ENVIRONMENTAL IMPACT ASSESSMENT PROCESS
DRAFT SCOPING REPORT

PROPOSED TSHIVHASO COAL-FIRED POWER PLANT, NEAR LEPHALALE, LIMPOPO PROVINCE

DRAFT REPORT

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PROJECT DETAILS

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Project Developer	**:**	Cennergi
Report Status	**:**	Draft Scoping Report for public review 20 January 2016 – 19 February 2016

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PUBLIC REVIEW PERIOD FOR THE DRAFT SCOPING REPORT

This draft EIA Report for Tshivhaso Power Plant has been made available for a 30-day public review period. The 30 day public review period is from 20 January 2016 – 19 February 2016. The draft report which has been submitted to DEA is also available for download on www.savannahsa.com or on request from Savannah Environmental. The report will be distributed to relevant Organs of State and will also be made available at the following locations:

- Lephalale Local Municipality Public Library (Address: Cnr Joe Slovo Street and Douwater Avenue, Lephalale)
- Marapong Community Library (Address: 1456 Setlhora Street, Marapong)
- www.savannahSA.com

SUMMARY: SCOPING REPORT

Cennergi is proposing the construction of a coal-fired power station on a site near Lephalale in the Limpopo Province. The power station would have a capacity of up to 1200MW (to be developed in 2 phases of 600MW each). The project is to be known as the Tshivhaso Coal-fired Power Plant. Various options regarding siting of the power station and associated infrastructure are being investigated (refer to Figure 1.1). Coal is proposed to be sourced from Exxaro Coal's Thabametsi Coal-Mine development which is to be located in the vicinity of the sites under investigation. The electricity generated from the power station will be fed into the Eskom electricity grid. Two options in this regard are being considered.

South Africa's energy-resource base is dominated by coal. Coal provides for about 80% of South Africa's primary energy needs and according to the South Africa Yearbook 2013/14, this is unlikely to change significantly in the next 20 years due to the relative lack of suitable affordable alternatives to coal as an energy source. Owing to the relatively favourable cost at which most of the deposits can be exploited, a large coal mining industry has developed in the country. About two thirds of South Africa's coal reserves and resources are in the Waterberg area, which is the driving force behind the development of Lephalale.

The Integrated Resource Plan Update report of 2013 assumes that South Africa has a total installed capacity of 48 220 MW, of which approximately 88% is generated by Eskom and specifically about three quarters is generated from Eskom owned coal-fired power stations. The IRP also recognises that electricity generation needs to increase to 80 000 MW capacity by 2030. In order to meet this required generation capacity, the IRP includes a mix of generation technologies, including a nuclear fleet of 9.6 GW; 6.3 GW of coal; 17.8 GW of renewables; and 8.9 GW of other generation sources.

The main infrastructure proposed power station includes (specifications will be decided based on the technology selected):

- Access roads.
- Coal storage areas and bunkers.
- Coal mill (for grinding the coal into fine material).
- Pipeline for water supply. Water is expected to be available from the allocation to Exxaro Coal from the Mokolo-

Crocodile Water Augmentation Project (MCWAP) Phase 2.
» Coal loading and offloading areas, as well as conveyor belts.
» Power plant production unit/s (boilers / furnaces, turbines, generator and associated equipment, control room).
» Ash dump.
» Water infrastructure such as Raw-Water Storage Dam, purification works and reservoirs
» A substation.
» An overhead power line to connect into the Eskom grid.
» Office and maintenance area/s.

The nature and extent of project, as well as potential environmental impacts associated with the construction, operation and decommissioning of a facility of this nature are assessed in this Draft Scoping Report.

Overall Conclusion

A brief appraisal of existing data revealed that none of the sites represent a 'Fatal Flaw' or 'Red Flag' for the proposed development and that the 'No-Go' Options would not apply in any of the site alternatives. Some sites do exhibit limitations as suitable alternatives, and should preferably not be considered as viable alternatives, especially in terms of impacts on biodiversity.

From the recommendations made within this desk-top scoping study, the following recommendations are made:

The power station site alternative Option 1 is currently regarded the preferred option, mainly as a result of lower (preliminary) habitat sensitivities of these farms as well as the proximity to existing areas of anthropogenic transformation.

Overall the Goedehoop Option 1 was recommended as the most suitable option for the ashing facility, with option 2 a close second. However during scoping Exxaro responded that it is not desirable for them to have the ashing facility located on Farm Goedehoop from a land-use perspective. Option 2 (Appelvlakte Option) is therefore recommended as the preferred alternative at this stage.

During scoping it was also recommended that the possibility of locating the ashing facility on Graaffwater 456 (the same farm as the power station site option 1) also be investigated option will be assessed in the EIA phase.

The possibility of 'in-pit ashing' should be explored exhaustively. This is recommended in spite of

the known legal ramifications and implications of shared responsibilities, etc. The benefit to the environment is expected to be enormous should 'in-pit ashing' be achieved.

» Power line Alternative 2, although slightly longer than alterntiave 1, makes use of existing corridors of transformation, limiting the potential direct impacts to some extent. This alternative is therefore considered the preferred option and localised areas of sensitivity can be avoided through local realignment options.

The findings of the Draft Scoping Report indicate that there are no environmental fatal flaws identified at this stage associated with any of the alternative proposed for the proposed power station and associated infrastructure. In addition, it is expected that the main potential risks to the proposed project, as outlined within this report, can be addressed. It is recommended that the proposed site should be further considered in an EIA phase assessment according to the Plan of Study contained in this report.

The following Appendices are present in this report:

Appendix A: CVs of EIA team

Appendix B: Public Participation Information

Appendix C: Ecology Report

Appendix D: Agriculture & Soils

Appendix E: Heritage

Appendix F: Paleontology

Appendix G: Surface Water

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INTRODUCTION *CHAPTER 1*

Cennergi is proposing the construction of a coal-fired power station on a site near Lephalale in the Limpopo Province. The power station would have a capacity of up to 1200MW (to be developed in 2 phases of 600MW each). The project is to be known as the **Tshivhaso Coal-fired Power Plant**. Various options regarding siting of the power station and associated infrastructure are being investigated (refer to Figure 1.1 and Chapter 3). Coal is proposed to be sourced from Exxaro Coal's Thabametsi Coal-Mine development which is to be located in the vicinity of the sites under investigation. The electricity generated from the power station will be fed into the Eskom electricity grid. Two options in this regard are being considered (refer to Chapter 3).

The main infrastructure associated with the proposed power station includes (specifications will be decided based on the technology selected):

» Access roads.
» Coal storage areas and bunkers.
» Coal mill (for grinding the coal into fine material).
» Pipeline for water supply. Water is expected to be available from the Mokolo-Crocodile Water Augmentation Project (MCWAP) Phase 2. (A water availability report has been prepared and is included as Appendix B).
» Coal loading and offloading areas, as well as conveyor belts.
» Power plant production unit/s (boilers / furnaces, turbines, generator and associated equipment, control room).
» Ash dump.
» Water infrastructure such as Raw-Water Storage Dam, purification works and reservoirs
» A substation.
» An overhead power line to connect into the Eskom grid.
» Office and maintenance area/s.

The power station will utilise Circulating Fluidised Bed (CFB) combustors (boilers) which have the advantage that sulphur trapping can take place with the sorbent bed (limestone) in these boilers. This ensures a plant with relatively low emissions. In addition, the power station will utilise dry cooling technology and dry ashing due to water availability constraints.

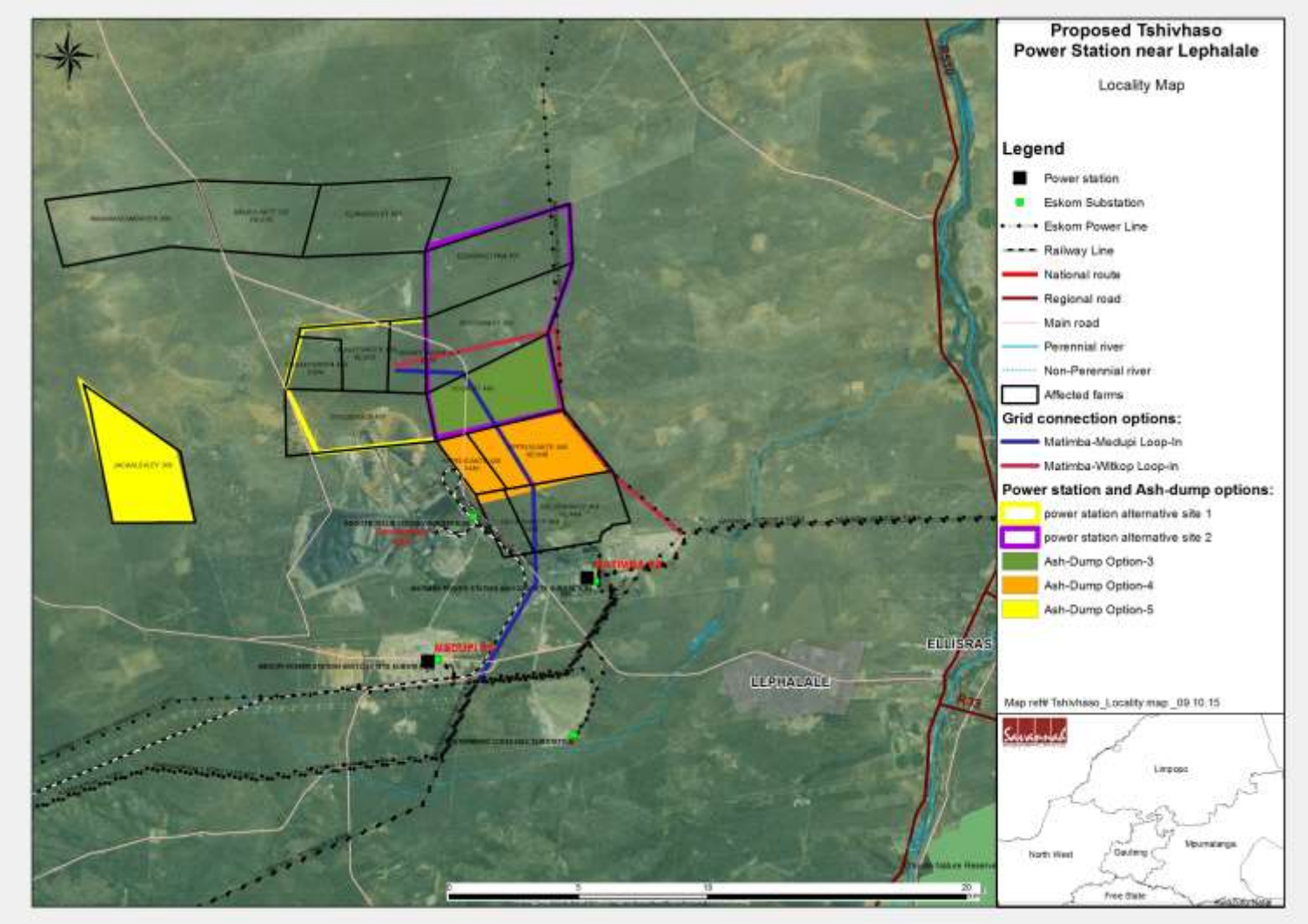


Figure 1.1: Potential sites for the power station and power line route alternatives.

The nature and extent of project, as well as potential environmental impacts associated with the construction, operation and decommissioning of a facility of this nature are assessed in this Draft Scoping Report. This Report consists of the following chapters:

» **Chapter 1** provides background and a brief description of the receiving environment for the proposed coal-fired power station near Lephalale.
» **Chapter 2** provides the regulatory and planning context for energy projects within South Africa.
» **Chapter 3** describes the activities associated with the project (project scope) and project alternatives.
» **Chapter 4** outlines the process which was followed during the Scoping Phase of the EIA process, including the consultation programme that was undertaken and input received from interested and affected parties.
» **Chapter 5** provides the description of the potential environmental issues and potential impacts identified to be associated with the project, including potential cumulative impacts.
» **Chapter 6** presents the conclusions of the scoping evaluation.
» **Chapter 7** describes the Plan of Study for EIA.
» **Chapter 8** provides references for this report.

1.1. Need for the Project

The studies included within this report have been undertaken at a desk-top level based on existing information and previous experience in the study area. The purpose of this report is to provide Cennergi with an indication of any potential environmental fatal flaws associated with the proposed project.

South Africa's energy-resource base is dominated by coal. Coal provides for about 80% of South Africa's primary energy needs and according to the South Africa Yearbook 2013/14, this is unlikely to change significantly in the next 20 years due to the relative lack of suitable affordable alternatives to coal as a baseload energy source. Owing to the relatively favourable cost at which most of the deposits can be exploited, a large coal mining industry has developed in the country. About two thirds of South Africa's remaining coal reserves and resources are in the Waterberg area, which is the driving force behind the development of Lephalale.

The Integrated Resource Plan Update report of 2013 assumes that South Africa has a total installed capacity of 48 220 MW, of which approximately 88% is generated by Eskom and specifically about three quarters is generated from Eskom owned coal-fired power stations. The IRP recognises that electricity generation needs to increase to 80 000 MW capacity by

2030. In order to meet this required generation capacity, the IRP includes a mix of generation technologies, including a nuclear fleet of 9.6 GW; 6.3 GW of coal; 17.8 GW of renewables; and 8.9 GW of other generation sources.

1.2. Study area

The closest town to the project site is Lephalale which is situated about 25km from the project site within the Lephalale Local Municipality (LM). Also in close proximity is the Marapong township, which is located about 12km south-east of the project site. The Lephalale LM is one of six local municipalities (the other being Blouberg, Modimolle, Mogalakwena, Bela-Bela and Thabazimbi) comprising the Waterberg District Municipality (DM). Geographically, the Lephalale LM is the largest in the Limpopo Province, covering 14 000 km². The municipality borders with four local municipalities, namely Blouberg, Modimolle, Mogalakwena and Thabazimbi with the north-western border forming part of the international border between South Africa and Botswana.

The immediate region is characterised by mostly untransformed savanna woodland, but recently (past 10 years) has seen significant development in terms of road networks, mining related land transformation and power stations with the appurtenant infrastructure, such as power line servitudes, ashing facilities, water treatment plants, etc. Significant increases in habitat transformation, fragmentation and isolation have been noted in recent time. Of the approximately 1 960 140 ha of the Lephalale Municipal area, ~ 94.4 % is currently regarded untransformed (BGIS, 2009).

Lephalale Municipal area's contribution of mining to GDP is significant at 59.21 %. Electricity contributes 11.33 % to the GDP and its contribution to the Waterberg electricity sector is at 69.65 %. Other sectors that have a significant contribution to the Waterberg GDP per sector include agriculture, mining, and manufacturing. Agriculture (38.85 %) is the sector that employs the largest part of the workforce and is followed by community services (15.71 %) (Lephalale Municipality IDP, 2013). As part of the Waterberg biosphere, Lephalale area is richly blessed with pristine natural beauty and an abundance of fauna and flora. Lephalale offers an infinite variety of scenic contrasts and encompass the unique Waterberg wilderness with its extraordinary beauty, which boasts superb vistas, mountain gorges, clear streams and rolling hills. Rich in geological sites and rock art is a strong draw-card for the region, suggesting its links to many previous generations. Hence, the importance of tourism industry to the economy of the area is likely to continue to grow into the future. This is likely to be related to the hunting and ecotourism industries, but could also be linked to any expansion of the industrial operations and the related business tourism. Agriculture, especially red meat production, is one the potential economic activities which is likely to grow in the municipal area. Lephalale Local Municipality has

been blessed with natural resources that give it a competitive and comparative advantage in Mining, Energy, Tourism and Agriculture (Lephalale Municipality IDP, 2013).

Currently, there are nine declared land-based protected areas in the Lephalale Municipality, comprising approximately 89 406 ha, 4.6 % of municipality). However, there are no biospheres, conservancies or other declared areas of conservation present in the immediate surroundings of the proposed project. The closest area of declared conservation is the D'Njala Nature Reserve, situated approximately 18 km to the southeast. In addition to the formal declared conservation areas, a number of game farms are located within the broader region. These are focussed on tourism, conservation and hunting activities.

The alternative sites for the power station and associated infrastructure are situated within the Limpopo Catchment area. Major rivers of the surrounds include the Mogol River (approximately 13 km to the east of the project area) and the Limpopo River (approximately 40 km to the northwest of the project area). No significant areas of permanent surface water occur within the proposed project area. However, numerous small, non-perennial drainage lines and floodplains can be noted from aerial imagery.

1.3. Requirement for an Environmental Impact Assessment Process

The construction and operation of the proposed power station is subject to the requirements of the EIA Regulations published in terms of Section 24(5) of the National Environmental Management Act (NEMA) 107 of 1998. In terms of Government Notice 921 published in terms of the NEM: Waste Act No. 59 of 2008, a waste licence is also required for storage, treatment and disposal of general and hazardous waste. Therefore, an integrated environmental authorisation process is being undertaken for the project. This section provides a brief overview of EIA Regulations and their application to this project.

NEMA is the national legislation that provides for the authorisation of 'listed activities'. In terms of Section 24(1) of NEMA, the potential impact on the environment associated with these activities must be considered, investigated, assessed and reported on to the competent authority that has been charged by NEMA with the responsibility of granting environmental authorisations. As this is a proposed electricity generation project and thereby considered to be of national importance, the National Department of Environmental Affairs (DEA) is the competent authority[1] and the Limpopo Department of Economic Development, Environment and Tourism (LDEDET) will act as a commenting authority.

[1] In terms of the Energy Response Plan, the DEA is the competent authority for all energy related applications.

The need to comply with the requirements of the EIA Regulations ensures that the competent authority is provided with the opportunity to consider the potential environmental impacts of a project early in the project development process and to assess if potential environmental impacts can be avoided, minimised or mitigated to acceptable levels. Comprehensive, independent environmental studies are required in accordance with the EIA Regulations to provide the competent authority with sufficient information in order to make an informed decision.

An EIA is also an effective planning and decision-making tool for the project developer as it allows for the identification and management of potential environmental impacts. It provides the opportunity for the developer to be fore-warned of potential environmental issues, and allows for resolution of the issues reported on in the Scoping and EIA Reports as well as dialogue with interested and affected parties (I&APs).

The EIA process comprises two phases – i.e. Scoping and Impact Assessment - and involves the identification and assessment of environmental impacts though specialist studies, as well as public participation. The process followed in these two phases is as follows:

» The **Scoping Phase** includes the identification of potential issues associated with the proposed project through a desktop study (considering existing information), limited field work and consultation with affected parties and key stakeholders. This phase considers the broader site in order to identify and delineate any environmental fatal flaws, no-go or sensitive areas. Following public review of the report, this phase culminates in the submission of a final Scoping Report and Plan of Study for EIA to the competent authority for acceptance.
» The **EIA Phase** involves a detailed assessment of potentially significant positive and negative impacts (direct, indirect, and cumulative) identified in the Scoping Phase. This phase considers a proposed development footprint and includes detailed specialist investigations and public consultation. Following a public review period of the EIA report, this phase culminates in the submission of a Final EIA Report and an Environmental Management Programme (EMPr), including recommendations of practical and achievable mitigation and management measures, to the competent authority for review and decision-making.

The EIA process will also support the application for other permits required for the project, i.e.:

» Water Use License, as required in terms of Section 21 of the National Water Act (Act No 36 of 1989)
» Air Emissions License, as required in terms of the National Environmental Management: Air Quality Act (Act No. 39 of 2004)

1.4. Details of the Environmental Assessment Practitioner

Savannah Environmental was contracted by Cennergi as the independent environmental consulting company to undertake and the required EIA process for the proposed project. Neither Savannah Environmental nor any of its specialist sub-consultants on this project are subsidiaries of or are affiliated to Cennergi in any way. Furthermore, Savannah Environmental does not have any interests in secondary developments that could arise out of the authorisation of the proposed project.

Savannah Environmental is a specialist environmental consulting company providing holistic environmental management services, including environmental impact assessments and planning to ensure compliance and evaluate the risk of development, and the development and implementation of environmental management tools. Savannah Environmental benefits from the pooled resources, diverse skills and experience in the environmental field held by its team.

The Savannah Environmental team have considerable experience in environmental impact assessments and environmental management, and have been actively involved in undertaking environmental studies, for a wide variety of projects throughout South Africa, including those associated with electricity generation.

» *John von Mayer,* - the principal author if this report is a registered Professional Natural Scientist and holds a honours of Science degree with 8 years of work experience in the environmental field. The majority of his experience is in energy sector related projects.
» ***Gabriele Wood*** holds an Honours Degree in Anthropology, obtained from the University of Johannesburg. She has 6 years consulting experience in public participation and social research. Her experience includes the design and implementation of public participation programmes and stakeholder management strategies for numerous integrated development planning and infrastructure projects. Her work focuses on managing the public participation component of Environmental Impact Assessments and Basic Assessments undertaken by Savannah Environmental.
» *Jo-Anne Thomas,* a registered Professional Natural Scientist, holds a Master of Science degree. She has 18 years' experience consulting in the environmental field. Her key focus is on strategic environmental assessment and advice; management and co-

ordination of environmental projects, which includes integration of environmental studies and environmental processes into larger engineering-based projects and ensuring compliance to legislation and guidelines; compliance reporting; the identification of environmental management solutions and mitigation/risk minimising measures; and strategy and guideline development. She is currently involved in undertaking siting processes as well as EIAs for several renewable energy projects across the country.

In order to adequately identify and assess potential environmental impacts associated with the proposed project, the following specialist sub-consultants have provided input into this scoping report:

» Riaan Robbesn (Bathusi Environmental Consulting) - Ecology
» Johan Mare (Menco) – Surface Water
» Morne de Jager (EAR) - Noise
» Mark Zunkle (uMoya) – Air Quality
» Jaco Jansen (Savannah Environmental) - Agriculture
» Johan van der Walt (HCAC) - Heritage
» John Almond (Natura Viva) – Palaeontology
» Jon Marshal (Afzelia) – Visual
» Elena Broughton (Urban Econ) - Social

Appendix A includes the curricula vitae for the environmental assessment practitioners from Savannah Environmental and the specialist consultants.

REGULATORY AND LEGAL CONTEXT CHAPTER 2

2.1 Strategic Electricity Planning in South Africa

The need to expand electricity generation capacity in South Africa is based on national policy and is informed by on-going strategic planning undertaken by the Department of Energy (DoE). The hierarchy of policy and planning documentation that support the development of IPP projects is illustrated in Figure 2.1. These policies are discussed in more detail in the following sections, along with the provincial and local policies or plans that have relevance to the development of the proposed project.

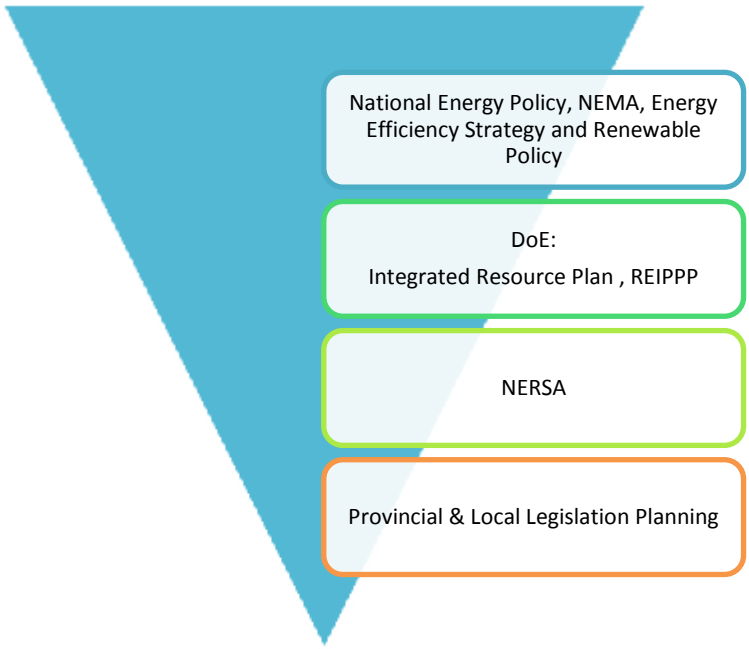


Figure 2.1: Hierarchy of electricity policy and planning documents

2.1.1 Regulatory Hierarchy

The South African energy industry is evolving rapidly, with regular changes to legislation and industry role-players. The regulatory hierarchy for an energy generation project of

this nature consists of three tiers of authority who exercise control through both statutory and non-statutory instruments – that is National, Provincial and Local levels.

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

» *Department of Energy (DoE):* This Department is responsible for policy relating to all energy forms, including renewable energy, and are responsible for forming and approving the IRP (Integrated Resource Plan for Electricity).
» *National Energy Regulator of South Africa (NERSA):* This body is responsible for regulating all aspects of the electricity sector, and will ultimately issue licenses for projects to generate electricity.
» *Department of Environmental Affairs (DEA):* This Department is responsible for environmental policy and is the controlling authority in terms of NEMA and the EIA Regulations. The DEA is the competent authority for this project, and charged with granting the relevant environmental authorisation.
» *The South African Heritage Resources Agency (SAHRA):* The National Heritage Resources Act (Act No 25 of 1999) and the associated provincial regulations provides legislative protection for listed or proclaimed sites.
» *South African National Roads Agency (SANRAL):* This agency of the Department of Transport is responsible for all National road routes.
» *Department of Water and Sanitation (DWS):* This Department is responsible for effective and efficient water resources management to ensure sustainable economic and social development. This Department is also responsible for evaluating and issuing licenses pertaining to water use.
» *Department of Agriculture, Forestry and Fisheries (DAFF):* This Department is the custodian of South Africa's agriculture, fisheries and forestry resources and is primarily responsible for the formulation and implementation of policies governing the Agriculture, Forestry and Fisheries Sector.
» *Department of Mineral Resources:* Approval from the Department of Mineral Resources (DMR) may be required to use land surface contrary to the objects of the Act in terms of section 53 of the Mineral and Petroleum Resources Development Act, (Act No 28 of 2002): In terms of the Act approval from the Minister of Mineral Resources is required to ensure that proposed activities do not sterilise a mineral resources that might occur on site.

