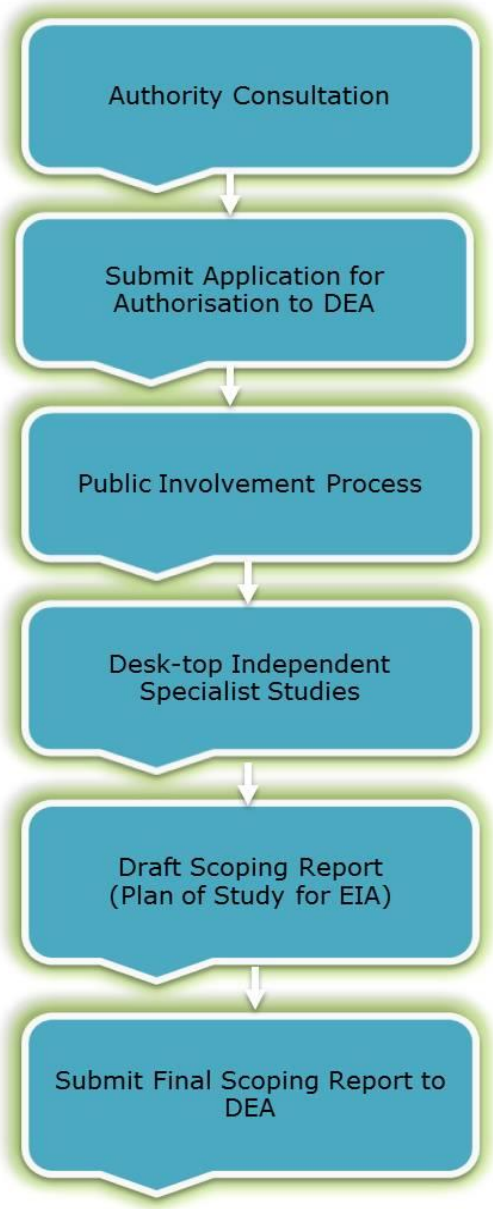


Figure 3.1: Key tasks in the Scoping Phase of the EIA process

The tasks are discussed in detail below.

3.2.1 Authority Consultation and Application for Authorisation in terms of NEMA and NEM:AQA

As this is an **energy generation** project, the National Department of Environmental Affairs (DEA) is the competent authority for this application. As the project falls within Mpumalanga, the Mpumalanga Department of Economic Development, Environment and Tourism (MDEDET) act as a commenting authority for the project. Consultation with these authorities has been

undertaken throughout the Scoping process. This consultation has included the following:

» Consultation with DEA regarding the proposed project and the EIA process to be undertaken.
» Submission of an application for authorisation to DEA in terms of NEMA and the NEM: Waste Act. The integrated environmental authorisation reference number allocated to the project is **14/12/16/3/3/3/97**.
» Consultation with the Nkangala District Municipality who are mandated to consider the Atmospheric Emissions License (AEL) application for this project.

A record of all authority consultation undertaken prior to and within the Scoping Phase is included within **Appendix B**.

3.2.2 I&AP Identification, Registration and the Creation of an Electronic Database

The first step in the public involvement process was to identify relevant stakeholders and interested and affected parties (I&APs). This process was undertaken through existing contacts and databases, recording responses to site notices and newspaper advertisements, as well as through the process of networking. Stakeholder groups identified include:

» Provincial and local government departments (including Mpumalanga DEDET, South African Heritage Resources Agency (SAHRA), Mpumalanga Provincial Heritage Resources Authority (MPHRA), Department of Water Affairs (DWA), Department of Agriculture, Transnet, South African Roads Agency (SANRAL) etc.);
» Government Structures (including the Provincial Roads Authority, municipal planning departments, etc);
» Municipalities including Emalahleni Local Municipality and Nkangala District Municipality as well as the local Ward Councillor
» Potentially affected and neighbouring landowners and tenants;
» Conservation authorities;
» Industry and business; and
» Community Based Organisations (CBOs) and other Non-governmental Organisations (NGOs).

All relevant stakeholder and I&AP information has been recorded within a database of affected parties (refer to Appendix C for a listing of recorded parties). While I&APs have been encouraged to register their interest in the project from the start of the process, the identification and registration of I&APs will be on-going for the duration of the EIA process. The project database will be updated on

an on-going basis throughout the project process, and will act as a record of the parties involved in the public involvement process.

3.2.3 Notification of the EIA Process and draft Scoping Report

In order to notify and inform the public of the proposed project and invite members of the public to register as interested and affected parties (I&APs) newspaper advertisements were placed in the following newspapers:

» *Witbank News (English advertisement published on 25 October 2013)*

A second round of newspapers advertisements was also placed in the following newspapers to inform the public on the availability of the Draft Scoping Report and advertising the public meeting.

» *Witbank News (English and Afrikaans advertisement published on 22 November 2013)*

In addition the following notifications were issued regarding the project:

» Site notices were placed on the Transalloys boundary fence and in public places around the project area including the Clewer supermarket and the Clewer Primary School in accordance with the requirements of the EIA Regulations.
» Background Information Documents (BIDs) were distributed to surrounding land owners and occupiers of land.
» BIDs were placed at the Clewer post-office and the Clewer Primary School.
» Stakeholder letters were distributed to the project database notifying I&APs and stakeholders of the proposed project; and

In addition to the above advertisements and notices, key stakeholders and registered I&APs were notified in writing of the commencement of the EIA process. These parties included, *inter alia*:

» Relevant parties from Municipalities potentially affected (directly or indirectly) by the proposed project;
» Communities and potentially affected landowners as well as adjacent landowners;
» Organs of state having jurisdiction in respect of any aspect of the activity, including:
  * Mpumalanga DEDET;
  * Department of Energy;
  * Department of Water Affairs;

- Department of Agriculture;
- South African Heritage Resources Agency (SAHRA) and MPHRA;
- Conservation Authorities (SANBI etc.);
- Department of Transport and Public Works;
- South African National Roads Agency Limited (SANRAL);
- Transnet and Spoornet;
- Local and District Municipality; and
- Eskom.

Copies of all the advertisements placed and notices distributed are contained in **Appendix D** of this report.

3.2.4 Public Involvement and Consultation

The aim of the public participation process (PPP) conducted in the scoping phase of the process was primarily to ensure that:

» All potential stakeholders and I&APs are identified and consulted with;
» Information containing all relevant facts in respect of the application is made available to potential stakeholders and I&APs;
» Participation by potential I&APs is facilitated in such a manner that all potential stakeholders and I&APs are provided with a reasonable opportunity to comment on the application and identify issues to be addressed in the EIA process; and
» Comments received from stakeholders and I&APs is recorded.

In order to provide information regarding the proposed project and the EIA process, a background information document (BID) for the project was compiled at the outset of the process (refer to Appendix E). The BID was distributed to identified stakeholders and I&APs, and additional copies were made available at public venues within the broader study area.

Through consultation with key stakeholders and I&APs, issues for inclusion within the issues-based scoping study were identified and confirmed. In order to accommodate the varying needs of stakeholders and I&APs within the study area, as well as capture their views, issues and concerns regarding the project, various opportunities have been and will continue to be provided for I&APs to have their issues noted after the release of the Draft Scoping Report for public review, as follows:

» **Public meeting** in the study area (open meeting advertised in the local press);
» **Focus group meetings** (pre-arranged and stakeholders invited to attend);

» One-on-one **consultation meetings** (for example with directly affected or surrounding landowners);
» Telephonic consultation sessions (consultation with various parties from the EIA project team, including the project participation consultant, lead EIA consultant as well as specialist consultants); and
» Written, faxed or e-mail **correspondence.**

Networking with I&APs will continue throughout the duration of the EIA process.

3.2.5 Identification and Recording of Issues and Concerns

Issues and concerns raised by I&APs during the scoping process will be consolidated in a Comments and Response Report (C&RR) (to be included in the final Scoping Report for submission to DEA). The Comments and Response Report will include responses from members of the EIA project team and/or the project developer to indicate how issues will be addressed in the EIA process, or provide clarification. Where issues are raised that the EIA team considers beyond the scope and purpose of this EIA process, clear reasoning for this view will be provided.

3.2.6 Evaluation of Issues Identified through the Scoping Process

Issues (both direct and indirect environmental impacts) associated with the proposed project identified within the scoping process have been evaluated through desk-top specialist studies. In evaluating potential impacts, Savannah Environmental has been assisted by the following specialist consultants:

Area of Expertise	Specialist	Refer Appendix
Air Quality Scoping Study	Airshed Planning Professionals	Appendix F
Soils and Agricultural Potential Scoping Study	Johann Lanz (soil scientist)	Appendix G
Flora & Fauna Scoping Study	Marianne Strohbach	Appendix H
Surface Water Scoping Study	MENCO	Appendix I
Wetland delineation study		Appendix J
Visual Scoping Study	MetroGIS	Appendix K
Noise Scoping Study	Enviro Acoustic Research	Appendix L
Social Scoping Study	Tony Barbour	Appendix M
Heritage Scoping Study	Jaco van der Walt of Heritage Contracts and Archaeological Consulting	Appendix N

Area of Expertise	Specialist	Refer Appendix
Paleontological study	Dr B Milsteed	Appendix O

In order to evaluate issues and assign an order of priority, it was necessary to identify the characteristics of each potential issue/impact:

» *the nature,* which includes a description of what causes the effect, what will be affected and how it will be affected; and
» *the extent,* wherein it is indicated whether the impact will be local (limited to the immediate area or site of development) or regional.

The evaluation of the issues resulted in a statement regarding the potential significance of the identified issues, as well as recommendations regarding further studies required within an EIA.

Specialist Scoping Reports are contained within Appendices F - M.

3.2.7 Public Review of Draft Scoping Report and Feedback Meeting

This is the **current stage** of the Scoping Phase. The Draft Scoping Report will be been made available for public review from **22 November 2013 to 22 January 2013** at the following locations:

» Transalloys (reception)
» Clewer Primary School (reception)
» Witbank Public Library (Emalahleni Main Library)
» www.savannahSA.com

In order to facilitate comments on the Draft Scoping Report, a public meeting will be held during the review period for the Draft Scoping Report as follows:

» **Date:** 28 November 2013
» **Time:** 18:00
» **Venue:** Clewer Primary School, Clewer

The public review process and details of the public meeting were advertised in in the Witbank News and by way of site notices and handouts at the Clewer Primary School. In addition, all registered I&APs were notified of the availability of the report and public meeting by letter (refer to Appendix E).

3.2.8 Final Scoping Report

The final stage in the Scoping Phase will entail the capturing of responses from stakeholders and I&APs on the Draft Scoping Report in order to refine this report. It is this final report upon which the decision-making environmental Authorities provide comments, recommendations and acceptance to undertake the EIA Phase of the process.

3.3 Regulatory and Legal Context

The South African energy industry is evolving rapidly, with regular changes to legislation and industry role-players. The regulatory hierarchy for an energy generation project of this nature consists of three tiers of authority who exercise control through both statutory and non-statutory instruments – that is National, Provincial and Local levels.

3.3.1. Regulatory Hierarchy

At **National Level**, the main regulatory agencies are:

» *Department of Energy:* This department is responsible for policy relating to all energy forms, including renewable energy. This department is the controlling authority in terms of the Electricity Regulation Act (Act No 4 of 2006). The DoE Integrated Resource Plan (IRP) (2010 to 2030) also indicates that coal-fired power stations will still be required as part of the energy mix to 2030.
» *National Energy Regulator of South Africa (NERSA):* This body is responsible for regulating all aspects of the electricity sector, and will ultimately issue a energy generation license to Transalloys to generate electricity from the coal-fired power station.
» *Department of Environmental Affairs (DEA):* This Department is responsible for environmental policy and is the controlling authority in terms of NEMA (Act No of 1998) and the EIA Regulations and the NEM: Waste Act (Act No 59 of 1998). The DEA is the competent authority for this project, and charged with granting the relevant environmental authorisation and waste license.
» *The South African Heritage Resources Agency (SAHRA):* The National Heritage Resources Act (Act No 25 of 1999) and the associated provincial regulations provides legislative protection for listed or proclaimed sites, such as urban conservation areas, nature reserves and proclaimed scenic routes;
» *South African National Roads Agency Limited (SANRAL):* This department is responsible for all National road routes;

» *Department of Water Affairs (DWA):* This Department is responsible for effective and efficient water resources management according to the National Water Act (Act No 59 of 1998) to ensure sustainable economic and social development and for evaluating and issuing licenses pertaining to water use.
» *Department of Mineral Resources:* Approval from the Department of Mineral Resources (DMR) may be required to use land surface contrary to the objects of the Act in terms of Section 53 of the Mineral and Petroleum Resources Development Act, (Act No 28 of 2002) (MPRDA): In terms of the MPRDA approval from the Minister of Mineral Resources is required to ensure that proposed activities do not sterilise a mineral resources that might occur on site.
» *Department of Agriculture, Forestry and Fisheries:* This Department is the custodian of South Africa's agriculture, fisheries and forestry resources and is primarily responsible for the formulation and implementation of policies and legislation governing the Agriculture, Forestry and Fisheries Sector.
» *South African Civil Aviation Authority:* This Department is responsible for aircraft movements and radar. The power station stacks will require obstacle approvals from the CAA.

At **Provincial Level**, the main regulatory agencies are:

» *Provincial Government of the Mpumalanga Province – Mpumalanga DEDET.* This department is the commenting authority for this project.
» *Mpumalanga Department of Public Works, Roads and Transport* – This department is responsible for roads.
» *Mpumalanga Provincial Heritage Resources Authority (MPHRA):* who deal with heritage resources within the Mpumalanga Province.

At **Local Level** the local and municipal authorities are the principal regulatory authorities responsible for planning, land use and the environment.

» In terms of the Municipal Systems Act (Act No 32 of 2000) it is compulsory for all municipalities to go through an Integrated Development Planning (IDP) process to prepare a five-year strategic development plan for the area under their control;
» The proposed project is planned to be located in the Highveld Priority Area airshed (Government Notice 1123 of 2007). Due to the nature of the process and the resultant atmospheric emissions, combustion installations using solid fuels for steam raising of electricity generation are a listed activity in terms of Section 21 of the National Environmental Management: Air Quality Act (Act 39 of 2004) (Republic of South Africa, 2010). As a result an Atmospheric Emission License (AEL) is required as part of the environmental authorisation

process in order to operate the power station. The AEL will be obtained from the Nkangala District Municipality.

» Bioregional planning involves the identification of priority areas for conservation and their placement within a planning framework of core, buffer and transition areas. These could include reference to visual and scenic resources and the identification of areas of special significance, together with visual guidelines for the area covered by these plans; and
» By-laws and policies have been formulated by local authorities to protect visual and aesthetic resources relating to urban edge lines, scenic drives, special areas, signage, communication masts, etc.

There are also numerous non-statutory bodies such as environmental lobby groups that play a role in various aspects of planning and the environment that will influence coal energy development.

3.3.2 Legislation and Guidelines that have informed the preparation of this Scoping Report

The following environmental legislation and guidelines have informed the scope and content of this Scoping Report:

» National Environmental Management Act (Act No 107 of 1998)
» EIA Regulations, published under Chapter 5 of the NEMA (GN R543, GN R544, GN R545 and GN R546 of June 2010);
» Guidelines published in terms of the NEMA EIA Regulations, in particular:
  * Companion to the National Environmental Management Act (NEMA) Environmental Impact Assessment (EIA) Regulations of 2010 (Draft Guideline; DEA, 2010); and
  * Public Participation in the EIA Process (DEA, 2010);
» The Equator Principles; and
» International Finance Corporation (IFC) guidelines

Several other Acts, standards or guidelines have also informed the project process and the scope of issues evaluated in the scoping report, and to be addressed in the EIA. A listing of relevant legislation is provided in Table 3.1. A more detailed review of legislative requirements applicable to the proposed project will be included in the EIA phase.

Table 3.1: Initial review of relevant environmental policies, legislation, guidelines and standards applicable to the proposed coal-fired power station project EIA

Legislation	Applicable Sections
National Legislation	

Legislation	Applicable Sections
Constitution of the Republic of South Africa (Act No 108 of 1996)	» Bill of Rights (S2) » Environmental Rights (S24) – i.e. the right to an environment which is not harmful to health and well-being » Rights to freedom of movement and residence (S22) » Property rights (S25) » Access to information (S32) » Right to just administrative action (S33) » Recognition of international agreements (S231)
National Environmental Management Act (Act No 107 of 1998)	» National environmental principles (S2), providing strategic environmental management goals and objectives of the government applicable throughout the Republic to the actions of all organs of state that may significantly affect the environment » NEMA EIA Regulations (GN R543, GN R544, GN R545 and GN R546 of June 2010) » Public Participation (S2) » The requirement for potential impact on the environment of listed activities must be considered, investigated, assessed and reported on to the competent authority (S24 – Environmental Authorisations) » Duty of Care (S28) requiring that reasonable measures are taken to prevent pollution or degradation from occurring, continuing or recurring, or, where this is not possible, to minimise & rectify pollution or degradation of the environment » Procedures to be followed in the event of an emergency incident which may impact on the environment (S30) » Appeals against decisions made by authorities (S43)
Environment Conservation Act (Act No 73 of 1989)	» National Noise Control Regulations (GN R154 dated 10 January 1992)
National Heritage Resources Act (Act No 25 of 1999)	» Stipulates assessment criteria and categories of heritage resources according to their significance (S7) » Provides for the protection of all archaeological and palaeontological sites, and meteorites (S35) » Provides for the conservation and care of cemeteries and graves by SAHRA where this is not the responsibility of any other authority (S36) » Lists activities which require developers any person who intends to undertake to notify the responsible heritage resources authority and furnish it with details regarding the location, nature and extent of the proposed development (S38) » Requires the compilation of a Conservation Management Plan as well as a permit from SAHRA for the presentation of archaeological sites as part of tourism attraction (S44)
National Environmental Management: Biodiversity Act (Act No 10 of 2004)	» Provides for the MEC/Minister to list ecosystems which are threatened and in need of protection (S52) – none have as yet been published

Legislation	Applicable Sections
	» Provides for the MEC/Minister to identify any process or activity in such a listed ecosystem as a threatening process (S53) - none have as yet been published » A list of threatened & protected species has been published in terms of S 56(1) - Government Gazette 29657. » Three government notices have been published, i.e. GN R 150 (Commencement of Threatened and Protected Species Regulations, 2007), GN R 151 (Lists of critically endangered, vulnerable and protected species) and GN R 152 (Threatened or Protected Species Regulations).
National Environmental Management: Air Quality Act (Act No 39 of 2004)	» National, provincial and local ambient air quality standards (S9 - 10 & S11) » Listed Activities (S21) » Atmospheric Emissions Licenses (S22) » Measures in respect of dust control (S32) – no regulations promulgated as yet » Measures to control noise (S34) - no regulations promulgated as yet
Conservation of Agricultural Resources Act (Act No 43 of 1983)	» Prohibition of the spreading of weeds (S5) » Classification of categories of weeds & invader plants (Regulation 15 of GN R1048) & restrictions in terms of where these species may occur » Requirement & methods to implement control measures for alien and invasive plant species (Regulation 15E of GN R1048)
National Water Act (Act No 36 of 1998)	» National Government is the public trustee of the Nation's water resources (S3) » Entitlement to use water (S4) – entitles a person to use water in or from a water resource for purposes such as reasonable domestic use, domestic gardening, animal watering, fire fighting and recreational use, as set out in Schedule 1 » Duty of Care to prevent and remedy the effects of pollution to water resources (S19) » Procedures to be followed in the event of an emergency incident which may impact on a water resource (S20) » Definition of water use (S21) » Requirements for registration of water use (S26 and S34) » Definition of offences in terms of the Act (S151)
The National Environmental Management: Air Quality Act (Act no.39 of 2004) (AQA)	» This is the current air quality law (commenced in September 2005) in South Africa governing air quality management. This Act requires the IPP to seek an atmospheric emissions licence from the relevant provincial / national department. » The Atmospheric Pollution Prevention Act (APPA) of 1965 was repealed on 31 March 2010 when the National Environmental Management: Air Quality Act (Act No. 39 of 2004) (AQA) came into effect. APPA

Legislation	Applicable Sections
	Registration Certificates that regulated industrial emissions were phased out with the introduction of Atmospheric Emission Licenses (AEL). The AEL function was delegated to District and Metropolitan Municipalities. The AEL function includes the review and conversion of existing APPA Registration Certificates to AEL's and the issuing of AEL's for new Listed Activities. » The proposed coal-fired plant is planned to be located in a declared Air Quality Priority Management Area (DEA, 2012). Due to the nature of the process and the resultant atmospheric emissions, combustion installations using solid fuels for steam raising in electricity generation is a listed activity in terms of Section 21 of the National Environmental Management: Air Quality Act (Act 39 of 2004) (DEA, 2010).
NEMA: AQA: Ambient Air Quality standards of 24 December 2009 and NEMA: AQA Emission standards of 31 March 2010 (DEA 2010).	» The Emission standards triggered by the proposed coal fired power plant are those under section 10 sub-category 1.1 relating to solid fuel combustion installations.
Water Services Act (Act No 108 of 1997)	» No person may dispose of industrial effluent except in a manner approved by the water services provider (S7)
National Environmental Management: Waste Act (Act No 59 of 2008)	» Waste management measures » Regulations and schedules (Schedule A & B) » Listed activities requiring waste licenses » Waste disposal practices (S20) » Contamination
National Forests Act (Act No 84 of 1998)	» Protected trees » Conservation of forests » List of protected tree species published (GN 716 in *GG* 35648 of 7 September 2012)
National Environmental Protected Areas Act (Act No 57 of 2003)	» System of protected areas in South Africa (S9 – 16) » Regulation and prohibition of activities in Protected Areas (S37, 38 & 40)
National Roads Act (Act No 7 of 1998)	» Policy concerning use and management of national roads
National Veld and Forest Fire Act (Act 101 of 1998)	» Regulates the prevention and combating of veld ,forest and mountain fires throughout South Africa.
National noise-control regulations (of 10 January 1992)	» In terms of section 25 of the ECA, the national noise-control regulations (GN R154 in Government Gazette No. 13717 dated 10 January 1992) were promulgated. The NCRs were revised under Government Notice Number R. 55 of 14 January 1994 to make it obligatory for all authorities to apply the regulations. » Subsequently, in terms of Schedule 5 of the Constitution of South Africa of 1996, legislative responsibility for administering the noise control regulations was devolved to provincial and local authorities. Provincial Noise Control Regulations exist

