





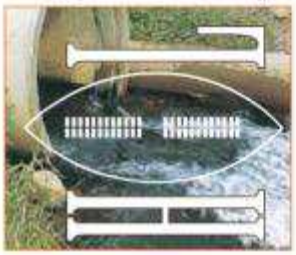
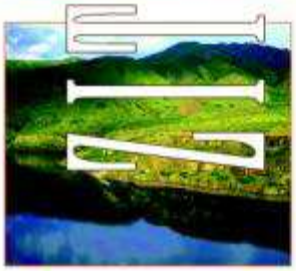

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EIA, WML and WULA for Kendal Power Station - 30 Year Ash Disposal Facility

Proponent:

Eskom Holdings SOC Limited
P O Box 1091
Johannesburg
2000

DEA Reference Number: 14/12/16/3/3/3/68

NEAS Reference Number: DEA/EIA/0001624/2013

5 August 2013 **Project: 12935**

FINAL SCOPING REPORT

YOUR COMMENT ON THE DRAFT SCOPING REPORT

The FSR is available for comment from **6 August to 30 August 2013**. This FSR has been distributed to the authorities, and copies thereof are available at strategic public places in the project area (see below).

List of public places where the Final Scoping Report is available:

PLACE	Address / Contact details
Phola Public Library	013 645 0094
Ogies Public Library, 61 Main Street, Ogies	013 643 1150
Delmas Public Library	013 665 2425
Emalahleni Public Library – 28 Hofmeyer Street	013 653 3116
Kungwini Public Library	013 932 6305
Kendal power station – Security Reception	013 647 6002

The report is also available electronically from the Public Participation office or on the Zitholele web site: http://www.zitholele.co.za, or the Eskom website http://www.eskom.co.za/eia

You may comment on the Final Scoping Report by:

- Completing the comment sheet;
- Writing a letter, or producing additional written submissions; and
- Emailing or telephoning the public participation office.

DUE DATE FOR COMMENT ON THE FINAL SCOPING REPORT IS 26 AUGUST 2013

SEND YOUR COMMENTS TO THE PUBLIC PARTICIPATION OFFICE:

Nicolene Venter or Patiswa Mnqokoyi
Public Participation Office
Zitholele Consulting
P O Box 6002, Halfway House, 1685
Tel: (011) 207 2060
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Email: nicolenev@zitholele.co.za / patiswam@zitholele.co.za

AN EIA AND WMLA CONSISTS OF SEVERAL PHASES. WULA PROCESS INCLUDED.

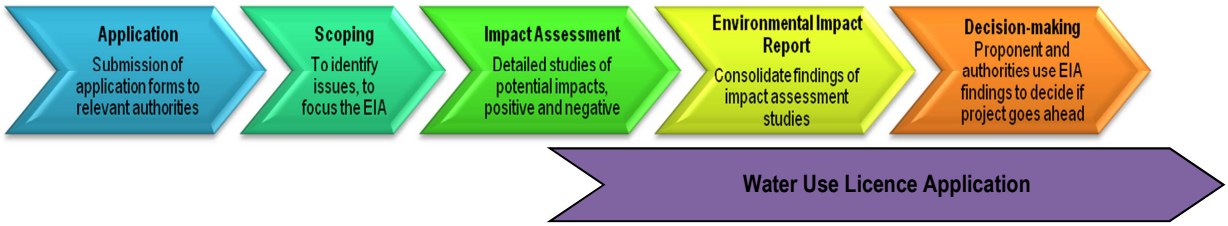

TABLE OF CONTENTS

SECTION **PAGE**

LIST OF FIGURES

LIST OF TABLES

LIST OF APPENDICES

ABBREVIATIONS

CA.....Competent Authority
DMR ..... Department of Mineral Resources
DEA ..... Department of Environmental Affairs
DEIR .....Draft Environmental Impact Report
DSR .....Draft Scoping Report
DWA ..... Department of Water Affairs
DWEA..... Department of Water and Environmental Affairs (Ministry)
EA.....Environmental Authorisation
EAP ..... Environmental Assessment Practitioner
ECA ..... Environment Conservation Act
EIA.....Environmental Impact Assessment
EIR..... Environmental Impact Report
EMPr..... Environmental Management Programme
FEIR .....Final Environmental Impact Report
FSR .....Final Scoping Report
GNR.....Government Notice Regulation
I&APs.....Interested and Affected Parties
IEA.....Integrated Environmental Authorisation
IEM .....Integrated Environmental Management
kV ..... Kilo Volts
MVA.....Mega Volt Ampere
NEMA .....National Environmental Management Act
NEM:WA.....National Environmental Management: Waste Act
NERSA ..... National Energy Regulator of South Africa
NIRP .....National Integrated Resource Plan
NWA .....National Water Act
PoS.....Plan of Study
PPP ..... Public Participation Process
SIA.....Social Impact Assessment
SR.....Scoping Report
TIA..... Traffic Impact Assessment
ToR.....Terms of Reference
WMLA.....Waste Management License Application
IWULA .....Integrated Water Use Licence Application

1 INTRODUCTION

1.1 CONTEXT AND OBJECTIVES OF THIS REPORT

This Final Scoping Report (FSR) is a key component of the EIA and WML authorisation process and is compiled for stakeholder consumption; for the purposes of review and comment; and to address the requirements for Scoping and the Plan of Study (PoS) for the EIA as outlined in the NEMA EIA regulations. The aim of this FSR is to:

- Indicate the methodology followed to identify and evaluate alternatives;
- Provide information to the authorities as well as Interested and Affected Parties (I&APs) on the proposed project as well as a description of the baseline environment;
- Indicate how I&APs have been afforded the opportunity to contribute to the project; to verify that their issues, raised to date, have been considered; and to comment on the PoS included in the FSR, and comment on the Terms of References for the proposed specialists;
- Define the Terms of Reference (ToR) for specialist studies to be undertaken in the EIA; and
- Present the findings of the Scoping Phase in a manner that facilitates timely review of the FSR and approval of the PoS by the relevant authorities.

Comments received to date during the Public Participation Process have been incorporated into the FSR, which will be submitted to the competent authority for review and approval of the PoS. The PPP is continuous during this phase of the EIA and any further comments can be sent to the Public Participation Office even after submission to the authority for review and approval of the FSR. The FSR thus sets the scope for the second phase of the EIA, the Impact Assessment Phase.

1.2 PROJECT LOCATION

Kendal Power Station is a coal-fired power station situated south west of the town of Ogies in Mpumalanga Province, and became operational in 1993 (see Figure 1-1).

1.3 KENDAL POWER STATION

Kendal Power Station uses indirect dry-cooling through a condenser, cooling water and cooling tower system to effectively cool the cooling water to required temperatures.

The process of electricity generation is such that coal it used as a fuel source to heat pure demineralised water to produce steam. The steam produced, in turn, drives an electrical turbine producing electricity, which is fed into the electricity grid as it is produced. Waste steam exiting the turbine enters the condenser where it condensates for reuse. In the

condenser cooling water flows through thousands of condenser tubes, in an enclosed unit surrounded by the waste steam. As a result of the temperature difference between the water and steam, condensation is achieved through transferral of waste heat to the cooling water. The warmed cooling water flows to a cooling tower from where the heat is conducted from the water by means of A-Frame bundles of cooling elements. Cooling water flowing through these elements cools down as an upward draft of cool air removes the heat from the water. After cooling, this water returns to the condenser.

This cooling system is a closed system as there is no loss of water due to evaporation. This closed system uses significantly less water in its cooling processes than conventional wet cooled power stations. Kendal has six (6) 686 megawatt (MW) electricity generating units, with a combined installed capacity of 4116 MW. The station's cooling towers are the largest structures of their kind in the world with a height and base diameter of 165 m.

1.4 PROJECT BACKGROUND

The current ash disposal facility of the Kendal Power Station is running out of space due to the fact that the life span of Kendal has been extended to 2053, which would render the available ash disposal space inadequate to accommodate the continuation of disposal. In addition poor quality coal accessible for combustion is producing more ash than was anticipated in station planning processes. Concurrently with this EIA process for the authorisation of the Kendal 30 year ash disposal facility, another EIA process is underway to apply for authorisation of the continuation of the existing ash disposal facility at Kendal Power Station in order to extend the life of the existing facility sufficiently into the future up to the point that the second ash disposal facility can be authorised, constructed and become operational. These two EIA processes are being undertaken separately through independent applications to the Competent Authority (CA).

The options that are being considered in the Kendal Continuous Ash Disposal project (EIA) can potentially accommodate between 7 years (minimum disposal option) to 17 years (maximum disposal option) of ash, from a benchmark period of September 2012, in the event that the continuation of the existing facility is authorised by the CA. Assuming the worst case scenario whereby only the minimum disposal option is authorised by the CA for the Kendal Continuous Ash Disposal project, the additional new ash disposal facility would need to accommodate a maximum ash disposal capacity equivalent to 37 years.

Alternatives for the Kendal 30 Year Ash Disposal Facility have been considered (and are discussed in detail in Chapter 5), and it is envisaged that the project will include the following components (discussed in more detail in Chapter 4):

- Construction of an ash disposal facility within a 7 km radius of the Kendal Power Station that can accommodate 37 years of ash. A maximum radius of 10 km may be investigated if enough feasible alternatives for further investigation are not forthcoming;

- Design and construction of the conveyance system from the power station to the ash disposal facility;
- Ash Pollution Control Dams;
- Clean and dirty water cut-off and management systems / trenches;
- Design and construction of new and/or expansion of existing storm water management infrastructure;
- Provision of support services including electricity and water supply in the form of power lines, pipelines, associated infrastructure, design and construction of access and maintenance roads to and from the site, and associated infrastructures such as culverts and channels; and Integrated Water Use License Application (IWULA).

Zitholele has been appointed to undertake the following activities for the project;

- Environmental Impact Assessment (EIA) – According to the National Environmental Management Act ([NEMA] Act No 107 of 1998, as amended 2010)
- Waste Management License (WML) - According to the National Environmental Management: Waste Act ([NEM:WA] Act No 59 of 2008)
- Integrated Water Use License Application (IWULA) – According to the National Water Act (Act No. 36 of 1998).

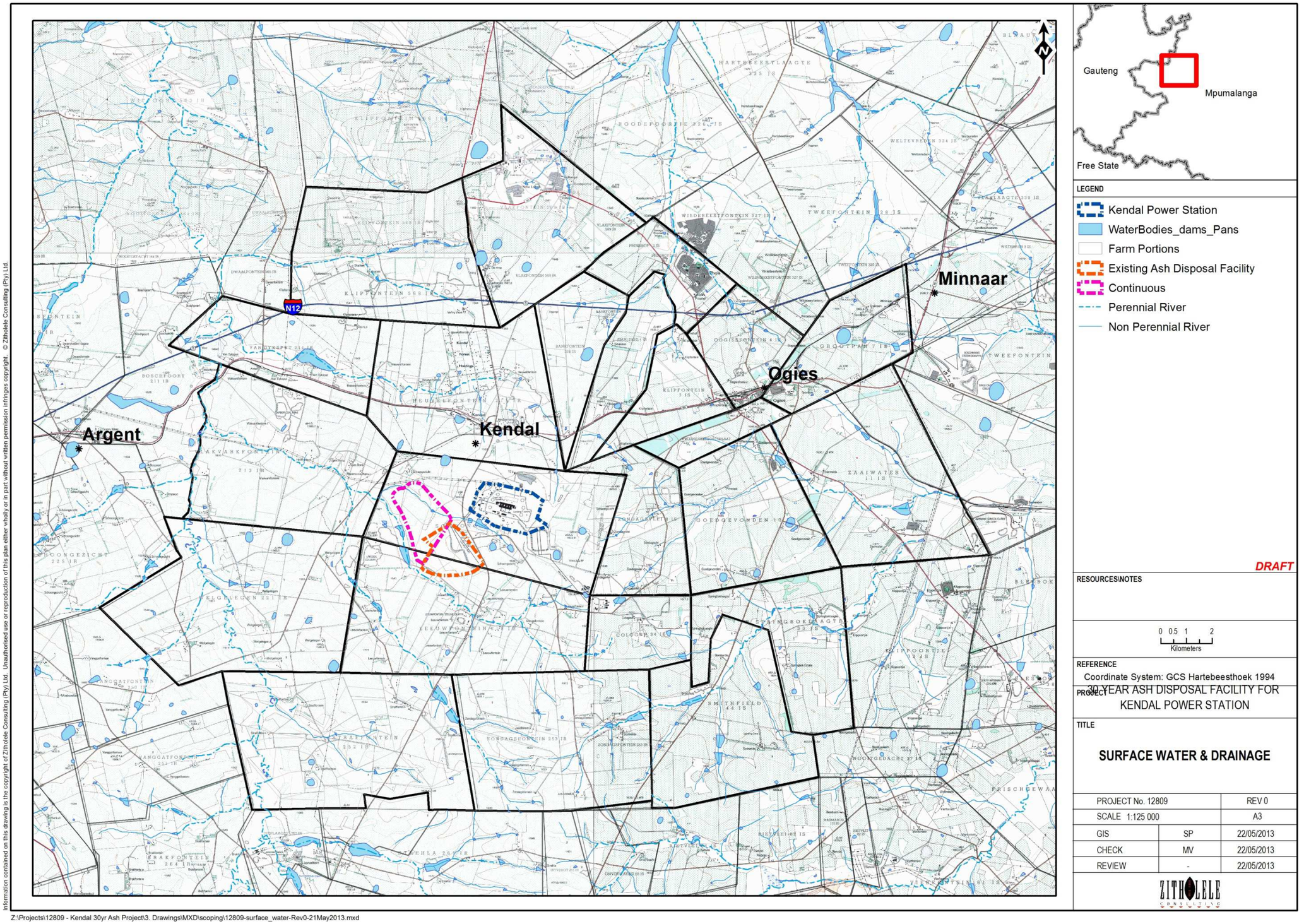

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Figure 1-1 - Location of the Project

2 KEY ROLE PLAYERS

2.1 WHO IS THE PROPONENT?

Eskom Holdings SOC Limited (Eskom) is the main South African utility that generates, transmits and distributes electricity. Eskom was established in 1923 by the South African government and today supplies ~95 % of the country's electricity. The utility is the largest producer of electricity in Africa, is among the top seven utilities in the world in terms of generation capacity and among the top nine in terms of sales. Eskom plays a major role in accelerating growth in the South African economy by providing a high-quality and reliable supply of electricity.

Details of the applicant are as follow:

Name of Applicant:	Eskom Holding SOC Limited
Contact person:	Deidre Herbst
Address:	P O Box 1091, Johannesburg, 2000
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Fax:	086 660 6092
E-mail:	deidre.herbst@eskom.co.za

Details of the Kendal Power Station Eskom representative:

Contact person:	Christopher Nani
Address:	Private Bag X7272, Emalahleni, 1035
Telephone:	013 295 9119
Cell:	082 805 3392
Fax:	013 647 6904

2.2 ENVIRONMENTAL ASSESSMENT PRACTITIONER (EAP) DETAILS

Waste related activities requiring an EIA are listed in terms of the NEM:WA and associated listings. Furthermore, the NEM:WA requires that EIA's for listed waste activities be undertaken in terms of the NEMA EIA Regulations. In terms of the NEMA EIA Regulations, the proponent must appoint an independent Environmental Assessment Practitioner (EAP) to undertake an environmental assessment for an activity regulated in terms of NEMA. In this regard, Eskom appointed Zitholele Consulting to undertake the EIA for the proposed project, in accordance with the aforementioned regulations.

Zitholele Consulting is an empowerment company formed to provide specialist consulting services primarily to the public sector in the fields of Water Engineering, Integrated Water Resource Management, Environmental and Waste Services, Communication (public participation and awareness creation) and Livelihoods and Economic Development.

Zitholele Consulting has no vested interest in the proposed project and hereby declares its independence as required by the EIA Regulations. The details of the EAP representatives are listed below.

Dr. Mathys Vosloo, Project Manager

Name:	Mathys Vosloo
Company Represented:	Zitholele Consulting (Pty) Ltd.
Address:	P O Box 6002, Halfway House, 1685
Telephone:	011 207 2079
Fax:	086 545 8835
E-mail:	mathysv@zitholele.co.za

Dr. Mathys Vosloo graduated from the Nelson Mandela Metropolitan University with a PhD in Zoology in 2012. Over the past few years Mathys has been involved in a variety of projects and has undertaken environmental authorisations for ranging from the construction of roads, rehabilitation of dam wall infrastructure, development of low cost housing, and electrical generation and transmission projects. Mathys has also been involved in the development of strategic environmental assessments and state of the environment reporting, and has developed numerous environmental management programmes during the course of his career. With more than 10 years of environmental and scientific field and more than 6 years in environmental consulting Mathys has gained an advanced and holistic understanding of environmental management in the built environment.

Warren Kok, as Project Director and Reviewer

Name:	Warren Kok
Company Represented:	Zitholele Consulting (Pty) Ltd.
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Telephone:	011 207 2073
Fax:	086 676 9950
E-mail:	warrenk@zitholele.co.za

Warren Kok is the designated Project Director on behalf of Zitholele. Warren will ensure regulatory compliance, quality assurance and overseeing the Public Participation and Technical Environmental Team. Warren will hold final responsibility for the compilation of the EIA / EMP Reports. Warren holds a B.Hon degree in Geography and Environmental Management from Rand Afrikaans University (2000) and a Higher Certificate in Project Management from Damelin. He is a certified Environmental Assessment Practitioner (EAP) who is registered with EAPASA. Warren has in excess of 10 years' experience in environmental consulting in South Africa. His experience spans both the public and private sector. The majority of his work experience has been gained in the mining sector in South Africa, where he has been responsible for undertaking and managing Integrated EIA Processes. Warren has successfully undertaken countless integrated EIA processes that require integration of the MPRDA, NEM:WA, WULA and NEMA regulatory processes. Many of these projects are considered landmark projects in South Africa's environmental mining

sector and included several hazardous waste facilities. He is ideally skilled and experienced to manage this project to its conclusion. He is currently a Senior Environmental Practitioner for Zitholele Consulting, responsible for overseeing and managing project teams in the Environmental Division, mentoring staff, liaising with clients and public stakeholders at all levels.

2.3 COMPETENT AND RELEVANT AUTHORITIES

The National Department of Environmental Affairs (DEA) is the Competent Authority. The mandate and core business of DEA is underpinned by the Constitution and all other relevant legislation and policies applicable to the government.

Details of the DEA case officer undertaking the assessment of the project are:

Name:	Pumeza Skepe
Company Represented:	National Department of Environmental Affairs
Address:	Private Bag X 447, Pretoria, 0001
Telephone:	012 310 3061
Fax:	012 320 7539
E-mail:	PSkepe@environment.gov.za

The Mpumalanga Department of Economic Development, Environment and Tourism (MDEDET) and the Department of Water Affairs (DWA) are commenting authorities for this application.

Details of the contact person at MDEDET are as follow:

Name:	Bhekinkosi E Mndawe
Address:	P. O. Box 2777, Ermelo, 2351
Telephone:	017 811 3951
Fax:	012 320 7539
E-mail:	bemndawe@mpg.gov.za

Details of the contact person at the regional office of DWA are as follow:

Name:	Standford Macevele
Address:	Private Bag X 10580, Bronkhorstspruit, 1020
Telephone:	013 932 2061
Fax:	086 661 7621
E-mail:	maceveles@dwa.gov.za

Details of the Emalahleni Local Municipality

Name:	Erald Nkabinde
Address:	PO Box 3, Emalahleni, 1035
Telephone:	013 690 6353
E-mail:	nkabindeej@emalahleni.co.za

3 LEGAL REQUIREMENTS

Environmental legislation in South Africa was promulgated with the aim of, at the very least, minimising and at the most preventing environmental degradation. The following Acts and Regulations are applicable to this Project:

3.1 THE CONSTITUTION OF THE REPUBLIC OF SOUTH AFRICA (ACT NO 108 OF 1996)

Section 24 of the Constitution states that:

Everyone has the right

ii) to an environment that is not harmful to their health or well-being; and

iii) to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that-

- *prevent pollution and ecological degradation;*
- *promote conservation; and*
- *secure ecologically sustainable development and use of natural resources, while promoting justifiable economic and social development*

The current environmental laws in South Africa concentrate on protecting, promoting, and fulfilling the Nation's social, economic and environmental rights; while encouraging public participation, implementing cultural and traditional knowledge and benefiting previously disadvantaged communities.

3.2 NATIONAL ENVIRONMENTAL MANAGEMENT ACT (NO 107 OF 1998)

NEMA provides a framework for environmental law reform in South Africa and covers three areas, namely:

- Land, planning and development;
- Natural and cultural resources, use and conservation; and
- Pollution control and waste management.

This law is based on the concept of sustainable development. The objective of NEMA is to provide for co-operative environmental governance through a series of principles relating to:

- The procedures for state decision-making on the environment; and
- The institutions of state which make those decisions.

The NEMA principles serve as:

- A general framework for environmental planning;
- Guidelines according to which the state must exercise its environmental functions; and
- A guide to the interpretation of NEMA itself and of any other law relating to the environment.

3.2.1 *What are the NEMA principles?*

Some of the most important principles contained in NEMA are that:

- Environmental management must put people and their needs first;
- Development must be socially, environmentally and economically sustainable;
- There should be equal access to environmental resources, benefits and services to meet basic human needs;
- Government should promote public participation when making decisions about the environment;
- Communities must be given environmental education;
- Workers have the right to refuse to do work that is harmful to their health or to the environment;
- Decisions must be taken in an open and transparent manner and there must be access to information;
- The role of youth and women in environmental management must be recognised;
- The person or company who pollutes the environment must pay to clean it up;
- The environment is held in trust by the state for the benefit of all South Africans; and
- The utmost caution should be used when permission for new developments is granted.

3.2.2 *Environmental Impact Assessment Regulations: 543, 544, 545 and 546 of 18 June 2010*

In June 2010, an amended set of NEMA Environmental Impact Assessment Regulations was promulgated in GNR 543. These regulations govern, amongst others, the listing of activities that require Environmental Authorisation (EA), the authorisation procedures themselves, and the public participation process for authorisation procedures.

It should be noted that although the main activity of the project triggers the need for a waste management license in terms of NEM:WA, certain activities that will be undertaken as part of the project are also listed activities in terms of NEMA, and therefore also require an EA prior to proceeding with the project. All potential listed activities that may be triggered as a result of this project are listed in Table 3-1, although, some of these activities may not be undertaken dependent on the preferred alternative selected during the impact assessment phase of the project.

Table 3-1: Relevant NEMA Listed Activities that may be triggered by the proposed development

NOTICE NUMBER AND DATE:	ACTIVITY NUMBER (to the relevant or notice) :	DESCRIPTION OF THE LISTED ACTIVITY
Construction of the waste disposal facility and associated infrastructure		
GN R. 545 of 2010	Activity 15	Physical alteration of undeveloped, vacant or derelict land for residential, retail, commercial, industrial or institutional use where the total area to be transformed is 20 hectares or more.
GN R. 544 of 2010	Activity 24	The transformation of land bigger than 1000 square metres in size, to residential, retail commercial, industrial or institutional use, where at the time of coming into effect of this Schedule such land was zoned as open space, conservation or has en equivalent zoning.
Construction of a conveyor belt for the transportation of waste to the proposed disposal facility.		
GN R. 545 of 2010	Activity 6 (iii)	The construction of facilities or infrastructure for the bulk transportation of dangerous goods – in solid form, outside an industrial complex, using funiculars or conveyors with a throughput capacity of more than 50 tons per day;
Construction, realignment and decommissioning of transmission and distribution lines, and associated infrastructure.		
GN R. 545 of 2010	Activity 8	The construction of facilities or infrastructure for the transmission and distribution of electricity with a capacity of 275kV or more, outside an urban area or industrial complex.
GN R. 544 of 2010	Activity 10 (i)	Construction of infrastructure for the transmission and distribution of electricity outside urban areas or industrial complexes with a capacity of more than 33 but less than 275 kV.
GN R. 544 of 2010	Activity 27 (ii)	The decommissioning of existing infrastructure for the electricity transmission and distribution with a threshold of more than 132 kV.
GN R. 544 of 2010	Activity 29	Regardless the increased output of the facility, the development footprint will be increased by 1 hectare or more. There will be no increase in electricity output, however considering the ash disposal facilities footprint is part of the larger power station, it could be argued that the foot print of the Kendal Power Station is being increased by more than 1000 ha.
Construction of a return water dam and/or alteration of existing dams for the management of storm water.		
GN R. 545 of 2010	Activity 19	The construction of a dam where the highest part of the dam wall, as measured from the toe of the wall to the highest part of the wall, is 5 metres or higher, or where the high water mark of the dam covers an area of 10 hectares or more.
GN R. 544 of 2010	Activity 12	The construction of facilities for the off-stream storage of water, including dams and reservoirs, with a combined capacity of 50 000 cubic metres or more, unless such storage falls within the ambit of Activity 19 of GNR 545.
Construction of a storm water infrastructure such as pipelines / cut off drains or channels and/or the alteration of existing storm water infrastructure.		
GN R. 544 of 2010	Activity 9 (i, ii)	The construction of facilities or infrastructure exceeding 1000 metres in length for the bulk transportation of water, sewage or storm water – i) With an internal diameter of 0.36 metres or more; or ii) With a peak throughput of 120 litres per second or more.
The construction of access roads for the construction and or long term servicing of all planned infrastructure for the project and/or the realignment and expansion of existing roads.		

