

#### **4. SITE SELECTION PROCESS UNDERTAKEN DURING THE ENVIRONMENTAL SCOPING STUDY**

The Environmental Scoping Study (ESS) identified the potential positive and negative environmental (biophysical and social) impacts associated with the proposed new coal-fired power station and ancillary infrastructure. The ESS nominated the farms Naauwontkomen and Eenzaamheid as the preferred farms for the establishment of the proposed power station and ancillary infrastructure respectively. This section serves to outline the approach that was utilised to evaluate the alternative farms and select a preferred site for the establishment of the proposed power station and ancillary infrastructure.

A number of issues and potential environmental impacts on the power station and ancillary infrastructure alternatives were identified and considered in the selection of a preferred site for the construction of the power station and ancillary infrastructure, as well as in determining what further studies would be required in the Environmental Impact Assessment (EIA) phase. All issues which were anticipated to have a moderate to high impact on the preferred sites have been investigated further by specialists and detailed within the EIA phase of the study.

The scoping process evaluated four alternative sites for the power station and eight alternatives for the ancillary infrastructure. The footprint of the proposed power plant and associated plant (terrace area) was anticipated to be approximately 700 ha and approximately 500 – 1000 ha for ancillary infrastructure (such as ashing facilities). In order to establish the best possible site to be evaluated in the EIA, a site specific evaluation was undertaken. The process involved a range of physical, biological and social criteria.

##### **4.1. Site Evaluation – Field Studies**

The eight alternative sites were inspected by the specialists in order to:

- Investigate the study area;
- Gather baseline information for the sites;
- Assess the current situation;
- Identify any potential environmental (biophysical and social) impacts;
- Engage in interdisciplinary discussions; and
- Interview Landowners.

## 4.2. Specialist Studies

The choice of specialist studies undertaken during the Environmental Scoping Study was influenced by the need to cover all aspects of the environment namely, physical, biological and social.

The studies undertaken covered the physical, biological and social aspects of the environment. Table 4.1 outlines the components or issues that were used in ranking the sites. Over 78 components were reviewed by the specialists through 11 different specialist studies.

**Table 4.1:** Specialist studies and the components investigated during the Environmental Scoping Phase

<b>Physical Variables</b>		
Water Resources	Poor quality water stored on site recharging the groundwater.	
	Artificial recharge impacting on groundwater.	
	Poor quality surface water on site.	
	Surface water drainage.	
	Seepage below the ash dump.	
Geology, Soils and Agricultural Potential	Geotechnical.	
	Soil.	
	Agricultural potential.	
<b>Biological Variables</b>		
Fauna and Flora	Destruction of pristine floristic and faunal habitat within development area.	
	Destruction of Red Data flora and fauna species and suitable Red Data habitat.	
	Destruction of protected tree species and associated habitat.	
	Destruction of sensitive ecological habitat types (outcrops, riparian fringes, non-perennial streams, etc.)	
<b>Social Variables</b>		
Visual	Power Station.	Potential visual exposure.
		Proximity and exposure to the R510 and R33.

		Proximity and exposure to secondary roads.
		Proximity and exposure to residential areas.
		Proximity and exposure to game farms and lodges.
		Compound visual impact.
		The effect of lighting.
		Strategic placement of the proposed power station near the existing ash dump.
		Strategic placement of the proposed power station near the Grootegeluk Mine pit.
		Destruction of natural vegetation.
	Ancillary Infrastructure	Visual exposure and proximity to secondary roads.
		Visual exposure and proximity to residential areas.
		Visual exposure and proximity to game farms and lodges.
		The effect of lighting.
		Strategic placement of infrastructure.
		Destruction of natural vegetation.
Tourism	Noise impact.	
	Visual impact.	
	Corporate demand.	
Land Use	Towns and Settlements.	Functional division.
		Possible restriction of access.
		Possible restriction of development.
		Visual impact.
		Possible resettlement of households.
		Possible impact on planning policies and future development.
		Possible safety risks.
	Agriculture.	Functional division.