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

» *Provincial Government of Limpopo Province – Department of Economic Development, Environment and Tourism (LEDET):* This department is the commenting authority for this project for environmental assessments as well as development planning applications.

» *Department of Transport and Public Works (Limpopo):* This department is responsible for roads and the granting of exemption permits for the conveyance of abnormal loads on public roads.
» *Department of Agriculture:* This Department's involvement relates specifically to sustainable resource management and land care.
» *Limpopo Heritage Resources Authority (LIHRA:* LIHRA is a provincial heritage resources authority. This public entity seeks to identify, protect and conserve the rich and diverse heritage resources of the Limpopo province.
» *Department of Water and Sanitation:* This Department is responsible for evaluating and issuing licenses pertaining to water use.

At **Local Level** the local and municipal authorities are the principal regulatory authorities responsible for planning, land use and the environment. The site is located within the Lephalale Local Municipality.

» In terms of the Municipal Systems Act (Act No 32 of 2000) it is compulsory for all municipalities to go through an Integrated Development Planning (IDP) process to prepare a five-year strategic development plan for the area under their control.
» Bioregional planning involves the identification of priority areas for conservation and their placement within a planning framework of core, buffer and transition areas. These could include reference to visual and scenic resources and the identification of areas of special significance, together with visual guidelines for the area covered by these plans.
» By-laws and policies have been formulated by local authorities to protect visual and aesthetic resources relating to urban edge lines, scenic drives, special areas, signage, communication masts, etc.

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

2.3 National Policy

2.3.1 The National Energy Act (2008)

The National Energy Act was promulgated in 2008 (Act No 34 of 2008). One of the objectives of the Act was to promote diversity of supply of energy and its sources. The

National Energy Act aims to ensure that diverse energy resources are available, in sustainable quantities and at affordable prices, to the South African economy in support of economic growth and poverty alleviation, taking into account environmental management requirements and interactions amongst economic sectors. The Act provides the legal framework which supports the development of power generation facilities.

2.3.2 White Paper on the Energy Policy of South Africa, 1998

The South African Energy Policy, published in December 1998 by the Department of Minerals and Energy (DME) identifies five key objectives, namely:

» Increasing access to affordable energy services;
» Improving energy sector governance;
» Stimulating economic development;
» Managing energy-related environmental impacts; and
» Securing supply through diversity.

In order to meet these objectives and the developmental and socio-economic objectives in South Africa, the country needs to optimally use the available energy resources. The South African Government is required to address what can be done to meet these electricity needs both in the short- and long-term. The White Paper identifies key objectives for energy supply, such as increasing access to affordable energy services, managing energy-related environmental impacts and securing energy supply through diversity.

2.3.3. The Electricity Regulation Act, 2006 (Act No. 4 of 2006), as amended

The Electricity Regulation Act, 2006, replaced the Electricity Act, 1987 (Act No. 41 of 1987), as amended, with the exception of Section 5B, which provides for the funds for the energy regulator for the purpose of regulating the electricity industry. The Act establishes a national regulatory framework for the electricity supply industry & introduces the National Energy Regulator as the custodian and enforcer of the National Electricity Regulatory Framework. The Act also provides for licences & registration as the manner in which generation, transmission, distribution, trading & the import & export of electricity are regulated.

2.3.4. Final Integrated Resource Plan 2010 - 2030

The current iteration of the Integrated Resource Plan (IRP) for South Africa, initiated by the Department of Energy (DoE) after a first round of public participation in June 2010, led to the Revised Balanced Scenario (RBS) that was published in October 2010. A second round of public participation was conducted in November/December 2010, which led to several changes to the IRP model assumptions

The document outlines the proposed generation new-build fleet for South Africa for the period 2010 to 2030. This scenario was derived based on the cost-optimal solution for new-build options (considering the direct costs of new build power plants), which was then "balanced" in accordance with qualitative measures such as local job creation.

The Policy-Adjusted IRP includes the same amount of coal and nuclear new builds as the RBS, while reflecting recent developments with respect to prices for renewables. In addition to all existing and committed power plants (including 10 GW committed coal), the plan includes 9,6 GW of nuclear; 6,3 GW of coal; 17,8 GW of renewables; and 8,9 GW of other generation sources.

	New build options							
	Coal (PF, FBC, imports, own build)	Nuclear	Import hydro	Gas – CCGT	Peak – OCGT	Wind	CSP	Solar PV
	MW	MW	MW	MW	MW	MW	MW	MW
2010	0	0	0	0	0	0	0	0
2011	0	0	0	0	0	0	0	0
2012	0	0	0	0	0	0	0	300
2013	0	0	0	0	0	0	0	300
2014	500[1]	0	0	0	0	400	0	300
2015	500[1]	0	0	0	0	400	0	300
2016	0	0	0	0	0	400	100	300
2017	0	0	0	0	0	400	100	300
2018	0	0	0	0	0	400[4]	100[4]	300[4]
2019	250	0	0	237[3]	0	400[4]	100[4]	300[4]
2020	250	0	0	237[3]	0	400	100	300
2021	250	0	0	237[3]	0	400	100	300
2022	250	0	1 143[2]	0	805	400	100	300
2023	250	1 600	1 183[2]	0	805	400	100	300
2024	250	1 600	283[2]	0	0	800	100	300
2025	250	1 600	0	0	805	1 600	100	1 000
2026	1 000	1 600	0	0	0	400	0	500
2027	250	0	0	0	0	1 600	0	500
2028	1 000	1 600	0	474	690	0	0	500
2029	250	1 600	0	237	805	0	0	1 000
2030	1 000	0	0	948	0	0	0	1 000
Total	6 250	9 600	2 609	2 370	3 910	8 400	1 000	8 400

Firm commitment necessary now

Final commitment in IRP 2012

1. Built, owned & operated by IPPs 2. Commitment necessary due to required high-voltage infrastructure, which has long lead time 3. Commitment necessary due to required gas infrastructure, which has long lead time 4. Possibly required grid upgrade has long lead time and thus makes commitment to power capacity necessary

Figure 2.2: National Energy Development Commitments detailed in the IRP 2010

Figure 2.2 above indicates the new capacities of the Policy commitment. The dates shown indicate the latest that the capacity is required in order to avoid security of supply concerns. The IRP notes that projects could be concluded earlier than indicated if feasible.

When promulgated in March 2011, it was indicated that the IRP should be a "living plan" which would be revised by the Department of Energy (DoE) every two years. Since the promulgation of the IRP 2010 there have been a number of developments in the energy sector in South and Southern Africa. In addition the electricity demand outlook has changed markedly from that expected in 2010. The Department of Energy has now completed an IRP 2010 Update (which was available for comments until 7 February 2014). The finalisation of this is however dependent on the finalisation of the Integrated Energy Plan, as detailed below.

2.3.5. Integrated Energy Plan

The development of a national Integrated Energy Plan (IEP) was envisaged in the White Paper on Energy Policy of 1998 and the Minister of Energy, as entrenched in the National Energy Act of 2008, is mandated to develop and publish the IEP on an annual basis. The IEP takes existing policy into consideration and provides a roadmap of the future energy landscape for South Africa which guides future energy infrastructure investments and policy development.

The IEP takes into consideration the crucial role that energy plays in the entire economy of the country and is informed by the output of analyses founded on a solid fact base. It is a multi-faceted, long-term energy framework which has multiple aims, some of which include:

» To guide the development of energy policies and, where relevant, set the framework for regulations in the energy sector.
» To guide the selection of appropriate technologies to meet energy demand (i.e. the types and sizes of new power plants and refineries to be built and the prices that should be charged for fuels).
» To guide investment in and the development of energy infrastructure in South Africa.
» To propose alternative energy strategies which are informed by testing the potential impacts of various factors such as proposed policies, introduction of new technologies, and effects of exogenous macro-economic factors.

Eight key objectives for energy planning were identified:

» Objective 1: Ensure the security of supply
» Objective 2: Minimise the cost of energy
» Objective 3: Increase access to energy
» Objective 4: Diversify supply sources and primary sources of energy
» Objective 5: Minimise emissions from the energy sector
» Objective 6: Promote energy efficiency in the economy
» Objective 7: Promote localisation and technology transfer and the creation of jobs
» Objective 8: Promote the conservation of water

The DoE has released a draft Integrated Energy Planning Report (June 2013) for public comment. Once the implications of all the energy options have been explored and evaluated against each of the eight (8) key objectives, final recommendations will be made in the form of the Final IEP Report. The DoE has acknowledged the need to finalise the IEP, which will also provide the revised IRP (DoE Strategic Plan, 2015-2020). The DoE must ensure that these policies serve both the purpose of providing policy certainty as well as ensuring energy security, support development of local industries, job creation and skills transfer.

2.3.6. United Nations Framework Convention on Climate Change and COP21 – Paris Agreement

Climate change is one of the major global challenges of the 21st century that require global response. The adverse impacts of climate change include persistent drought and extreme weather events, rising sea levels, coastal erosion and ocean acidification, further threatening food security, water, energy and health, and more broadly efforts to eradicate poverty and achieving sustainable development. Combating climate change would require substantial and sustained reductions in greenhouse gas emissions (GHGs), which, together with adaptation, can limit climate change risks. The convention responsible for dealing with climate change is called United Nations Framework Convention on Climate Change (UNFCCC).

The UNFCCC was adopted in 1992 and entered into force in 1994. It provides the overall global policy framework for addressing the climate change issue and marks the first international political response to climate change. The UNFCCC sets out a framework for action aimed at stabilizing atmospheric concentrations of greenhouse gases to avoid dangerous anthropogenic interference with the climate system.

The Convention has established a variety of arrangements to govern, coordinate and provide for oversight of the arrangements described in this document. The oversight bodies

take decisions, provide regular guidance, and keep the arrangements under regular review in order to enhance and ensure their effectiveness and efficiency. The Conference of Parties (COP), established by Article 7 of the Convention, is the supreme body and highest decision-making organ of the Convention. It reviews the implementation of the Convention and any related legal instruments, and takes decisions to promote the effective implementation of the Convention.

COP 21 was held in Paris from 30 November to 12 December 2015. From this conference, an agreement to tackle global warming was reached between 195 countries. This Agreement shall be open for signature and subject to ratification, acceptance or approval by States and regional economic integration organizations that are Parties to the Convention from 22 April 2016 to 21 April 2017. Thereafter, this Agreement shall be open for accession from the day following the date on which it is closed for signature. The agreement can only enter into force once it has been ratified by 55 countries, representing at least 55% of emissions.

This Agreement, in enhancing the implementation of the Convention, including its objective, aims to strengthen the global response to the threat of climate change, in the context of sustainable development and efforts to eradicate poverty, including by:

(a) Holding the increase in the global average temperature to well below 2 °C above pre-industrial levels and to pursue efforts to limit the temperature increase to 1.5 °C above pre-industrial levels, recognizing that this would significantly reduce the risks and impacts of climate change;
(b) Increasing the ability to adapt to the adverse impacts of climate change and foster climate resilience and low greenhouse gas emissions development, in a manner that does not threaten food production;
(c) Making finance flows consistent with a pathway towards low greenhouse gas emissions and climate-resilient development.

In order to achieve the long-term temperature goal set out in Article 2 of the Agreement, Parties aim to reach global peaking of greenhouse gas emissions as soon as possible, recognizing that peaking will take longer for developing country Parties, and to undertake rapid reductions thereafter in accordance with best available science, so as to achieve a balance between anthropogenic emissions by sources and removals by sinks of greenhouse gases in the second half of this century, on the basis of equity, and in the context of sustainable development and efforts to eradicate poverty.

In working towards this goal, advanced economies have already included renewables in their energy mix and have planned to increase their use in order to meet their mitigation goals: Japan aims to derive 22-24% of its electricity production from renewable sources by

2030 and the European Union plans for them to reach 27% of its final energy consumption. Developing countries are also playing their part, including South Africa which has included a goal of 17,8GW of renewables by 2030 within the IRP.

South Africa supports the adoption of the Paris Agreement and will be required to communicate a nationally determined contribution to the global response to climate change every five years from 2020.

2.3.7. Department of Energy Process for Independent Power Producers (IPPs)

The Coal Baseload IPP Procurement Programme aims to procure 2 500MW of electricity from coal fired power stations with individual bids capped at 600MW per project. The programme is designed to contribute towards socio-economic development and sustainable growth, and to start and stimulate the participation of independent power producers in the Baseload Energy generation capacity industry in South Africa.

The IPP will undergo a bidding process in which the Department of Energy will determine preferred bidders. A preferred bidder will be held to compliance with the price and economic development proposals in its bid, with regular reporting to demonstrate compliance during the life of the project.

2.4. Provincial Policy and Planning Context

2.4.1. Limpopo Employment, Growth and Development Plan (LEGDP) (2009-2014)

The Limpopo Employment Growth and Development Plan aims to solve the problem areas of growth, decent jobs and poverty reduction within a broad economic wide framework. This plan synthesises findings from recent analysis of different sectors and features of the Limpopo political economy. While its focus is broad, it does not try to present all the components of a comprehensive growth plan – in some areas, it points instead to issues where further investigation is called for. The main objective of this plan is to contribute to the economic debate in the province and in the country by highlighting policy imperatives that should be addressed to promote growth and employment in a complex international and domestic economic environment. The proposed project will contribute to growth and

development of the study area by expanding the economic base and creating employment opportunities.

2.5. Local Policy and Planning Context

2.5.1. Waterberg District Spatial Development Framework (2009)

The overarching aim of the Waterberg District Spatial Development Framework (SDF) is to provide a spatial framework within which the sustainable development of the district and its specific resources can be carried out. The Framework is intended to be broad-scaled and centred on principles and issues significant to the district as a whole. The principle focus of the SDF is on spatial elements. The Waterberg SDF consists of 6 main objectives namely:

» restructure spatially inefficient settlements;
» promote the sustainable use of the land resources in the country;
» channel resources to area of greatest need and development potential, thereby redressing the inequitable historical treatment of marginalised areas;
» take into account the fiscal, institutional and administrative capacities of role players, the needs of communities and the environment;
» stimulate economic development opportunities in rural and urban areas; and
» support an equitable protection of rights to and in land.

The proposed project will contribute towards the stimulation of economic development opportunities, specifically within the energy sector.

2.5.2. Waterberg District Municipality Integrated Development Plan (2013/2014)

The integrated planning approach for the Waterberg District is documented in the IDP which focuses on: local economic development and spatial rational; municipal transformation and organisational development; good governance and public participation; basic service delivery and infrastructure; municipal financial viability and financial management. The vision of the Municipality is "to be the energy hub and eco-tourism destination in Southern Africa." The municipality's mission is "to invest in a constituency of talented human capital who are motivated and innovative to build a sustainable economy

in the field of energy, minerals and eco-tourism for the benefit of all our communities." The proposed project will contribute in assisting the WDM in its aim for building a sustainable economy in the field of energy.

2.5.3. Waterberg District Municipality Air Quality Management Plan (AQMP), 2015

The National Environmental Management: Air Quality Act 39 of 2004 (AQA) requires Municipalities to introduce Air Quality Management Plans (AQMP) that set out what will be done to achieve the prescribed air quality standards. Municipalities are required to include an AQMP as part of its Integrated Development Plan.

Air quality legislation comprises primary standards which protect human health and secondary standards which protect property, vegetation, climate and aesthetic values. The development of new industries that increase air pollution through the emission of gases in the atmosphere should be managed. The construction of the new power station in Lephalale requires that the industries should comply with air quality standards. In the WDM, the air quality hot spots are Lephalale, Mogalakwena and Thabazimbi as a result of the presence of industry, mines and power stations. The AQMP recommends emission reduction interventions for the District. Of specific relevance to the proposed power station are those measures applicable to power generation.

2.5.4. Waterberg District Environmental Management Framework (EMF) (2010)

The WDM, together with the Department of Environmental Affairs (DEA), developed an Environmental Management Framework (EMF) for the WDM area. The purpose of the EMF is to develop a framework that will integrate policies and frameworks, and align different government mandates in a way that will streamline decision-making to improve cooperative governance and guide future development in an environmentally responsible manner. The specific objectives of the EMF include:

» Encourage sustainable development;
» establish development priorities;
» identify strategic guidance and development management proposals;
» identify the status quo, development pressures and trends in the area;
» determine opportunities and constraints;

- identify geographical areas in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA);
- specify additional activities within identified geographical areas that will require EIA based on the environmental attributes of such areas;
- specify currently listed activities that will be excluded from EIA within certain identified geographical areas based on the environmental attributes of such areas; and
- develop a decision support system for development in the area to ensure that environmental attributes, issues and priorities are taken into account.

The EMF defines Environmental Management Zones for the Waterberg on the basis of the status quo of the area as well as from inputs obtained through the EMF development process. The proposed project development site falls within Zone 4: Mining focus areas (refer to Figure 2.3). This zone represents areas where significant mineral resources (in this instance coal) of strategic national importance occur within largely natural environments. The proposed power station would be viewed as a preferred development within this Zone as it is directly associated with mining (i.e. the Thabametsi Mine), and does not restrict or constrain potential mineral exploitation.

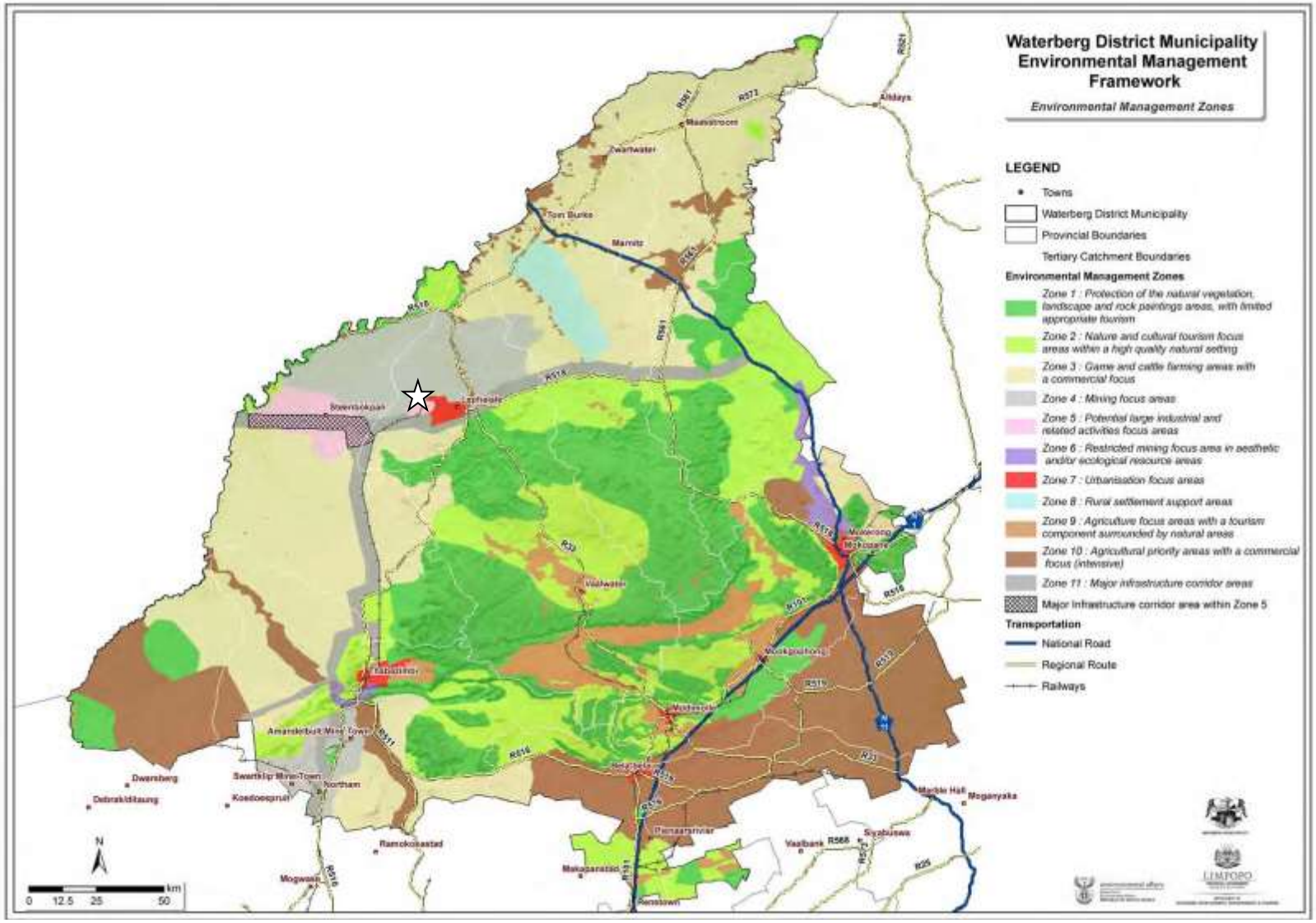


Figure 2.3: WDM EMF: Environmental Management Zones showing the location of the study area (white star)

2.5.5. Lephalale Local Municipality IDP (2013 – 2016)

The proposed project site falls within Spatial Development Area 3 (mixed non-residential land-use driven by mining and energy) as defined in the Spatial Development Framework and within the mining zone (focus area 3) as defined in the IDP. The proposed project is therefore in line with the strategic planning of the municipality.

The IDP acknowledges the coal reserves and potential for establishment of additional mines and power stations in the area as part of the municipality's competitive advantage. The IDP specifically refers to the proposed new coal mine being proposed by Exxaro Coal (i.e. Thabametsi), and also acknowledges the plans to develop coal-fired power stations linked to this mine. These developments are recognised as being part of the economic development potential of Lephalale and will contribute towards benefits to the local community. Further, the creation of an enabling environment where the electricity sector can become a hub within the provincial and national economy is noted as a contributing factor towards the realisation of development opportunities within the municipality.

SCOPE OF THE PROJECT CHAPTER 3

The Tshivhaso power station components and infrastructure presented in this chapter are indicative at this stage and aimed at enabling the reader to obtain an understanding of the proposed project.

3.1 Need and Desirability for the Proposed Coal-Fired Power Station

Approximately 80% of South African electricity comes from coal-fired power stations, with Eskom being the dominant electricity producing company generating 95% of all electricity in South Africa (SA Yearbook 2009/2010). The demand for electricity in South Africa has grown, on average, at more than 4% over the past few years, with a simultaneous reduction in the surplus generating capacity due to limited commissioning of new generation facilities. Although the electricity demand shows a slight negative trend over the recent past, the maximum demand, together with the greater need for maintenance of existing power plants, has put the available power supply under pressure. In spite of capacity coming on line in the near future (as a result of the commissioning of Medupi Power Station near Lephalale, and a number of renewable energy projects across the country), the electricity demand within the country is still higher than the available capacity.

The Integrated Resource Plan (IRP) 2010 developed by the Department of Energy projected that an additional capacity of up to 56 539MW of generation capacity will be required to support the country's economic development and ensure adequate reserves over the next twenty years. The required expansion is more than two times the size of the existing capacity of the system. In order to meet this required generation capacity, the IRP includes a mix of generation technologies, including a nuclear fleet of 9.6 GW; 6.3 GW of coal; 17.8 GW of renewables; and 8.9 GW of other generation sources. Between 2010 and 2020, the IRP (2010) provides that 14.7% of the generation capacities of the envisioned coal-powered power stations to be developed are to be added by Independent Power Producers (IPPs).

The need to develop IPP coal-fired power stations has been identified by Cennergi in order to meet the requirements of the IRP 2010. In addition, the proposed project is considered desirable in terms of the planning and policy aims and needs of the Limpopo Province, Waterberg District Municipality and Lephalale Local Municipality, as discussed in the previous chapter of this report.

The proposed site is considered to be technically feasible by Cennergi due to the confirmed availability of coal and water for the operation of the power station.

3.2 Description of the Proposed Project

The project involves the construction of a coal-fired power station which will provide baseload power supply[2] to the electricity grid. The power station would have a capacity of up to 1 200 MW (to be developed in two phases of 600MW each). This capacity is constrained by the available water, as well as constraints associated with grid integration. Coal is to be supplied from the Thabametsi coal mine to be developed in the vicinity of the site.

The project involves the construction of a coal-fired power station and associated infrastructure. Table 2.1 below provides details of the proposed project, including the main infrastructure and services.