NOTICE NUMBER AND DATE:	ACTIVITY NUMBER (to the relevant or notice) :	DESCRIPTION OF THE LISTED ACTIVITY
GN R. 544 of 2010	Activity 22	The construction of a road outside urban areas: i) With a reserve wider than 13,5 metres, ii) Where no reserve exists where the road is wider than 8 metres, or iii) For which an EA was obtained for the route determination in terms of Activity 5 of GN 387 of 2006 or Activity 18 of GN 545 of 2010.
GN R. 544 of 2010	Activity 47	The widening of a road by more than 6 metres, or the lengthening of a road by more than 1 kilometre i) With a reserve wider than 13,5 metres; ii) Where no reserve exists where the road is wider than 8 metres, Excluding widening or lengthening inside urban areas.
The crossing of rivers by road, conveyor or storm water structures, potential storm water outlets.		
GN R. 544 of 2010	Activity 11	The new site for disposal of ash may impact on water resources within the study area through the construction of: Canals; Channels; Bridges; Dams; Bulk storm water outlet structures; Buildings > 50 m^2; Infrastructure or structures > 50 m^2
GN R. 544 of 2010	Activity 18	The infilling or depositing of any material of more than 5 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 5 cubic metres from: (i) a watercourse;
GN R. 544 of 2010	Activity 26	Any process or activity identified in terms of section 53(1) of the National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004).
GN R. 544 of 2010	Activity 28	The expansion of existing facilities for any process or activity where such expansion will result in the need for a new, or amendment of, an existing permit or license in terms of national or provincial legislation governing the release of emissions or pollution, excluding where the facility, process or activity is 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.
GN R. 544 of 2010	Activity 38	The expansion of facilities for the transmission and distribution of electricity where the expanded capacity will exceed 275 kilovolts and the development footprint will increase.
GN R. 544 of 2010	Activity 39	The expansion of canals, channels, bridges, weirs; or bulk storm water outlet structures within a watercourse or within 32 metres of a watercourse, measured from the edge of a watercourse, where such expansion will result in an increased development footprint but excluding where such expansion will occur behind the development setback line.
GN R. 544 of 2010	Activity 41	The expansion of facilities or infrastructure for the off-stream storage of water, including dams and reservoirs, where the combined capacity will be increased by 50000 cubic metres or more.
GN R. 544 of 2010	Activity 49	The Expansion of facilities or infrastructure for the bulk transportation of dangerous goods in solid form, outside an industrial complex or zone, by an increased throughput capacity of 50 tons or more per day.

A number of Listed Activities, which include GNR 545: Activities 8, 15 and 19, and GNR 544: Activities 9, 19, 27, 28, 38, 39, 41 and 49 (as above), were added to the list of activities that may trigger the need for environmental authorisation during Scoping. These listed activities will be considered, in addition to the list of activities submitted with the application form to DEA during the application phase of this project, during the EIR and conceptual design phase to verify it's validity. ***It thus stands to reason that the listed activities included in***

the application form submitted to the DEA on 3 January 2013 will differ from those reported on in this FSR, and eventually the FEIR, resulting from the EIA process being informed by location of the preferred alternative and detailed conceptual designs.

Based on the aforementioned list of activities that may be triggered by the project a full Scoping and Environmental Impact Reporting authorisation procedure is required in terms of the NEMA Regulations as amended (June 2010) and published in GNR 543.

3.3 NATIONAL ENVIRONMENTAL MANAGEMENT: WASTE ACT (NO 59 OF 2008)

In July 2009 the NEM:WA was promulgated, and amongst others makes provision for licensing and management of waste disposal facilities. The Minister of the Department of Water and Environmental Affairs, under Section 19 (1) of the NEM:WA, has published a list of waste management activities, which has or is likely to have, a detrimental effect on the environment in GNR 718 of 3 July 2009. Amendments to the list were proposed by the Minister in 2012 by the publication of GNR 779 of 28 September 2012, which called for comment on the proposed changes. However, this amended list has not been promulgated as yet. GNR 718 of 3 July 2009 listed activities in two different categories:

For **Category "A"** activities: a person who wishes to commence, undertake or conduct an activity listed under this Category, must conduct a Basic Assessment, as stipulated in the EIA regulations under section 24 (5) of the NEMA as part of a Waste Management Licence Application.

For **Category "B"** activities: a person who wishes to commence, undertake or conduct an activity listed under this Category, must conduct a S&EIR process, as stipulated in the EIA regulations under section 24(5) of the NEMA as part of a Waste Management Licence Application.

Proposed inclusion under the proposed amended list of waste management activities, which has or is likely to have, a detrimental effect on the environment are:

*For **Category "C"** activities: a person who wishes to commence, undertake or conduct an activity listed under this Category, must comply with the requirements or standards determined by the Minister in terms of the NEM:WA.*

The activities of the project that require a waste management license in terms of these regulations are listed in Table 3-2. It should be noted that the activities listed for the project fall within Category B and will therefore require a full Scoping and EIA process be undertaken for the licensing of the proposed project.

Table 3-2: Relevant GNR 718 (3 July 2009) Listed Activities.

NOTICE NUMBER, CATEGORY AND DATE	ACTIVITY NUMBER (as listed in the waste management activity list) :	Description of Listed Activity
GNR 718, Category B	9	The disposal of any quantity of hazardous waste to land.
	11	The construction of facilities for the activities listed in Category B of this Schedule.

3.4 THE NATIONAL WATER ACT (NO. 36 OF 1998)

The identified study area contains a large number of rivers and streams (including the Wilge River), wetlands and pans. Some of these water resources are likely to be affected by the development of an ash disposal facility within 10 km of the Kendal Power Station. As a consequence, this project is likely to require a water use license in terms of Section 21 of the NWA. A full list of water uses to be licensed will be identified during the early stages of the EIA phase. The list of potential water uses that will require licensing is given in the table below.

Table 3-3: Potential applicable Section 21 Water Use Licenses

Water Use	Description	Potential Section 21 Water Uses
Section 21 (a)	Taking of water from a water resource.	Using water for dust suppression on roads or waste disposal facility; and Borehole water abstraction.
Section 21 (b)	Storing of water.	Raw water storage (clean, untreated water) / reservoirs. Storing of water in return water dams, pollution control dams, and or storm water control dams.
Section 21 (c)	Impeding or diverting the flow of water in a water course.	Activities within or near wetlands, or activities affecting wetlands. Stream diversion.
Section 21 (d)	Engaging in a stream flow reduction activity contemplated in Section 36 of the Act.	To be confirmed, but unlikely.
Section 21 (e)	Engaging in a controlled activity: S37(1)(a) irrigation of any land with waste, or water containing waste generated through any industrial activity or by a water work.	Water used for dust suppression (to be confirmed).
Section 21 (f)	Discharging waste or water containing waste into a water resource.	To be confirmed, but unlikely.
Section 21 (g)	Disposing of waste in a manner which may impact on a water resource.	Construction of a ~1000 ha waste disposal facility. Storage of contaminated water in a pollution control dam / balancing dam / evaporation dam.
Section 21 (h)	Disposing in any manner of water which contains waste from, or which has been heated in, any industrial or power generation process.	To be confirmed.
Section 21 (i)	Altering the bed, banks, course, or characteristics of a watercourse. This includes altering the course of a watercourse (previously referred to as a river diversion).	Stream diversion.
Section 21 (j)	Removing, discharging or disposing of water found underground if it is necessary for the efficient continuation of an activity, or for the safety of people.	To be confirmed.
Section 21 (k)	Using water for recreational purposes.	Unlikely

Other important Government Notices that are considered in this EIA include:

- ***GN 704 of 4 June 1999: Regulations on use of water for mining and related activities aimed at the protection of Water Resources.***

3.5 NATIONAL ENVIRONMENTAL MANAGEMENT: AIR QUALITY ACT (NO 39 OF 2004)

Considering the nature of the proposed development impacts on air quality is of concern. The NEM:AQA is specifically aimed at providing reasonable measures for the prevention of pollution and ecological degradation and for securing ecologically sustainable development while promoting justifiable economic and social development. The Act further provides for national norms and standards regulating air quality monitoring, management and control by all spheres of government.

Air quality guidelines and standards are fundamental to ensure effective air quality management, providing the link between the source of atmospheric emissions and the downstream air quality receptors. The ambient air quality limits are intended to indicate safe daily exposure levels for the majority of the population, including the very young and the elderly, throughout an individual's lifetime. Air quality guidelines and standards are normally given for specific averaging periods. These averaging periods refer to the time-span over which the air concentration of the pollutant was monitored at a location. Generally, five averaging periods are applicable, namely an instantaneous peak, 1-hour average, 24-hour average, 1-month average, and annual average. The application of these standards varies, with some countries allowing a certain number of exceedances of each of the standards per year.

Important regulations and frameworks stemming from the NEM:AQA that will be taken into consideration include:

- National Ambient Air Quality Standards (GN 1210 of 24 December 2009)

The South African Bureau of Standards (SABS) assisted the Department of Environmental Affairs (DEA) in the development of ambient air quality standards. National Ambient Air Quality Standards (NAAQS) were determined based on international best practice for PM_{10}, SO_2, NO_2, ozone (O_3), CO, lead (Pb) and benzene. The PM national ambient air quality standards were recently finalised and gazetted (Government Gazette no. 35463, #486) on the 29 June 2012 with lowering concentration limits over three commitment periods.

- Draft National Dust Control Regulations (GN 309 of 27 May 2011)

No criteria for the evaluation of dust fallout levels are available for the United States Environmental Protection Agency (US-EPA), European Union (EU), World Health Organisation (WHO), or the World Bank (WB). Dust deposition however may be gauged

according to the criteria published by the South African Department of Environmental Affairs (DEA). A draft copy of the National Dust Regulation was published for comment on the 27 May 2011, but has not been promulgated to date.

- National Ambient Air Quality Standard for $PM_{2.5}$ (GN 486 of 29 June 2012)

This notice sets national ambient air quality standards for particulate matter ($PM_{2.5}$) and stipulates the National Framework for Air Quality Management in the Republic of South Africa as the assessment standard for air quality in South Africa.

- National Framework for Air Quality Management in the Republic of South Africa

The purpose of the National Framework is to achieve the objectives of the AQA, and as thus provides a medium- to long-term plan of the practical implementation of the AQA. The National Framework provides mechanisms, systems and procedures to promote holistic and integrated air quality management through pollution prevention and minimisation at source, and through impact management with respect to the receiving environment from local scale to international issues. Hence, the National Framework provides norms and standards for all technical aspects of air quality management.

3.6 ENVIRONMENT CONSERVATION ACT (NO 73 OF 1989)

The Environment Conservation Act (ECA) is a law that relates specifically to the environment. Although most of this Act has been replaced by the NEMA there are still some important sections that remain in operation. These sections relate to:

- Protected natural environments;
- Special nature reserves;
- Limited development areas; and
- Regulations on noise, vibration and shock.

3.7 THE NATIONAL HERITAGE RESOURCES ACT (NO. 25 OF 1999)

The objectives of the National Heritage Resources Act ([NHR] No 25 of 1999) are to:

- Introduce an integrated and interactive system for the management of the national heritage resources; to promote good government at all levels, and empower civil society to nurture and conserve their heritage resources so that they may be bequeathed to future generations;
- Lay down general principles for governing heritage resources management throughout the Republic;
- Introduce an integrated system for the identification, assessment and management of the heritage resources of South Africa;

- Establish the South African Heritage Resources Agency (SAHRA) together with its Council to co-ordinate and promote the management of heritage resources at national level;
- Set norms and maintain essential national standards for the management of heritage resources in the Republic and to protect heritage resources of national significance;
- Control the export of nationally significant heritage objects and the import into the Republic of cultural property illegally exported from foreign countries;
- Enable the provinces to establish heritage authorities which must adopt powers to protect and manage certain categories of heritage resources; and
- Provide for the protection and management of conservation-worthy places and areas by local authorities; and to provide for matters connected therewith.

The proposed construction of this project comprises certain activities (e.g. changing the nature of a site of ~ 1000 ha and linear developments in excess of 300 m) that require authorisation in terms of Section 38 (1) of the NHR. Section 38 (8) of the NHR states that, if heritage considerations are taken into account as part of an application process undertaken in terms of the environmental impact assessment process, there is no need to undertake a separate application in terms of the National Heritage Resources Act. The requirements of the National Heritage Resources Act have thus been addressed as an element of this EIA process, specifically by the inclusion of a Heritage Impact Assessment.

3.8 NATIONAL ENVIRONMENTAL MANAGEMENT: BIODIVERSITY ACT 10 OF 2004

The Act, amongst others, provides the framework for biodiversity management and planning. Section 52 provides for the listing of threatened (critically endangered, endangered or vulnerable) and protected ecosystems (of high conservation value or of high national or provincial importance although not listed as threatened) and for activities or processes within those ecosystems to be listed as ‘threatening processes’, thus triggering the need to comply with the NEMA EIA regulations. The Act establishes the South African National Biodiversity Institute (SANBI), with a range of functions and powers (Chapter 2 Part 1). It also provides for the listing, control and eradication of invasive species (currently the responsibility of the Conservation of Agricultural Resources Act, 1983).

The development of the ash disposal facility will impact on the riparian and wetland areas next to existing streams and rivers. This may trigger requirements and regulations of the National Environmental management: Biodiversity Act.

Other acts that will be taken cognisance of are included in the Table 3-4 below

Table 3-4: List of relevant acts that will be considered

Act name	Act no	Notes/remarks
National Environmental Management: protected Areas Act	57 of 2003	Provide for the protection and conservation of ecologically viable areas representative of South Africa's biological diversity, natural landscapes and seascapes.
Conservation of Agricultural Resources Act	43 of 1983	Control of utilisation and protection of wetlands; soil conservation; control and prevention of veld fires; control of weeds and invader plants.
Atmospheric Pollution Prevention Act	45 of 1964	Provides for control of dust control and air pollution.
Fencing Act	31 of 1963	Prohibition of damage to a property owner's gates and fences ◆ *Climbing or crawling over or through fences without permission* ◆ *Closing gates* Any person erecting a boundary fence may clean any bush along the line of the fence up to 1.5 metres on each side thereof and remove any tree standing in the immediate line of the fence. However, this provision must be read in conjunction with the environmental legal provisions relevant to protection of flora.
National Forest Act	84 of 1998	No person may cut, disturb, damage or destroy any indigenous, living tree in a natural forest, except in terms of a licence issued under section 7(4) or section 23.
Veld and Forest Fires Act	101 of 1998	Prevention of unauthorised veld and forest fires
Hazard substances Act, and regulations	15 of 1973 of	Provides for the definition, classification, use, operation, modification, disposal or ing of hazardous substances.
Occupational Health and Safety Act	85 of 1993	Prescribes health and safety measures necessary to adhere to for all construction workers
Fertilisers, Farm Feeds, Agricultural Remedies and Stock Remedies Act	36 of 1947	Control of the use of registered pesticides, herbicides (weed killers) and fertilisers. Special precautions must be taken to prevent workers from being exposed to chemical substances in this regard.
All relevant Provincial and Municipal bylaws		

3.9 ADDITIONAL RELEVANT POLICY DOCUMENTATION AND GUIDELINES

The policy and waste regulations pertinent to the ash facilities are in the process of being revised by government, and the most recent draft regulations have not yet been promulgated. Cognisance will be taken of these requirements.

4 PROJECT DESCRIPTION

4.1 PROJECT MOTIVATION

The following project motivations are relevant:

- The expansion of South Africa's power generation capacity has become a national strategy and focus areas. Eskom has been mandated to expand and develop new power generation facilities to meet the growing demand for electricity.
- The Kendal Power Station has been in operation since 1993, and as a by-product ash is being produced that must be disposed of on a continuous basis.
- Kendal Power Station is running out of space due to poor quality coal utilised for combustion. This results in higher quantities of ash being produced than the existing facility can receive.
- The life span of Kendal has also been extended to 2053, and a new disposal facility must thus be developed to receive the ash generated through the combustion process.

4.2 DESCRIPTION OF THE WASTE STREAM

4.2.1 *Sources of Waste to be disposed*

This project will address the following waste stream produced at Kendal Power Station:

- Fly and coarse ash from coal burning operations;

4.2.2 *Composition of the Waste*

Waste classification was undertaken by Jones and Wagener on ash produced by the Kendal Power Station. Using the South African Acid Rain Leach Procedure (ARLP) it was found that none of the elements tested for in the ARLP leach solution, leached at concentrations higher than their Acceptable Risk Levels (ARLs) and therefore the ash was classified as nontoxic (general) by En-Chem Consultants. For this waste classification, Kendal Power Station ash samples were also used (En-Chem Consultants, 2008). Other tests conducted included Total extraction (aqua regia digestion) analysis of the ash sample, including both inorganic and organic constituents; Australian de-ionised water leach of the dry ash and analysis of the leach solution. This was required to classify the waste in terms of the DEA's draft waste classification regulations for disposal purposes; and Radiological analysis by NECSA for gross alpha/beta-activity and for selected radionuclides in the uranium and thorium decay series.

Based on the chemical analysis obtained from ARLP leach solution, the ash is classified as a Hazard Group 1 waste. This is due to chromium VI having been detected in the ARLP

solution at a concentration higher than its Acceptable Risk Level (ARL) value of 0.020 mg/ℓ. None of the other elements and organic compounds tested for was detected in the leach solution at a concentration higher than its respective ARL value.

Constituents of the Kendal Ash based on the ARLP leach solution method include (% in waste stream included in Italics): Aluminium (Al – *1.3 x 10^{-6} %*), Antimony (Sb – *7 x 10^{-7} %*), Barium (Ba – *1.38 x 10^{-5} %*), Cadmium (Cd – *5 x 10^{-5} %*), Chromium III (Cr III – *8.6 x 10^{-6} %*), Chromium VI (Cr VI – *7.2 x 10^{-6} %*), Cobalt (Co – *2 x 10^{-7} %*), Mercury (Hg – *2 x 10^{-8} %*), Selenium (Se – *1.6 x 10^{-6} %*), Quartz (SiO2 – *14.15 %*), and Vanadium (Va – *1.88 x 10^{-5} %*) (Jones and Wagener, 2013).

4.2.3 *Waste Classification*

The waste classification regulations pertinent to the ash facility are in the process of being revised by government and the most recent regulations (DEA's draft waste regulations, 2011) have not yet been promulgated.

In terms of the Minimum Requirements methodology the coal derived ash at Kendal Power Station is classified as a Hazard Group 1 waste or an Extreme Hazard waste. This was due to the leachable concentration of Chromium VI detected in the leach solution. In terms of the Minimum Requirements, a Hazard Group 1 waste should be disposed of on a landfill with a type H:H barrier system.

4.2.4 *Waste Volumes and Densities*

The following waste volumes and densities are anticipated for the proposed Kendal 30 year ash disposal facility. These will be used as design parameters for the facility.

Table 4-1: Estimated tonnages and volumes used in the design of the 30 year ash facility

Tonnages per year (tonnes per 6 units per year):	5.9 mill tons/y
Density (tonnes per m^3):	0.85
Volume per year (m^3 per 6 units per year):	6.9 mill m^3/y
Desired lifespan (years):	37 (2016 – 2053)
Desired total volume (m^3 per 6 units per year):	235 Mill m^3

4.3 DESCRIPTION OF THE PROPOSED 30 YEAR ASH DISPOSAL FACILITY

4.3.1 *Location*

The location of the proposed study site is within a maximum of 10 km around Kendal Power Station. After a rigorous site selection process (detailed in Appendix G) four developable areas were identified as feasible alternatives. Site areas B and C are located to the west of the Kendal Power Station, while site areas D and F are located to the east and north of the

power station, respectively. These four site areas (B, C, D, and F) are shown in Figure 4-1. A comparative assessment of these four alternatives will be undertaken during the impact assessment phase to inform the selection of a preferred alternative.

4.3.2 *Footprint, Height and Lifespan*

Preliminary calculations indicate that for a maximum facility life of 37 years, an ash volume of 256 Million m^3 would require a stack with an approximate maximum footprint of 1 000 ha and a height between 50 and 100 m high. Side slopes of 1[v]:5[h] were used with an approach slope of 1[v]:20[h].

A minimum and maximum facility footprint scenario was developed by the technical team. Assuming a facility height of 50 m, which has proven feasible at other dry ash disposal facilities in the region, the maximum footprint scenario would require a facility footprint of approximately **770 ha**. For the minimum footprint scenario a maximum height of 100 m would require a facility footprint of approximately **520 ha**. The viability of the minimum footprint scenario is however dependant of the underlying geotechnical conditions in the study area. In both these scenarios the calculated facility footprints did include 15% additional area to allow for topography variability, and additional 50 ha to house return water dams, ash water return channels, roads, conveyor alignment, and site camp.

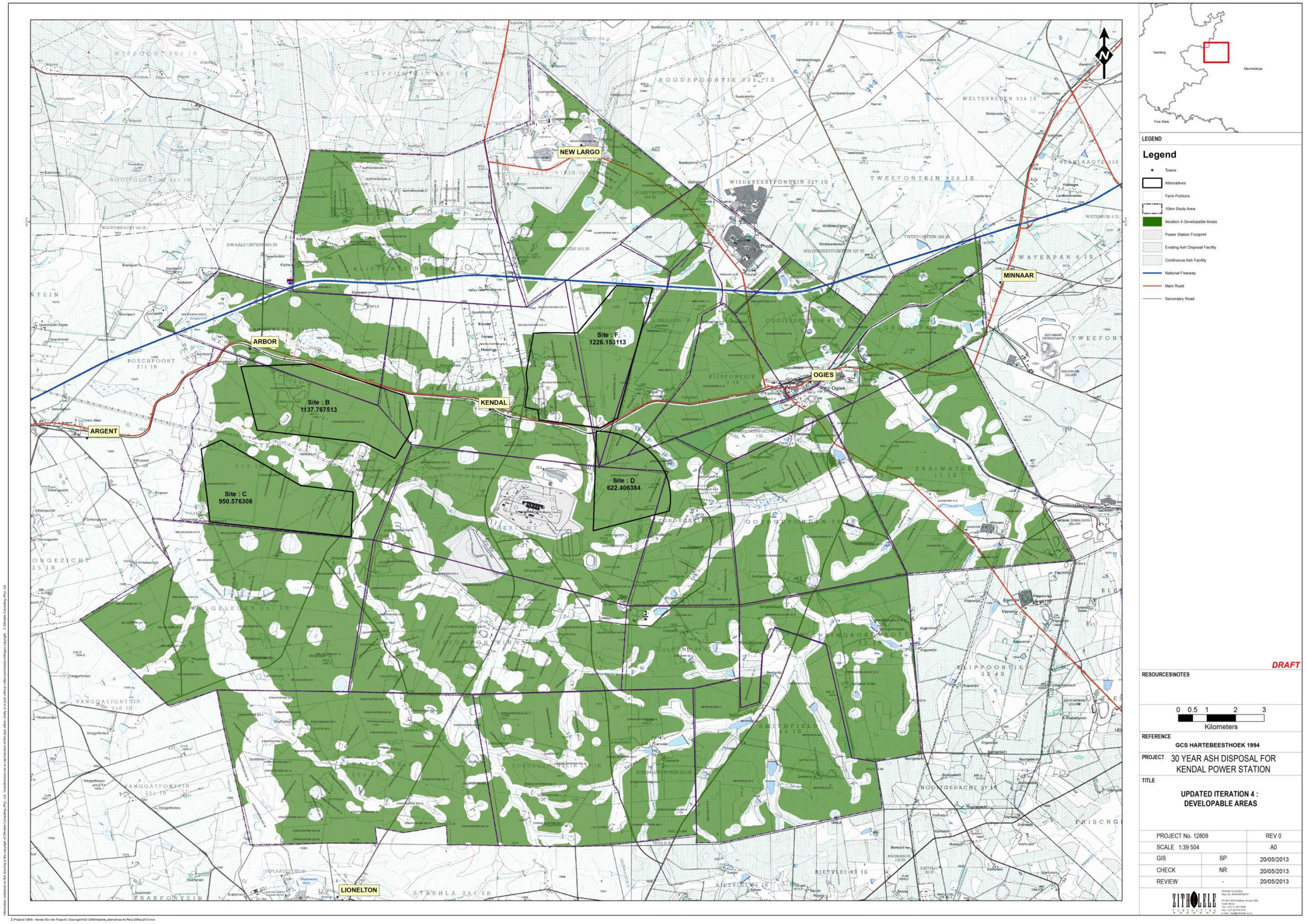

Figure 4-1: Identified feasible sites for the placement of an ash disposal facility

4.3.3 *Geotechnical Conditions and Foundation Design*

Geological stability and properties were considered during the technical evaluation that informed the site identification process. Due to the underlying geology not offering sufficient strength to support a front stack of more than 15 m [Kusile 10 year Ash Stability Report, August 2009], it was assumed that a multi-level stacker setup, similar to the one at Majuba Power Station (another Eskom power station in Mpumalanga), would be used.

More detailed geotechnical studies are proposed for the sites identified during the EIR phase in order to inform the foundation design and the selection of the preferred site.

4.4 PROPOSED ASSOCIATED INFRASTRUCTURE

The following associated infrastructure is envisaged for the Kendal 30 year ash disposal facility.

4.4.1 *Clean and Dirty Water Separation (return water dams and trenches / drains)*

A clean and dirty water separation system will be designed for the facility dependant on the slope. Dirty storm water from the facility will be collected and channelled to a return water dam. The capacity requirements will be determined by an engineering investigation that will be undertaken during the EIA phase. Clean water cut-off canals / trenches / drains will be established to divert clean water back into the natural environment at flow rates equivalent to the pre-development natural flow rates.

