Table 4-1 lists each of the sites with the advantages and disadvantages of each of the sites.

Table 4-1: Assessment of site locations

Site	Advantages	Disadvantages
1	Close to Ash Dam site for ash disposal. Prevailing winds unlikely to blow coal dust over Power Station	5 km to water storage 5 km to substation Conveyor belt will require 90 degree turns
2	Further From Ash Dump Prevailing winds unlikely to blow coal dust over Power Station	Although Closer (2-3 km) from Substation, Conveyor belt for coal supply requires 90 degree turns 2 – 3 km from water point
3	Close to Ash dam Close to centre of railway line for evaporation ponds	Prevailing winds would blow coal from loading stock pile over power plant Conveyor would require 90 degree turns 5 km to water storage 5 km to substation Transmission line path awkward with rail line and loading infrastructure in the path
4	Close to substation Short transmission lines Coal conveyor simpler (marginal)	Planned stockpile for middlings fraction on the boundary fence Doubling of loading yard may impinge on power plant site. Further From Ash Dump
5	Very close to substation Close to main consumer Very close to water point Conveyor direct line to power plant Closer to mining shovels for power point Keeps the ‘dirty’ footprint smaller and concentrated	Water disposal to evaporation ponds further The construction yard would have to be relocated Further from Ash dam

Site	Advantages	Disadvantages
	Prevailing winds unlikely to blow coal dust over Power Station	

Site 1 was chosen for the location of the power station due to the various reasons summarized in Table 4-1.

4.2 Technology Alternatives (Generation)

4.2.1 Eskom supply

The preferred supply of electricity would be to obtain a 50MVA direct supply from Eskom. This supply would prevent the necessity for the construction of a power station and associated infrastructure for the operation of the Boikarabelo Coal Mine. Since the onset of the project, Resgen has been able to secure an initial supply from Eskom, however this supply is not sufficient for the full operation of the processing plant as well as the use of electrical mining shovels. As supply from the grid may not be reliable, Resgen requires a stable source of power to ensure optimal operation of the mine.

4.2.2 Renewable energy

Solar thermal electric power plant generates heat by using lenses and reflectors to concentrate the sun's energy, which is then stored. These plants are unique because they can supply power when it is needed, day or night, rain or shine.

The sun's heat can be collected in a variety of different ways:

- Solar Parabolic Troughs consist of curved mirrors which form troughs that focus the sun's energy on a pipe. A fluid, typically oil, is circulated through the pipes which are used to drive a conventional generator to create electricity.
- Solar Parabolic Dish systems consist of a parabolic-shaped concentrator (similar in shape to a satellite dish) that reflects solar radiation onto a receiver mounted at the focal point at the center. The collected heat is utilised directly by a heat engine mounted on the receiver which generates electricity.
- Solar Central Receivers or "Power Towers" consist of a tower surrounded heliostats. Heliostats are mirrors that track the sun and reflect its rays onto the receiver, which absorbs the heat energy that is then utilised in driving a turbine electric generator.

4.2.3 Photovoltaic Energy

Photovoltaic energy is an energy source which directly converts sunlight into electricity. The solar cell is the elementary building block of the photovoltaic technology. Solar cells are made of semiconductor materials, such as silicon. One of the properties of semiconductors

that makes them most useful is that their conductivity may easily be modified by introducing impurities into their crystal lattice.

In order for photovoltaic to be implemented on a significant scale, the cost of implementing a system of solar electricity needs to be substantially reduced in South Africa. This cost is essentially derived from the raw materials which are used in the manufacturing of the solar cells, the high purity crystalline silicon, as well as the low density of energy which is obtained from photovoltaic collectors.

4.2.4 Pulverised Fuel (PF)

PF Technology is used in all of Eskom's existing power stations. In a PF plant, coal is first received by the mills where it is ground into a fine powder before being introduced into the boiler for combustion. Due to the fineness of the coal, combustion efficiency is high and virtually instantaneous once the coal is introduced into the boiler. PF Boilers are designed to operate on a relatively high quality / CV coal which has little variation or deviation from its design specification. However, CFB technology, as proposed for this project, allows for a greater band of coal qualities to be received and can also receive relatively low quality/CV coal for combustion. This makes the PF boilers unsuitable for use in the Boikarabelo project since the project is intended to receive a lower grade coal with high variability from the mine.

4.2.5 Diesel / Heavy Fuel Oil Generators

Diesel or Heavy Fuel Oil (HFO) generators would consist of a number of reciprocating generator engine sets producing approximately between 1 and 5MW each. The technology is simple and well proven with minimal fuel pre-treatment required and very little auxiliary infrastructure needed for operations. This technology is often seen in remote locations where no other power alternatives exist. The biggest problem however is the cost of fuel is very high thus yielding a total power tariff cost much higher than that which would be applicable for a CFB power station. Although HFO may be comparatively cheaper than Diesel to use, it is still significantly more expensive than the low grade coal to be used for this project. In addition to the pricing issues, there would also be logistical problems with using either Diesel or HFO as both would have to be sourced from the coastal areas in SA and transport would add a significant cost onto the already high fuel price. Thus, as a long term power solution for the mine, this option would not be feasible.

4.2.6 Underground Coal Gasification

Underground Gasification of Coal (UCG) is the gasification of coal in the seam underground, and, as such, avoids many of the expenses and disadvantages of traditional mining, whilst generating a gas (synthesis gas / syngas) with a low emissions profile and the potential for simple carbon capture and storage. UCG offers a potential means of extracting energy from deposits, which are not amenable to conventional mining, economically.

UCG involves drilling boreholes into the coal and injecting water/air or water/oxygen mixtures. It combines an extraction process and a conversion process into one step,

producing a high-quality, affordable synthetic gas, which can be used for power generation in gas turbine combined cycle power stations.

UCG is briefly described below:

- Vertical wells are drilled into the coal seam. These are linked together horizontally by drilling or combustion links;
- The coal seam is ignited and air or oxygen is pumped into a well (the injection well) to drive coal combustion and gasification;
- Through partial combustion and a series of subsequent reactions controlled by heat, pressure and water influx, the coal is converted to syngas;
- When coal combustion occurs, heat and carbon dioxide are produced. These become active in some of the gasification reactions;
- Syngas flows from the gasification chamber through the horizontal connection in the coal seam and flows to the surface through another well (called the production well).

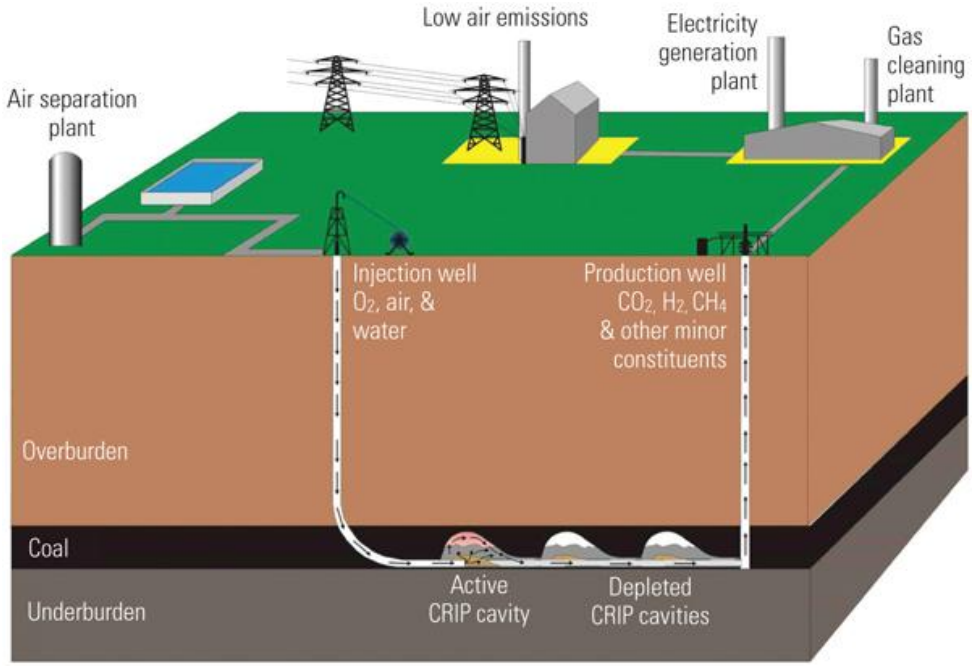


Figure 4-1: UCG Process Diagram

4.2.7 Power Alternatives Summary

Of the known power alternatives, the Limpopo Province would be an excellent environment wherein solar energy may be contemplated, considering the high percentage of sunlight received annually. Although the above two alternatives described are attractive options for a renewable energy source, neither of these two alternatives are a feasible option due to the high cost involved, and size of disturbed area required.

Furthermore Solar Power is in its infancy in terms of usage in 24 hour per day operations and due to the immaturity of the technology in comparison with coal power the entire mining operation would be infeasible if another technology were to be utilised.

For UCG to be effective there needs to be a non-permeable layer above the coal seam with a depth of approximately 100 – 200 m, to prevent loss of syngas to surface, before reaching the extraction well. In the areas that Resgen plan to mine there is no area that has sufficient overburden and depth, so UCG is not a viable power generation alternative.

4.2.8 Combustion Technology Alternatives

The CFB boiler technology was chosen over a traditional Pulverised Coal (PC) boiler primarily due to the capability for superior fuel flexibility with the capability of firing a wide range of solid fuels with varying heating values, ash content, and moisture content. Slagging and fouling tendencies are minimized in CFB units because of the low combustion temperatures. In addition, sulphur dioxide emissions can be controlled from a CFB without the use of external scrubbers and nitrous oxide emissions from CFB units are inherently lower than a PC boiler.

4.2.8.1 Cooling Technology Alternatives

There are three basic cooling technology alternatives: once through cooling, wet cooling and dry cooling. Once through cooling requires a large body of water, such as a large river or reservoir, as a source of cooling water. This is not available for the proposed Boikarabelo Power Station Project. Wet cooling is a preferred technology because of its favourable capital cost and performance impacts. However, large amounts of makeup water are required due to the evaporation in the cooling tower which is not available for this Project. Based on the above reasons, dry cooling is the preferred option and will be utilised for this Project.

Dry cooling is accomplished by either an indirect or direct dry cooling method.

Direct cooling utilises exhaust steam from the turbine flowing to the dry cooling elements. Heat from the steam is removed by air which is blown over the finned heat exchanger by forced draft fans, causing the steam to condense to water. The condensate (water) is pumped back to the boiler, for reuse in the process.

An indirect dry cooling system uses cold water from the cooling tower which flows through the condenser tubes, where the steam from the turbine passes over them. The steam is condensed and pumped back to the boilers whilst the resulted heated water is pumped back to the cooling tower. Heat exchangers inside the cooling towers cool the heated water before it flows back to the condenser tubes.

For the purpose of this project, indirect dry cooling will be used due to lack of water availability in the area.

4.2.8.2 Atmospheric Emission Control Technology Alternatives, including Removal of Dry Ash

Flue gas emissions include fly ash particulate, sulphur dioxide, and nitrous oxides. Since a larger portion of the fuel ash will leave the CFB boiler with the bed ash, a lower total fly ash particulate loading will exist in the flue gas entering the particulate removal equipment compared to a PC boiler. Depending on the type of particulate removal device, this would lead to lower particulate emission rate for CFB boiler. The addition of a supplemental sorbent (limestone) with the fuel in a CFB boiler will result in lower sulphur dioxide emissions with the CFB technology which can meet the World Bank emission limits without the need for Flue Gas Desulphurisation (FGD) equipment. The lower combustion temperature of the CFB boiler will result in a significant reduction on the NO_x emissions of the CFB boiler compared to a PC boiler.

4.3 Ash Disposal Alternatives

Ash may be disposed of in one of three ways: above-ground ash dumping, in pit ashing and the sale of the ash.

Above-ground ash dumping involves the disposing of ash by means of stacking and spreading on a piece of ground, so as to create an ash dump. The operational dump site would be continuously rehabilitated with topsoil and re-vegetated as it develops, until it reaches the end of its life. The ash dump will be lined with clay. Approximately 15 ha of land will be required to accommodate an ash dump for the 40 year life of the proposed Boikarabelo Power Station.

An additional option would be the sale of the ash. Ash can be used in a concrete mix, as it improves concrete performance, making it stronger, more durable, and more resistant to chemical attack. It could also be used for brick making.

Future studies will be required to determine which option will be used for the Boikarabelo Power Station.

4.4 No-go Alternative

The ‘No-go’ alternative is the option of not constructing the Boikarabelo Power Station. The Boikarabelo Coal Mine needs to have access to reliable and available electrical power to operate and it is proposed that the construction of the Boikarabelo Power Station will supply power directly to the Mine.

If the Boikarabelo power station project were not to proceed an alternative supply of electricity to the Boikarabelow coal mining project is required.

Should the Boikarabelo power station project not proceed and not alternative power supply is found it will lead to the Boikarabelo coal mine project not proceeding. This will result in the following impacts: the demand for Eskom’s energy consumption will continue, economic activity, skills development and available jobs will not be created.