Legislation	Applicable Sections
	in the Free State, Western Cape and Gauteng provinces.
The Hazardous Substances Act No. 15 of 1973	» This Act was promulgated to provide for the control of » substances which may cause injury or ill-health to, or death of, humans by reason of their toxic, corrosive, irritant, strongly sensitising or flammable nature. » The Hazardous Substances Act also provides for matters concerning the division of such substances or products into groups in relation to the degree of danger, the prohibition and control of the importation, manufacture, sale, use, operation, application and disposal of such substances and products.
Occupational Health And Safety Act No. 85 of 1993	» This Act and its regulations provide for the control of hazardous chemical substances (HCS), such as asbestos, lead and major hazardous installations that may have adverse health and safety effects.
Provincial Legislation	
Mpumalanga Nature Conservation Act	» Regulates nature conservation
Mpumalanga Road Traffic Act	» Regulates roads in the province
Mpumalanga Land Administration Act	» Regulates land and land usage
Guideline Documents / Standards / Plans	
South African National Standard (SANS) 10328, Methods for environmental noise impact assessments in terms of NEMA No. 107 of 1998	» Prediction of impact that noise emanating from a proposed development would have on occupants of surrounding land by determining the rating level. » Noise limits are based on the acceptable rating levels of ambient noise contained in SANS 10103
South African Bureau of Standards (SABS)	» Four South African Bureau of Standards (SABS) scientific standards are considered relevant to noise from a Power Station. They are: * SANS 10103:2008. 'The measurement and rating of environmental noise with respect to annoyance and to speech communication'. * SANS 10210:2004. 'Calculating and predicting road traffic noise'. * SANS 10328:2008. 'Methods for environmental noise impact assessments'. * SANS 10357:2004. 'The calculation of sound propagation by the Concave method'. » The relevant standards use the equivalent continuous rating level as a basis for determining what is acceptable. The levels may take single event noise into account, but single event noise by itself does not determine whether noise levels are acceptable for land use purposes. The recommendations that the standards make are likely to inform decisions by authorities, but non-compliance with the standards will not necessarily render an activity unlawful per se.
Guidelines for Community Noise (WHO, 1999)	» The scope of WHO's effort to derive guidelines for community noise is to consolidate actual scientific knowledge on the health impacts of community noise and to provide guidance to environmental health

Legislation	Applicable Sections
	authorities and professionals trying to protect people from the harmful effects of noise in non-industrial environments.
SANS 69 - South African National Standard - Framework for setting & implementing national ambient air quality standards, SANS 1929 - South African National Standard - Ambient Air Quality - Limits for common pollutants.	» The South African Bureau of Standards (SABS), through a technical committee, developed ambient air quality limits, based on international best practice for particulate matter less than 10 µm in aerodynamic diameter (PM10), dust fallout, sulphur dioxide, nitrogen dioxide, ozone, carbon monoxide, lead and benzene. » These ambient limits were derived from international best practice and what was regarded to be achievable in the South African context, taking both the natural environment and socio-economic status into account. The SANS limits informed the newly promulgated SA Standards
World Bank Group Environmental, Health, and Safety Guidelines (known as the 'EHS Guidelines') (IFC, 2007).	» The EHS Guidelines are technical reference documents with general and industry-specific examples of Good International Industry Practice (GIIP). » When host country regulations differ from the levels and measures presented in the EHS Guidelines, projects are expected to achieve whichever is more stringent. If less stringent levels or measures are appropriate in view of specific project circumstances, a full and detailed justification for any proposed alternatives is needed as part of the site-specific environmental assessment. This justification should demonstrate that the choice for any alternate performance levels is protective of human health and the environment.
IFC Air Emissions and Ambient Air Quality. Environmental, Health and Safety Guidelines. Washington DC, International Finance Corporation	» The World Bank group through the IFC has emission guidelines for thermal power plants. These guidelines are applicable to new facilities.
European Union Emission Guidelines	» The European Union has specific guidelines for the air pollutant emissions from large power plants. These limits are similar to those of the IFC.
The Equator Principles (June 2003)	» The Equator Principles (EPs) are a voluntary set of standards for determining, assessing and managing social and environmental risk in project financing. Equator Principles Financial Institutions (EPFIs) commit to not providing loans to projects where the borrower will not or is unable to comply with their respective social and environmental policies and procedures that implement the EPs. » The Equator Principles were developed by private sector banks. The banks chose to model the Equator Principles on the environmental standards of the World Bank and the social policies of the International Finance Corporation (IFC).
Planning Documents	

Legislation	Applicable Sections
Mpumalanga Province Provincial Growth and Development Strategy	The Mpumalanga Provincial Growth and Development Strategy (MPGDS) is a nine-year strategy (2004-2014) which aims to achieve the objectives of Vision 2014. As a provincial policy framework, it sets the tone and pace for shared growth and development in the Province. It addresses the key social, economic, environmental and spatial imperatives in the Province.
Emalahleni Municipality Integrated Development Plan	The IDP identifies a set of long term goals for the municipality aimed at increasing service delivery capacity, rehabilitating the current base at scale and growing the economic base. These are: » The development of long term strategies for the municipality: » Develop long-term financial strategy aligned with the operational and capital requirements over the next 3 to 5 years. » Develop a capital investment programme and mobilising funding to revitalise the infrastructure base and ensure sufficient capacity to deliver services » Development of a partnership programme with the private sector and community to promote the development of the economic base, and » Execution of long term strategies
Mpumalanga Biodiversity Conservation Plan.	» The Mpumalanga Biodiversity Conservation Plan contains various classes of environmental features of conservation value, such as protected areas; irreplaceable areas etc. » Mapping of critical biodiversity areas is also provided in this document.

3.4 Assumptions and Limitations of the EIA

In conducting this scoping process, the following general assumptions have been made:

- » It is assumed that the identified alternative sites identified by Transalloys represent technically suitable sites for the establishment of a coal-fired power station and associated infrastructure;
- » The EIA will comparatively assess site alternatives for the power plant and suitable technology options; and
- » This Scoping Report has been prepared based on information available at the time of undertaking the study, while further technical studies are being conducted by Transalloys as part of the feasibility study. This information will be available for consideration in the EIA phase of the process.

Details of specific assumptions, limitations and/ gaps in knowledge for each of the specialist studies undertaken are discussed in each individual report and not

repeated here (refer to specialist studies contained in Appendix F - M for more details).

DESCRIPTION OF THE AFFECTED ENVIRONMENT CHAPTER 4

This section of the Scoping Report provides a description of the environment that may be affected by the proposed Transalloys Power Plant proposed to be located adjacent to the Transalloys smelter complex. Aspects of the physical, biophysical, social and economic environment that could be directly or indirectly affected by, or could affect, the proposed development have been described. This information has been sourced from both existing information available for the area as well as field data, and aims to provide the context within which this EIA is being conducted. A more detailed description of each aspect of the affected environment is included within the desktop specialist scoping reports contained within Appendices F - M.

4.1 Location description

The Transalloys smelter complex is located south of the N4 national road approximately 8km west of Emalahleni. Transalloys is situated east of Evraz Highveld Steel and Vanadium and north of Clewer town and smallholdings, in the Emalahleni Local Municipality within the greater Nkangala District Municipality of the Mpumalanga Province.

4.2 Topography

The topography of the region is broadly described as Moderately Undulating Plains and Pans of the Central Interior Plain. Within the study area the surface water drainage is towards the east, into the Brugspruit. The topography is undulating and gently slopes towards the Brugspruit. Refer to Figure 4.1 for the shaded relief/topography map of the study area.

Prominent rivers or streams include the Grootspruit, to the south-west, and the Brugspruit traversing east of the Transalloys plant over land owned by Transalloys. This water course (wetland) and grassland account for the remaining scenic natural resources in an area largely dominated by industrial and surface mining activities.

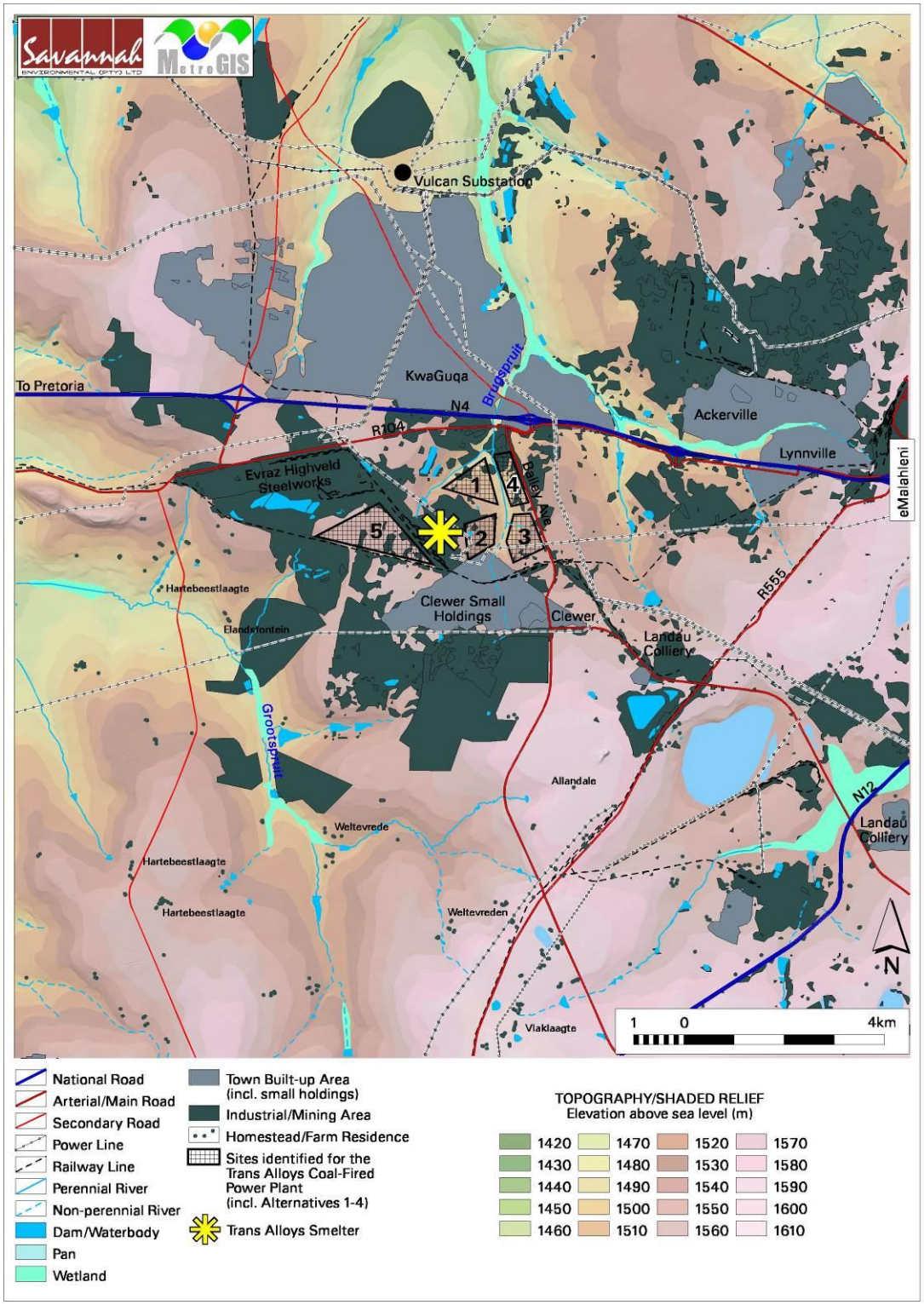


Figure 4.1: Shaded relief map (indicating the location of the alternative sites under investigation and the topography and elevation above sea level) of the broader study area

4.3 Land-use

The region has a strong mining and industrial character, interspersed with agricultural activities (maize crop production) and human settlements. The central and south-eastern parts of the study area are home to a number of coal mines and industrial plants. These activities, especially the expansive mining and quarrying are rapidly changing the once rural and agricultural character to that of a predominantly industrial nature. Industrial and mining activities in close proximity to the Transalloys smelter complex include the Evraz Highveld Steelworks to the north-west and the Landau colliery to the south-east. The latter colliery is currently applying to expand their open-cast mining activities north-wards, east of Baily Avenue towards the N4 national road. This application is in the Environmental Impact Assessment phase and has not been concluded as yet.

A host of power lines cross the study area, many of them originating at the power stations within the region, or congregating at the Vulcan substation north of KwaGuqa. Electricity for the Highveld steelworks and Transalloys plant are supplied by some of these power lines. Additional linear infrastructure includes the railway line and railway sidings traversing west of the Transalloys plant, transporting iron ore to the Highveld steelworks.

The southern part of the study area still has a largely agricultural and rural character where predominantly dryland agriculture (maize) and limited irrigated agriculture are practised. North of the N4 national road the land use activities are dominated by the KwaGuqa town. This town and expanded town lands primarily include formalised high density settlements with some informal township developments along the outskirts. Other than the above town, Ackerville, Lynnville and Emalahleni to the east, and smaller residential areas to the south are generally associated with the mining activities, where employees of these mines are housed, particularly in Clewer, a small town and small holdings, situated south of the Transalloys smelter complex – refer to Figure 4.2.

Farm settlements or residences are (still) found to the south of the study area. Some of these include: Allandale, Weltevrede, Hartebeestalaagte and Elandsfontein. The population density of the region is indicated at approximately 100 people per km^2, predominantly concentrated within the towns of Emalahleni and KwaGuqa.

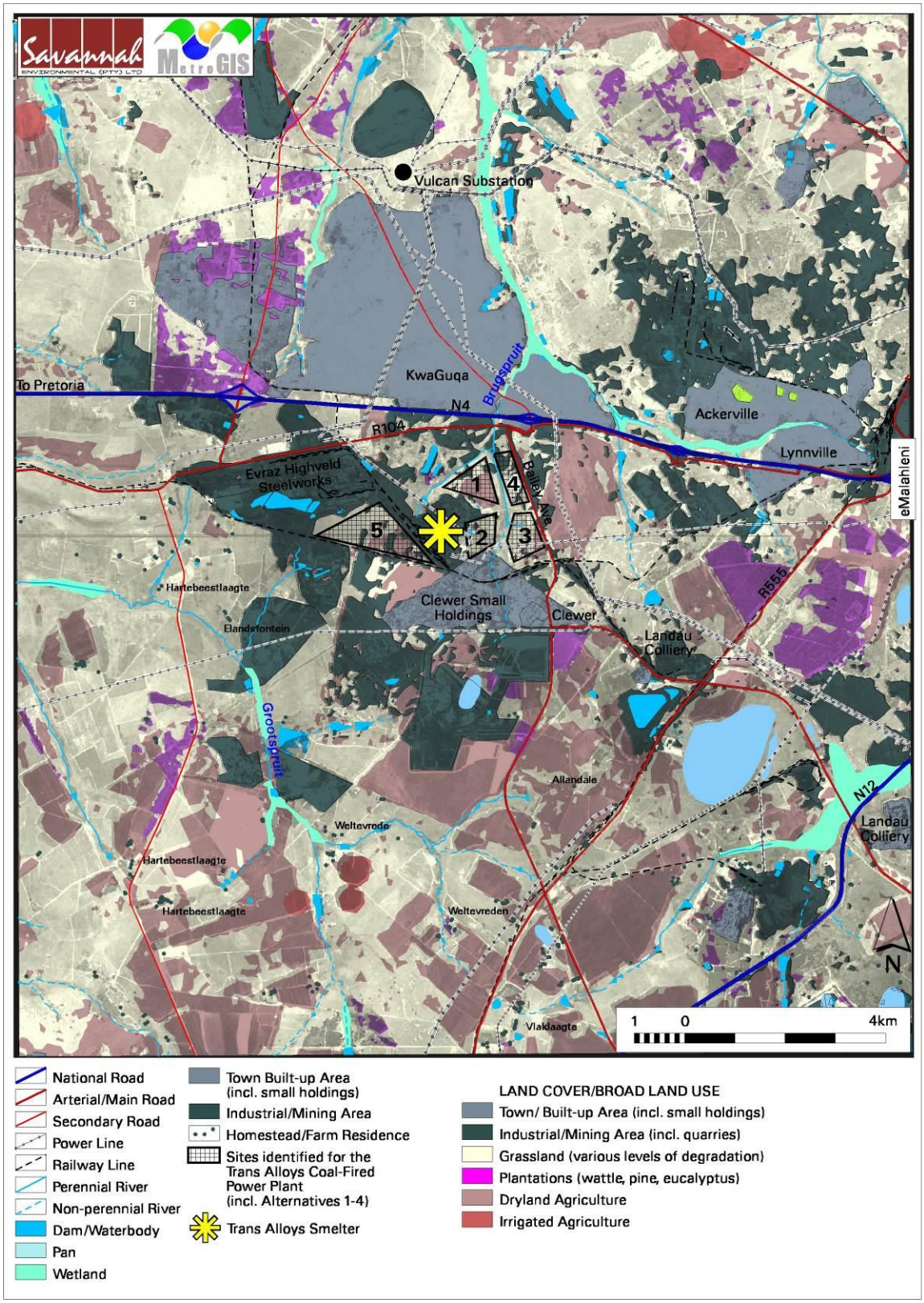


Figure 4.2: Map showing the land cover of the region relative to the Transalloys Smelter Complex and site alternatives.

4.4 Climate

The climate for Transalloys has been derived from climatic data summarised for Emalahleni (Figure 4.3, for sources see AGIS 2007 and additional websites listed under references). The area receives approximately between 540mm and 650 mm of rain on average per year. From May to September, rainfall is minimal, with most rainfall occurring from November to March, peaking between November and January. The warmest month is January with daily average temperatures rising from 13.4 °C to 26.9 °C. In July, the average temperature at night drops to 5.6°C, and rises to 21.8 °C during the day. Frosts are common during winter, generally occurring from mid-April to late September.

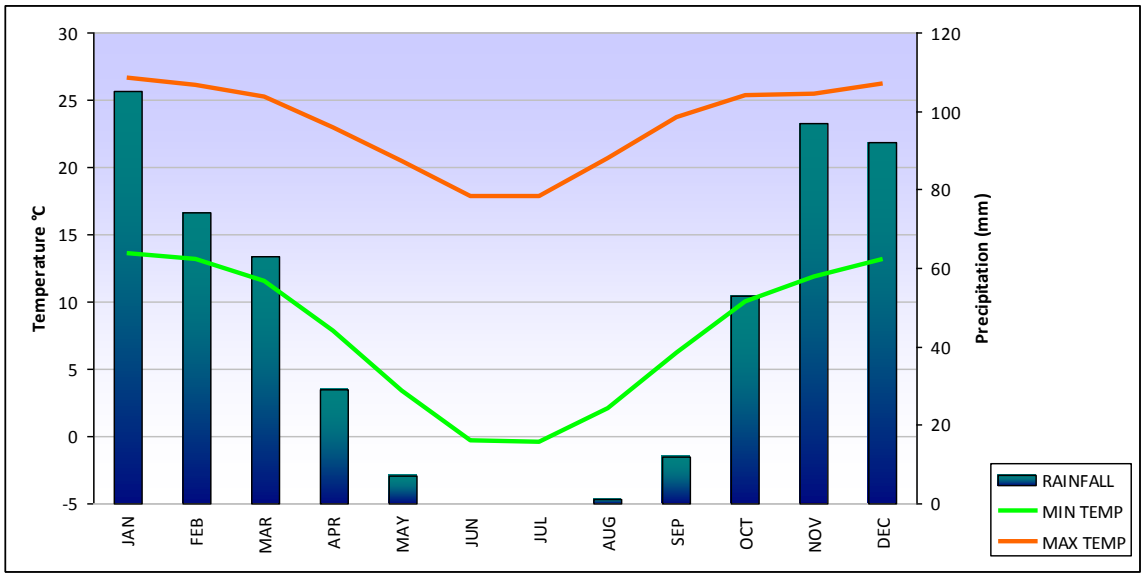


Figure 4.3: Climate data for Emalahleni as summarised from available sources.

4.5 Air quality

Transalloys is situated within the Highveld Priority Area (HPA) which is an area that has been identified as being characterised with poor air quality (refer to Figure 4.4). Power Generation activity in the HPA is the major source of SO_2 emissions (82%) and NOx emissions (73%) while it is only responsible for a relatively small contribution to the total PM_{10} load (12%). As a result of the concerns over the poor ambient air quality over the Highveld area, the Minister of Environmental Affairs declared a portion of Mpumalanga and Gauteng provinces an air quality priority area in November 2007 and a management plan for the HPA was published in September 2011.

The proposed Transalloys coal-fired power plant falls within the HPA footprint and it will contribute to the pollution within the Highveld airshed. The management plan for the HPA must therefore be included in all management plans to be prepared for the proposed power project.

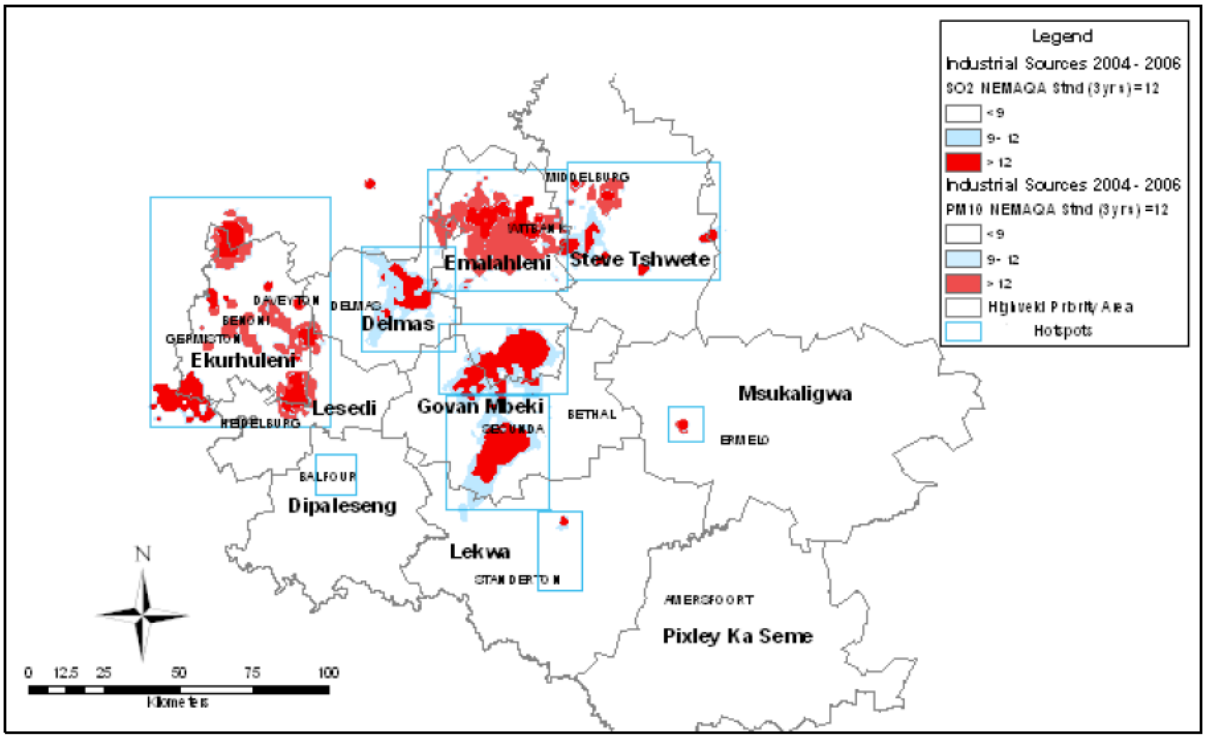


Figure 4.4: Extent of Highveld priority area indicating hotspot areas of PM10 and SO_2 exceedance (Zunckel, Naiker et al. 2010)

4.6 Geological and soil profile

4.6.1 Geological profile

The regional geology in the area is characterised by the sedimentary rocks of the Karoo Supergroup, in particular the Dwyka and Ecca Groups. The Dwyka consists mainly of tillite and diamictite, whereas the Ecca consists of siltstone, shale and sandstone belonging to the Vryheid Formation. The Dwyka sediments were deposited during late Carboniferous to early Permian times by glacial processes and the underlying rocks particularly in the north, display well-developed striated glacial pavements in places. The group consists mainly of diamictite (tillite), which is generally massive with little jointing, but it may be stratified in places.