Table 2.1: Details of the proposed project

Component	Description/ Dimensions
Location of the site	Site alternative 1 - farms Graaffwater 456. Site alternative 2 - farms Eendragtpan 451, Geylkebult 450 and Vooiruit 449
Municipal Jurisdiction	The property is located within the Lephalale Local Municipality which falls within the Waterberg District Municipality.
Electricity Generating capacity	1200MW, to be developed in two phases of 600 MW each
Proposed technology	» Circulating Fluidised Bed (CFB) coal-fired power station (baseload power supply) » Dry cooled » The facility will be developed as a zero liquid effluent discharge (ZLED) plant.
Extent of the proposed development	» Power Plant - 50ha » Ash Dump – 500ha (extending over a 40-year period) » Strategic Coal Stockpile – 100ha (providing for a

[2] Baseload electricity generating capacity" refers to power station technology designed specifically to generate electricity continuously for all hours of the day and night

Component	Description/ Dimensions
footprint (including Power plant production unit/s (boilers / furnaces, turbines, generator and associated equipment, control room), Office and maintenance area/s and ash dump area	stockpile for 30 days) » A Raw-Water Dam - 2ha
Stack height	220m
Coal storage areas and bunkers, Coal loading and offloading areas, as well as conveyor belts with transfer house	» Coal is to be provided to the power station from the Thabametsi coal mine proposed to be established to the south-east of the site. » To be supplied at a rate of 1000 t/h » Coal will be transported to the coal storage area via overland conveyors.
Strategic Coal Stockyard	sized for a ~30-days capacity of ~700,000 tonnes
Sorbent (limestone granular)	» 64 T/hr for 1200 MW capacity » To be obtained from sources in the Northern Cape[3]
Ash dumps and associated drainage channels and pollution control dams	» 660-t/h of ash and spent sorbent to be disposed of to the ash dump » 500ha in extent » Height: up to 50m » Provides storage for a volume of approximately 200 million cubic meters of ash » Ash to be transported from power station to ash dump via overland conveyors » Three pollution control dams to be associated with ash dump – capacity proposed to be 75 000m^3, 54 000m^3 and 33 000 m^3
Site access	Access from existing roads in close proximity to site
Grid connection	» Two power evacuation Alternatives: * Alternative 1:a Matimba – Witkop loop-in line; and * Alternative 2: a Matimba – Medupi loop-in line » 400kV line required » Servitude width – 55m

[3] Sources of sorbent to be confirmed through further investigations

Component	Description/ Dimensions
	» Height of towers – maximum height of 35m
Services required	» Refuse material disposal - all refuse material generated from the proposed development will be collected by a contractor to be disposed of at a licensed waste disposal site off site. This service will be arranged with the municipality when required. » Sanitation – during construction, all sewage waste will be collected by a contractor to be disposed of at a licensed waste disposal site. This service will be arranged with the municipality when required. During operation, a wastewater treatment facility will be operated on the site. » Water– 1.5-million m^3/a is required for 1200MW. Water is to be supplied from the Mokolo-Crocodile Water Augmentation Project (MCWAP) Phase 2.
Pipeline for water supply	» A water supply pipeline of approximately 1m in diameter will be required to be constructed to the power station site from the point of supply. Peak throughput of >120 litres per second.
Raw-Water Storage Reservoir and Pump-station	» Capacity: 120 000m^3 » Reservoir wall height: 1-2 m (to be confirmed in final design)
Water treatment plant	» Daily treatment capacity: 4800 m^3/day
Wastewater treatment plant	» Daily throughput capacity: 6000 m^3/day

3.2.1. Water Use

The project will source its water from the Mokolo Crocodile Water Augmentation Project (MCWAP) Phase 2 which is scheduled for completion by 2019/20. The power plant will use water of different qualities in following specific areas or processes:

- Dry cooling will be used for condensing steam exhausted from the turbines. The cycle heat rejection will be undertaken through use of heat exchangers that transfer the heat directly to the ambient air. No water will thus be required for this purpose.
- The steam cycle will utilise demineralised water in a closed circuit. Some make-up water will be required as the result of small losses due to leakage and blow-downs. Make-up demineralised water will be produced by treating raw water using the ion exchange method.

- Service water will be required for general cleaning of the plant, fire protection, and other miscellaneous plant uses.
- Recycled water from other processes is proposed to be used for ash hydration, ash handling, and coal dust suppression.
- Treated sewage plant effluent is proposed to be used for irrigation of the ash landfill for dust suppression and for regeneration of plant life as cells are covered with soil and grass.
- Potable water for domestic purposes at the power station will be obtained by treatment of raw water.
- Plant wastewater will be treated as required for utilization in the bottom ash system, ash hydration and landfill process, and the coal dust suppression systems.

In terms of the National Water Act (Act No 36 of 1989), a water use license will be required to be obtained for the various water uses as described above. In terms of the application for water supply from MCWAP2, the date for submission of applications is to be confirmed by the DWA and TCTA. As the Water Use license application process requires that a project submits a consolidated application (i.e. for all water uses), the application for all water uses will only be submitted once the date for submission has been confirmed.

In terms of water uses which would be relevant for the project, the following is applicable:

» 21 a) taking water from a water resource:
» 21 b) storing water
» 21 c) Impeding and diverting the flow of a watercourse
» 21 e) engaging in a controlled activity identified as such in section 37(1) or declared under section 38(1) (i.e. using wastewater for dust suppression)
» 21 g) Disposing of waste in a manner which may detrimentally impact on a water resource
» 21 h) Disposing in any manner of water which contains waste from or which has been heated in any industrial or power generation process
» 21 i) Altering the bed, banks. course or characteristics of a watercourse

3.2.2. Waste Management and Treatment

Waste treatment for the power station includes the following:

» Liquid waste disposal
» Solid waste disposal
» Waste storage and separation
» Waste transport
» Solid waste disposal

Table 3.1 provides an estimate of the quantities of waste produced by the power station.

Table 3.1: Estimate of the quantities of waste produced by the power station

Hazardous waste	Non-hazardous waste	Total waste handled (tonnes per day)
Ash + Sorbent		16,000
Waste Water		6,000
Sewage		50
	Polluted Water (Rainwater Run-off)	To be determined
	Compactable General Waste	16
	Un-Compactable General Waste	4
Oil-contaminated Run-off / Water		0.2
Spent Lubricants & Chemical Fills		0.2
Spent Consumable / Fills Materials		0.2
Spent Flue-Gas Filter Bags		To be determined

» ***Ash Disposal***

The ash dump will be sized to accommodate the estimated bottom ash and fly ash from all units for 40 years assuming a conservative availability and capacity factor. The ash dump provides storage for a volume of approximately 200 million cubic meters of ash and would have a footprint of approximately 500ha and approximately 50m high. The ash dump will be required to be designed according to the requirements for waste disposal as contained in Regulation 636 of August 2013 published in terms of the NEM: Waste Act (Act No 59 of 2008).

3.3 Project Alternatives

In terms of the Environmental Impact Assessment (EIA) Regulations, reasonable and feasible alternatives are required to be considered within the Environmental Impact Assessment process. All identified, feasible alternatives are required to be assessed in terms of social, biophysical, economic and technical factors.

A key challenge of the EIA process is the consideration of alternatives. Most guidelines use terms such as 'reasonable', 'practicable', 'feasible' or 'viable' to define the range of alternatives that should be considered. Essentially there are two types of alternatives:

» incrementally different (modifications) alternatives to the project; and
» fundamentally (totally) different alternatives to the project.

Fundamentally different alternatives are usually assessed at a strategic level, and EIA practitioners recognise the limitations of project-specific EIAs to address fundamentally different alternatives. Electricity generating alternatives have been addressed as part of the National Integrated Resource Plan (IRP) by the Department of Energy[4]. In this regard, the need for baseload power generation from coal as part of the technology mix for power generation in the country in the next 20 years has been identified. Renewable energy alternatives do not offer a baseload solution to South Africa's energy requirements and are therefore not presented as an option in this regard. The Project Company is therefore proposing the development of a coal-fired power station and have not considered any other power generation options for this project.

Incrementally different alternatives relate specifically to the project under investigation. "Alternatives", in relation to a proposed activity, means different ways of meeting the general purposes and requirements of the activity, which may include alternatives to:

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

These alternatives are discussed below.

[4] The Integrated Resource Plan (IRP) is legislated policy which regulates power generation planning

3.3.1 Site Alternatives

As the availability of the coal resource is critical to the development of such a project, the location of the power station is constrained to a large degree by the location of this resource. Over 50% of South Africa's remaining coal reserves lie in the Waterberg coalfields, a 3 500km^2 expanse of Limpopo that stretches into Botswana and hosts almost 76 billion tonnes of in-situ inferred resources in 11 coal-bearing zones. In order to exploit this resource, a number of new coal mines are proposed in the Waterberg area. Of particular relevance to the proposed power station is the new coal mine, Thabametsi Coal Mine, to be developed by Exxaro Resources. This mine will provide the required coal resource to the power station for the operational life of the power station. These factors dictated the selection of the Waterberg region for the development of the proposed power station.

As illustrated in Figure 3.1, there are two possible sites currently considered for the establishment of the power station and four possible sites for the ash dump.

One of the power station site alternatives includes the farm Graaffwater 456, while the other alternative includes farms Eendragtpan 451, Geylkebult 450 and Vooiruit 449.

Site alternatives for the ash dump are more scattered. Alternative 1, i.e. including farms Kalkvlakte 256 and Elandsvley 453, s situated north of the location of the approved Thabametsi Coal-Fired Power Station. Alternatives 2 (farm Goedehoop) was situated between the proposed site for the power station and the mine. **Both of these alternatives were creened out at scoping.**

Alterntaive 3 (farm Vooruit 449) and 4 (farm Appelvlakte 448) are adjacent to the farms where Grootegeluk mine is located and are to be situated between the proposed site for the power station and the mine. The last alternative (farm Jackalsvley) is located further away and is proposed to be established above the underground component of the proposed Thabametsi coal mine. Relative to the proposed sites of the power station itself, it is also situated across the existing Grootegeluk mine.

There are two power evacuation Alternatives. Alternative 1:a Matimba – Witkop loop-in line; and Alternative 2: a Matimba – Medupi loop-in line.

All project alternatives are located near Lephalale town in the Limpopo Province, in close proximity to the authorised Thabametsi power station and north of the Grootgeluk coal mine.

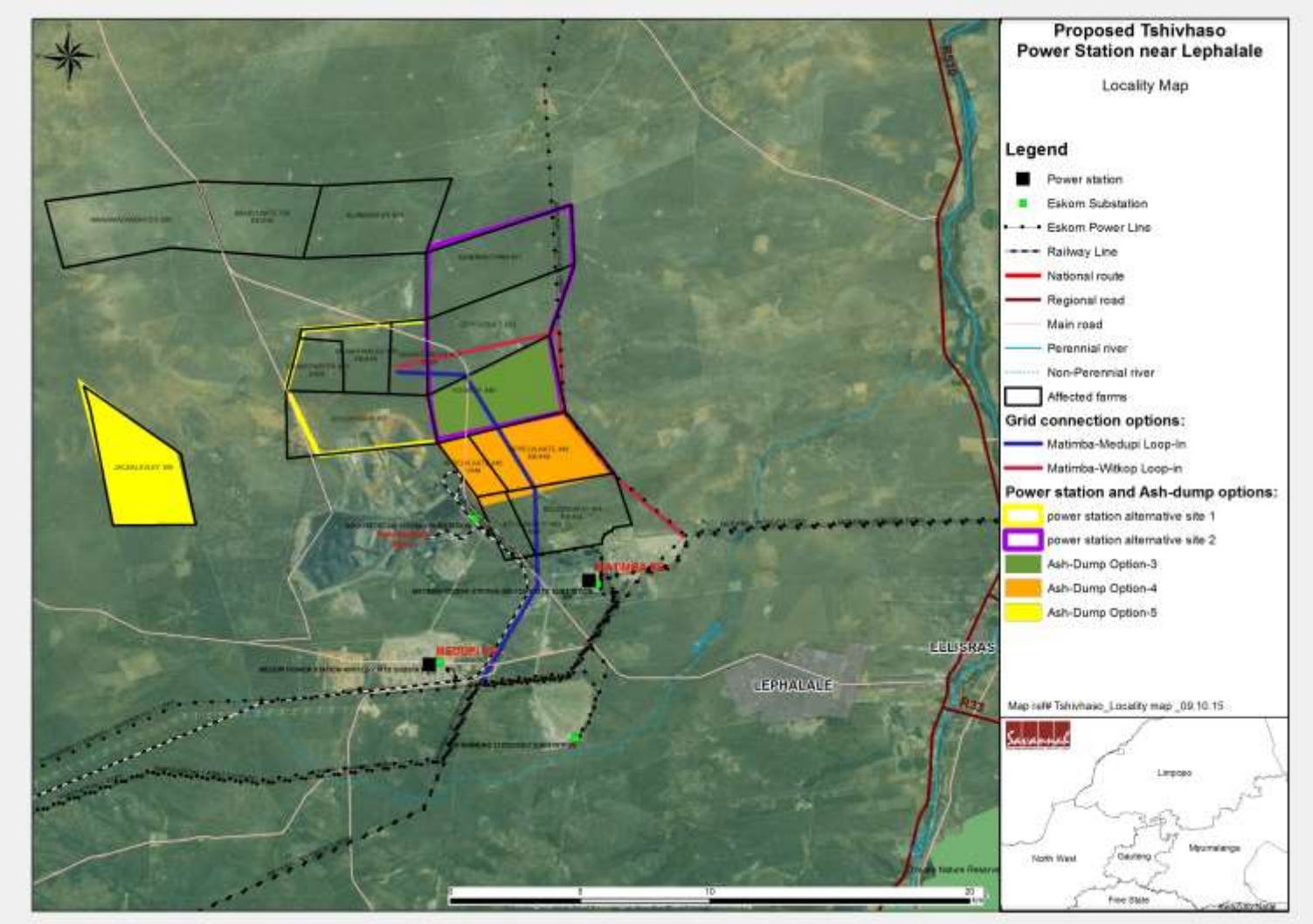


Figure 3.1: Potential sites for the power station and power line route alternatives.

3.3.2 Technology Alternatives

Technology alternatives considered for the project:

» The **fuel combustion technology** – conventional pulverised coal fired or circulating fluidised bed boiler technology; and
» **Cooling Systems technology** – the power station will make use of dry cooling technology, either direct or indirect.

Fuel Combustion Technology

Technologies considered include conventional pulverised coal fired or circulating fluidised bed boiler technology. A basic description of the technologies is provided below.

a) Conventional Coal Fired Power Station

A conventional coal-fired power station produces electricity by the burning of pulverised coal and air in a steam generator, where it heats water to produce steam. The steam flows through a series of steam turbines which spin an electrical generator to produce electricity. The exhaust steam from the turbines is cooled, condensed back into water, and returned to the steam generator to start the process over. These plants provide most of the electrical energy used in many countries, i.e. a tried and tested method.

b) Circulating Fluidised Bed Boiler Technology

Fluidised bed combustion (FBC) is another technology used for power plants. There are different designs of FBCs, namely two major groups, atmospheric systems (FBC) and pressurised systems (PFBC), and two minor subgroups, bubbling (BFB) and circulating fluidized bed (CFB).

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

form of SOx emissions. The solids from the filter are re-circulated into the bed. Limestone can be added to capture sulphur and prevent its release to the atmosphere as sulphur dioxide.

Through the technical feasibility studies undertaken for the project, FBC technology has been selected as the preferred technology for implementation at the power station. This is the alternative considered within this EIA process.

Cooling Systems technology

The steam that is produced and converted to mechanical energy at a power plant must be recovered through condensation (conversation of the steam (vapour) to water). Cooling systems for a coal-fired power station can be either wet-cooled, direct dry-cooled or indirect dry-cooled systems. Dry-cooling results in resource saving in terms of water conservation, and is generally utilised in water-stressed environments. Due to the study area being water-stressed only dry-cooling systems were considered for the project. The two dry-cooling systems are briefly described below.

a) Direct Dry cooling

In this system, the steam from the turbines goes to dry-cooling element or a heat exchanger. Fans are used to blow air over the condenser causing water vapour to change into liquid. The liquid (water) is pumped back to the boiler for re-use. No cooling towers are needed for this system; therefore water loss by evaporation is prevented. This system is utilised at Matimba Power Station located near Lephalale, and will also be used by Medupi Power Station (under construction). Issues associated with this technology include increased noise levels as a result of the additional fans required.

b) Indirect Dry cooling

A cooling tower and cooling water (from a water resource) is required for this cooling method. Warm water from the condensers is pumped to cooling towers. Within the cooling tower, bundles of cooling elements are arranged in rings. Cooling water is sent into

the elements and cooled water returns to the condenser for re-use. This system prevents water loss by evaporation, as it is a closed system. This system is utilised at the Kendal Power Station located near Witbank in the Mpumalanga Province. Associated issues include additional visual impacts associated with the large cooling towers required.

Through the technical feasibility studies undertaken for the project, direct dry technology has been selected as the preferred technology for implementation at the power station, largely as a result of the limited water resources in the study area. This is the alternative considered within this EIA process.

3.3.3 Operational Alternatives – Pollution Control

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

a) Ash management

The ash management system will use dry-ashing (no water used). Wet ashing uses a large volume of water and is therefore not considered suitable for this project.

Above-ground ash dumping (where ash is stacked in an ash dump within the power station area and the ash dump is rehabilitated (using topsoil and vegetation)) will be utilised. The practice of ashing into the mine pit is not considered to be a feasible option. In this option, the ash is not separated from the coal by means of any type of membrane, and bringing it into contact with the acidic coal will result in metals and other toxic substances leaching out of the ash, at least over a long time period. Previous studies have concluded that this option is not suitable from an environmental perspective due to the potential for groundwater contamination and the low potential for mitigation.

Wastewater generated at the power station will be utilised for dust suppression at the ash dump.

b) Air Emission Control

Burning of coal releases CO_2, SOx, NOx, and other pollutants into the atmosphere and air pollution abatement technologies are being explored to minimise associated impacts. The use of air emissions control measures such as use of electrostatic precipitators/fabric filters are also considered. The commitment in this regard is to achieve minimum emission that will be defined in the Air Emissions License.

3.4 Life-cycle Phases of the proposed Power Station

3.4.1 Construction of a Coal-Fired Power Station

Construction of the proposed coal-fired power station is expected take between 48 - 54 months. The construction activity involves the following[5]:

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

3.4.2 Operation of a Coal-Fired Power Station

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

Prior to the operation of the power station, testing and trails will need to be undertaken. The proposed facility will create 239 permanent employment positions that will be retained for 40 years. It is anticipated that there will be full time security, maintenance and control room staff required at the site. In order to operate a coal-fired power station, resources are required (input), and processes and outputs occur from the electricity generation process. This concept is outlined in **Figure 3.2.**

Figure 3.2: Resources (input), processes and outputs (waste) for a coal-fired power station

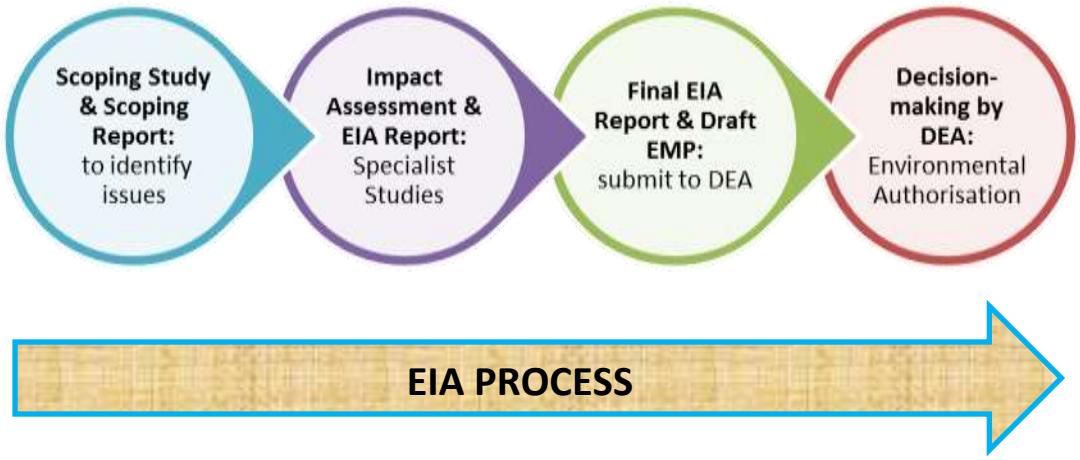
Figure 3.2 illustrates that in order to operate a coal-fired power station, natural resources such as coal and water will be required. For combustion coal and air are required. Water is required in the power generation process – it is converted to steam for energy conversion (from thermal energy to mechanical energy). Water is also used for cooling in a power station. The output of the process is electricity as well as waste and by-products. The power station will operate for 24 hours a day and 7 days a week.

3.4.3 Decommissioning of a Coal-Fired Power Station

The lifespan of the proposed coal-fired power station is more than 30 years. Equipment associated with this facility would only be decommissioned once it has reached the end of its economic life. It is most likely that decommissioning activities of the infrastructure of the facility discussed in this EIA would comprise the disassembly and disposal of the infrastructure. Decommissioning activities will involve disassembly of the production units and ancillary infrastructure, demolishing of buildings, removal of hazardous waste and rehabilitation of the ash dumps and site.

APPROACH TO UNDERTAKING THE SCOPING PHASE CHAPTER 4

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



The Scoping Phase for the proposed project has been undertaken in accordance with the EIA Regulations published in Government Notice 38282 of 8 December 2014, in terms of Section 24(5) of the National Environmental Management Act (NEMA; Act No 107 of 1998). This process was undertaken in support of the application for Authorisation in terms of NEMA, as well as in support of the application for a waste license in terms of the requirements of the NEM: Waste Act (Act No. 59 of 1998).

This scoping process aimed at identifying potential issues associated with all components of the proposed project, and defining the extent of studies required within the EIA. This was achieved through an evaluation of the proposed project involving specialists with expertise relevant to the nature of the project and the study area, the project proponent, as well as

on-going consultation process with key stakeholders (including relevant government authorities) and interested and affected parties (I&APs).

This chapter serves to outline the process which has been followed to date for the Scoping Phase of the EIA process.

4.1 Listed Activities

In terms of Sections 24 and 24D of NEMA, as read with Government Notices R983, R984 and R985, a Scoping and EIA process is required for the proposed project. The key listed activity contained in GN984 which triggered a full EIA process is Listed Activity 1: The construction of facilities or infrastructure, for the generation of electricity where the output is 20 megawatts or more, as the coal-fired power plant will have an electricity generation capacity of up to 1200MW. The table below contains all the listed activities in terms of the EIA Regulations of 8 December 2014 which apply, and for which an Application for Authorisation has been applied. The table also includes a description of those project activities which relate to the applicable listed activities.

Table 4.1: Listed activities in terms of the EIA Regulations of 8 December 2014 which apply to the project:

Notice No.	Activity No :	Description of listed activity
GN 983, December 2014	9	The development of infrastructure exceeding 1000 metres in length for the bulk transportation of water 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 ***A water supply pipeline will be required to be constructed to the power station site from the point of supply.***
GN 983, December 2014	11	The construction of facilities or infrastructure for the transmission and distribution of electricity -

Notice No.	Activity No :	Description of listed activity
		(i) outside urban areas or industrial complexes with a capacity of more than 33 but less than 275 kilovolts ***Construction of temporary power lines for electricity that is required during construction***
GN 983, December 2014	12	The development of— (iii) bridges exceeding 100 s where such development occurs— (a) within a watercourse; (c) if no development setback exists, within 32 m ***Drainage lines occur on the site. These could be impacted by the proposed project.***
GN 983, December 2014	19	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; (ii) the seashore; or (iii) the littoral active zone, an estuary or a distance of 100 metres inland of the high-water mark of the sea or an estuary, whichever distance is the greater ***Drainage lines occur on the site. These could be impacted by the proposed project.***
GN 983, December 2014	24	The development of— (ii) a road with a reserve wider than 13,5 meters, or where no reserve exists where the road is wider than 8 metres;

Notice No.	Activity No :	Description of listed activity
		Access roads to the site and within the site will be required.
GN 984, December 2014	1	The development and related operation of facilities or infrastructure for the generation of electricity from a non-renewable resource where the electricity output is 20 megawatts or more. ***The power station is planned to have a generating capacity of up to 1200MW***
GN 984, December 2014	4	The construction of facilities or infrastructure for the storage, or storage and handling of a dangerous good, where such storage occurs in containers with a combined capacity of more than 500 cubic metres. ***Storage of dangerous substances (such as fuel, oils, etc.) would be required at the power station.***
GN 984, December 2014	6	The development of facilities or infrastructure for any process or activity which requires a permit or licence in terms of national or provincial legislation governing the generation or release of emissions, pollution or effluent. ***A Water Use License will be required in terms of Section 21(g) - Disposal of water or water containing waste that may detrimentally affect a water resource.*** ***An Air Emissions License is required under the NEM: AQA release of emissions to atmosphere which requires a license also requires an EIA.***
GN 984, December 2014	9	The construction of facilities or infrastructure for the transmission and distribution of electricity with a capacity of

Notice No.	Activity No :	Description of listed activity
		275 kilovolts or more, outside an urban area or industrial complex. ***400kV power lines are planned to be constructed from the power station to the grid connection point.***
GN 984, December 2014	28	Commencing of an activity, which requires an atmospheric emission license in terms of section 21 of the National Environmental Management: Air Quality Act, 2004 (Act No. 39 of 2004) ***An Air Emissions License is required under the NEM: AQA for the release of emissions from the power station to atmosphere.***

Table 4.2: Listed activities in terms of the Waste Act (2013)

Notice No.	Activity No :	Description of listed activity
GN 921, 29 August 2013	Category B 7	The disposal of any quantity of hazardous waste to land ***The power station will require an ash dump. The ash produced through the power generation process is considered to be hazardous***
GN 921, 29 August 2013	Category B 10	The construction of facilities for a waste management activity listed in Category B of this schedule (not in isolation to associated activity). ***An ashing facility will be required to be constructed.***

4.2 Objectives of the Scoping Phase

This Scoping Phase aims to:

» Describe the pre-construction environment which may be affected by the proposed project.
» Identify and evaluate potential environmental (biophysical and social) impacts (direct, indirect and cumulative impacts) and benefits of all phases of the proposed development (including design, construction, operation and decommissioning) within the broader study area through a desk-top review of existing baseline data and public participation.
» Define potentially significant impacts which require further study, and the scope of studies to be undertaken within the EIA process.
» Provide the authorities with sufficient information in order to make a decision regarding the scope of issues to be addressed in the EIA process, as well as regarding the scope and extent of specialist studies that will be required to be undertaken as part of the EIA Phase of the process.
» Identify potentially sensitive environmental features and areas on the site to inform the preliminary design process of the facility.