Boikarabelo Coal Mine can initiate production without the development of the power station, however it will not be able to reach full capacity of the processing plant, limiting the introduction of electrical powered shovels, thus reducing efficiency and potentially the viability of the operation. Increased dependence upon diesel powered equipment would be required, thus increasing costs, potentially reducing viability and increasing greenhouse emission.

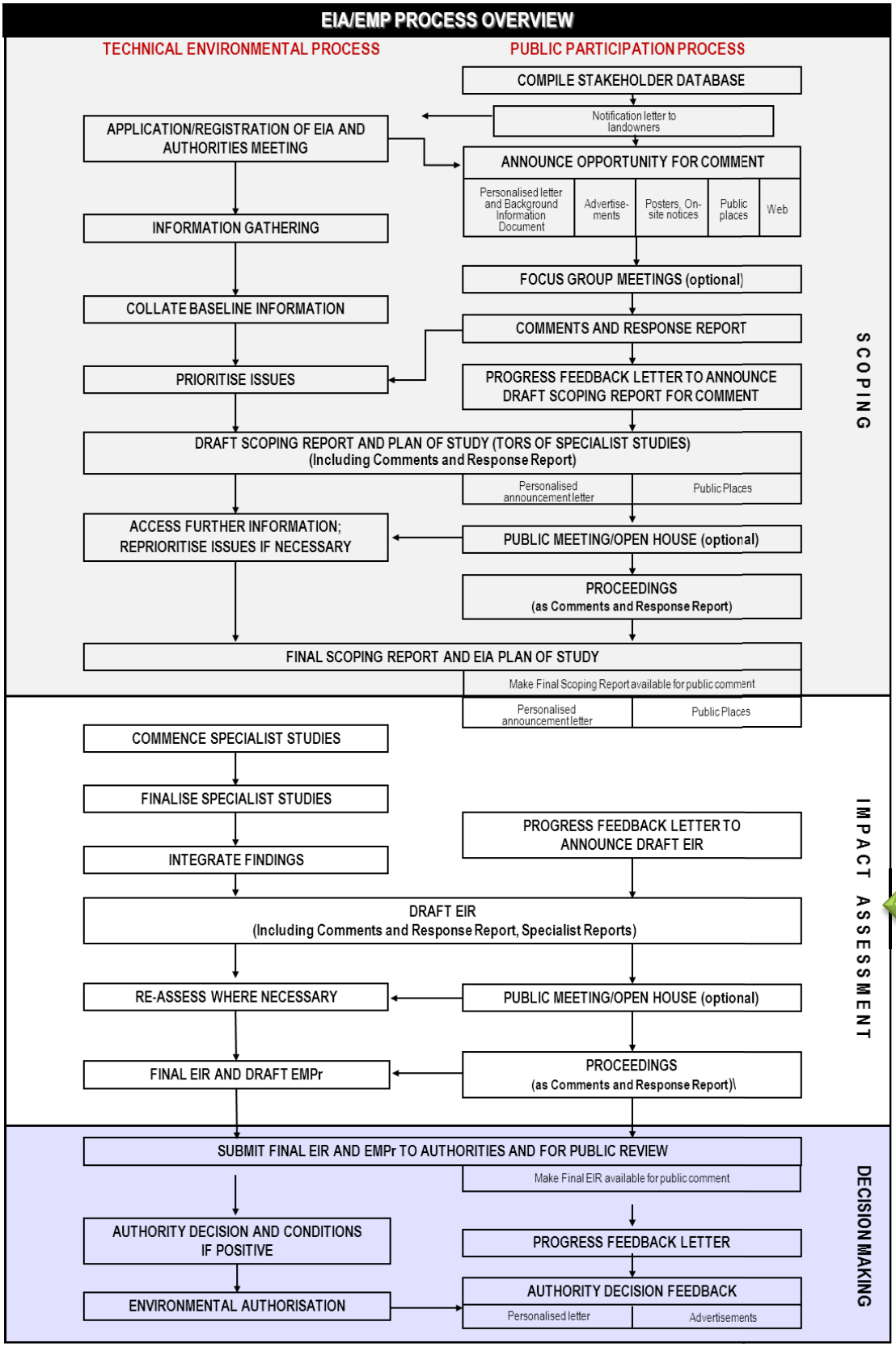
5 EIA PROCESS

5.1 Objectives

The main objective of the EIA Phase is to:

- Determine the sensitivity and ecological status quo of the receiving environment through specialist investigations;
- To identify the activities involved in all phases of the proposed project that may result in a detrimental impact to the receiving environment;
- To determine the significance of identified impacts; and
- To relay findings of the EIA phase to all stakeholders.

5.2 Process Schedule



5.3 Engagement with Stakeholders

A public participation process (PPP) has been developed as part of the EIA process for the Boikarabelo Power Station. A PPP in environmental authorisation processes is not only a statutory requirement, but a process that should lead to a joint effort by I&APs who work together to produce better decisions than if they had acted independently. Through PPP, I&APs are provided with the platform to contribute essential local knowledge to project planning and design, and thereby influence the decision-making process. The inputs received from I&APs will assist the authorities and Resgen to make better informed decisions sustainable for the long-term success and operation of the Boikarabelo Power Station.

The PPP for the Boikarabelo Power Station has been undertaken in line with NEMA EIA Regulations 27 (a-d and g), 28(h) and 54, 55, 56 and 57. In addition to these Regulations, the NEMA Guidelines on Public Participation (August 2010) have also been considered as a guide to conducting an acceptable consultation process for this EIA process. This PPP Report contains the results of the consultation process undertaken to date, the approach and methodology adopted as well as a record of issues raised by registered I&APs on the proposed project.

5.3.1 PPP Scope of Work

The PPP undertaken for the proposed Boikarabelo Power Station project has been designed to comply with the above legal requirements laid down in the above legislation and its guidelines.

This PPP Report provides an account of the results of the consultation process undertaken from November 2012 until July 2012, the approach and methodology adopted as well as the record of issues raised by commenting authorities and registered I&APs on the proposed project. These issues raised have been recorded and collated into the Comments and Response Report (CRR) attached as appendix F of the PPP Report. The PPP Report forms part of the EIAR and EMPR and is attached as Appendix Q.

5.3.2 PPP Approach

A consultative approach was followed for the project and various methods of consultation were implemented to ensure that an open and transparent process is maintained with all potentially affected and interest groups.

During the Announcement phase, the public was provided with an opportunity to register as I&APs on the project and raise issues, comments and suggestions for the enhancement of benefits of the project, how the applicant could minimise or mitigate negative impacts and to inform the project design. The Draft and Final Scoping Reports including the methodology for the PPP were made available to registered I&AP’s enabling them to comment on the proposed project.

The inputs received from I&APs has assisted to guide specialist studies and define the specialist's terms of reference undertaken for the Impact Assessment phase. The PPP designed for the proposed project will be continuously evaluated throughout the EIA process to ensure that the views, opinions and comments expressed by commenting authorities and registered I&APs are recorded and taken into consideration. A simplified diagram of the PPP activities conducted to date is presented in Figure 5-1.

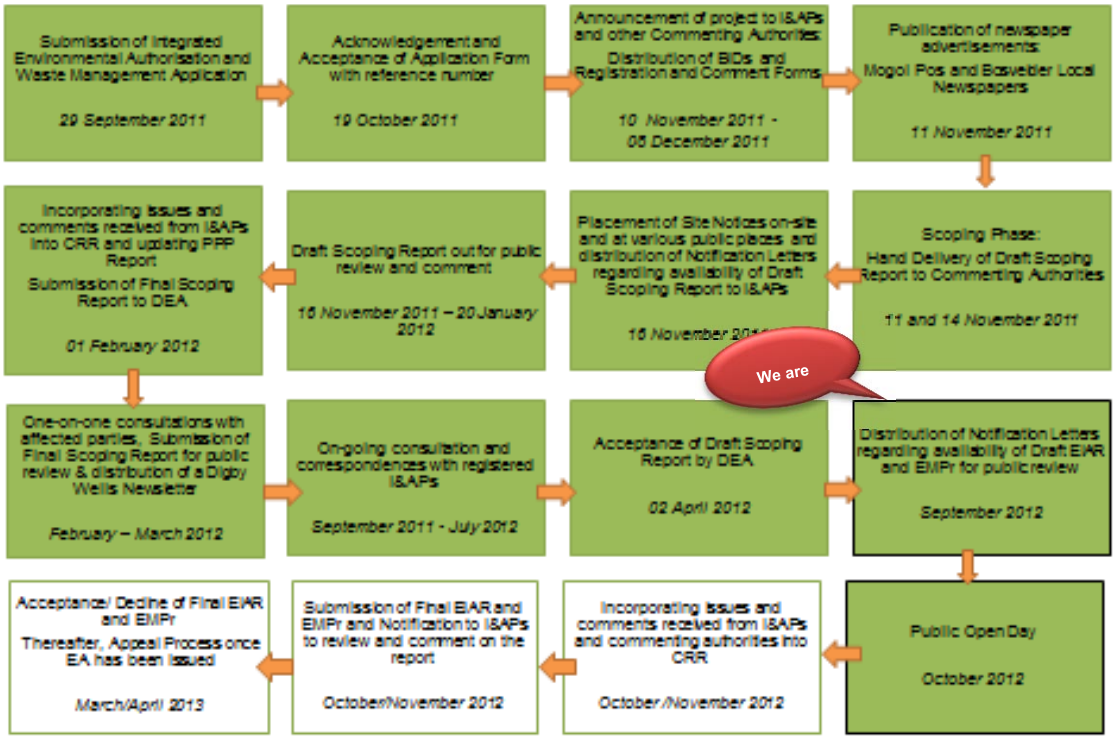


Figure 5-1: PPP activities undertaken for Boikarabelo Power Station

The consultation process should be understood within the context of on-going consultation and participation. This is fundamentally a process that shapes and re-shapes itself to meet the arising needs of potentially affected groups, particularly directly affected parties.

5.3.3 PPP Objectives

The following section provides an account of the PPP conducted to date to serve the following objectives:

5.3.3.1 During Announcement and Scoping Phases (completed)

- To identify all relevant authorities, surrounding landowners, vulnerable groups and any other mining or environmental organisations that exist within the surrounds of the project area;

- Provide sufficient and accessible information to I&APs in an open and transparent manner;
- Provide a platform for I&APs to raise issues of concern and suggestions for the enhanced benefit of the project;
- Assist in identifying project alternatives; and
- Contribute relevant information to the environmental impact assessment process.

5.3.3.2 During EIA Phase (in progress)

- Verify that issues raised have been captured, recorded and considered in the EIA process for DEA's consideration;
- Provide feedback in respect to the specialists findings and the mitigation measures and management plans developed to reduce and/or avoid negative impacts and enhance positive impacts associated with the design, planning and operation of the Boikarabelo Power Station; and
- To ensure on-going communication with all registered I&APs, the competent authority and commenting authorities.

5.3.4 Methodology for Public Participation

The following section details the PPP methodology that has been implemented to date and outlines the techniques employed to engage with I&APs and relevant commenting authorities. These methods of consultation have ensured that registered I&APs are always informed and updated about the progress of the proposed Boikarabelo Power Station project to ensure effective participation.

5.3.4.1 Identification and Categorisation of I&APs

It is important to note that separate PPP's were conducted for the Boikarabelo Coal Mine and Railway Link in terms of NEMA and NEM:WA, respectively. As such, the existing I&AP database was used to ensure that existing I&APs are kept informed of the overall Boikarabelo Coal Mine projects.

Other I&APs were registered through responses to newspaper advertisements and site notices, and through the distribution of project information. To date, 33 I&APs formally registered for the proposed project. In total, 560 I&APs were listed on the database by end of July 2012.

I&APs' details have been captured on Maximiser version 12, an electronic database management software programme. According to Section 24(5) of NEMA, a register of I&APs (Regulation 55 of GNR 543) must be kept by the public participation practitioner. Such a register has been compiled. As the project progresses, any new I&APs will be registered and added to the existing I&AP database. This database will be continually refined as and when interested parties register for the project (Refer to Appendix Q).

Identified affected groups have been categorised accordingly into three groups, namely:

5.3.4.1.1 Commenting Authorities

National and Provincial Authorities

- Department of Environmental Affairs (DEA) – competent authority;
- Department of Mineral Resources, Limpopo;
- Department of Water Affairs, Limpopo;
- Department of Energy, Limpopo;
- Department of Rural Development and Land Reform, Limpopo;
- Department of Co-Operative Governance, Human Settlements and Traditional Affairs;
- Department of Agriculture, Limpopo;
- Department of Health and Social Development;
- Limpopo Roads Agency;
- Limpopo Department of Economic Development, Environment and Tourism;
- Limpopo Department of Roads and Transport; and
- South African Heritage Resources Agency.

District and Local Authorities

- Waterberg District Municipality; and
- Lephalale Local Municipality.