4.6.2 Land Types (Soils) and Agricultural Potential

Land capability is the combination of soil suitability and climate factors. Site alternatives 1 - 5 have a land capability classification, on the 8 category scale, of class 3 (moderate potential arable land). The agricultural limitation is mainly that of a lack of water and soil moisture for crop production.

There is a single land type across the sites, namely Bb13. This land type is dominated by deep to moderately deep, yellow, well drained sandy loam soils of the Clovelly, Avalon and Glencoe soil forms.

The site is located within a grain farming agricultural region. All the sites have been cultivated in the past. The alternative site to the west of the Transalloys complex (Site Alternative 5) is currently the most intensively cultivated of the sites. Sites 2, 3 and parts of 4 have not been cultivated for at least the last 5 years. Site 1 and parts of site 4 have been cultivated within the past 5 years. There is no irrigated agriculture on the sites. The potential maize yield for all sites is given on AGIS as between 2.5 and 3.4 tons per hectare.

4.7 Hydrogeology

The rock types underlying the study site can be divided into two distinct aquifers, namely a shallow weathered aquifer and a deeper fractured aquifer (*source: Transalloys Groundwater Model – MVB Groundwater Consulting)*.

Shallow aquifer: This aquifer mainly comprises unconsolidated sand and clay. The depth of weathering, based on the geological borehole logs and some field investigations varies between 0m to 12m in depth. Recharge to this aquifer occurs from rainfall as well as from surface water sources, including the Transalloys waste disposal sites.

Deep fractured aquifer: A deeper fractured aquifer also underlies Transalloys in the fresh shale, sandstone and coal seams underlying the weathered material. The primary porosity of the Ecca Group rocks does not allow significant groundwater flow, except where the porosity has been increased by subsequent secondary structures, such as faults and dykes. No dykes were however, detected in the study area.

4.8 Surface water resources and features within the study area

Watercourses: The Transalloys study area falls within the Olifants River Catchment (quaternary catchment B11K) and is situated in the headwaters of the Brugspruit and a tributary (known as the western tributary).

The main water course traversing the properties investigated for the development of the Transalloys Power Plant (Site Alternatives 1-4) is the Brugspruit. This drainage line is a tributary of the Klipspruit north of the project site which conjoins with the Klip River in a northerly direction to ultimately feed into the Olifants River. To the south of the project site on the Farm Elandsfontein 309 JS, the Grootspruit and its tributaries flow towards the Saalklapspruit which flows west of the farm. It is not foreseen that the proposed Power Plant will have any

impact on this tributary since it will be effectively outside the 1:100 year floodline of this specific water course.

The majority of selected sites for the proposed Power Plant development are located within Quaternary Catchment B11K with only the western portion of Alternative site 5 located within Quaternary Catchment B20G. The Klipspruit and its tributaries (including the Brugspruit) in Quaternary Catchment B11K has been classified by the Department of Water Affairs as being perennial having a Present Ecological State (PES) of Class D, implying a largely modified river system.

Wetlands: Five wetland systems have been delineated within 500m of the Transalloys industrial complex, over a total area of 84ha comprising of the following (refer to Figure 4.5):

1. Valley bottom wetlands with a channel (24ha)
2. Valley bottom without a channel (13ha)
3. Hillslope seep feeding a watercourse (34ha)
4. Hillslope seepage not feeding a watercourse (10ha)
5. Hillslope seepage not feeding a watercourse (3ha)

The wetlands on and around the study area can be generally described as Eastern Temperate Freshwater Wetlands (AZf 3), with most identified in portions of the study area too small to have been mapped at a national scale. These wetlands consist of shallow depressions filled with seasonal or permanent water supporting hydrophyllous (water-loving) vegetation.

In general, wetlands in the study area are deemed to be in a good condition, with localised impacts from current activities including:

- Quarrying in wetland 4
- Tailings on wetland 3
- Seepage from tailings into wetlands 2 and 3
- Alien invasive species in wetlands 1 and 2

Site alternatives: As shown in Figure 4.5, should the proposed power plant be constructed on alternative sites 1 – 4, it would be located within close proximity to the watercourses and delineated wetlands. Site alternative 2 which is the only site wholly situated within the Transalloys complex boundary will be most affected due to the extent of wetlands delineated on the site (wetland 4).

Figure 4.5: Wetlands (blue and green areas) delineated within 500m of the Transalloys industrial complex (*source: Ixhaphozi Environmental Services)* as mapped relative to the site alternatives 1 - 5

4.9 Biophysical Characteristics of the Study Area and Surrounds

4.9.1 Ecology

The study area can be described as gently undulating high level plains between 1500 and 1500 m above sea level, with slopes ranging from <2% to 8% (AGIS 2007). Various types of depressions, seepage areas and other wetlands have been mapped and observed within and surrounding the study area (Grundling and Linström 2012). It is possible that more seepage areas and smaller streams occur within the selected sites, as soils are highly leached, structureless and have somewhat impeded drainage (AGIS 2007). The drainage characteristics of the soils implies a moderate to high risk that contamination affecting soil can be rapidly distributed into lower-lying landscapes and wetlands during a rainfall event.

Evidence of seasonally significantly higher moisture levels in these depressions, seepage areas and wetlands should be visible from the difference in vegetation vigour and species composition from the surrounding vegetation.

Soils generally have a low pH ($\leq$ pH 5.5) and are moderately to highly susceptible to acidification. Erosion hazard is generally low, but on sloping land a moderate erodibility of soils has been identified (AGIS 2007). Generally the soils are undifferentiated, structureless soils.

4.9.2 Vegetation overview

The study area (site alternative 1-5) falls within the original extent of the Eastern Highveld Grassland (Unit Gm 12). This vegetation type is listed as Vulnerable on the Gazetted National Threatened Ecosystems List. In close proximity of the study area are Eastern Temperate Freshwater Wetlands (Unit AZf 3), which are partially fed by drainage lines and seepage areas that occur within the study area. All three vegetation types (refer to Figure 4.6) have been gazetted as threatened ecosystems, being classified as 'vulnerable'.

Eastern Highveld Grassland (Gm 12) is situated on slightly to moderately undulating plains, dominated by short dense grasses of the genera *Aristida, Brachiaria, Cynodon, Digitaria, Eragrostis*, *Setaria, Sporobolus*, *Themeda* and *Tristachya*. Smaller rocky outcrops provide a niche habitat for more wiry grasses and few woody species, including *Parinari capensis* and *Protea caffra*. Similar specialised habitats are provided by pan depressions and seepage areas (Mucina and Rutherford 2006). The diversity of the herbaceous layer may vary significantly from year to year depending on rainfall amount and timing, which influence the germination of annuals and resprouting of species with woody

below-ground rootstocks. Common herbs include *Berkheya setifera*, *Haplocarpha scaposa, Acalypha angustata, Dicoma anomala* and several *Helichrysum* and *Ipomoea* species.

The remaining extent of the Eastern Highveld Grassland has been listed in the threatened terrestrial ecosystems for South Africa (2011) as Vulnerable, as more than 44% of this vegetation type has been irreversibly transformed. Less than 0.3% of the ecosystem is currently formally protected.

4.9.3 Plant species potentially occurring in the study area

917 plant species have been recorded in the Witbank/Emalahleni area to date (Quarter Grid 2529CC), whilst up to 1700 species are currently known to occur in the wider grid (Grid 2529) according to the SANBI database. It is unlikely that all of these species will occur within the project area, whilst species not previously recorded may be present.

Of the previously recorded species, 37 species that could likely occur on the study area have a red-data status. The presence of these species on site will have to be verified during a detailed field study. It is also important to note that a large percentage of the potential red data species are geophytes that will only be visible during the growing season. The appropriate timing of the EIA field study is therefore of utmost importance.

A full description of plant communities on the site and associated habitats will be provided after a field study conducted during the growing season, which will also reveal where remaining threatened grassland vegetation may occur.

4.9.4 Botanical status of site alternatives and associated infrastructure

The alternative sites that have been identified as possible sites for the construction of the power plant can be described as follows:

» **Site alternative 1**: partially transformed, with two edges in close proximity to streams. A high possibility of protected or red data plants present in areas closer to the stream exists.
» **Site alternative 2**: natural vegetation with one edge in close proximity to a stream. A high possibility of protected or red data plants present all over the site exists.
» **Site alternative 3**: natural vegetation with various levels of disturbance, large seepage areas identified on the site and one edge in close proximity to a stream. A high possibility of protected or red data plants present throughout the site exists.

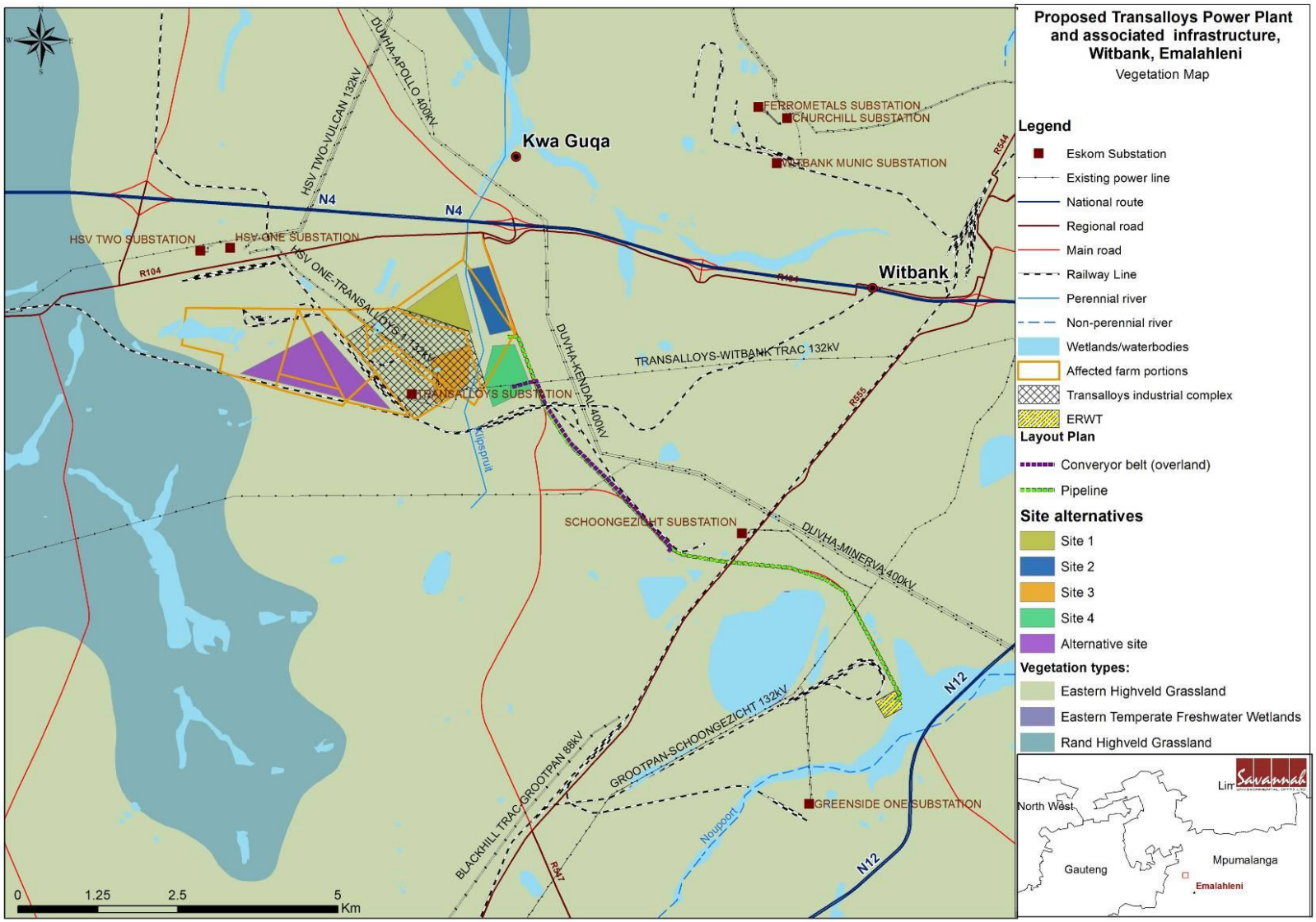


Figure 4.6: The original extent of Vegetation types of the study area.

» **Site alternative 4**: natural vegetation with one edge in close proximity to a stream. A high possibility of protected or red data plants present throughout the site exists.
» **Alternative site 5**: entirely transformed area adjacent to a railway line. Seepage from past cultivation activities have been intercepted by the railway line and over the years may have created a small seepage area adjacent to the railway line, but outside the proposed development site. A high presence of alien invasive species on the fallow lands is expected.

The associated infrastructure routes can be described as follows from a botanical perspective:

» **Water supply pipeline**: The pipeline is proposed to be situated mostly in the road reserve, crossing a small section of natural vegetation. Despite past disturbance levels along this route, the presence of protected/and or red data species is possible. The presence of alien invasive species is expected.
» **Overland conveyor**: The route will be determined according to the final selection of the site on which the power plant will be constructed, but will most likely be situated on previously disturbed areas and adjacent to the water supply pipeline.

4.9.5 Vertebrates

A list of protected vertebrate species (reptiles, birds, and mammals) that could occur in the study area according to the ADU and SANBI databases, as well as Apps (2000) is presented in Table 4.1. Several amphibians have been recorded for the area, but these are not listed here as none of the species recorded are of any conservation concern. Whilst fauna species are mobile and the impact of new structures does not destroy animals as it does plants, they do depend on specific habitats which could be impacted by the project. For all species that are protected as indicated in the list, the presence and suitable habitat of such species must be verified by a suitably qualified specialist to ensure that the habitat of such species will not be impacted on by the proposed development.

Table 4.1: Protected vertebrates that could occur in the study area (MNCA = Mpumalanga Nature Conservation Act)

Common Name	Species Name	Threat Status
Reptiles - Chameleons		
Common Flap-neck Chameleon	*Chamaeleo dilepis* subsp *dilepis*	MNCA
Reptiles - Geckos		
Cape Gecko	*Pachydactylus capensis*	MNCA
Reptiles – Lizards and skinks		

Common Name	Species Name	Threat Status
Coppery Grass Lizard	*Chamaesaura aenea*	MNCA, end
Large-scaled Grass Lizard	*Chamaesaura macrolepis*	MNCA
Common Girdled Lizard	*Cordylus vittifer*	MNCA
Yellow-throated Plated Lizard	*Gerrhosaurus flavigularis*	MNCA
Wahlberg's Snake-eyed Skink	*Afroablepharus wahlbergii*	MNCA
Sundevall's Writhing Skink	*Mochlus sundevallii* subsp *sundevallii*	MNCA
Cape Skink	*Trachylepis capensis*	MNCA
Speckled Rock Skink	*Trachylepis punctatissima*	MNCA
Variable Skink	*Trachylepis varia*	MNCA

4.10 Social Characteristics of the Study Area and Surrounds

The proposed project is located in the Emalahleni Local Municipality (ELM) which forms part of the Nkangala District Municipality (NDM). The town of Witbank is the administrative seat of the ELM. The NDM is located to the North-West of the Mpumalanga Province and is the smallest district in land mass (21%) and has the second largest population concentration (35%) in the province. The NDM covers an area of about 2677.67 km² in extent.

4.10.1 Demographic profile

The population of the NDM increased by from 1 018 422 in 2001 to 1 308 129 in 2011, which represents an increase of ~ 28%. The population of the ELM increased from 276 413 in 2001 to 395 466 in 2011, which represents a significant increase of 43% over the same period. This represents an average annual increase of ~ 2.5% and 3.58% for the NDM and ELM respectively. The majority of the population in the ELM are Africans (81.3%), followed by Whites (15.7%) and Coloureds (0.9%). In terms of gender, 52.8% of the ELM population were males and 47.2% females. This is largely due to the nature of industries around the municipality area which tend to be more male oriented.

The increase in the population in both the NDM and ELM was linked to an increase in the 15-65 and older age groups. The increase in the economically active age group of 15-65 years in the ELM is likely linked to the influx of job seekers to the area from the surrounding rural areas in the province. This is also reflected in the decrease in the dependency ratios in both the NDM and ELM (see below). This highlights the economic importance of the area and towns such as Witbank and Middleburg. As expected, the number of households in both the NDM and ELM increased between 2001 and 2011. The size of the household sizes in both areas essentially remained the same, namely in the region of 3.9-3.2.

The dependency ratio in both the NDM and ELM decreased from 60.7 to 50.4 and 45.4 to 40.4 respectively. The decrease in the NDM as indicated was significant. The age dependency ratio is the ratio of dependents, people younger than 15 or older than 64, to the working, age population, those ages 15-64. The decrease represents a positive socio-economic improvement, and reflects a decreasing number of people dependent the economically active 15-64 age group. As indicated above, there has been an increase in the percentage of economically active people in both the NDM and ELM. The dependency ratios for both the NDM and ELM are lower than the provincial and national ratios, which were 56.0 and 52.7 in 2011 respectively. Over the past 50 years, the value for this indicator has fluctuated between 84.43 in 1966 and 53.29 in 2010.

In terms of percentage of formal dwellings, the number of formal dwellings in the NDM increased from 74.8% in 2001 to 82.8% in 2011. In the ELM the number of formal dwellings also increased from 67.1% to 77.2% for the same period. This represents a positive socio-economic improvement for the area.

The official unemployment rate in both the NDM and ELM also decreased for the ten year period between 2001 and 2011. In the NDM the rate fell significantly from 43.8 to 30.0 %, a decrease of 13.8 %. In the ELM the unemployment rate decreased from 38.4 % to 27.3 %, a decrease of 11.1 %. Youth unemployment in both the NDM and ELM also dropped over the same period. However, the youth unemployment rate in both the NDM and ELM remains high at 39.6 % and 36.0% respectively. The unemployment rate for females in the ELM was 37.1% compared to 20.8% for males. This reflects the dominant role played by the mining sector in the ELM economy.

The education levels in both the NDM and ELM also improved, with the percentage of the population over 20 years of age with no schooling dropping in the NDM decreasing from 24.9 1% to 11.5%. For the ELM the decrease was from 15.7% to 5.8%. The percentage of the population over the age of 20 with matric also increased in both the NDM and ELM, from 20.1% to 29.4% in the NDM and 24.4% to 31.4% in the ELM.

4.10.2 Economic profile

Mining sector: The economy of the ELM is driven by the Mining sector which contributed more than 50% to the economic activity of the LM in 2009, followed by Electricity at 12.1% and Finance at 10.8%. The mining sector is also the most important sector in terms of job creation. The importance of the Mining sector has also increased, increasing from 41% in 2007, to 50.8% in 2008, with a slight decline to 49.8% in 2009. The majority of the mining in the ELM is linked to coal.

Coal produced within Emalahleni is for both the local and export markets. For the local market, Eskom is the major buyer while China is the major export buyer. However, the current condition of the rail freight transportation system for transporting coal to power stations within Mpumalanga and Richards Bay is one of the biggest challenges faced by mining houses within the ELM and this has put a strain on the road infrastructure which requires regular repairs. The large scale mining has also been at the expense of the agricultural sector. The IDP does, however, note that coal mining and electricity generation within the ELM do pose serious challenges around environmental degradation and pollution from greenhouse gas emissions which calls for special focus being given on the green economy and related projects.

The IDP identifies a number of factors limiting or capable of limiting the ability of the mining sector to increase production and improving their operational efficiency. Two of the factors identified are also relevant to the proposed project, namely:

- Shortage of energy due to Eskom electricity outages that tend to cause machine breakdowns and work stoppages;
- Shortage of skilled labour, particularly skilled artisans and technicians among the previously disadvantaged population groupings;

In terms of potential growth the key sectors identified in the IDP include Finance, Trade and the green economy. Of concern is the contribution of the Agricultural sector which is relatively low compared to the other sectors of the economy.

Manufacturing sector: The IDP notes that the performance of the ELMs Manufacturing sector over the past few years is of concern. Given the location of some of the major steel manufacturing companies such as Highveld Steel within the locality, the sector contribution to GVA-R and growth rates are expected to out-perform sectors such as finance and trade. However, the lack of diversification of the sector and its concentration on metal products is identified as a key factor contributing to the present performance state of the sector.

In terms of job creation the manufacturing sector is a key sector, specifically given the potential for beneficiation and longer value chains, economic growth and SMME development. The IDP notes that given the proxy relationship between manufacturing and other sectors such as mining, agriculture and construction the manufacturing sector potential within ELM requires attention. In this regard the IDP recommended that the ELM should develop an Industrial Development Plan in which extensive and intensive research is undertaken to unlock the manufacturing potential that is linked to mining and agriculture as well as other support services sectors.

Tourism sector: Business tourism is identified as the key contributor to the performance of the hospitality services sector within the ELM. Key clients were identified and categorised as government employees from both national and provincial, mine employees and executives visiting the various mining houses and other businesses across the municipal area, friends and relatives visiting and tourists and travellers in transit either to the Lowveld or Maputo as well as those to Gauteng.

The IDP identifies a number of potential constraints facing the tourism sector. Of relevance to the proposed project are power failures and the impact on business reputation and loss of confidence by clients.