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

» Describe the scope and nature of the proposed project.
» Describe the reasonable and feasible project-specific alternatives to be considered through the EIA process, including the "do nothing" option.
» Describe the need and desirability for the proposed project.
» Identify and evaluate key environmental issues/impacts associated with the proposed project, and through a process of broad-based consultation with stakeholders and desk-top specialist studies identify those issues to be addressed in more detail in the Impact Assessment Phase of the EIA process, as well as potentially sensitive environmental features and areas which should be considered in the preliminary design phase.
» Conduct an open, participatory, and transparent public involvement process and facilitate the inclusion of stakeholders' concerns regarding the proposed project into the decision-making process.

4.3 Overview of the Scoping Phase

Key tasks undertaken within the scoping phase included:

» Consultation with relevant decision-making and regulating authorities (at National, Provincial and Local levels).

» Submission of a completed application for authorisation in terms of Regulation 12 and 21 of Government Notice No R983 of 2014 to the competent authority (DEA).
» Undertaking of a thorough public involvement process throughout the Scoping process in accordance with Regulation 54 of Government Notice No R983 of 2010 in order to identify issues and concerns associated with the proposed project.
» Preparation of a Comments and Response Report detailing key issues raised by I&APs as part of the EIA Process (in accordance with Regulation 57 of Government Notice No R983 of 2014).
» Identification of potential environmental impacts associated with all components of the proposed project (in accordance with Regulation 28(g) of Government Notice No R983 of 2014).
» Preparation of a Draft Scoping Report and Plan of Study for EIA in accordance with the requirements of the Regulation 28 and Appendix 2 of Government Notice No R983 of 2014.

4.3.1. Authority Consultation and Application for Authorisation

As this is an energy generation project the National Department of Environmental Affairs (DEA) is the competent authority for this application. Limpopo LEDET will act as the commenting authority. Consultation with these authorities has been undertaken during the Scoping Phase. This consultation has included the following:

» Consultation with DEA regarding the proposed project and the EIA process to be undertaken.
» Submission of an integrated application for authorisation to DEA, with a copy submitted to LEDET.

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

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

The first step in the public involvement process was to identify relevant stakeholders and interested and affected parties (I&APs). This process was undertaken through existing contacts and databases, recording responses to site notices and newspaper

advertisements, as well as through the process of networking. Stakeholder groups identified include:

» Provincial and local government departments (including Limpopo LEDET, Lephalale Local Municipality, South African Heritage Resources Agency (SAHRA), Limpopo Heritage Authority (LIHRA) Department of Water Affairs (DWA), Department of Agriculture, South African Roads Agency (SANRAL), Air Emissions Licensing Authority (AELA), etc.);
» Government Structures (including the Provincial Roads Authority, municipal planning departments, etc);
» Waterberg District Municipality and Lephalale Local Municipality;
» Potentially affected and neighbouring landowners and tenants;
» Conservation authorities;
» Industry and business; and
» Community Based Organisations (CBOs) and other Non-governmental Organisations (NGOs).

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

4.3.3 Notification of the EIA Process

In order to notify and inform the public of the proposed project, invite members of the public to register as I&APs and comment on the draft scoping report, newspaper adverts were placed in the following newspapers:

» *Mogol Pos (Afrikaans Advert)*
» *The Star (English Advert)*

In addition the following notifications were issued regarding the project:

» Site notices were placed on the proposed site and in public places (such as notice boards) around the project area in accordance with the requirements of the EIA Regulations.
» Stakeholder letters were distributed to the project database notifying I&APs and stakeholders of the proposed project; and
» A Background information document (BID) was distributed in the project area and also distributed electronically.
» Written notice was provided to affected and adjacent landowners.

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

» Relevant parties from Municipalities potentially affected (directly or indirectly) by the proposed project;
» Communities and potentially affected landowners as well as adjacent landowners;
» Organs of state having jurisdiction in respect of any aspect of the activity, including:
  * Limpopo LEDET;
  * Department of Energy;
  * Department of Water Affairs and Sanitation;
  * Department of Agriculture;
  * South African Heritage Resources Agency (SAHRA) and LIHRA;
  * Conservation Authorities (SANBI etc.);
  * Department of Transport and Public Works;
  * South African National Roads Agency;
  * Local and District Municipality; and
  * Eskom.

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

4.3.4 Public Involvement and Consultation

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

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

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

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

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

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

4.3.5 Identification and Recording of Issues and Concerns

Issues and concerns raised by I&APs during the scoping process will be consolidated in a Comments and Response Report (C&RR). The Comments and Response Report will include

responses from members of the EIA project team and/or the project developer to indicate how issues will be addressed in the EIA process, or provide clarification. Where issues are raised that the EIA team considers beyond the scope and purpose of this EIA process, clear reasoning for this view will be provided.

4.3.6 Evaluation of Issues Identified through the Scoping Process

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

Specialist	Area of Expertise	Refer Appendix
Umoya Nilu	Air Quality	Appendix F
Bathusi Environmental Consulting	Biodiversity (Flora & Fauna)	Appendix G
Heritage Contracts and Archaeological Consulting CC	Heritage	Appendix H
M2 Environmental Connections CC	Hydrology	Appendix I
M2 Environmental Connections CC	Noise	Appendix J
Urban-Econ Development Economists	Socio-Economics and land use	Appendix K
Savannah Environmental	Soils and agricultural potential	Appendix L
M2 Environmental Connections (Menco)	Surface Water and wetlands	Appendix M
Afzelia	Visual and mapping	Appendix O

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

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

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

Specialist Scoping Reports are contained within Appendices C - M.

4.3.7 Public Review of Draft Scoping Report and Feedback Meeting

This is the **current stage** of the Scoping Phase. The Draft Scoping Report has been made available for public review from **20 January 2016 – 19 February 2016** at the following locations:

» Lephalale Local Municipality Public Library (Address: Cnr Joe Slovo Street and Douwater Avenue, Lephalale)
» Marapong Community Library (Address: 1456 Setlhora Street, Marapong)
» www.savannahSA.com

The public review process and details of the public meeting were advertised in regional and local newspapers such as the Mogol Pos and The Star. In addition, all registered I&APs were notified of the availability of the report and public meeting by letter (refer to Appendix E).

4.3.8 Final Scoping Report

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

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

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

- National Environmental Management Act (Act No 107 of 1998)
- EIA Regulations, published under Chapter 5 of the NEMA
- Guidelines published in terms of the NEMA EIA Regulations, in particular:
  - Integrated Environmental Management Information Series (published by DEA)

Several other Acts, standards, or guidelines have informed the project process and the scope of issues evaluated in the scoping report, and to be addressed in the EIA Phase. A listing of relevant legislation is provided in Table 4.1.

Table 4.1: Initial review of relevant environmental policies, legislation, guidelines and standards applicable to the proposed coal-fired power station project EIA

Legislation	Applicable Sections
National Legislation	
Constitution of the Republic of South Africa (Act No 108 of 1996)	» Bill of Rights (S2) » Environmental Rights (S24) – i.e. the right to an environment which is not harmful to health and well-being » Rights to freedom of movement and residence (S22) » Property rights (S25) » Access to information (S32) » Right to just administrative action (S33) » Recognition of international agreements (S231)
National Environmental Management Act (Act No 107 of 1998)	» National environmental principles (S2), providing strategic environmental management goals and objectives of the government applicable throughout the Republic to the actions of all organs of state that may significantly affect the environment » NEMA EIA Regulations (GN 982 – 985 of

Legislation	Applicable Sections
	December 2014) » The requirement for potential impact on the environment of listed activities must be considered, investigated, assessed and reported on to the competent authority (S24 – Environmental Authorisations) » Duty of Care (S28) requiring that reasonable measures are taken to prevent pollution or degradation from occurring, continuing or recurring, or, where this is not possible, to minimise & rectify pollution or degradation of the environment » Procedures to be followed in the event of an emergency incident which may impact on the environment (S30) » Appeals against decisions made by authorities (S43)
Environment Conservation Act (Act No 73 of 1989)	» National Noise Control Regulations (GN R154 dated 10 January 1992)
National Noise Control Regulations (of 10 January 1992)	» In terms of section 25 of the ECA, the national noise-control regulations (GN R154 in Government Gazette No. 13717 dated 10 January 1992) were promulgated. The NCRs were revised under Government Notice Number R. 55 of 14 January 1994 to make it obligatory for all authorities to apply the regulations. » Subsequently, in terms of Schedule 5 of the Constitution of South Africa of 1996, legislative responsibility for administering the noise control regulations was devolved to provincial and local authorities. Provincial Noise Control Regulations exist in the Free State, Western Cape and Gauteng provinces.
National Heritage Resources Act (Act No 25 of 1999)	» Stipulates assessment criteria and categories of heritage resources according to their significance (S7) » Provides for the protection of all archaeological and palaeontological sites, and meteorites (S35) » Provides for the conservation and care of cemeteries and graves by SAHRA where this is not the responsibility of any other authority (S36)

Legislation	Applicable Sections
	» Lists activities which require developers any person who intends to undertake to notify the responsible heritage resources authority and furnish it with details regarding the location, nature and extent of the proposed development (S38) » Requires the compilation of a Conservation Management Plan as well as a permit from SAHRA for the presentation of archaeological sites as part of tourism attraction (S44)
National Environmental Management: Biodiversity Act (Act No 10 of 2004)	» Provides for the MEC/Minister to identify any process or activity in such a listed ecosystem as a threatening process (S53) » A list of threatened and protected species has been published in terms of S 56(1) - Government Gazette 29657. » Three government notices have been published, i.e. GN R 150 (Commencement of Threatened and Protected Species Regulations, 2007), GN R 151 (Lists of critically endangered, vulnerable and protected species) and GN R 152 (Threatened or Protected Species Regulations). » Provides for listing threatened or protected ecosystems, in one of four categories: critically endangered (CR), endangered (EN), vulnerable (VU) or protected. The first national list of threatened terrestrial ecosystems has been gazetted, together with supporting information on the listing process including the purpose and rationale for listing ecosystems, the criteria used to identify listed ecosystems, the implications of listing ecosystems, and summary statistics and national maps of listed ecosystems (National Environmental Management: Biodiversity Act: National list of ecosystems that are threatened and in need of protection, (G 34809, GN 1002), 9 December 2011). » This Act also regulates alien and invader species.
National Environmental Management: Air Quality Act	» S18, S19 and S20 of the Act allow certain areas to be declared and managed as "priority areas".

Legislation	Applicable Sections
(Act No 39 of 2004)	» Declaration of controlled emitters (Part 3 of Act) and controlled fuels (Part 4 of Act) with relevant emission standards. » The Act provides that an air quality officer may require any person to submit an atmospheric impact report if there is reasonable suspicion that the person has failed to comply with the Act. » Dust control regulations promulgated in November 2013 may require the implementation of a dust management plan. » GNR893 of November 2013 provides listed activities which result in air emissions which may have a detrimental impact on the environment. An Air Emissions License is required to be obtained for these listed activities.
Conservation of Agricultural Resources Act (Act No 43 of 1983)	» Prohibition of the spreading of weeds (S5) » Classification of categories of weeds & invader plants (Regulation 15 of GN R1048) & restrictions in terms of where these species may occur. » Requirement & methods to implement control measures for alien and invasive plant species (Regulation 15E of GN R1048).
National Water Act (Act No 36 of 1998)	» Under S21 of the Act, water uses must be licensed unless such water use falls into one of the categories listed in S22 of the Act or falls under the general authorisation. » In terms of S19, the project proponent must ensure that reasonable measures are taken throughout the life cycle of this project to prevent and remedy the effects of pollution to water resources from occurring, continuing, or recurring. » National Government is the public trustee of the Nation's water resources (S3) » Entitlement to use water (S4) – entitles a person to use water in or from a water resource for purposes such as reasonable domestic use, domestic gardening, animal watering, fire fighting and recreational use, as set out in Schedule 1 » Duty of Care to prevent and remedy the effects of pollution to water resources (S19)

Legislation	Applicable Sections
	» Procedures to be followed in the event of an emergency incident which may impact on a water resource (S20) » Definition of water use (S21) » Requirements for registration of water use (S26 and S34) » Definition of offences in terms of the Act (S151)
National Environmental Management: Waste Act (Act No 59 of 2008)	» The Minister may by notice in the Gazette publish a list of waste management activities that have, or are likely to have, a detrimental effect on the environment. » In terms of the regulations published in terms of this Act (GN 921 of November 2013), a Basic Assessment or Environmental Impact Assessment is required to be undertaken for identified listed activities. » Any person who stores waste must at least take steps, unless otherwise provided by this Act, to ensure that (a) The containers in which any waste is stored, are intact and not corroded or in any other way rendered unlit for the safe storage of waste; (b) Adequate measures are taken to prevent accidental spillage or leaking; (c) The waste cannot be blown away; (d) Nuisances such as odour, visual impacts and breeding of vectors do not arise; and (e) Pollution of the environment and harm to health are prevented.
National Forests Act (Act No 84 of 1998)	» According to this Act, the Minister may declare a tree, group of trees, woodland or a species of trees as protected. The prohibitions provide that 'no person may cut, damage, disturb, destroy or remove any protected tree, or collect, remove, transport, export, purchase, sell, donate or in any other manner acquire or dispose of any protected tree, except under a license granted by the

Legislation	Applicable Sections
	Minister'. » GN 1042 provides a list of protected tree species.
The Hazardous Substances Act No. 15 of 1973	» This Act was promulgated to provide for the control of » substances which may cause injury or ill-health to, or death of, humans by reason of their toxic, corrosive, irritant, strongly sensitising or flammable nature. » The Hazardous Substances Act also provides for matters concerning the division of such substances or products into groups in relation to the degree of danger, the prohibition and control of the importation, manufacture, sale, use, operation, application and disposal of such substances and products.
Provincial Legislation	
Limpopo Environmental Management Act / LIMA (Act 7 of 2003)	This Act provides for the sustainable utilisation of wild animals, aquatic biota and plants; provides for the implementation of the Convention on International Trade in Endangered Species of Wild Fauna and Flora; provides for offences and penalties for contravention of the Act; provides for the appointment of nature conservators to implement the provisions of the Act; and provides for the issuing of permits and other authorisations. Amongst other regulations, the following may apply to the current project: » Boundary fences may not be altered in such a way as to prevent wild animals from freely moving onto or off of a property; » Aquatic habitats may not be destroyed or damaged; » The owner of land upon which an invasive species is found (plant or animal) must take the necessary steps to eradicate or destroy such species. The Act provides lists of protected species for the Province.

Legislation	Applicable Sections
Guideline Documents / Standards / Plans	
South African National Standard (SANS) 10328, Methods for environmental noise impact assessments in terms of NEMA No. 107 of 1998	» Prediction of impact that noise emanating from a proposed development would have on occupants of surrounding land by determining the rating level. » Noise limits are based on the acceptable rating levels of ambient noise contained in SANS 10103
South African Bureau of Standards (SABS)	» Four South African Bureau of Standards (SABS) scientific standards are considered relevant to noise from a Power Station. They are: * SANS 10103:2008. 'The measurement and rating of environmental noise with respect to annoyance and to speech communication'. * SANS 10210:2004. 'Calculating and predicting road traffic noise'. * SANS 10328:2008. 'Methods for environmental noise impact assessments'. * SANS 10357:2004. 'The calculation of sound propagation by the Concave method'. » The relevant standards use the equivalent continuous rating level as a basis for determining what is acceptable. The levels may take single event noise into account, but single event noise by itself does not determine whether noise levels are acceptable for land use purposes. The recommendations that the standards make are likely to inform decisions by authorities, but non-compliance with the standards will not necessarily render an activity unlawful per se.
SANS 69 - South African National Standard - Framework for setting & implementing national ambient air quality standards, SANS 1929 - South African National Standard - Ambient Air Quality - Limits for	» The South African Bureau of Standards (SABS), through a technical committee, developed ambient air quality limits, based on international best practice for particulate matter less than 10 µm in aerodynamic diameter (PM10), dust fallout, sulphur dioxide, nitrogen dioxide, ozone, carbon monoxide, lead and benzene.

Legislation	Applicable Sections
common pollutants.	» These ambient limits were derived from international best practice and what was regarded to be achievable in the South African context, taking both the natural environment and socio-economic status into account. The SANS limits informed the newly promulgated SA Standards
IFC Air Emissions and Ambient Air Quality. Environmental, Health and Safety Guidelines. Washington DC, International Finance Corporation	» The World Bank group through the IFC has emission guidelines for power plants. These guidelines are applicable to new facilities. Please note that the emission values are normalised to 6% excess oxygen, while the South African standards are normalised to 10% excess oxygen.
The Equator Principles (June 2003)	» The Equator Principles (EPs) are a voluntary set of standards for determining, assessing and managing social and environmental risk in project financing. Equator Principles Financial Institutions (EPFIs) commit to not providing loans to projects where the borrower will not or is unable to comply with their respective social and environmental policies and procedures that implement the EPs. » The Equator Principles were developed by private sector banks. The banks chose to model the Equator Principles on the environmental standards of the World Bank and the social policies of the International Finance Corporation (IFC).

4.5 Assumptions and Limitations of the EIA

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

- It is assumed that the development site identified represents a technically suitable site for the establishment of a coal-fired power plant and associated infrastructure.
- This Scoping Report has been prepared based on information available at the time of doing the study. More detailed information will be available for consideration in the EIA phase of the process.

SCOPING OF POTENTIAL ISSUES CHAPTER 5

This chapter serves to describe environmental issues and potential impacts (direct, indirect and cumulative impacts) that have been identified to be associated with the proposed power plant and associated infrastructure from the desk-top studies undertaken, and to make recommendations for further studies required to be undertaken in the EIA phase. In this regard is contained within the specialist reports contained within Appendices A – H.

Environmental issues associated with **construction and decommissioning** activities associated with the power station and associated infrastructure may include, among others, soil erosion, impacts on biodiversity, and impacts on the social environment and current land use. Environmental issues specific to the **operation** of a coal fired power station include air quality impacts, noise impacts and visual impacts.

Sections 4.1 and 4.2 provide a summary of the findings of the scoping study undertaken for the construction and operation phases of the proposed project respectively. Impacts of the proposed facility are evaluated, and recommendations are made regarding further studies required within the EIA Phase of the process.

The **cumulative impacts** associated with the proposed power plant and associated infrastructure are expected to be associated with the scale of the project as well as with the presence of other similar developments within the region. The potential for these impacts is described in this chapter of the scoping report.

5.1 Evaluation of potential impacts associated with the Construction Phase

5.1.1 Potential impact on Flora and Terrestrial Fauna

The proposed activity implies the loss of natural habitat and no impacts of a beneficial nature on the floristic environment are likely to result. Based on a generic list of impacts associated with this type of development, three categories of impacts are likely to result, namely, direct impacts, indirect impacts and impacts of a cumulative nature. The largest extent of impacts within the floristic environment is likely to result due to direct (physical) effects of land clearing activities and vegetation loss. Direct impacts include any effect on the vegetation, including locally endemic species, populations or individual species of conservation importance, as well as on overall species richness, diversity and abundance. These effects include impacts on genetic variability, population dynamics, overall species existence or health and on habitats important for species of conservation consideration. Impacts on sensitive, restricted or protected habitat types are included in this category, but only on a local scale.

In contrast, indirect impacts are not always immediately evident and can consequently not be measured at a specific moment in time. The extent of the effect is frequently at a scale that is larger than the actual site of impact, but usually restricted to a local scale (and not regional). A measure of estimation, extrapolation, or interpretation is therefore required to evaluate the importance of these impacts and is usually a factor of the sensitivity of the receiving surrounding environment. This type of impact typically results in adverse effects or deterioration of surrounding areas due to uncontrolled, development related activities. In addition, the ecological functionality of the immediate and surrounding area could be adversely affected by development, with particular reference to the ecological interaction between plants and animals.

Lastly, impacts of a cumulative nature places direct and indirect impacts of this projects into a regional and national context, particularly in view of similar or resultant developments and activities in the region. Impacts of a cumulative nature typically adversely affect the local and regional conservation status of plant taxa and protected habitat types as well as local and regional fragmentation levels, but also issues such as increased exploitation due to the exacerbation of anthropogenic activities on a local scale.

Issue	Nature of Impact	Extent
Direct impacts on flora	Anticipated direct impacts on flora include: » loss of plant taxa (individuals, stands, populations) of conservation importance	Local

	(threatened taxa); » loss of plant taxa of conservation concern (declining status, provincially protected taxa); » loss of natural vegetation (physical modifications, removal, damage); » local depletion of plant taxa and reduction of phytodiversity; and » loss of atypical, sensitive, conservation important habitat types or ecosystems of restricted abundance.	
Indirect impacts on flora	Anticipated indirect impacts on flora include » decreased habitat quality of surrounding areas due to peripheral impacts such as spillages, litter, increased erosion, contaminants, etc.; » reduced ecological functionality (including fire, erosion); » decreased aesthetic appeal of the landscape; and » the introduction of invasive, exotic and encroacher plant species.	Local
Cumulative impacts on flora	Cumulative flora impacts typically include the following: » Increased exploitation of natural resources due to increased human presence and resource requirements.	Local
Direct impacts on terrestrial fauna	Anticipated direct impacts of the proposed project on the terrestrial fauna of the study area include: » Loss of untransformed habitat suitable for a diversity of naturally occurring fauna species; » Degradation of untransformed habitat suitable for a diversity of naturally occurring fauna species; » Depletion of faunal diversity, including taxa, assemblages and communities on a local scale; » Alteration of faunal assemblage and community structures; » Direct impacts on fauna taxa of conservation importance; » Direct losses of fauna habitat potentially suitable for fauna taxa of conservation importance; » Loss, or degradation of essential faunal habitat refugia, such as abandoned termitaria and dead standing trees; and » Loss and alteration of ecological processes and ecosystem services on a local scale.	Local

Indirect impacts on terrestrial fauna	Anticipated indirect impacts of the proposed project on the terrestrial fauna of the study area and surrounds include: » Loss of untransformed habitat in areas surrounding the project area; » Degradation of untransformed habitat in areas surrounding the project area; » Depletion of faunal diversity, assemblages and communities in areas surrounding the project area; » Alteration of faunal assemblage and community structures in areas surrounding the project area; » Localised impacts on movement/ migration patterns of animals and ecological interaction and processes; and » An increase in edge effects in the project area and immediate surrounds.	Regional
Cumulative impacts on terrestrial fauna	Anticipated cumulative impacts of the proposed project on the terrestrial fauna of the region include: » Cumulative losses of remaining natural faunal habitat; » Cumulative degradation of remaining natural faunal habitat on a regional scale; » Cumulative depletion of faunal taxa, assemblages and communities on a regional scale, with specific reference to the conservation status of certain fauna taxa; » Cumulative alteration of faunal abundance, assemblages and communities on a regional scale; » Cumulative fragmentation and isolation of natural faunal habitats on a regional scale; and » Loss and alteration of ecological processes and ecosystem services on a regional scale	
Gaps in knowledge and assumptions » Lack of site-specific, and detailed biological information from the site alternatives and site locations render the estimation of sensitivity and Red Data probabilities extremely problematic. This weakness was overcome, to some extent, by applying the Precautionary Principle throughout the process. Similarly, seasonality plays an important role in the ecology of this environment, but the exact nature of seasonal variability in presence, abundance and activity levels; most of these aspects, could not be factored into the decision process. » Regional and national databases, although containing some information on certain biological disciplines, exhibit a severe lack of data. Invertebrates, herpetofauna, and vegetation, to some extent, represent disciplines where a high paucity is noted in available database. Across the spectrum of biological disciplines, the lack of site-specific data relating to taxa of conservation concern and importance is noted, representing a		

severe limitation in applying the decision process.

» The need for adequate field deployment and discipline specific surveys are emphasised.

Recommendations regarding the proposed sites

1. Flora:

Power Plant Alternatives

Option 1 – Graaffwater/ Goedehoop Option:

While the Graaffwater farm (north) comprises entirely of natural, untransformed woodland, the vegetation on the Goedehoop farm (south) has been extensively transformed through mining of coal resources (Exxaro Grootegeluk Mine). For the purpose of this assessment, it is assumed that these areas will not be considered for the development of a power plant as mining activities are expected to expand towards the north, further into the Goedehoop farm. It is therefore assumed that the largest extent of the proposed power plant will be placed within the Graaffwater farm.

Natural vegetation of both these farms comprises the typical Limpopo Sweet Bushveld vegetation and minimal physiognomic and topographical variability is noted across the farms; a moderate floristic sensitivity is typically ascribed to this vegetation type. However, the northern part of the Graaffwater farm comprises of alluvial floodplains, which are typically attributed a moderate-high floristic sensitivity. These areas form part of a larger alluvial floodplain system and the ecological functionality of the system will probably be affected adversely by the development of a power plant in the vicinity to these habitat types. The complete loss of these areas will be regarded as a significant impact on the biological environment.

Aspects that would be considered beneficial in terms of suitability would be the proximity to existing nodes of development; the concentration of, particularly, industrial developments in delimited nodal areas is regarded beneficial and will limit cumulative impacts to some extent.