5.3.4.1.2 Affected Groups

The Boikarabelo Power Station will be located within the mining footprint of the Boikarabelo Coal Mine which is owned by Resgen and its partner Ledjadja Coal Mining (Pty) Ltd. Table 5-1 indicates the surface and mining right ownership details of the properties to be affected by the proposed power station. Refer to Plan 3 for the Land Tenure of the Boikarabelo Power Station indicating landownership details. Numerous properties have been purchased specifically to allow the mine and power plant to be situated centrally within these properties and a significant buffer zone will be maintained around the operations, this sustainable buffer will retain the fauna and flora which currently exists There are however, adjacent private landowners and neighbouring mining companies which will be affected by the Boikarabelo Power Station as indicated in Table 5-2.

Table 5-1: Landowners Directly Affected by Boikarabelo Power Station

Project component	Farm Name	Surface and Mining Rights Owner
Integrated NEMA and NEM:WA Application –	Vischpan 274 LQ	Resgen South Africa

Project component	Farm Name	Surface and Mining Rights Owner
Boikarabelo Power Station	Kruishout 271 LQ	(Pty) Ltd
	Zeekoevley 241 LQ	
	Kalkpan 243 LQ	
Mining Right Boundary and NEMA – Boikarabelo Coal Mine and Surface Infrastructure	Witkopje 238 LQ (Portion RE,1,2 & 3)	Resgen South Africa (Pty) Ltd
	Draai Om 244 LQ	
	Vischpan 274 LQ	
	Kruishout 271 LQ	
	Zeekoevley 241 LQ	
	Kalkpan 243 LQ	

Table 5-2: Surrounding landowners to Boikarabelo Power Station

Project component	Farm Name	Surface Right Owner
South Africa		
Integrated NEMA and NEM:WA Application – Boikarabelo Power Station	Boompan 237 LQ	Haygon Safaris (Pty) Ltd
	Osorno 700 LQ	
	Kruispad 242 LQ	Main Street 552 (Pty) Ltd
	Van Jaarsveldtpan LQ	Maluma Lodge CC.
	Geelbult 276 LQ	Sasol Mafutha (Pty) Ltd
	Vlughtkraal 273 LQ	Zinyathi Lodge CC.
	Bitterfontein 272 LQ	Resgen South Africa (Pty) Ltd
	Wildebeestvlakte 268 LQ	ResGen South Africa (Pty) Ltd
	Kleinpan 269 LQ	ResGen South Africa (Pty) Ltd
	Swelpan 245 LQ	ResGen South Africa (Pty) Ltd
	Nieuw Holland 247 LQ	Mr G. Steenkamp
	Verloren Valley 248 LQ	Mrs E.M Swanepoel

Project component	Farm Name	Surface Right Owner
	Dalyshope 232 LQ	Quick Leap Investments 284 (Pty) Ltd
	Koert Louw Zyn Pan 234 LQ	Mr and Mrs Visnak
	Doornkopje 235 LQ	Mr D. Steenkamp
Botswana		
Integrated NEMA and NEM:WA Application – Boikarabelo Power Station	Basinghall 31 LQ	Mr W. Biemond
	Dovedale 33 LQ	Mrs. Riggs Mr Counihan
	Riversley 32 LQ	Mrs. Riggs Mr D. Swart
	Darnaway Farm	Mrs Riggs
	Saaspost 34 LQ	Mr D. Brink

5.3.4.1.3 Interested Groups

This group represents individual persons or groups who have a personal, business or civil interest in the project. South African Non-governmental Organisations (NGOs) and Community Based Organisations (CBOs) active on a provincial, district and local level were identified including:

- Media;
- Environmental associations;
- Legal groups;
- Parastatals; and
- Mining and Industrial Business groups.

The following surrounding mining companies, parastatals, NGO's, CBO's, environmental and legal groups were included in the database (Table 5-3).

Table 5-3: Interested Groups

AGRI South Africa (Agri SA)	Mogol Water Users Association
Anglo American Limited: Thermal Coal South Africa	National Water Forum
Birdlife South Africa	Limpopo Omgewingsbewarings Komitee (LOBK)
Cabanga Concepts CC	Sasol Mining (Pty) Ltd
Council for Geoscience	Sasol Mafutha Mining (Pty) Ltd
Duard Barnard and Associates	Sekoko Resources (Pty) Ltd / Sekoko Coal (Pty) Ltd
Endangered Wildlife Trust	Steenbokpan Development Consortium
Environomics	Steenbokpan Environmental Forum
Eskom Holdings Limited	Lesedi Steering Committee
Eskom Transmission Land and Rights	The Ground Hornbill Research & Conservation Project
Exxaro Coal (Pty) Ltd	Transvaal Agricultural Union South Africa, North
GroundWork - Friends of the Earth South Africa	Transnet Freight Rail
Lategan, Viljoen & Pretorius Attorneys, Notaries & Conveyancers (LVP)	Wildlife and Environmental Society of South Africa
Lephalale District Agricultural Union	Wildlife Ranching South Africa
Lephalale Development Forum	Telkom
Mapongubwe Action Group	

5.3.4.2 Announcement of Opportunity to become involved

Various information sharing documents were compiled to distribute information about the proposed project to I&APs. The opportunity to participate in the proposed Boikarabelo Power Station project was announced in November 2011. The documentation developed and distributed is described below and the documents can be found in Appendices B-D of Appendix Q.

5.3.4.2.1 Background Information Document

A *Background Information Document (BID)* was compiled and distributed to all I&APs registered previously in other environmental processes for the Boikarabelo Coal Mine and to relevant commenting authorities on 10 November 2011 (See Appendix Q). The BID contained information regarding the following:

- Project overview including the locality, design, infrastructure and extent of the proposed project on attached regional setting and land tenure plans;
- A description of the project;
- Environmental authorisation process including applicable legislation requirements;
- EIA process to be followed;
- PPP that would be followed for the proposed project including the registration comment period (30 days);
- Contact details of the public participation practitioner;
- Notification of availability of Draft Scoping Report, commenting dates and venues of where the report was made placed (40 days).

5.3.4.3 Newspaper Advertisements

In compliance with NEMA requirements, newspaper advertisements were published in English and Afrikaans in the "*Mogol Post" and "Bosvelder*" on 11 November 2011 to provide stakeholders with the opportunity to register and comment on the proposed project and to notify them of the availability of the Draft Scoping report for comment (See Appendix C for copies of the published newspaper advertisements).

5.3.4.4 I&AP Registration and Comment Form

The I&AP registration form was included as part of the BID and provided I&APs with an opportunity to register as affected or interested parties for the EIA process and to raise issues of concern and comments regarding the Boikarabelo Power Station from 16 November 2011 until 08 December 2011 (30 days registration period). To date, 15 I&AP Registration and Comment Forms have been received (Appendix Q).

5.3.4.5 Site Notices

Site notices were placed on-site and at public places to inform the general public, directly affected and surrounding communities of the proposed development on 16 November 2011.

The notices gave the location and review period for the Draft Scoping Report, and also provided a brief project description, EIA and PPP processes followed for the project and the contact details of the public participation consultant. The notices were placed at the following locations:

- Waterberg District Municipality;
- Steenbokpan Crossing;
- Theunispan Kontant Winkel;
- Steenbokpan Wholesalers CC;
- Lesedi Village Shop, Steenbokpan; and
- Lephalale Local Municipality Public Library.

5.3.4.6 Notification Letters

- A **Scoping Notification Letter** notifying I&AP's about the availability of the Draft Scoping Report was distributed on 16 November 2011 by email, and postal correspondences. This provided I&APs with an opportunity to raise any issues, comments, and concerns regarding the proposed project and to comment on the report.
- An **EIA Notification Letter** will be distributed to notify registered I&APs about the availability of Draft EIAR and EMPR on 07 September 2012. This will provide a further opportunity for registered I&APs and commenting authorities to give their input into the EIA process conducted for Boikarabelo Power Station.

5.3.4.7 Consultation and Written Notification

5.3.4.7.1 Telephonic Consultation

Throughout the EIA process, telephonic consultation with identified and registered I&APs will continue to take place to:

- Obtain and verify contact details and representation of organisations;
- Provide an update on the proposed project;
- Inform I&APs and commenting authorities of, and invite them to the public feedback open day; and
- Gather any issues, comments, objections and suggestions on the project.

Telephone correspondence was undertaken with DEA, landowners, and surrounding mining companies. These consultations took place from to end of January 2012 to July 2012.

5.3.4.7.2 Written Consultation

- Hand-delivery: BID's, notification letters and registration/comment forms were hand-delivered to commenting authorities during the delivery of the Draft Scoping Report in

November 2011 and to private landowners during consultation meetings held in March to April 2012.

- Email: has been used to distribute project information and maintain continuous communication with I&APs from the inception of the project in November 2011.
- Postal services: registered postal services were utilised when no email or fax contact details were available. Registered post was sent mainly to farm landowners and local communities to disseminate project related information.
- Short-message services (sms): sms notification will be used to remind I&APs to attend the public feedback open day to be held in September/October 2012.
- Newsletter: Digby Wells is conducting various EIA processes in the Waterberg area. As such, a quarterly newsletter has been developed to provide an overview of the projects and an update of progress thereof including the Boikarabelo Power Station. This newsletter was distributed to all registered I&APs on 30 March 2012.

All correspondence sent and received from I&APs is included in Appendix Q.

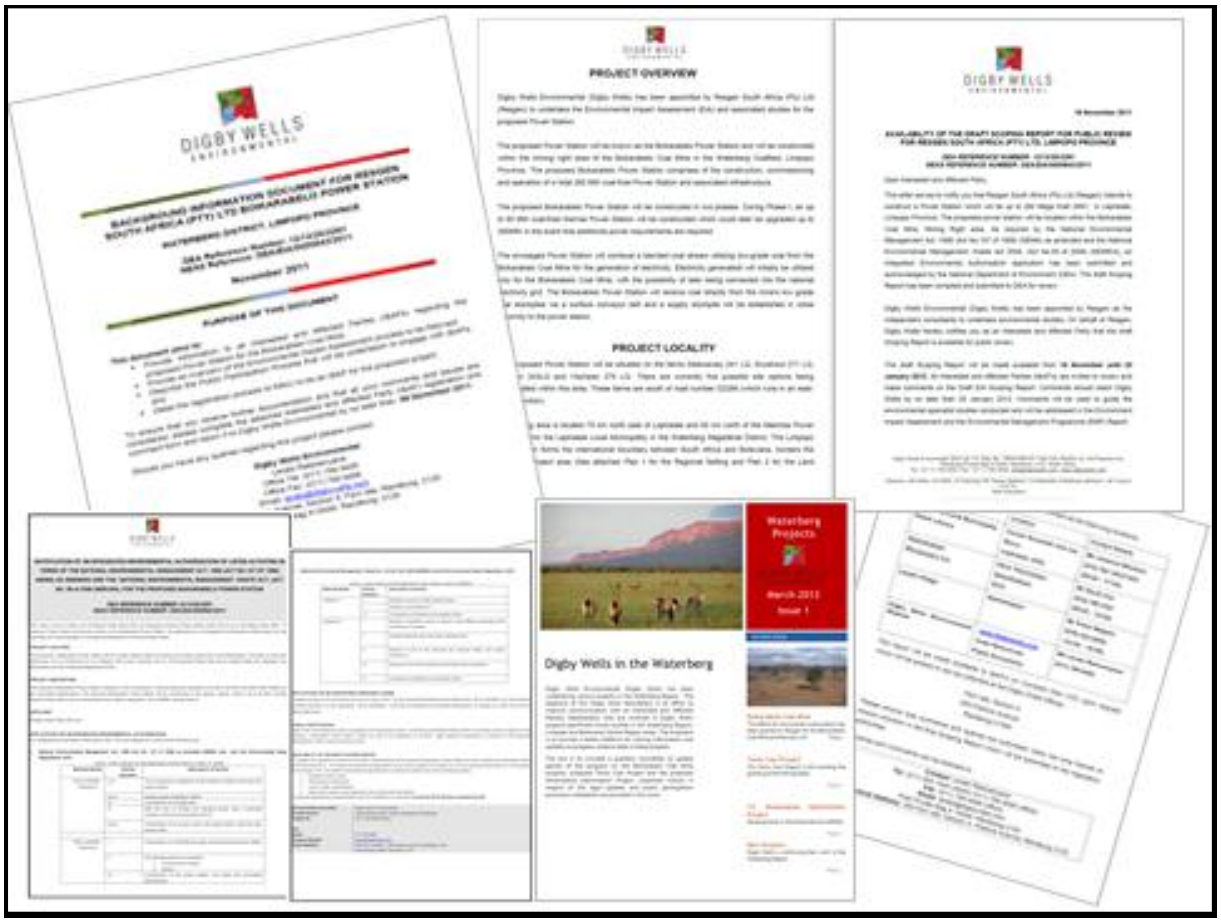


Figure 5-2: Information Documents Compiled and Distributed

5.3.5 Scoping Consultation Phase

It is imperative to undertake a consultation process for a project of this nature which has the potential to impact on people, the natural environment and local economy. The primary purpose of the PPP during the Scoping phase was to gather issues and comments identified by I&APs and by environmental technical specialists and to capture these into the CRR. The issues raised assisted to define the Terms of Reference for the specialist studies undertaken during the impact assessment phase.