4.10.3 Labour force and Employment Structure

Mpumalanga's labour market is characterised by a low participation rate and a high unemployment rate. In 2007, the unemployment rate in the province was estimated at 22.9%. The figure for 2011 was 31.6% (Census 2011). Unemployment rates in Mpumalanga are high even for individuals who have completed their secondary education. The share of the unemployed with higher levels of education has increased from 20.7% 1995 to 32% in 2006, an increase of more than 10%. This appears to point towards the lack of returns to education in the Mpumalanga labour market, unless an individual has a tertiary education, in which case there are larger returns in Mpumalanga than in the rest of the country.

In terms of population groups and gender, unemployment among Africans (38.7%) was more than four times that of Whites in 1995, while in 2006 this ratio had increased almost 10-fold. Females in Mpumalanga have an unemployment rate roughly twice that of males with the total female unemployment rate at approximately 50%.

On the positive side, the MPGDS states that total employment in Mpumalanga has increased by an average of 2.9% per year, which is close to the rate of economic expansion in the province (3.1%). Overall, output expansion in the province was accompanied by employment growth, with every 1% of GGP growth in the province translating into a 0.92% increase in employment. Therefore, no jobless growth is evident for the province as a whole despite the considerable jobless growth in the period 1995 to 2005, in the agriculture, mining and utilities sectors.

4.11 Paleontological and Archaeological Profile

4.11.1Paleontological profile

The Vryheid Formation in which the study area occurs is fossiliferous (occasionally richly) elsewhere in the Main Karoo Basin. The Vryheid Formation contains both plant macrofossils of the Glossopteris Flora and trace fossil assemblages that are potentially highly significant to the cultural and scientific heritage of South Africa. As such, fossils are potentially present. A regolith cover is inferred to be present over much of the project area. The fossiliferous potential of this unit is assumed to be low due to the generally sporadic and scarce nature of fossils in the geological record.

4.11.2 Archaeological profile

History of the study area: An Anglo Boer war battle took place on the farm Donkerhoek, only a few kilometers to the west of Transalloys. The battle lasted between 11 and 12 June 1900 and other skirmishes also took in the vicinity. Blockhouses were also erected in the vicinity by the British. The potential existence of farm buildings and objects as well as artefacts related to the Anglo-Boer War during construction may be anticipated.

Heritage potential: There is a low to medium likelihood of finding Middle Stone Age sites scattered over the study area similar to finds made to the north (Huffman 1999). Due to the disturbed character of the area it is not anticipated that any Iron Age sites will be found, in addition to this no known Iron Age sites are on record for the study area. There is a medium likelihood of finding sites relating to the Anglo Boer War in the study area.

SCOPING OF ISSUES ASSOCIATED WITH THE PROPOSED TRANSALLOYS POWER PLANT AND ASSOCIATED INFRASTRUCTURE CHAPTER 5

This chapter serves to describe and evaluate the identified potential environmental impacts associated with the proposed Transalloys Coal-Fired Power Plant project, and to make recommendations for further studies required to be undertaken in the EIA phase. The scoping process has involved input from environmental specialists and consultants, the project proponent, stakeholders and the public. Environmental specialist scoping reports are included within Appendix F to O.

Impacts associated with the proposed coal-fired power plant and associated infrastructures are evaluated in the sections which follow, following which information gaps are identified and recommendations made regarding further studies / inputs required within the EIA phase of the process.

Impacts are expected to result from both the construction and operational phases of the power station and associated infrastructure (such as power lines, ash dams, wastewater treatment works, water supply pipeline, coal conveyor, etc.), and are expected to include:

» Impacts on air quality;
» Impacts on biodiversity (flora & fauna);
» Impacts on soil, land use and land capability;
» Impacts on groundwater;
» Impacts on surface water and wetlands;
» Impacts on heritage artefacts;
» Social impacts;
» Noise impacts;
» Visual impacts;
» Additional traffic impacts.

The extent of the impacts listed above will differ between the five site alternatives included in the scoping assessment. This chapter serves to separate site alternatives which are not suitable for further assessment during the EIA phase of the project from more suitable siting options based on the environmental criteria and anticipated impact extent and probability.

The **cumulative impacts** associated with the proposed coal-fired power station and associated infrastructure are expected to be associated with the other coal-fired power stations located in the broader HPA. The potential direct cumulative impacts associated with the project are expected to be associated predominantly

with air quality, impacts on biodiversity and the physical alteration of land use. Cumulative noise impacts are also anticipated due to the combined operations of the Transalloys industrial complex, the EVRAZ Highveld Steelworks and the proposed power plant. Cumulative effects are identified and described on this scoping report and will be assessed in the detailed specialist studies to be undertaken in the EIA phase.

5.1 Scoping of Issues

The text and tables below provide an indication of the potential direct and indirect environmental issues and impacts which have been identified during the Scoping phase of the EIA and which may be relevant during the construction and operational phases of the project. Impacts associated with decommissioning of the project are expected to be similar to those associated with the construction phase and are therefore not evaluated separately.

5.1.1 Impacts on Air Quality

Environmental aspects influencing the dispersion and removal of air pollutants from the atmosphere include meteorological parameters, topography and land-use characteristics and location of sensitive receptors in relation to the source of pollution. Source parameters, on the other hand, determine the amount of, and the way in which pollution is released into the atmosphere.

From an air quality perspective, significant constraints with regards to the construction and operation of a coal fired power station in the proposed area may include the close proximity to sensitive receptors such as:

» Clewer – A small town located about 500 m from the Transalloys southern boundary
» Kwa-Guqa – A town located about 3 km north of Transalloys
» eMpumelelweni - A town located about 3 km north-west of Transalloys.

Construction impacts: Air emissions during construction are expected to be related to those associated with dust generation and impacts from emissions from vehicles.

Operational impacts: The main pollutants of concern from the power station operations are particulate matter, specifically PM_{10} and $PM_{2.5}$, sulphur dioxide (SO_2) and oxides of nitrogen (NOx). With the proposed site being located within the HPA, which is an area that has been identified as one characterised with poor air quality, it is likely that the power station operations would add to the already elevated ambient concentrations of air pollutants.

Table 5.1: Impacts on air quality

Issue	Nature of Impact	Extent of Impact	'No go' areas
Construction Phase			
Dust and air emissions due to construction vehicles and activities.	During construction, site clearing and excavations may result in dust, which could be a nuisance to people in and around the site. Dust is a nuisance that can be managed during construction through use of appropriate dust control measures.	Local (500m from site)	Recommended 500m buffer zone around construction operations.
Operational Phase			
Dust generated during operations of the power station, specifically materials handling of coal and ash, vehicle entrainment on roads and wind-blown dust from the coal stockpiles and ash storage facility.	Nuisance effect of dust depositing on surfaces such as the coal stockpiles and ash storage facility. The main concern is for impacts downwind of the facility.	Local	None identified at this stage.
Emissions of gaseous and particulate pollutants during operations from coal handling and processing, stacks, vehicle entrainment on roads and ash storage facility.	Potential health impacts specifically associated with PM_{10}, $PM_{2.5}$, SO_2 and NOx.	Local and Regional (cumulative)	None identified at this stage

Preferred site: From an air quality perspective, **Site Alternative 5** will likely generate lower impact on the sensitive receptor sites of Clewer, Kwa-Guqa and eMpumelelweni. Alternative site 5 is located west of the Transalloys complex and downwind of the major sources of air pollution from Transalloys processes.

Gaps in knowledge & recommendations for further study:

Construction: An air quality specialist study will be undertaken during the EIA phase and will consider the impacts of dust during construction. The EMP will state measures for avoidance or reduction of dust during construction.

Operation: An air quality specialist study will be undertaken during the EIA phase and will consider the impacts of dust and gaseous pollutant during the operational phase of the proposed power plant. The EMP will state measures for

avoidance or reduction of dust and gaseous emissions during operations. Cumulative impacts would be addressed by including the measured background concentrations to determine the potential for cumulative impacts from the proposed power plant.

5.1.2 Impacts on Biodiversity (Flora and Fauna)

The Transalloys site falls within the original extent of the Eastern Highveld Grassland (Unit Gm 12). This vegetation type is listed as Vulnerable on the Gazetted National Threatened Ecosystems List. In close proximity of the study area are Eastern Temperate Freshwater Wetlands (Unit AZf 3), which are partially fed by drainage lines and seepage areas that occur within the study area. All three vegetation types have been gazetted as threatened ecosystems, being classified as 'vulnerable'.

Previous studies conducted around the Transalloys complex indicated the presence of several wetlands. Similarly, currently available vegetation maps of the area indicate that all remaining natural veld can be regarded as a threatened ecosystem. The areas thus identified as sensitive (Figure 5.1) are depressions, seepage areas and wetlands including larger drainage lines, dams and vleis, as well as remaining natural vegetation. It must be noted that the BGIS maps are largely based on the analysis of remotely sensed data, and not actual ground verification. According to legislation, the remaining portions of natural vegetation of threatened ecosystems must be investigated on the ground by a specialist to determine their ecological state, from which a final classification about their sensitivity can be made. These ecosystems with their inclusive wetlands and niche habitats are sensitive because of their ecosystem functions – providing specialised niches for fauna, creating corridors in the landscape, filtering water, catching sedimentation and concentrating water runoff from catchments.

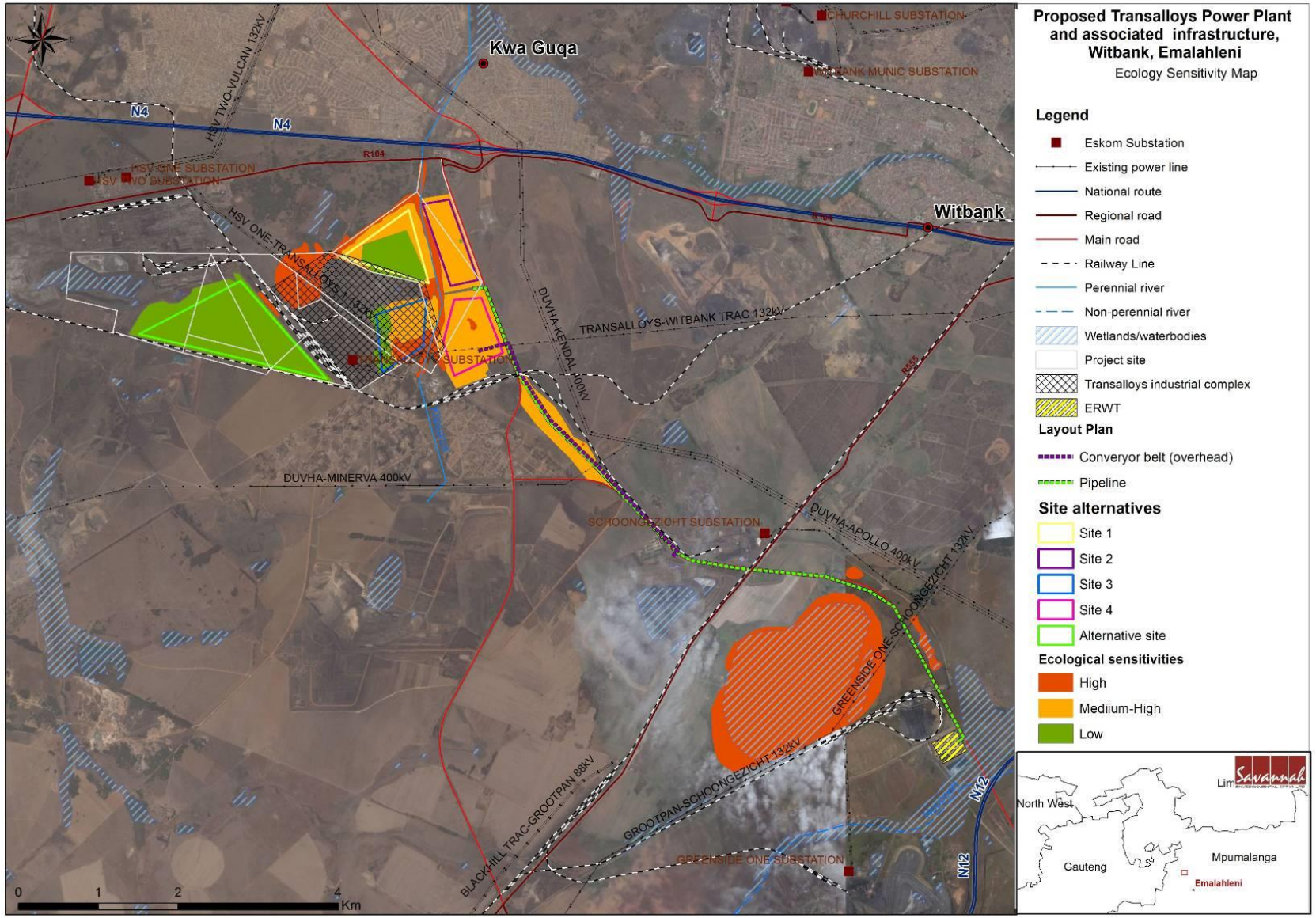


Figure 5.1: Preliminary sensitivity map of the study area

Table 5.2: Impacts on biodiversity

Issue	Nature of Impact	Extent of Impact	'No go' areas
Construction Phase			
Disturbance or loss of indigenous vegetation	Construction of infrastructure may lead to direct loss of natural and semi-natural vegetation, causing a reduction in the overall extent of specific species and vegetation cover. Consequences of the potential impact of loss of indigenous semi-natural vegetation occurring may include: » Increased vulnerability of remaining vegetation portions to future disturbance, including erosion; » General loss of habitat for sensitive species; » General reduction in biodiversity; » Disturbance to processes maintaining biodiversity and ecosystem goods and services; or » Direct loss of ecosystem goods and services.	Local	The only "no-go" areas identified to date are confirmed wetland areas; areas of potential high sensitivity relate only to the possible presence of additional wetlands and / or intact natural vegetation.
Disturbance or loss of threatened / protected plants	Several protected or threatened plant species occur on and adjacent to the proposed development site. Flora is affected by direct loss or change of habitat due to infrastructure development, or indirect effects of the development which may lead to a change of habitat quality. In the case of threatened plant species, a loss of a population or individuals could lead to a direct change in the conservation status of the species, possibly extinction. This may arise if the proposed infrastructure is located where it will impact on such individuals or populations. Consequences of this may include: » Fragmentation of populations of affected species » Reduction in area of occupancy of affected species » Loss of genetic variation within affected species Many of the protected species expected	Local	As above

Issue	Nature of Impact	Extent of Impact	'No go' areas
	to occur on site are geophytes, hence the field study must be conducted during the peak growing season for the area.		
Loss of habitat for protected terrestrial vertebrates	Terrestrial fauna species are affected primarily due to loss or alteration of habitat. Animals are generally mobile and, in most cases, can move away from a potential threat. Consequences of the development on fauna may include: » Reduction in area of occupancy of affected species; and » Loss of genetic variation within affected species. These may all lead to a negative change in conservation status of the affected species, which implies a reduction in the chances of the species' overall survival chances. To date no threatened terrestrial fauna species have been recorded from the project area. However, it can be expected that protected reptiles and amphibians may be present. Due to the previous transformation of most of the proposed development area, the presence of critical habitats for any species is unlikely.	Local	The only "no-go" areas identified to date are confirmed wetland areas. It is not anticipated that these small wetlands constitute any critical habitat for any fauna species.
Deterioration of surrounding habitats due to possible leaching or deposition of pollutants	The drainage characteristics of the soils as indicated by available data indicates a moderate to high risk that contamination affecting soil can be rapidly distributed into lower-lying landscapes and wetlands during a rainfall event. Contamination of soils through direct spills or deposition of wind-borne pollution will gradually change habitat characteristics and quality, leading to a gradual decline in species presence and persistence. Such contamination can arise from: » Accidental discharge of materials	Local to regional	The only "no-go" areas identified to date are confirmed wetland areas; areas of potential high sensitivity relate only to the possible presence of more wetlands and / or intact

Issue	Nature of Impact	Extent of Impact	'No go' areas
	from construction machinery » Pollutants carried by wind, mostly arising from dust created by the construction process With adequate spill prevention, dust suppression and pollution containment measures in place, potential negative impacts can be avoided.		natural vegetation.
Impacts on wetlands	The site is in a semi-arid to dry sub-humid area (BGIS 2007). The generally low slopes and soil conditions in the area have, over time, created many smaller wetlands – ranging from insignificant depressions to seepage areas, insignificant drainage lines, pans, and rivers. . Construction of CFB Power plant and associated infrastructure, if it occurred within the immediate surroundings of any of these wetland areas, would lead to direct or indirect changes to the surface hydrology of these areas. This effect on the hydrology of the larger landscape or loss of habitat for species that depend on this habitat type needs to be kept as low as possible by maintaining a suitably wide buffer zone between the wetlands and the proposed development. Further recommendations will depend on the wetland study to be undertaken during the EIA phase.	Local	The only "no-go" areas identified to date are confirmed wetland areas; areas of potential high sensitivity relate only to the possible presence of more wetlands.
Establishment and spread of declared weeds and alien invader plants.	Major factors contributing to the invasion by alien invader plants includes high disturbance such as clearing for construction activities or past cultivation. Exotic species are often more prominent near infrastructural disturbances than within less disturbed natural vegetation. Consequences of these invasions may include: » Loss of indigenous vegetation; » Change in vegetation structure leading to change in various habitat	Local	None

Issue	Nature of Impact	Extent of Impact	'No go' areas
	characteristics; » Change in plant species composition; » Change in soil chemical properties; » Loss of sensitive habitats; » Loss or disturbance to individuals of rare, endangered, endemic and/or protected species; » Fragmentation of sensitive habitats; » Change in flammability of vegetation, depending on alien species; » Hydrological impacts due to increased transpiration and runoff; and » Impairment of wetland function.		
Operational Phase			
Disturbance or loss of indigenous natural vegetation due to possible indirect impacts (described under nature of impact) leading to a change in habitat characteristics and quality	The drainage characteristics of the soils as indicated by available data indicates a moderate to high risk that contamination affecting soil can be rapidly distributed into lower-lying landscapes and wetlands during a rainfall event. Contamination of soils through direct spills or deposition of wind-borne pollution will gradually change habitat characteristics and quality, leading to a gradual decline in species presence and persistence. Such contamination can arise from: » Accidental discharge of materials from the sewage treatment pond, ash dump runoff, evaporation ponds and lime storage areas » Pollutants carried by wind, coming off the ash dumps, lime storage areas, coal conveying operations (conveyor or vehicle transport and loading operations) and emissions from the power station With adequate mitigation measures in place (as planned), these potential negative impacts can be avoided or minimised.	Local to regional	The only "no-go" areas identified to date are confirmed wetland areas; areas of potential high sensitivity relate only to the possible presence of more wetlands and / or intact natural vegetation.
Reduction of surrounding	Stockpiles of low-grade coal discarded by surrounding mines contribute to:	Local to regional	None

Issue	Nature of Impact	Extent of Impact	'No go' areas
low-grade coal stockpiles (Positive impact)	» methane gas production, » leaching of sulphur, » possible leaching of substances that can lead to the acidification of soils and wetlands, » increased dust loads containing harmful pollutants. The gradual reduction of these stockpiles and conversion to ash that can be used in construction/cement production will significantly contribute to the reversal of negative impacts created by past industrial activities in the Emalahleni Area.		
Reduction or increase of alien invasive species through implementation of alien plant management plan	Extensive disturbances to natural vegetation as currently present in the study area and as will result from the construction process, create a window of opportunity for the establishment of more alien invasive species. The following scenarios will be possible: » construction across natural vegetation may lead to an increased presence of alien invasive species » construction on previously transformed areas may lead to a reduction of area of occupancy of alien invasive species and hence also a reduction in reproductive material being disbursed into the surrounding environments » this positive impact can only be maintained through a regular monitoring and clearing program on and around the development area for the duration of the operational phase of the development	Local and surroundings	The only "no-go" areas identified to date are confirmed wetland areas; areas of potential high sensitivity relate only to the possible presence of more wetlands and / or intact natural vegetation.
Altered runoff patterns due to rainfall interception by sealed and compacted	Sealed and compacted surfaces create large surfaces of rainfall interception, concentrating rainfall at the edges from where it flows in larger, concentrated quantities opposed to small drops being directly absorbed by the ground or	Local and surrounds	As above

Issue	Nature of Impact	Extent of Impact	'No go' areas
areas	intercepted by vegetation. This may lead to a localised increase in runoff during rainfall events, which may result in stormwater discharge and accelerated erosion. Likewise, access roads and areas where soils have been compacted during construction will have a low rainfall infiltration rate, hence creating an increase in runoff. Runoff will thus have to be monitored and channelled where necessary to prevent erosion or degradation of lower-lying drainage lines, seepage areas, and rivers beyond the development area.		

Preferred site:

The alternative sites that have been identified as potential siting options for the construction of the power plant can be described as follows:

» Site 1: partially transformed, with two edges in close proximity to streams. A high possibility of protected or red data plants present in areas closer to the stream exists.
» Site 2: natural vegetation with one edge in close proximity to a stream. A high possibility of protected or red data plants present all over the site exists.
» Site 3: natural vegetation with various levels of disturbance, large seepage areas identified on the site and one edge in close proximity to a stream. A high possibility of protected or red data plants present all over the site exists.
» Site 4: natural vegetation with one edge in close proximity to a stream. A high possibility of protected or red data plants present all over the site exists.
» Alternative site: entirely transformed area adjacent to a railway line. Seepage from past cultivation activities have been intercepted by the railway line and over the years may have created a small seepage area adjacent to the railway line, but outside the proposed construction site. A high presence of alien invasive species on the fallow lands is expected.

The initial desk-top investigation of the study area indicates that placement of components of the proposed power plant will be most favourable on transformed areas, and in areas maintaining a suitable buffer zone around all identified wetlands. Therefore, from an ecological perspective, **Site alternative 5** would be the preferred option for the construction of the power plant.

Gaps in knowledge & recommendations for further study:

Construction and operation:

» The presence and delineation of all wetlands will need to be confirmed by a detailed wetland study (site alternative 5).
» It must be noted that there is a possibility of species that have not been captured in the POSA SANBI species database for the area to date to be found within the study area.
» A detailed ecological survey and sensitivity assessment will be undertaken during the EIA phase between mid-November to April.
» The extent of alien invasive species on and around the study area needs to be determined.
» Once the final site for the power plant has been determined, possible routes of stormwater discharge need to be determined to ensure that such stormwater does not enter directly into wetlands in the area.

5.1.3 Impacts on soil, land use and land capability

Transalloys is located within a grain farming region also characterised by the occurrence of heavy industry and residential areas in close proximity to each other. All the site alternatives considered for the siting of the power station have been cultivated in the past with Site Alternative 5 (site between Transalloys and Highveld Steel) being the most intensively cultivated and likely the most productive of the sites. The other four site alternatives have similar sensitivity to each other and have not been cultivated within the last 5 years. Although the alternative site has the highest sensitivity, the impact of its loss is still not likely to have very high significance as it is ascribed a class 3 land capability and is not irrigated.