This option is regarded suitable for the proposed development of a coal-fired power plant, but the placement of the site and appurtenant infrastructure

will require detailed micro-siting and considerations in order to prevent impacts on the natural environment. In particular, alluvial habitat types toward the north of the farm Graaffwater need to be afforded high protection levels. The loss of natural woodland habitat is unlikely to result in significant impacts on a local and regional scale, but the EIA process need to consider the abundance of protected tree species as well as other plant taxa of conservation concern.

This alternative is regarded the preferred option, mainly as a result of lower (preliminary) habitat sensitivities of these farms as well as the proximity to existing areas of anthropogenic transformation.

Option 2 – Eendrachtpan/ Gelykebult/ Vooruit Option:

The three farms in this site alternative comprises of extensive areas of untransformed, natural woodland habitat, also exhibiting habitat variation in the presence of alluvial floodplain habitat. The presence of alluvial habitat in the centre parts of the alternative, particularly the farm Vooruit (south) will likely result in unavoidable and significant impacts on these floristic receptors, ultimately compromising the ecological integrity and functionality of the system on a local scale.

While no habitat of particular sensitivity is noted on the northern farm (Eendrachtpan), the spatial distance from other anthropogenic activities implies that the development within these parts will likely result in significant cumulative and indirect impacts; requiring extensive appurtenant linear infrastructure.

Depending on the spatial requirements for the power plant and other infrastructure, several possibilities within the middle farm (Gelykebult) and northern farm (Eendrachtpan) can be explored, as parts of these farms are regarded moderately suitable for the proposed development. However, expected impacts associated with this Option (3 farms collectively) will in all likelihood be of higher significance compared to Option 1.

Ashing Facility Alternatives

Option 1 – Goedehoop Option

The uniform nature of natural habitat within this option will ultimately render the perceived floristic sensitivity moderate. In addition, and probably the most important consideration, would be the proximity to the existing Exxaro Grootegeluk Mine (transformed/ industrial areas). The proximity to transformed areas will ultimately imply significantly lower cumulative impacts on the biological/ floristic environment.

The possibility of 'in-pit ashing' should be explored exhaustively. This is recommended in spite of the known legal ramifications and implications of shared responsibilities, etc. The benefit to the environment is expected to be enormous should 'in-pit ashing' be achieved. Ultimately, the Goedehoop Option is recommended as the most suitable option as an ashing facility.

Option 2 – Appelvlakte Option

This alternative appears to comprise of extensive areas of existing transformation. However, it is assumed that these areas will not be considered for the proposed ashing facility due to these being associated with existing mining activities, and therefore only remaining areas of natural habitat is considered for the activity. While the presence of alluvial wetland habitat is noted in the central part of the farm, these areas are already compromised to some extent by existing developments; the proposed ashing facility is therefore likely to be situated in areas of the typical woodland (east). The loss of these areas is not expected to be more deleterious compared to other options. However, the proximity to existing industrial developments will limit cumulative impacts to some extent. This option is therefore recommended as the second preferred alternative.

Option 3 – Jakalsvlei Option

The Jakalsvley Option represents, depending on the ultimate location of the power plant, the most remote alternative as an ashing facility, representing a significant disadvantage in terms of suitability. In terms of the expected loss of natural habitat, it is likely to be similar in extent compared to other alternatives such as Kalkvlakte, Elandsvley, and Vooruit. However, cumulative and indirect impacts associated with extensive overland conveyors and other appurtenant infrastructure, will ultimately render this option as 'not suitable' as an ashing facility. Limited habitat variation can be observed on this farm, but these variations do not include any significant wetland, or alluvial, habitat types. Therefore, protected tree species that are strongly associated with alluvial habitat types (*Combretum apiculatum*, *Spirostachys africana*, etc.) are unlikely to be encountered in

large quantities.

The remoteness from, and absence of other anthropogenic transformed areas and (assumed) pristine nature of dominant terrestrial woodland vegetation within this site, ultimately renders this the least preferred option as an ashing facility.

Option 4 – Kalkvlakte & Elandsvley Option

Similar to the Jakalsvley farm (Option 3), areas of natural terrestrial woodland are extensive and unaffected by local industrial developments. It can therefore be assumed, with a relatively high degree of certainty, that these woodland habitats, although extremely homogenous, are relatively pristine. Depending on the ultimate location of the proposed ashing facility within the site, these farms will be located some distance from the power plant, implying linear infrastructure (conveyors) of considerable length. Cumulative and indirect impacts are therefore likely to be of a high significance.

These farms therefore represent the third-least preferred alternative, marginally more preferable compared to Option 5 (Vooruit) because of the homogenous nature of the terrestrial habitat on Vooruit.

Option 5 – Vooruit Option

The visual disparity (physiognomic appearance) in the vegetation indicates a strong hydromorphic nature of extensive parts of this farm. These areas, although unlikely to comprise of significantly sensitive floristic taxa, represents a particularly important contribution to ecological habitat diversity and aspects that will ultimately relate to faunal diversity as well.

Proximity to areas of existing transformation is disadvantageous for this alternative. Depending on the actual size that will be required for the ashing facility, the possibility of excluding sensitive floristic receptors could be investigated. However, considered on a local scale, this option is presented as the second least preferred alternative as an ashing facility.

Power Evacuation Alternatives

Alternative 1 – Matimba – Witkop Loop-In:

Being situated within less extensive areas of natural woodland vegetation, the expected impact on sensitive floristic attributes is likely to be less significant compared to Alternative 2. In addition, indirect and cumulative impacts will likely be of lower significance compared to Alternative 2. It would appear that use could be made of existing corridors of transformation, limiting the potential direct impacts to some extent. This alternative is therefore considered the preferred option and localised areas of sensitivity can be avoided through local realignment options.

Alternative 2 – Matimba – Medupi Loop-In:

The extent of natural woodland habitat that is likely to be lost, as well as the remote nature of the proposed line to the east of existing areas of transformation, implies cumulative and indirect impacts that are likely to be of higher significance compared to Alternative 1. This alternative is therefore the least preferred option.

2. Fauna:

Power Plant Alternatives

Two options are presented as power plant alternatives for the project:

1) Option 1: Graaffwater – Goedehoop; and

2) Option 2: Eendrachtpan – Gelykebult – Vooruit.

Extensive parts of Option 1 represent transformed faunal habitat of low sensitivity (Goedehoop farm – Exxaro Grootegeluk Mine) as well as significant areas of untransformed terrestrial woodland habitat of undetermined sensitivity (mostly on Graaffwater farm). In the northern parts of Option 1, faunal wetland habitat (high faunal sensitivity) is included on the farm Graaffwater. Option 1 is located close to the current zones of habitat transformation and fragmentation at the hand of mining and power generation; keeping impacts of the proposed power plant construction and operation to Option 1 would limit cumulative impacts in the region.

Option 2 includes areas of untransformed terrestrial woodland habitat (undetermined faunal sensitivity) and faunal wetland habitat (high faunal sensitivity) that are well linked to other natural faunal habitats in the region. Option 2 is also positioned far from current developments and associated habitat loss and fragmentation than Option 1. Option 2 does not include the significant transformed faunal habitat fragments of Option 1.

Based on the ecological attributes, faunal habitats and associated faunal sensitivities and geographic locations relative to current developments and associated ecological impacts of the two Options presented, Option 1 is regarded more suitable regarding the construction and operation of a power plant.

<u>Ashing Facility Alternatives</u>

Five options are presented as ashing facility alternatives for the project, namely:

1) Option 1: Goedehoop;

2) Option 2: Appelvlakte;

3) Option 3: Jackhalsvley;

4) Option 4: Kalkvlakte and Elandsvley; and

5) Option 5: Vooruti.

Option 1 includes significant areas of transformed faunal habitat (low faunal sensitivity) and is located close to mining and power generation developments. Option 1 includes only seemingly insignificant untransformed faunal habitat fragments.

Option 2 includes significant fragments of transformed faunal habitat (low faunal sensitivity) and untransformed terrestrial woodland habitat (undetermined faunal sensitivity). The untransformed faunal habitat of Option 2 is relatively isolated and ecological linkage is limited by the Marapong residential area and Grootegeluk Mine. As is the case with Option 1, Option 2 is located close to current development zones.

Option 3 is characterised by untransformed terrestrial woodland habitat (undetermined faunal sensitivity) and faunal wetland habitat (high faunal sensitivity) that is well linked to large areas of natural faunal habitat in the region. It is not positioned close to any current development or areas of transformed faunal habitat.

Likewise, Option 4 is characterised by untransformed terrestrial woodland habitat (undetermined faunal sensitivity) that is well linked to large areas of natural faunal habitat in the region. It is located a significant distance from any current developments and faunal habitat transformation.

Option 5 is located close to the current mining, power generation activities of the region, and includes significant portions of untransformed terrestrial woodland habitat (undetermined faunal sensitivity) and faunal wetland habitat (high faunal sensitivity). The natural faunal habitats of Option 5 are reasonably well linked to other areas of ecological diversity, but are limited by the proximity to the Grootegeluk Mine and associated infrastructure.

Based on these ecological and faunal habitat traits of the five Options presented, the following preliminary, estimated suitability ranking is assigned:

1) Most suitable option: Option 1;

2) Second most suitable option: Option 2;

3) Third most suitable option: Option 5;

4) Second least suitable option: Option 4; and

5) Least suitable option: Option 3.

Power Evacuation Alternatives

Two options are presented as power evacuation alternatives for the project:

1) Option 1: Matimba – Witkop Loop-in; and

2) Option 2: Matimba – Medupi Loop-in.

Option 1 intersects significant areas of untransformed terrestrial woodland habitat (undetermined faunal sensitivity) and faunal wetland habitat (high faunal sensitivity) that is well linked to large areas of natural faunal habitat in the region. It extends into a region of natural faunal habitat that is significantly geographically removed from the existing industrial development of opencast coal mining and power generation as well as residential development. It does not include any significant transformed faunal habitat (low faunal sensitivity) fragments.

Option 2 includes significant areas of transformed faunal habitat (low faunal sensitivity) and some habitat fragments of untransformed terrestrial woodland (undetermined faunal sensitivity). Most of the natural faunal habitat fragments included in Option 2 is limited in ecological linkage by Marapong, Grootegeluk Coal Mine and the two coal-fired power stations, Matimba and Medupi. Most of Option 2 is spatially located in proximity to existing developments and areas of significant faunal habitat transformation and fragmentation.

Based on these faunal habitat and ecological characteristics of the two Options presented, the preliminary assessment indicates that Option 2 is regarded the most suitable option for power evacuation from the proposed power station. It should be noted that, to some extent, the ultimate recommendation would be dependent upon the final location of the power plant footprint.

Description of expected significance of impact

The ecological impacts during construction are likely to be local – regional in extent, of low – high probability and of a long-term duration. The impacts will potentially be of high significance which should be reduced to low-moderate after mitigation.

Recommendations for further study

» Detailed flora and fauna surveys will be undertaken during the EIA phase
» Phytodiversity Measurements
» Data processing

5.1.2 Potential impact on birds

Potential impacts of the construction of the proposed development on bird life in the area include: habitat loss through the establishment of the facility, disturbance and displacement of birds from their preferred foraging, roosting and breeding areas and flight paths.

Issue	Nature of Impact	Extent
Direct impacts on avifauna	Direct impacts may include » Loss of important habitat containing high avifaunal diversity; » Subsequent transformation of adjacent habitat due to restricted management procedures; » Displacement of bird species, especially large-bodied birds of prey and large terrestrial bird species;	Local - regional

	» Changes in the community structure due to habitat fragmentation (e.g. roads, loss of closed-canopy woodland) and habitat loss; » Loss of sensitive habitat and subsequent loss of threatened and near-threatened species; » Loss of daily migration/foraging corridors.	
Indirect impacts on avifauna	Indirect impacts are mostly impacts that are unseen and often only expressed during a later stage of the project. These could include: » Loss of dispersal corridors owing to habitat alteration; » Subsequent habitat change and changes to the local avifaunal community structure and composition (mainly generalists and secondary species); and » Urban sprawl based on "job-seeking" opportunities leading to the localised depletion of natural resources and direct persecution of bird taxa.	Regional
Residual impacts on avifauna	These impacts are often related to the "after-effect" when the project is decommissioned. It mainly pertains to rehabilitation efforts and how these relate to residing avifaunal communities. Therefore, it is often witnessed that early successional habitat contributes to the establishment of a transient avifaunal community.	Regional
Cumulative impacts on avifauna	These include cumulative fragmentation and isolation of avifaunal habitats on a regional scale; and » Loss and alteration of ecological processes and ecosystem services on a regional scale	Local - regional
Gaps in knowledge and assumptions » Lack of site-specific, and detailed biological information from the site alternatives and site locations render the estimation of sensitivity and Red Data probabilities extremely problematic. This weakness was overcome, to some extent, by applying the Precautionary Principle throughout the process. Similarly, seasonality plays an important role in the ecology of this environment, but the exact nature of seasonal variability in presence, abundance and activity levels; most of these aspects, could not be factored into the decision process. » Regional and national databases, although containing some information on certain biological disciplines, exhibit a severe lack of data. Across the		

spectrum of biological disciplines, the lack of site-specific data relating to taxa of conservation concern and importance is noted, representing a severe limitation in applying the decision process.

» The lack of site-specific as well as discipline-specific data from the proposed site alternative and site locations represents a severe gap in knowledge. The main threat stems from the inadvertent recommendation of a site and the eventual discovery of an aspect that should have rendered the alternative as a 'No-Go' option. Without adequate field deployment and surveys, the presence/ absence of conservation important taxa within certain areas cannot be predicted to acceptable. For the scoping investigation, every effort was however made to minimise this particular eventuality. While these types of surveys are not a requirement for scoping level investigations, the need for adequate field deployment and discipline specific surveys are emphasised.

Recommendations regarding the proposed sites

From a bird impact perspective, for any area or option/alternative to be regarded as a suitable candidate it must:

a) hold the least number of vegetation types, in particular vegetation in pristine condition;
b) hold the least number of wetland/drainage line/rivers;
c) corresponds to an area with low reporting rates for bird species considered to be threatened or "near-threatened";
d) be of small surface area and; and
e) the proposed electrical infrastructure should follow existing servitudes (or transmission lines) wherever possible.

<u>Power Plant Alternatives</u>

Two options are presented as power plant alternatives for the project:

1. Option 1: Graaffwater – Goedehoop; and
2. Option 2: Eendrachtpan – Gelykebult – Vooruit.

A large section of Option 1 represents transformed habitat, which also corresponds to the existing Exxaro Grootegeluk Mine. However, the northern section of as farm Graaffwater encompasses areas of ephemeral wetland habitat, which could contribute towards avifaunal diversity. Option 1 is in most instances located in close proximity to habitat where transformation is current. It is therefore argued that Option 1 is "more suitable" since it is

best practice to "keep current impacts" spatially clustered.

Option 2 includes areas of untransformed woodland habitat, which show a high ecological connectivity with similar adjacent habitat. Option 2 is also less subjected to current transformation events when compared to Option 1.

Based on the above, Option 1 is regarded a "more suitable" alternative than Option 2.

Ashing Facility Alternatives

Five options are presented as ashing facility alternatives for the project, namely:

1. Option 1: Goedehoop;
2. Option 2: Appelvlakte;
3. Option 3: Jackhalsvley;
4. Option 4: Kalkvlakte and Elandsvley; and
5. Option 5: Vooruit

Option 1 is located in close proximity to the existing Grootegeluk Mine and is regarded as the more suitable alternative for the development of an ashing facility based on current transformation events.

Option 2 includes significant areas of transformed and woodland habitat (undetermined faunal sensitivity). A section of woodland on Option 2 is

isolated and by the Marapong residential area and Grootegeluk Mine.

Option 3 is largely untransformed and includes areas of ephemeral wetland habitat. It exhibits a high ecological connectivity with adjacent woodland and is not located close to any existing development.

Option 4 is in many instances similar to Option 3 and characterised by extensive untransformed woodland. It is located a significant distance from any existing development.

Although Option 5 is located proximal to the existing mining and power generation activities, it also comprehends significant tracts of untransformed woodland and ephemeral wetland habitat. However, ecological connectivity (in part) is constrained by its proximity to the Grootegeluk Mine.

Based the above Option 1 is the most suitable alternative, followed by Option 2 and Option 5.

Power Evacuation Alternatives

Two options are presented as power evacuation alternatives for the project:

1) Option 1: Matimba – Witkop Loop-in; and

2) Option 2: Matimba – Medupi Loop-in.

Option 1 intersects significant areas of untransformed woodland, which could also provide habitat for large terrestrial bird species that are susceptible towards power line collisions. Compared to Option 2, it is significantly distal to existing industrial development.

Option 2 includes areas of transformed habitat and some fragments of untransformed woodland. It also traverses woodland that is modified by activities relative to the Marapong area, Grootegeluk Coal Mine and the two Matimba and Medupi power stations.

Based on the above, the preliminary assessment indicates that Option 2 is regarded the most suitable option for power evacuation. However, it should be emphasised that the final recommendation will be dependent upon the outcome of a detailed baseline survey.

Description of expected significance of impact

The avifunal impacts during construction are likely to be local – regional in extent, of low – high probability and of a long-term duration. The impacts will potentially be of high significance which should be reduced to low-moderate after mitigation.

Recommendations for further study

The following methods are recommended: for the EIA phase

» Point-count surveys
» Random surveys
» Detecting patterns in diversity and composition
» Nocturnal bird surveys
» Playback/broadcasting of bird vocalisations
» Construction of bird guilds

5.1.3 Potential impact on agricultural potential and soil resources

The entire area for the proposed Power Plant and associated infrastructure (including ash dump and power line) is Land Class V – i.e. little or no erosion hazard but has other limitations which are impractical to remove that limit its use mainly to grazing and habitat for wildlife. These limitations restrict the kind of plants that can be grown and prevent normal tillage of cultivated crops; it is nearly level; some occurrences are wet or frequently

flooded; others are stony, have climatic limitations, or have some combination of these limitations.

Moisture availability is an aridity index which provides desktop understanding of the susceptibility to dryness and desertification across an area. Information may be processed to assume with what degree of ease potential evapotranspiration takes place whilst bearing in mind measured rainfall set against potential evaporation, providing clarity and practical understanding of the plant available water. The study area has a moisture availability of class 4 which equates to moderate to severe limitations accompanied by low and unreliable rainfall. Temperature and rainfall variations are high and restrict regular crop production. Various factors have constraints that prohibit crop production and lead to insignificant agricultural activities except that of grazing. Although the study area is currently classified as grazing land, there is evidence that the capacity to support livestock is very small and surrounding areas would suffice for grazing alternatives were this facility to be developed. Dust generation from construction would be a significant and ongoing impact. Soil erosion is very likely and never avoidable. Due diligence would need to be taken in order to prevent water erosion.

Issue	Nature of Impact	Extent
Loss of agricultural land associated with construction activities	Direct occupation by infrastructure, including roads, will result in loss of agricultural land for the duration of the project. This will remove affected portions of land from agricultural production.	Local
Land surface disturbance and alteration as a result of construction activities	Uncontrolled erosion may cause loss and deterioration of soil resources.	Local
Loss of topsoil as a result of construction activities	Poor topsoil management (burial, erosion, etc.) during construction can result in the loss of topsoil from the site. This may result in soil profile disturbance (excavations etc.) and resultant decrease in that soil's agricultural suitability.	Local

Gaps in knowledge and assumptions

The gaps in knowledge at this stage in the study are minor. It is unknown whether or not there has been any change in land use since the 2007 AGIS survey that is used as reference had been done.

Recommendations regarding the proposed sites

As there appears to be no significant difference between the sites from an agricultural potential and soil resources perspective, there is no preference at this stage regarding the various alternatives proposed. No fatal flaws to the proposed project have been identified at this stage. The final recommendation will be dependent upon the outcome of detailed studies including investigation of the current land use on the various farms.

Description of expected significance of impact

Impacts would be local in extent, long in duration and of moderate intensity. Overall significance would be negligible to low.

Recommendations for further study

The plan of study for the EIA phase assessment includes a field investigation of the site including all different soils classes and land types. Through completing a comprehensive field investigation it is possible to obtain more information and ground truth all uncertainties. This can assist in describing the land type and soil properties as well as understanding the specific soil and agricultural conditions on site.

The method of undertaking the EIA phase assessment will include the following:

» Hand auger sampling will be undertaken, assisting in understanding the environment and specific soil conditions.
» Detailed surveying of the topography, current drainage patterns and lines will enable specialist input of any potentially significant impacts e.g. erosion potential and present status thereof.
» No chemical analysis of samples is necessary to further determine soil status.

A detailed agricultural potential study is not needed. Complete conclusions regarding potential land degradation and erosion potential can be made through the above-mentioned field investigations.

It is recommended that in the next phase of study on site, details be gathered from current land owners and farmers. With assistance from these parties information may be obtained to ascertaining agricultural importance and use of the site. The EIA phase will allow for a field investigation to clarify and determine areas of acceptable and defendable loss as the desktop study revealed a fairly uniform landscape.

2.1.4 Potential impacts on heritage and fossil resources

Excavations required for the installation of foundations, road construction and clearing for lay-down areas could disturb or destroy features of cultural heritage interest. These potential impacts have been assessed through the completed heritage specialist study.

This scoping study revealed that pans with exposed calcrete could contain Middle Stone Age sites and, although unlikely, it might be possible to find Late Iron Age sites/material belonging to the Letsibogo ceramic facies that dates to between 1550 AD and 1750 AD in the area. Two farmhouse complexes are indicated on Google images of the study area and if older than 60 years these structures are protected by legislation. Several grave sites are on record for the wider region and similarly grave sites can be expected in the study area. Every site is relevant to the Heritage Landscape, but it is anticipated that few if any, have conservation value.

Construction of the proposed Tshivhaso Coal-fired Power Plant and associated infrastructure near Lephalale, Limpopo Province, will involve substantial excavations into the underlying bedrocks as well as large-scale ground clearance (e.g. for access roads). The great majority of the study area to the north of the existing Grootegeluk opencast mine overlies Karoo Supergroup sedimentary rocks (Eendragtpan and Clarens Formations) as well as Lebombo Group volcanics that are of low palaeontological sensitivity. Significant impacts on local palaeontological heritage resources are not anticipated here. This assessment applies to adjoining farms Graafwater 456, Goedehoop 457, Eendragpan 451, Gelykbult 455, Vooruit 449, Kalkvlakte 256, Elandsvley 453 and Appelvlakte 448. It is noted that farm Eendragtpan 451 may be of special geological (stratigraphic) heritage significance, however, as the probable type area of the eponymous Eendragtpan Formation (supporting documentation not available). The two power plant grid connection options under consideration (Fig. 2, blue lines) are both short with a small anticipated footprint (i.e. pylon footings). Although they traverse potentially fossiliferous Karoo Supergroup rocks, direct impacts on subsurface bedrocks are rated as negligible.

Issue	**Nature of Impact**	**Extent**
Archaeology - Loss of / damage to archaeological resources.	The construction phase of the project could directly impact on surface and subsurface archaeological sites.	Local

Damage to historical sites	The construction of the proposed project could directly impact on marked and unmarked graves.	Local
Destruction / disturbance burials and cemeteries	The construction and operation of the proposed project could directly impact on marked and unmarked graves.	Local

Gaps in knowledge and assumptions

The study area was not subjected to a field survey. It is assumed that information obtained for the wider area is applicable to the study area.

Recommendations regarding the proposed sites

Based on the current information obtained for the area at a desktop level it is anticipated that archaeological sites that occur within the proposed development area will be of low heritage significance and have a Generally Protected B (GP.B) field rating and it should be possible to mitigate these sites. However pans and shelters could be archaeologically sensitive (due to archaeological deposit and rock art) and should rather be avoided. These sites are provisionally given a field rating of Local Significance (LS) or Generally Protected A (GP.A). Elements relating to the build environment are expected in the study area and it is anticipated that these will be of local significance only. These assumptions will have to be tested by a field visit.

As there appears to be no significant difference between the sites from heritage perspective, there is no preference at this stage regarding the various alternatives proposed. No fatal flaws to the proposed project have been identified at this stage. The final recommendation will be dependent upon the outcome of detailed studies recommended.

Description of expected significance of impacts

Impact significance is unknown. It could be low but potential exists for impacts to be of medium-high significance in localise areas. Best overall estimate is low-medium. Duration of impacts would be permanent. Probability is low.

Recommendations for further study

A full assessment must be completed for the site. Impacts on heritage sites, archaeology and palaeontology must be assessed in terms of the EIA Regulations, National Heritage Resources Act, and all other relevant guidelines and legislation. The following is recommended:

- Conduct a Phase 1 Archaeological Impact Assessment (AIA) to determine specific sites which might be impacted. Map, record and photograph any heritage sites or objects offered protection by the NHRA or any other object or place considered significant.
- Produce an illustrated report describing the findings, defining areas of sensitivity, any further work required and suggesting mitigatory actions for reducing impacts to heritage resources.
- The isolated portion of the study area on Jakhalsvley 309, to the west of the Grootegeluk opencast mine, overlies bedrocks of the Grootegeluk and Swartrant Formations (Karoo Supergroup). These sedimentary successions are correlated with the Ecca Group of the Main Karoo Basin and are likewise known to be associated with rich plant fossil assemblages of the Glossopteris Flora of Gondwana. Palaeofloras of the Waterberg Coalfield are still very poorly known, despite a history of large-scale mining here. Substantial excavations into, or sealing-in of, the bedrocks on Farm Jakhalsvley 309 may have significant negative impacts on possible fossil-rich horizons in the subsurface (e.g. coal seams and associated sedimentary partings). Should this site be selected for the proposed ash dump, a field-based palaeontological assessment would be required prior to development in order to determine if any fossiliferous surface exposures will be impacted. Specialist palaeontological mitigation may then be required during the construction phase of the ash dump (See Almond 2015). Provided that the recommended mitigation measures are carried through, it is likely that negative impacts of the proposed mining on local fossil resources will be substantially reduced. Furthermore, they will be partially offset by the positive impact represented by increased understanding of the palaeontological heritage of the coal measures of Limpopo.