The following section provides the outcome of the consultation process undertaken during this phase.

5.3.5.1 PPP Outcomes from the Announcement Phase

During the announcement and registration process, the following I&APs and commenting authorities formally registered and commented on the proposed Boikarabelo Power Station as listed in Table 5-4. The issues raised have been recorded and collated into the CRR (Appendix Q).

Table 5-4: PPP outcomes from Announcement Phase

Name	Department/Farm/Organisation/ Company	Date and Method of Communication
Commenting Authority		
Ms Nyiko Nkosi	DEA	10 and 18 November 2011 Email correspondence
Ms Zama Masondo	Department of Water Affairs	16 November 2011 Email correspondence
Mr Azwindini Mabata	Limpopo Department of Rural Development and Land Reform	22 November 2011 Email correspondence
Mr Mahlatse Shubane	DEA – Case Officer	03 and 09 January 2012 Email correspondence
Interested and Affected Parties		
Mr Mark Berry	Mmabolela Estates Swartwater	10 November 2011 Registration form and Email correspondence
Ms Louise Corbett	Aurecon	10 and 21 November 2011 Email correspondence
Mr Leonard van der Walt	Eskom	11 November 2011 Registration form and Email correspondence
Mr Wolfie Jahn	GLK HQ Exxaro Technology	11 November 2011 Registration form and Email correspondence

Name	Department/Farm/Organisation/ Company	Date and Method of Communication
Professor Jan Meiring	Taaiboschpan Landgoed CC	11 November 2011 Registration form and email correspondence
Mr Willie Brits	Akasia Boerdery - Haakdoornpan 673 LQ	11 November 2011 Registration form and Email correspondence
Dr Kristy Ross	Eskom	11 November 2011 Registration form and email correspondence
Mr Sarel J. Pelser Eloff	Eloff Plant Hire cc	11 November 2011 Email correspondence
Ms Sebenzile Vilakazi	Eskom Group Capital Land Development	11 November 2011 Registration form and Email correspondence
Ms Elana Greyling	Zandheuvel 356 LQ	11 November 2011 Email correspondence
Dr Sarel Booyens and Ms Anneke Conradie	Sasol Mining (Pty) Ltd Mining Rights and Properties Department	11 November 2011 Registration form and Email correspondence
Mr Chris Maritz	Steenbokpan Development Consortium	14 and 23 November 2011 by Registration form and Email correspondence
Mr Mark Wood	Mark Wood Consultants	15 November 2011 by Registration form and Email

Name	Department/Farm/Organisation/ Company	Date and Method of Communication
		correspondence
Mr Rico Euripidou	Groundwork – Friends of the Earth	17 November 2011 and 25 July 2012 Email correspondence
Mr Johan Lourens	Anglo American Thermal Coal	18 November 2011 Telephone and Email correspondence
Mr Tobile Bokwe and Ms Mpho Muswubi	Eskom Generation and Environmental Management	18 November 2011 Telephone and Email correspondence
Mr Marc Judas	Maluma Lodge CC Van Jaarsveldtpan 277LQ	21 November 2011 Fax and Email correspondence
Mr Hein Boegman	Mooipan Boerdery	22 and 23 November 2011 Registration form and Email correspondence
Mr Jan Oberholzer and Mr Neil Anderson	Exxaro Resources	25 November 2011 Registration form and Email correspondence
Mr Fanie van Jaarsveld	Private	28 November 2011 Email correspondence

5.3.5.2 PPP outcomes from Scoping Phase

5.3.5.2.1 One-on-one consultation meetings

Digby Wells provided I&APs with the opportunity to indicate whether an information sharing meeting should be undertaken for the Scoping phase. Seven responses from I&APs were received requesting the above meeting. Due to availability schedules, one-on-one consultation meetings were arranged as listed in Table 5-5. The aim of these consultations was to provide technical information pertaining to the Boikarabelo Coal Mine and record issues of concern raised by the relevant parties.

Table 5-5: One-on-one consultation meetings

Name	Department/Farm/Organisation/Company	Date and Method of Communication
Mr Jan Oberholzer, Mr Charl Burger and Mr Francois Theron	Exxaro Resources	23 February 2012 One-on-one meeting held at Exxaro Head Office, Pretoria
Mr Marc and Mrs Judas	Maluma Lodge CC Van Jaarsveldtpan 277LQ	18 March 2012 One-on-one meeting held at farm Van Jaarsveldtpan 277LQ

5.3.5.2.2 Announcing the availability of the Draft Scoping Report

The Draft Scoping Report including PPP Report was made available for comment at the following venues for a period of 40 days, from **16 November 2011 to 20 January 2012**:

- Lephalale Library;
- Steenbokpan Wholesalers;
- Lesedi Village, Steenbokpan;
- Lephalale Local Municipality;
- The Digby Wells website www.digbywells.com ; and
- Compact Discs (CDs) of the report were made available on request.

I&APs were informed of the availability of the Draft Scoping Report through a notification letter distributed on 10 November 2011. This provided registered I&APs an opportunity to give inputs in the process, and to ensure that their issues, comments and concerns are included and assessed during the impact assessment phase of the EIA.

To date, written comments have been received from the following I&APs as listed in Table 5-6 below.

Table 5-6: Comments received on Draft Scoping Report

Name	Department/Farm/Organisation/Company	Date and Method of Communication
Mr David Mochambi and Family	Duikerpan 249 LQ – Land Occupiers	03 January 2012 by Post letter correspondence
Mr Dave Lucas, Mr Xander Neethling, Mr Hannes Janse Van Rensburg and Ms Keneuoe Moamogwe	Eskom Holdings Limited: Strategy and Risk Management Division	26 January 2012 by Email correspondence

5.3.5.2.3 Limitations to Focus Group Meeting

A focus group meeting was proposed by Digby Wells in response to seven (7) requested received as per the registration and comment forms. A meeting request was sent to the relevant parties on 19 January 2012 to request for their confirmation of attendance. Unfortunately this meeting did not occur mainly due to conflicting availability schedules as some parties had prior scheduled commitments and others were only available in March 2012 due to hunting activities on their properties. However, Digby Wells was able to conduct one-on-one consultation meetings with the relevant parties who were present for consultations (Refer to Table 5-5). To avoid stakeholder fatigue, it was proposed that a public open day be scheduled for the proposed project in order to gather all inputs from the respective parties (Refer to Section 5.3.6 for further details).

5.3.5.2.4 Final Scoping Report and Acceptance by DEA

The Final Scoping Report was updated with issues raised by registered I&APs and submitted to DEA on 01 February 2012 for approval. The Digby Wells newsletter compiled and distributed on 30 March 2012 included the status of the Boikarabelo Power Station application and also indicated that the Final Scoping Report was available for comment to be submitted directly to DEA for attention – Mr M Shubane • Fax: (012) 320 7539 • Post: Private Bag X447, Pretoria, 0001 and a copy be sent to Digby Wells. To date, no comments were received on the Final Scoping Report from registered I&APs.

The Scoping Report has been accepted by DEA as per letter of acceptance signed 02 April 2012.

5.3.5.2.5 Comments and Response Report

All issues raised from November 2011 until July 2012 have been recorded and have been collated into the Comments and Response Report attached as Appendix Q to this report.

This report will be updated throughout the EIA process.

5.3.6 Impact Assessment Consultation Phase

The Impact Assessment phase has been initiated and the Draft EIAR and EMPR have been compiled for public review and comment.

The NEMA PPP Guidelines specify that I&APs must have the opportunity to verify that their issues have been captured and assessed before the EIAR and EMPR will be approved by the competent authority. The findings of the specialist study assessments have been integrated into the Draft EIAR. This report contains a comprehensive project description, motivation, and description of alternatives considered and also the findings of the assessment and recommended mitigation measures and management plans developed as part of the EMPR.

5.3.6.1 Public Feedback Open Day

A public open day will be held on 10 October 2012 to provide feedback on the EIAR and the findings of the specialist assessments undertaken for the project. During this meeting, the mitigation and management measures developed as part of the EMPR will also be presented. The open day will be held at the Mogol Sports Club, Lephalale. Details of the meeting will be included in the notification letter which will be distributed to relevant parties. The comments from the public recorded from the open day meeting will be included in the PPP Report and updated on the CRR which will be attached as an appendix to the Final EIAR and EMPR.

5.3.7 PPP Timeframes and Environmental Authorisation

The public participation process will proceed as the EIA process progresses into the Decision-making phase. Registered I&APs and commenting authorities will be provided with a period of 60 days to comment on the Draft EIAR and EMPR from 07 September 2012 until 06 November 2012. During this period, the PPP together with the CRR will be continuously updated to include issues received from consultation meetings to be held during this phase.

*Thereafter, all comments received on the Draft EIAR and EMPR will be collated into the Final EIAR and EMPR to be submitted to DEA for an environmental authorisation in November 2012. Registered I&APs and commenting authorities will be offered a further opportunity to comment on the Final EIAR and EMPR within 21 days. The review of the Final EIAR and EMPR by DEA will take approximately 60 days to accept or decline the report. Should the Final EIAR and EMPR be approved, the DEA will issue an Integrated Environmental and Waste Management authorisation within 45 days.

**Please note that these timeframes may change as the project progresses.*

5.4 Issues and Comments from Commenting Authorities & Registered I&APs

Throughout the Scoping phase of the project, identified and registered I&APs were provided with the opportunity to comment on the proposed project. To date, the public participation team recorded issues and comments through registration and comment forms received by email, fax and postal correspondences and through written comments received on the draft Scoping Report. Refer to Appendix Q for the copies of I&APs registration and comment forms as well as written stakeholder correspondences.

The following is a list of key issues raised. These included but are not limited to:

5.4.1 Negative Issues

Negative issues relate primarily to:

- The perceived impact of the proposed activity on surrounding farmers' nature-based tourism business activities;
- The perceived impact of the project on property values;
- Concern about pollution including air quality and associated dust impacts;
- Concern on source of water for the proposed Boikarabelo Power Station;
- Concern regarding possible pollution of sub-surface and surface aquifers and impacts on downstream users;
- Concern about water users competing against each other for water use and no integration between parties;
- Potential impacts on fauna and flora;
- Potential increase in traffic and road usage by the public and mines and the need for road upgrade and maintenance; and
- Concern regarding cumulative impacts of coal mining in the region.

5.4.2 Positives Issues

Positive issues identified include:

- Expected opportunities for job creation;
- Benefits of the proposed project to the local economy;
- Expected improvement on local infrastructure; and
- Through the proposed project, opportunities in respect to skills development will be created through empowerment training and skills transfer to the local communities.

The issues raised until the end of July 2012 have been collated and recorded in a Comments and Response Report (CRR). Responses to these issues have been provided by the applicant, the project team and also discussed in detail in the relevant specialist reports. The CRR will be updated throughout the EIA process to include any additional inputs received from DEA, registered I&APs and commenting authorities.

5.5 Conclusion

In conclusion, the PPP developed for the proposed Boikarabelo Power Station project aims to provide sufficient and accessible information in an open and transparent manner to ensure meaningful participation from I&APs. A flexible approach to consultation has been adopted so as to allow registered I&APs an ample opportunity to comment on the proposed project throughout the EIA process. This will assist the applicant (Resgen) and competent authority (DEA) to make informed decisions in respect of the project planning, project design and management thereof of impacts that could be detrimental with the development of the Boikarabelo Power Station prior to the granting of the Integrated Environmental Authorisation. On-going feedback and acknowledgement of comments received from registered I&APs and commenting authorities will be undertaken throughout the EIA process and updated in the CRR.

6 THE BASELINE ENVIRONMENT

6.1 Climate

The following climatic conditions were established as part of the Air Quality assessment by ESciences Associates (Pty) Ltd.

6.1.1 Regional climate

South Africa is situated beneath the descending limb of the Hadley cell, an anti-cyclonic circulation that forms part of the general circulation of the atmosphere. This circulation has easterly waves associated with it to the North and Westerly waves, or cold fronts to the South.

The Waterberg is situated over 1000 m above mean sea level in the North-East interior of South Africa. During summer this region experiences rainfall as a result of the warm, moist easterly winds that dominate. Thunderstorms often develop due to surface heating and associated convection bringing high intensity rainfall events. However, rain events lasting several days also occur due to the presence of an upper air trough that is fed moisture from the tropics.

During winter, the descending high pressure system pushes the easterlies further north, resulting in cold, dry winters. Temperatures drop further due to passing westerly waves, or cold fronts. The interior of South Africa is characterised by strong absolutely stable layers in winter. These layers prevent vertical mixing of the atmosphere and result in the accumulation of trace gases and aerosols. The layers are broken up temporarily by the passing of deep frontal systems, before re-establishing themselves. Absolutely stable layers play an important role in controlling the long-range transport and recirculation of pollution. The lowest elevated inversion occurs at approximately the 700 hPa (≈3 km above sea level) (Cosijn and Tyson, 1996). Conditions in the winter months are highly unfavourable for the dispersion of atmospheric pollutants (Tyson and Preston-Whyte, 2003).