No off-site impacts on agriculture are anticipated. The significance of agricultural impacts is influenced by the land capability limitations of the sites and thus agricultural impacts are not likely to be of high significance.

Table 5.3: Impacts on soil / agriculture

Issue	Nature of Impact	Extent of Impact	'No go' areas
Construction Phase			
Loss of agricultural land	The permanent loss of agricultural use and production on the site due to re-zoning of land.	Local	None identified
Physical soil disturbance due to	Direct soil impacts are associated with the preparation of the power plant site, as well as construction of internal roads, pipeline and	Local	None identified at this

Issue	Nature of Impact	Extent of Impact	'No go' areas
construction activities.	conveyor routes and other associated infrastructure. Indirect impacts could arise in the form of soil erosion and degradation if storm water management is not planned and implemented appropriately as runoff is generated on the roads and construction sites.		stage.
Operational Phase			
Loss of agricultural land	The primary operational impact would be the permanent loss of agricultural use and production on the site due to re-zoning and development of land.	Local	None identified
Founding conditions and infrastructure	The AGIS database indicates a possibility of swelling clays in the study area, which could lead to ruptures in infrastructure, increasing the chances of pollution. Soil characteristics should therefore be studied in detail once the locations of the various components of the development has been determined to ensure appropriate construction	Local and regional	None identified

Preferred site:

From an agricultural impact and loss of agricultural land point of view, Site Alternative 5 is the most sensitive of the five sites under consideration, as it is most intensively cultivated and is likely to be the most productive of the sites.

Gaps in knowledge & recommendations for further study:

A more detailed assessment of specific soil conditions to more accurately determine agricultural potential differences between the alternative sites will be undertaken during the EIA Phase in order to define a preferred site for development.

5.1.4 Impacts on groundwater

According to a groundwater study conducted at Transalloys (*Groundwater flow and contaminant transport model to assess the groundwater impacts at Transalloys operations: dated May 2012*), two aquifers are present within the area, namely a shallow weathered aquifer and a deeper fractured rock aquifer. These aquifers are separated by the transition from the weathered zone to more competent rock. Aquifer test results suggest that the hydraulic conductivity of both aquifers is low.

Table 5.4: Impacts on groundwater

Issue	Nature of Impact	Extent of Impact	'No go' areas
Construction Phase			
Deterioration of groundwater quality.	Oil, diesel and chemical spills from machinery and construction vehicles during the construction phase.	Local (Site)	None identified at this stage.
Operational Phase			
Deterioration of groundwater quality down gradient of the Transalloys power station	The proposed power station could have an impact on groundwater resources due to contamination as the result of various components of the power station, but most notably from the ash disposal facility, pollution control dams and the wastewater treatment works. Seepage of liquid (leachate) from the ash dumps can be expected to artificially increase the underlying groundwater levels due to continuous seepage from the dumps. These increases will influence local groundwater flow patterns.	Local to Regional	None identified at this stage.
Degradation of the groundwater quality.	Seepage from the ash dump will be of relatively poor quality. This poor quality leachate could mix with the groundwater contained within the underlying aquifers and negatively impact on the groundwater quality. Due to the locally increased groundwater levels underlying the ash dump, it can be expected that contaminated groundwater will migrate away from the ash dump, thereby causing contamination of the surrounding area.	Local to Regional	None identified at this stage.

5.1.5 Impacts on surface water resources and wetlands

Watercourses: The Grootspruit is located to the south-west of Transalloys and outside of the study area. The Brugspruit is located to the east of the Transalloys complex and forms a physical barrier between Site Alternatives 1-2 and 3-4. A tributary of the Brugspruit is situated to the north of the Transallloys complex. All sites apart from Site Alternative 5 are therefore bordered by the Brugspruit or its tributary and development on these sites could potentially impact on this river system.

Wetlands: Several different types of wetlands have been identified and delineated within the study area during a previous investigation (Grundling and Linström 2012). The wetland delineation study was conducted prior to the initiation of the EIA process to have an overview of wetlands in relation to existing Transalloys operations and was therefore limited to Site Alternatives 1-4. The study excluded Site Alternative 5. The presence of wetlands in this area is therefore unknown.

It is possible that more seepage areas and smaller streams occur within the study area, as soils are highly leached, structureless and of somewhat impeded drainage (AGIS 2007). The drainage characteristics of the soils implies a moderate to high risk that contamination affecting soil can be rapidly distributed into lower-lying landscapes and wetlands during a rainfall event.

Table 5.5: Impacts on surface water and wetland resources

Issue	Nature of Impact	Extent of Impact	'No go' areas
Construction Phase			
Degradation of watercourses and wetlands due to construction activities.	The following activities leading to impacts on surface water features have the potential to occur: » Clearance of vegetation to prepare site for construction; » Storage of hazardous chemical substances; » Storage of fuel and oil; » Cement and concrete batching; » Transportation of material to site and the storage of material on site, and » Dust as a result of construction activities.	Local	A wetland feature within Site Alternative 2 has been delineated and Site Alternative 1 is bordered by two watercourses. These areas should be avoided.
Operational Phase			
Storm water from the power station infrastructure	The change in land use from natural vegetation to hardened surfaces will result in an increase in the amount of storm water generated from the site. On the steeper slopes erosion can take place extremely quickly once initiated resulting in dongas and undermining structures. The resultant increased sediment load in wetland areas inhibits these systems to provide ecological services such as water quality enhancement. The change of land use from natural	Local and regional	A wetland feature within Site Alternative 2 has been delineated and Site Alternative 1 is bordered by two watercourses. These areas should be

Issue	Nature of Impact	Extent of Impact	'No go' areas
	vegetation to hardened surfaces reduces the potential for recharge of shallow aquifers that feed hillslope wetlands, which in turn reduces the flow in water resources		avoided.
Impact on water quality	» Potential contaminated storm water run-off from storage facilities; » Possible contamination of surface water as a result of transportation of ash to the ash dump; » Risk of over-flow from storm water dams into the Brugspruit; » Risk of overflow/spillage of pollution control dams and facilities into the surrounding environment and surface water resources » Possible contamination of surface water resources as a result of transportation of material to and from the site;	Local and regional	A wetland feature within Site Alternative 2 has been delineated and Site Alternative 1 is bordered by two watercourses. These areas should be avoided.

Preferred alternative:

Should the proposed power plant be constructed on alternative sites 1 – 4, it would be located within close proximity to the watercourses and delineated wetlands. Site alternative 2 which is the only site wholly situated within the Transalloys complex boundary will be most affected due to the extent of wetlands delineated on the site. From an aquatic ecological perspective it is suggested that Site Alternative 5 be considered the preferred site for development of the proposed power plant. Development on this site is not foreseen to have any significant impact on aquatic ecology.

Gaps in knowledge & recommendations for further study:

The wetland delineation study was conducted prior to the initiation of the EIA process to have an overview of wetlands in relation to existing Transalloys operations and was therefore limited to Site Alternatives 1-4. Seepage from past cultivation activities have been intercepted by the railway line and over the years may have induced small seepage areas adjacent to the railway line, but outside of the proposed construction site. A wetland delineation study over Site Alternative 5 is therefore recommended.

5.1.6 Impacts on Heritage Resources

A single graveyard occurs outside of the Transalloys access gate (between site alternative 1 and 3) and there is evidence that the graveyard is still visited. There is a low to medium likelihood of finding Middle Stone Age sites scattered over the study area similar to finds made to the north (Huffman 1999). Due to the disturbed character of the area it is not anticipated that any Iron Age sites will be found; in addition to this no known Iron Age sites are on record for the study area. There is a medium likelihood of finding sites relating to the Anglo Boer War in the study area.

Table 5.6: Impacts on heritage resources

Issue	Nature of Impact	Extent of Impact	'No go' areas
Construction Phase			
Loss / destruction of Archaeological finds	The construction phase of the project could directly impact on surface and subsurface archaeological sites.	Local	None identified at this stage.
Destruction / disturbance of historical finds and cultural landscape	The construction of the project can directly impact on boer war artefacts and historical sites. There are few structures identified in the study area.	Local	n/a
Destruction / disturbance burials and cemeteries	The construction of the proposed project could directly impact on marked and unmarked graves.	Local	A graveyard occurs between site 1 and site 3
Operational Phase			
Destruction / disturbance burials and cemeteries	The construction and operation of the proposed project could directly impact on marked and unmarked graves.	Local	A graveyard occurs between site 1 and site 3

Preferred site:

Currently there are no sites which are preferred from a heritage perspective.

Gaps in knowledge & recommendations for further study:

» In order to comply with the requirements of the National Heritage Resources Act (Act 25 of 1999), a Phase 1 Heritage Impact Assessment will be undertaken in the EIA phase.

» All identified heritage sites of significance could be mitigated either in the form of conservation of the site within the development or through a Phase 2 study where the sites will be recorded and sampled before the developer can apply for a destruction permit for these sites prior to development. It is not anticipated that the built environment will be severely impacted upon as very few structures occur within the study area and those which do occur are probably younger than 60 years and not protected by legislation. This assumption will however be verified in the field.
» It is recommended that as part of the public consultation process the presence of additional grave sites, archaeological and historical sites should be determined.

5.1.7 Noise impacts

The towns of Clewer and Kwa-Guqa are located just south and north of Transalloys complex respectively. Potential receptors in these towns are already subject to increased noise levels as there are a number of significant noise sources in the area, including the N4 and R547 roads as well as other mining and industrial activities clearly audible at night. A railway siding occurs between Transalloys and the town of Clewer with shunting activities taking place in the area on a 24-hour basis. These shunting activities are clearly audible at night at significant distances.

The area is characterised by uneven terrain with evidence of previous disturbance and is relatively well covered with vegetation. The ground conditions may assist in the attenuation of noise (fraction of sound waves hitting and being reflected from the ground).

An assessment of the area was done using available topographical maps to identify potential Noise-sensitive developments (NSD) in the area (within area proposed, as well as potential noise sensitive developments (NSDs) up to 2 km from boundary of the proposed facility) as indicated in Figure 5.2.

Figure 5.2: Aerial Image indicating identified Noise-sensitive developments relative to the site alternatives

Table 5.6: Potential noise impacts

Issue	Nature of Impact	Extent of Impact	'No go' areas
Construction Phase			
Increase in noise levels due to various types of construction activities	**Construction activities:** Increased noise levels are directly linked with the various activities associated with the construction of the proposed facility and related infrastructure and include: » Development of access roads, water supply pipeline and coal conveyor; » Site establishment (contractors camp, equipment and material storage, security and access control, security fence); » Vegetation and topsoil removal; » Establishment of storage (coal stockpile footprints) facilities; and » Construction of infrastructure (foundations to completed structure). **Material supply:** Instead of transporting the required material for construction to the site using concrete trucks, portable concrete batching plants may be required to supply concrete on-site. Batching plant equipment may be relocated between the sites of construction within the development area as the works progresses to different areas of the site. **Blasting:** Blasting could be required as part of the civil works to clear obstacles or to prepare foundations **Traffic:** A significant source of noise during the construction phase is additional traffic to and from the site, as well as traffic on the site. This will include trucks transporting equipment and machinery, as well as contractors.	Local and regional	None identified at this stage.
Operational Phase			
Noise impact on Noise Sensitive Developments during operation	The main source of noise is associated with the intake and cooling fans as well as material handling activities at the coal stockpile. Boilers, steam turbines and generators are generally constructed within fixed structures that will attenuate the noise from this equipment. Noise from ancillary services and activities such as pumps (boiler feed, water, chemical,	Local and regional	None identified at this stage.

	condensate, vacuum), air compressors and onsite traffic generally is far less than the noise from the main sources.		

Preferred site alternative:

Based on acoustics for this preliminary evaluation the preferred site would be (in order of preference):

1. Alternative site 5 (as close as possible to Highveld steel);
2. Site option 1;
3. Site option 4;
4. Site option 3; and
5. Site option 2 (closest to Clewer).

Gaps in knowledge & recommendations for further study:

Activities would be highly dependent on the location selected for the power station, final design and infrastructure layout. The potential noise impact could extend further than 1,000 m from the power plant.

The potential noise impact is required to be investigated in more detail during the EIA phase, including further ambient sound measurements. Additional information required for further assessment includes the following:

- Exact location of the various activities (i.e. coal stockpile area, coal management, boilers, power generation turbines, cooling towers etc.). In the case of equipment installed on buildings the height of this equipment will be required.
- Project design (which equipment will be in buildings, what materials will be used to build these buildings).
- A more accurate description of equipment to be used in and around the proposed facility (wet cooling vs. dry cooling, fans, turbines, etc.). This would include data such as the type and amount of equipment to be used, focusing specifically on the intake and cooling fans.
- Layout of various roads and projected routes that equipment and material/coal will use.

5.1.8 Visual impacts

The visual character of the study area is characterised by prominent rivers or streams including the Grootspruit, to the south-west, and the Brugspruit traversing east of the Transalloys plant. The Brugspruit and associated wetlands and adjacent grasslands account for the remaining scenic natural resources in an area largely dominated by industrial and surface mining activities. Site

Alternatives 1 – 4 may therefore be considered as sensitive from a visual resource perspective and as they contribute to a visual buffer zone between the smelter complex, power plant and ancillary infrastructure and the N4, R104, R547 (Bailey Avenue) and Clewer. This is illustrated in Figure 5.3 below, which indicates the visual resource sensitivity relative to the alternative sites, and Figures 5.4 – 5.7 showing the potential visual exposure for each of the alternative sites. The extent of the potential visual exposure of the facility would also be a factor of the height of the stack (currently indicated at 250m) which would be determined by the emissions targets to be achieved within the HPA.

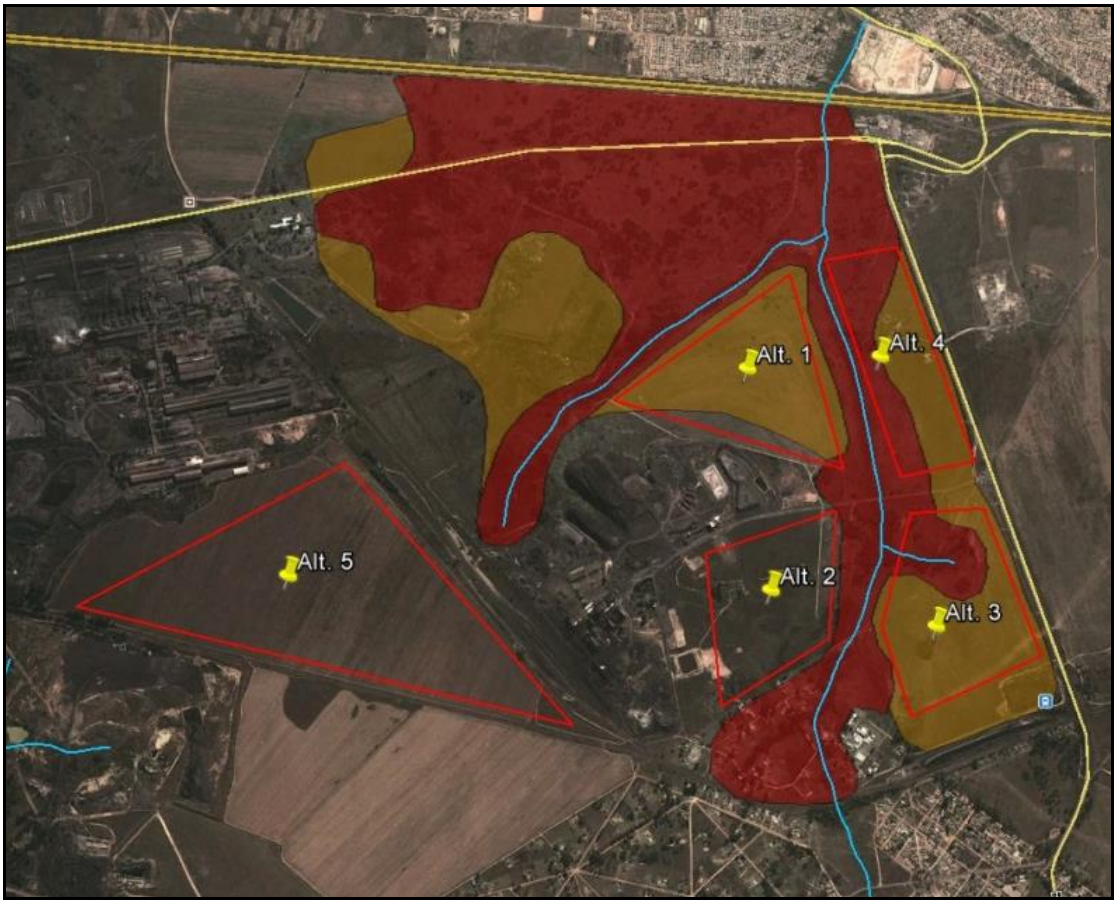


Figure 5.3: Visual resource sensitivity (Red = very high, orange = high).

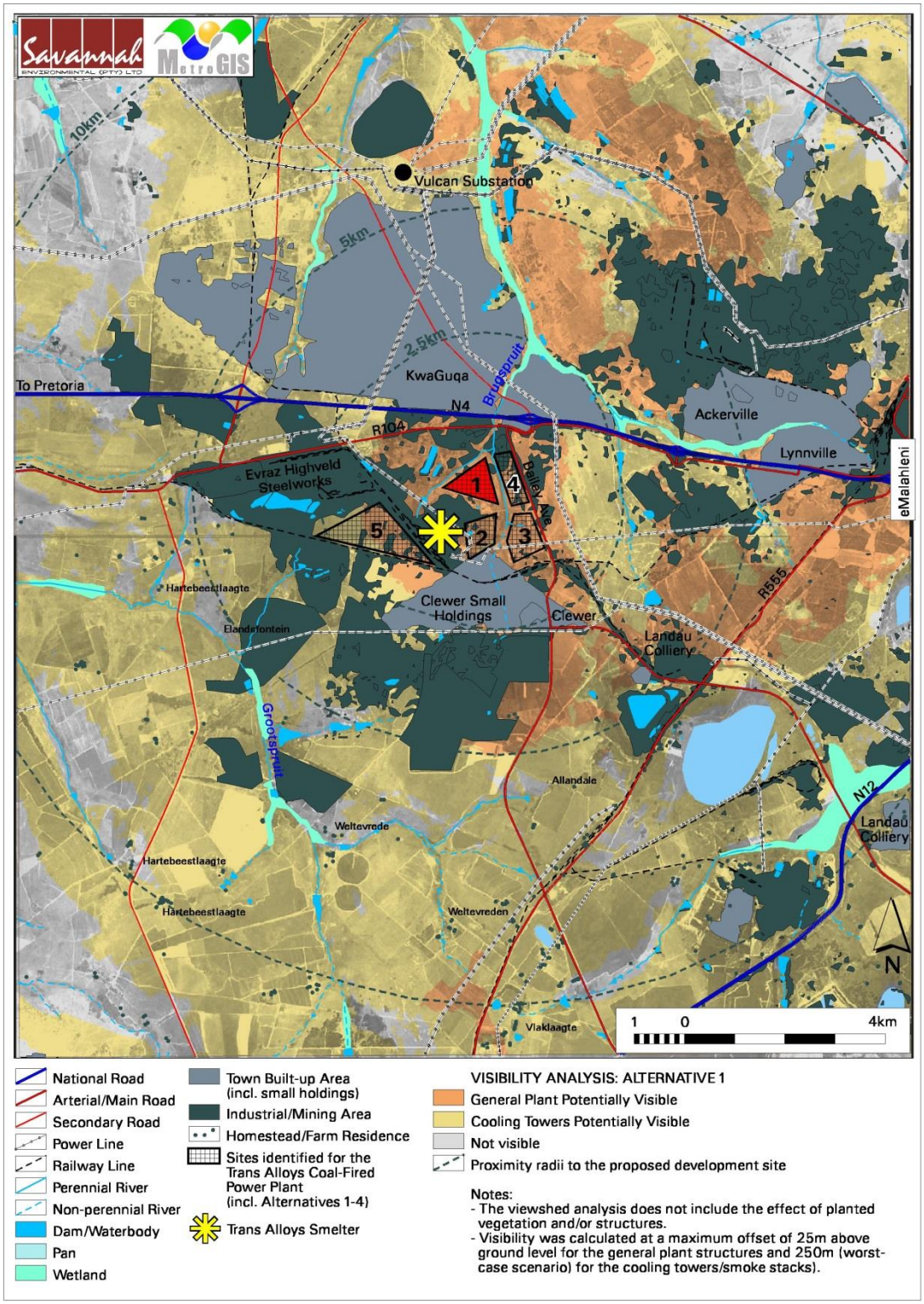


Figure 5.4: Map indicating the potential visual exposure of the proposed power plant: Alternative 1.

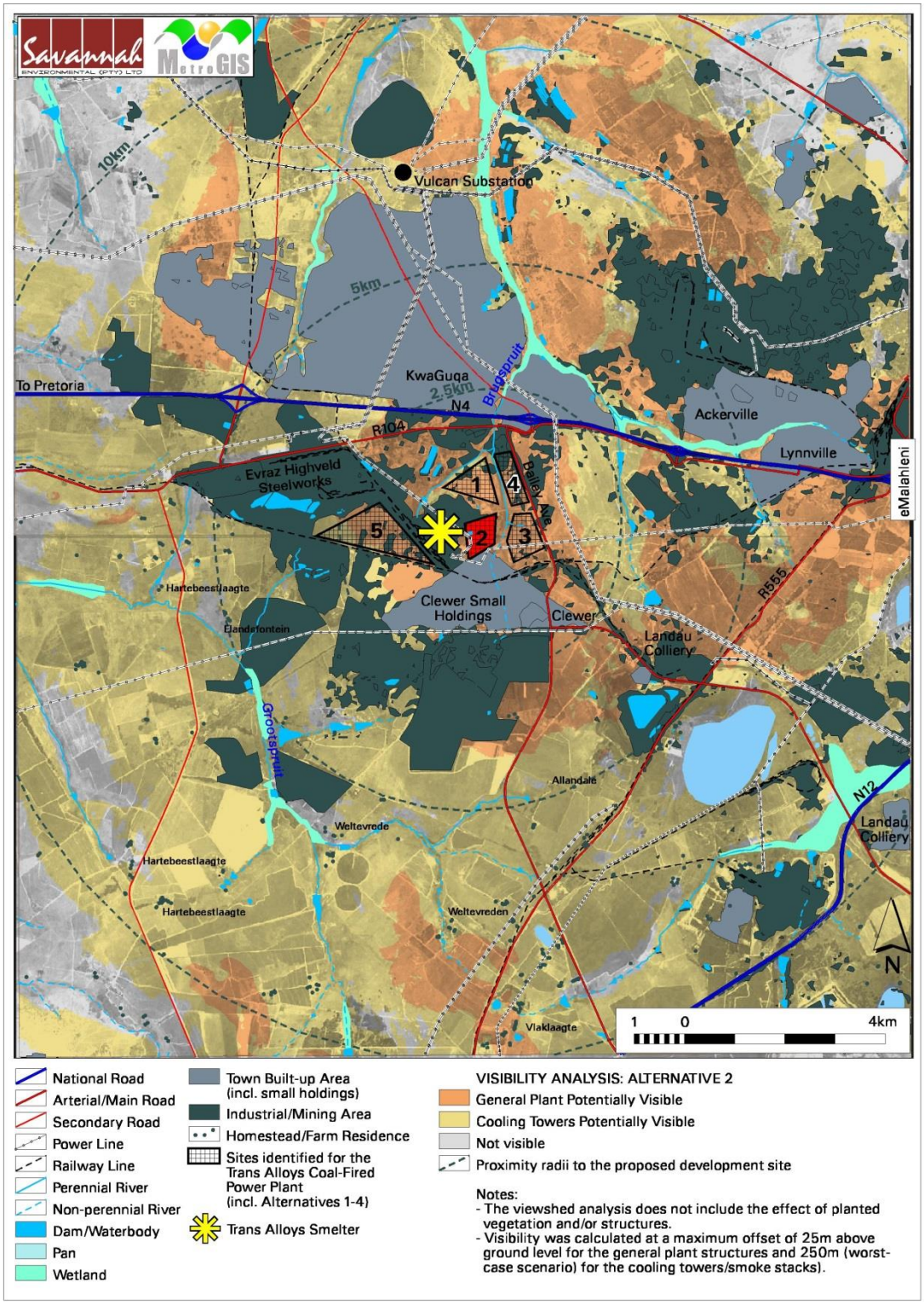


Figure 5.5: Map indicating the potential visual exposure of the proposed power plant: Alternative 2.

