

10. CONCLUSIONS AND RECOMMENDATIONS

The Environmental Scoping Study (ESS) for the proposed establishment of a Combined Cycle Gas Turbine (CCGT) power plant has been undertaken in accordance with the Environmental Impact Assessment Regulations (2006) published in Government Notice R385 to R387 of 21 April 2006 in terms of Section 24(5), read with Section 44, of the National Environmental Management Act, 1998 (Act No. 107 of 1998)

In line with Regulation 29 (Chapter 3) of the EIA Regulations, the ESS aimed to identify and provide:

- information on the methodology applied to assess the potential impacts that have been identified;
- *feasible* and *reasonable* alternatives that have been considered as part of the Scoping Process;
- a description of the environmental issues and potential impacts associated with all aspects of the proposed project.

From the above process, six (6) candidate sites were nominated for the location of the proposed CCGT power plant and associated infrastructure, for detailed study within the Environmental Impact Assessment (EIA) Phase;

The conclusions and recommendations of this Scoping Study are the result of desk-top studies as well as on-site inspections and evaluation of impacts identified by specialists.

The Environmental Scoping Report evaluated six candidate sites identified as feasible sites for the construction of the CCGT power plant. The sites are located on the farms as follows (see Figure 10.1):

- **Site 1** (Portions 1, 3 and 7 of the farm Palmietspruit 68 HS; Portion 6 of the farm Strydkraal 53 HS; Portion 1 of the farm Roodekopjes 67 HS)
- **Site 2**
 - * Site 2a (Portion 7 of the farm Bergvliet 65 HS; Portion 4 of the farm Rietpoort 83 HS; Werda 116 HS)
 - * Site 2b (Portions 3 and 4 of the farm Rietpoort 83 HS and Werda 116 HS)
- **Site 3**
 - * Site 3a (Portions 1, 2, 6, 10 and 11 of the farm Witkoppies 81 HS)
 - * Site 3b (Portions 1, 5 and 6 of the farm Witkoppies 81 HS)
 - * Site 3c (Portions 4, 5, 8, 9, 12, 13 and 14 of the farm Witkoppies HS)

The sites were evaluated in terms of their suitability for development based on each specialist's criteria and/or impacts identified in the specialist reports in order to nominate a preferred site for the construction of the CCGT power plant and associated infrastructure.