6.1.2 Site Meteorology

Observations from several stations in the Limpopo Province are reported here to describe the temperature, wind and precipitation of the Resgen Site. Atmospheric stability and mixing height will also be discussed in relation to emissions dispersion.

6.1.2.1 Temperature

The Waterberg experiences warm mean annual temperatures of around 19 ˚C. Hot summers (November to February) occur with maximum temperatures reaching the low thirties (30 ˚C) and minimums in the high teens (˚C). Mean summer temperatures are in the low twenties (Figure 6-1).

The coolest temperatures occur in winter months between May and August. Maximum temperatures reach low twenties (˚C) and minimum temperatures drop to single digits, occasionally dropping below 0 ˚C. Mean winter temperatures are in the low teens

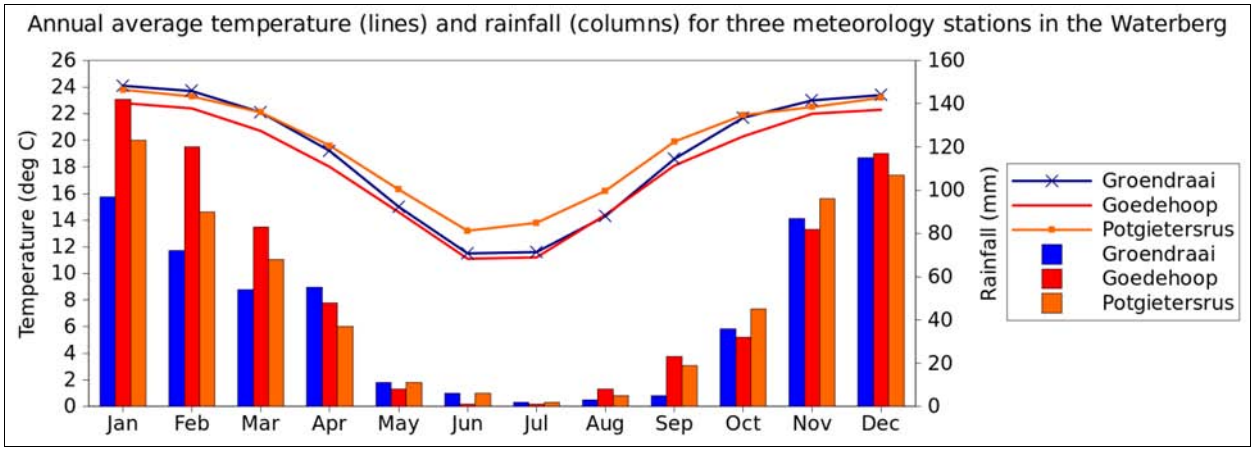
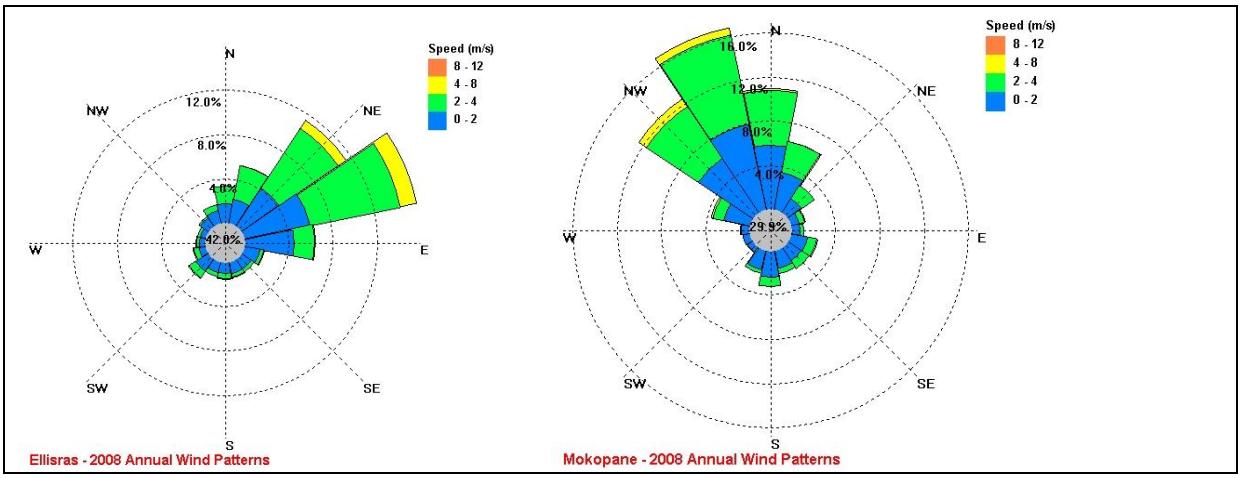


Figure 6-1: Monthly means of temperature and rainfall for three meteorological stations in the Waterberg.

6.1.2.2 Wind

Wind direction generally has a significant northerly component, shifting between north-west and north-east depending on the locality within the Waterberg (Figure 6-2). Winds are mostly light, between 7 and 14 km/h (2-4 m/s). Strong gusts of 40 km/h (12 m/s) do occur, but mostly in conjunction with thunderstorms and are short lived (Kruger, 2010). Overall, the Limpopo province experiences the lowest mean annual wind speeds in South Africa (Kruger, 2011).



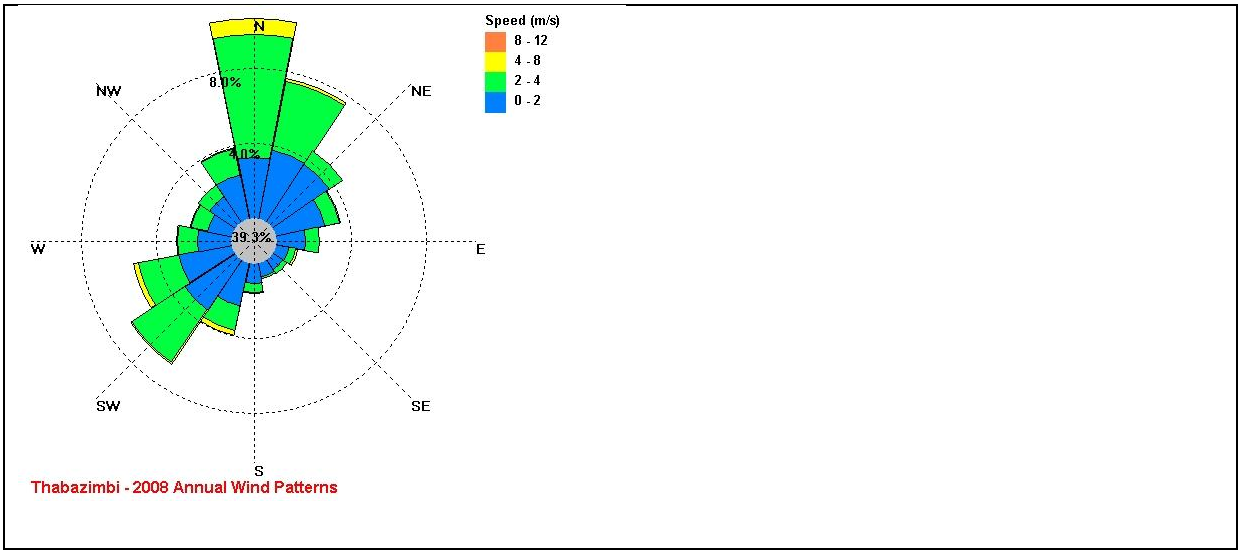


Figure 6-2: Annual windrose for 2008 of Lephalale (Ellisras), Mokopane and Thabazimbi from meso-scale model data

6.1.2.3 Rainfall

The Waterberg receives between 500 mm and 800 mm of rainfall a year. Most of this is received in the summer months (about 80-100 mm per month) (Figure 6-3) due to the easterly winds and moist air from the tropics. Winter months experience very little rainfall (1-11mm per month) due to the semi-permanent continental high pressure system.

6.1.2.4 Atmospheric stability

Atmospheric stability determines the ability of a plume to be transported vertically within the atmosphere. It is driven by the temperature lapse rate of the natural atmosphere at the comparative temperature of a plume. The latitude of South Africa coincides with the descending limb of the Hadley cell, which is characteristic of sinking air that warms up due to adiabatic heating. Consequently, the interior of South Africa experiences absolutely stable layers in the upper atmosphere that cap the dispersion of emissions. These layers typically occur at a pressure of 500hPa and are particularly persistent in winter (Cosijn and Tyson, 1996). During summer months these layers can be penetrated by strong convection due to surface heating. However, the strong convection in summer months also causes turbulence below the stable layer, which can lead to adverse air pollution events (Figure 6-3). Turbulence allows emission to be mixed from stack tip to ground level with very little dispersion taking place. Thus, although the general air pollution is worse in South Africa in winter months due to multiple sources and bad dispersion, air pollution events do occur in summer due to turbulent mixing. This pattern is replicated in dispersion modelling when a single stack is modelled and background emissions are excluded. Time-series graphs indicate that high ground level concentrations occur in Summer months. Similar patterns are also discernible in measure data in Limpopo Province, although to a lesser extent as measured data includes extra sources and accumulation of emissions.

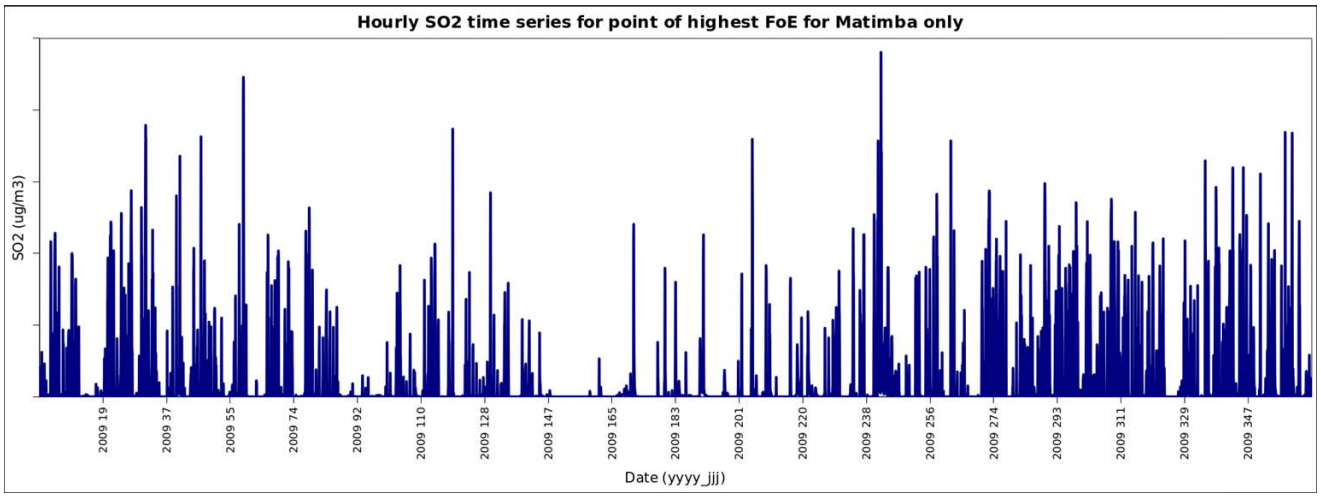
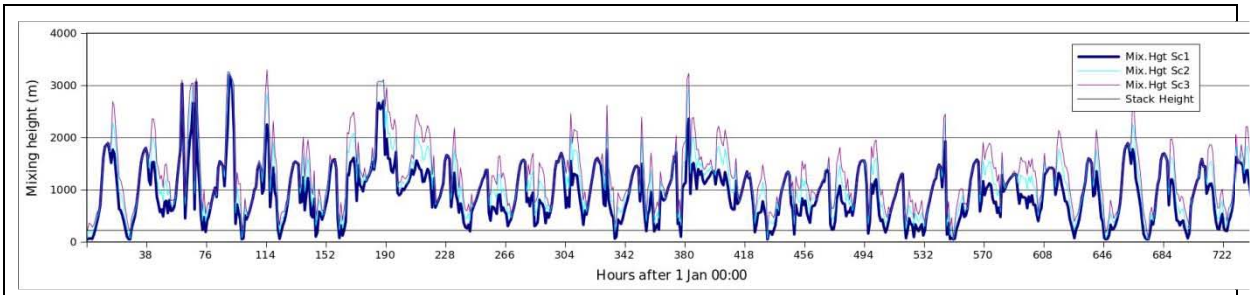


Figure 6-3: Maximum concentration of SO_2 from a tall stack (Matimba) occurs during summer months due to turbulent mixing to ground level and tall stack does not penetrate stable layers

6.1.2.5 Mixing height

Typically, mixing height is higher in summer and extends to 2.5km (as modelled in Calmet) while winter mixing heights are frequently below 2km (Figure 6-4). The mixing height is the layer of the atmosphere in which emissions are dispersed and is determined by the atmospheric stability. Extra to absolutely stable layers in the upper atmosphere, the interior of South Africa is characterised by surface inversions during the night. These are formed by radiative cooling of the earth's surface and are therefore, typically stronger in winter months. The effect of these layers on dispersion is as follows. During the night, surface inversions can prevent the mixing of tall stack emission to ground surface. However, after sunrise, heating causes these layers to lift causing very shallow stable layers to occur. When these layers exceed stack height, fumigation events can occur provided the heating is sufficient to provide turbulent mixing to the surface.