		Sterilisation of agricultural land.
		Impact on production.
	Exemption Farms.	Decreased in property value.
		Visual impact.
	Mineral Potential Areas.	Possible restriction of future mining operations.
Heritage	Presence or absence of heritage sites.	
Air Quality	Impacts on human health due to gaseous and particulate emissions.	
	Impacts on vegetation / landuse potential (land not currently utilised for mining or industry).	
	Non-compliance with air quality limits and standards.	
Noise	Power Station .	Impact of Matimba B on Marapong Township.
		Impact of Matimba B on Lephhalale (Onvewacht Township).
		Impact of Matimba B on farmhouses/other rural residences.
		Impact of Matimba B traffic on Nelson Mandela Drive area.
		Impact of Matimba B traffic on Nelson Mandela Dr Ext area.
		Impact of Matimba B traffic on Sterkpoort Road area.
		Impact of Matimba B traffic on Steenbokpan Road area.
		Impact of Matimba B traffic on Afguns Road area.
		Impact of conveyor belt systems.
		Site location related to already degraded noise condition.
		Wind mitigating factor.
		Cumulative effect of existing Matimba Power Station.

	Ancillary Infrastructure.	Impact of ash dump on Marapong.
		Impact of ash dump on Lephhalale (Onvewacht Township).
		Impact of ash dump on farmhouses/other rural residences.
		Impact of conveyor belt systems.
		Site location related to already degraded noise condition.
		Wind mitigating factor.
		Cumulative effect of existing Matimba Power Station.
Traffic	Employee transport.	
	Ash transport.	
	Coal supply.	
	Infrastructure Changes.	Conveyor crossings.
	Construction traffic.	Road re-alignment.
Social Impact Assessment	Social problems arising from contact between local residents and newcomers (conflict and sexually transmitted diseases).	
	Change in local infrastructure requirements (to supply construction camp and power station).	
	Impact on development.	
	Relocation of populations.	
	Impacts on surrounding farm owners and residents.	

### 4.3. Rating Criteria

The evaluation and nomination of the two preferred sites for the proposed power station and ancillary infrastructure involved a highly interdisciplinary approach. The approach undertaken involved a wide range of specialist studies which examined a number of different issues. In order to evaluate the sites and nominate a preferred site, the studies needed to be comparative and therefore a site rating matrix was utilised. A site preference rating system was applied to each discipline, and the rating of each site was conducted according to the following system:

- 1 = Not suitable for development (impact of very high significance - negative)
- 2 = not preferred (impact of high significance - negative)
- 3 = acceptable (impact of moderate significance - negative)
- 4 = preferred (impact of low or negligible significance - negative)
- 5 = Ideal site for development, or positive impact

While each specialist study was required to have the Site Preference as an outcome, how they evaluated each site varied from discipline to discipline.

Table 4.2 includes the site preference ratings that were included in the Environmental Scoping Study.

**Table 4.2:** Site preference ratings included in the Environmental Scoping Study

Farm name	Site Preference Ratings	
	Proposed Power Station	Ancillary Infrastructure
<b>Water Resources</b>		
Farm Appelvlakte 448 LQ	2 (not preferred)	2 (not preferred)
Farm Nelsonskop 464 LQ	2 (not preferred)	2 (not preferred)
Farm Naauwontkome 509 LQ	3 (acceptable)	3 (acceptable)
Farm Eenzaamheid 687 LQ	4 (preferred)	4 (preferred)
Farm Droogeheuwel 447 LQ		2 (not preferred)
Farm Zongezien 467 LQ		3 (acceptable)
Farm Kuipersbult 511 LQ		3 (acceptable)
Farm Kromdraai 690 LQ		4 (preferred)
<b>Ecology (Fauna and Flora)</b>		
Farm Appelvlakte 448 LQ	2 (not preferred)	2 (not preferred)
Farm Nelsonskop 464 LQ	1 (not suitable)	1 (not suitable)
Farm Naauwontkome 509 LQ	5 (ideal)	5 (ideal)
Farm Eenzaamheid 687 LQ	4 (preferred)	4 (preferred)
Farm Droogeheuwel 447 LQ		3 (acceptable)
Farm Zongezien 467 LQ		2 (not preferred)
Farm Kuipersbult 511 LQ		2 (not preferred)
Farm Kromdraai 690 LQ		1 (not suitable)
<b>Geology, Soils and Agricultural Potential</b>		
Farm Appelvlakte 448 LQ	4 (Preferred)	4 (Preferred)
Farm Nelsonskop 464 LQ	3 (Acceptable)	3 (Acceptable)
Farm Naauwontkome 509 LQ	3 (Acceptable)	3 (Acceptable)
Farm Eenzaamheid 687 LQ	4 (Preferred)	4 (Preferred)
Farm Droogeheuwel 447 LQ		4 (Preferred)
Farm Zongezien 467 LQ		2 (not preferred)
Farm Kuipersbult 511 LQ		3 (Acceptable)
Farm Kromdraai 690 LQ		3 (Acceptable)