5.1.5 Potential impacts on sensitive noise receptors

Noise during the construction phase is expected to be of a short term and temporary nature.

Construction activities include:

- Development of access roads,
- Site establishment (contractors camp, equipment and material storage, security and access control, security fence)
- Vegetation and topsoil removal,
- Establishment of the waste disposal facilities,
- Establishment of storage (coal stockpile footprints) facilities, and

» Construction of infrastructure (foundations to completed structure)

There are a number of factors that determine the audibility as well as the potential of a noise impact on receptors. Maximum noises generated can be audible over a large distance, however, are generally of very short duration. If maximum noise levels exceed 65 dBA at a receptor, or if it is clearly audible with a significant number of instances where the noise level exceeds the prevailing ambient sound level with more than 15 dB, the noise can increase annoyance levels and may ultimately result in noise complaints.

An additional source of noise during the construction phase is additional traffic to and from the site, as well as traffic on the site. This will include heavy and light vehicles transporting equipment, topsoil, overburden, as well as contractors to and from the site.

Issue	**Nature of Impact**	**Extent**
Noise impacts due to construction equipment and activities	Noisy activities and equipment is likely to be associated with: » (potential) borrow pit; » concrete batching/delivery; » foundation preparation; and » the digging of trenches.	Local
Noise impacts due to blasting (where required)	Noise associated with blasting activities	Local
Noise impacts from construction traffic	Construction traffic is expected to be generated throughout the entire construction period. However, the volume and type of traffic generated will be dependent upon the construction activities being conducted, which will vary during the construction period.	Local

Gaps in knowledge and assumptions

While it is difficult to define the character of a measured noise in terms of numbers (third octave sound power levels), it is difficult to accurately model noise levels at a receptor from any operation. The projected noise levels are the output of a numerical model with the accuracy depending on the assumptions made during the setup of the model. Assumptions include:

- The octave sound power levels selected for processes and equipment accurately represent the sound character and power levels of this processes/equipment. The determination of these levels in itself is subject to errors, limitations and assumptions with any potential errors carried over to any model making use of these results;
- Sound power emission levels from processes and equipment change depending on the load the process and equipment is subject too. While the octave sound power level is the average (equivalent) result of a number of measurements, this measurement relates to a period that the process or equipment was subject to a certain load. Normally these measurements are collected when the process or equipment is under high load. The result is that measurements generally represent a worse-case scenario;
- During the scoping phase it is unknown which processes and equipment will be operational (and when operational and for how long), modelling considers a scenario where all processes and equipment are under full load for a set time period. Modelling assumptions comply with the precautionary principle and operational time periods are frequently overestimated. The result is that projected noise levels would likely over-estimate noise levels;
- Ambient sound levels vary over time of day, season and largely depend on the complexity and development character of the surrounding environment. To allow the calculation of change in ambient sound levels, a potential ambient sound level of 20 dBA is assumed. This level represents a very quiet environment.
- Modelling cannot capture the potential impulsive or tonal character of a noise that can increase the potential nuisance factor.
- The impact of atmospheric absorption is simplified and very uniform meteorological conditions are considered. This is an over-simplification and the effect of this in terms of sound propagation modelling is difficult to quantify;
- Acoustical characteristics of the ground are over-simplified with ground conditions accepted as uniform.

Recommendations regarding the proposed sites

Figure 4.1: Aerial image showing potential sensitive noise receptors.

As there appears to be no significant difference between the sites from noise perspective, there is no preference at this stage regarding the various alternatives proposed. No fatal flaws to the proposed project have been identified at this stage. The final recommendation will be dependent upon the outcome of detailed studies including investigation recommended, including confirmation of noise sensitive receptors in close proximity to the development sites.

Description of expected significance of impact

Impact significance is unknown. It could be low but potential exists for impacts to be of medium significance. Duration of impacts would be short-term (construction only). Probability of the impacts occurring is high.

Recommendations for further study

It is recommended that the noise impact be investigated in more detail during the Environmental Impact Assessment phase, including further ambient sound measurements. Additional information required would be:

» Project design (which equipment will be in buildings, what materials will be used to build these buildings);
» A more accurate description of equipment to be used in and around the proposed power plant and ancillary activities. This would include data such as the type of equipment, but also the number of that equipment to be used;
» Layout of various roads and projected routes that equipment and material/product/waste will use.

5.1.6 Potential visual impacts

The proposed Power Station could be visible to an extensive area of the Lowland LCA. It should be noted however that due to the intervening minor ridgeline, only the exceptionally tall elements such as the stacks and cooling towers may be visible from this area, all other elements are likely to be screened. This area is a relatively natural landscape that is important for grazing and eco-tourism. It is possible that views of the development could increase the industrial component of the view to the degree that areas become unattractive for ecotourism. It is anticipated that the degree to which the minor ridgeline to the north of the proposed development reduces this impact is likely to be critical in minimising this impact.

The proposed Power Station could be visible to an extensive area of the Upland LCA. This area is likely to be a relatively natural landscape that is

important for grazing and eco-tourism. It is possible that views of the development could increase the industrial component of the view to the degree that areas become unattractive for ecotourism. It is likely that the majority of this area is screened, however, the northern edge may be impacted and views may be possible within the area due to channelled views along narrow valleys.

The proposed Power Station is likely to be visible to urban areas. It is possible that views from the closest urban areas could be transformed to the extent that industry becomes the predominant feature in the outlook. All features including overhead power lines are likely to impose this character. The degree to which this change dominates the character of urban areas as well as the nature of current views given the extent of existing heavy industry in the area will be important considerations.

The proposed Power Station is likely to be visible from both major and minor routes through the area that are likely to be important for tourism. The extent to which the development will be visible will depend on the alignment of the route, the distance from the development as well as the nature of surrounding vegetation.

The proposed Power Station could be visible from sections of the Riverine LCA which is an important tourism and recreational resource. The exceptionally tall elements are likely to be most obvious. These are likely to be a long range views and it is likely that only the taller elements will be visible. It is likely that due to topography and screening provided by vegetation that visibility of the development within this LCA is limited.

The proposed development could be visible from the D'nyala Nature Reserve. It should be noted however that only the exceptionally tall elements of Power Station Alternative 1 will be visible from this area. This is likely to be a long range view and it is likely that only the taller elements will be visible. The level of impact is likely to be dependent on the nature of vegetation cover.

Ash Dump Alternative 4 is likely to be the more obvious in the landscape than other alternatives. This ash dump is proposed on top of the minor ridge line to the north. It is possible that this might be used to increase the screening effect of this landform, however it is likely that the end tipping operation will be obvious to the Lowland LCA for an extended period. It is also likely that this will end up as a relatively engineered landform that will

contrast with the natural topography.

Ash Dump Alternative 3 is also located on a ridgeline to the west of the proposed power station. This alternative is likely to impact areas to the west that have generally not been impacted directly by dumps previously. As with alternative 5 there is a possibility that this might be used to increase the screening ability of the ridgeline. However, it is likely that the end tipping operation will be obvious to the Lowland LCA for an extended period. It is also likely that this will end up as a relatively engineered landform that will contrast with the natural topography.

Ash Dump Alternatives 1, 2 and 5 appear likely to be least visible in the landscape and they will be visible to similar areas. It is possible that these might also be used to provide screening of the lower sections of the proposed power station from adjacent urban areas.

Both Overhead Power Line Alternatives seem likely to impact on the urban area of Marapong. It is possible that existing electrical infrastructure in the area could influence this impact.

Issue	**Nature of Impact**	**Extent**
Generally landscape change or degradation	Change is character or sense of place of the landscape.	Local
Visual intrusion and obstruction	Change in specific views within the affected area from which the character of a view may be important for a specific use or enjoyment of the area	Local

Gaps in knowledge and assumptions

» None identified at this stage

Recommendations regarding the proposed sites

Power station site

» Whilst Power Station Alternative 1 is likely to impact less on urban areas than Power Station Alternative 2, it is set at a slightly higher elevation

which could mean that lower elements associated with it are more obvious from the Lowland LCA to the north. There is no major preference for either option.

Ash dump

» Ash Dump Alternatives 1, 2 and 5 appear likely to be least visible in the landscape.

Power Line

» No preference in terms of visual impacts for either option.

Description of expected significance of impact

Visual impacts associated with construction will be local in extent and would definitely occur. The significance of the impacts would be low - moderate and the impact would last until construction is complete (short-term).

Recommendations for further study

» When details of the proposed development are available, existing impacts from adjacent power stations may be used by way of detailed comparison.
» Screening capacity of vegetation and landform.
» A site visit is required.

5.1.7 Impacts on the socio-economic environment

Impacts on the socio-economic environment during construction are expected to be both positive and negative, and could include:

» Potential positive impacts associated with the construction phase relate to the creation of employment and skills development opportunities.
» Potential negative impacts are linked to the presence of construction workers on the site and in the area and the potential impact on local communities, farmers and farm workers, and impacts on surrounding land use.

The area has an established eco-tourism industry based on game farming activities. Since its full potential is largely unrealised and it is associated with opportunities to create numerous direct and indirect jobs, this sector is considered to be among the priority industries to uplift the economy of the local municipalities in the area. Though it is clear that the policies reviewed largely support the development of a coal-fired project in the area as it could uplift the local economy, the proposed project can potentially restrain the development of the local eco-tourism and agricultural industries due to the possible environmental impacts that it could create.

The Lephalale area has seen a sharp increase in population due to the migration of job seekers and construction workers attracted by various developments in the area. Increase in the population and increase in general activity in the area has a positive effect on the economic activities, but also puts an extreme pressure on the local service delivery and infrastructure. Local government is already unable to meet the demand for affordable housing and basic services. New developments ay create an additional cumulative impact and further aggravate the situation, which will also need to be considered when analysing potential impacts

Issue	**Nature of Impact**	**Extent**
Employment	Employment and investment opportunities could be created which could have some short to long-term positive impacts, especially if local labour is to be used.	Local - Regional
Influx of construction crews and job seekers	An increase in the security / fire risk in the area. Furthermore, the influx of job seekers could lead to conflict between individuals seeking work. An inflow of workers and the associated construction activities (vehicle movement, noise, dust) could result in temporary disruptions to the daily living and movement patterns of neighbouring private property owners.	Local
Impacts on surrounding land uses and tourism	Intrusion impacts (including noise, dust and visual impacts) associated with the construction of the project could impact on surrounding land uses.	Local - Regional
Impacts associated	Increased traffic in the study area as a result of the construction activities may impact on road	Local -

with increased traffic	surfaces and could present road safety issues.	Regional

Gaps in knowledge and assumptions

» None identified at this stage

Recommendations regarding the proposed sites

Power station site

Considering the location and activities on the adjacent farms, it is clear that Alternative 1 that includes farm portions Graaffwater 456 and Goedehoop 457 may be associated with a lower potential negative impact on the local eco-tourism activity than Alternative 2. The major difference lies in the following:

» With the selection of Alternative 1, the potential impact on eco-tourism will only be associated with the noise and visual impacts on the adjacent farms that could ensue during various stages of the project.
» Alternative 2 will be associated with the sterilisation of land currently used for commercial game farming and impact on the adjacent commercial game farming activities.

Ash dump

» The least preferred options considering the potential impact from a socio-economic perspective are Alternatives 1 (Kalkvlakte 256 and Elandsvley 453) and 3 (Vooiruit 449 farm). Alternative 4 (Appelvlakte 448 farm) may be considered to be among the least preferred due to its proximity to the Marapong township.
» Among the other three alternatives, ash dump Alternative 2 (the Goedehoop 457 farm) appears to be associated with the lowest sensitivity from a socio-economic perspective and therefore may be considered a preferred option given the existing information.
» Regardless of the alternative chosen, potential impact on the existing commercial livestock and game farming activities will need to be examined and will need to include not only directly affected farms but the adjacent and possibly nearby farms.

Power Line

None of the potential impacts are expected to be of significance, however, it appears that although power line alternative 1 is shorter, it may be associated with a slightly greater negative impact on the existing activities and the nearby settlement. Therefore, it may be considered to be slightly

less preferred than another alternative.

Description of expected significance of impact

Social impacts related to construction will be both positive and negative. Impacts will last for duration of construction (short term), while being of local to regional significance, and they will definitely occur. Significance of social impacts during construction will be moderate on average.

Recommendations for further study

Overall, the following potential issues and impacts will need to be considered during the next phase of the study:

» Site specific impacts and issues to be investigated
» Conflict between land-use for electricity generating purposes and tourism activities.
» Permanent loss of production created by the current economic activities, if any, on the directly affected and adjacent farms.
» Permanent loss of jobs associated with the existing activities on site.
» Stock theft and poaching on surrounding farms because of increased access to the site.
» Deterioration of living and working conditions due to various environmental impacts.
» Local and regional impacts and issues to be investigated
» Impact on balance of payment due to possibility that certain equipment and machinery will be imported.
» Temporary increase in production and GDP-R of the national and local economies due to project capital expenditure.
» Temporary creation of employment in the local communities and elsewhere in the country.
» Skills development due to the creation of new employment opportunities.
» Improved standard of living of households directly or indirectly benefiting from created employment.
» Temporary increase in government revenue due to the establishment of the mine.
» Change in demographics of the areas due to influx of workers and job seekers.
» Increase in social pathologies associated with influx of migrant labourers and job seekers to the area (health, crime, prostitution, xenophobia, etc.)
» Added pressure on basic services and social and economic infrastructure.

5.2 Evaluation of potential impacts associated with the Operation Phase

5.2.1 Potential impact on flora and terrestrial fauna

Operational phase impacts on flora and fauna are generally indirect ecological impacts. Indirect impacts are not always immediately evident and can consequently not be measured at a specific moment in time; the extent of the effect is frequently at a scale that is larger than the actual site of impact, but usually restricted to a local scale (and not regional).

Issue	Nature of Impact	Extent
Indirect impacts on flora	Anticipated indirect impacts on flora include: » Decreased habitat quality of surrounding areas due to peripheral impacts such as spillages, litter, increased erosion, contaminants, etc.; » Reduced ecological functionality (including fire, erosion); » Decreased aesthetic appeal of the landscape; and » The introduction of invasive, exotic and encroacher plant species.	Local
Cumulative impacts on flora	Cumulative flora impacts typically include the following: » Exacerbation of existing levels of habitat fragmentation and isolation; and » Cumulative impacts on local/ regional and national conservation targets and obligations.	Local - national
Indirect impacts on terrestrial fauna	Anticipated indirect impacts of the proposed project on the terrestrial fauna of the study area and surrounds include: » Alteration of faunal assemblage and community structures in areas surrounding the project area; » Localised impacts on movement/ migration patterns of animals and ecological interaction and processes; and » An increase in edge effects in the project area and immediate surrounds.	Regional
Cumulative impacts on fauna	Anticipated cumulative impacts of the proposed project on the fauna of the region include:	Regional

	» Cumulative fragmentation and isolation of natural faunal habitats on a regional scale; and » Loss and alteration of ecological processes and ecosystem services on a regional scale	

Gaps in knowledge and assumptions

» Lack of site-specific, and detailed biological information from the site alternatives and site locations render the estimation of sensitivity and Red Data probabilities extremely problematic. This weakness was overcome, to some extent, by applying the Precautionary Principle throughout the process. Similarly, seasonality plays an important role in the ecology of this environment, but the exact nature of seasonal variability in presence, abundance and activity levels; most of these aspects, could not be factored into the decision process.
» Regional and national databases, although containing some information on certain biological disciplines, exhibit a severe lack of data. Invertebrates, herpetofauna, and vegetation, to some extent, represent disciplines where a high paucity is noted in available database. Across the spectrum of biological disciplines, the lack of site-specific data relating to taxa of conservation concern and importance is noted, representing a severe limitation in applying the decision process.
» The lack of site-specific as well as discipline-specific data from the proposed site alternative and site locations represents a severe threat to the process. The main threat stems from the inadvertent recommendation of a site and the eventual discovery of an aspect that should have rendered the alternative as a 'No-Go' option. Without adequate field deployment and surveys, the presence/ absence of conservation important taxa within certain areas cannot be predicted to acceptable. For the scoping investigation, every effort was however made to minimise this particular eventuality. While these types of surveys are

Description of expected significance of impact

The ecological impacts during operation are likely to be local – regional in extent, of low – high probability and of a long-term duration. The impacts will potentially be of high significance which should be reduced to low-moderate after mitigation.

Recommendations for further study

» In order to establish the finer phytosociological characteristics of this woodland vegetation, it is strongly recommended that a suitable number of point samples be collected and subjected to a classification
» Detailed flora and fauna surveys will be undertaken during the EIA phase
» Phytodiversity Measurements
» Data processing

5.2.2 Potential impact on birds

A high diversity of threatened species (mainly scavenging bird of prey species and Kori Bustard - Ardeotis kori) is expected to be present within the study area. Since the majority of these species requires large home range sizes, it could be argued that a high frequency of occurrence and wide distribution of these species in the study area and on nearby farms are due to the high similarity of habitat types in the region. Direct, indirect and cumulative adverse impacts on the bird community are expected during the operation of the proposed power station and associated infrastructure.

Issue	Nature of Impact	Extent
Direct impacts on birds	Direct impacts represent those that are a result of the proposed project and unequivocally influencing the avifauna of the region. Anticipated impacts include: » Changes in the community structure due to habitat fragmentation (e.g. roads, loss of closed-canopy woodland) and habitat loss; » Bird collisions with fence structures and proposed overhead power lines (anticipated); » Electrocution of large-bodied birds due to the use of inappropriate tower design fr the power line; and » Loss of daily migration/foraging corridors.	Local - Regional
Indirect impacts on birds	» Loss of dispersal corridors owing to habitat alteration; » Subsequent habitat change and changes to the local avifaunal community structure and composition (mainly generalists and secondary species); and » Urban sprawl based on "job-seeking" opportunities leading to the localised depletion of natural resources and direct persecution of bird taxa.	Local - Regional
Residual impact	These impacts are often related to the "after-effect" when the project is decommissioned. It mainly pertains to rehabilitation efforts and how these relate to residing avifaunal communities. Therefore, it is often witnessed that early successional habitat contributes to the establishment of a transient avifaunal community.	Local

Cumulative impacts	Anticipated cumulative impacts of the proposed project on the avifauna of the region include cumulative fragmentation and isolation of natural faunal habitats on a regional scale.	Local - Regional

Gaps in knowledge and assumptions

Lack of site-specific, and detailed biological information from the site alternatives and site locations render the estimation of sensitivity and red data probabilities extremely problematic. This weakness was overcome, to some extent, by applying the precautionary principle throughout the process. Similarly, seasonality plays an important role in the ecology of this environment, but the exact nature of seasonal variability in presence, abundance and activity levels; most of these aspects, could not be factored into the decision process.

Regional and national databases, although containing some information on certain biological disciplines, exhibit a severe lack of data. Across the spectrum of biological disciplines, the lack of site-specific data relating to taxa of conservation concern and importance is noted, representing a severe limitation in applying the decision process.

Description of expected significance of impact

The avifaunal impacts during construction are likely to be local – regional in extent, of low – high probability and of a long-term duration. The impacts will potentially be of moderate negative significance which should be reduced to low after mitigation.

Recommendations for further study

The following methods are considered relevant for a detailed baseline avifaunal survey:

- Point Count Surveys
- Random (ad hoc) surveys
- Nocturnal bird surveys
- Playback/broadcasting of bird vocalisations
- Detecting patterns in diversity and composition
- Construction of bird guilds

5.2.3 Potential impact on air quality

With the expansion of the power generation capacity in the Waterberg District Municipality through the Medupi and Thabametsi Powers Stations, and the associated increase in mining an increased ambient concentrations of SO_2, NO_X and particulates is expected (DEA, 2015). Scenario modelling shows the potential for exceedances of the National Ambient Air Quality Standards (NAAQS) over large parts of Lephalale Local Municipality with new and proposed power plants becoming operational.

Issue	Nature of Impact	Extent
Potential impacts related to air quality due to emissions from the power station	Potential impact increasing existing ambient concentrations of SO_2, NO_X and particulates (PM 10 and PM 2.5) in the area and increasing the impact on air quality and health	Local - Regional
Potential impacts related to air quality due to dust from the ash dumps	Potential increase in dust deposition resulting from emission of dust from the ash handling and storage.	Local - Regional
Potential impacts related to air quality due to emissions from the power station	Potential increase in GHG emissions of carbon dioxide (CO_2), methane (CH_4) and nitrous oxide (N_2O)	Local - Regional

Gaps in knowledge and assumptions

None identified at this stage.

Description of expected significance of impact

Air quality impacts are local in extent and would definitely occur. The significance of the impacts would be low - moderate and the impact would last

until the facility is decommissioned (long-term).

Recommendations for further study

It is recommended that the following are assessed in the air quality specialist study:

» Predict ambient concentrations of SO_2, NO_x, and particulates resulting from stack emissions as well as coal processing and ash disposal at the Tshivhaso Coal-fired Power Plant for the following scenarios:
2) Operations, for the Tshivhaso Coal-fired Power Plant in isolation and against the existing air pollution load of the area, i.e. cumulative effects;

3) Decommissioning (particulates only).

» The potential risk of impact associated with the predicted ambient concentration in potentially affected communities; and
» Relative contribution of GHG emissions associated with the proposed facility to global warming.

5.2.4 Potential impact on agricultural potential and soil resources

During the operation of the facility, exposed areas / soil could be susceptible to wind/water erosion in the absence of soil erosion control measures. Soil contamination is possible. Erosion is generally considered to be the most important direct negative impact on soil, due to the fact that it can have significant knock-on effects in terms of hydrology and agricultural land use. Areas where these factors occur simultaneously are typically considered to be highly sensitive areas.

Issue	Nature of Impact	Extent
Degradation of natural resource: soil	Soil loss as a result of water and/or wind erosion.	Local
Loss of agricultural land	Land that is no longer able to be utilised due to presence of infrastructure.	Local

Gaps in knowledge and assumptions

The gaps in knowledge at this stage in the process are minor. It is however unknown whether or not there has been any change in land use since the

AGIS survey that is used as reference had been done.
Description of expected significance of impact Impacts would be local in extent, long in duration and of moderate intensity with a moderate probability of occurring. Overall significance would be negligible to low.
Recommendations for further study Impacts on soils and agricultural potential must be assessed in terms of the EIA Regulations as well as all other relevant guidelines and legislation. The agricultural potential of the site should be mapped and recommended mitigation measures, monitoring requirements, and rehabilitation guidelines for identified impacts will be provided.

5.2.5 Potential impact on sensitive noise receptors

The main source of operational noise is associated with the intake and cooling fans, as well as material handling activities at the coal stockpile. Coal pulverizing, boilers, steam turbines and generators are generally constructed within fixed structures that will attenuate the noise from this equipment. Noise from ancillary services and activities such as pumps (boiler feed, water, chemical, condensate, vacuum), air compressors and onsite traffic generally is far less than the noise from the main sources. It is not foreseen that traffic will contribute to noise from and to the site during the operational phase. In additional there will be minimal traffic noise on the site.

Issue	Nature of Impact	Extent
Noise during operational phase.	The main source of operational noise is associated with the intake and cooling fans, as well as material handling activities at the coal stockpile.	Local

Gaps in knowledge and assumptions

» Facility layout required.

- While it is difficult to define the character of a measured noise in terms of numbers (third octave sound power levels), it is difficult to accurately model noise levels at a receptor from any operation. The projected noise levels are the output of a numerical model with the accuracy depending on the assumptions made during the setup of the model. Assumptions include:
- The octave sound power levels selected for processes and equipment accurately represent the sound character and power levels of this processes/equipment. The determination of these levels in itself is subject to errors, limitations and assumptions with any potential errors carried over to any model making use of these results;
- Sound power emission levels from processes and equipment change depending on the load the process and equipment is subject too. While the octave sound power level is the average (equivalent) result of a number of measurements, this measurement relates to a period that the process or equipment was subject to a certain load. Normally these measurements are collected when the process or equipment is under high load. The result is that measurements generally represent a worse-case scenario;
- During the scoping phase it is unknown which processes and equipment will be operational (and when operational and for how long), modelling considers a scenario where all processes and equipment are under full load for a set time period. Modelling assumptions complies with the precautionary principle and operational time periods are frequently overestimated. The result is that projected noise levels would likely over-estimate noise levels;
- Ambient sound levels vary over time of day, season and largely depend on the complexity and development character of the surrounding environment. To allow the calculation of change in ambient sound levels, a potential ambient sound level of 20 dBA is assumed. This level represents a very quiet environment.
- Modelling cannot capture the potential impulsive or tonal character of a noise that can increase the potential nuisance factor.
- The impact of atmospheric absorption is simplified and very uniform meteorological conditions are considered. This is an over-simplification and the effect of this in terms of sound propagation modelling is difficult to quantify;
- Acoustical characteristics of the ground are over-simplified with ground conditions accepted as uniform.