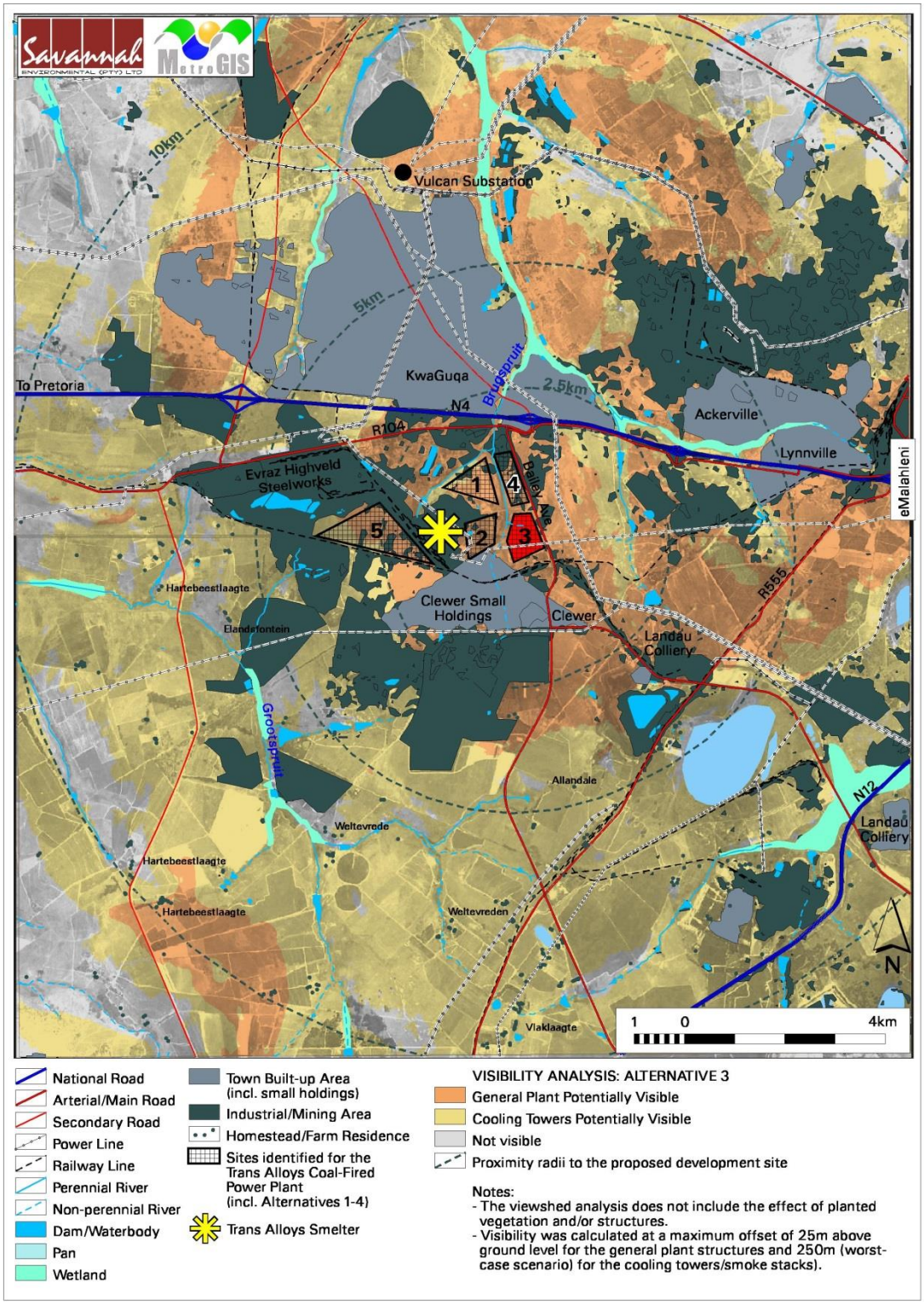


Figure 5.6: Map indicating the potential visual exposure of the proposed power plant: Alternative 3.

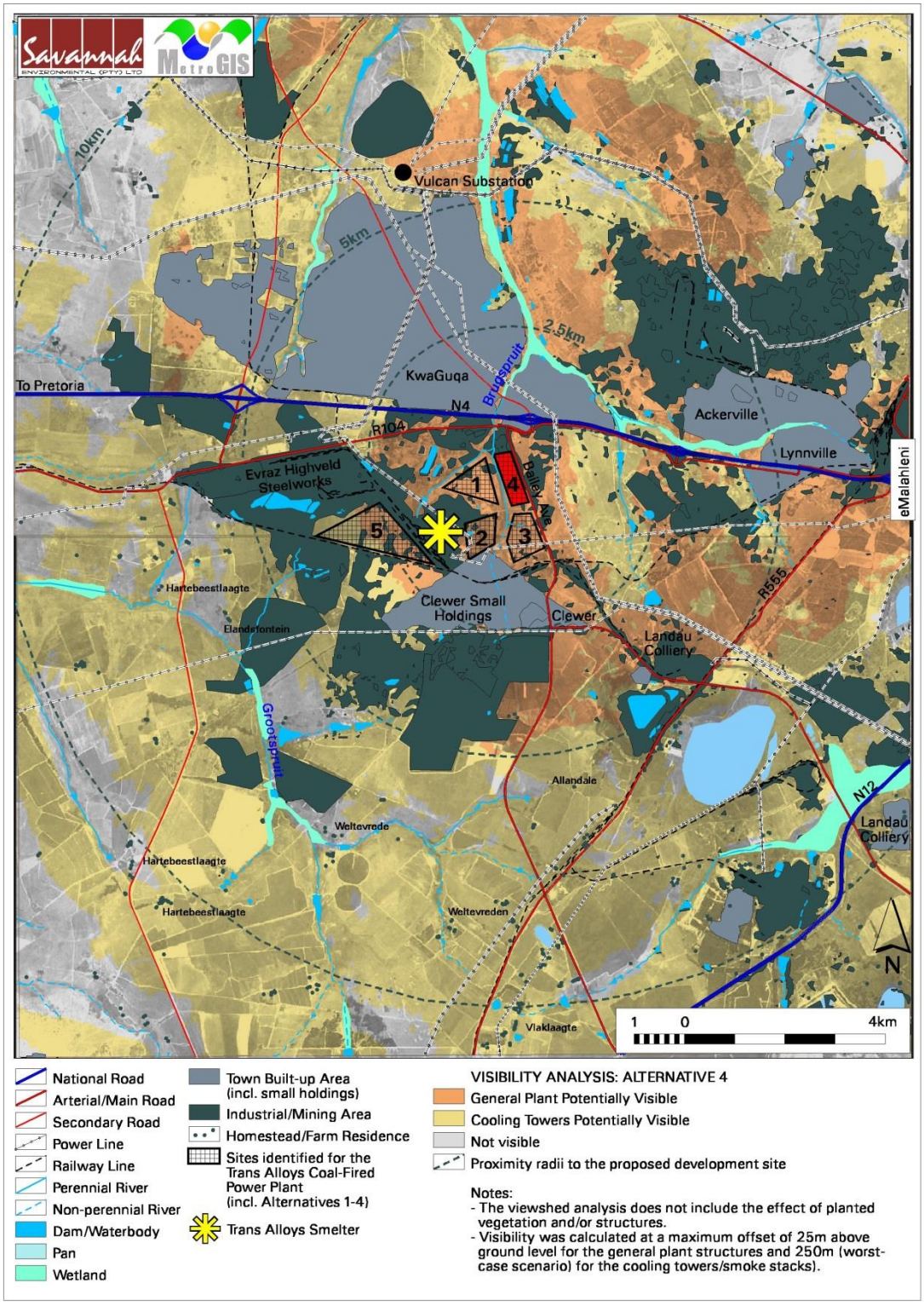


Figure 5.7: Map indicating the potential visual exposure of the proposed power plant: Alternative 4.

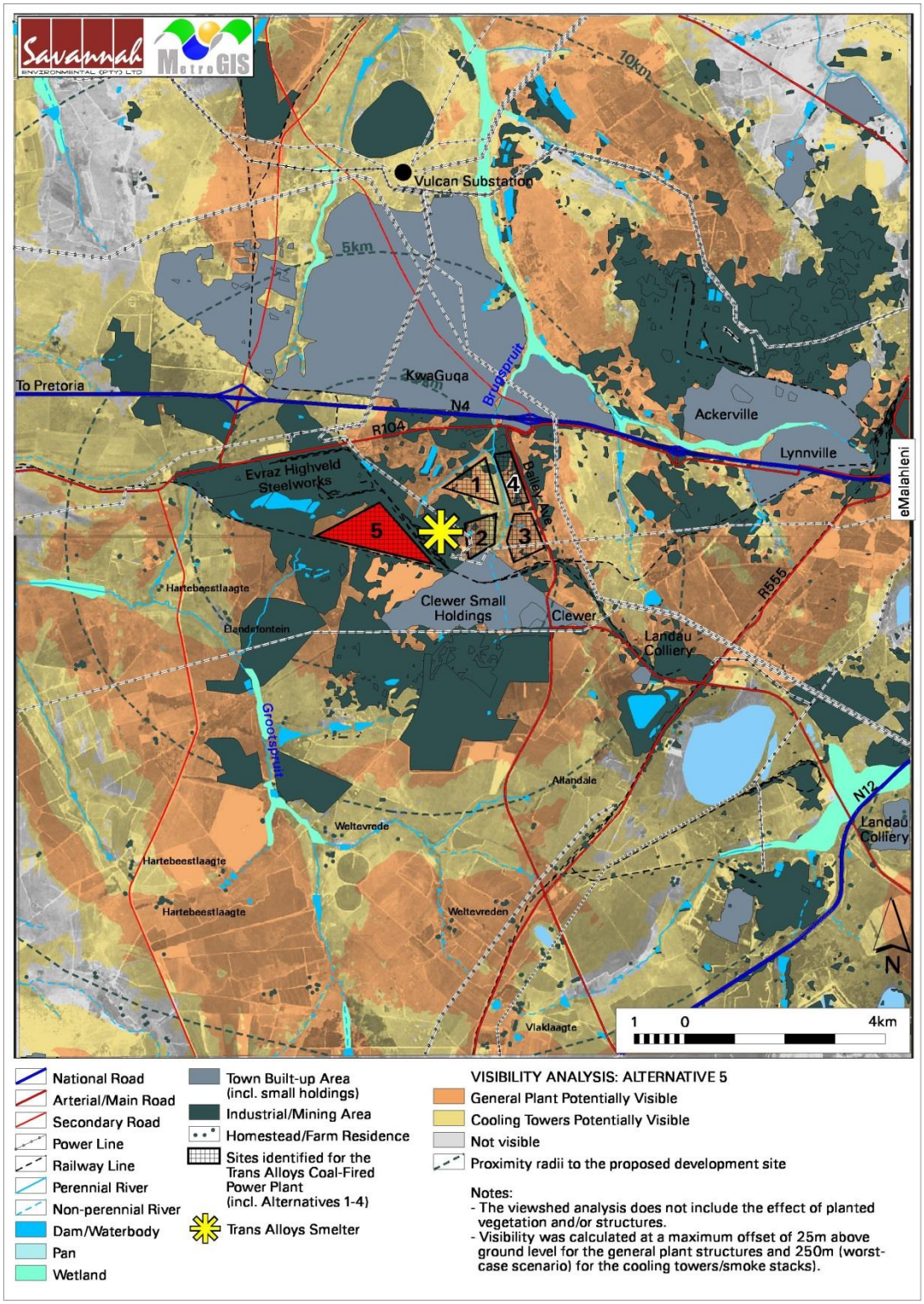


Figure 5.8: Map indicating the potential visual exposure of the proposed power plant: Alternative 5.

Table 5.7: Potential visual impacts

Issue	Nature of Impact	Extent of Impact	'No go' areas
Construction Phase			
The potential visual impact during construction.	The potential visual impact of the construction of ancillary infrastructure (i.e. the substation at the facility, overland coal conveyors, water pipeline, coal stockpile, ash dump, etc.) on observers in close proximity of these structures.	Local to regional	None identified at this stage
Operational Phase			
The potential visual impact during operation.	» The visibility of the facility to, and potential visual impact on, observers travelling along the N4 national road, the R104 arterial road and the major local roads (e.g. Bailey Avenue) traversing near the proposed facility. » The visibility of the facility to, and potential visual impact on observers residing at the Clewer agricultural/small holdings, KwaGuqa, Ackerville, Lynnville and homesteads (farm residences) located within close proximity of the site. » The potential visual impact of operational, safety and security lighting of the facility at night on observers residing in close proximity of the facility. » The influence of the visual absorption capacity of natural/planted vegetation or built structures on the visual exposure of the power plant.	Local to regional	None identified at this stage

Cumulative impacts:

Potential cumulative visual impacts (or alternately, consolidation of visual impacts) are anticipated due to the extent of industrial infrastructure in the study area (including existing power line and railway line infrastructure traversing the development site, the Transalloys smelter complex, the Evraz Highveld steelworks and the existing mining/quarrying activities in close proximity to the proposed development site).

Preferred site alternative:

A decision regarding the preferred site alternative, based purely on the area of potential visual exposure, or even the number of potentially affected sensitive

visual receptors, would favour Site Alternatives 1 to 4 above Alternative 5. However, the proximity of Site Alternatives 3 and 4 to the R547, and the locality of these two sites (as well as Site Alternative 1) within an area of higher visual resource sensitivity, suggests that Site Alternatives 2 and 5 are preferred.

Site Alternative 2 has the added benefit of being located within the Transalloys property, adjacent to the existing smelter complex. This location generally fulfils the requirements of the consolidation of visual impacts within an existing development node; thereby negating or mitigating potential secondary visual impacts (e.g. the construction of additional services and infrastructure).

Site Alternative 5, situated between the Transalloys smelter complex and the Evraz Highveld Steelworks, similarly contains the potential visual impacts to an already visually disturbed area. Its location on slightly more elevated terrain, poses a potential concern, as it would generally be more visually exposed than any of the other site alternatives.

Positive visual impacts are associated with the reduction of coal discard dumps thereby decreasing the visual impact on the observer.

Gaps in knowledge & recommendations for further study:

It is recommended that additional spatial analyses be undertaken in order to create a visual impact index that will further aid in determining potential areas of visual impact. This exercise should be undertaken for the entire facility (i.e. core power plant and cooling towers) as well as for the ancillary infrastructure, as these structures (e.g. the coal conveyers, coal stockpile, pipe line, etc.) are envisaged to have varying levels of visual impact at a more localised scale.

5.1.9 Social impacts

Social and economic impacts associated with the construction and operation phase could be both positive and negative. Potential impacts are described and evaluated in the specialist social report, and are summarised below

Table 5.8: Potential social impacts

Issue	Nature of Impact	Extent of Impact	'No go' areas
Construction Phase			
Influx of job seekers into the area	» Potential impacts associated with the influx of job seekers into the area during the construction phase. These impacts are similar to those associated with the presence of construction workers	Local and regional	None identified at this stage

Issue	Nature of Impact	Extent of Impact	'No go' areas
	» Potential impacts associated with the presence of construction workers during the construction phase. The typical impacts associated with the presence of construction workers include increase in sexually transmitted diseases, including HIV/AIDS; increase in prostitution; increase in alcohol and drug related incidents; increase in crime; and creation of tension and conflict in the community etc.		
Job and business opportunities (positive)	» Creation of employment and business opportunities during the construction phase	Local and regional	N/A
Operational Phase			
Impact on sense of place	» Potential impact on rural sense of place (this will be closely linked to the visual impacts)	Local and regional	N/A
Agricultural impacts	» Potential impact on farming activities and other existing land uses	Local and regional	None identified at this stage
Health impacts	» Potential health related impacts on surrounding landowners and communities linked to emissions, noise etc.	Local and regional	None identified at this stage
Impact on property prices	» Potential impact on property prices, specifically adjacent properties	Local and regional	None identified at this stage
Impact on tourism	» Potential impact on tourism, both locally and regionally	Regional	None identified at this stage
Job and other economic opportunities (positive)	» Creation of employment and business creation opportunities during the operational phase; » Creation of potential training and skills development opportunities for local communities and businesses during the construction and operational phases; » Potential up- and down-stream economic opportunities for the local, regional and national economy.	Local and regional	N/A

Preferred site:

No preferred site has been identified however the significance of noise and visual impacts on the Clewer area could increase the closer the proposed power plant is to this area.

Gaps in knowledge & recommendations for further study:

Social change is recognised as a natural and on-going process. However, it is important to recognise and understand that projects of this scale and nature have the potential to influence and alter both the rate and direction of specific social change both positive and negative. Social impacts can be defined as the consequences (both positive and negative) to human populations through any public or private actions (these include policies, programs, plans and or projects) that alter the way in which people function as members of society. The following typical, generic project information is required in order to inform the Social Impact Assessment to be undertaken during the EIA Phase:

Construction phase:

- » Comments received from I&APs during the public participation process, including comments reflected in the Final Scoping Report;
- » A plan of the proposed location of the coal fired power plant in relation to the site;
- » Duration of the construction phase (months);
- » Number of people employed during the construction phase;
- » Breakdown of number of people employed in terms of skills categories (low skilled, semi-skilled and skilled);
- » Estimate of the total wage bill for the construction phase and breakdown in % as per skills categories;
- » Estimate of total capital expenditure for the construction phase;
- » Indication of where construction workers will be housed (on site or in nearest town?);
- » Opportunities for on-site skills development and training;
- » Description of the typical activities associated with the construction phase, specifically on-site construction activities. This includes a description of how the components associated with the facility will be transported to and assembled on site;
- » The size of the vehicles needed to transport the components and the routes that will be used to transport the large components to the site, and an estimate of the number of vehicle trips required.

Operational phase:

- » Estimate of operating budget per annum;
- » Estimate of total number of people employed;
- » Breakdown in terms of skills levels (see above);

- » Estimate of annual wage bill;
- » Typical activities associated with the operational phase;
- » Information on opportunities for skills development and training;
- » Typical lifespan of proposed power plant.

5.1.10 Land rights

There is a pending application for a prospecting right (coal mining) over Portion 25 of the Farm Elandsfontein 309 (central portion of Site Alternative 5). Approval of the prospecting right by the Department of Mineral Resources (DMR) would likely result in an application for a Mining Right being submitted to the DMR. If mining on the site is approved by the DMR, development of a power plant on Site Alternative 5 could potentially restrict the amount of space available to the proposed coal fired power station on this site.

5.2 Cumulative Impacts

Cumulative impacts, in relation to an activity, refer to the impact of an activity that in-itself may not be significant but may become significant when added to the existing and potential impacts eventuating from similar or diverse activities or undertakings in the area. For cumulative effects analysis to help the decision-maker and inform interested parties, it must be limited to effects that can be evaluated meaningfully (DEAT, 2004). Boundaries must be set so analysts are not attempting to measure effects on everything. Therefore, the cumulative impacts associated with the proposed Transalloys Power Plant have been viewed from two perspectives within this Scoping Study being:

- » Cumulative impacts associated with the scale of the project; and,
- » Cumulative impacts associated with other relevant and existing power stations and/ industrial plants in region and / or other major proposed development projects in the area.

Based on the information available at the time of undertaking this study, there are 2 coal-fired power stations in the area and one existing coal mine expansion project. These include:

- » Eskom Kusile Coal-Fired Power Station (located ~20km to the west of Transalloys) with a total installed capacity of 4 800MW;
- » Khanyisa Power Project involving the proposed development of a 450MW coal-fired power station at the Kleinkopje Colliery utilising CFB technology.
- » The Landau Colliery is currently applying to expand their open-cast mining activities northwards, east of Baily Avenue towards the N4 national road. This

application is in the Environmental Impact Assessment phase and has not been concluded as yet.

Cumulative effects are commonly understood as the impacts which combine from different projects and which result in significant change, which is larger than the sum of all the impacts (DEAT, 2004). The complicating factor is that the projects that need to be considered are from past, present and reasonably foreseeable future development. Cumulative effects can be characterised according to the pathway they follow. One pathway could be the persistent additions from one process. Another pathway could be the compounding effect from one or more processes. Cumulative effects can therefore occur when impacts are:

» Additive (incremental);
» Interactive;
» Sequential; or
» Synergistic.

Canter and Sadler (1997) describe a four step process for addressing cumulative effects in an EIA:

» Delineating potential sources of cumulative change (i.e. GIS to map the relevant coal-fired power stations energy facilities in close proximity to one another);
» Identifying the pathways of possible change (direct impacts);
» Indirect, non-linear or synergistic processes; and
» Classification of resultant cumulative changes.

Potential Cumulative Impacts:

The cumulative impacts associated with the proposed coal fired power station at a site level are expected to be associated with the scale of the project. The potential direct cumulative impacts associated with the project are expected to be associated predominantly with the potential effects on biodiversity, soil, surface and groundwater, air quality, traffic, noise, visual, land-use and social impacts. These cumulative effects will be assessed in the EIA phase.