Farm name	Site Preference Ratings	
	Proposed Power Station	Ancillary Infrastructure
<b>Land Use</b>		
Farm Appelvlakte 448 LQ	3 (acceptable)	3 (acceptable)
Farm Nelsonskop 464 LQ	4 (preferred)	4 (preferred)
Farm Naauwontkomen 509 LQ	3 (acceptable)	3 (acceptable)
Farm Eenzaamheid 687 LQ	3 (acceptable)	3 (acceptable)
Farm Droogeheuwel 447 LQ		3 (acceptable)
Farm Zongezien 467 LQ		2 (not preferred)
Farm Kuipersbult 511 LQ		3 (acceptable)
Farm Kromdraai 690 LQ		3 (acceptable)
<b>Visual Impact</b>		
Farm Appelvlakte 448 LQ	2 (not preferred)	2 (not preferred)
Farm Nelsonskop 464 LQ	3 (acceptable)	2 (not preferred)
Farm Naauwontkomen 509 LQ	4 (preferred)	4 (preferred)
Farm Eenzaamheid 687 LQ	2 (not preferred)	4 (preferred)
Farm Droogeheuwel 447 LQ		3 (acceptable)
Farm Zongezien 467 LQ		3 (acceptable)
Farm Kuipersbult 511 LQ		3 (acceptable)
Farm Kromdraai 690 LQ		2 (not preferred)
<b>Tourism</b>		
Farm Appelvlakte 448 LQ	2 (not preferred)	2 (not preferred)
Farm Nelsonskop 464 LQ	4 (preferred)	4 (preferred)
Farm Naauwontkomen 509 LQ	3 (acceptable)	3 (acceptable)
Farm Eenzaamheid 687 LQ	2 (not preferred)	2 (not preferred)
Farm Droogeheuwel 447 LQ		2 (not preferred)
Farm Zongezien 467 LQ		3 (acceptable)
Farm Kuipersbult 511 LQ		2 (not preferred)
Farm Kromdraai 690 LQ		2 (not preferred)
<b>Heritage</b>		
Farm Appelvlakte 448 LQ	2 (not preferred)	2 (not preferred)
Farm Nelsonskop 464 LQ	1 (not suitable)	1 (not suitable)
Farm Naauwontkomen 509 LQ	5 (ideal)	5 (ideal)
Farm Eenzaamheid 687 LQ	5 (ideal)	5 (ideal)
Farm Droogeheuwel 447 LQ		2 (not preferred)
Farm Zongezien 467 LQ		2 (not preferred)
Farm Kuipersbult 511 LQ		3 (acceptable)
Farm Kromdraai 690 LQ		5 (ideal)

Farm name	Site Preference Ratings	
	Proposed Power Station	Ancillary Infrastructure
<b>Traffic and Transport</b>		
Farm Appelvlakte 448 LQ	4 (preferred)	5 (ideal)
Farm Nelsonskop 464 LQ	5 (ideal)	5 (ideal)
Farm Naauwontkomen 509 LQ	3 (acceptable)	3 (acceptable)
Farm Eenzaamheid 687 LQ	3 (acceptable)	4 (preferred)
Farm Droogeheuwel 447 LQ		4 (preferred)
Farm Zongezien 467 LQ		4 (preferred)
Farm Kuipersbult 511 LQ		4 (preferred)
Farm Kromdraai 690 LQ		3 (acceptable)
<b>Noise</b>		
Farm Appelvlakte 448 LQ	3 (acceptable)	3 (acceptable)
Farm Nelsonskop 464 LQ	2 (not preferred)	2 (not preferred)
Farm Naauwontkomen 509 LQ	4 (preferred)	4 (preferred)
Farm Eenzaamheid 687 LQ	3 (acceptable)	3 (acceptable)
Farm Droogeheuwel 447 LQ		3 (acceptable)
Farm Zongezien 467 LQ		2 (not preferred)
Farm Kuipersbult 511 LQ		4 (preferred)
Farm Kromdraai 690 LQ		3 (acceptable)
<b>Social Impact</b>		
Farm Appelvlakte 448 LQ	3 (acceptable)	4 (preferred)
Farm Nelsonskop 464 LQ	3 (acceptable)	4 (preferred)
Farm Naauwontkomen 509 LQ	4 (preferred)	3 (acceptable)
Farm Eenzaamheid 687 LQ	3 (acceptable)	3 (acceptable)
Farm Droogeheuwel 447 LQ		3 (acceptable)
Farm Zongezien 467 LQ		3 (acceptable)
Farm Kuipersbult 511 LQ		3 (acceptable)
Farm Kromdraai 690 LQ		2 (not preferred)
<b>Air Quality</b>		
Farm Appelvlakte 448 LQ	2 (not preferred)	2 (not preferred)
Farm Nelsonskop 464 LQ	2 (not preferred)	2 (not preferred)
Farm Naauwontkomen 509 LQ	4 (preferred)	4 (preferred)
Farm Eenzaamheid 687 LQ	4 (preferred)	4 (preferred)
Farm Droogeheuwel 447 LQ		2 (not preferred)
Farm Zongezien 467 LQ		2 (not preferred)
Farm Kuipersbult 511 LQ		3 (acceptable)
Farm Kromdraai 690 LQ		3 (acceptable)