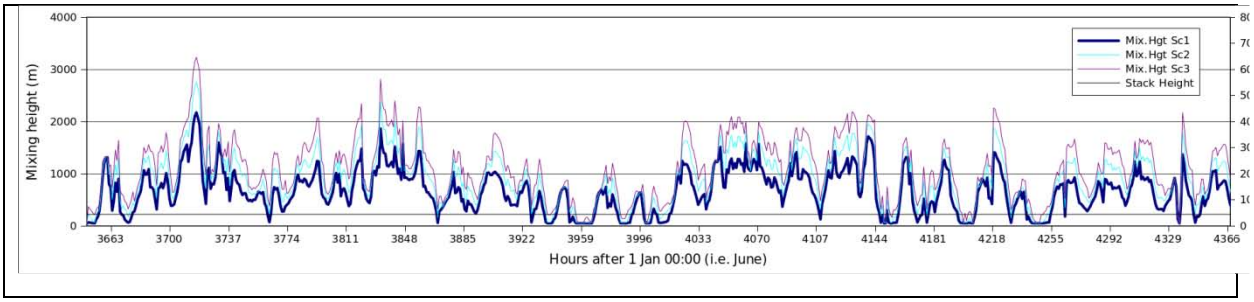


Figure 6-4: Calmet mixing heights from a study of increased wind speed on dispersion and mixing heights using Komati power station. Top: January. Bottom: June

6.1.3 Climate change

In terms of the impacts of climate change on water resources and scarcity in South Africa, recent studies (e.g. Kiker, 2000; Schulze, 2000) predict that climate change will result in an increase in temperature of between 1°C and 3°C by 2050, with the highest increase in the arid regions of the country and northern regions of the subcontinent. Increased subsidence over the interior of the country will suppress convective precipitation and thus, rainfall could decrease by between 5% and 10% in the summer rainfall regions. The net effect is likely to be greater evapo-transpiration and increased stress on arid and marginal zones, such as the Waterberg region (Kiker, 2000). It should be noted that the findings of these studies are based on climate change models which yield widely different results, depending on the type of model and methodology used.

The hydrological responses (viz. runoff and groundwater recharge), to climate change in South Africa was modeled by Schulze (2000) using the ACRU hydrological modeling system. Results show that in the western parts of the country, runoff could be expected to decrease by 10% by 2015 (Schulze, 2000). However, the study also concluded that southern Africa's hydrological regime is already so variable that climate change will be difficult to detect. In addition, hydrological responses are highly sensitive to land use changes and local scale abrupt land use changes may be hydrological more significant than regional scale gradual changes.

Even without taking climate change into consideration, South Africa is currently experiencing climate variability and its large-scale impact on water supply and protection. It is further predicted that an increased demand for water supply will result in the depletion of most of the country’s surface water resources within a few decades (Kiker, 2000; DEAT, 2010).

6.2 Topography

The topographical model completed for the Boikarabelo Coal Mine indicates that the elevation of the study area decreases from 870 metres in the south to 830 metres near the Limpopo River in the north. The study area is relatively flat with the exception of the Zoetfontein Fault which outcrops on the farm Boompan 237 LQ just outside the study area.

This fault is also visible on the farm Kalkpan 243 LQ within the study area. Plan 6 illustrates the topographical model and features of the study area.

Most of the study area has gentle slopes of between 0% and 3%. Several steeper slopes of between 3% and 7.5% occur on the terraces down towards the Limpopo River floodplain. Slopes of between 7.5% and 16% occur in isolated sections of the terraced slopes described above. The slopes along the Zoetfontein Fault are between 16% and 30%. Plan 5 illustrates the slope model of the study area.

The slope aspect/direction of the study area is generally in a northerly direction towards the Limpopo River. Slopes along the Zoetfontein Fault are in a southerly and south-westerly direction. Plan 5 illustrates the aspect model of the study area.

The study area is relatively flat with the Zoetfontein Fault which is only visible when looking in a north easterly direction. This rocky outcrop creates the only visible change in elevation within the study area. Figure 6-5 depicts the view from the top of the Zoetfontein Fault in a south westerly direction and again illustrates that the study area is relatively flat with the exception of the Zoetfontein Fault.

Figure 6-5: Photographic representation of the topography of the area

A change in the land use of the study area from agriculture to a power station will change the topography. The construction and operation of a power station involves changing the natural

features of and adding man-made features to the topography and will therefore have a negative impact on the topography of the study area. The removal of topsoil will change the topography/surface. The greatest impact on the topography will be from the ash dump. This covers a larger area and will change the topographic functioning of the area. The construction of the power station infrastructure will have a lesser impact on the topography as it only covers a small area.

In conclusion any change in the land use will have a negative impact on the topography of the study area. The construction and operation of the proposed Boikarabelo Power Station and associated infrastructure and ash dump will impact negatively on the topography, the development does however fall within an area which will be developed as part of a coal mine operation. The negative impact which will be experienced will be related to changing the natural slope of the area which will change the natural drainage of the area and could result in erosion and loss of topsoil. The ash dump due to its height will also change the topography of the area. The ash dump and power station stack will have a secondary associated impact of creating a visual intrusion of the area.

Plan 6

Boikarabelo Power Station

Topography

27°5'0"E 27°7'30"E 27°10'0"E 27°12'30"E

23°32'30"S 23°35'0"S 23°37'30"S 23°40'0"S

BOTSWANA

SOUTH AFRICA

BONWAPITSE

LIMPOPO RIVER

820 840 860 880 900

Temporary Construction Village

Power Station

Ash Dump

Legend

- Project Area
- Mining Right Boundary
- Power Station Infrastructure
- Trig Beacon
- House
- Main Road
- Secondary Road
- Minor Road
- Track
- Contour (20 m)
- Non-Perennial Stream
- Perennial Stream
- Dam / Lake
- Perennial Pan
- Non-Perennial Pan / Stream
- Wetland
- International Boundary

Topographical Model

Elevation

High : 937 m

Low : 815 m

resource generation

DIGBY WELLS ENVIRONMENTAL

www.digbywells.com

Projection: Transverse Mercator
Datum: Hartebeesthoek 1994
Central Meridian: 27°E

Ref #: scc.RES1065.201108.063
Revision Number: 5
Date: 30/08/2012

N

0 0.5 1 2 3

Kilometres

1:65 000

6.3 Geology

The project area is situated in the Waterberg Coalfield (Plan 7). The Zoetfontein Fault forms the northern boundary of the coal field and the Eenzaamheid Fault forms the southern boundary. North of the Eenzaamheind Fault it is underlain by the Waterberg Group. The Waterberg group stretches approximately 90km southward and culminates in the Waterberg and Sandrivier mountain ranges. To the north of the Zoetfontein fault a portion of the group extends westwards into Botswana and another portion extends northeast to the Blouberg range.

The classical units of the Karoo Sequence are present in the Waterberg coalfield. The subdivision of the Karoo Sequence is based mainly on lithological boundaries which consist of the Stormberg Group, followed by the Beaufort Group, the Ecca Group and the Dwyka Group. The Waterberg forms the basin floor.

6.3.1 Geotechnical

A preliminary geotechnical investigation was undertaken in January and February 2011. While the investigation was divided into twelve separate areas, the results indicate that both the geotechnical conditions and the engineering properties of the near surface soils are surprisingly uniform across the whole site.

The typical soil profile comprises a generally medium dense but collapsing hillwash, overlying varying thicknesses of pedogenic material which in turn overlies various types of very soft rock. The average depth to the very soft rock across the whole site was in the order of 2.1m, while the average thickness of the collapsing hillwash was 1.7m.

There are several small fault lines in the area These are listed as stable, but water ingress and possible contamination of ground water is of concern at the fault line. It was noted that noxious gases emitted from the drill holes, where fault lines were crossed during drilling. The power plant will be situated between fault lines and will not cross fault lines.

Plan 7

Boikarabelo Power Station

Regional Geology

27°2'30"E 27°5'0"E 27°7'30"E 27°10'0"E 27°12'30"E 27°15'0"E

23°30'0"S 23°32'30"S 23°35'0"S 23°37'30"S 23°40'0"S 23°42'30"S

DOVEDALE

BOTSWANA

SOUTH AFRICA

Jurassic
Karoo Spgrp

Perm/Carbon
Dwyka Grp, Karoo Spgrp

Kheisian
Matlabas Sbgrp, Waterberg Grp

Kheisian
Kransberg Sbgrp, Waterberg Grp

Zoetfontein Fault

Eenzaamheid Fault

LIMPOPO RIVER

BONWAPITSE

837.3

860.6

840 820 860 880 900 920

Legend

- Project Area
- Mining Right Boundary

Regional Geology

- Jurassic, Karoo Spgrp
- Kheisian, Kransberg Sbgrp, Waterberg Grp
- Kheisian, Matlabas Sbgrp, Waterberg Grp
- Perm/Carbon, Dwyka Grp, Karoo Spgrp
- Settlement
- Trig Beacon
- House
- Main Road
- Minor Road
- Track
- Contour (20m)
- Non-Perennial Stream
- Perennial Stream
- Dam / Lake
- Perennial Pan
- Non-Perennial Pan / Stream
- Wetland
- International Boundary

resource generation

DIGBY WELLS ENVIRONMENTAL
www.digbywells.com

Projection: Transverse Mercator
Datum: Hartebeesthoek 1994
Central Meridian: 27°E

Ref #: scc.RES1065.201108.064
Revision Number: 4
Date: 03/11/2011

N

0 0.5 1 2 3 4 5
Kilometres
1:100 000

6.4 Soil Assessment

The complete Soil Assessment Report for the project site is attached in Appendix C.

6.4.1 Soil types

The soils found in the project area are broadly represented by the Ae and Ah land types (well drained yellow and red deep sandy soil) of the 2326 Ellisras land type map (Land Type Survey Staff, 1989) see Figure 6-6. These land types indicate the underlying geology to consist mainly of sandstone.

The Ae land type contains red well drained low base status soils. The Clovelly and Hutton soil forms are well represented in this land type. The soils are non-structured and the A horizon contains 6 – 12% clay. Soil texture represents a sandy loamy textured soil.

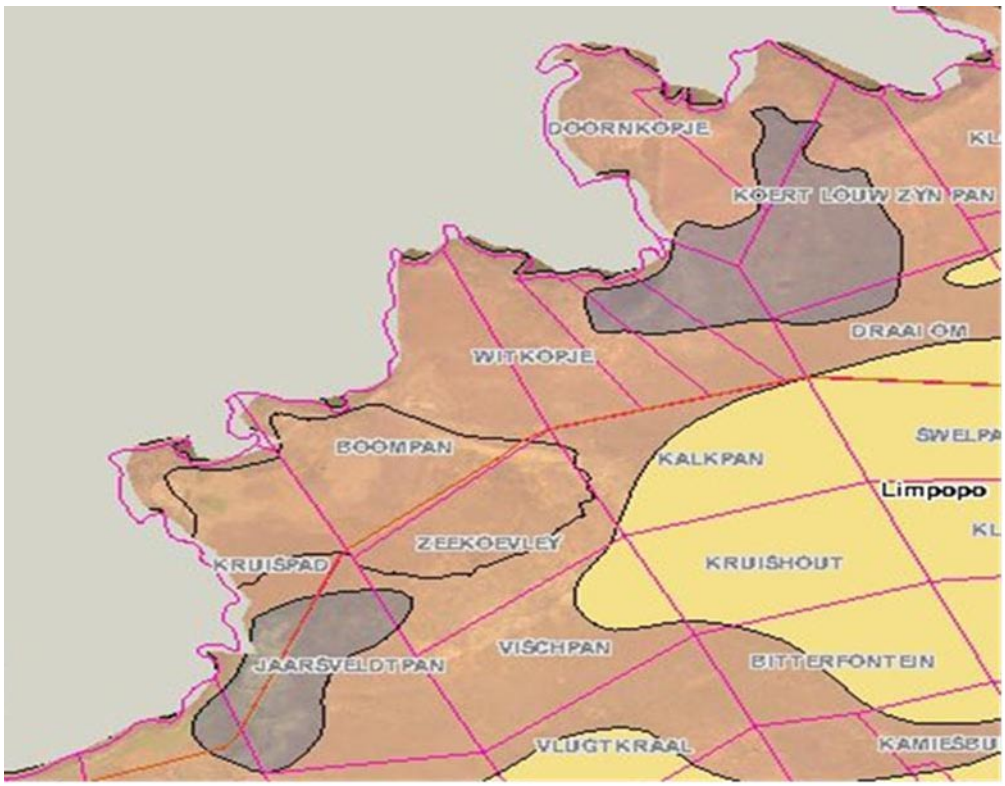


Figure 6-6: The farms Vischpan and Kruishout are present on the Ah and Ae land types

The Ah land type contains red well drained high base status soils. The Clovelly and Hutton soil forms are also well represented in this land type. The soils are non-structured and the A horizon contains 6 – 12% clay. Soil texture represents a sandy loamy textured soil.