4.4.2 *Pipelines or canals*

A network of pipelines or canals, design dependant, will be installed to, amongst others, transport water to and from the return water dams, transport water for dust suppression and to transport water collected from the waste facility to the return water dam.

4.4.3 *Internal and external Access Roads*

Access roads will be established, initially to allow for construction vehicles, but some of these roads may be retained post construction to allow for maintenance of the facility. The location of these access roads has not yet been determined, and will form part of the next phase of assessment.

4.4.4 *Fencing and Access Control*

It is envisaged that the access roads and disposal site will be fenced off for safety and security reasons.

4.4.5 *Storm Water Drainage and Monitoring Boreholes*

As part of the site design, on-going monitoring of the site storm water drainage features will be undertaken, and additional monitoring boreholes to be installed for monitoring, if required. Monitoring will be conducted with reference to applicable standards. As part of the conceptual designs a storm water management plan will be developed to ensure that storm water is adequately managed.

4.4.6 *Relocation of existing Service Infrastructure*

Any services on the proposed property shall be identified as part of the impact assessment phase and the rerouting of any of these services will be investigated and potential corridors identified. It is envisaged that wherever possible the rerouting of services will be addressed as a component of this EIA and not as a separate study undertaken at a later date.

4.4.7 *Construction area*

The construction area for the ash disposal site will include the footprint of the disposal site, as well as any additional features required as part of the construction i.e. an access road, conveyors, new pipelines/canals, and areas to be rehabilitated. At this stage the full size of the site including associated infrastructure is estimated to be in the order of 1000 ha. The exact surface area is still to be determined during the conceptual design of the facility. Construction activities will be limited to the areas mentioned above.

4.5 MAJOR ACTIVITIES OF THE PROJECT EXECUTION

The major phases for the proposed project (including the EIA), prior to and after construction, are explained in the table below.

Table 4-2: Major phases for the proposed project.

NO	PHASE	ACTIVITY DETAILS
	PRECONSTRUCTION PHASE	
1	Application and Scoping	The Scoping Phase, as its name implies, determines the scope of the project appropriately (i.e. alternatives, consultation requirements, extent of specialist studies, impact assessment methodology and approach, issues / concerns to be addressed, and reporting for decision-making). This is undertaken through an inclusive stakeholder engagement process, which allows for all sectors of society to be involved, including the proponent, the various spheres of government, the regulator, the immediately affected parties, interest groups or individuals, the consulting team, and the public at large. This phase of the project is structured and minimum requirements are regulated through legislation.
2	EIA	An EIA is being undertaken to ensure that all environmental, social and cultural impacts are identified. During this phase the specialist studies as identified during the Scoping Phase are undertaken, and issues / concerns identified are addressed. This phase of the project is also undertaken in consultation with all stakeholder groups as identified during the Scoping Phase. This phase of the project is a necessary precursor to obtaining EA from the CA, without which the project cannot proceed any further.
3	Approval from authorities.	
4	Appeal	Once authorities have issued their decision an appeal process will commence. During

NO	PHASE	ACTIVITY DETAILS
		this phase both the proponent and other stakeholders have the opportunity to appeal the decisions, or conditions thereof.
5	Property acquisition (if required)	Purchase of property if the chosen site is not on existing Eskom property.
6	Structure foundation investigation	Investigations will be undertaken to ensure that the foundation specifications are in line with the underlying geology.
CONSTRUCTION PHASE		
7	Site establishment	The first stage of the construction phase is the establishment of contractors on site. This must be undertaken in line with the conditions of EA.
8	Relocation of services	The relocation of services is imperative, and will be undertaken during the initial phases of the project to ensure that the supply of services is not interrupted.
9	Structures	**Fencing** - Provide a safe and secured waste disposal area to restrict access and prevent injuries to livestock.
		Formation and lining - Provide a ground formation/lining compacted to the correct standard on which to build the ash disposal site.
		Drainage - Provide water drainage channels within the site.
10	Rehabilitate facilities made redundant.	Rehabilitation of facilities that are made redundant, such as pipelines / pump stations that will no longer be required, due to the implementation of this project.
11	Rehabilitate the construction area	The area where construction activities have taken place must be rehabilitated to minimise environmental degradation by following the Environmental Management Programme that is compiled in conjunction to the EIA.
OPERATIONAL PHASE		
12	Operations for continuation of ash disposal	Current operations to be continued onto the proposed new portion by means of adjusting the spreader and stacker.
13	Rehabilitation and closure of existing ash dam.	The current and continuous ash disposal facility shall be rehabilitated as required.
DECOMMISSIONING AND CLOSURE PHASE		
14	Decommissioning of the ash site and its infrastructure	Once the ash disposal site is no longer in use and is no longer required a decommissioning process may commence.

5 CONSIDERATION OF ALTERNATIVES

The optimal goal in establishment of a waste disposal facility and associated infrastructure (such as conveyors, pipelines and return water dams) is to effectively minimise the negative environmental and social impact while ensuring safety, reliability, and cost savings for the facility.

A structured approach was utilised to ensure that a defensible approach was utilised in the consideration of alternatives. Initially, the project team determined the need and motivation for the proposed project (NEMA, 1998). Once the need was established, potential solutions that can fulfil that need were identified; at this point no alternative solutions had been excluded. When dealing with waste related projects, this discussion typically is structured around the waste hierarchy (National Management Waste Strategy [NMWS], 2010) as shown in Figure 5.1.

The essence of the approach is to group waste management measures across the entire value chain in a series of steps, which are applied in a descending order of priority. The foundation of the hierarchy, and the first choice of measures in the management of waste, is waste avoidance and reduction. Where waste cannot be avoided, it should be recovered, reused, recycled and treated (NMWS, 2010). Waste should only be disposed of as a last resort. Remediation on the other hand is part of the rehabilitation process and is on-going until the decommissioning of the power station.

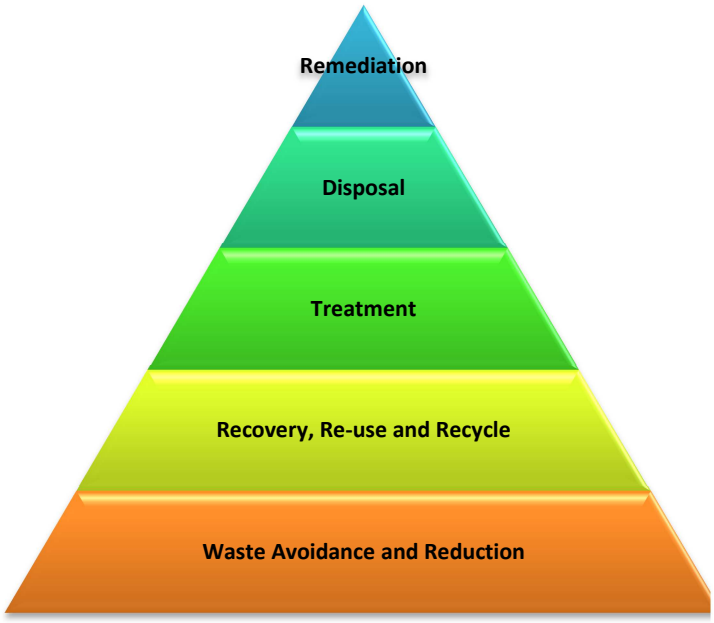

Figure 5-1: Waste hierarchy (NMWS, 2010)

In working through these systematic hierarchical steps alternative solutions are generated. Waste management could be a single solution best suited to the type of waste, or a combination of several solutions. In each of these steps alternatives can be evaluated and excluded as being not feasible. Once feasible solutions are identified a process of evaluation can commence to evaluate the environmental, social, and technical acceptability of these solutions for the site may be considered to improve the positive aspects or reduce the negative aspects of each solution. A graphical representation of the approach utilised is shown in Figure 5-2**.**

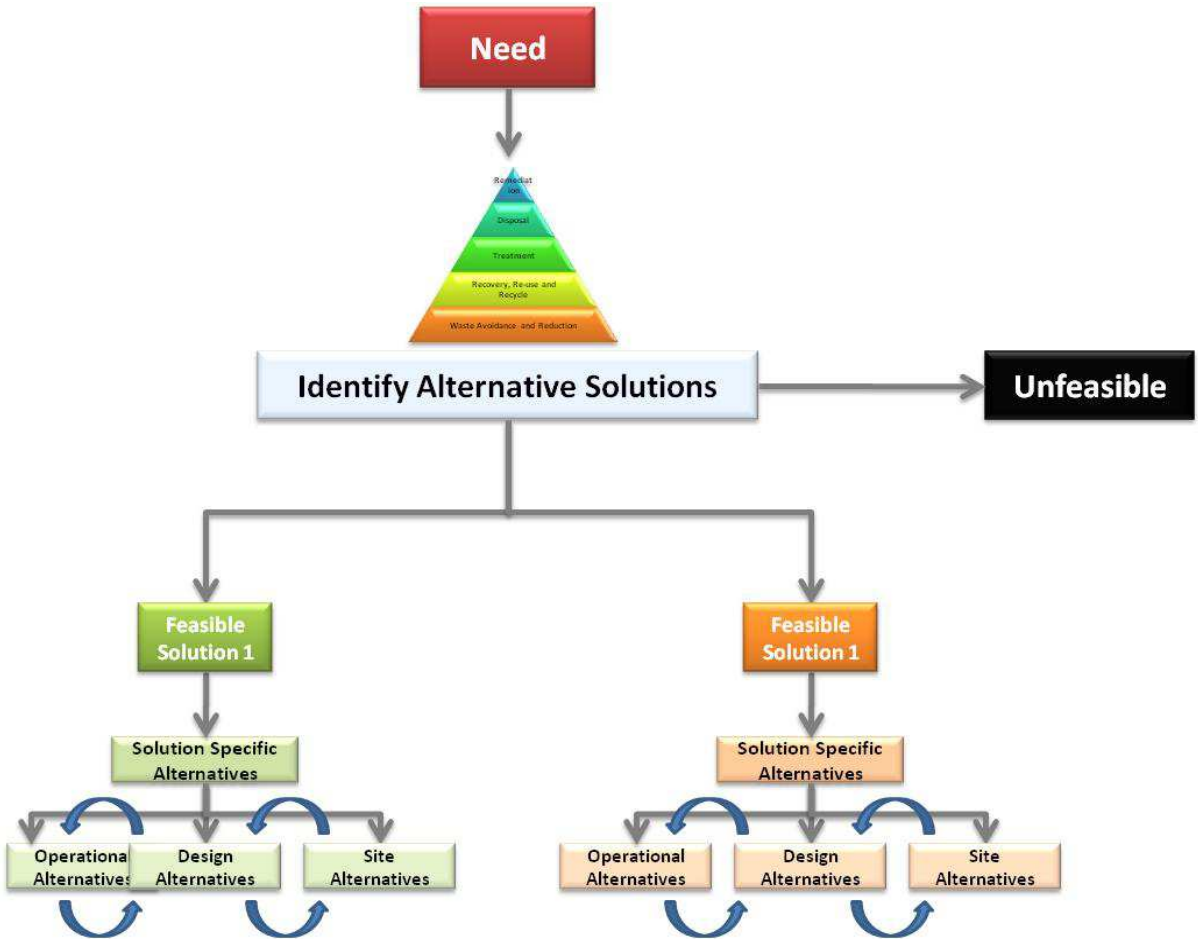

Figure 5-2: Alternatives identification and evaluation process.

5.1 ALTERNATIVE WASTE MANAGEMENT SOLUTIONS

The current status, available information, and further studies required based on the implementation of the Waste Hierarchy is summarised in Figure 5-1. Based on the information available to date the following alternative solutions to the ash waste stream exists:

- **<u>Avoidance and Minimisation:</u>**
  - None. Kendal Power Station has been in operation since 1993, therefore the generation of the ash waste stream is unavoidable.
- **<u>Recovery / Recycling / Re-use:</u>**
  - Use of ash in construction activities i.e. as aggregate in road construction, or as a cement extender;
  - Other applications include cosmetics, toothpaste, kitchen counter tops, floor and ceiling tiles.
- **<u>Treatment</u>**
  - No feasible alternatives are currently available to treat the ash waste.

- **Disposal**
  - Disposal to a suitably designed ash disposal facility.
- **Remediation**
  - Capping of the new facility at the end of life.

Due to the large volumes of ash that will be generated it has been concluded that a dry ash disposal facility will be required, even with the implementation of all the other alternatives.

5.2 ALTERNATIVES SPECIFIC TO THE ASH DISPOSAL FACILITY

5.2.1 *Introduction*

A number of alternative types are generally associated with EIAs. In terms of the EIA Regulations published in Government Notice R543 of 2 August 2010 in terms of Section 24 (5) of the National Environmental Management Act (Act No. 107 of 1998), the definition of "alternatives" in relation to a proposed activity, refers to different means of meeting the general purpose and requirements of the activity, and may include alternatives to:

1. The property on which or location where it is proposed to undertake the activity;
2. The type of activity to be undertaken;
3. The design or layout of the activity;
4. The technology to be used in the activity;
5. The operational aspects of the activity; and
6. The option of not implementing the activity.

Further, in terms of NEMA and the EIA Regulations, feasible and reasonable alternatives have to be considered within the Environmental Scoping Study, including the 'No Go' option. All identified, feasible and reasonable alternatives are required to be identified in terms of social, biophysical, economic and technical factors. Feasible and reasonable alternatives identified during the Scoping Phase are discussed in more detail below.

5.2.2 *Location Alternatives*

A detailed site screening and identification process was undertaken to identify the most feasible site areas within a maximum radius of 10 km around Kendal Power Station. This report is attached in Appendix G.

A four phased approach was used to attain the most feasible sites within the study area. This included:

1. Identification of the study area;
2. Defining the developable areas;

3. Undertaking an environmental, social and technical site screening exercise; and
4. Rating and ranking of the identified site areas according to the identified site sensitivities (Overlay analysis).

Identification of the study area

The study area was determined by identifying all farm and erf portions potentially affected within a 7 km radius from the Kendal Power Station. A maximum distance of 10 km was additionally investigated after realisation that the constraints in the study area of 7 km may not provide a feasible number of potential sites.

Defining the developable area (Negative mapping)

The next step in the process was to define the developable areas. This was done by using negative mapping in such a way as to exclude all areas within the study area that conflict with the proposed development. A draft list of "Limiting Factors" was drawn up and is shown in Table 5-1 below.

The preliminary desktop assessment of the study site from existing high-level environmental, social and cultural GIS layers, and Google Earth Imagery and 1:50000 topographical maps indicated that the following features were not detected within the study area:

- Cemeteries
- Churches
- Military Facilities
- Known Archaeological sites
- Monuments, and heritage and culturally significant areas
- Protected Areas and Parks

The following No-Go areas where no ash s may be placed were identified from the outset of the exercise:

- New Largo footprint, including a 100 m buffer;
- N12 National Road, including a 100 m buffer;
- Rail reserve across the study area, including a 50 m buffer;
- Wilge River, including a 500 m buffer; and
- High density residential areas – Wilge settlement, Phola settlement, Ogies and New Largo settlement, including a 100 m buffer.

After exclusion of the No-Go areas above, the remaining area was subjected to a negative mapping exercise. The objective of the negative mapping exercise was to identify important features (environmental, social and technical) in the landscape that should not be impacted by the proposed disposal facility. The GIS layers containing these features are shown in Table 5-1.

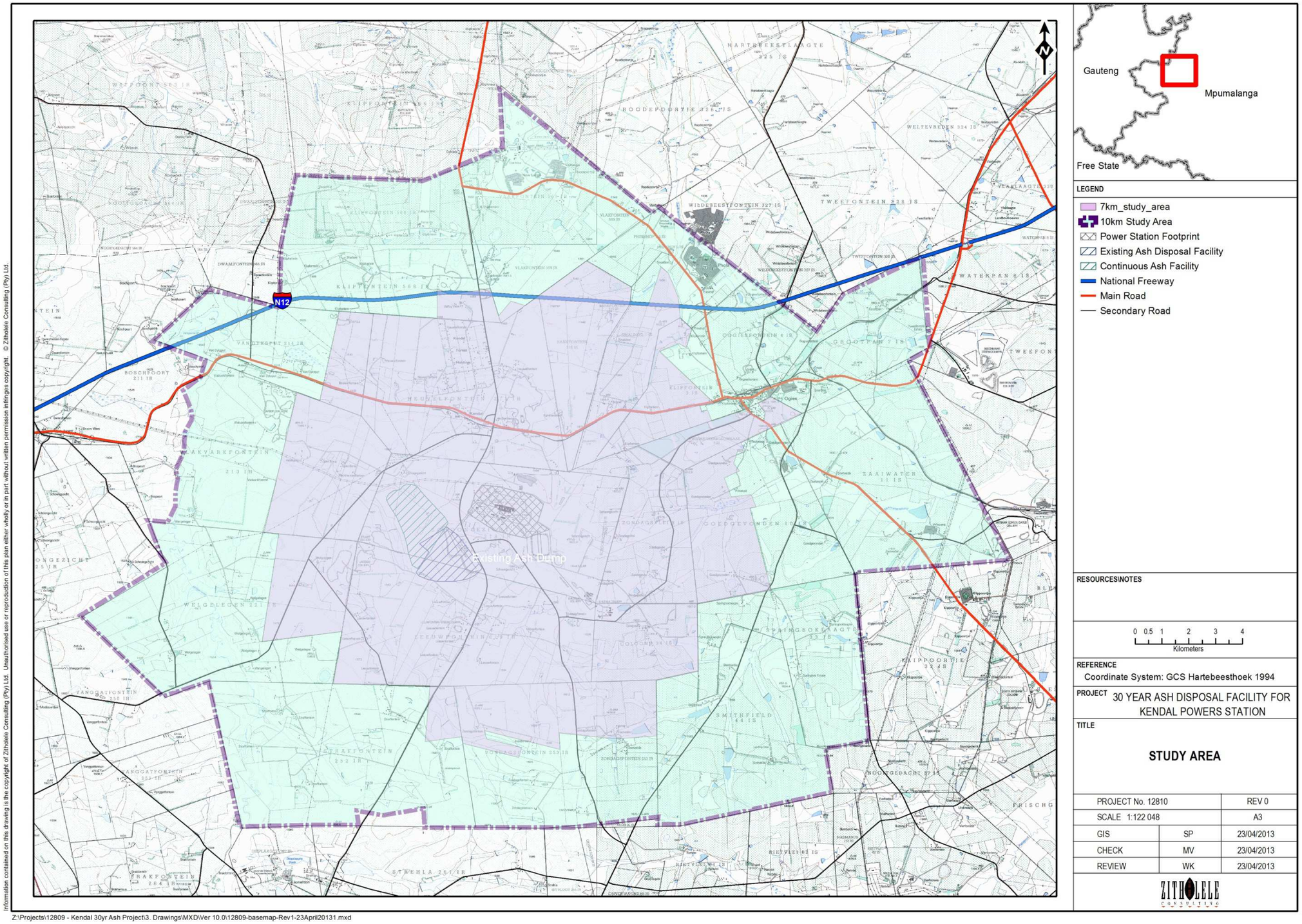

Figure 5-3: Study area for the Kendal 30 year ash disposal facility

In the first instance the feature footprint and substantial buffer for each feature were excluded from the developable area layer in the negative mapping exercise. The buffer width was informed either by legislation, for example the 500 m buffers around wetlands and rivers as stipulated by the National Water Act, or stipulated by existing guidelines and documentation for example pertaining to servitude widths for roads and transmission lines, or dictated by best practice and experience of the environmental assessment practitioner.

The philosophy applied to the first iteration was thus that if sufficient areas of suitable sizes could be identified, most of the sensitivities and important features in the landscape would already have been avoided. On the other hand, if no areas could be identified, then the buffers of selected features would be reduced and potential areas again investigated. With each iteration the buffers around the landscape feature would be reduced until an assigned minimum value for each feature is reached. For some features such as minor roads and transmission lines, it was assumed that these could be relocated if no other alternatives existed, however for rivers and wetlands it was assumed that they cannot be relocated. Four iterations were investigated before sufficient number and size developable areas were identified.

The following iterations of the negative mapping took place:

- Iteration 1 – Buffers as per Table 5-1, no suitable areas were identified;
- Iteration 2 – Farmsteads, schools, powerline and roads buffers removed, no suitable areas identified;
- Iteration 3 – Built buffers reduced to 100 m, 1 potential site, 1 combination site (2 smaller areas) were identified; and
- Iteration 4 – Wetland and river buffers reduced to 100 m, several potential areas.

Table 5-1: Areas of avoidance. Red items indicate the identified No-Go areas.

Natural Environment				
Layer	**Iteration 1**	**Iteration 2**	**Iteration 3**	**Iteration 4**
Wilge River	***500 m buffer***			
Rivers / Streams	500 m	500 m	500 m	100 m
Wetlands / Dams	500 m	500 m	500 m	100 m
Red Data Species	100 m	100 m	100 m	100 m
Protected areas and parks	None in study area			
Social Environment				
High density residential areas	***500 m buffer***			
Farmsteads	1 km	☒	☒	☒
Schools	1 km	☒	☒	☒
Cemeteries, Churches, Monuments, and heritage and culturally significant areas	Not identified in study area from high level scan			
Built Environment / Engineering Requirements				
New Largo footprint	***100 m buffer***			

Natural Environment				
Layer	**Iteration 1**	**Iteration 2**	**Iteration 3**	**Iteration 4**
Open Pits	100 m	100 m	☒	☒
Undermined Areas	100 m	100 m	☒	☒
Richards Bay Rail	***50 m buffer***			
Other Railway Lines	50 m	50 m	☒	☒
N12 National Road	***100 m buffer***			
Tarred Roads	100 m	☒	☒	☒
Farm Roads	100 m	☒	☒	☒
Overhead Power lines	Servitude	☒	☒	☒
Gas Pipeline	Servitude	☒	☒	☒
Water Pipeline	Servitude	☒	☒	☒
Conveyor Belt	50 m	☒	☒	☒

In order to determine the potential footprint requirements of a potential ash disposal site, the following technical specifications were assumed:

- Ash production would continue in the range of 576 223 m^3 per month;
- Total ash produced over the life of the ash disposal facility would be in the order of 256 million m^3;
- The maximum design life of the facility would be 37 years;
- The facility side slopes should be 1:5.

Using the technical specifications above, a minimum and maximum facility footprint scenario was developed by the technical team. Assuming a facility height of 50 m, which has proven feasible at other dry ash disposal facilities in the region, the maximum footprint scenario would require a facility footprint of approximately 770 ha. For the minimum footprint scenario a maximum height of 100 m would require a facility footprint of approximately 520 ha. The viability of the minimum footprint scenario is however dependant of the underlying geotechnical conditions in the study area. In both these scenarios the calculated facility footprints did include 15 % additional area to allow for topography variability, and additional 50 ha to house return water dams, roads, conveyor alignment, site camp, etc.

The negative mapping exercise identified 9 potential developable areas within the study area as shown in Figure 5-4. Site area A was fatally flawed at this stage due to the insufficient size of the area.

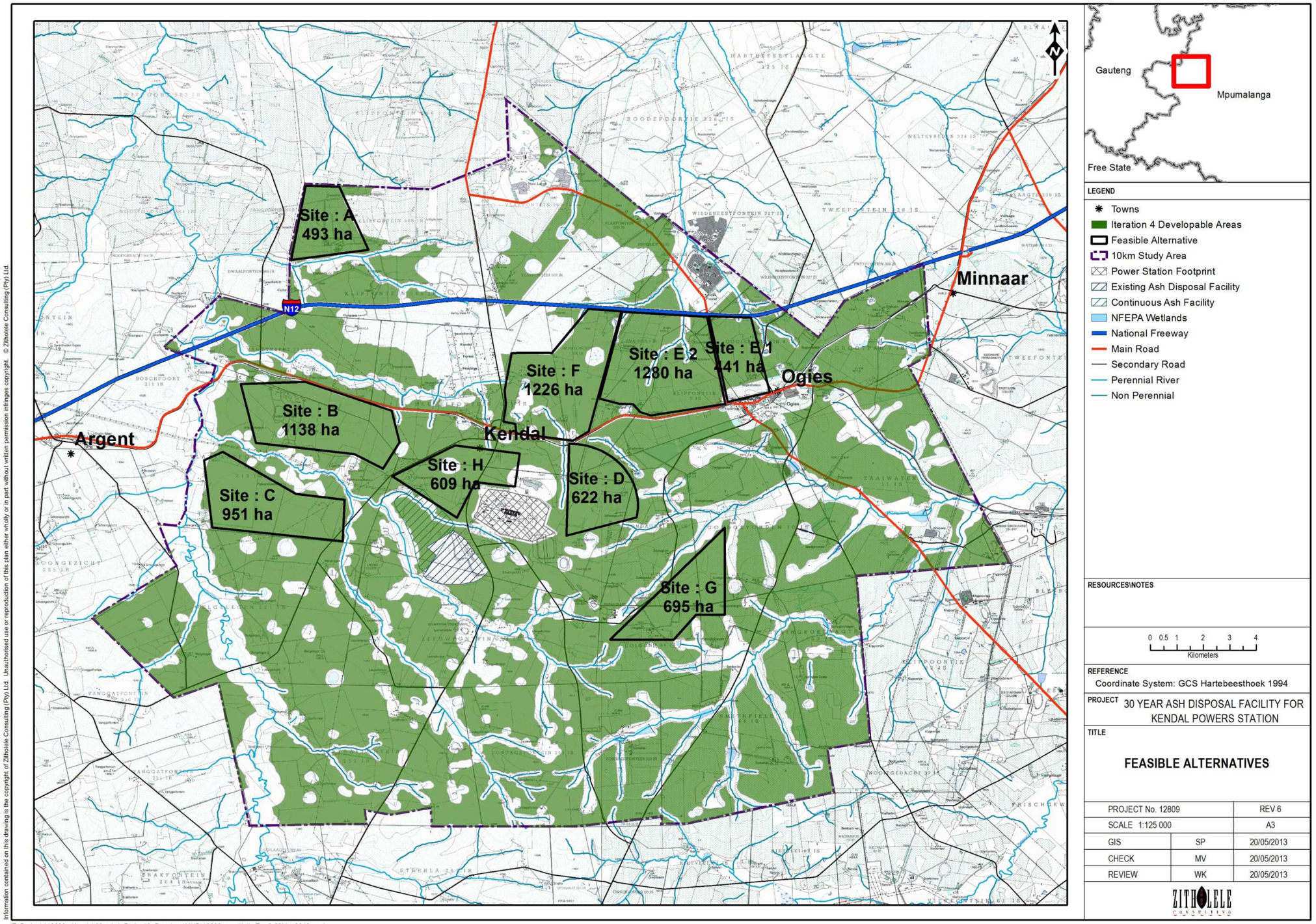

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Figure 5-4: Potential feasible sites identified during the site identification process

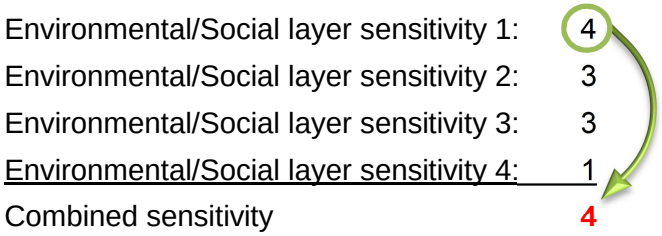
Environmental, Social and Technical Sensitivity Analysis

Each of the developable areas identified were rated according to their environmental and social sensitivity, and their technical / geotechnical suitability. Several environmental and social layers were used to calculate the environmental and social sensitivity of the proposed developable areas. These layers can be viewed in the full site identification report included in Appendix G. The sensitivity of the features in each layer was rated according to a rating scale ranging from 1 to a maximum of 5. The rating scale is provided in Figure 5-2 below.