#### 4.4. Site Rating Matrix

In order to confirm the result of the environmental evaluation, the identified alternative sites were weighted against one another using a comparative mathematical model, thus the impacts of each site were quantified and compared against each other. The objective of the model was to calculate a comparative percentage-based score, built on mathematical formulas reliant on a set of



environmental issues (characteristics) which have been identified for a hypothesis test. The mathematical formulas were set-up to ensure that the existence of more potential impacts for one alternative than the other is not biased in favour of the option which contains more variables. To ensure a uniform score between the alternative site models, the model assumed a defined set of environmental issues that apply to all options subjected to the model. These environmental issues were ranked in order of importance, relevant to the project. Potential impacts were defined for each of the environmental issues. However, in some instances, one alternative may have had more potential impacts than the other options for a particular environmental issue. It is in these situations that the model calculated a comparative percentage score as one site cannot be unfairly biased if it has less impact than another site. The end result produced a percentage score that was used to rank the various site alternatives. The option with the highest percentage score was considered to be the most favourable alternative. The score did not reflect the environmental acceptability of the development, i.e. there was no pass or fail percentage. The scores were required to be read in relation to one another.

The results of the site ranking matrix are included in Appendix K.

#### **4.5. Conclusions**

In terms of the studies undertaken by the specialists during the Environmental Scoping Study, the farms Naauwontkomen 509 LQ and Eenzaamhied 687 LQ were considered to be the most suitable for the development of the power station and/or ancillary infrastructure.

The site ranking matrix confirmed the conclusion that the farms Naauwontkomen 509 LQ and Eenzaamhied 687 LQ were considered to be the preferred sites for the development of the power station and/or ancillary infrastructure.

##### ***4.5.1. Evaluation in terms of Economic and Technical Criteria***

In order to provide a balanced approach to the site selection process, economic and technical criteria which play a role in the selection of a site were included within the overall evaluation of the candidate sites during the Environmental Scoping Study. The issues raised for consideration were as follows:

- Wind effects – the suitability of a site in terms of the potential impacts of the dominant wind direction and the potential for elevated ambient temperatures.
- Distance of coal conveyor system – from the coal supplier to the power station.
- Distance of ash conveyor system – from the power station to the ash disposal site.

- The cost of relocating existing infrastructure on sites, the cost of moving infrastructure, for example the cost of constructing a road bypass on the Steenbokpan Road at Naauwontkomen.
- Consideration of geotechnical conditions and the potential issues with regards to founding conditions.

The relative ratings for each of these issues were also included in the Site ranking Matrix (refer to Appendix K).

#### ***4.5.2. Overall Conclusion and Recommendation***

Based on the specialist studies no environmental fatal flaws were identified during the Environmental Scoping Study, although a number of potentially significant environmental impacts were identified for further in-depth study. Therefore, an EIA was required to be undertaken in order to provide an assessment of these potential impacts and to recommend appropriate mitigation measures, where required.

**This EIR has been undertaken for the nominated preferred sites, namely, the farms Naauwontkomen 509 LQ and Eenzaamheid 687 LQ.**