Description of expected significance of impact

Operational noise impacts would be local in extent, long in duration and of low - moderate intensity with a high probability of occurring. Overall significance is expected to be low – moderate.

Recommendations for further study

It is recommended that the noise impact be investigated in more detail during the Environmental Impact Assessment phase, including further ambient

sound measurements. Additional information required would be:

- » Project design (which equipment will be in buildings, what materials will be used to build these buildings);
- » A more accurate description of equipment to be used in and around the proposed activity. This would include data such as the type of equipment, but also the number of that equipment to be used; and
- » Layout of various roads and projected routes that equipment and material/product/waste will use.

5.2.6 Visual impacts

The proposed Power Station could be visible to an extensive area of the Lowland LCA. It should be noted however that due to the intervening minor ridgeline, only the exceptionally tall elements such as the stacks and cooling towers may be visible from this area, all other elements are likely to be screened. This area is a relatively natural landscape that is important for grazing and eco-tourism. It is possible that views of the development could increase the industrial component of the view to the degree that areas become unattractive for ecotourism. It is anticipated that the degree to which the minor ridgeline to the north of the proposed development reduces this impact is likely to be critical in minimising this impact.

The proposed Power Station could be visible to an extensive area of the Upland LCA. This area is likely to be a relatively natural landscape that is important for grazing and eco-tourism. It is possible that views of the development could increase the industrial component of the view to the degree that areas become unattractive for ecotourism. It is likely that the majority of this area is screened, however, the northern edge may be impacted and views may be possible within the area due to channelled views along narrow valleys.

The proposed Power Station is likely to be visible to urban areas. It is possible that views from the closest urban areas could be transformed to the extent that industry becomes the predominant feature in the outlook. All features including overhead power lines are likely to impose this character. The degree to which this change dominates the character of urban areas as well as the nature of current views given the extent of existing heavy industry in the area will be important considerations.

The proposed Power Station is likely to be visible from both major and minor routes through the area that are likely to be important for tourism. The extent to which the development will be visible will depend on the alignment of the route, the distance from the development as well as the nature of surrounding vegetation.

The proposed Power Station could be visible from sections of the Riverine LCA which is an important tourism and recreational resource. The exceptionally tall elements are likely to be most obvious. These are likely to be a long range views and it is likely that only the taller elements will be visible. It is likely that due to topography and screening provided by vegetation that visibility of the development within this LCA is limited.

The proposed development could be visible from the D'nyala Nature Reserve. It should be noted however that only the exceptionally tall elements of Power Station Alternative 1 will be visible from this area. This is likely to be a long range view and it is likely that only the taller elements will be visible. The level of impact is likely to be dependent on the nature of vegetation cover.

Ash Dump Alternative 4 is likely to be the more obvious in the landscape than other alternatives. This ash dump is proposed on top of the minor ridge line to the north. It is possible that this might be used to increase the screening effect of this landform, however it is likely that the end tipping operation will be obvious to the Lowland LCA for an extended period. It is also likely that this will end up as a relatively engineered landform that will contrast with the natural topography.

Ash Dump Alternative 3 is also located on a ridgeline to the west of the proposed power station. This alternative is likely to impact areas to the west that have generally not been impacted directly by dumps previously. As with alternative 5 there is a possibility that this might be used to increase the screening ability of the ridgeline. However, it is likely that the end tipping operation will be obvious to the Lowland LCA for an extended period. It is also likely that this will end up as a relatively engineered landform that will contrast with the natural topography.

Ash Dump Alternatives 1, 2 and 5 appear likely to be least visible in the landscape and they will be visible to similar areas. It is possible that these might also be used to provide screening of the lower sections of the proposed power station from adjacent urban areas.

Both Overhead Power Line Alternatives seem likely to impact on the urban area of Marapong. It is possible that existing electrical infrastructure in the area could influence this impact.

Issue	Nature of Impact	Extent
Generally landscape change or degradation	Change is character or sense of place of the landscape.	Local
Visual intrusion and obstruction	Change in specific views within the affected area from which the character of a view may be important for a specific use or enjoyment of the area	Local

Gaps in knowledge and assumptions

» None identified at this stage

Recommendations regarding the proposed sites

Power station site

» Whilst Power Station Alternative 1 is likely to impact less on urban areas than Power Station Alternative 2, it is set at a slightly higher elevation which could mean that lower elements associated with it are more obvious from the Lowland LCA to the north. There is no major preference for either option.

Ash dump

» Ash Dump Alternatives 1, 2 and 5 appear likely to be least visible in the landscape.

Power Line

» No preference in terms of visual impacts for either option.
Description of expected significance of Description of expected significance of impact Operational visual impacts would be local - regional in extent, long in duration and potentially of moderate to high significance. Visual impacts during operation will definitely occur.
Recommendations for further study » When details of the proposed development are available, existing impacts from adjacent power stations may be used by way of detailed comparison. » Confirmation of ecotourism areas. » A site visit is required.

5.2.7 Impacts on the socio-economic environment

Potential impacts associated with the operational phase of the power plant and associated infrastructure are expected to be both positive and negative, and could include:

» Potential positive impacts associated with the operational phase relate to the creation of employment opportunities and local economic upliftment
» The potential negative impacts are linked to the impact on the rural sense of place and scenic integrity of the landscape. These impacts can in turn impact on land use and the tourism sector in the area.

Issue	**Nature of Impact**	**Extent of Impact**
Creation of employment opportunities	Employment opportunities (particularly of local people) such as security and maintenance services would lead to long-term positive impacts (i.e. for the duration of the operational	Local

	phase).	
Contribution towards the generation of energy	On a global scale the project is anticipated to have positive economic impact.	Regional - National
Visual impacts affecting eco-tourism and sense of place from the settlement perspective	The project will have visual impacts on existing commercial game farms in the region.	Local
Value of surrounding properties	The proposed power plant and associated infrastructure could impact on property values in the vicinity of the project.	Local

Gaps in knowledge and assumptions

» None identified at this stage

Description of expected significance of impact

Social impacts related to operation will be both positive and negative. Impacts will last for duration of operation (long-term term), while being of local to regional significance, and they will definitely occur. Significance of social impacts during operation are expected to be moderate on average.

Recommendations for further study

The following must be investigated:

» Sustainable increase in production and GDP-R of the national and local economies through operation and maintenance activities.
» Creation of long-term employment in local and national economies through operation and maintenance activities.
Skills development due to the creation of new sustainable employment opportunities.

» Improved standard of living of households directly or indirectly benefiting from created employment opportunities.
» Increase in government revenue stream.
» Investment in the local community and economic development projects.
» Potential losses of sustainable revenue by local farming and/or tourism activities due to various environmental impacts.
» Altered sense of place.

- Impact on the local tourism industry.

5.3 Cumulative Impacts

Impacts of a cumulative nature places direct and indirect impacts of this projects into a regional and national context, particularly in view of similar or resultant developments and activities in the region. Impacts of a cumulative nature typically adversely affect the local and regional conservation status of plant taxa and protected habitat types as well as local and regional fragmentation levels, but also issues such as increased exploitation due to the exacerbation of anthropogenic activities on a local scale. Anticipated cumulative impacts of the proposed project to include:

» Cumulative losses of remaining natural faunal, floral and bird habitat;
» Cumulative degradation of remaining natural vegetation and habitat on a regional scale;
» Loss and alteration of ecological processes and ecosystem services on a regional scale;
» Loss and alteration of ecological processes and ecosystem services on a regional scale;
» Air quality;
» Visual impacts;
» Surface water impacts; and
» Both positive and negative social impacts.

At this stage cumulative impacts are expected to be of low to moderate significance. Cumulative impacts will be investigated in more detail during the EIA phase.

CONCLUSIONS CHAPTER 6

This Scoping Study has been undertaken in order to provide Cennergi with an indication of any potential environmental fatal flaws associated with the proposed Tshivhaso Coal-Fired Power Plant and associated infrastructure. This Scoping Report is aimed at detailing the nature and extent of this facility, identifying and describing potential issues associated the proposed project within the sites identified, identifying any environmental fatal flaws, and defining the extent of studies required within a detailed EIA. This has been achieved through an evaluation of the proposed project, considering existing information for the area, input from the project team with experience on similar projects and in the study area. The scoping report has been completed in terms of the EIA Regulations published in Government Notice 38282 of GN R982, R983, R984 and R985 (December 2014), in terms of Section 24(5) of the National Environmental Management Act (NEMA; Act No 107 of 1998).

A summary of the conclusions of the evaluation of the potential impacts identified to be associated with the proposed project is provided in Section 5.1 below. Recommendations regarding investigations required to be undertaken within a detailed EIA are provided within the Plan of Study for EIA, contained in the next chapter of this report.

6.1. Conclusions drawn from the Evaluation of the Proposed Project

The Tshivhaso Coal-Fired Power Plant is proposed to be up to 1200MW (to be developed in 2 phases of 600MW each) in capacity and will include the following infrastructure:

- Access roads;
- Coal storage areas and bunkers;
- Coal mill (for grinding the coal into fine material);
- Pipeline for water supply (Water is expected to be available from the Mokolo-Crocodile Water Augmentation Project (MCWAP) Phase 2);
- Coal loading and offloading areas, as well as conveyor belts;
- Power plant production unit/s (boilers / furnaces, turbines, generator and associated equipment, control room);
- Ash dump;
- Water infrastructure such as Raw-Water Storage Dam, purification works and reservoirs;

- A substation;
- An overhead power line to connect into the Eskom grid, and
- Office and maintenance area/s.

The following site alternatives were recommended for the proposed project:

- Power Plant Alternatives:
  - Option 1 – Graaffwater/ Goedehoop Option;
  - Option 2 – Eendrachtpan/ Gelykebult/ Voorui Option;
- Ashing Facility Alternatives
  - Option 3 – Jackhalsvley Option;
  - Option 4 – Kalkvlakte & Elandsvley Option;
  - Option 5 – Voorui Option;
- Power Evacuation Alternatives:
  - Alternative 1 – Matimba – Witkop Loop-In; and
  - Alternative 2 – Matimba – Medupi Loop-In.

The following potentially significant impacts have been identified as being associated with the proposed project:

Table 6.1: Potential impacts associated with the Construction Phase

Construction / Decommissioning Phase Impacts	**Extent***	**Applicable activities**
Direct and indirect impacts on flora and fauna	L-R	GN 983, 2; GN983, 9; GN983, 11; GN 983, 12; GN984, 1
Direct and indirect impacts on avifauna	L	GN 983, 2; GN983, 11; ; GN 983, 12; GN984, 1;
Loss of agricultural land	L	GN 983, 2; GN983, 11 ; GN984, 1
Land surface disturbance and alteration	L	GN 983, 2; GN983, 9; ; GN 983, 12; GN984, 1
Loss of topsoil	L	GN 983, 2; GN983, 9
Loss of / damage to archaeological, heritage and cultural resources	L	GN 983, 2; GN983, 9; GN983, 11; GN984, 1; GN984, 9
Loss of / damage to historical resources & graves	L	GN 983, 2; GN983, 9;

Construction / Decommissioning Phase Impacts	Extent*	Applicable activities
		GN983, 11; GN984, 1; GN984, 9
Noise impacts due to construction equipment and activities	L	GN983, 9; ; GN 983, 12; GN984, 1
Noise impacts from traffic	L	GN 983, 2; GN983, 9; GN983, 11; GN984, 1
Employment (+)	L-R	GN 983, 2; GN983, 9; ; GN 983, 12; GN984, 1; GN984, 9
Skills development (+)	L-R	GN 983, 2; GN983, 9; ; GN 983, 12; GN984, 1; GN984, 9
Influx of construction crews and job seekers	L	GN983, 9; GN983, 11; GN984, 9

Table 6.2: Potential impacts associated with the Operational Phase

Operational Phase Impacts	Extent*	Applicable activities
Direct and indirect impacts on flora and fauna	L	GN 983, 2; GN983, 9; GN983, 11; ; GN 983, 12; GN984, 1; GN984, 9
Indirect impacts on avifauna	L	GN 983, 2; GN983, 9 GN983, 11; GN984, 9
Air quality impacts	L-R	GN 983, 2;11; GN984, 1
Soil erosion	L	GN 983, 12; GN 983, 24; GN984, 1
Degradation of natural resource: soil	L	GN 983, 2; GN983, 9
Disturbance to flow pattern of run-off water	L	GN 983, 12; GN 983, 19, GN 983, 24; GN984, 1
Noise during the operational phase.	L	GN 983, 12
Employment opportunities during operation and maintenance	L	GN983, 11; GN984, 1; GN984, 9

Operational Phase Impacts	Extent*	Applicable activities
Tourism impact (renewable energy tourism versus disturbing the natural environment)	L	GN983, 9; GN983, 11; GN984, 9
Impact on sense of place (aesthetic value)	L-R	GN 983, 2; GN983, 9; GN984, 1; GN984, 1; GN984, 9
Impacts on existing farm operations	L	GN 983, 2; GN983, 9
Impacts on value of surrounding properties	L	GN 983, 2; GN983, 9; GN983, 11; GN984, 1

*L	**Local**	R	**Regional**	N	**National**	I	**International**

6.1.1. Key Risks to Project Development

a. Water Availability

One of the key constraints to the development of the power station within the proposed area is the availability of water for the power generation process. A significant amount of water is required to be sourced for this purpose over the lifetime of the project. Considering the proposed locality of the project on the farm Graaffwater 456, Lephalale, it is already reported that the A42J drainage area of the Mogol River is regarded as water scarce with an over allocation on the available water sources.

Consultation with Department of Water and Sanitation has revealed that the water scarcity in the area is considered a high priority and to be addressed through the Crocodile Mogol Water Augmentation Program (MCWAP). Phase 1 of the MCWAP is already in place and needs to be further developed with the implementation of Phase 2. The DWS has appointed the Trans Caledon Tunnel Authority (TCTA) to fund and construct the required pipeline from the Hartbeespoort Dam to the Lephalale area. The pipeline forms an integral part of CMWAP Phase 2. The original planning was for the construction of a pipeline that could deliver 140Mm^3 of raw water to Lephalale, but it was reduced to 100Mm^3/annum when Sasol has withdrawn their development plans for the area. The latest is that the TCTA has committed for the construction of a pipeline that could deliver 75Mm^3/annum.

The TCTA is awaiting the approval from National Treasury to obtain finance from the banking sectors to fund the MCWAP2 project. Approval in this regard is expected in due course where after the required environmental authorisations. Timeous implementation of MCWAP 2 eliminates the availability of water as a fatal flaw.

b. Air Quality

The rich coal reserves in the Steenbokpan Lephalale area have led to the establishment of a coal fired power station (Matimba), the largest direct dry-cooling power station in the world, and the construction of a second (Medupi) - both owned by Eskom. The combination of the existing sources of air pollution has a negative impact on air quality, and the potential exists for further impact in the light of the current development projects and proposed projects. As a result, the Minister declared the Waterberg Priority Area for Air Quality Management (Republic of South Africa, 2012a). The priority area includes the Waterberg District Municipality and Lephalale Local Municipality.

With the expansion of the power generation capacity in the Waterberg District Municipality through the Medupi and Thabametsi Powers Stations, and the associate increase in mining will result in increased ambient concentrations of SO_2, NO_X and particulates (DEA, 2015). Scenario modelling shows the potential for exceedances of the NAAQS over large parts of Lephalale Local Municipality with new and proposed power plants becoming operational.

Although unlikely to be a fatal flaw to the development of the project, air quality considerations may result in additional mitigation measures being required to be implemented for the project, which could result in additional financial requirements for the development.

6.1.2. Identified Impacts

The following section provides a summary of the findings of the desk-top studies undertaken for the project.

a. Impacts on Biodiversity (including flora, fauna and avifauna)

The area, on a regional scale, represents savanna habitat with the typical variations and biodiversity attributes. The conservation status of the habitat is Least Concern, mostly because of the high representation within game farms and limited habitat loss associated with anthropogenic transformation. On a local scale, mining and industrial developments, with the associated cumulative impacts experienced from human influx, have resulted in moderate levels of habitat loss.

However, in spite of a moderate knowledge level of biological information on a local and regional scale, a moderate sensitivity level is indicated, implying that the likelihood of encountering biological attributes of special conservation concern is relatively low. The commodity of uninterrupted natural habitat is recognised as a significant attribute of the region and much of the ultimate site recommendations contained in this report take cognisance of the cumulative impacts that are likely to result from a dispersed, as opposed to concentrated, development strategy.

A brief appraisal of existing data revealed that none of the sites represent a 'Fatal Flaw' or 'Red Flag' for the proposed development and that the 'No-Go' Options would not apply in any of the site alternatives. The homogenous nature of habitat comprised in most of the sites would suggest similarly uniform biodiversity levels on a local scale. However, with an understanding of the ecological functionality of the region, some sites do exhibit limitations as suitable alternatives, and should preferably not be considered as viable alternatives.

Ultimately, other than localised variations in terms of habitat, and the remote nature of some of the sites, no biological receptors of particular sensitivity are highlighted for any of the proposed sites (that would elevate the biological sensitivity of a site beyond acceptable levels). It is critical to note that this statement is not based on detailed and appropriate field deployments and discipline-specific surveys and the potential that extremely sensitive receptors could be identified during latter stages of the project cannot be eliminated entirely.

The overall preferred alternative location for the **power plant** from an ecological perspective is **site option 1**.

The preferred alternative ashing facility from an ecological perspective is **site option 1.**

The preferred power line route from an ecological perspective is **option 2.**

b. Impacts on Agricultural Potential and Soil Resources

Although the area is currently classified as grazing land, there is evidence that the capacity to support livestock is very small and surrounding areas would suffice for grazing alternatives were this facility to be developed. Dust generation from construction would be a significant and ongoing impact. Soil erosion is very likely unavoidable and mitigation would be required.

No fatal flaws have been identified and there is no preference at this stage in terms of preferred alternative sites for infrastructure.

c. Noise Impacts

Previous sound measurements in the area indicated a sound environment that is relatively quiet, conforming to a SANS 10103:2008 rural sound environment. With the preliminary input data as used, this assessment indicated that there is a risk of a noise impact during the construction and operational phases due to the proximity to noise-sensitive receptors to the locations where noise generating activities may take place.

There are no fatal flaws from a noise impact perspective and no preference in terms of alternative sites for noise.

d. Air Quality Impacts

The Tshivhaso Coal-fired Power Plant will impact on air quality in the vicinity of the plant and in the larger region by increasing ambient concentrations. The power plant will be required to operate according to Minimum Emissions Standards and not to increase ambient concentrations of SO_2, NO_2 and PM_{10} beyond the National Ambient Air Quality Standards (NAAQS). Air dispersion modelling will be used in the EIA with a detailed emission inventory to predict ambient concentrations resulting from the power plant emissions in the context of other sources. The significance of impacts will be assessed through comparison with the NAAQS.

There are no fatal flaws from an air quality perspective and no preference in terms of the alternative sites.

e. Impacts on Heritage Sites

The study revealed that a range of heritage sites occur in the region and similar sites can be expected for the study area. Pans and shelters could be archaeologically sensitive and are best avoided. Based on maps of the area, structures older than 60 years can be expected as well as associated infrastructure. Although no known grave sites are on record some are expected for the study area. Every site is relevant to the Heritage Landscape, but it is anticipated that few (rock art and archaeological deposit and graves) could have conservation value. The following conclusions are applicable to the following sites:

» *Archaeological sites*

All sites could be mitigated either in the form of conservation of the sites with in the development or by a Phase 2 study where the sites will be recorded and sampled before the developer can apply for a destruction permit for these sites prior to development.

» *Historical finds and Cultural landscape*

It is not anticipated that the built environment will be severely impacted upon as very little structures occur within the study area and could be younger than 60 years. This assumption will however have to be verified in the field.

» *Burials and cemeteries*

Formal and informal cemeteries as well as pre-colonial graves occur widely across Southern Africa. It is generally recommended that these sites are preserved with in a development. These sites can how ever be relocated if conservation is not possible, but this option must be seen as a last resort and is not advisable. The presence of any grave sites must be confirmed during the field survey and the public consultation process.

» *General*

It is recommended that as part of the public consultation process the presence of graves, archaeological and historical sites should be determined.

» *Fossils*

The great majority of the study area for the proposed Tshivhaso Coal-fired Power Plant and associated ash-dumps is underlain by sedimentary rocks of low palaeontological sensitivity. Significant impacts on local fossil heritage resources are not anticipated here and there are no preferred sites for the power plant or ash-dump on fossil heritage grounds.

There are no fatal flaws from a heritage and palaeontological perspective and no preference in terms of the alternative sites.

f. Impacts on Surface Water Resources

The project area falls within Critical Biodiversity Area 2, as well as an Ecological Support Area. A limitation for the development of a power generation plant is that it is considered an incompatible land use. The close proximity of the Eendrag Wetland System is considered a risk factor as it is classified as Natural with threatened species that requires protection.

g. Socio-economic Impacts

Overall, it is clear that the proposed project has the opportunity to bring much needed investment into the area to revitalise the local economies and provide the local residents with jobs and sustainable income. The unemployment in the area is relatively high and development such as the one proposed would bring sustainable jobs for the locals, which could assist in curbing this dire situation. Together with other projects planned for the area, it will also lead to the development of the supporting industries in the area and create an opportunity to revitalise the nearby towns and improve the standards of living and livelihoods of the local people.

However, two aspects will need to be considered when examining the potential impact of the proposed project on the socio-economic environment. These are:

- The area has an established eco-tourism industry based on game farming activities. Since its full potential is largely unrealised and it is associated with opportunities to create numerous direct and indirect jobs, this sector is considered to be among the priority industries to uplift the economy of the local municipalities in the area. Though it is clear that the policies reviewed largely support the development of a coal-fired power station project in the area as it could uplift the local economy, the proposed project can potentially restrain the development of the local eco-tourism and agricultural industries due to the possible environmental impacts that it could create.
- The Lephalale area has seen a sharp increase in population due to the migration of job seekers and construction workers attracted by various developments in the area. Increase in the population and increase in general activity in the area has a positive effect on the economic activities, but also puts an extreme pressure on the local service delivery and infrastructure. Local government is already unable to meet the demand for affordable housing and basic services. New developments may create an additional cumulative impact and further aggravate the situation, which will also need to be considered when analysing potential impacts.

These and other potential benefits associated with the proposed project will be considered further and assessed in more detail in the EIA phase of the process. No fatal flaws have been identified.

The preferred site for the power plant from a social perspective is **site option 1.**

The preferred site for the ashing facility is **site option 2.**

In terms of the power line options, **option 2** is slightly preferred.

6.2. Overall Conclusion and Fatal Flaw Analysis

A brief appraisal of existing data revealed that none of the sites represent a 'Fatal Flaw' or 'Red Flag' for the proposed development and that the 'No-Go' Options would not apply in any of the site alternatives. Some sites do exhibit limitations as suitable alternatives, and should preferably not be considered as viable alternatives, especially in terms of impacts on biodiversity. From the recommendations made within this desk-top scoping study, the following recommendations are made:

» The **power station site alternative Option 1** is currently regarded the preferred option, mainly as a result of lower (preliminary) habitat sensitivities of these farms as well as the proximity to existing areas of anthropogenic transformation.

» Overall the Goedehoop Option 1 was recommended as the most suitable option for the **ashing facility,** with option 2 a close second. However during scoping Exxaro responded that it is not desirable for them to have the ashing facility located on Farm Goedehoop from a land-use perspective. **Option 2** (Appelvlakte Option) is therefore recommended as the preferred alternative at this stage.

During scoping it was also recommended that the possibility of locating the ashing facility on Graaffwater 456 (the same farm as the power station site option 1) also be investigated option will be assessed in the EIA phase.

The possibility of 'in-pit ashing' should be explored exhaustively. This is recommended in spite of the known legal ramifications and implications of shared responsibilities, etc. The benefit to the environment is expected to be enormous should 'in-pit ashing' be achieved.

» **Power line Alternative 2,** although slightly longer than alterntiave 1, makes use of existing corridors of transformation, limiting the potential direct impacts to some extent. This alternative is therefore considered the preferred option and localised areas of sensitivity can be avoided through local realignment options.

The findings of the Draft Scoping Report indicate that there are no environmental fatal flaws identified at this stage associated with any of the alternative proposed for the proposed power station and associated infrastructure. In addition, it is expected that the main potential risks to the proposed project, as outlined within this report, can be

addressed. It is recommended that the proposed site should be further considered in an EIA phase assessment according to the Plan of Study contained in this report.

PLAN OF STUDY FOR EIA PHASE CHAPTER 7

A detailed description of the nature and extent of the proposed Tshivhaso Coal-Fired Power Plant and associated infrastructure, details regarding the Scoping Process followed, as well as the issues identified and evaluated have been included in this Scoping Report.

This Plan of Study describes how the EIA Phase for the proposed power station project will proceed. The EIA Phase includes detailed specialist studies for those impacts recorded to be of potential significance. The key findings of the Scoping Phase are used to inform the Plan of Study together with the requirements of the NEMA EIA Regulations and applicable guidelines.

7.1. Aims of the EIA Phase

The EIA Phase will aim to achieve the following:

- Provide an overall assessment of the social and biophysical environments affected by the proposed project.
- Assess potentially significant impacts (direct, indirect and cumulative, where required) associated with the proposed power station and associated infrastructure.
- Identify and recommend appropriate mitigation measures for potentially significant environmental impacts.
- Undertake a fully inclusive public participation process to ensure that I&APs are afforded the opportunity to participate, and that their issues and concerns are recorded.