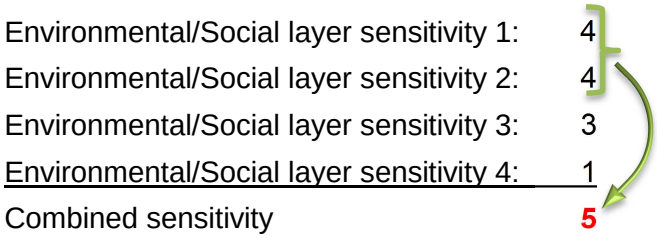
Table 5-2: Sensitivity rating scale used for rating of the site elements

Rating	Description
1	Very Low sensitivity
2	Low sensitivity
3	Moderate sensitivity
4	High sensitivity
5	Very High sensitivity

In the next step of the sensitivity analysis, the rated layers were overlaid on top of one another in a Geographical Information System package (ArcGIS 10.1). Where several components overlaid the same geographical area, the highest sensitivity rating of all of these layers was assigned to the particular area (or polygon). In instances where the highest rating was shared between 2 or more layers, the overall sensitivity rating of the area (or polygon) was bumped to the next level to ensure that the individual sensitivities in each layer translated into a cumulative higher sensitivity. This is described in a simplified manner below.



However, with 2 or more sensitivity layers with the same rating the combined rating is as follow:



The result of the sensitivity analysis includes a separate sensitivity layer for the environmental and social components. The environmental and social sensitivity layer was

subsequently “clipped” with the developable areas layers to exclude all the No-Go areas identified at the start of the exercise.

Overlay analysis

During the overlay analysis the sensitivities within the identified areas was considered. The environmental and social sensitivity layers were “clipped” with the identified areas and the highest sensitivity per site element was determined for each site element.

The ratings per site element were summarised in a table format where the un-weighted score represented the sum of all the sensitivity ratings and the weighted scores represented the sum of all the sensitivity ratings after a weighting per element had been factored into each rating.

Based on the combined ratings for the environmental, social and technical elements, and further discussion with the specialist and Eskom technical teams the following site areas were identified (in order of feasibility) as the most feasible site alternatives to be investigated further during the impact assessment phase:

1. Site area C;
2. Site area F;
3. Site area D; and
4. Site area B.

5.2.3 *Design Alternatives*

“Piggybacking” on the existing Kendal Power Station Ash Disposal facility

The nature and degree of expansion of the existing ash disposal facility located southwest of the Kendal Power Station is currently being investigated in a separate independent EIA. The study identified the possibility of “piggybacking” on top of the existing ash disposal facility in order to maximise the disposal capacity of the existing site thereby reducing the footprint and capacity required by a new disposal facility (this project) at a different location.

This option is regarded as an optimisation strategy for the existing ash disposal facility and will entail the top stacker of the multiple radial stacker system, which is currently depositing ash along an arch in a clockwise direction, to reset to position close to the point of origin on top of the existing ash facility. From this location the top stacker will start depositing ash on top of the existing ash stack moving in a clockwise position while the bottom stack continues to deposit ash as is currently the case.

The advantage of this optimisation strategy is that more ash can be deposited in the existing ash facility thus reducing the footprint of a new ash disposal facility. The feasibility of this option must however be determined based on stability and geotechnical requirements, which will be investigated in the EIR phase of this EIA.

Footprint optimisation and multi-stacking

A further design alternative includes the potential optimisation of the new ash disposal facility footprint through detailed and innovative conceptual engineering of the ash facility. If the geotechnical conditions at any or all of the identified feasible sites prove favourable, the footprint of the proposed ash facility can by reduced be increasing the height of the facility. This strategy is however further dependant on other factors such as to topography, visual and air quality impacts. These factors will be investigated further in the EIR phase of the project where more clarity will be gained on the feasibility of footprint optimisation and multi-stacking arrangements.

Single facility vs. Multiple facilities

A single facility is more desirable because it ultimately reduces the footprint requirement for the entire waste stream. In addition it is more cost effective. However, multiple facilities were considered in the event that a single facility of sufficient size could not be found.

Minimum standards

The design requirements for the ash facility are in the process of being revised by government (Minimum Requirements to Waste Regulations), and the most recent design requirements (DEA's draft waste regulations, 2011) have not yet been promulgated. Appropriate and approved design standards will be utilised when designing the facility.

5.3 THE "NO GO" PROJECT ALTERNATIVE

The No Project or "No-Go" alternative will also be assessed further in the EIA process. This alternative proposes that the power station dispose of ash only to the end of its existing environmental authorisatio and that no second facility be commissioned to receive the surplus ash produced by the Kendal Power Station to end of the extended station life in 2053. This means that the station would have to stop generating electricity, and ash, since ash is waste generated from electricity generation.

Should the "No-Go" alternative be the preferred alternative, Eskom will have to shut-down and stop production of electricity by 2016 at the Kendal Power Station. The environmental and social impacts will be assessed and compared to the aforementioned alternatives.

6 SCOPING PROCESS

6.1 PROJECT INCEPTION PHASE

On appointment, Zitholele arranged a project meeting between Eskom and the Zitholele project team. During the inception meeting the following was discussed:

- Project Scope and Requirements;
- Project Schedule;
- Identification of key stakeholders and role players; and
- Discussion of the identification of ash disposal site.

6.2 COMPILATION, SUBMISSION AND ACKNOWLEDGEMENT OF APPLICATION FORMS

The Integrated EIA and WML application form (attached as Appendix B) for the proposed project was submitted to the DEA on 3 January 2013 and accepted on 31 January 2013. In DEA's acknowledgement of receipt an updated project schedule was requested. An updated project schedule was sent to the department on 4 April 2013, and receipt of the updated project schedule from DEA received on 19 April 2013. This correspondence is also included in Appendix B.

6.3 PRE-APPLICATION CONSULTATION WITH RELEVANT AUTHORITIES

Initial consultation with the Department of Environmental Affairs was undertaken through email correspondence. In this manner it was established that:

- This application will be considered by the Integrated Permitting System sub-directorate of the DEA; and
- An integrated EA and WML process must be undertaken.

Pre-consultation with the Department of Water Affairs (Regional) in Bronkhorstspruit, Mpumalanga was undertaken to introduce the project and to present the site identification process that was followed and subsequent feasible sites that was identified. Feedback from the DWA includes:

- The department is in agreement with the site identification process followed; and
- The department raised no objections with the the four alternative site areas identified at conclusion of the site identification process.

6.4 SITE SCREENING, IDENTIFICATION AND CONSIDERATION OF ALTERNATIVES

This phase consisted of:

- The assessment of the receiving environment based on high level information, data and GIS layers;
- The identification of developable areas within the study site that avoids major environmental, social and technical sensitivities on site;
- The identification of alternative solutions to meeting the project need; and
- Identification of the most feasible site solutions.

The results of this phase have been discussed extensively in Chapter 5.

6.5 IDENTIFICATION OF STAKEHOLDERS

The identification of key stakeholders was done in collaboration with Eskom, the local municipalities and other organisations in the area. Having undertaken work previously in the area, Zitholele already have a stakeholder database that was used as a departure point for this project. The identification of stakeholders is on-going and is refined throughout the process. As the “on-the-ground” understanding of affected stakeholders improves through interaction with various stakeholders in the area the database is updated.

The stakeholders’ details are captured in an electronic database management software programme that automatically categorises every mailing to stakeholders, thus providing an on-going record of communications - an important requirement by the authorities for public participation. In addition, comments and contributions received from stakeholders are recorded, linking each comment to the name of the person who made it.

According to the NEMA EIA Regulations, a register of I&APs (Regulation 55 of GNR 543) must be kept by the public participation practitioner. Such a register has been compiled and will be updated with the details of involved I&APs throughout the process (See Appendix D).

6.6 INITIATION OF PUBLIC PARTICIPATION

The opportunity to participate in the EIA was announced between 23 and 30 November 2012 as follows:

- Advertisements were placed in the following newspapers (Appendix C):

Table 6-1: Advertisements placed during the announcement phase

NEWSPAPER	DATE
Streeknuus	30 November 2012
Witbank News	30 November 2012
The Echo	30 November 2012
Springs Advertiser	29 November 2012
Citizen	28 November 2012
Beeld	28 November 2012

- Registered mail and emails to potentially affected identified stakeholders – these include adjacent and surrounding landowners. A notification letter, map of the site, description of the proposed site and a comment sheet. Please refer to Appendix D for proof of notification.

- A Background Information Document (BID) containing details of the proposed project, including a map of the project area, a registration / comment sheet and a letter of invitation to stakeholders to become involved was distributed via mail and email to all potential interested and affected stakeholders. See Appendix E.

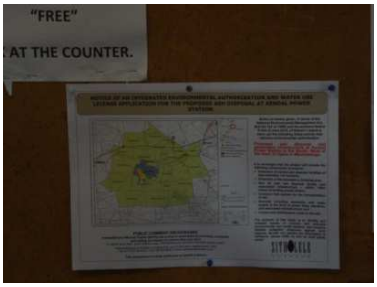
Figure 6-1: BID documents placed on site

- Site notice boards were positioned at prominent localities on 23 November 2012 on all roads surrounding the site area. These notice boards were placed at conspicuous places and at various public places (Figure 6-2). See Appendix C which provides a detailed register of where the site notices were placed (photos included) and a map indicating the placement of the notices.

Kendal Power Station Ash Plant

Road Outside Leeufontein

Ogies Public Library



Emalahleni Library – Site notice board

Kriel Public Library

Corner Groen & Sprinkbok Laan Kriel

Figure 6-2: Site notice boards were put up in the area.

- Stakeholders were also invited to visit the Zitholele/Eskom websites where all documents for public review are available – http://www.zitholele.co.za/, www.eskom.co.za/eia.

6.7 NOTIFICATION OF LAND-OWNERS

During the announcement phase of the Kendal 30 Year Ash Disposal Facility EIA land owners within a 10 km radius that could possibly be affected by the project were notified, based on contact details obtained from the deeds registry. Personalised emails and letters, to those land owners without email addresses, were sent to land owners.

6.8 COMMENTS AND RESPONSES REPORT

The issues raised in the announcement phase and DSR comment period was captured in an Comments and Responses Report (CRR). The CRR will be updated to include additional I&AP contributions that may be received throughout the EIA process. The following versions of the CRR shall be compiled (every version is an update of the previous version):

- Version 1 appended to the Final Scoping Report and include all comments received during the notification and draft scoping period;
- Version 2 appended to the Draft Environmental Impact Assessment Report; and
- Version 3 appended to the Final Environmental Impact Assessment Report.

6.9 SCOPING OF SPECIALIST STUDIES

During the Scoping Phase it is the responsibility of the EAP to determine the scope of specialist studies that are to be undertaken with input from stakeholder during the subsequent EIA phase of the project. Zitholele have compiled Terms of Reference (ToR) for identified specialist studies, based on the availability of published materials; the magnitude of the project; anticipated impacts associated with the project; comments received to date, and experience with other related projects. These ToRs for specialist studies are documented in Chapter 10.

6.10 DRAFT SCOPING REPORT - OBTAINING COMMENT AND CONTRIBUTIONS

The DSR was made available for public review from **Thursday, 6 June 2013 to Thursday, 18 July 2013**. The availability of the DSR for public review was announced in the following manner:

- Advertisements were placed in the following newspapers (Appendix C):

Table 6-2: Advertisements placed during the Scoping Phase

NEWSPAPER	DATE
Streeknuus	5 June 2013
Witbank News	5 June 2013
The Echo	6 June 2013
Springs Advertiser	5 June 2013
Citizen	5 June 2013
Beeld	5 June 2013

- Registered mail and emails to potentially affected stakeholders on the I&AP database – these include adjacent and surrounding landowners. A notification letter, map of the site, description of the proposed site and a comment sheet. Please refer to Appendix D for proof of notification).

The following opportunities were available during the Scoping Phase for comment and contribution by registered I&APs:

- Completing and returning the registration/comment sheets on which space was provided for comment:
- Providing comments telephonically, by email or per letter to the public participation office; and
- Attending public meeting that has been widely advertised (see table below) and raise comments there.

Table 6-3: Two community public meetings were held as part of the public review period of the Draft Scoping Report

INTEREST GROUP	DATE	TIME	VENUE AND ADDRESS
Phola Community	Thursday, 20 June 2013	16:00	Venue for the meetings shall be at the Phola Community Hall in Phola.
Community of Ogies, Heuwelfontein smallholdings, Kendal Power Station employees, and any other residents and	Thursday, 4 July 2013	18:00	NG Church Hall, Ogies

INTEREST GROUP	DATE	TIME	VENUE AND ADDRESS
land owners within the 10 km radius of the Kendal Power Station			

The above mentioned meetings were held separately but contained and addressed the same information. The reason was to accommodate the needs, perceptions and availability of the different interest groups.

- Three separate Focus Group Meetings were held with I&APs:

  Focus Group Meeting 1:

  Attendees: Ngankala DM and eMalahleni Local Municipal officials

  Date: Thursday, 20 June 2013

  Time: 09:00 – 11:00

  Place: Ngankala DM offices

  Focus Group Meeting 2:

  Attendees: Representatives from potentially affected Mining Houses, NGOs and other interest groups

  Date: Thursday, 20 June 2013

  Time: 12:00 – 14:00

  Place: Ngankala DM offices

  Focus Group Meeting 3:

  Attendees: Landowners and potentially affected Mining Houses

  Date: Thursday, 4 July 2013

  Time: 14:00 – 16:00

  Place: NG Church Hall, Ogies

Issues relevant to the project will be considered and where necessary will be carried forward into the Impact Assessment phase.

This DSR was made available and distributed for comment as follows:

- Placed in public venues within the vicinity of the project area (these are listed in Table 6-4 below);
- Published on the Eskom and Zitholele websites;
- Mailed to I&APs who requested a copy of the report; and
- Copies were made available at the stakeholder meetings.

I&APs could comment on the report in various ways, such as completing the comment sheet accompanying the report, and submitting individual comments in writing or by email.

Table 6-4: List of public places where the Draft Scoping Report is available

Contact	Location	Contact
Printed Copies		
Phola Public Library		013 645 0094
Ogies Public Library, 61 Main Street, Ogies		013 643 1150
Delmas Public Library		013 665 2425
Emalahleni Public Library – 19 OR Thambo Street		013 653 3116
Kungwini Public Library		013 932 6305
Kendal Power Station – Security Reception		013 647 6002
Electronic Copies		
Emmy Molepo	www.eskom.co.za/eia Kendal 30-year ash	011 800 4211
Patiswa Mnqokoyi	www.zitholele.co.za	011 207 2077
Patiswa Mnqokoyi	CD available on request via email from Zitholele Consulting.	Phone 011 207 2074 or send email request to patiswam@zitholel.co.za

6.11 FINAL SCOPING REPORT

Using the comments received from stakeholders the DSR was be updated and finalised. All comments received were added to the CRR and attached to the FSR as an appendix.

The FSR once updated with additional issues raised by I&APs may contain new information. The FSR will be submitted to the DEA for consideration and decision with regards to acceptance of the Plan of Study. The FSR will be distributed to those I&APs who specifically request a copy, but will be available at the same public venues as the DSR.

7 ISSUES IDENTIFIED DURING THE SCOPING PHASE

A summary of the issues identified / raised to date in the Scoping Phase include:

- Impact on mining, mineral and prospecting rights have been raised by the potentially affected Mining Houses around the Kendal Power Station. Transparent information sharing and fair negotiations with effected Mining Houses represent the agreed way forward.

- Possible impact on Transnet servitudes, oil pipeline, fibre optic cables and Zibulu-Phola conveyor.

- Air quality in the region and possible cumulative impacts of an additional ash facility on air quality and effects of hazardous elements of fly ash on humans, plants and animals.

- Impacts to the surface water features such as the Wilge River, and groundwater resources, which is utilised by landowners in the area.

- Impact of dust ash outfall on productive agricultural land and existing farming practices.

A detailed register of comments received to date is documented in the CRR attached as Appendix F.

8 RECEIVING ENVIRONMENT

The site environment is described in the section below.

8.1 CLIMATE

8.1.1 *Data Collection*

Climate information was attained using the climate of South Africa database. Due to the close vicinity of the Kusile Power Station, the Air Quality Impact Assessment report which was done by Airshed Planning Professionals[1] for the Phola-Kusile overland conveyor system was used. The weather related information extracted from the weather report was obtained from the Kendal 2 monitoring station, which is in close proximity to Kendal Power station.

8.1.2 *Regional Description*

The site area displays warm summers and cold winters typical of the Highveld climate. The region falls within the summer rainfall region of South Africa, rainfall occurs mainly as thunderstorms (Mean Annual Precipitation - 662 mm) and drought conditions occur in approximately 12 % of all years. The mean annual potential evaporation of 2 060 mm indicates a loss of water out of the system.

The area experiences frequent frosts, with mean frost days of 41 days. In addition to frost the area is prone to hail storms during the summer time. Winds are usually light to moderate, with the prevailing wind direction north-westerly during summer and easterly during winter.

Ambient Temperature

Air temperature is important, both for determining the effect of plume buoyancy (the larger the temperature difference between the plume and the ambient air, the higher the plume is able to rise), and determining the development of the mixing and inversion layers. Minimum, mean and maximum temperatures for Kendal 2 for the period January 2005 – April 2011 are illustrated in Figure 8-1 below.

Annual average maximum, minimum and mean temperatures for Kendal 2 are given as 27°C, 10°C and 16°C, respectively, based on the January 2005 to April 2011 record. Average daily maximum temperatures range from 31°C in December to 20°C in June, with daily minima ranging from 15°C in January to 3°C in July.

[1] Air Quality Impact Assessment for the 'AIR QUALITY SPECIALIST IMPACT ASSESSMENT FOR THE PROPOSED NEW PHOLA-KUSILE COAL CONVEYOR, NKANGALA DISTRICT MUNICIPALITY, MPUMALANGA'. Report No.: APP/09/SYN-03B Rev 0.2, 2011.

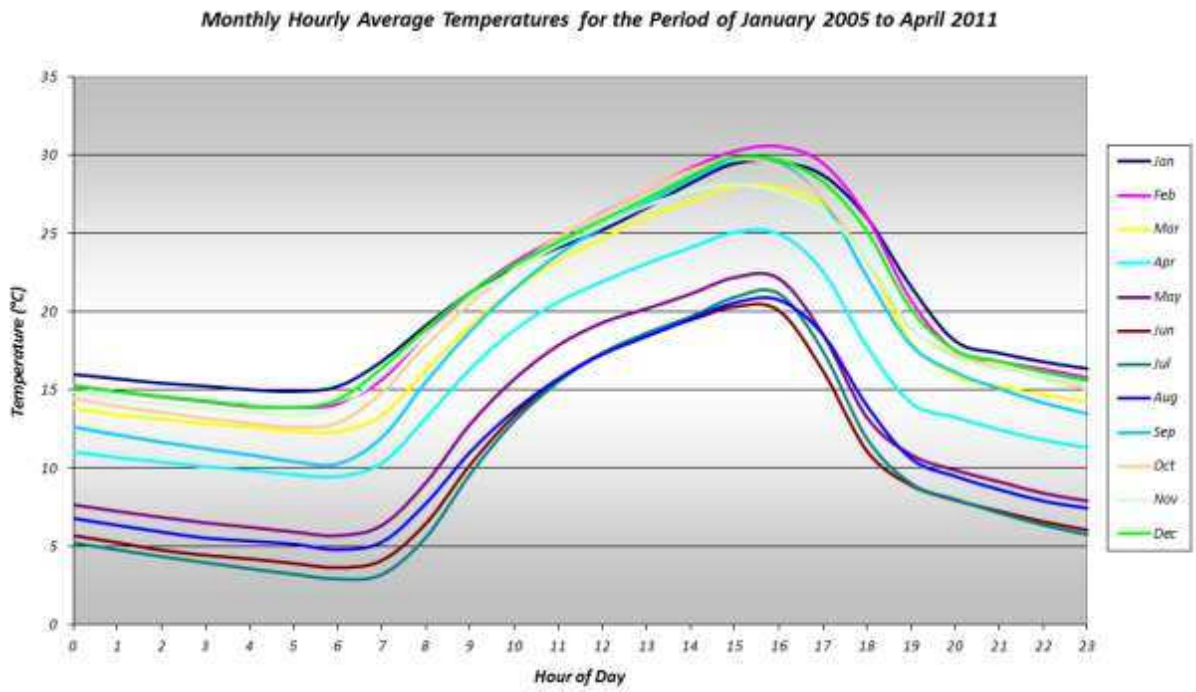


Figure 8-1 - Diurnal temperature profile at Kendal 2 monitoring station for the period

Wind

The predominant wind direction at Kendal 2 for the period January 2005 to April 2011 is from the west-northwest (~16 % frequency of occurrence). Calm periods and low wind speeds are more prevalent during the night-time, as is to be expected (Figure 8-2). The gentle slope of the terrain may account for the increased frequency of occurrence of west-north westerly winds during the day-time and increased east-south easterly winds during the night-time.

During winter months (July to August), the enhanced influence of westerly wave disturbances is evident in the increased frequency of south westerly winds at Kendal 2 (Figure 8-3). An increase in the frequency of easterly and east-south easterly winds during summer months (December to February) reflects the influence of easterly wave systems. Autumn months are associated with a greater frequency of calm wind conditions, with the smallest number of calms occurring during spring months.