In addition to cumulative impacts at a site level, cumulative impacts could be associated with this proposed development and other similar developments in the area, as listed above. It is important to describe the potential cumulative impacts which may be expected in order to obtain a better understanding of these impacts and the possible mitigation that may be required. The cumulative impacts in this regard are expected to be associated with those impacts associated with biodiversity, soil, surface and groundwater, air quality (and human health), visual and social impacts.

Potential cumulative negative and positive impacts associated with numerous coal fired power stations and mines within the study area will occur and are listed below.

Table 5.9: Cumulative impacts

Issue	Nature of Impact	Extent of Impact
Air Quality and associated human health effects.	Cumulative decline in air quality in the Highveld Priority Area Air Quality Management Area.	Regional and Transboundary
Ecology / Biodiversity: Cumulative ecosystem loss, fragmentation and / degradation	Natural vegetation within the study area is largely impacted by industrial activities, and is formally conserved only to a limited extent. Cumulative ecological impacts associated with this type of development include direct loss of vegetation and indirect impacts associated with pollution. Indirect impacts could lead to initial, incremental or augmentation of existing types of environmental degradation, including impacts on the air, soil and water present within available habitat. Pollution of these elements might not always be immediately visible or readily quantifiable, but incremental or fractional increases might rise to levels where biological attributes could be affected adversely on a local or regional scale.	Local to Regional
Ground Water Contamination	The proposed power station together with other developments in the area could have a cumulative negative impact on groundwater resources causing contamination as the result of the ash disposal facility, pollution control dams and the waste water treatment works. Run-off from ash disposal facilities and leachate generated through infiltration of water has the potential to contaminate the ground water resource.	Regional
Surface Water Contamination and Availability	The proposed development could result in a cumulative increase in aquatic impacts due to additional industrial infrastructure (including ash dumps) etc. adding to a decrease in water quality in the Brugspruit or western tributary. The feasibility study conducted by the developer found that the raw water demand of the power plant could be satisfied by surplus mine water in the region treated at the EMalahleni Water Recovery Plant.	Regional
Cumulative	The development of numerous power stations and	Regional

Issue	Nature of Impact	Extent of Impact
negative Social impacts	mines within the study area will have a cumulative impact on several existing issues within the area, predominately within rural settlements associated with the potential influx of workers and job seekers. With the increased population density, this may lead to a cumulative impact on housing requirements, services (i.e. water, electricity and sanitation), health issues, safety and security. With the existing rural settlements in the area this will have a cumulative impact on the environment and health (i.e. in terms of ablution facilities). Cumulative air quality, visual and noise impacts may also be registered by nearby communities.	
Cumulative positive social impacts	Cumulative positive impacts are, however, also anticipated should a number of similar developments be developed in the area, largely due to job creation opportunities, business opportunities for local companies, skills development and training. The development of a new coal fired power station will have a positive local economic impact at a regional level.	Regional to National

CONCLUSIONS CHAPTER 6

6.1. Overview of the Proposed Project

Transalloys, a producer of export grade Siliconmanganese, as an energy intensive electricity user, proposes to develop a Coal-Fired Power Plant and associated infrastructure on a site adjacent to its smelter complex near Emalahleni, Mpumalanga Province. The proposed power plant will have a generating capacity of up to 150 MW in order to meet Transalloys current electricity demands and future expansion requirements. The development of the power plant project would mean that Transalloys would become independent of the Eskom electricity grid.

Technical feasibility: The project is considered to be technically feasible based on the following:

- Location of Transalloys within close proximity to coal reserves
- Abundance of low grade coal including coal discards of a quality below Eskom rejection limits or export but which can be utilised in a Circulating Fluidised Bed boiler as proposed for the power plant
- Coal can be supplied via overland conveyors from the mines in the area to the power station, reducing the potential logistical cost associated with rail and truck transport
- The use of Circulating Fluidised Bed boiler technology is key to the use of low grade coal in the power generation process and the control of emissions
- Existing electrical infrastructure facilitating connection and distribution of generated electricity directly to Transalloys
- Abundance of surplus mine water in the area and availability of raw water supply to the project
- The use of ash produced in the combustion process in the cement and construction industries eliminating the need for large disposal sites.

Development footprint: The project will require the development of a power station over an area of approximately 10ha and associated infrastructure (as indicated in Section 1 and 2 of this Scoping Report) over an area of approximately 30ha. The water pipeline from EWRP to Transalloys will be approximately 9km in length and the overland coal conveyor will be approximately 3.5km in length.

6.2. Overview of the Scoping Process

The Scoping Report for the proposed Transalloys coal-fired power plant and associated infrastructure has been undertaken in accordance with the EIA

Regulations published in Government Notice 33306 of 18 June 2010, in terms of Section 24(5) of the National Environmental Management Act (NEMA; Act No 107 of 1998).

This Scoping Report is aimed at detailing the nature and extent of this proposed power plant and associated infrastructure, identifying potential issues associated with the proposed project, and defining the extent of studies required within the EIA. This was achieved through an evaluation of the proposed project, involving the project proponent, specialist consultants, and a consultation process with key stakeholders, relevant government authorities and interested and affected parties (I&APs). In accordance with the requirements of the EIA Regulations, feasible project-specific alternatives (including the "do nothing" option) have been identified for consideration within the EIA process (refer to Chapter 7).

The conclusions and recommendations of this Scoping Report are the result of desktop evaluations of impacts identified by the different environmental specialists, review of existing information, limited on-site inspections, and the parallel public participation process. The public consultation process is extensive and every effort is being made to include representatives of all stakeholder groupings in the study area and the Mpumalanga Province. This process is on-going through the entire EIA process.

A summary of the conclusions of the scoping evaluation of the proposed coal-fired power plant and associated infrastructure is provided below. Recommendations regarding investigations required to be undertaken within the EIA are provided within the Plan of Study for EIA, contained within Chapter 7 of this report.

6.3. Conclusions drawn from the Evaluation of the Proposed Site for Development of a Coal-Fired Power Plant

The main issues identified through this scoping study associated with the proposed coal-fired power plant are summarised in Table 6.2. From this table it can be concluded that the majority of potential impacts identified to be associated with the **construction** of the proposed project are anticipated to be local in extent, apart from impacts on traffic and job creation and economic growth which are anticipated to be regional in extent. Impacts from the **operation** of the coal-fired power station and associated infrastructure vary between the alternative sites, the most significant of which relate to air quality impacts which is expected to have a regional impact due to the nature of the ambient air quality in the area.

Potential impacts: Issues of potential environmental concern have been identified through the scoping phase. These environmental issues include the following:

- » Potential air quality impacts from the proposed power station due to emissions. This is partially mitigated through the use of Circulating Fluidised Bed technology allowing for reduced emissions due to the occurrence of the site within the Highveld Priority Area.
- » Potential cumulative air quality impacts due to existing power stations and other mining and industrial activities in the area.
- » Potential contaminated storm water run-off from the coal storage stockyard and contaminated runoff from the ash dam polluting watercourses and wetlands unless appropriately retained on the site.
- » Potential noise impacts of the proposed facility on Noise Sensitive Developments in the surrounding areas.
- » The potential visual impact of the proposed facility taking into account the visual resource sensitivity of the area around Transalloys.

Technology alternatives: The use of Circulating Fluidised Bed is expected to result in improved emissions (over conventional pulverised coal fired boiler technology) in line with the standards of the IFC. Furthermore the following benefits from the use of CFB technology are anticipated:

- » The sourcing of discard coal or waste coal for use in the firing process
- » This could in turn lead to a reduction of coal discard dumps in the area and associated positive impacts
- » The use of dry-cooling technology will reduce the water requirements of the plant
- » In-bed capturing or neutralisation of sulphur through introduction of limestone directly into the bed leading to a significant reduction of SO_2.
- » Low burning temperatures resulting in limited formation of NOx gases.
- » Generation of gypsum as a by-product for use in construction and cement manufacturing

Site alternatives: Five potential site alternatives have been identified and evaluated through the scoping study for the development of the project. No environmental fatal flaws were identified to be associated with any of the sites, however clear preferred site alternatives have emerged through the Scoping studies undertaken, as summarised in Table 6.1.

Table 6.1: Summary of most preferred and least preferred site alternatives based on impacts identified at Scoping level

Impact	Most preferred site	Summary	Least preferred site	Summary
Air quality impacts	Site alternative 5	From an air quality point of view, this site will likely result in lower impacts on the sensitive receptor sites	Site alternative 3	Proximity to Clewer of concern
Soils and agricultural impacts	Site alternative 1-4	Previously cultivated	Site alternative 5	Recent land use is dryland maize farming
Biodiversity (flora and fauna) impacts	Site alternatives 1 and 5	Sites currently and previously disturbed from ecological perspective	Site alternative 2 (within Transalloys complex)	Wetlands habitats and sensitive grasslands occupy a significant section of the site
Surface water and wetland impacts	Site alternative 5	No surface water or wetlands present on or surrounding the site	Site Alternative 2	Wetlands occupy a significant section of the site
Noise impacts	Site alternative 5	Furthest removed from noise sensitive developments and nearest to Evraz Highveld Steel	Site alternative 2	Proximity to Clewer smallholdings of concern
Visual impacts	Site alternative 2 and 5	Allows for consolidation of visual impacts and no impact on visual resource sensitivity	Site alternative 3-4	Medium to high impact on visual resource sensitivity

In summary **Site Alternative 5** is the most preferred site from an air quality, ecological, surface water, noise and visual perspective. Site Alternative 2, while being the only site situated wholly within the Transalloys industrial complex boundary is the least preferred site due to the anticipated ecological sensitivity, the proximity to delineated wetlands and the proximity to noise sensitive developments. Site Alternative 1 is also not preferred due to the risk associated with the slope of the site in the direction of the Brugspruit and its tributary.

Based on the findings of the Scoping studies it is recommended that Site Alternative 5 be carried through to the EIA phase of the project as the technically

preferred and most environmentally suitable site for the development of the Transalloys power plant, followed by Site Alternatives 3 and 4.
The potential implications of a pending application for a prospecting right (coal mining) and pursuant mining right over a portion of Site Alternative 5 must however be evaluated as this could potentially render a large portion of this site undevelopable for a coal-fired power station.

None of the alternative sites evaluated through the Scoping phase are however deemed to be fatally flawed at this stage of the process and may be considered as part of the EIA Phase.

6.2. Evaluation of the Potential Issues of Associated Infrastructure

Potential issues identified to be associated with the proposed associated infrastructure (including the water pipeline and conveyor route), include impacts on flora, fauna and ecological processes, impacts on land use, potential impacts on heritage sites and visual impacts. The potential impacts associated with all related infrastructure will be considered in detail within the EIA phase. Recommendations regarding a preferred alignment and appropriate mitigation measures (if required) will be made for the water pipeline and coal conveyor. The location of this infrastructure will be informed by the preliminary design of the power station (to be assessed in the EIA Phase), as well as the outcomes of the EIA.

Table 6.1: Summary of potential impacts associated with the proposed coal-fired power plant

Construction / Decommissioning Impacts	**Extent**
Direct impacts on threatened and protected flora species, threatened fauna species, Loss or Degradation of Natural Vegetation/ Sensitive Habitat, surrounding habitat/ species & ecosystem functioning.	L-R
Loss /destruction of Archaeological finds, destruction / disturbance of burials and historical finds and cultural landscape.	L
Deterioration of groundwater quality.	L
Increase in traffic and damage to roads.	L-R
Loss of agricultural potential.	L
Construction noise.	L
Job creation and economic growth.	R
Dust and air emissions due to construction vehicles and activities.	L
Operational Impacts	**Extent**
Decrease in air quality due to emissions (such as NO_2, SO_2 and particulates) from combustion process and vehicles.	R - N
Human health effects from harmful emissions into the air.	R
Change in groundwater levels and decrease in water quality.	R
Contamination of surface water.	L
Increase in noise levels within a 2km radius of the site.	L - R
Visual (visibility) of the power station and associated infrastructure to observers who reside in the area / use roads.	L - R
Increase in road traffic.	R
Release of greenhouse gases that contributes to global climate change.	I-T
Permanent employment opportunities at the power station.	L
Growth in GDP.	R
Positive / negative effect on tourism.	L

KEY	L	**Local**	R	**Regional**	N	**National**	I	**International**	T	**Transboundary**

PLAN OF STUDY FOR ENVIRONMENTAL IMPACT ASSESSMENT CHAPTER 7

A detailed description of the nature and extent of the proposed Transalloys coal-fired power station and associated infrastructure, details regarding the Scoping process followed, as well as the issues identified and evaluated through the Scoping phase (to date) have been included in this Scoping Report. This provides the context for a Plan of Study for Environmental Impact Assessment (EIA).

The Plan of Study for EIA presented in this chapter describes how the EIA Phase for the proposed coal-fired power plant project will proceed. The EIA Phase of the study includes detailed specialist studies for those impacts recorded to be of potential significance as well as a public consultation process. The key findings of the Scoping Phase (which includes inputs from authorities, the public, the proponent and the EIA specialist team) are used to inform the Plan of Study for EIA, together with the requirements of the NEMA EIA Regulations of June 2010 and applicable guidelines.

7.1. Aims of the EIA Phase

The EIA Phase will aim to achieve the following:

» Provide an overall assessment of the social and biophysical environments affected by the proposed project;
» Comparatively assess technically feasible alternatives and recommend a preferred option for implementation;
» Assess potentially significant impacts (direct, indirect and cumulative, where required) associated with the proposed power plant and associated infrastructure;
» Identify and recommend appropriate mitigation measures for potentially significant environmental impacts; and
» Undertake a fully inclusive public involvement process to ensure that I&AP are afforded the opportunity to participate, and that their issues and concerns are recorded.

The EIA will address potential environmental impacts and benefits (direct, indirect and cumulative impacts) associated with all phases of the project including design, construction, operation and decommissioning, and will aim to provide the environmental authorities with sufficient information to make an informed

decision regarding the proposed project. All feasible alternatives (including the 'No go Option / do nothing' alternative) will be assessed.

7.2. Authority Consultation

Consultation with the regulating authorities (i.e. National DEA and Mpumalanga Department of Economic Development, Environment and Tourism (MDEDET)) will be undertaken and will continue throughout the EIA process. On-going consultation will include the following:

» Submission of a Final Scoping Report following a 40-day public review period (and consideration of comments received);
» A consultation meeting with the MDEDET in order to discuss the findings of the Scoping Report and the issues identified for consideration in the EIA process, if requested and required by the authorities;
» An opportunity to visit and inspect the site;
» Submission of a Draft EIA Report to organs of state;
» Submission of a Final Environmental Impact Assessment Report following a 40-day public review period;
» A consultation meeting with the DEA and MDEDET in order to discuss the findings and conclusions of the EIA Report, if requested and required by the authorities.

7.3. Consideration of Alternatives

The following project alternatives will be investigated in the EIA:

» **Site alternatives –** The preferred site alternative (Site Alternative 5) and other viable site alternatives will be assessed for technical feasibility and environmental suitability. The potential implications of a pending application for a prospecting right (coal mining) and pursuant mining right over a portion of Site Alternative 5 must however be evaluated as this could potentially render a large portion of this site undevelopable for a coal-fired power station.
» **Design or layout alternatives –** A preliminary layout of the power plant and associated infrastructure (coal stockpile, ash dump, dams, pipeline alignments, conveyor route alignments, access roads etc.) will be provided by Transalloys in the EIA phase such that site-specific environmental evaluations can be made as part of the detailed studies which form part of this phase of the EIA process. Where environmental sensitivities are identified through the EIA process, recommendations will be made regarding the relocation of project components affecting these areas.
» **Technology alternatives** - Technology alternatives to be considered in the EIA include the fuel combustion technology (i.e. circulating fluidised bed vs.

gas-fired technology (should this technology prove to be a technically feasible option)); and

» **Operational alternatives** – Air pollution abatement technologies will be explored further in the EIA study.

7.4. Methodology for the Assessment of Potential Impacts and Recommendations regarding Mitigation Measures

A summary of the issues which require further investigation within the EIA phase, as well as the proposed activities to be undertaken in order to assess the significance of these potential impacts is provided within Table 7.1. The specialists involved in the EIA Phase are also reflected in Table 7.1. These specialist studies will consider the proposed site for the development of the coal-fired power plant and all associated infrastructure (including alternatives with regards to design, layout and technology), as well as the alternative alignments of the proposed conveyor belt routes, access roads and water supply pipeline.

Table 7.1: Summary of the issues which require further investigation within the EIA phase and activities to be undertaken in order to assess the significance of these potential impacts

Issue	Activities to be undertaken in order to assess significance of impacts	Specialist
Air Quality Impact Assessment	The proposed steps to be undertaken during the air quality impact assessment include: » Emissions quantification of all sources of air pollution associated with the proposed coal-fired power station; » Using an appropriate internationally recognised dispersion model, simulate the potential impacts on the surrounding environment for each of the five sites for a number of stack height scenarios; » Evaluate the significance of the predicted impacts on the surrounding environment and human health by screening the impacts against the selected ambient air quality guidelines; and » Provide mitigation measured and management strategies to ensure minimal impacts on the environment and human health. More detail on the above can be found in the specialist study.	Airshed Planning Professional
Impact on Soils and Agricultural Potential	» The EIA phase assessment will include a field soil investigation to identify and compare specific soils and agricultural conditions. The soil investigation will use hand augered samples in strategic places. The fieldwork will include interviews with land owners / users to obtain additional information about agricultural production and potential.	Johann Lanz – Soil Scientist
Biodiversity Impacts	As part of the EIA process, a detailed field survey of the vegetation will be undertaken, preferably between mid-November to April, and results will include: » A phytosociological classification of the vegetation found on the study area according to vegetation survey data and its TWINSPAN analysis » A corresponding description of all defined plant communities and their typical habitats, including a full species list for each plant community and a representative photographic record taken on site of each community » A map of all plant communities within the boundaries of the study area » A description of the sensitivity of each plant community, based on sensitivity accepted sensitivity criteria of extent (scale), duration, magnitude (severity), probability (certainty) and direction (negative, neutral or positive).	Marianne Strohbach of Savannah Environmental

Issue	Activities to be undertaken in order to assess significance of impacts	Specialist
	» A full assessment of impacts including an assessment of the significant direct, indirect, and cumulative impacts.	
Impacts on Surface Water	The specialist surface water report will include the following: » Storm water management plan; » Water Balance; » Flow simulations; » Flood lines; » Water Quality monitoring; » Hydrocensus; and » Engineering reports for pollution control dams, sewerage, and potable water supply A site visit will also be conducted and a report produced as part of the final deliverables.	J. Maré of M2 Environmental Connections
Heritage Impact Assessment	The heritage specialist study to be undertaken in the EIA phase will include: » A Phase One - Heritage Impact Assessment (HIA) will be undertaken. During this study sites of archaeological, historical significance or places of cultural interest must be located, identified, recorded, photographed and described. During this study the levels of significance of recorded heritage resources must be determined and mitigation proposed should any significant sites be impacted upon, ensuring that all the requirements of SAHRA are met. » Should a permit be required for activities involving the damaging or removal of specific heritage resources, a separate application would have to be submitted to SAHRA and-or the relevant provincial heritage agency for the approval of such. These agencies will also review the final EIA reports and provide comments to DEA.	Jaco van der Walt of Heritage Contracts and Archaeological Consulting
Noise Impact Assessment	The Environmental Noise Impact Report will cover the following points: » the purpose of the investigation; » a brief description of the planned development or the changes that are being considered; » a brief description of the existing environment including, where relevant, the topography, surface conditions and meteorological conditions during measurements; » the identified noise sources together with their respective sound pressure levels or sound power levels (or both) and, where applicable, the operating cycles, the nature of sound emission, the spectral composition and the directional characteristics; » the identified noise sources that were not taken into account and the reasons as to why they	Morné de Jager of Enviro Accoustic Research

Issue	Activities to be undertaken in order to assess significance of impacts	Specialist
	were not investigated; » the identified Potentially Sensitive Receptors and the noise impact on them; » where applicable, any assumptions, with references, made with regard to any calculations or determination of source and propagation characteristics; » an explanation, either by a brief description or by reference, of all measuring and calculation procedures that were followed, as well as any possible adjustments to existing measuring methods that had to be made, together with the results of calculations; » an explanation, either by description or by reference, of all measuring or calculation methods (or both) that were used to determine existing and predicted rating levels, as well as other relevant information, including a statement of how the data were obtained and applied to determine the rating level for the area in question; » the location of measuring or calculating points in a sketch or on a map; » quantification of the noise impact with, where relevant, reference to the literature consulted and the assumptions made; » alternatives that were considered and the results of those that were investigated; » a list of all the interested or affected parties that offered any comments with respect to the environmental noise impact investigation (if comments are received); » a detailed summary of all the comments received from interested or affected parties as well as the procedures and discussions followed to deal with them (if comments are received); » conclusions that were reached; » proposed recommendations including potential mitigation measures; » any follow-up investigation which should be conducted at completion of the project as well as at regular intervals after the commissioning of the project so as to ensure that the recommendations of this report will be maintained in the future.	
Visual Impact Assessment	It is recommended that additional spatial analyses be undertaken in order to create a visual impact index that will further aid in determining potential areas of visual impact. This exercise should be undertaken for the entire facility (i.e. core power plant) as well as for the ancillary infrastructure, as these structures (e.g. the coal conveyers, coal stock pile, pipeline, etc.) are envisaged to have varying levels of visual impact at a more localised scale. The site-specific issues (as identified in the scoping study) and potential sensitive visual receptors should be measured against this visual impact index and be addressed individually in terms of nature, extent, duration, probability, severity	Lourens du Plessis of MetroGIS

Issue	Activities to be undertaken in order to assess significance of impacts	Specialist
	and significance of visual impact. In this respect, the Plan of Study for EIA is as follows: **Determine Visual Distance/Observer Proximity to the facility** » In order to refine the visual exposure of the facility on surrounding areas / receptors, the principle of reduced impact over distance is applied in order to determine the core area of visual influence for the power plant structures. » Proximity radii for the proposed development site are created in order to indicate the scale and viewing distance of the facility and to determine the prominence of the structures in relation to their environment. » MetroGIS determined the proximity radii based on the anticipated visual experience of the observer over varying distances. The distances are adjusted upwards for larger facilities and downwards for smaller facilities (i.e. depending on the size and nature of the proposed infrastructure). MetroGIS developed this methodology in the absence of any known and/or acceptable standards for South African power station facilities. » The proximity radii (calculated from the boundary lines of the power plant) are as follows: » 0 – 2.5km. Short distance view where the facility would dominate the frame of vision and constitute a very high visual prominence. » 2.5 - 5km. Medium distance view where the structures would be easily and comfortably visible and constitute a high visual prominence. » 5 - 10km. Longer distance view where the facility would become part of the visual environment, but would still be visible and recognisable. This zone constitutes a medium visual prominence. » Greater than 10km. Very long distance view of the facility where the facility could potentially still be visible, though not as easily recognisable. This zone constitutes a low visual prominence for the facility. **Determine Viewer Incidence/Viewer Perception** » The number of observers and their perception of a structure determine the concept of visual impact. If there are no observers, there would be no visual impact. If the visual perception of	