The EIA Phase will address potential environmental impacts and benefits (direct, indirect, and cumulative impacts) associated with all phases of the project including design, construction, and operation and decommissioning, and will aim to provide the environmental authorities with sufficient information to make an informed decision regarding the proposed project. All feasible alternatives (including the 'do nothing' alternative) will be assessed.

7.2. Consideration of Alternatives

The following project alternatives will be investigated in the EIA:

i. **The 'do nothing' alternative:** Cennergi does not establish the Tshivhaso Power Station near Lephalale (maintain status quo).
ii. **Layout Alternatives:** Routing for power lines, Power Plant Alternative locations and Ashing Facility Alternative locations
iii. **Siting Alternatives:** siting alternatives for ash dump and for power station
iv. **Micro-siting alternatives:** in terms of actual infrastructure positioning on the preferred site in order to avoid sensitive areas.

7.3. Assessment of Potential Impacts and Recommendations regarding Mitigation Measures

A summary of the issues which would require further investigation within a detailed EIA, as well as the proposed activities to be undertaken in order to assess the significance of these potential impacts is provided within Table 7.1. These specialist studies will consider the site alternatives proposed for the development of power station and all associated infrastructure (including alternatives with regards to design, layout and technology), as well as any feasible alternative alignments of the proposed overhead power line and access road/s.

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

Issue	Activities to be undertaken in order to assess significance of impacts	Specialist
Potential impacts on biodiversity	Flora: The number of sample plots to be distributed in a given area depends on various factors, such as the scale of the classification, environmental heterogeneity and the accuracy required for the classification (Bredenkamp 1982). Stratification of sample plots will be based on visual observations made during the initial site investigation as well as aerial imagery. The Zurich-Montpellier approach of phytosociology (Braun-Blanquet 1964) will be followed; this is a standardised and widely used sampling technique for general vegetation surveying in South Africa. During the surveys, all plant species in the sample plots and the cover and/or abundance of each species will be estimated according to the following Braun-Blanquet cover abundance scale: In addition, a relevant selection of the following biophysical attributes will be recorded: » Altitude- and longitude positions for each relevè - obtained from a GPS; » Soil characteristics, including colour, clay content, etc; » Topography (crests, scarps, midslopes, footslopes, valley bottoms, floodplains or drainage lines); » Altitude, slope and aspect; » Rockiness, estimated as a percentage; » Rock size; and » General observations (including the extent of erosion, utilisation, disturbances of the vegetation management practices, etc).	Riaan Robbesn (Bathusi Environmental Consulting)

Issue	Activities to be undertaken in order to assess significance of impacts	Specialist
	In addition to species captured within the sample plots, general observations will be made in order to compile a comprehensive species list that will include taxa that, because of low abundance levels, are unlikely to be captured within the sample areas. Particular reference is made to Red Data plants, which normally do not occur at great densities. Analysis technique and subsequently refined by Braun-Blanquet procedures. TWINSPAN will be applied to derive a first approximation of the vegetation units. These classifications will be further refined by the application of Braun-Blanquet procedures to determine the plant communities. A phytosociological table showing the vegetation lines will be used to compile a synoptic table of the datasets. A synoptic table summarizes and confirms the vegetation types/ habitat types and variations. Relevant descriptions will follow from the data analysis, based on the presence/ absence and abundance of taxa. <u>Fauna:</u> » Invertebrates The great majority of animal species are represented by invertebrates. They range from microscopic, single-cell protozoa to highly complex animals such as insects and spiders, but most of the twenty-three phyla of invertebrates are seldom used during invertebrate assessments. Reasons vary from sampling difficulties to identification impossibilities. In addition, most of these groups cannot be used to create an understanding of the ecological and biodiversity intricacies of a particular habitat (or when comparing subtle differences between habitats) and are therefore rarely considered during general invertebrate assessments. Even within the "higher invertebrates" (i.e. insects, spiders, scorpions, etc.), not all groups are useful when performing invertebrate assessments with the aim of	

Issue	Activities to be undertaken in order to assess significance of impacts	Specialist
	assessing areas in terms of faunal sensitivities and ecological or biodiversity importance. A careful selection process of invertebrate groups for a specific area is therefore one of the most important phases of the invertebrate assessment process. For example, the use of Papilionidae butterflies when comparing different areas in the Kalahari Desert is a poor choice of invertebrate group given the geographical location of the study area. In comparison, scorpion diversity in the arid regions of South Africa is relatively high and the scorpion assemblage of a specific area in the Kalahari is likely to reveal significant information concerning the ecological quality and biodiversity health of the area. Pre-selection of the invertebrate groups of the invertebrate groups to be used is therefore fundamental to the success of an invertebrate assessment. Various factors should be considered during this selection process: geographical location, habitat diversity, habitat status, ecological connectivity, nature and duration of the impacts of the proposed project, size of the study area and practical aspects such as accessibility to the study area. Taking cognisance of these aspects, it is therefore recommended that the following invertebrate groups are sampled and used as indicator groups for the invertebrate diversity and ecological integrity of the faunal habitats of the study area: * Dung Beetles and Fruit Chafers * Dragonflies and Damselflies * Lacewings and Antlions * Butterflies * Scorpions * Baboon and Trapdoor spiders	

Issue	Activities to be undertaken in order to assess significance of impacts	Specialist
	As with other groups, when performing an assessment, it is critical to have a clear understanding of the requirements for data collation and how sampling results ultimately will be analysed and interpreted. Most often, invertebrate censuses aim to: * Evaluate the invertebrate hosting ability of a specific habitat fragment and to identify the optimal invertebrate conservation strategy for the specific area; * Monitor invertebrate assemblage and community changes; and * Investigate the abundance of invertebrates as prey for vertebrates such as birds and small mammals. The main aim of EIA invertebrate surveys will be to establish an optimal invertebrate conservation scenario by obtaining as much information as possible given the usual time and budget allowances. The main requirement for such an evaluation survey is that most or all habitats and microhabitats thought to be important to invertebrates at a site are sampled adequately. Evaluation surveys usually concentrate on searching specific habitats considered important for species of high conservation value. Such surveys often include a range of complementary techniques to maximise the range of species recorded. Two major objectives are therefore recommended for the invertebrate EIA assessment in order to create an ecological image of the area to be investigated, namely: * To compile an inventory species for specific groups of invertebrates (species inventory of groups listed above). Taxa within the target groups should be easily identified by either field investigators, or with readily accessible specialists from other institutions; and * Sampling efforts should be stratified across a variety of habitats for specific groups in order to compare the species diversity (species numbers and relative abundances) of these areas with each other using species diversity indices such as Simpson's Index of Evenness.	

Issue	Activities to be undertaken in order to assess significance of impacts	Specialist
	» Herpetofauna It is proposed that all frogs are sampled using species-specific vocalizations of males as identification; also active searches for active adults during early evenings. Snakes, lizards and other reptiles will be sampled by active searches in likely habitats such as rocks, inactive termitaria, etc. General sampling during early evenings and mornings by driving slowly on roads in the area and observing reptiles crossing the road (roadkills). » Mammals Visual sightings as well as the use of ecological indicators such as tracks, dung, calls, and diggings will be used to compile a species inventory of the study area, and where possible, for each faunal habitat fragment within the study area. Baited UV field cameras will be used to assess the study area regarding the presence or absence of medium and large carnivores known to be present in the region of the study area. Driving at night and early morning on the roads and identifying species crossing the road as well as roadkills, when encountered. The following methods are considered relevant for a detailed baseline avifaunal survey: » Point Count Surveys Data will be collected by means of point counts (Buckland et. al. 1993; Ralph et. al. 1995; Sutherland et. al. 2004) to determine indicator species and to delineate the dominant bird communities present. The use of point counts is the preferred method for detecting shy or elusive species. It is also preferred over line transect counts where access is problematic, or where terrain is complex. It is an	

Issue	Activities to be undertaken in order to assess significance of impacts	Specialist
	appropriate method to use, and is very efficient for gathering a large amount of data in a short time period (Sutherland, 2006). » Point counts will be spaced at least 200 m apart to improve the independence of observations. Each point count will be surveyed for a period of 10-15 minutes (depending on the structure of the vegetation and which will be determined when on site). The following data will be collected at each survey point: * The species (identification) of each bird observed or heard; and * The number of individuals observed for each species. » Random (ad hoc) surveys To obtain a more complete inventory of bird species present (apart from those observed during the point counts), all bird species observed while moving between point counts will be identified and noted. Particular attention will also be paid to suitable roosting, foraging and nesting habitat for threatened or near-threatened species. Besides visual observations, bird species will also be identified by means of their calls and other signs such as nests, discarded eggshells, and feathers. » Nocturnal bird surveys Nocturnal bird species (owls and nightjars) will be searched for by driving slowly or walking (depending on safety and accessibility) on roads at night. Attention will be paid to calling bird species such as owls and nightjars. » Playback/broadcasting of bird vocalisations The probability of detecting skulking or elusive species will be verified by playback of bird calls/songs wherever suitable habitat was detected (e.g. Tinkling Cisticola - Cisticola rufilatus), certain owl and	

Issue	Activities to be undertaken in order to assess significance of impacts	Specialist
	nightjar taxa and warblers). Special care will be taken to keep disturbance to a minimum and not to affect the bird's natural behaviour (e.g. to prevent unnecessary habituation). » Detecting patterns in diversity and composition The data generated from the point counts will be analysed according to Clarke & Warwick (1994). A comparison of the different point counts relative to the different habitat types/homogenous habitat units will be performed using multivariate community analyses of calculated Bray-Curtis similarity coefficients. Dominant and indicator species will be determined according to Clarke & Warwick (1994). Species with high contributions (i.e. with high abundance values and consistency across sampling sites) to a particular habitat represent the typical/dominant species for a given community. In addition, the dissimilarity between the different habitat types will also be measured. A species with a high contribution to the dissimilarity between two habitat types is a good indicator species of the particular habitat. Bird species richness and diversity will be measured by means of rarefaction and selective diversity indices. Species richness will be measured for each community (as delineated above) by calculating the total number of species recorded (S), the total number of individuals (N) and by means of the Shannon – Wiener diversity index (H' (loge)) » Construction of bird guilds Bird guilds are a better alternative to species lists or inventories. The bird community on the study	

Issue	Activities to be undertaken in order to assess significance of impacts	Specialist
	site represents a "guild profile", consisting of an array of different feeding and nesting guilds, each represented by one or more species (Feinsinger, 2001). Since richness values and species composition alone are not as good ecological indicators, a "guild profile" may be more sensitive to the effects of human-induced activities. The "guild profile" of each bird community will be analysed and interpreted (e.g. dominant guilds vs. "missing" guilds).	
Potential Impacts on Agricultural Potential	» Identify and describe potential sensitive areas through on site investigations. » Mitigation procedures must be recommended to ensure that medium to long term impacts may be avoided or at least reduced. » It is recommended that in the next phase of study on site, details be gathered from current land owners and farmers with regards to current farming activities on the properties and in the surrounding area. With assistance from these parties information may be obtained to assist in issues regarding agricultural importance and use of the site.	Jaco Jansen (Savannah Environmental)
Potential impacts on heritage resources	» Establish the range and importance of the exposed and in situ archaeological, heritage material remains, sites and features through on-site investigations. » Assess the potential impact of the development (including direct, indirect and cumulative impacts). » Make recommendations to minimise possible damage to the archaeological heritage. » Identification and assessment of all potential impacts (direct, indirect and cumulative) identified in the scoping phase report. » Provide recommendations for the mitigation of impacts associated with the construction and operation phases of the proposed development. » A Phase 1 Archaeological Impact Assessment (AIA) report will include appropriate recommendations and assessment of the significance of archaeological material remains, features, and sites documented during the survey, as well the potential impact of the development. » It is recommended that as part of the public consultation process the presence of graves, archaeological and historical sites should be determined.	Johan van der Walt (HCAC)
Potential impacts on palaeontology	» Illustrated, fully-referenced review of palaeontological heritage within study area based on desktop study and new data from fieldwork and analysis.	John Almond (Natura Viva)

Issue	Activities to be undertaken in order to assess significance of impacts	Specialist
	» Identification and ranking of highlights and sensitivities to development of fossil heritage within study area (Assessment of impact significance, including direct, indirect and cumulative impacts). » Specific recommendations for any further palaeontological studies or mitigation (EIA and EMP).	
Potential impacts on sensitive noise receptors	The Environmental Noise Impact Report will cover the following points: » the purpose of the investigation; » a brief description of the planned development or the changes that are being considered; » a brief description of the existing environment including, where relevant, the topography, surface conditions and meteorological conditions during measurements; » the identified noise sources together with their respective sound pressure levels or sound power levels (or both) and, where applicable, the operating cycles, the nature of sound emission, the spectral composition and the directional characteristics; » the identified noise sources that were not taken into account and the reasons as to why they were not investigated; » the identified Potentially Sensitive Receptors and the noise impact on them; » where applicable, any assumptions, with references, made with regard to any calculations or determination of source and propagation characteristics; » an explanation, either by a brief description or by reference, of all measuring and calculation procedures that were followed, as well as any possible adjustments to existing measuring methods that had to be made, together with the results of calculations; » an explanation, either by description or by reference, of all measuring or calculation methods (or both) that were used to determine existing and predicted rating levels, as well as other relevant information, including a statement of how the data were obtained and applied to determine the rating level for the area in question; » the location of measuring or calculating points in a sketch or on a map; » quantification of the noise impact with, where relevant, reference to the literature consulted and the assumptions made; » alternatives that were considered and the results of those that were investigated;	Morne De Jager (EAR)

Issue	Activities to be undertaken in order to assess significance of impacts	Specialist
	» a list of all the interested or affected parties that offered any comments with respect to the environmental noise impact investigation (if comments are received); » a detailed summary of all the comments received from interested or affected parties as well as the procedures and discussions followed to deal with them (if comments are received); » conclusions that were reached; » proposed recommendations including potential mitigation measures; and » any follow-up investigation which should be conducted at completion of the project as well as at regular intervals after the commissioning of the project so as to ensure that the recommendations of this report will be maintained in the future.	
Potential impacts on air quality	The following is required in order to assess the issues: » The compilation of a detailed emission inventory for the proposed Tshivhaso Coal-fired Power Plant, for the construction, operations and decommissioning phases. The inventory will be based on activity data such as the proposed generation technology; air pollution abatement technology, coal quality and consumption, as well as coal processing technology, and will use default emission factors from the US-EPA. » Air dispersion modelling using the CALPUFF model as recommended in the dispersion modelling regulation to predict ambient concentrations of air pollutants resulting from the Tshivhaso Power Plant for emissions during construction, operations and decommissioning phases. » Assessment of the significance of potential impacts by comparing predicted ambient concentrations with the relevant NAAQS.	Mark Zunkle (uMoya-Nilu)
Potential impacts on surface and ground water	No further studies are required. Impacts are expected to be of low - negligible significance.	N/A
Visual impacts	The following would be required in the EIA phase:	Jon Marshal

Issue	Activities to be undertaken in order to assess significance of impacts	Specialist
	» Screening capacity of vegetation would be calculated. » A site visit is required to properly assess the impacts.	(Afzelia)
Socio-economic impacts	» Provide a baseline description of the socio-economic environment that may be affected by the proposed project activities. » The baseline description will be derived from secondary data (range of sources, including but not limited to, census data, existing reports, and IDP and other strategic planning documents) and primary data collection (using a combination of telephonic, face-to-face and focus group interviews). » Identify and assess socio-economic impacts (direct, indirect and cumulative) that may result from the construction and operation phases of the project based on experience of projects of a similar nature. » Identify and assess potential opportunities for enhancing positive impacts and benefits. » Identify all relevant legislation, permits and standards that would apply to the development. » Provide recommendations for the mitigation of impacts associated with the construction and operation phases of the proposed development.	Elena Broughton (Urban Econ)

7.4 Methodology for the Assessment of Potential Impacts

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

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

- The **significance**, which shall be determined through a synthesis of the characteristics described above (refer formula below) and can be assessed as low, medium or high.
- The **status**, which will be described as positive, negative, or neutral.
- The degree to which the impact can be reversed.
- The degree to which the impact may cause irreplaceable loss of resources.
- The *degree* to which the impact can be *mitigated.*

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

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

S = Significance weighting

E = Extent

D = Duration

M = Magnitude

P = Probability

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

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

As Cennergi have the responsibility to avoid or minimise impacts, and plan for their management (in terms of the EIA Regulations), the mitigation of significant impacts will be discussed. Assessment of impacts with mitigation will be made in order to demonstrate the effectiveness of the proposed mitigation measures. The results of the specialist studies and other available information will be integrated and synthesised by the Savannah Environmental project team. The contents of the EIA report are listed in below:

- **Detailed description** of the proposed activity
- **Details and expertise** of the Environmental Practitioners involved in the report writing
- A description of the property on which the activity is to be undertaken and the location of the activity on the property(ies)
- A description of the **environment that may be affected by the activity** and the manner in which the physical, biological, social, economic and cultural aspects of the environment may be affected by the proposed activity
- Details of the **public participation process** conducted, including:
  - Steps undertaken in accordance with the plan of study for EIA;
  - A list of persons, organisations and organs of state that were registered as interested and affected parties;
  - A summary of comments received from, and a summary of issues raised by registered interested and affected parties, the date of receipt of these comments and the response to those comments; and
  - Copies of any representations, objections and comments received from registered interested and affected parties
- A description of the **need and desirability** of the proposed project and identified potential alternatives to the proposed activity, including advantages and disadvantages that the proposed activity or alternatives may have on the environment and the community that may be affected by the activity
- An indication of the methodology used in determining the **significance** of potential environmental impacts
- A detailed **site selection** process description
- A description and comparative **assessment of all alternatives** identified during the environmental impact assessment process
- A summary of the findings and recommendations of **specialist reports**
- A **description of all environmental issue**s that were identified during the environmental impact assessment process, an assessment of the significance of each issue and an indication of the extent to which the issue could be addressed by the adoption of mitigation measures
- An **assessment** of each identified potentially significant impact
- A description of any **assumptions, uncertainties and gaps in knowledge**
- A description of the **period** for which the environmental authorisation is required and relevant dates for commencement of construction and monitoring programmes;
- The final micro-siting **layout** taking into account impact avoidance, mitigation and management measures identified through the assessment.
- An environmental **impact statement** which contains:
  - A summary of the key findings of the EIA; and
  - A comparative assessment of the positive and negative implications of the proposed activity and identified alternatives
- A draft **Environmental Management Programme**
- Copies of specialist reports

The draft EIA Report will be released for a 30-day public review period. The comments received from I&APs will be captured within a Comments and Response Report, which will be included within the final EIA Report, for submission to the authorities for decision-making.

7.5. Public Participation Process

A public participation process will be undertaken by Savannah Environmental. The aim of the public participation process is primarily to ensure that:

- Information containing all relevant facts in respect of the proposed project was made available to potential stakeholders and I&APs.
- Participation by potential I&APs was facilitated in such a manner that all potential stakeholders and I&APs were provided with a reasonable opportunity to comment on the proposed project.
- 30-day review periods are provided for I&APs to comment on the findings of the draft Scoping Reports and Environmental Impact Assessment Reports.
- Comments received from stakeholders and I&APs were recorded and incorporated into the EIA process.

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

- Focus group meetings (pre-arranged and stakeholders invited to attend – for example with directly affected and surrounding landowners, organs of state departments and key stakeholders).
- Telephonic consultation sessions (consultation with various parties from the EIA project team, including the project participation consultant, lead EIA consultant as well as specialist consultants).
- Written, faxed or e-mail correspondence.
- The draft Scoping Report has been released for a 30-day public review period from 20 January – 19 February 2016. The comments received from I&APs will be captured within a Comments and Responses Report, and will be included within the Scoping Report, for submission to the authorities for decision-making.

In terms of Chapter 6 of the EIA Regulations, 2014, the following public participation tasks are required to be undertaken:

- Fixing a notice board at a place conspicuous to the public at the boundary or on the fence of—
  - (i) the site where the activity to which the application relates is or is to be undertaken; and
  - (ii) any alternative site mentioned in the application;
- Giving written notice to:
  - (i) the owner or person in control of that land if the applicant is not the owner or person in control of the land;
  - (ii) the occupiers of the site where the activity is to be undertaken or to any alternative site where the activity is to be undertaken;
  - (iii) owners and occupiers of land adjacent to the site where the activity is to be undertaken or to any alternative site where the activity is to be undertaken;
  - (iv) the municipal councillor of the ward in which the site or alternative site is situated and any organisation of ratepayers that represent the community in the area;
  - (v) the municipality which has jurisdiction in the area;
  - (vi) any organ of state having jurisdiction in respect of any aspect of the activity; and
  - (vii) any other party as required by the competent authority.
- Placing an advertisement in:
  - (i) one local newspaper; and
  - (ii) in at least one provincial newspaper, if the activity has or may have an impact that extends beyond the boundaries of the metropolitan or district municipality in which it is or will be undertaken.
- Open and maintain a register/ database of interested and affected parties and organs of state.
- Release of reports for public review.
- Compilation of a Comments and Responses Report which documents all of the comments received and responses provided by the project team.

In compliance with the requirements of Chapter 6 of the EIA Regulations, 2014, the following summarises the key public participation activities which will be undertaken.

- **Placement of Site Notices**

  Site notices will be placed on-site, on any alternative sites being considered in the application and at relevant public places.

» **Identification of I&APs and establishment of a database**
Identification of I&APs was undertaken by Savannah Environmental through utilising existing contacts and databases, recording responses to site notices and the newspaper advertisement, as well as through the process of networking. The key stakeholder groups identified include:

- Directly affected landowners
- Adjacent mines and industrial operations
- Adjacent farmers
- Surrounding mines and industrial operations
- Surrounding farmers
- Ward Councillors
- Rate Payers Associations and area residents
- Farmers Union
- Local Municipality
- District Municipality
- National Organs of State Departments
- Provincial Organs of State Departments
- State-owned Enterprises
- Non-governmental Organisations (NGOs)
- Conservations Groups

Table 7.2 below lists the key stakeholders identified during the EIA Process.

Table 7.2 Interested and Affected Parties identified in the EIA Process

ORGANS OF STATE
National Organs of State Departments

Department of Agriculture, Forestry & Fisheries
Department of Environmental Affairs
Department of Communications
Department of Energy
Department of Mineral Resources
Department of Rural Development and Land Reform
Department of Water and Sanitation
State-owned Enterprises
Eskom
South African National Roads Agency
Transnet
South African Civil Aviation Authority
South African Heritage Resources Authority
Limpopo Provincial Heritage Resources Authority
Provincial Organs of State Departments
Limpopo Department of Agriculture
Limpopo Department of Economic Development, Environment and Tourism
Limpopo Department of Roads and Public Transport
Local Organs of State Departments
Lephalale Local Municipality, including local ward councillors
Waterberg District Municipality
NGOs
Wildlife and Environment Society of South Africa (WESSA)
BirdLife South Africa
EarthLife Africa
KEY STAKEHOLDERS
Directly affected landowner/s

Adjacent mines/ industrial operations
Adjacent farmers
Surrounding mines/ industrial operations
Surrounding farmers
Ward Councillor/s
Ratepayers Association/s or area residents
Farmers Union

All relevant stakeholder and I&AP information has been recorded within a database of affected parties (refer to Appendix C). While I&APs are encouraged to register their interest in the project from the onset of the process undertaken by Savannah Environmental, the identification and registration of I&APs will be on-going for the duration of the Scoping and EIA phases of the project.

» **Newspaper Advertisements**
Newspaper advertisements will be placed to notify and inform the public of the proposed project and EIA process, invite the public to participate in the EIA process by registering themselves as I&APs and announce the availability of the draft Scoping Report for public review. These advertisements will be placed in the following newspapers at the onset of the 30-day review period:

* The Mogol Pos
* The Star Newspaper

» **Stakeholder Consultation Meetings**
In order to accommodate the varying needs of stakeholders and I&APs, the following opportunities will be provided for I&AP issues to be recorded and verified through the Scoping phase and EIA process as outlined in Table 7.3 below.

Table 7.3: Planned Stakeholder Consultation Meetings

Consultation Meetings in Scoping Phase	Planned Date
Focus Group Meeting with impacted and adjacent farmers	Week of 15 February 2016

Focus Group Meeting with adjacent mines/industries	
Focus Group Meeting with Lephalale Local Municipality	
Focus Group Meetings with Ward Councillors and/or chairpersons of rate payer's associations (Ward 2 and Ward 3 of the Lephalale Local Municipality)	
Focus Group Meeting with Earthlife Africa	

Records of all consultation undertaken will be included in the Scoping Report which will be submitted to the Department of Environmental Affairs for decision-making.

» **Identification and Recording of Issues and Concerns**
Issues and comments raised by I&APs over the duration of the EIA process will been collated into a Comments and Response Reports. The Comments and Response Report will include responses from members of the EIA project team and/or the project proponent.

7.6. Key Milestones

The envisaged key milestones of the programme for the EIA phase of the project are outlined in Table 7.4.

Table 7.4: Envisaged key milestones of the programme for the EIA phase of the project

Key Milestone Activities	Proposed completion date[6]
Public review period for draft Scoping report	20 January 2016 – 19 February 2016 30 day review period

[6] Indicative dates only

Key Milestone Activities	Proposed completion date[6]
Finalisation and Submission of Scoping Report to DEA	End February 2016
Authority acceptance of the Environmental Scoping Report and Plan of Study to undertake the EIA	March - April 2016
Detailed specialist studies and public participation process	March - April 2016
Make draft EIA Report and draft EMP available to the public, stakeholders and authorities	April - June 2015
Submit Final EIA Report to DEA for review and decision-making	July 2015

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