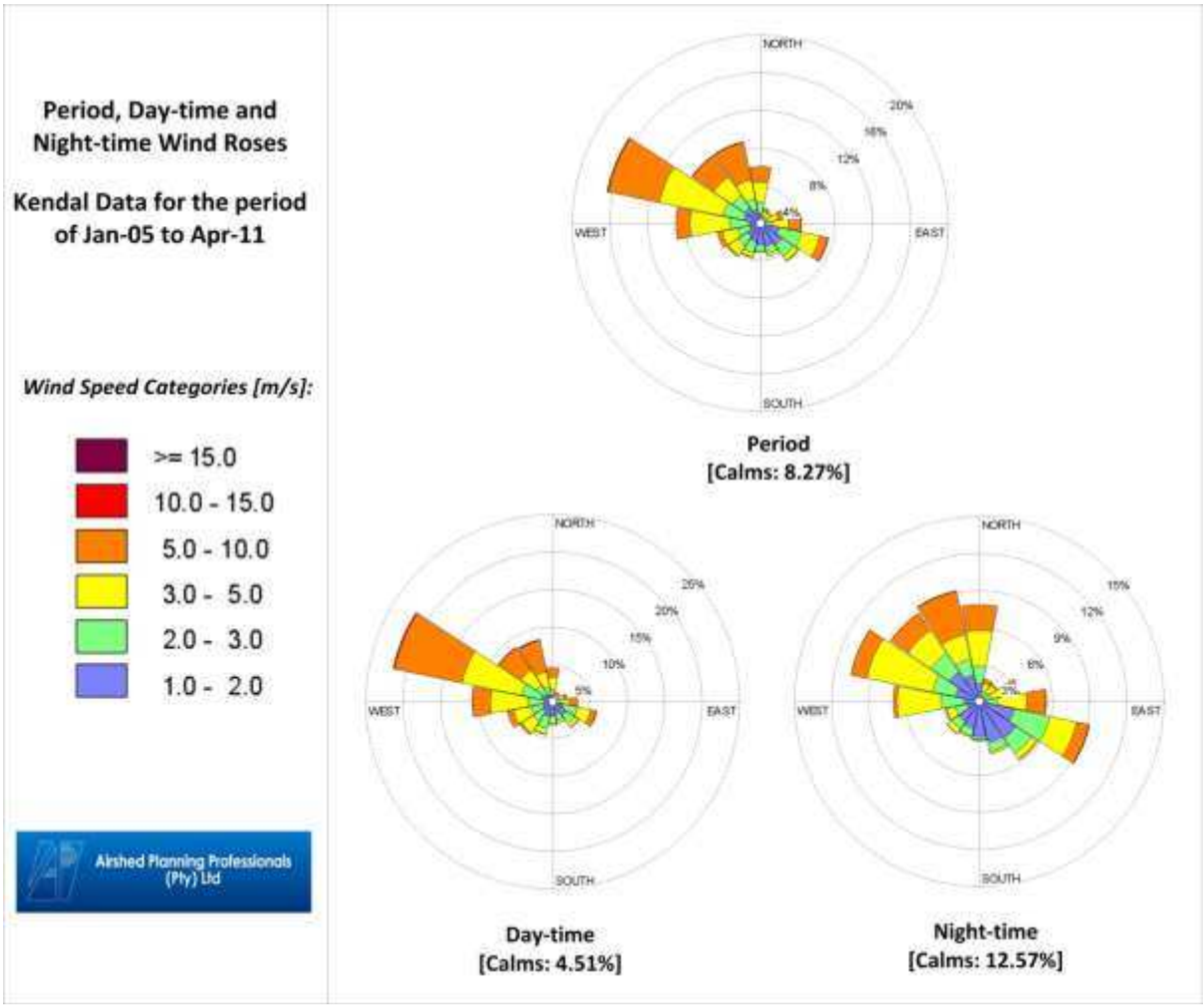


Figure 8-2: Period, day- and night-time wind roses for the Kendal 2 monitoring station (January 2005 to April 2011)

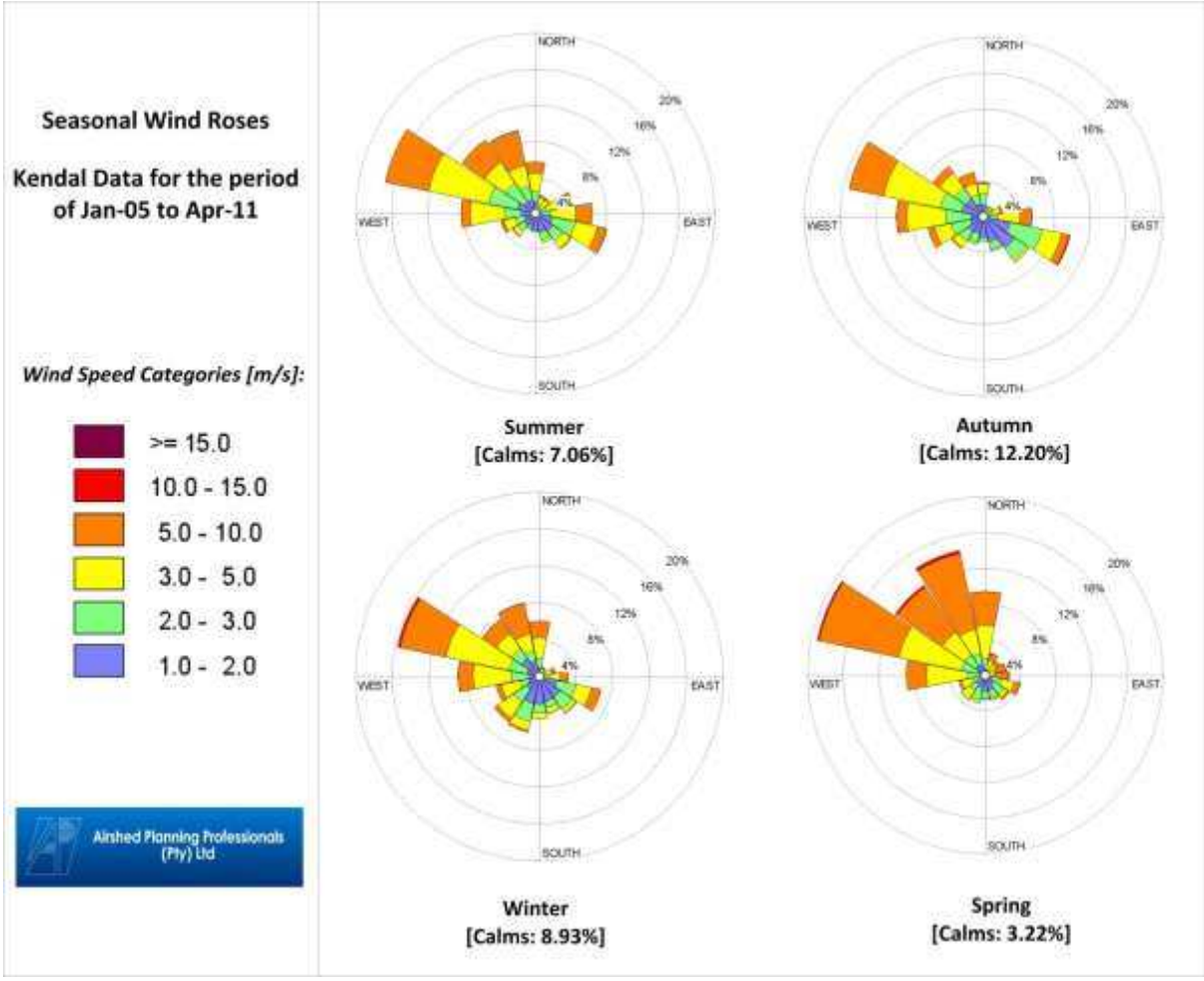


Figure 8-3: Seasonal wind roses for the Kendal 2 monitoring station (January 2005 to April 2011)

8.2 GEOLOGY

8.2.1 *Methodology and Data Sources*

The geological analysis was undertaken through the desktop evaluation using a Geographic Information System (GIS) and relevant data sources. The geological data was taken from the Department of Water Affairs Geology data.

8.2.2 *Regional Description*

The geology in the areas is fairly complex. The main rock types found in the region are sandstone, dolerite, granite, norite, quartzite, tillite and shale. The geology in the areas mainly consists of the following geological groups as per Figure 8-4 below.

Table 8-1 - Site Geology

Group	Main rock types
Karoo Super group/Ecca Group	Arenite, Shale, Coal
Bushveld complex	Granite
Transvaal Super group/Rooiberg Group	Rhyolite

The granite and quartzite form the harder rocks in the region and hence these areas are mostly the ridges found around site. The sandstone which covers the bulk of the Mpumalanga Highveld in association with dolerite generally weathers into sandy soils with relatively flat undulating plains. The above table will be updated for each potential site once the Geotechnical assessment is available.

8.2.3 *Sensitivities*

With regards to the construction of an ash disposal facility geological sensitivities to consider include:

1) Areas of unstable geology, which in this instance refer to the areas of deep clay layers. The clay deposits tend to shrink and swell and can slip under the foundation of the ash disposal facility. Special foundation designs will need to be made to accommodate this type of geological founding conditions.

2) Areas of shallow soils or rock outcrops also present problematic founding conditions and are also deemed to constitute sensitive geology. In such areas cut to fill operations may be required to create suitable ash storage areas / capacity, resulting in permanent damage to in-situ geology.

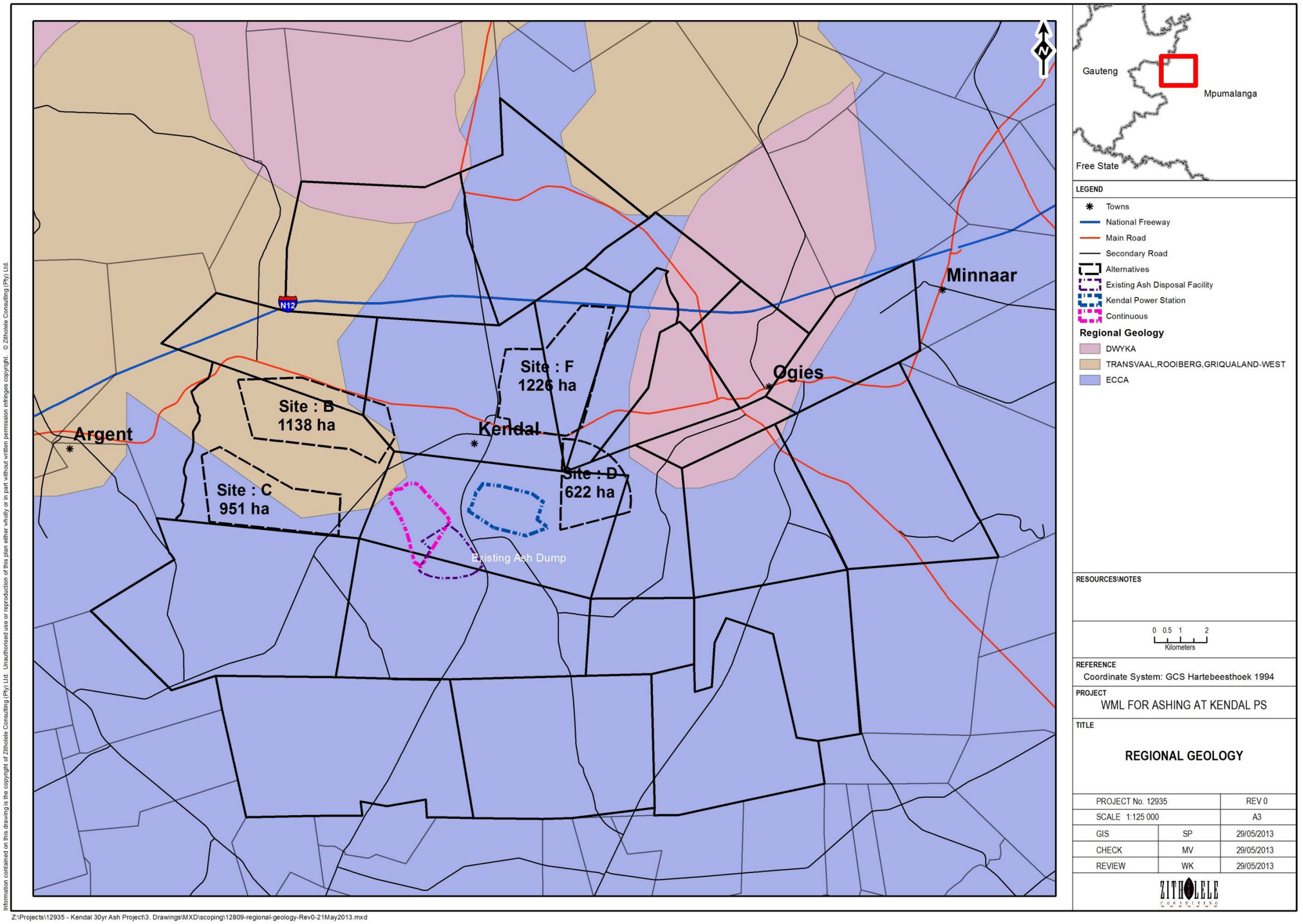


Figure 8-4: Site Geology of the area

8.3 SOILS AND LAND CAPABILITY

8.3.1 *Data Collection*

8.3.2 *Regional Description*

The soils in the region are mostly derived from the geology of the region (as described above). The harder geologies (such as granite and quartzite) weather into rocky and sandy soils, while the softer geologies have weathered into deeper red or brown sandy soils (sandstone and dolerite). The soils in the region form a typical Highveld plinthic catena with shallow soils on the crests of slopes, deeper sandy apedal soils on the slopes and soils with some plinthic clay layers in the foot slopes. In the valleys the clays accumulate and in some cases harden into ferricrete (hardpan / ouklip). The study site for the Kendal 30 year ash disposal project is classified as having moderate to high potential arable land as per Figure 8-5 below which provides an illustration of the soils within the region.

8.3.3 *Sensitivities*

The sandy apedal soils as well as the deeper plinthic soils mentioned above result in the wide spread occurrence of high potential arable soils in the region. These soils are considered to be sensitive because:

1) Arable soils in South Africa are considered to be valuable because it constitute such a small percentage of the total soil distribution in the country;

2) The arable soils in the region underpin the basis of agricultural activities in the area;

3) The ash disposal facility will result in the sterilisation of a large area of soil;

8.4 TOPOGRAPHY

8.4.1 *Data Collection*

The topography data was obtained from the Surveyor General's 1:50 000 toposheet data for the region, namely 2628 and 2629. Using the latest aerial photography of the area a digital elevation model (DEM) was developed of the region as shown in Figure 8-6 below.

8.4.2 *Regional Description*

The topography of the region is a gently undulating to moderately undulating landscape of the Highveld plateau. Scattered wetlands and pans occur in the area, with a higher concentration of wetlands and streams occurring in the southern portion of the study area. Rocky outcrops and ridges also form part of significant landscape features in the wider area. The altitude ranges

between 1 400 – 1 645 metres above mean sea level (mamsl). Figure 8-6 below provides an illustration of the topography of the region as well as the ridges.

8.4.3 *Sensitivities*

Ridges on the Highveld typically constitute areas of high biodiversity. In Mpumalanga these areas have also been significantly transformed over the years. Once transformed, restoration and rehabilitation are difficult or impossible. Thus ridges are deemed to be sensitive features.

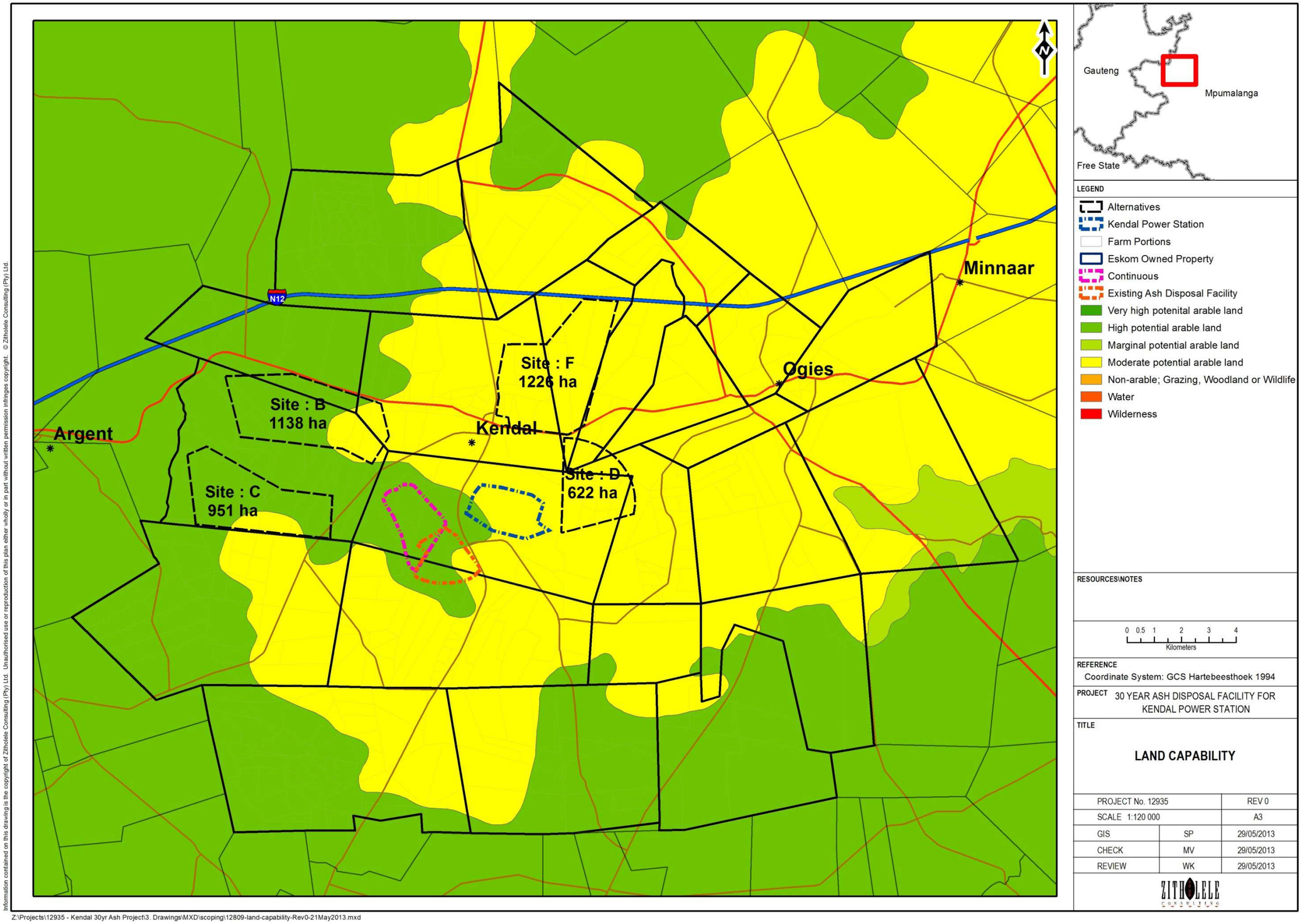


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Figure 8-5 – Land Capability of the soils within the study site

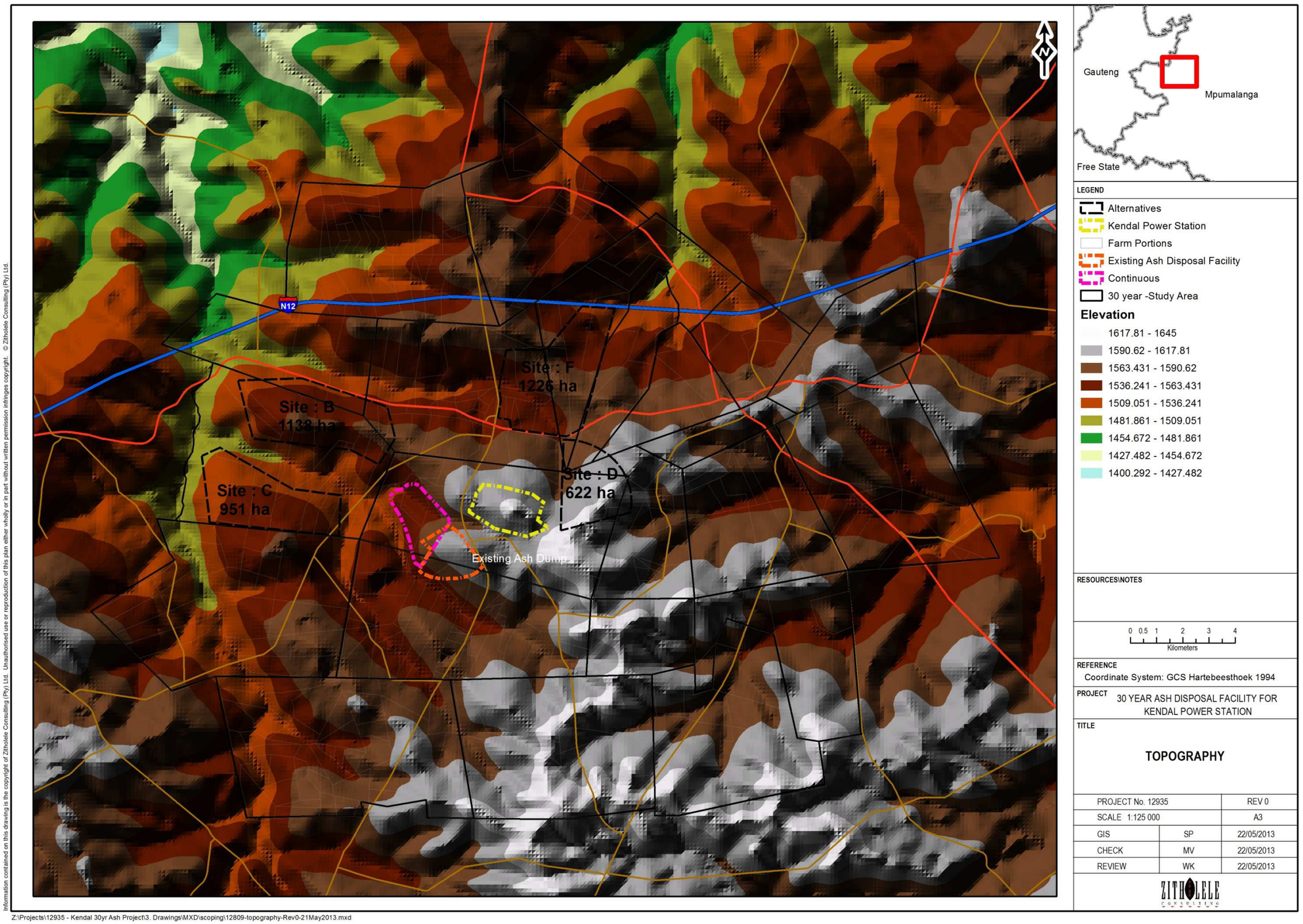

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Figure 8-6: Topography of the area.

8.5 AIR QUALITY

8.5.1 *Data Collection*

Air quality information for the proposed study site was obtained from existing literature and specialist studies conducted for similar projects in the vicinity of the Kendal and Kusile Power Stations.

8.5.2 *Regional Description*

The Highveld Airshed Priority Area (HPA) was declared the second national air quality priority area (after the Vaal Triangle Airshed Priority Area) by the Minister of Environmental Affairs at the end of 2007 (HPA, 2011). This required that an Air Quality Management Plan for the area be developed. The plan includes the establishment of emissions reduction strategies and intervention programmes based on the findings of a baseline characterisation of the area. The implication of this is that all contributing sources in the area will be assessed to determine the emission reduction targets to be achieved over the following few years.

The poor ambient air quality in the Emahaleni Hot Spot is a result of emissions from power generation, metallurgical manufacturing processes, open-cast coal mining and residential fuel burning; where industrial processes dominate the source contribution (HPA, 2011). Dispersion modelling projected exceedances of the daily PM_{10} limit for more than 12 days across the Emahaleni Hot Spot (HPA. 2011). Monitored daily PM_{10} concentrations within the Hot Spot, at Witbank and Greendale High School show regular exceedances of the daily limit, between 2008 and 2012. The HPA Air Quality Management Plan (2011) reported exceedance of the annual limit, for 2008 / 2009, at one of the two monitoring stations in Witbank with an annual averages ~83 $\mu g.m^{-3}$ for Witbank 2 monitoring station.

The life-time increased cancer risk was calculated on specialist studies undertaken for Kusile Power Station (Airshed, 2013) based on the identified sensitive receptors for exposure to inhalable arsenic, nickel and chromium. The calculations were based on the projected annual PM_{10} concentrations at each sensitive receptor, literature values for the proportion of the toxic forms of the trace metals in coal fly ash in combination with total trace metal concentrations in a sample of ash from Kendal Power station and the US-EPA IRIS Unit [cancer] Risk Factor for exposure via inhalation. These calculations showed that the increased life-time cancer risk was low to very low.

8.5.3 *Potential effects of particulate matter on vegetation, animals and humans*

The effect of particulate matter on vegetation, animals and humans was summarised in the available specialist studies. According to the Canadian Environmental Protection Agency (CEPA), generally air pollution adversely affects plants in one of two ways. Either the quantity of output or yield is reduced or the quality of the product is lowered. Impacts from quantity of yield results from pollutant impacts on plant physiological or biochemical processes and can lead to significant loss

of growth or yield in nutritional quality (e.g. protein content). Impacts on product quality may take the form of discolouration of the leaf surface caused by internal cellular damage. Such injury can reduce the market value of agricultural crops for which visual appearance is important (e.g. lettuce and spinach). Visible injury tends to be associated with acute exposures at high pollutant concentrations whilst invisible injury is generally a consequence of chronic exposures to moderately elevated pollutant concentrations. Therefore level of exposure to concentrations of ash is the determining factor.

Studies presented by the Canadian Environmental Protection Agency (CEPA, 1998) using experimental animals have not provided convincing evidence of particle toxicity at ambient levels. Acute exposures (4-6 hour single exposures) of laboratory animals to a variety of types of particles, almost always at concentrations well above those occurring in the environment have been shown to cause:

- decreases in ventilatory lung function;
- changes in mucociliary clearance of particles from the lower respiratory tract;
- increased number of alveolar macrophages and polymorphonuclear leukocytes in the alveoli (primary line of defence of the alveolar region against inhaled particles);
- alterations in immunologic responses (particle composition a factor, since particles with known cytotoxic properties, such as metals, affect the immune system to a significantly greater degree);
- changes in airway defence mechanisms against microbial infections (appears to be related to particle composition and not strictly a particle effect);
- increase or decrease in the ability of macrophages to phagocytize particles;
- a range of histologic, cellular and biochemical disturbances, including the production of proinflammatory cytokines and other mediators by the lungs alveolar macrophages (may be related to particle size, with greater effects occurring with ultrafine particles);
- increased electrocardiographic abnormalities (an indication of cardiovascular disturbance); and,
- increased mortality.

An investigation into extra-pulmonary migration of metals in coal fly-ash revealed that potentially carcinogenic trace metals (chromium, copper, cadmium, lead, and manganese) can accumulate in the livers of rats subsequent to acute inhalation of fly-ash, resulting in altered cellular biochemistry and histomorphology (Mani et al., 2007). These results suggest that exposure to elevated particulate matter concentrations may not be limited to the pulmonary system.