Figure 6-7: Overgrazed veld present on the farm Vischpan in the Resource Generation Power Station project area

.

Figure 6-8: Most areas are well managed and little overgrazing occurs on the farm Kruishout

Indications of overgrazing exist especially on shallow stony shallow soil of the proposed ash dump project site. There are in addition well managed areas indicating better vegetation growth conditions less impacted by animal numbers (as seen in Figure 6-7 and Figure 6-8 above).

The formation of the dominant soil types present in the Boikarabelo Power Station project area is influenced by topographical features, Kalahari sands and sandstone parent materials occurring in the landscape. The landscape topographical features are flat and contain mostly deep sandy soils resulting from the sandstone parent materials as well as windblown Kalahari sands. Limestone is present in some places especially in the area where the proposed ash dump is located. Soils are shallow in the presence of the limestone in the subsoil typically 0.3 m or shallower and very stony. The number of stones in the profile prevents hand augering to deeper layers. The stone layer was defined as a restrictive layer indicating for example a Kimberley and or Molopo soil form if the restrictive layer stones are of soft carbonate origin (calcrete) and the subsoil is red or yellow brown respectively. Addo Gamoep and Coega soil forms are also present in the area earmarked for the ash dump. The presence of lime in the subsoil of all these soil forms, play a significant role in establishing the soil type. There is a clear divide in the soil types present in the west or ash dump project site and the power station and camp areas see Plan 8.

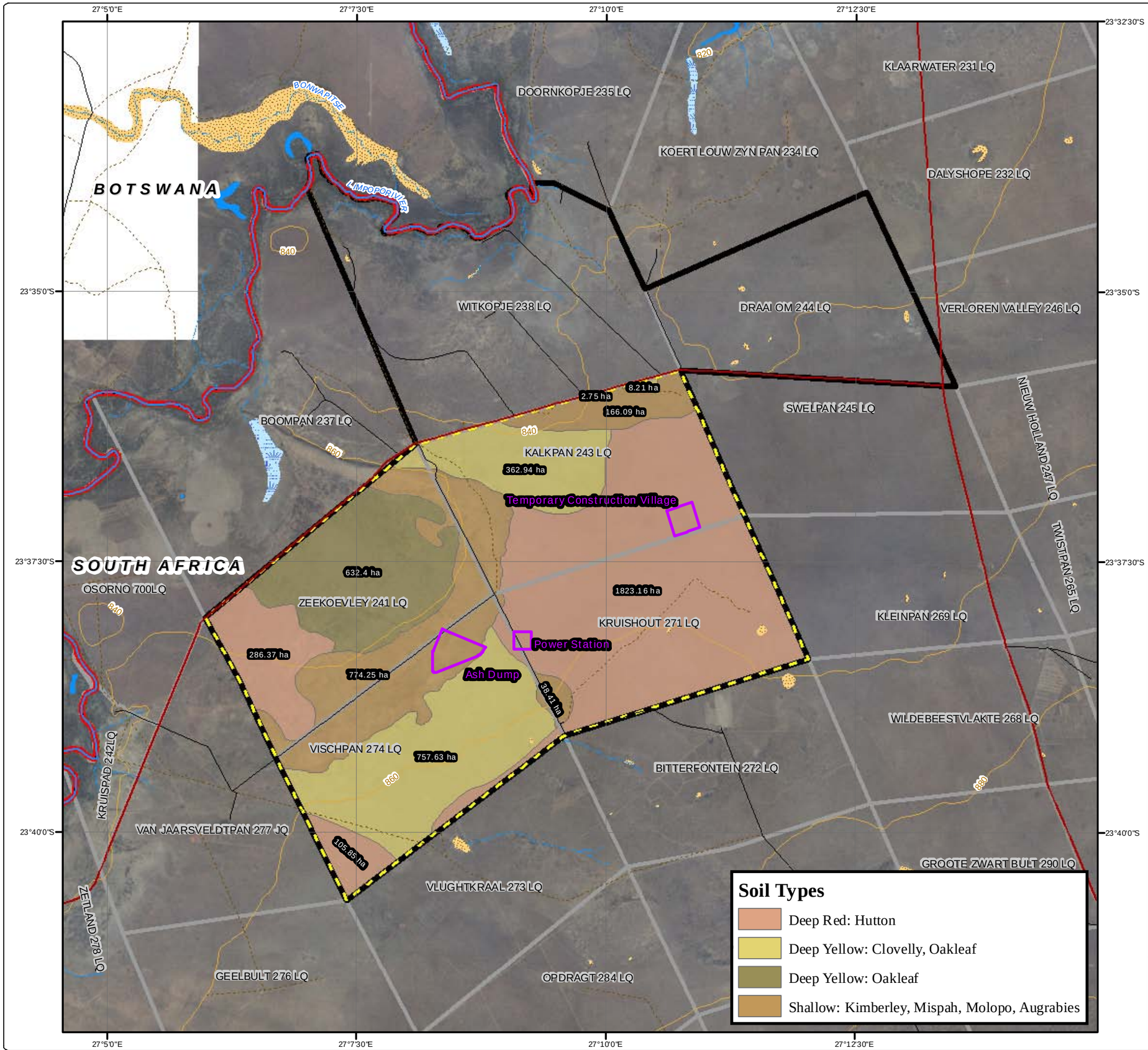
The power station and camp areas were large flat areas occupied by yellow soils representing the Clovelly soil forms while smaller areas of the Hutton soil form were also found. The Clovelly soil form is characterised by an orthic A horizon overlying a yellow apedal B horizon while Hutton soil is defined as an orthic A horizon overlying a red apedal B horizon.

Plan 8 contains the soil type map of the Boikarabelo Power Station project site. The main land use in the area is agriculture specifically grazing. The areas surveyed are located within cattle and commercial game farming operations.

Plan 8

Boikarabelo Power Station

Soil Types



Legend

- Project Area
- Mining Right Boundary
- Power Station Infrastructure
- Main Road
- Secondary Road
- Minor Road
- Track
- Contour (20m)
- Non-perennial Stream
- Perennial Stream
- Dam / Lake
- Perennial Pan
- Non-Perennial Pan / Stream
- Wetland
- Farm Boundaries
- International Boundary

Soil Types

- Deep Red: Hutton
- Deep Yellow: Clovelly, Oakleaf
- Deep Yellow: Oakleaf
- Shallow: Kimberley, Mispah, Molopo, Augrabies

resource generation

DIGBY WELLS ENVIRONMENTAL
www.digbywells.com

Projection: Transverse Mercator
Datum: Hartebeesthoek 1994
Central Meridian: 27°E

Ref #: scc.RES1065.201108.069
Revision Number: 5
Date: 30/08/2012

N

0 0.5 1 2 3
Kilometres

1:65 000

6.4.2 Land Capability

Land capability is determined by a combination of soil, terrain and climate features. Land capability shows the most intensive long term use of land under rain-fed conditions. At the same time an indication is given about the permanent limitations associated with the different land use classes (Schoeman ***et al***, 2000).

The land capability of the Boikarabelo Power Station project area was classified as non-arable, moderate grazing potential, Class VII. This grazing only classification status is due to the unfavourable prevailing climate at the Boikarabelo Power Station project area. Low rainfall provides severe limitations causing the area in general to be unsuited for arable cultivation and restrict agricultural use to grazing cattle and/or wildlife.

6.4.3 Land Use

The predominant present land use in the wider area is agriculture. The land use at the power station project area is no exception and land use is dominated by grazing, specifically cattle and game due to the low arable agricultural potential. The project area is well serviced by tar roads as well as farm roads. However the roads are not well maintained by local government and the mine plans to construct new access roads and relocate existing roads and re institute them in an improved condition to their existing state.

It should be noted however, that the immediate surrounding area will be developed as part of the Boikarabelo Coal Mine and therefore the eventual immediate surrounding land use to the power station will be mining.

Regional land use in the project area remains grazing due to the low annual rainfall in the region.

6.5 Flora and Fauna Assessment

The complete flora and fauna report for the project site can be found in Appendix D

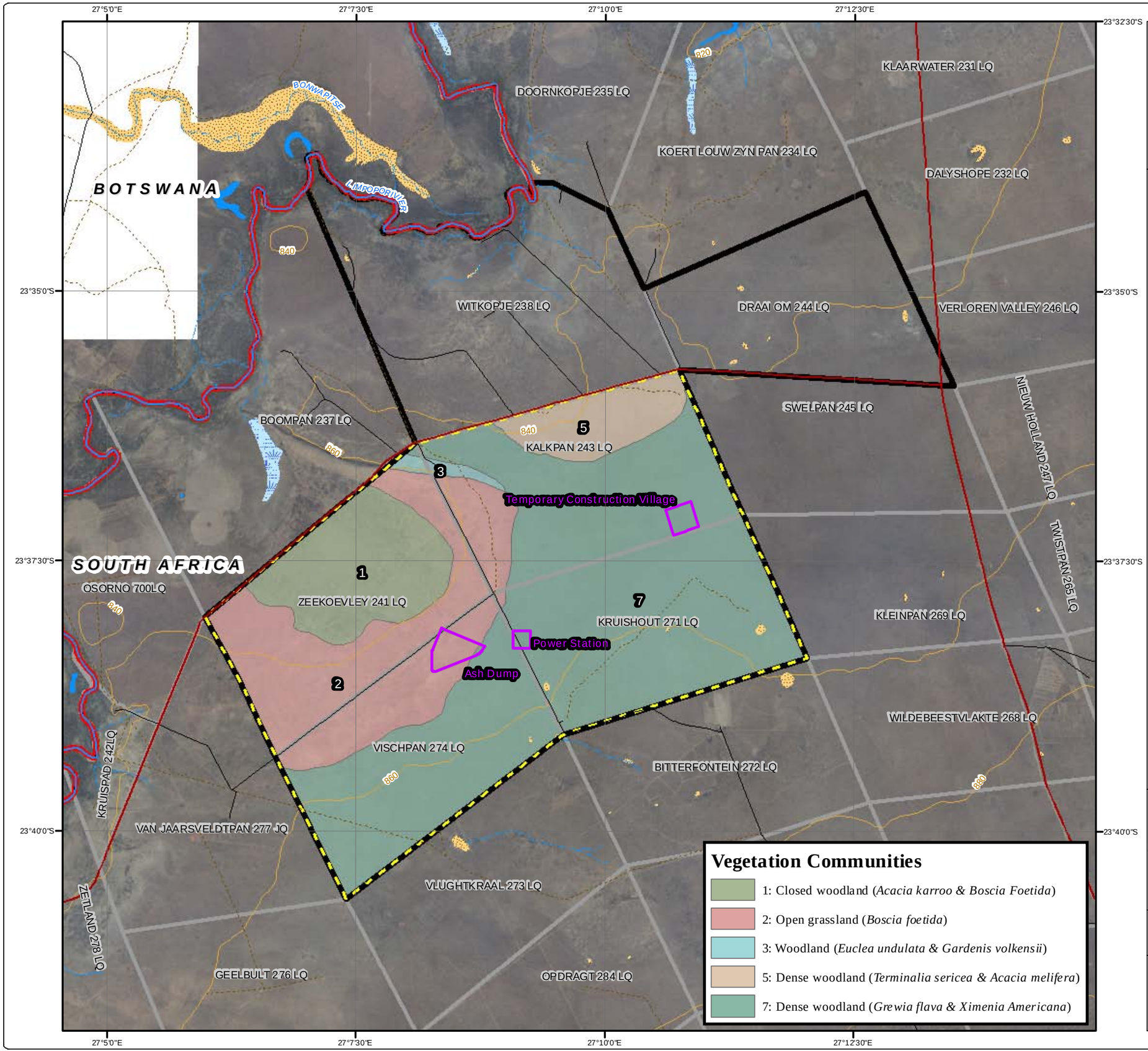
6.5.1 Flora

Vegetation communities were delineated in the survey conducted for the greater area by Digby Wells in 2010. The findings were confirmed during the 2012 field survey. Vegetation communities were delineated and described. The vegetation communities within which the three sites of focus lie are illustrated in Plan 9.

Plan 9

Boikarabelo Power Station

Vegetation Communities



Legend

- Project Area
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Vegetation Communities

- 1: Closed woodland (*Acacia karroo & Boscia Foetida*)
- 2: Open grassland (*Boscia foetida*)
- 3: Woodland (*Euclea undulata & Gardenis volkensii*)
- 5: Dense woodland (*Terminalia sericea & Acacia melifera*)
- 7: Dense woodland (*Grewia flava & Ximenia Americana*)

resource generation

DIGBY WELLS ENVIRONMENTAL

www.digbywells.com

Projection: Transverse Mercator
Datum: Hartebeesthoek 1994
Central Meridian: 27°E

Ref #: scc.RES1065.201108.070
Revision Number: 5
Date: 30/08/2012

N

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Kilometres

1:65 000

6.5.1.1 Site A (Location of Ash Dump) - Vischpan

This site is located west of Kruishout, the farm was previously privately owned, and used for commercial game farming. The eastern side of the site has a ground cover comprising of a mixture of*, Aristida congesta s. congesta, Aristida congesta s. barbicollis*, *Acacia fleckii* and *Acacia mellifera. Boscia foetida*, *Commiphora pyracanthoides,* as seen in Figure 6-9.