Issue	Activities to be undertaken in order to assess significance of impacts	Specialist
	the structure is favourable to all the observers, then the visual impact would be positive. » It is therefore necessary to identify areas of high viewer incidence and to classify certain areas according to the observer's visual sensitivity towards the proposed facility and its related infrastructure. » It would be impossible not to generalise the viewer incidence and sensitivity to some degree, as there are many variables when trying to determine the perception of the observer; regularity of sighting, cultural background, state of mind, and purpose of sighting which would create a myriad of options. **Determine the Visual Absorption Capacity of the landscape** » This is the capacity of the receiving environment to absorb or screen the potential visual impact of the proposed facility. The VAC is primarily a function of the vegetation, and will be high if the vegetation is tall, dense and continuous. Conversely, low growing sparse and patchy vegetation will have a low VAC. » The VAC would also be high where the environment can readily absorb the structure in terms of texture, colour, form and light / shade characteristics of the structure. On the other hand, the VAC for a structure contrasting markedly with one or more of the characteristics of the environment would be low. » The VAC also generally increases with distance, where discernable detail in visual characteristics of both environment and structure decreases. » The digital terrain model utilised in the calculation of the visual exposure of the facility does not incorporate the potential visual absorption capacity (VAC) of the region. It is therefore necessary to determine the VAC by means of the interpretation of the natural visual characteristics, supplemented with field observations. **Determine the Visual Impact Index** » The results of the above analyses are merged in order to determine where the areas of likely visual impact would occur. These areas are further analysed in terms of the previously mentioned issues (related to the visual impact) and in order to judge the severity of each impact. » The above exercise should be undertaken for the core power plant as well as the ancillary	

Issue	Activities to be undertaken in order to assess significance of impacts	Specialist
	infrastructure, as these structures (e.g. the substation at the facility, overland coal conveyors, water pipeline, coal stockpile, ash dump, etc.) are envisaged to have varying levels of visual impact at a more localised scale. » The site-specific issues (as mentioned earlier in the report) and potential sensitive visual receptors should be measured against this visual impact index and be addressed individually in terms of nature, extent, duration, probability, severity and significance of visual impact, as well as suggested mitigation measures.	
Social Impact Assessment	The identification and assessment of social impacts will be guided by the Guidelines for specialist SIA input into EIAs adopted by DEA&DP in the Western Cape in 2007. The Guidelines are based on accepted international best practice guidelines, including the Guidelines and Principles for Social Impact Assessment (Inter-organizational Committee on Guidelines and Principles for Social Impact Assessment, 1994). The approach will include: » Review of existing project information, including the Planning and Scoping Documents; » Collection and review of reports and baseline socio-economic data on the area (IDPs, Spatial Development Frameworks etc.); » Site visit and interviews with key stakeholders in the area including local land owners and authorities, local community leaders and councillors, local resident associations and residents, local businesses, community workers etc.; » Identification and assessment of the key social issues and opportunities; » Review of key specialist studies, including health assessment and emissions study; » Preparation of Draft Social Impact Assessment (SIA) Report, including identification of mitigation/optimization and management measures to be implemented; and » Finalisation of the SIA Report.	Tony Barbour - Environmental Consulting And Research

7.5 Methodology for the Assessment of Potential Impacts

Direct, indirect and cumulative impacts of the above issues, as well as all other issues identified will be assessed in terms of the following criteria:

- The **nature**, which shall include a description of what causes the effect, what will be affected and how it will be affected;
- The **extent**, wherein it will be indicated whether the impact will be local (limited to the immediate area or site of development) or regional:
  - Local extending only as far as the development site area – assigned a score of 1;
  - Limited to the site and its immediate surroundings (up to 10 km) – assigned a score of 2;
  - Will have an impact on the region – assigned a score of 3;
  - Will have an impact on a national scale – assigned a score of 4; or
  - Will have an impact across international borders – assigned a score of 5.
- The **duration**, wherein it will be indicated whether:
  - The lifetime of the impact will be of a very short duration (0–1 years) – assigned a score of 1;
  - The lifetime of the impact will be of a short duration (2-5 years) - assigned a score of 2;
  - Medium-term (5–15 years) – assigned a score of 3;
  - Long term (> 15 years) - assigned a score of 4; or
  - Permanent - assigned a score of 5.
- The **magnitude**, quantified on a scale from 0-10, where a score is assigned:
  - 0 is small and will have no effect on the environment;
  - 2 is minor and will not result in an impact on processes;
  - 4 is low and will cause a slight impact on processes;
  - 6 is moderate and will result in processes continuing but in a modified way;
  - 8 is high (processes are altered to the extent that they temporarily cease); and
  - 10 is very high and results in complete destruction of patterns and permanent cessation of processes.
- The **probability** *of occurrence*, which shall describe the likelihood of the impact actually occurring. Probability will be estimated on a scale, and a score assigned:
  - Assigned a score of 1–5, where 1 is very improbable (probably will not happen);
  - Assigned a score of 2 is improbable (some possibility, but low likelihood);
  - Assigned a score of 3 is probable (distinct possibility);
  - Assigned a score of 4 is highly probable (most likely); and

    - Assigned a score of 5 is definite (impact will occur regardless of any prevention measures).
- The **significance**, which shall be determined through a synthesis of the characteristics described above (refer formula below) and can be assessed as low, medium or high;
- The **status**, which will be described as either positive, negative or neutral;
- The degree to which the impact can be reversed;
- The degree to which the impact may cause irreplaceable loss of resources; and.
- The *degree* to which the impact can be *mitigated.*

The **significance** is determined by combining the criteria in the following formula:

S = (E+D+M)P; where

S = Significance weighting;
E = Extent;
D = Duration;
M = Magnitude; and
P = Probability.

The **significance weightings** for each potential impact are as follows:

- < 30 points: Low (i.e. where this impact would not have a direct influence on the decision to develop in the area);
- 30-60 points: Medium (i.e. where the impact could influence the decision to develop in the area unless it is effectively mitigated); and
- > 60 points: High (i.e. where the impact must have an influence on the decision process to develop in the area).

As Transalloys has the responsibility to avoid or minimise impacts, and plan for their management (in terms of the EIA Regulations). The mitigation of significant impacts will be discussed. Assessment of impacts with mitigation will be made in order to demonstrate the effectiveness of the proposed mitigation measures.

The results of the specialist studies and other available information will be integrated and synthesised by the Savannah Environmental project team. An EIA report will be compiled, and will include:

- **Details and expertise** of the EAP who compiled the report;
- **Detailed description** of the proposed activity;

- A description of the property(ies) on which the activity is to be undertaken and the location of the activity on the property(ies);
- A description of the **environment that may be affected by the activity** and the manner in which the physical, biological, social, economic and cultural aspects of the environment may be affected by the proposed activity;
- Details of the **public participation process** conducted, including:
  - Steps undertaken in accordance with the plan of study for EIA;
  - A list of persons, organisations and organs of state that were registered as interested and affected parties;
  - A summary of comments received from, and a summary of issues raised by registered interested and affected parties, the date of receipt of these comments and the response to those comments; and
  - Copies of any representations, objections and comments received from registered interested and affected parties.
- A description of the **need and desirability** of the proposed project and identified potential alternatives to the proposed activity, including advantages and disadvantages that the proposed activity or alternatives may have on the environment and the community that may be affected by the activity;
- An indication of the methodology used in determining the **significance** of potential environmental impacts;
- A description and comparative **assessment of all alternatives** identified during the environmental impact assessment process;
- A summary of the findings and recommendations of **specialist reports;**
- A description of all environmental issues that were identified during the environmental impact assessment process, an assessment of the significance of each issue and an indication of the extent to which the issue could be addressed by the adoption of mitigation measures;
- An assessment of each identified potentially significant impact;
- A description of any assumptions, uncertainties and gaps in knowledge;
- An environmental **impact statement** which contains:
  - A summary of the key findings of the environmental impact assessment; and
  - A comparative assessment of the positive and negative implications of the proposed activity and identified alternatives;
- A draft **environmental management programme;** and
- Copies of specialist reports.

The draft EIA Report will be released for a 40-day public review period. The comments received from I&APs will be captured within a Comments and Response Report, which will be included within the final EIA Report, for submission to the authorities for decision-making.

7.6. Public Participation Process (PPP)

A public participation process will be undertaken by Savannah Environmental. Consultation with key stakeholders and I&APs will be on-going throughout the EIA process. Through this consultation process, stakeholders and I&APs will be encouraged to identify additional issues of concern or highlight positive aspects of the project, and to comment on the findings of the EIA process.

In order to accommodate the varying needs of stakeholders and I&APs within the study area, as well as capture their inputs regarding the project, various opportunities will be provided for stakeholders and I&APs to be involved in the EIA phase of the process, as follows:

» Focus group meetings (pre-arranged and stakeholders invited to attend);
» One-on-one consultation meetings (for example with directly affected and surrounding landowners);
» Telephonic consultation sessions (consultation with various parties from the EIA project team, including the project participation consultant, lead EIA consultant as well as specialist consultants); and.
» Written, faxed or e-mail correspondence.

The draft EIA report will be made available for public review for a 40-day period prior to finalisation and submission to the DEA for review and decision-making. In order to provide an overview of the findings of the EIA process and facilitate comments, a public meeting and key stakeholder meetings will be held during this public review period.

7.7. Key Milestones of the programme for the EIA

The envisaged key milestones of the programme for the EIA phase of the project are outlined in Table 7.1.

Table 7.1: Envisaged key milestones of the programme for the EIA phase of the project

Key Milestone Activities	Proposed completion date[11]
Public review period for Draft Scoping report	22 November 2013 – 22 January 2014
Authority acceptance of the Scoping Report and Plan of Study to undertake the EIA	March 2013
Undertake detailed specialist studies and public participation process	To be announced

[11] Indicative dates only

Key Milestone Activities	Proposed completion date[11]
Make draft EIA Report and draft EMP available to the public, stakeholders and authorities	To be announced
Finalisation of Environmental Impact Assessment Report	To be announced
Submit Final EIA Report to DEA for review and decision-making	To be announced

REFERENCES CHAPTER 7

References For Biodiversity (flora & fauna) Specialist Study

Apps, P. (ed). 2000. Smither's Mammals of Southern Africa. A field guide. Random House Struik, Cape Town, RSA

Carrick, P. J. and R. Krüger. 2007. Restoring degraded landscapes in lowland Namaqualand: Lessons from the mining experience and from regional ecological dynamics. Journal of Arid Environments 70(4): 767-781.

Chapin, F. S. I., E. S. Zavaleta, *et al.* 2000. Consequences of changing biodiversity. Nature 405: 234-242.

Chong, G. W. and T. J. Stohlgren. 2007. Species-area curves indicate the importance of habitats' contributions to regional biodiversity. Ecological Indicators 7: 387-395.

Dekker, S. C., M. Rietkerk, *et al.* 2007. Coupling microscale vegetation-soil water and macroscale vegetation-precipitation feedbacks in semiarid ecosystems. Global Change Biology 13: 671-678.

Dirnböck, T., R. J. Hobbs, *et al.* 2002. Vegetation distribution in relation to topographically driven processes in southwestern Australia. Applied Vegetation Science 5: 147-158.

Esler, K.J., Milton, S.J., Dean, W.R.J. (eds). 2006. Karoo Veld Ecology and Management. Briza

Garrard, G. E., S. A. Bekessy, *et al.* 2008. When have we looked hard enough? A novel method for setting minimum survey effort protocols for flora surveys. Austral Ecology 33: 986-998.

Germishuizen, G. and Meyer, N.L. (eds). 2003. Plants of southern Africa: an annotated checklist. Strelitzia 14. South African National Biodiversity Institute, Pretoria.

Grundling, P. and Linström, A. 2012. Wetland delineation for Transalloys (Pty) Ltd, Emalahleni (Witbank), Mpumalanga Province. Internal Specialist Report by Ixhaphozi Enviro Services CC

Hill, D. and R. Arnold. 2012. Building the evidence base for ecological impact assessment and mitigation. Journal of Applied Ecology 49(1): 6-9.

Hoffman, T. & Ashwell, A. 2001. Nature divided: Land degradation in South Africa. University of Cape Town Press, Cape Town.

Hooper, D. U., F. S. Chapin III, *et al.* 2005. Effects of biodiversity on ecosystem functioning: a consensus of current knowledge. Ecological Monographs 75(1): 3-35.

Keith, D. A. 1998. An evaluation and modification of World Conservation Union Red List Criteria for classification of extinction risk in vascular plants. Conservation Biology 12(5): 1076-1090.

Kremen, C. 2005. Managing ecosystem services: what do we need to know about their ecology? Ecology Letters 8: 468-479.

Le Houérou, H. N. 2000. Restoration and rehabilitation of arid and semiarid Mediterranean ecosystems in north Africa and west Asia: a review. Arid Soil Research and Rehabilitation 14: 3-14.

Mucina, L, & Rutherford, M.C. (Eds.) 2006. The vegetation of South Africa, Lesotho and Swaziland. Strelitzia 19. South African National Biodiversity Institute, Pretoria.

Münzbergová, Z. 2006. Effect of population size on the prospect of species survival. Folia Geobotanica 41: 137-150.

Raimondo, D., Von Staden, L., Foden, W., Victor, J.E., Helme, N.A., Turner, R.C. Kamundi, D.A. & Manyama, P.A. (Eds.). 2009. Red list of South African plants 2009. Strelitzia 25:1-668.

Tongway, D.J., Hindley, N.L. 2004. LANDSCAPE FUNCTION ANALYSIS: PROCEDURES FOR MONITORING AND ASSESSING LANDSCAPES, with special reference to Mine sites and Rangelands. CSIRO Publishing, Canberra, Australia.

UNCCD: United Nations Convention to Combat Desertification, 1995.

Wynberg, R. 2002. A decade of biodiversity conservation and use in South Africa: tracking progress from the Rio Earth Summit to the Johannesburg World Summit on Sustainable Development. South African Journal of Science 98: 233 – 243.

References for Noise Scoping Study

Autumn, Lyn Radle, 2007: The effect of noise on Wildlife: A literature review

ISO 9613-2: 1996. 'Acoustics – Attenuation of sound during propagation outdoors – Part 2: General method of calculation'

Milieu, 2010: 'Inventory of Potential Measures for a Better Control of Environmental Noise', DG Environment of the European Commission

Noise quest, Aviation Noise Information & Resources, 2010: http://www.noisequest.psu.edu/pmwiki.php?n=Main.HomePage

Norton, M.P. and Karczub, D.G.: Fundamentals of Noise and Vibration Analysis for Engineers, Second Edition, 2003

SANS 10103:2008. 'The measurement and rating of environmental noise with respect to annoyance and to speech communication'.

SANS 10210:2004. 'Calculating and predicting road traffic noise'.

SANS 10328:2008. 'Methods for environmental noise impact assessments'.

SANS 10357:2004 The calculation of sound propagation by the Concave method'.

USEPA, 1971: Effects of Noise on Wildlife and other animals

World Health Organization, 2009: Night Noise Guidelines for Europe

World Health Organization, 1999: Protection of the Human Environment; Guidelines for Community Noise

References for Soil Scoping Study

Beneficiation strategy for the minerals industry of South Africa (2011);

The National Development Plan (2011);

Mpumalanga Provincial Growth and Development Strategy (2004-2014);

Emalahleni Municipality Integrated Development Plan (2013/2014)

References For Socio-Economic Scoping Study

References For Heritage Scoping Study

Archaeological Database Wits University 2009

Du Preez, S. J. 1977. Peace attempts during the Anglo Boer War until March 1901. Magister

Artium thesis in History. Pretoria: University of Pretoria.

Geskiedenisatlas van Suid-Afrika. Die vier noordelike provinsies. Edited by J. S. Bergh. 1999. Pretoria: J. L. van Schaik Uitgewers.

Huffman, T.N. 1999. Archaeological Survey of Blesboklaagte, Witbank. An unpublished report by Archaeological Resources Management on file at SAHRA as: 1999-SAHRA-0064.

Huffman, T.N. 2007. Handbook to the Iron Age. The archaeology of pre-colonial farming societies in Southern Africa. Pietermaritzburg: University of KwaZulu-Natal Press.

Massie, R. H. 1905. The Native tribes of Transvaal. Prepared for the General Staff War Office. London: His Majesty's Stationery Office.

Millsteed, B. 2013. Desktop Palaeontological Heritage Impact Assessement Report On The Site Of The Proposed Transalloys (Pty) Ltd's Power Station To Be Located Within Portions 25, 26, 33, 34, 35, 36 And 37 Of The Farm

Elandsfontein 309 Js And Portions 20, 24 And 38 Of The Farm Schoongezicht 308 Js, Mpumalanga Province. Unpublished Report.

Mucina, L. & Rutherford,M.C. 2006. The vegetation map of South Africa, Lesotho and Swaziland. SANBI, Pretoria.

Murimbika, M. 2008. Proposed Construction of New 132 kV Powerline from Wilge Substation to Bravo Substation, Telecommunications Tower and Wilge Substation in Emalahleni Local Municipality, Nkangala District, Mpumalanga Province. An unpublished report by Nzumbululo Heritage Solutions on file at SAHRA as: 2008-SAHRA-0204

National Heritage Resources Act NHRA of 1999 (Act 25 of 1999)

Readers Digest. 1992. Illustrated history of South Africa. The Real Story. Expanded second edition: completely updated. Cape Town: Readers Digest Association.

Ross, R. 2002. A concise history of South Africa. Cambridge: Cambridge University Press.

SAHRA Report Mapping Project Version 1.0, 2009

South African Heritage Information System (SAHRIS)

Van der Walt, J. 2013. Heritage Feasibility study for the Proposed Witbank Dam

Development on portions of the farm Rhenosterfontein 318 JS and Naauwpoort 335 JS. Unpublished report.

Van Schalkwyk, J.A. 2003. Eskom Transmission Line Duvha (Witbank) to Janus (Mecklenburg) : Cultural Heritage Scoping Report. An unpublished report by the National Cultural History Museum

Van Vollenhoven, A.C. 2013. A Report On A Cultural Heritage Impact Assessment For A Proposed Prospecting Rights Application On The Farm Elandsfontein 309 Js, Close To Emalahleni, Mpumalanga Province. Unpublished report.

References For Air Quality Scoping Study

Aurecon. 2011. Background Information Document: Environmental and Socia-Economic Impact Assessment for the Proposed Coal-fired Power Station in the Erongo Region.

Beychock, M.R., 2005. Fundamental of Stack gas Dispersion. Fourth addition. Published by the author.

DEA (2004). National Environment Management: Air Quality Act. No.27318. South Africa, Government Gazette. 476: 56.

DEA (2009). National Environmental Management: Air Quality Act, 2004, National Ambient Air Quality Standards 1210. D. o. E. affairs. Pretoria, Government Gazette. Act 39 of 2004.

DEA (2010). National Environment Management: Air Quality Act- List of activities which may result in atmospheric emissions which have or may have a significant detrimental effect on the environment, including health, social conditions, economic conditions ecological conditions or cultural heritage. No.33064. South Africa, Government Gazette. 537.

Godish R, 1990, Air Quality, Lewis Publishers, Michigan, 422 pp.

Goldreich, Y. and Tyson, P.D., 1988, Diurnal and inter-diurnal variations in large-scale atmospheric turbulence over southern Africa, South African Geographical Journal, 70, 48-56.

Goudie, A., 1972. Climate, weathering, crust formation, dunes, and fluvial features of the Central Namib Desert, near Gobabeb, South West Africa. Madoqua, Series II Vol I, Nos 54-62, 1972.

IFC, 2007. Environmental, Health, and Safety Guidelines; General EHS Guidelines: Environmental Air Emissions and Ambient Air Quality. International Finanace Corporation, World Bank Group. 30 April 2007. http://www.ifc.org/ifcext/enviro.nsf/Content/EnvironemntalGuidelines

Oke, T. T. 1990. Boundary Layer Climates, Routledge, London and New York, 435 pp.

Pasquill, F. and Smith, F.B. 1983. Atmospheric Diffusion: Study of the Dispersion of Windborne Material from Industrial and Other Sources, Ellis Horwood Ltd, Chichester, 437 pp.

Petzer, G. and von Gruenewaldt, R. 2008. Air Quality Impact Assessment for the Proposed Walvis Bay Coal-Fired Power Station and Black-Start Facility, APP/08/NS-04, November 2008.

Shaw, R.W. and Munn, R.E. 1971. Air Pollution Meteorology, in BM McCormac (Ed), Introduction to the Scientific Study of Air Pollution, Reidel Publishing Company, Dordrecht-Holland, 53-96.

US EPA, 2006. Compilation of Air Pollution Emission Factors: AP 42, Fifth Edition, Volume I, Chapter 13. [Online]. Available at: http://www.epa.gov/ttn/chief/ap42/ch13/index.html [Accessed 2013].

World Bank, 1999. Pollution Prevention and Abatement Handbook 1998: Toward Cleaner Production. The World Bank Group, Washington, D.C., April 1999.

WHO, 2000. Air Quality Guidelines. World Health Organization, Geneva.

WHO, 2005. WHO air quality guidelines global update 2005: Report on a Working Group meeting, Bonn, Germany, 18-20 October 2005.

Zemba, S., Ames, M. and Hendrix, S., 2008. Recent Observations on Risk Assessments of Combustor Stack Emissions, Cambridge Environmental Inc.

References For Visual Impact Scoping Study

Astom, 2013. Circulating Fluidised Bed Technology: Clean, efficient & Fuel-flexible.

Chief Directorate National Geo-Spatial Information, varying dates. 1:50 000 Topo-cadastral Maps and Data.

CSIR/ARC, 2000. National Land-cover Database 2000 (NLC 2000)

Department of Environmental Affairs and Tourism (DEAT), 2001. Environmental Potential Atlas (ENPAT) for the Mpumalanga Province

Google Inc. (Varying dates). Google Earth Street View and Satellite Images.

National Botanical Institute (NBI), 2004. Vegetation Map of South Africa, Lesotho and Swaziland (Unpublished Beta Version 3.0)

Photographs: Sourced from Google Earth (Panoramio and 360 Cities). Assumed to be in the public domain.

References For Agriculture Scoping Study

Agricultural Research Council. Undated. AGIS Agricultural Geo-Referenced Information System available at http://www.agis.agric.za/.

Water Research Commission. Undated. South African Rain Atlas available at http://134.76.173.220/rainfall/index.html.