The PM_{10} and $PM_{2.5}$ are of concern to human health due to their health impact potentials. As indicated previously, such fine particles are able to be deposited in, and damaging to, the lower airways and gas-exchanging portions of the lung. The World Health Organization states that the evidence on airborne particulates and public health consistently shows adverse health effects at exposures experienced by urban populations throughout the world. The range of effects is broad, affecting the respiratory and cardiovascular systems and extending from children to adults including a number of large, susceptible groups within the general population. Long-term exposure

to particulate matter has been found to have adverse effects on human respiratory health (Abbey et al., 1995). Respiratory symptoms in children resident in an industrialised city were found not to be associated with long-term exposure to particulate matter; however non-asthmatic symptoms and hospitalizations did increase with increased total suspended particulate concentrations (Hruba et al., 2001). The epidemiological evidence shows adverse effects of particles after both short-term and long-term exposures. However, current scientific evidence indicates that guidelines cannot be proposed that will lead to complete protection against adverse health effects as thresholds have not been identified by the WHO.

Scientific studies have linked inhaled particulate matter to a series of significant health problems, including aggravated asthma, increases in respiratory symptoms like coughing and difficult or painful breathing, chronic bronchitis, decreased lung function, and premature death. PM_{10} is the standard measure of particulate air pollution used worldwide and studies suggest that asthma symptoms can be worsened by increases in the levels of PM_{10}. PM_{10} has many components and there is no general agreement regarding which component(s) could exacerbate asthma. However, pro-inflammatory effects of transition metals, hydrocarbons, ultrafine particles (due to combustion processes) and endotoxins, which is all present to varying degrees in PM_{10}, could be important.

8.5.4 *Sensitivities*

The National Ambient Air Quality Standards (NAAQS) are based on human exposure to specific criteria pollutants and as such, possible sensitive receptors were identified where the public is likely to be unwittingly exposed. With regards to the proposed new ash disposal facility the most notable concerns are related to impacts on the production of crops, impacts on the rearing of animals, especially considering pig farming and cattle farming is important agricultural activities within the study area. Another major concern is the impact of fly ash on human health of residents living in the Witbank, Middleburg, Ogies and Phola areas, and what the cumulative impact of the new ash disposal facility will have on the existing ambient air quality in this region. These impacts will be assessed in detail in the environmental impact phase of the EIA through specialist studies and further detailed assessment of international and peer-reviewed literature sources.

8.6 SURFACE WATER

8.6.1 *Data Collection*

The surface water data was obtained from the WR90 database from the Water Research Commission and the National Freshwater Ecosystem Priority Area (NFEPA) database from DWA. The data used includes pans, dams, wetlands, catchments, river alignments and river names.

8.6.2 *Regional Description*

The study area falls partly in the B20E, B20F, B20G and B11F quaternary catchments. The main drainage feature of the area is the Wilge River which traverses the study area along the western boundary and drains northwards, including several tributaries to the Wilge River situated in the western portion of the study area. The study area falls entirely within the Olifants Water Management Area.

8.6.3 *Sensitivities*

One of the most sensitive features of the study area is the Wilge River that drains through the area. The Wilge River and tributaries largely constitute the upper catchment area of the Olifants Water Management Area (WMA) and is still in a relatively good condition compared to the rest of the rivers and streams in the Olifants WMA, which are considered to be in a poor state. As a result the Wilge River and tributaries has enjoyed a high level of conservation effort by the Department of Water Affairs in recent years. The streams, unnamed drainage lines and wetlands, and pans supports a number of faunal and floral species uniquely adapted to these aquatic ecosystems and therefore all surface water bodies are earmarked as sensitive features.

The sensitivity of wetlands is typically determined by its structure, function and composition (which are discussed in more detail in Section 8.9 and 8.10 of this report).

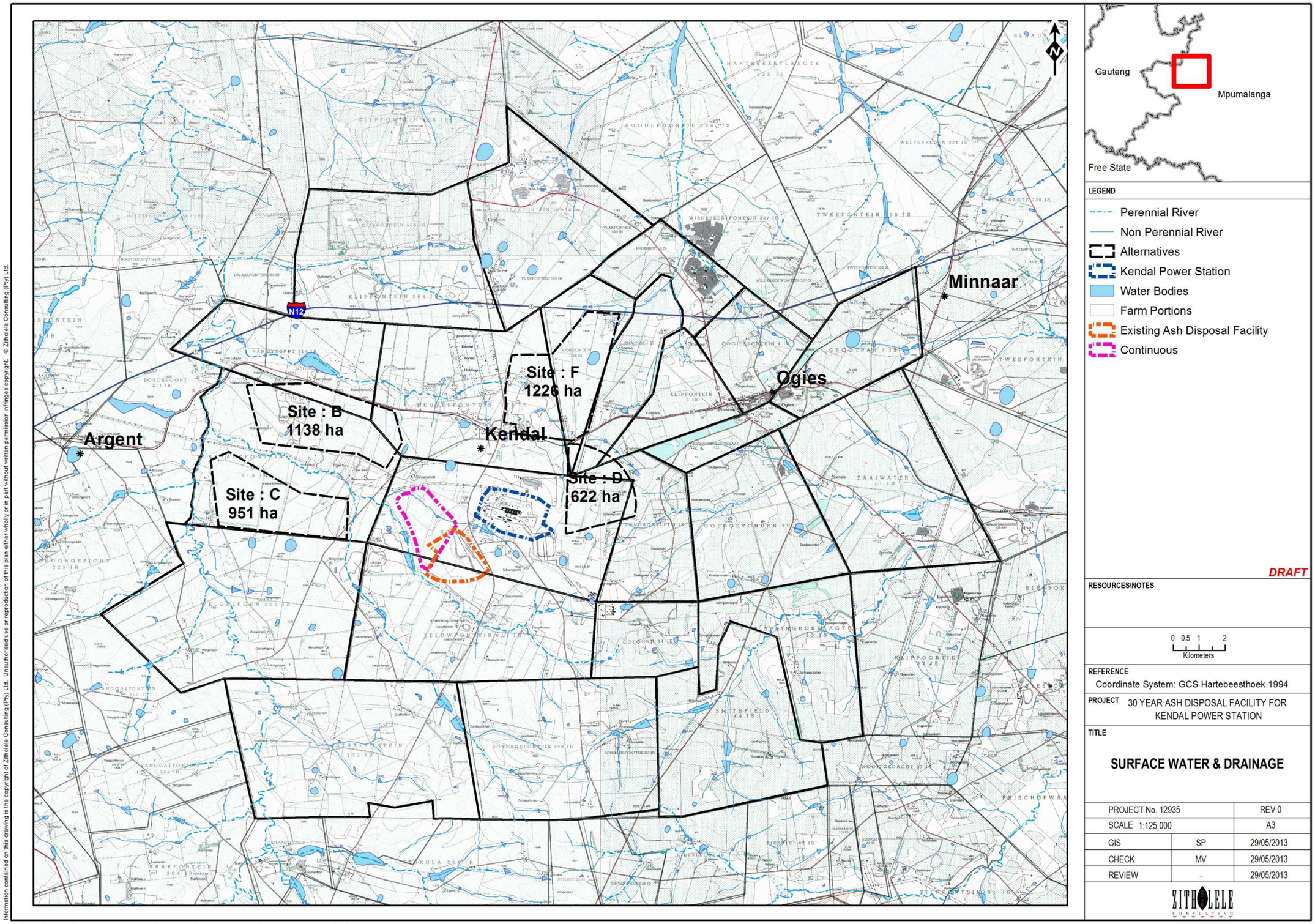

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Figure 8-7: Surface water and drainage features of the study site.

8.7 GROUNDWATER

8.7.1 *Data Collection*

Data and information relating to groundwater resources in the region was obtained from existing baseline specialist reports (Goldar Associates, June 2013) produced by groundwater specialists on similar projects in the area. The general information and data that was utilised during these studies include:

- National Groundwater Database (NGDB);
- 1:250 000 geological map series;
- 1:2 500 000 Groundwater Resources map of RSA –Sheet 1 (WRC.DWAF 1995);
- 1:4 000 000 Groundwater Resources map of RSA – Sheet 2 (WRC.DWAF 1995);
- 1: 500 000 Hydrogeological Map Series of RSA (1996); and
- Review of existing monitoring report from GHT (February 2012); and
- Groundwater monitoring data base received from GHT in Aquabase format.

8.7.2 *Regional Description*

Available hydrogeological information from DWAF (1996) was used to define the regional aquifer classification, which is classified as a minor aquifer system with intergranular and fractured aquifer zones. Published hydrogeological maps (DWAF 1996) indicate that the average borehole yield in the area is between 0.5l/s and 2.0l/s. The average borehole yield recorded in the Eskom/GHT groundwater data base is 0.24 l/s, with maximum yield being 1.3 l/s and the minimum yield recorded as 0.0001l/s. The groundwater flows mimic the topography and is toward the surface streams. The groundwater flow is generally toward the west in the vicinity of the Kendal Power Station.

The existing groundwater monitoring network around the Kendal Power Station, as confirmed from groundwater data base and monitoring reports, consists of 45 monitoring boreholes, which is considered adequate to monitor the groundwater quality in the region of the Kendal Power Station.

Groundwater monitoring indicated that manganese, iron, sulphate and fluoride exceed the SANS 241 (2011) drinking water compliance standards in the study area. From the published hydrogeological maps (DWAF 1996) the average recharge for the study area is shown as between 50mm to 75mm per annum.

8.7.3 *Sensitivities*

Sensitivities regarding groundwater in the study area include:

No detailed assessment of aquifer parameters exists. Hydraulic conductivity (k) and transmissivity (T) are values that indicate the rate at which groundwater flows in the subsurface. These aquifer parameters can be highly variable in Karoo and other aquifer aquifers due to the different geological units of sedimentary and igneous formations and geological conditions that apply.

These hydraulic parameters are essential to understand to create a realistic conceptual model for estimating contaminant migration rates.

Landowner consultation has revealed that groundwater resources are utilised significantly by landowners to supplement surface water resources. The extent of groundwater utilisation must be assessed in the EIR phase of the project.

Contamination of groundwater resources remains a tangible risk that must be managed and mitigated successfully to ensure groundwater resources are not adversely affected. Conceptual engineering of the proposed ash disposal facility and the use of a DWA approved liner system will be instrumental in ensuring that groundwater resources is not polluted.

8.8 LAND USE

8.8.1 *Data Collection*

The land use data was obtained from the CSIR Land Cover database (2006) and supplemented with visual observations from aerial photography.

8.8.2 *Regional Description*

From Figure 8-8 below it can be seen that a large portion of the study area, which belongs to Kendal Power Station, is located on cultivated land. The land use in the area is dominated by maize cultivation and grazed fields (mostly cattle).

A portion of the western half of the study area is leased to a farmer for agricultural use by means of centre pivots, however the lease contract will come to an end in due course. The farmer has been informed of the intention of Eskom to develop a potential ash disposal facility in the area. The rest of the site is undeveloped and natural ground.

Although not indicated on the map in Figure 8-8, mining is another important and sensitive land use that is present in the study area. Large portions of the study area are either currently being mined, or are earmarked for mining or have mineral rights registered on properties. Open pit or strip mining is currently occurring in the area between the N12 and R545 (Site areas E1, E2, and F), while underground mining is occurring east and south east of Kendal Power Station. Determining the extent and scheduling of the mining activity is required in order to determine the feasibility of the identified and recommended site alternatives in the EIR phase of the EIA.

8.8.3 *Sensitivities*

Sensitive land use features include:

- Intensive and specialised agricultural activities;

- Open cast and underground mining activities, and existing registered mineral rights on a number of the properties in the study area.

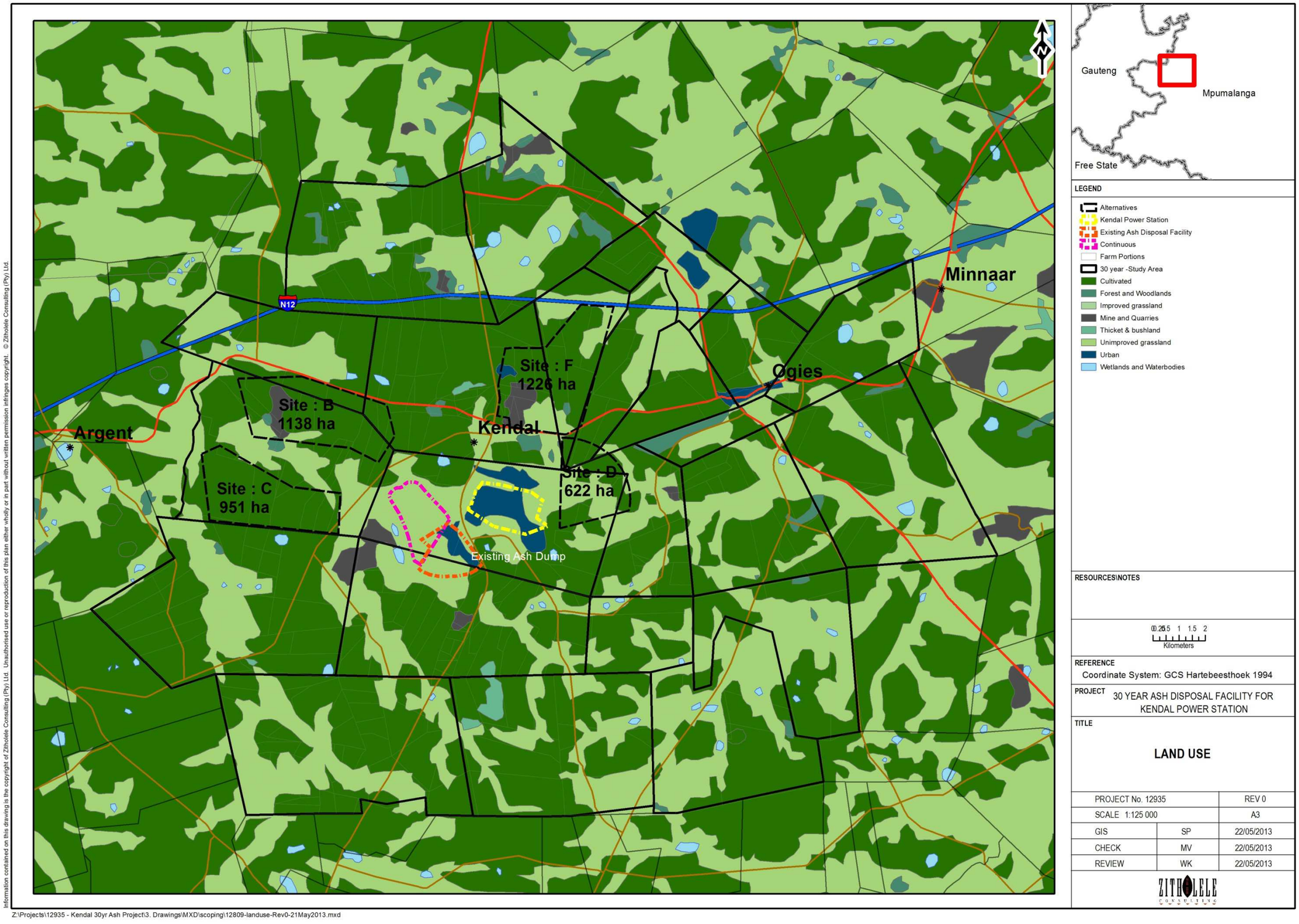

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Figure 8-8: Land Use Map of the study site.

8.9 FAUNAL BIODIVERSITY

8.9.1 *Data Collection*

A literature review of the faunal species that could occur in the area was conducted. C-Plan data provided from the Mpumalanga provincial department was used to conduct a desktop study of the area. This data consists of terrestrial components; ratings provide an indication as to the importance of the area with respect to biodiversity. Further, other specialist studies on terrestrial ecology in the area (Golder Associates, April 2013) was also consulted to describe baseline conditions in the study area more accurately.

8.9.2 *Regional Description*

The biodiversity rating for the study area (Figure 8-9) is rated from largely least concern to Important and Necessary habitat remaining. Five mammal species were recorded in the study area during a field study undertaken by Golder Associates in 2013. These are the Reddish-grey musk shrew (*Crocidura cyanea*), Multimammate mouse (*Mastomys* sp.), Black-backed jackal (*Canis mesomelas*), Cape clawless otter (*Aonyx capensis*), Water mongoose (*Atilax paludonosus*) and Warthog (*Phacochoerus africanus*).

Previous studies conducted in areas surrounding Kendal Power Station and the nearby Kusile Power Station have recorded an additional 10 mammal species, which include Lesser red musk shrew *Crocidura hirta*, Yellow mongoose *Cynictis penicillata*, Blesbok *Damaliscus dorcas phillipsi*, Chestnut climbing mouse *Dendromys mystacalis*, Porcupine *Hystrix africaeaustralis*, Scrub hare *Lepus saxatilis*, Aardvark *Orycteropus afer*, Angoni vlei rat *Otomys angoniensis*, Striped mouse *Rhabdomys pumilio*, and Common duiker *Sylvicarpa grimmia.* The majority of these species are fairly-common, to common with widespread distributions. Based on historic distributions, a further 47 species are known to occur in the region in which the study area is located.

Cape clawless otter (*Aonyx capensis*) was the only Red Data/protected mammal recorded in the study area. This species is protected in terms of Schedule 2 of the Mpumalanga Nature Conservation Act (No 10 of 1997) and the NEMBA TOPS list (2007). Cape clawless otters are found near permanent water where they feed on a mixture of fish, amphibians and crustaceans (Estes, 1991). Threats to otters include habitat loss, and habitat degradation mainly in the form of pollution, increased siltation and agricultural run-off. Otters are likely to frequent the stream channels and artificial dams in the study area and environs.

Forty one bird species were recorded in the study area during the Golder field survey. Most of these are common and widespread species typical of grassland and wetland habitats in Mpumalanga. Although none were observed during the 2013 field survey anecdotal evidence from a local farmer indicates that Flamingo (*Phoenicopterus* sp.) frequently use a pan located approximately one kilometre north of the Kendal Power Station.

Two species of flamingo occur in southern Africa, namely the Greater flamingo (*Phoenicopterus ruber*) and the Lesser flamingo (*Phoenicopterus minor*). Both species are listed as Near Threatened by the IUCN and are protected in according to Schedule 2 of the Mpumalanga Nature Conservation Act (No 10 of 1997). Flamingos inhabit shallow water bodies such as pans and lakes where they feed on inter alia, small fish, aquatic insects and crustaceans.

Three amphibians were recorded in the study area. These include Common river frog (*Afrana angolensis*), Striped stream frog (*Strongylopus fasciatus*) and Red toad (*Schismaderma carens*). These are all common species with widespread distributions. In terms of reptiles only the Striped skink (*Mabuya striata punctatissima*) was observed in the study area during the 2013 field survey.

Seventeen other species of herpetofauna were also recorded in the region and surrounds of the Kendal Power Station. These include ten reptile and seven amphibian species. All recorded species are common and not restricted in terms range or habitat.

According to Schedule 2 of the Mpumalanga Nature Conservation Act (No 10 of 1997), all species of reptile excluding both monitor species (*Varanus exanthematicus* and *Varanus niloticus*) and all snakes, are listed as Protected. The Giant bullfrog (*Pyxicephalus adspersus*) is the only listed amphibian that may potentially occur in the study area. According to Schedule 2 of the Mpumalanga Nature Conservation Act (No 10 of 1997) this species is protected, while the NEMBA TOPS List (2007) and IUCN (2012) categorise it as Near Threatened. The probability of Giant bullfrog (Pyxicephalus adspersus) occurring in the Moist grass and sedge vegetation community in the study area is considered medium.

Ninety five arthropod taxa have been recorded in the study area and surrounds. These are all common and widespread species. The Marsh sylph (*Metisella meninx*) has a high probability of occurring in the study area. This species is listed as Vulnerable according to Henning et al. (2009) and favours wetland and marsh habitats on the Highveld. Within the study area this species potentially occurs in undisturbed sites comprising the Moist grass and sedge vegetation community.

8.9.3 *Sensitivities*

Site sensitivities are related to habitat loss for faunal species. Grassland areas in South Africa provide habitat for a number of fauna species. It is likely that upon commencement of construction activates many larger and more agile species will move-off to avoid disturbance. A number of smaller and less mobile species however, may be trapped and killed /injured during all phases of the project.

Loss of species of conservation importance is also of concern. During initial vegetation clearing and earth works, flora and fauna of conservation importance such as Red Data and protected species may be killed, injured or damaged. Moreover, habitat loss and degradation may result in sensitive species populations becoming unsustainable leading to local extinctions.

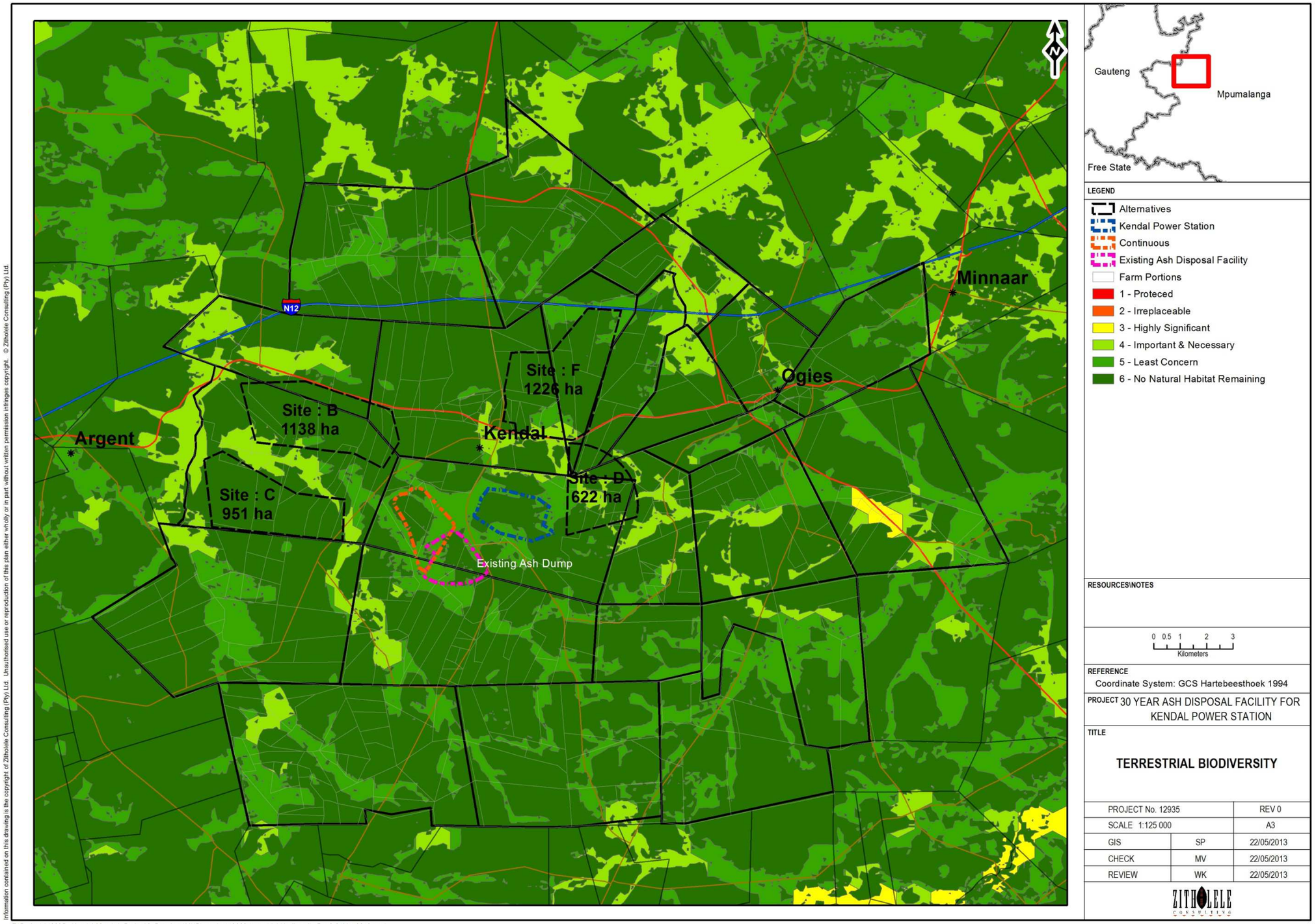


Figure 8-9: Biodiversity of the study area.

8.10 FLORAL BIODIVERSITY

8.10.1 *Methodology and Data Sources*

The floral data below is taken from The Vegetation of South Africa, Lesotho and Swaziland (Mucina and Rutherford 2006).

8.10.2 *Regional Description*

According to the South African National Biodiversity Institute, the study area falls within the Grassland Biome, where most of the country's maize production occurs. The vegetation of the area is classified as Rand Highveld Grassland and Eastern Highveld grassland as classified by Mucina and Rutherford[2].

Rand Highveld Grassland

Rand Highveld Grassland is found in the highly variable landscape with extensive sloping plains and ridges in the Gauteng, North-West, Free State and Mpumalanga Provinces. The vegetation type is found in areas between rocky ridges from Pretoria to Witbank, extending onto ridges in the Stoffberg and Roossenekal regions as well as in the vicinity of Derby and Potchefstroom, extending southwards and north-eastwards from there. The vegetation is species rich, sour grassland alternating with low shrubland on rocky outcrops. The most common grasses on the plains belong to the genera *Themeda*, *Eragrostis, Heteropogon* and *Elionurus*. High numbers of herbs, especially *Asteraceae* are also found. In rocky areas shrubs and trees prevail and are mostly *Protea caffra, Acacia caffra, Celtis africana* and *Rhus* spp.

Eastern Highveld Grassland

Eastern Highveld Grassland is found in the Mpumalanga and Gauteng Provinces. This vegetation type is found in plains between Belfast in the east and the eastern side of Johannesburg in the west and extending southwards to Bethal, Ermelo and west of Piet Retief.