Figure 6-9:Site A Vegetation; Typical vegetation on eastern side of site comprising of a mixture of*, Aristida congesta s. congesta, Aristida congesta s. barbicollis, Acacia fleckii and Acacia mellifera. Boscia foetida, Commiphora pyracanthoides*

The Western side of the site is in a poorer ecological state, as seen in Figure 6-10. This is indicated by a number of factors; poor ground cover, sparse annual grasses, and *aggressive and dominant growth of Blepharis sp.* This state might be caused by overgrazing due to overstocking, or generally poor land management. In some areas large portions of ground are exposed with the shrub/small tree component dominated by *Boscia foetida*, as well as dense nearly impenetrable thickets of Blue thorn (*Acacia erubescens*), Black thorn (*Acacia mellifera*) and Sickle bush (*Dichrostachys cinerea*) as seen in Figure 6-10.

Figure 6-10: Site A Vegetation; Typical vegetation on Western side of the site; poor groundcover with dominance of Black thorn (*Acacia mellifera*) and Sickle bush (*Dichrostachys cinerea*)

The co-occurrence of grass and a woody component is the main feature of 'Bushveld'. The structure and pattern of the veld may differ in places however, the overall physiognomy is that of well-developed grass sword matrix with shrubs and trees of different heights and scattered in varying densities. The co-occurrence of grasses and woody plants and the mechanisms responsible for the perpetuation cannot be explained. There is a continual interaction between the grass and woody component which can be described as a dynamic equilibrium. When this balance is disrupted, as in this case, by excessive herbivory the effect is reflected in the balance and composition of the bushveld. Negative effects evident on Site A include the decrease in grass species and presence of small problem plants; in this case the spiky (*Blepharis* sp.). As well as this the prevalence of perennial grasses as opposed to annual grasses and general decrease in groundcover. Bush encroachment and extremely dense thickets of the multistemmed bushes such as Sickle Bush (*Dichrostachys cinera)* and Black thorn (*Acacia mellifera*) further indicate poor veld health.

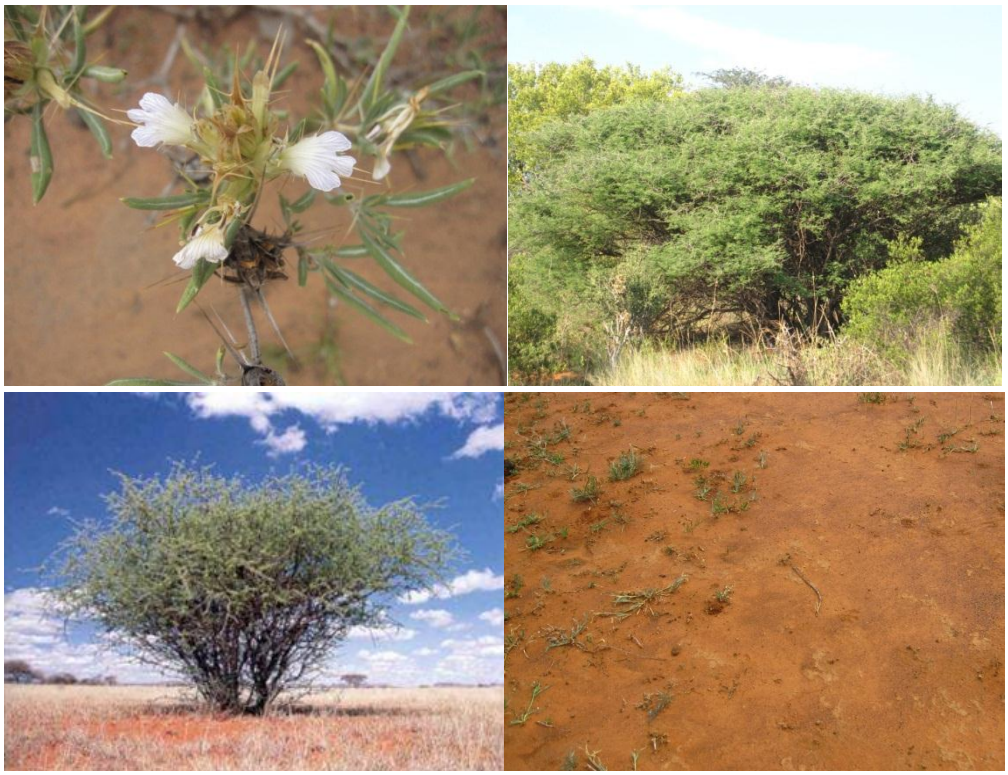

Figure 6-11: Problem plants indicating poor veld health; Blepharis sp (Top left). Sickle Bush (*Dichrostachys cinera)* (Top right). Black Thorn Acacia (*Acacia mellifera*) (Bottom left). Poor Ground Cover (Bottom right)

6.5.1.2 Site B (Location of Power Station) – Vischpan and Kruishout

This site is located on the Eastern boundary of Vishpan and the Western Boundary Kruishout. Both farms have previously been used for commercial game farming.

The vegetation is similar to that of the Eastern side of Site A. This community is described as *Aristida congesta s. congesta/ Terminalia sericea* open woodland. As seen in Figure 6-12 there is a well-developed grass sword, which is composed of various grasses including; *Aristida congesta s. congesta , Perotis patens*, *Pogonarthria squarrosa.* Guinea grass (*Panicum maximum*), Small Panicum (*P.coloratum*), Foxtail Buffalo grass (*Cenchrus ciliaris*), Wool grass (*Anthephora pubescens*), Bottle brush grass (*Enneopogon scoparius*), and Bushveld signal grass (*Urochloa mosambicensis*). The shrub and small tree component includes, dominant shrubs; Sandpaper Raisin (*Grewia flavescens*),Common corkwood (*Commiphora pyracanthoides*), Velvet Raisin (*Grewia flava*), and, dominant small trees are Red Bushwillow (*Combretum apiculatum*), Silver Cluster leaf (*Terminalia sericea*) and Knob thorn (*Acacia nigrescens*). The typical vegetation of the site is illustrated in Figure 6-12.

Figure 6-12: Site B Vegetation; A well-developed grass sword with grey green Velvet Raisin (*Grewia flava*) and leafless Common corkwood (*Commiphora pyracanthoides*) in the foreground and small trees; Red Bushwillow (*Combretum apiculatum*) in the background

Bush encroachment is not an issue here, there is an equal woody component to grassland ration. The bush is not exceptionally dense.

6.5.1.3 Site C (Location of Temporary Construction Village) - Kruishout Farm

Kruishout is situated east of Vischpan. This site is located on the Eastern boundary of Kruishout. The farm was previously used for commercial game farming.

The vegetation is similar to that of the Site A. As seen in Figure 6-13, the vegetation is in a relatively good ecological state; the ground cover is good, dominated by grasses while the woody component is diverse and not extremely dense. Bush encroachment is not problem on this site.

Figure 6-13: Site C vegetation

The vegetation structure comprises of a herbaceous layer, dominated by grasses such as Broom grass (*Eragrostis pallens*), Kalahari Sand Quick (*Schmidtia pappophoroides*), Hairy Love Grass (*Eragrostis trichophora*), Black footed grass (*Brachiaria nigropedata*), Common russet grass (*Loudetia simplex*), Long awned grass (*Aristida stipatata*) and other Aristida sp. The shrub and small tree component includes, dominant shrubs; Yellow Pomegranate (*Rhigozum obovatum*), Sandpaper Raisin (*Grewia flavescens*) ,Common corkwood (*Commiphora pyracanthoides*), Velvet Raisin (*Grewia flava*), Shepherds tree (*Boscia albitrunca*) and Red Bushwillow (*Combretum apiculatum*), dominant small trees are Silver Cluster leaf (*Terminalia sericea*), and the Umbrella thorn (*Acacia tortillis*).

Numerous bushveld flowers, trees and shrubs were identified at the various sites. These are contained in the species list, attached as Appendix D and illustrated in Figure 6-14 and Figure 6-15.

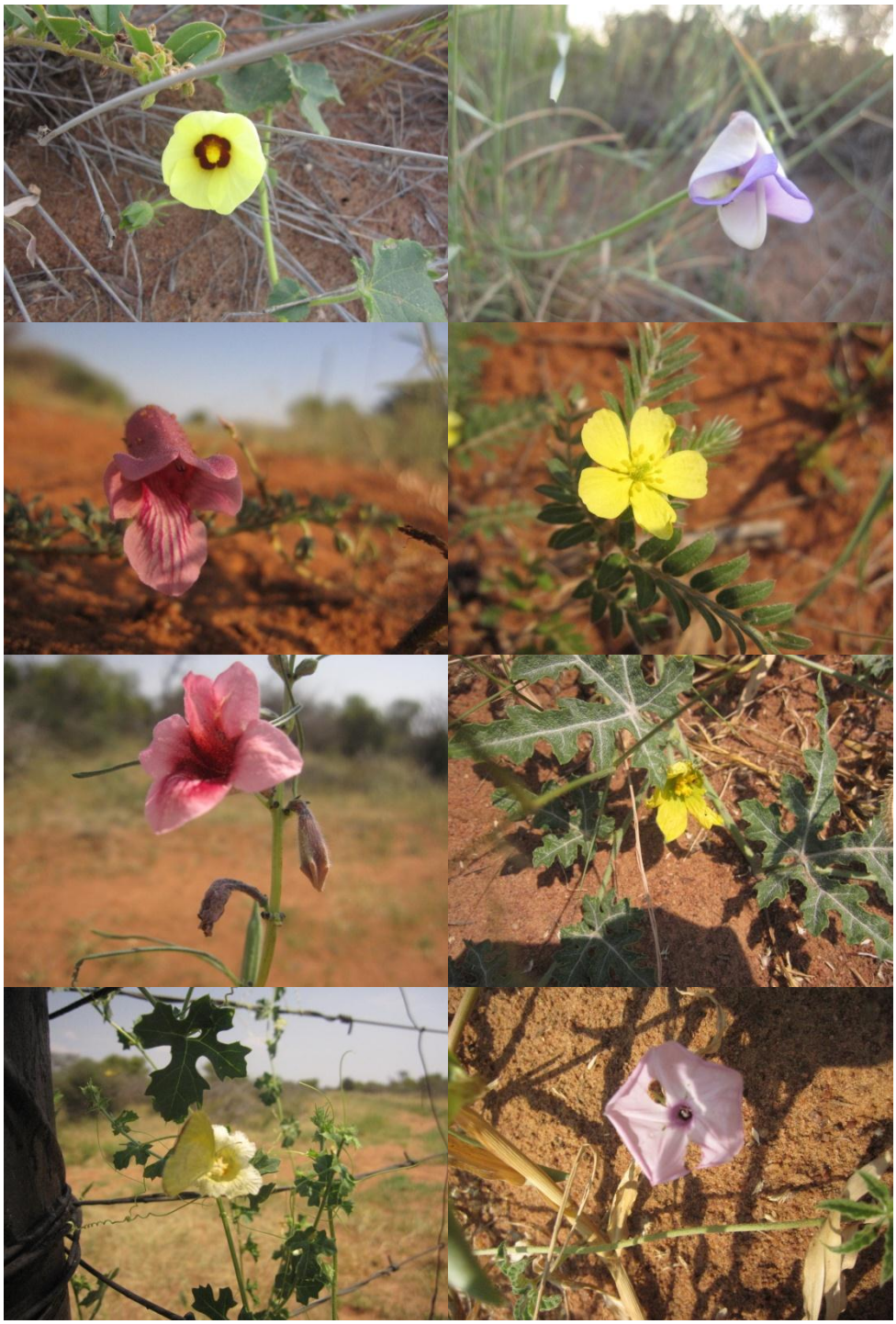

Figure 6-14: Flora species identified during field survey (top-bottom, right to left) *Hibiscus physaloides, Tephrosia retusa*, Hairy Wild Cucumber (*Cucumis hirsutus),* Devil's Thorn *(Dicerocaryum senecioides), Tribulus zeyheri subsp. zeyheri,* Wing seeded Sesame *(Sesamum alatum)* Wild Cucumber *(Cucumis nguria),* Small Pink Morning Glory *(Ipomea magnusiana)*

Figure 6-15: Trees and Shrubs identified during the field survey

6.5.1.4 Red Data Species and Protected Trees

No Red Data Flora species were identified during the field survey however, a number of protected trees occur on site. The trees are protected by Limpopo Environmental Management Act (Act No. 7 of 2003), listed in Schedule 12, as well as National Legislation;