8.10.3 *Sensitivities*

Rand Highveld Grassland

This vegetation type is poorly conserved (~1 %) and has a target of 24 % of the vegetation type to be conserved. Due to the low conservation status this vegetation type is classified as endangered. Almost half of the vegetation type has been transformed by cultivation,

[2] The Vegetation of South Africa, Lesotho and Swaziland, Muccina and Rutherford 2006.

plantations, urbanisation or dam-building. Scattered aliens (most prominently *Acacia mearnsii*) are present in the unit.

Eastern Highveld Grassland

This vegetation type is poorly conserved (only about 0.3 %) and has a target of 24 % of the vegetation type to be conserved. Due to the low conservation status this vegetation type is classified as endangered. Approximately 44 % of the vegetation type has been transformed by cultivation, mining, plantations, urbanisation or dam-building.

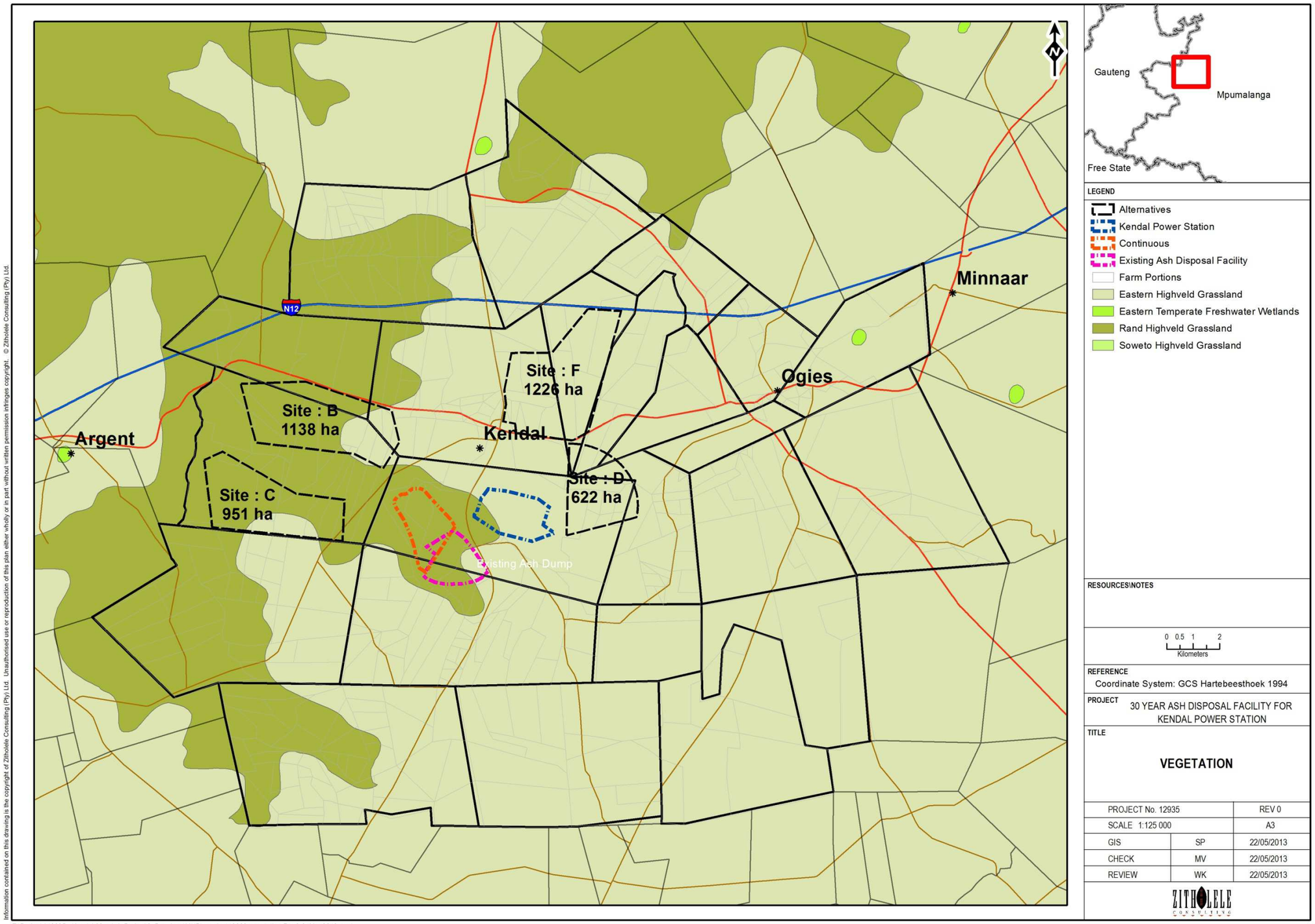


Figure 8-10: Vegetation of the study site.

8.11 INFRASTRUCTURE

8.11.1 *Methodology and Data Sources*

Infrastructure was identified using the 1:50 000 topocadastral maps of the area, and information provided by Eskom regarding existing services.

8.11.2 *Regional Description*

The following infrastructure are found in the study area:

- Kendal Power Station;
- Agricultural centre pivot and electrical cabling;
- Power lines and associated infrastructure;
- The Kendal - Kusile pipeline and Transnet pipeline;
- National, Regional and Local Roads;
- Rails roads and associated infrastructure;
- Grain silos;
- Low, medium and high residential housing;
- Mining related infrastructure such as conveyor belts, and immovable plant.

8.11.3 *Sensitivities*

All identified infrastructure is considered sensitive and the feasibility of possible relocation thereof to be investigated should it be required.

8.12 CULTURAL AND HISTORICAL RESOURCES

The regional area has several small cultural sites including graveyards, old buildings and some old battlefields and will be further investigated as part of the EIA and specialist studies.

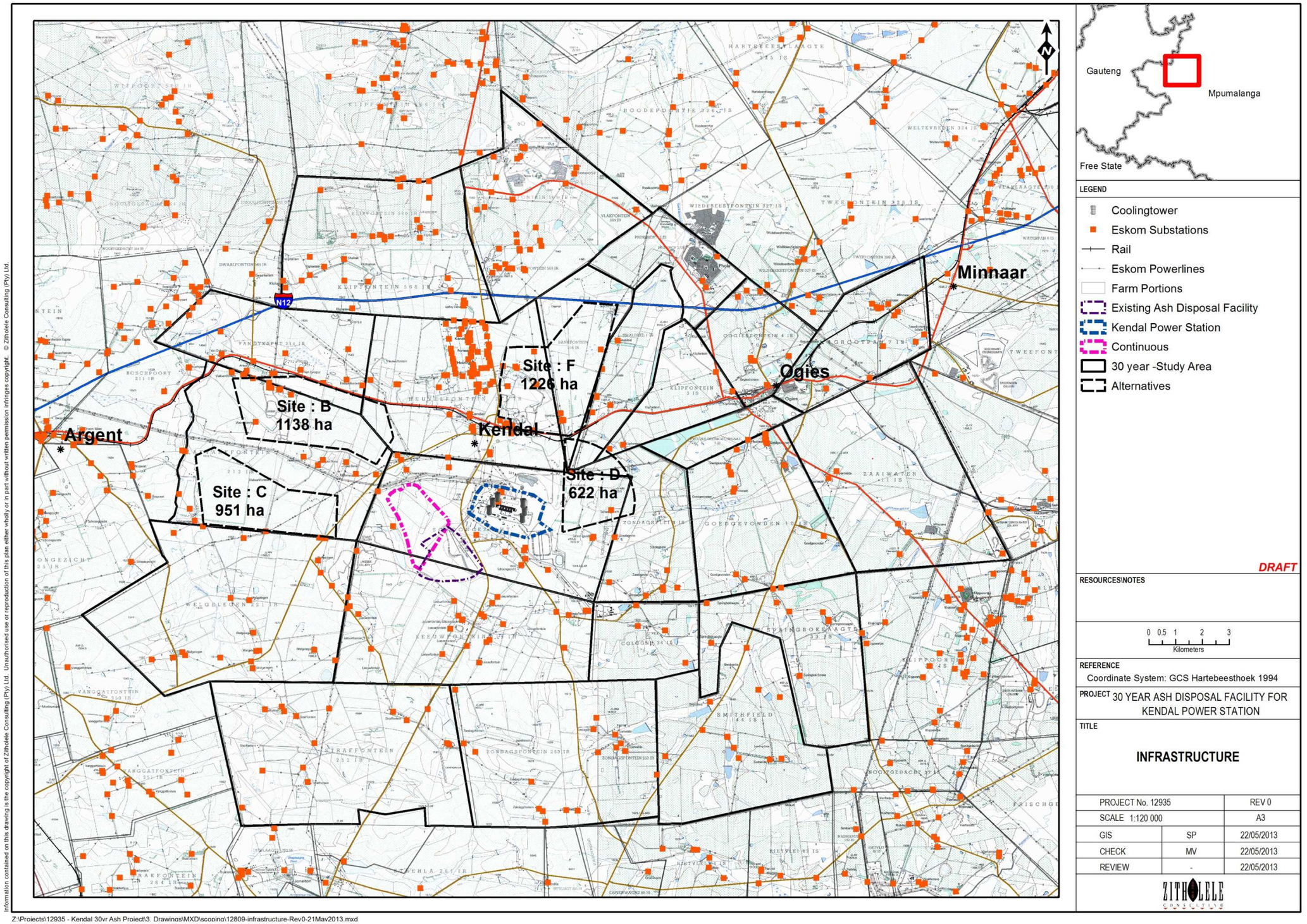


Figure 8-11: Infrastructure of the Study Site

9 POTENTIAL ENVIRONMENTAL AND SOCIAL IMPACTS

The proposed project is anticipated to have a range of impacts to the biophysical and socio-economic environment. The main purpose of the EIA process is to identify and evaluate potential impacts and to determine possible mitigation measures and management plans to address such impacts that may arise.

The potential environmental impacts identified during the Scoping Phase, which will be investigated further in the EIA phase of the project, are summarised in **Table 9-1** below.

Table 9-1: Potential Environmental Impacts to be investigated in the EIA Phase.

Environmental Element	Potential Impact
Geology	Permanent destruction of geological strata caused by: • Cut and fill operations;
Soils and Land Capability	Soil resources will be sterilised by: • The establishment of the ash disposal facility over a large area (~ 1000 ha); • The construction of roads that will be permanent for the construction and maintenance of the proposed project. Some soil may be lost through: • Erosion during the construction phase over exposed areas; • Pollution of soils (i.e. hydro-carbons from construction / maintenance vehicles); Some soils will only be temporarily impacted through compaction during the construction phase and will be rehabilitated.
Topography	Altered topography caused by: • Deposition of ash on surface over a large area; • The construction of cut off drains and berms; and • Profiling for the construction of surface infrastructure.
Surface and Ground Water	Reduction in surface water flow caused by: • Alteration of surface water drainage patterns causing run-off to be impeded or entrained. Pollution of surface / ground water resources caused by: • Deposition of fly ash on water resources. • Surface water runoff over exposed soils may result in the sedimentation or increased turbidity of surface water features. • Surface water features may become contaminated by hydro-carbons from construction / maintenance vehicles, dust, or fly ash. • Leachate from the facility may percolate into, and contaminate, ground / surface water features. • Pollutants could have a human / animal health impact if groundwater is contaminated, and is being used.

Environmental Element	Potential Impact
Terrestrial Ecology	Vegetation and habitat will be lost or the quality reduced because of the: • Establishment of the waste facility of approximately 1000 ha; • Establishment of associated infrastructure (i.e. roads, and dams); • Possible displacement of species; • Propagation of alien invasive species; • Health implications due to pollution/ash deposition; and • Impact on sensitive species / habitats.
Avifauna	Avifauna may be negatively impacted in the following way: • Disturbance of breeding birds, particularly the Red Listed species through the construction and operational activities. • Habitat destruction through the construction of associated infrastructure during the construction phase of the project e.g. roads and the clearing of footprint.
Air Quality	Decrease in air quality as a result of increased airborne dust particulates caused by: • Vehicles traversing dirt roads during construction and operation; • Dust from the exposed surfaces of the ash facility during operations; • Dust blown from the conveyor belt during operations. Potential cumulative impact to air quality in the region and concerns regarding the hazardous nature of the constituents of the ash to human, plant and animal life
Social	Impacts to human health may be caused by: • Increased airborne particulates. Individuals, families, or small communities, may need to be relocated because: • There is no area large enough to accommodate the facility that is unpopulated. • People may be located too close to the proposed boundary of the facility. Social perceptions may be altered because: • The sense of place may be altered; • They may have a positive / negative attitude to Eskom; • Safety and security perceptions are inclined to be dependent on the influx of people to and from an area.

Environmental Element	Potential Impact
Land Use	Property values may decrease as a result of: • The change in land use of land affected by the project; • The visual impact created by the project; and • Perceived security risks introduced by the proposed project. Spatial planning may be negatively affected because: • The proposed project may conflict with existing / future planned uses. • The land use of the site selected for the disposal facility will be altered, mostly agricultural uses at present (including grazing and crop farming is practiced).
Infrastructure	Infrastructure may need to be relocated including roads, power lines, pipelines and buildings, possibly causing the interruption of these services, because: • It is not possible to avoid the infrastructure due to the size of the project.
Heritage and Paleontological Resources	This is dependent upon the receiving environment and will be investigated further in greater detail in the EIR phase.

10 PLAN OF STUDY FOR EIA

10.1 INTRODUCTION

In terms of Chapter 5 of the NEMA EIA regulations, EIA refers to the process of collecting, organising, analysing, interpreting and communicating information that is relevant to the consideration of the application. This includes an assessment of the nature, extent, duration, probability and significance of the identified potential environmental, social and cultural impacts of the proposed development as well as the cumulative impacts thereof. Mitigatory measures for each significant impact are to be determined. Alternative land uses or developments, their impacts and their cumulative impacts will also be considered and compared with those of the proposed development. Details of the Public Participation Process (PPP) followed during the course of the assessment will be given and it will be indicated how issues raised by stakeholders have been addressed. Knowledge gaps will be identified and descriptions of the arrangements for monitoring and management of the environmental impacts will be given.

10.2 TERMS OF REFERENCE FOR SPECIALIST STUDIES

Based on the available data and the sensitivities identified the following specialist studies will be conducted in the EIA phase:

- Ecology (Terrestrial flora and fauna and Avifauna assessment);
- Heritage Impact Assessment;
- Social Impact Assessment;
- Surface water resources (hydrology and aquatic ecology) and wetlands (including wetlands delineation);
- Groundwater resources (Geohydrology);
- Geology and Geotechnical investigations (Phase 1 geotechnical investigations);
- Traffic impact studies;
- Air quality;
- Noise pollution;
- Soils, land capability and agricultural potential;
- Visual Impact Assessment;
- Resource economics and sustainability investigations;
- Ash classification
- Conceptual designs of the ash disposal facility; and

- Topographical Survey.

The findings of these studies will be reflected in the Environmental Impact Report (EIR). The proposed Terms of Reference (ToR) for each of these specialist investigations is indicated below.

10.2.1 *ToR: Terrestrial Ecology*

An ecological investigation will be conducted on the site and associated infrastructure. The objectives of these studies will be to:

- Review existing ecological information available;
- Identify and list all applicable Acts, regulations, policies, by-laws and other legislation;
- Conduct a site visit during the summer and winter seasons to determine the general ecological state of the proposed sites;
- Determine the occurrence of any red data and/or vulnerable species, or any sensitive species requiring special attention;
- Compile a detailed description of the baseline environment;
- Provide a ranking assessment of the suitability of the proposed site;
- Undertake a comparative assessment of the various alternatives;
- Provide mitigation measures to prevent and/or mitigate any environmental impacts that may occur due to the proposed project;
- Compile an ecological report, indicating findings, preferred site recommendations and maps indicating sensitive and/or no-go areas; and
- An indication of the confidence levels will be given.

10.2.2 *ToR: Avifauna*

The following methodology is proposed:

- Review existing ecological information available;
- Identify and list all applicable Acts, regulations, policies, by-laws and other legislation;
- Conduct a site visit during the summer seasons to determine the general ecological state of the proposed site;
- Determine the occurrence of any red data and/or vulnerable species, or any sensitive species requiring special attention;

- Describe the existing environment and the bird communities currently existing within the zone of influence of the proposed ash facility and associated infrastructure (including the roads) will be identified and described.
- Describe different bird micro-habitats as well as the species associated with those habitats.
- Gaps in baseline data will be highlighted and discussed and an indication of the confidence levels will be given. The best available data sources (both published and unpublished literature) will be used to establish the baseline conditions, and extensive use will be made of local knowledge if available (e.g. local bird clubs/amateur ornithologists/landowners) who are familiar with the study area.
- Map bird sensitive areas in a sensitivity map for easy reference, and particular emphasis will be placed on habitat for Red Data and endemic species.
- A full description of potential impacts (direct and indirect) will be provided, relative to these specific developments.
- Assess the potential impact on the birds and evaluated according to the criteria that are required by the EAP.
- Provide a ranking assessment of the suitability of the proposed sites;
- Undertake a comparative assessment of the various alternatives;
- Practical mitigation measures will be recommended and discussed.
- If a need for the implementation of a monitoring programme in the EMPr phase is evident, it will be highlighted and a programme proposed.

10.2.3 *ToR: Heritage (Archaeological and Palaeontological)*

A Heritage Impact Assessment will be conducted to comply with Section 38 of the National Heritage Resources Act (No 25 of 1999). Specific objectives of this study will be:

- Desktop study (consulting heritage data banks and appropriate literature);
- Identify and list all applicable Acts, regulations, policies, by-laws and other legislation;
- Site visit of the project area;
- Determine whether any of the types and ranges of heritage resources as outlined in Section 3 of the Act (No 25 of 1999) do occur in the project area;
- Determine what the nature, the extent and the significance of these remains are;
- Determine whether any heritage resources (including graves) will be affected by the development project;

- If any heritage resources are to be affected by the development project mitigation measures has to be undertaken and management proposals have to be set for heritage resources which may continue to exist unaffected in or near the project area.
- Compile a report which would:
  - Clearly identify possible archaeological, cultural and historical sites within the study site;
  - Identify the potential impacts of construction and operation of the proposed development on such resources, with and without mitigation;
  - Offer an opinion on a preferred site in terms of this specialist field;
  - Provide mitigation measures to ameliorate any negative impacts on areas of heritage significance; and
  - Include a map illustrating the salient aspects of the report.
- Provide a ranking assessment of the suitability of the proposed sites;
- Undertake a comparative assessment of the various alternatives; and
- Provide suitable mitigation measures and implementation actions.

10.2.4 *Social Impact Assessment*

The objective of the Social Impact Assessment is to assess possible positive and negative social impacts associated with the projects, to ensure social license to operate for Eskom and to incorporate the voice of the community in environmental processes which affects their lives on a day-to-day basis. The following are included in the Social Impact Assessment:

- Social Baseline study;
- Scoping report;
- Social Impact Assessment report identifying social impacts and suggesting mitigation measures.

It is proposed that the following methodologies are followed:

- The SIA will commence with a baseline study of the study area and site which will include an in-depth literature review of available literature. This will include relevant legislation and existing provincial and municipal documents and studies, as well as any additional literature that is deemed to be applicable to the study. This study will focus on the local and regional level.
- Necessary demographic data will be obtained from Statistics South Africa and Municipal Integrated Development Plans.
- A scoping exercise consisting of an initial site visit and information search will be conducted. Stakeholders will include town councils, tribal councils, land owners, the

relevant farmer's associations, community representatives and political leaders, amongst others.

- The initial site visit will be followed up with a longer period of field work to obtain additional information and communicate with key stakeholders. A preliminary report listing issues identified during this process will be submitted after the fieldwork is completed.
- All public meetings arranged by the stakeholder engagement team will be attended by the social scientists.
- Information will be obtained via focus groups, formal and informal interviews, participatory rural appraisal, observation, the internet and literature reviews. Minutes and notes will be kept of all interviews and focus groups. At this stage it is foreseen that four to five focus groups as well as a number of individual interviews will be conducted in each phase of the project, but more detailed planning regarding this can only be done once more detailed information is given, and key stakeholders have been identified.
- An interview schedule might be utilised instead of formal questionnaires. An interview schedule consists of a list of topics to be covered, but it is not as structured as an interview. It provides respondents with more freedom to elaborate on their views.
- The final SIA report will focus on current conditions, providing baseline data. Each category will discuss the current state of affairs, but also investigate the possible impacts that might occur in future. Recommendations for mitigation will be made at the end of the report.
- The SIA will have a participatory focus. This implies that the SIA will focus strongly on including the local community and key stakeholders.
- The public consultation process needs to feed into the SIA. Information obtained through the public processes will inform the writing of the SIA and associated documents.

10.2.5 *ToR: Surface Water and Hydrology*

The surface water data will be obtained from the WR90 database from the Water Research Commission. The data that will be used includes catchments, river alignments and river names. In addition water body data will be obtained from the CSIR land cover database (1990) to show water bodies and wetlands. This information will be ground-truthed during a site visit.

A surface hydrology assessment will be undertaken and will consist of the following:

- A desktop assessment;
- Identify and list all applicable Acts, regulations, policies, by-laws and other legislation;

- Site investigation;
- Water sampling and analysis of all constituents of fly ash, including hazardous constituents;
- Compilation of a baseline environmental description;
- Interaction with the design team during design interactions;
- Provide a ranking assessment of the suitability of the proposed sites;
- Undertake a comparative assessment of the various alternatives;
- Assess impacts and identify mitigation measures; and
- Compile a management and monitoring programme for the site.

The purpose of the surface hydrology study will be to address the following:

- Description of the surface hydrology:
  - Occurrence of drainage lines, springs, pans, dams, wetlands etc;
  - Characteristics of surface water features;
  - Precipitation patterns;
  - Determination of Floodlines for the 1:50 and 1:100 year flood events;
  - Surface water runoff patterns;
  - Water quality;
  - Sediment transport potential; and
  - Regional context of surface water resources.
- Description of impacts to surface water resources (quality and quantity):
  - Potential impacts in light of the vision for the area;
  - Potential impact on baseline conditions;
  - Possible use of surface water during construction and operation and the impacts thereof;
  - Trace the likely source path receptor pathways to determine all potentially significant, direct, indirect, and cumulative impacts;
  - Identify inter-connectedness of impacts to other environmental elements i.e. wetlands, groundwater, and aquatics; and
  - Assess pollution risk.
- Identify management measures to reduce negative impacts and exacerbate positive impacts. Compile a management plan appropriate to the requirements of the EIA process documenting such measures.

10.2.6 *ToR: Wetland Delineation*

The objectives of this study will be to:

- Review existing information available for the area;
- Identify and list all applicable Acts, regulations, policies, by-laws and other legislation;
- The riparian zone and wetlands will be delineated according to the guidelines and procedures developed by the Department of Water Affairs (DWA);
- During the site investigation the following indicators of potential wetlands will be identified:
  - Terrain unit indicator;
  - Soil form indicator;
  - Soil wetness indicator; and
  - Vegetation indicator.
- Assess the status of each of the wetlands identified and assess the potential impacts on the wetlands;
- Provide a ranking assessment of the suitability of the proposed sites;
- Undertake a comparative assessment of the various alternatives;
- Compilation of a wetland delineation report that is sufficient to address the requirements of a water and waste license applications, the EIR and management practices including mitigation measures; and
- Recommendations toward study site.

10.2.7 *ToR: Geohydrology*

The geohydrological assessment will consist of:

- A review of all existing groundwater information available from the power station and formulate a baseline status;
- Identify and list all applicable Acts, regulations, policies, by-laws and other legislation;
- A hydrocensus compiled by a specialist;
- A geophysical investigation (electromagnetic and magnetic);
- The drilling of monitoring boreholes;
- Infiltration tests;
- Aquifer tests;

- Hydrochemical sampling and analysis; of all constituents of fly ash, including hazardous constituents;
- The development of a flow and mass transport models;
- Provide a ranking assessment of the suitability of the proposed sites;
- Undertake a comparative assessment of the various alternatives; and
- Pollution plume simulation.

A report will be compiled that includes:

- A description of the groundwater flow regimes and the depth of the water table;
- A description of the aquifer parameters, classification and vulnerability;
- A description possible groundwater contamination or flooding;
- Assess possible pollution risks;
- A review of the current groundwater monitoring regime and make recommendations on any amendments required;
- Suggest mitigation measures to prevent any impacts to the groundwater;
- Highlight the current trends in the groundwater regime that could influence the design of the new ash disposal site; and
- Be of a sufficient standard to address the requirements of a water and waste license application, the EIR and management practices.

10.2.8 *ToR: Geotechnical assessment*

Geotechnical assessment undertaken on will consist of:

- Review of existing and available geological and geotechnical information;
- Identify and list all applicable Acts, regulations, policies, by-laws and other legislation;
- A site visit to verify available aerial photographs and to investigate the depth and properties of regolith by excavations and soil sampling;
- Test pits, if required, will be excavated on the site to characterise land forms or terrain units and anomalies identified during the API. Samples of representative soils will be collected for laboratory testing;
- Dynamic penetration tests (DCP) will be carried out at the site of each test pit to determine the variation in in-situ stiffness over the upper 1 m of the profile; and

- Soil samples from the test pits will be tested for classification, compaction characteristics and strength/stiffness properties. Problem soils, if presents, will be tested to quantify the degree of the problem condition (e.g. collapse potential).
- Compiling a map will be compiled indicating features observed;
- Identifying and assessing significance of potential geotechnical constraints to the proposed development;
- Provide a ranking assessment of the suitability of the proposed sites;
- Undertake a comparative assessment of the various alternatives;
- Proposing mitigation measures that could reduce or eliminate the identified constraints; and
- Compiling a report that will be compiled based on the findings of the study.

10.2.9 *ToR: Traffic*

The traffic study will include the following:

- Undertake a review of existing information and conceptual plans of the study area;
- Identify and list all applicable Acts, regulations, policies, by-laws and other legislation;
- Undertake a site visit, taking cognisance of the traffic in the area;
- Provide an opinion on the existing and predicted traffic impact during and after construction of the ash site and assess the general impact of the project on traffic.
- Provide a ranking assessment of the suitability of the proposed sites;
- Undertake a comparative assessment of the various alternatives;
- Provide mitigation measures to prevent and/or mitigate any environmental impacts that may occur due to the proposed project; and
- Compilation of a Traffic Impact Opinion Report.

10.2.10 *Air Quality Assessment*

The Air Quality Assessment will include a Baseline Characterisation and an Impact Assessment that will include the following:

The baseline assessment will include the following:

- The regional climate and site-specific atmospheric dispersion potential;
- Preparation of hourly average meteorological data;

- Identification of existing sources of emission and characterisation of ambient air quality within the region based on observational data recorded to date (if available).

The Air Quality Impact Assessment will include the following:

- Identification and quantification of all sources of atmospheric emissions associated with the new ash disposal facility.
- Use a 1st tier screening model to provide some guidance on the potential impacts from the proposed ash disposal facility.
- Provide a professional opinion on the proposed air quality impacts from the proposed ash facility and recommendations on air quality monitoring.

Other tasks will include:

- A desktop literature review and information gathering exercise will be conducted.
- Identify and list all applicable Acts, regulations, policies, by-laws and other legislation;
- Identification of expected air emissions sources and likely air quality parameters of potential concern on-site, based on potential health effects to identified sensitive receptors.
- Identification of applicable air quality standards, legislation and guidelines which would constitute project adherence / compliance requirements, including those specified by the World Bank.
- Provide a ranking assessment of the suitability of the proposed sites;
- Undertake a comparative assessment of the various alternatives;
- Incorporation of air quality criteria into the Environmental Impact Report (EIR) and Environmental Management Programme (EMPr) documents.
- Management interventions to control and/or mitigate the identified project air quality impacts.

10.2.11 *Noise Assessment*

Based on the terms of reference typically included in a noise assessment, the noise assessment will include the following tasks:

A baseline noise survey, including:

- A site visit which will be conducted in order to familiarise the consultant with the environment of the proposed development. Possible noise issues and the nearest noise sensitive receptors will be identified;
- Measurement and assessment of existing environmental noise levels at sensitive receptors in vicinity of the Kendal Power Station and surrounds;

- Measurement and calculation of existing noise emissions from the existing ash disposal;
- A survey of ground characteristics and other site specific features that may influence the propagation of noise; and
- The identification of existing sources of environmental noise in the area.

A noise impact assessment including:

- A review of local and international legislation and guidelines pertaining to environmental noise impacts;
- The identification and quantification of potential sources of environmental noise associated with the proposed project;
- The preparation of meteorological data and site specific acoustic parameters for use in the calculation of noise propagation;
- The calculation of noise propagation from through the application of a suitable noise propagation model to be compared with noise from existing air pollution control equipment;
- Provide a ranking assessment of the suitability of the proposed sites;
- Undertake a comparative assessment of the various alternatives;
- A qualitative discussion on the potential for cumulative noise impacts and the evaluation of estimated noise impacts based on legislation and guidelines; and
- A review of mitigation measures pertaining to environmental noise management.

10.2.12 *ToR: Aquatic Ecology*

A surface water aquatic ecological assessment in accordance with the River Health Programme (RHP) will focus primarily on the biological responses as an indicator of ecosystem health, with only a vague cause-and-effect relationship between the drivers and the biological responses. The minimum tools required for this assessment include:

- Drivers: Habitat and in situ Water Quality; and
- Responses: Fish, Aquatic Invertebrates and Riparian Vegetation.

The methodologies that will be adopted for the assessments are based on methodologies widely accepted by and utilized in the RHP of South Africa. The RHP is a national monitoring program used to monitor and assess South Africa's freshwater resources. An integrated ecological state assessment report will include:

- Habitat: Integrated Habitat Assessment System (IHAS) and the Index of Habitat Integrity (IHI);

- Water quality: pH, Dissolved oxygen concentration and saturation, temperature and conductivity (TDS);
- Fish: Fish Assessment Integrity Index (FAII);
- Aquatic invertebrates: South African Scoring System (SASS, version 5); and
- Riparian vegetation: Riparian Vegetation Index (RVI).

Other tasks will include:

- Identify and list all applicable Acts, regulations, policies, by-laws and other legislation;
- Providing a ranking assessment of the suitability of the proposed sites;
- Undertaking a comparative assessment of the various alternatives;
- Providing mitigation measures to prevent and/or mitigate any environmental impacts that may occur due to the proposed project; and
- Compilation of a draft report for Zitholele and client review and approval, before compiling the final assessment repoirt.

10.2.13 *ToR: Soils and Land Capability/Agricultural Potential*

The objectives of this study will be:

- Review existing information available from land type maps, previous reports and GIS information;
- Identify and list all applicable Acts, regulations, policies, by-laws and other legislation;
- A field visit to verify the aerial photographic study observations. Additionally, during the visit, the depth and properties of regolith will be judged from natural exposure (dongas) and hand augering where applicable. The following soil characteristics will be documented:
  - Soil horizons;
  - Soil colour;
  - Soil depth;
  - Soil texture (Field determination)
  - Wetness;
  - Occurrence of concretions or rocks; and
  - Underlying material (if possible).
- Assess the potential impacts and their significance on the agricultural potential of the site;

- Provide a ranking assessment of the suitability of the proposed sites;
- Undertake a comparative assessment of the various alternatives;
- Propose mitigation measures to reduce or mitigate potential impacts;
- Compile a report detailing the findings of the assessment; and
- Recommendation pertaining to proposed site.

10.2.14 *ToR: Visual Assessment*

The proposed methodology to be adopted for the visual assessment includes the following tasks:

- Examine the baseline information (contours, facility, dimensions, vegetation, inter alia);
- Identify and list all applicable Acts, regulations, policies, by-laws and other legislation;
- Determine the area from which any part of the facility may be visible (viewshed);
- Identify the locations from which views of the facility may be visible (observation sites), which include buildings and roads;
- Determine the visual landscape quality and character;
- Analyse the observation sites to determine the potential level of visual impact that may result from the facility;
- Provide a ranking assessment of the suitability of the proposed sites;
- Undertake a comparative assessment of the various alternatives;
- Identify measures available to mitigate the potential impacts; and
- Compile a draft report for Zitholele and client review and approval, before compiling the final assessment report.

10.2.15 *Resource economics and sustainability investigations;*

The proposed methodology to be adopted for the sustainability assessment includes the following tasks:

- Conduct a resource economics-based trade-off study on the socio-economic and the natural environment;
- Identify and list all applicable Acts, regulations, policies, by-laws and other legislation;
- Undertake a social-economic cost benefit analysis in compliance with the requirements of the Department of Environmental Affairs;

- Prioritise sites based on inputs received from the other specialist studies;
- Practical mitigation measures will be recommended and discussed;
- Sustainability assessment for each alternative;
- Impact statement on the preferred alternative;
- Opinion of the specialist on the preferred alternative;
- The no-go alternative will be assessed in terms of the NEMA Regulations.
- Facilitation / streamlining of trade-off assessment processes with relevant authorities, the proponent, and consulting team;
- Provide a ranking assessment of the suitability of the proposed sites;
- Undertake a comparative assessment of the various alternatives;
- Identify measures available to mitigate the potential impacts; and
- Compile a draft report for Zitholele and client review and approval, before compiling the final assessment report.

10.2.16 *ToR: Ash Classification*

The objectives of this study will be:

- Collect ash samples;
- Classify the ash according to the authorised and correct waste regulations (Minimum requirements);
- Determine if the ash from the site is classified as Hazardous or General Waste; and
- Based on classification, recommend appropriate mitigation measures

10.2.17 *ToR: Ash Disposal Facility Site Design and Operating Manual*

A specialist disposal facilities design engineer must complete the conceptual design of the ash disposal site. Included in this scope is:

- Identify and list all applicable Acts, regulations, policies, by-laws and other legislation;
- Site visit of the project area;
- Oversee the Topographical Survey of the site;
- Generate conceptual layout drawings for each of the four identified sites (C, F, D, and B);
- Compile design drawings for the preferred Kendal 30 year ash disposal facility;

- Submit drawings to DEA and DWA for review and make any alternations required;
- Include any mitigation measures prescribed by specialist into the design for example storm water drainage; and
- Review and amend current site operating manual to be relevant for the new site.

10.2.18 *ToR: Topographic Survey*

A specialist surveyor will be required to undertake a topographic survey, included in this scope is:

- Survey of the site at 0.5 m contours;
- Produce a digital elevation model (DTM) to inform engineering designs;
- Identify all features and structures on site; and
- Submit surveyed information in an electronic CAD and ECW format.

10.3 IMPACT ASSESSMENT METHODOLOGY

The impacts will be ranked according to the methodology described below. Where possible, mitigation measures will be provided to manage impacts. In order to ensure uniformity, a standard impact assessment methodology will be utilised so that a wide range of impacts can be compared with each other. The impact assessment methodology makes provision for the assessment of impacts against the following criteria:

- Significance;
- Spatial scale;
- Temporal scale;
- Probability; and
- Degree of certainty.

A combined quantitative and qualitative methodology was used to describe impacts for each of the aforementioned assessment criteria. A summary of each of the qualitative descriptors along with the equivalent quantitative rating scale for each of the aforementioned criteria is given in **Table 10-1**.

Table 10-1: Quantitative rating and equivalent descriptors for the impact assessment criteria

Rating	Significance	Extent Scale	Temporal Scale
1	VERY LOW	*Proposed site*	Incidental
2	LOW	*Study area*	Short-term
3	MODERATE	*Local*	Medium-term
4	HIGH	*Regional / Provincial*	Long-term

5	VERY HIGH	*Global / National*	Permanent

A more detailed description of each of the assessment criteria is given in the following sections.

10.3.1 *Significance Assessment*

Significance rating (importance) of the associated impacts embraces the notion of extent and magnitude, but does not always clearly define these since their importance in the rating scale is very relative. For example, the magnitude (i.e. the size) of area affected by atmospheric pollution may be extremely large (1 000 km^2) but the significance of this effect is dependent on the concentration or level of pollution. If the concentration is great, the significance of the impact would be HIGH or VERY HIGH, but if it is diluted it would be VERY LOW or LOW. Similarly, if 60 ha of a grassland type are destroyed the impact would be VERY HIGH if only 100 ha of that grassland type were known. The impact would be VERY LOW if the grassland type was common. A more detailed description of the impact significance rating scale is given in **Table 10-2** below.

Table 10-2: Description of the significance rating scale

Rating		Description
5	Very high	Of the highest order possible within the bounds of impacts which could occur. In the case of adverse impacts: there is no possible mitigation and/or remedial activity which could offset the impact. In the case of beneficial impacts, there is no real alternative to achieving this benefit.
4	High	Impact is of substantial order within the bounds of impacts, which could occur. In the case of adverse impacts: mitigation and/or remedial activity is feasible but difficult, expensive, time-consuming or some combination of these. In the case of beneficial impacts, other means of achieving this benefit are feasible but they are more difficult, expensive, time-consuming or some combination of these.
3	Moderate	Impact is real but not substantial in relation to other impacts, which might take effect within the bounds of those which could occur. In the case of adverse impacts: mitigation and/or remedial activity are both feasible and fairly easily possible. In the case of beneficial impacts: other means of achieving this benefit are about equal in time, cost, effort, etc.
2	Low	Impact is of a low order and therefore likely to have little real effect. In the case of adverse impacts: mitigation and/or remedial activity is either easily achieved or little will be required, or both. In the case of beneficial impacts, alternative means for achieving this benefit are likely to be easier, cheaper, more effective, less time consuming, or some combination of these.
1	Very low	Impact is negligible within the bounds of impacts which could occur. In the case of adverse impacts, almost no mitigation and/or remedial activity are needed, and any minor steps which might be needed are easy, cheap, and simple. In the case of beneficial impacts, alternative means are almost all likely to be better, in one or a number of ways, than this means of achieving the benefit. Three additional categories must also be used where relevant. They are in addition to the category

Rating		Description
		represented on the scale, and if used, will replace the scale.
0	No impact	There is no impact at all - not even a very low impact on a party or system.

10.3.2 *Spatial Scale*

The spatial scale refers to the extent of the impact i.e. will the impact be felt at the local, regional, or global scale. The spatial assessment scale is described in more detail in **Table 10-3.**

Table 10-3: Description of the significance rating scale

Rating		Description
5	Global/National	The maximum extent of any impact.
4	Regional/Provincial	The spatial scale is moderate within the bounds of impacts possible, and will be felt at a regional scale (District Municipality to Provincial Level).
3	Local	The impact will affect an area up to 10 km from the proposed site.
2	Study Site	The impact will affect an area not exceeding the Eskom property.
1	Proposed site	The impact will affect an area no bigger than the ash disposal site.

10.3.3 *Duration Scale*

In order to accurately describe the impact it is necessary to understand the duration and persistence of an impact in the environment. The temporal scale is rated according to criteria set out in **Table 10-4**.

Table 10-4: Description of the temporal rating scale

Rating		Description
1	Incidental	The impact will be limited to isolated incidences that are expected to occur very sporadically.
2	Short-term	The environmental impact identified will operate for the duration of the construction phase or a period of less than 5 years, whichever is the greater.
3	Medium term	The environmental impact identified will operate for the duration of life of facility.
4	Long term	The environmental impact identified will operate beyond the life of operation.
5	Permanent	The environmental impact will be permanent.

10.3.4 *Degree of Probability*

Probability or likelihood of an impact occurring will be described as shown in **Table 10-5** below.

Table 10-5: Description of the degree of probability of an impact occurring

Rating	Description
1	Practically impossible
2	Unlikely
3	Could happen
4	Very Likely
5	It's going to happen / has occurred

10.3.5 *Degree of Certainty*

As with all studies it is not possible to be 100% certain of all facts, and for this reason a standard "degree of certainty" scale is used as discussed in **Table 10-6**. The level of detail for specialist studies is determined according to the degree of certainty required for decision-making. The impacts are discussed in terms of affected parties or environmental components.

Table 10-6: Description of the degree of certainty rating scale

Rating	Description
Definite	More than 90% sure of a particular fact.
Probable	Between 70 and 90% sure of a particular fact, or of the likelihood of that impact occurring.
Possible	Between 40 and 70% sure of a particular fact or of the likelihood of an impact occurring.
Unsure	Less than 40% sure of a particular fact or the likelihood of an impact occurring.
Can't know	The consultant believes an assessment is not possible even with additional research.
Don't know	The consultant cannot, or is unwilling, to make an assessment given available information.

10.3.6 *Quantitative Description of Impacts*

To allow for impacts to be described in a quantitative manner in addition to the qualitative description given above, a rating scale of between 1 and 5 was used for each of the assessment criteria. Thus the total value of the impact is described as the function of significance, spatial and temporal scale as described below:

$$\textbf{\textit{Impact Risk}} = \frac{(\text{SIGNIFICANCE} + \textit{Spatial} + \text{Temporal})}{3} \times \frac{\text{Probability}}{5}$$

An example of how this rating scale is applied is shown below:

Table 10-7: Example of Rating Scale

Impact	Significance	Spatial Scale	Temporal Scale	Probability	Rating
	LOW	*Local*	Medium-term	*Could Happen*	
Impact to air	**2**	***3***	**3**	**3**	**1.6**

Note: The significance, spatial and temporal scales are added to give a total of 8, that is divided by 3 to give a criteria rating of 2,67. The probability (3) is divided by 5 to give a probability rating of 0,6. The criteria rating of 2,67 is then multiplied by the probability rating (0,6) to give the final rating of 1,6.

The impact risk is classified according to five classes as described in the **Table 10-8** below.

Table 10-8: Impact Risk Classes

Rating	Impact Class	Description
0.1 – 1.0	**1**	**Very Low**
1.1 – 2.0	**2**	**Low**
2.1 – 3.0	**3**	**Moderate**
3.1 – 4.0	**4**	**High**
4.1 – 5.0	**5**	**Very High**

Therefore with reference to the example used for air quality above, an impact rating of 1.6 will fall in the Impact Class 2, which will be considered to be a low impact.

10.3.7 *Cumulative Impacts*

It is a requirement that the impact assessments take cognisance of cumulative impacts. In fulfilment of this requirement the impact assessment will take cognisance of any existing impact sustained by the operations, any mitigation measures already in place, any additional impact to environment through continued and proposed future activities, and the residual impact after mitigation measures.

It is important to note that cumulative impacts at the national or provincial level will not be considered in this assessment, as the total quantification of external companies on resources is not possible at the project level due to the lack of information and research documenting the effects of existing activities. Such cumulative impacts that may occur across industry boundaries can also only be effectively addressed at Provincial and National Government levels.

Using the criteria as described above an example of how the cumulative impact assessment will be done is shown below:

Table 10-9 - Example of cumulative impact assessment

Impact	Significance	Spatial Scale	Temporal Scale	Probability	Rating
Initial / Existing Impact (I-IA)	**2**	**2**	**2**	*1*	0.4
Additional Impact (A-IA)	**1**	***2***	**1**	*1*	0.3
Cumulative Impact (C-IA)	**3**	***4***	**2**	*1*	0.6
Residual Impact after mitigation (R-IA)	**2**	***1***	**2**	*1*	0.3

As indicated in the example above the Additional Impact Assessment (A-IA) is the amount that the impact assessment for each criterion will increase. Thus if the initial impact will not increase, as shown for temporal scale in the example above the A-IA will be 0, however, where the impact will increase by two orders of magnitude from 2 to 4 as in the spatial scale the A-IA is 2. The Cumulative Impact Assessment (C-IA) is thus the sum of the Initial Impact Assessment (I-IA) and the A-IA for each of the assessment criteria.

In both cases the I-IA and A-IA are assessed without taking into account any form of mitigation measures. As such the C-IA is also a worst case scenario assessment where no mitigation measures have been implemented. Thus a Residual Impact Assessment (R-IA) is also made which takes into account the C-IA with mitigation measures. The latter is the most probable case scenario, and for the purpose of this report is considered to be the final state Impact Assessment.

10.3.8 *Notation of Impacts*

In order to make the report easier to read the following notation format is used to highlight the various components of the assessment:

- Significance or magnitude- IN CAPITALS
- Temporal Scale – in underline
- Probability – in *italics and underlined*
- Degree of certainty - in **bold**
- Spatial Extent Scale – in *italics*

10.4 ENVIRONMENTAL IMPACT REPORT

Once the Scoping Report and the Plan of Study for the EIA is accepted by the DEA, Zitholele will begin the Environmental Impact Report.

The Environmental Impact Report will include the activity description; site / area and corridor assessments; public participation; a description of the issues and assessment of the site.

The specialist studies results will be summarised and integrated into the Environmental Impact Report.

The WMLA Report will include all the technical information generated by the Design of the Facility, the Site Survey and the Operating Plan. In addition all the documents required by DEA for the waste license will also be included. These include the emergency and response plan, the closure and rehabilitation plan and the waste hierarchy implementation plan.

10.5 ENVIRONMENTAL MANAGEMENT PROGRAMME

An Environmental Management Programme (EMPr), in the context of the Regulations, is a tool that takes a project from a high level consideration of issues down to detailed workable mitigation measures that can be implemented in a cohesive and controlled manner. The objectives of an EMPr are to minimise disturbance to the environment, present mitigation measures for identified impacts, maximise potential environmental benefits, assign responsibility for actions to ensure that the pre-determined aims are met, and to act as a "cradle to grave" document. The EMPr will be drafted according to the findings in the Scoping Report and EIR.

10.6 PUBLIC PARTICIPATION DURING THE EIA PHASE

The purpose of public participation during the Impact Assessment Phase is to present the findings of the EIA phase and to avail the Draft EIR to the public for comments. I&APs will be afforded an opportunity to verify that their issues have been considered either by the EIA specialist studies, or elsewhere. Also, I&APs will comment on the findings of the Draft EIR, including the measures that have been proposed to enhance positive impacts and reduce or avoid negative ones. Once the review is completed, the authority may decide to request additional information on matters that may not be clear from the report, authorise the application with certain conditions to be complied with by the applicant or reject the application. An EA reflecting the decision of the authority as well as any conditions that may apply will be issued to the applicant.

I&APs will be advised in good time of the availability of these reports, how to obtain them, and the dates and venues of public and other meetings where the contents of the reports will be presented for comment.

The public participation process for the EIAs will involve the following proposed steps:

- Announcement of the availability and public review of the Draft EIR;
- Host a public meeting for the stakeholders to review the Draft EIR;
- Announcement of the availability of the Final EIR; and
- Notification of the authorities' decision with regard to EAs.

Below information is provided about each step.

10.6.1 *Announcing the availability of the Draft EIR and the EMPr*

A letter will be circulated to all I&APs, informing them in terms of progress made with the study and that the Draft EIR and EMPr are available for comment. The report will be distributed to public places and also presented at a stakeholder meeting. Advertisements will be placed in the same newspapers used in the scoping phase to announce the public review period of the Draft EIR.

10.6.2 *Public review of Draft EIR and EMPr*

The EIA Guidelines specify that stakeholders must have the opportunity to verify that their issues have been captured and assessed before the EIA Report will be approved. The findings of the specialist assessment will be integrated into the Draft EIR. The report will be written in a way accessible to stakeholders in terms of language level and general coherence. The Draft EIR will have a comprehensive project description, motivation and also the findings of the assessment and recommended mitigation measures. It will further include the Issues and Responses Report, which will list every issue raised with an indication of where the issue was dealt with in the EIR. The findings of the assessment and recommended mitigation measures will also be incorporated into the EIR.

As part of the process to review the Draft EIR and EMPr, one stakeholder workshop with an open house component will be arranged to afford stakeholders the opportunity to obtain first-hand information from the project team members and also to discuss their issues and concerns. Contributions at this meeting will be considered in the Final EIR.

10.6.3 *Announcing the availability of the Final EIR and EMPr*

A letter will be circulated to all I&APs, informing them in terms of progress made with the study and that the Final EIR and EMPr are available for comment. The reports will be distributed to the same public places (See Chapter 5 with the venues) as the previous reports for I&APs to review.

10.6.4 *Progress feedback*

After comments from I&APs have been incorporated, all stakeholders on the database will receive a personalised letter to report on the status of the process, to thank those who commented to date and to inform them that the Final EIR and EMPr have been submitted to the lead authority for consideration. I&APs will be advised on the next steps in the process.

10.6.5 *Announce authorities decision*

Registered I&APs will be notified by individual letters of the decision made by the authorities. Should it be a requirement from the authorities an advertisement will be placed in the same newspapers which were used during the scoping and impact assessment phases.

10.7 SUBMISSION OF FINAL EIR AND DECISION MAKING

Using the comments generated during the PPP the Draft EIR will be updated and finalised. All comments received will be added to the CRR and attached to the Final EIR as an appendix.

The Final EIR once updated with additional issues raised by I&APs may contain new information. The Final EIR will be submitted to the DEA for decision making, and will be distributed to those I&APs who specifically request a copy. I&APs will be notified of the availability of the report by letters, advertisements and emails. Copies of the Final EIR will also be made available in the same public places as was used during the Scoping Phase.

10.8 OVERALL EIA PROJECT SCHEDULE

Table 10-10: Primary milestones of the Project

Milestones	Date
Final Scoping Report	July 2013
Undertake Specialist Studies	August to October 2013
Draft EIR and EMP	October 2013
Stakeholder Engagement on EIR / EMP	November 2013 to January 2014
Finalise EIR and Draft EMP	January 2014
Submission to Relevant Authorities	January 2014
Environmental Authorisation	January to April 2014
Appeal Period	To be confirmed in the Impact Assessment Phase
Negotiations with landowners and Site specific EMP	To be confirmed in the Impact Assessment Phase
Construction (including EMP Auditing)	To be confirmed in the Impact Assessment Phase

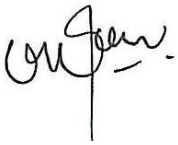
11 CONCLUSION AND WAY FORWARD

Eskom appointed Zitholele Consulting to undertake the EIA, WML and WUL application for the proposed 30 year ash disposal facility at Kendal Power Station, which also includes associated infrastructure such as road infrastructure, return water dams, etc. This Scoping study is being undertaken with the aim of identifying potential aspects of concern (both positive and negative) on the biophysical environment and identifying issues, concerns and queries from I&APs. This FSR documents the process followed, the findings and recommendations of the Scoping study, and the proposed Plan of Study for the EIA Phase to follow.

The way forward recommended by this study is as follows:

- The FSR is submitted to authorities for review and approval of the Plan of Study;
- Upon approval of the Plan of Study of the FSR, execute the Plan of Study for the EIA phase of the project, including amendment required by conditions recommended by the competent authority;
- Commence with identified specialist studies; and
- Commence with engineering design and WML application.

ZITHOLELE CONSULTING (PTY) LTD



Dr. Mathys Vosloo Warren Kok

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Appendix A: EAP CV

Appendix B: Integrated EIA Application Form, EAP Declaration and DEA acceptance letter

Appendix C: Newspaper Advertisements and Site Notices

Appendix D: I&AP Database and Proof of Notification

Appendix E: Background Information Document

Appendix F: Comment and Responses Report

Appendix G: Kendal 30 Year Site Identification Report