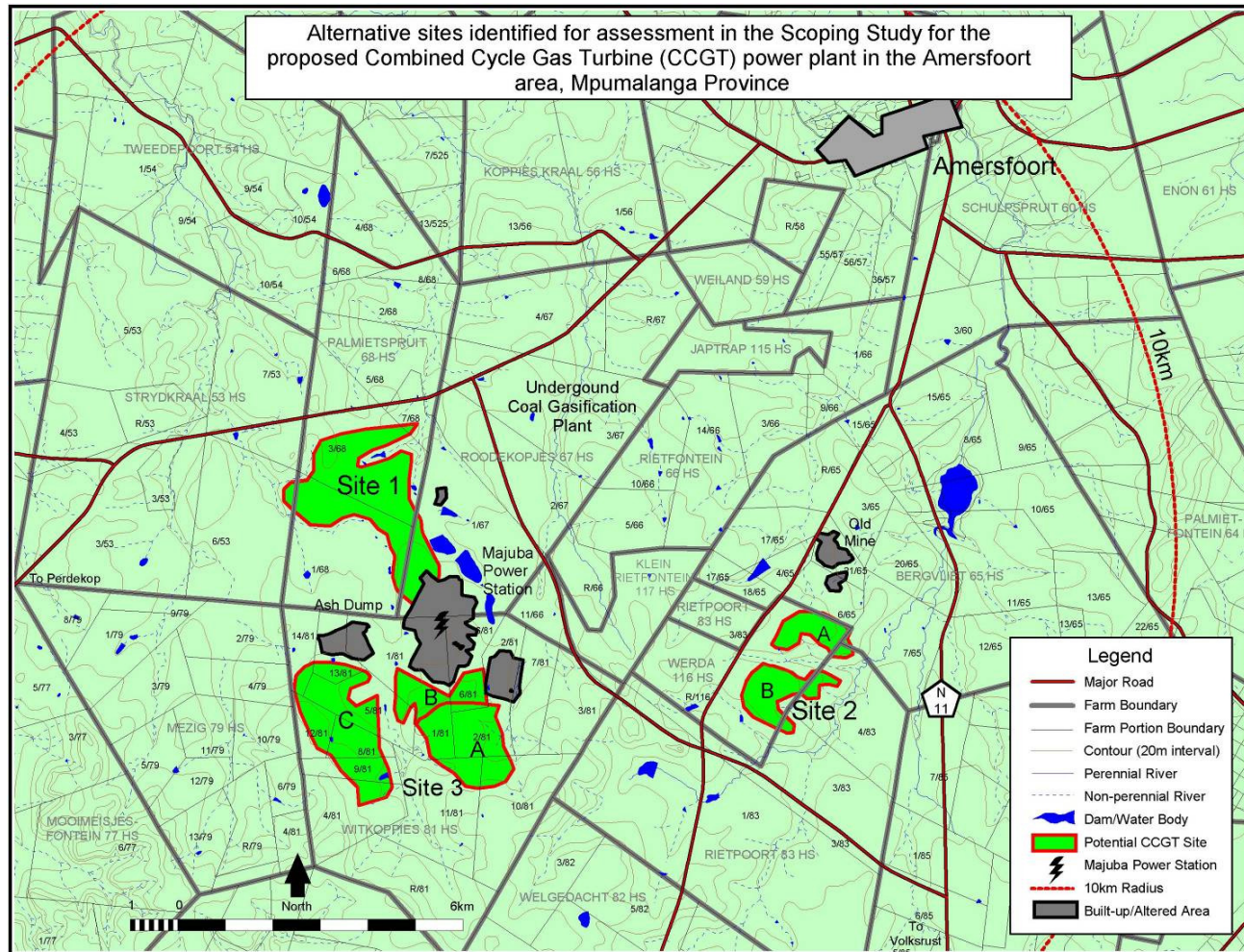


Figure 10.1 Showing the six (6) candidate sites evaluated in the Scoping Study

10.1. Potential Environmental Impacts

A summary of the potentially significant issues associated with the proposed CCGT power plant, identified within the Environmental Scoping Study, is provided in Table 10.1 below. The specialist studies conducted include: Impacts on Hydrogeology; Hydrology; Biodiversity; Air Quality; Noise; Social; Visual; Heritage; Risk and Traffic. The area of potential impact and recommendations for investigations to be undertaken within the EIA phase are also specified. Additional studies as identified during the consultation process with Key Stakeholders and Authorities include: a Micro-economic study, a Wetland Delineation Exercise and Agricultural Potential Study.

Table 10.1 Potentially significant issues associated with the proposed CCGT power plant, identified within the Environmental Scoping Study. The area of potential impact and recommendations for investigations to be undertaken within the EIA phase are also specified.

Issue	Area of Potential Impact	Recommendations
Biophysical Environment		
Hydrogeology	<p>The following potential impacts have been identified:</p> <ul style="list-style-type: none"> • Raw water dams – sources of artificial recharge to groundwater. • Water (neutralized) storage tanks – possible sources of artificial recharge. • Sewage plant and dams – seepage of irrigation of effluent may impact on groundwater. • Treated (demineralised) water system – resultant wet waste brine may impact on groundwater • Fuel oil and stored chemicals - oil/chemicals enters water and requires treatment. • Solid waste site - source of leachate or poor quality water. • Borrow pits - reduced runoff and enhanced recharge. • Air quality abatement technology - wet waste and water use (if used). 	<ul style="list-style-type: none"> • Site 1 is the preferred option with Site 3a and 3b ranking second and third respectively in terms of site suitability for the development of the CCGT power plant and associated infrastructure. • A detailed assessment of the selected overall preferred alternative sites will be undertaken within the EIA phase in order to adequately assess the potential impacts on hydrogeology as a result of the proposed project and recommend appropriate, site-specific mitigation measures where required.
Hydrology	<p>The following potential impacts have been identified:</p> <ul style="list-style-type: none"> • Impact of flooding on the CCGT power plant – infrastructure need to be placed out of flooding area to avoid expensive infrastructural damage, ensure safety of those using the infrastructure, protect water courses from pollution during floods and protect the riparian areas around water courses. • Slope area – steeper slopes produce quicker and large storm water runoff flows which are more likely to result in erosion 	<ul style="list-style-type: none"> • Site 1 has been identified as being the best suited for the proposed construction of the CCGT power plant. Site 3b and Site 2b were ranked second and third respectively in terms of sites selected for the development of the CCGT power plant. • A detailed assessment of the selected overall preferred alternative sites will be undertaken within the EIA phase in order to adequately assess the potential impacts on hydrology

Issue	Area of Potential Impact	Recommendations
	and sediment transport.	as a result of the proposed project and recommend appropriate, site-specific mitigation measures where required.
Biodiversity (Flora – terrestrial and aquatic vegetation)	Potential impacts include: <ul style="list-style-type: none"> • Destruction of threatened species and habitat. • Destruction of sensitive habitat types (outcrops, riparian fringes, non-perennial streams, river, etc.). • Destruction of pristine habitat. • Changes in the local and regional biodiversity. • Impacts on surrounding natural habitat and species. 	<ul style="list-style-type: none"> • Site 3b has been identified as being the best suited site for the proposed construction of the CCGT power plant. Site 1 and Site 3c were ranked second and third respectively from a floral perspective. • Site 3b has been identified as being the best suited site for the proposed construction of the CCGT power plant. Site 1 and Site 3c were ranked second and third respectively from a faunal perspective. • A detailed assessment of the selected overall preferred alternative sites will be undertaken within the EIA phase in order to adequately assess the potential impacts on terrestrial and aquatic vegetation as a result of the proposed project and recommend appropriate, site-specific mitigation measures where required.
Social Environment		
Air Quality	The following possible sources of fugitive dust and particulate emissions were identified as activities which could potentially generate air pollution during construction operations: <ul style="list-style-type: none"> • Demolition and debris removal. • Site preparation (earthworks). • General construction. The following possible sources of fugitive dust and particulate	<ul style="list-style-type: none"> • At the Scoping Phase available information could not result in exclusion of any site. Based on available information, no fatal flaws are associated with the proposed project in the sites studied. • A detailed assessment of the selected alternative sites will be undertaken within the EIA phase in order to adequately assess the potential impacts on air quality as a result of the proposed project and recommend appropriate mitigation

Issue	Area of Potential Impact	Recommendations
	<p>emissions were identified as activities which could potentially generate air pollution during operation: CCGT power plant (comprising 6 units of approximately 350MW each); compressor plant; ignition gas for unit start-up (using commercial propane); gas pipeline from the UCG plant to the CCGT; construction of the water supply pipeline from the Rietpoort balancing dam; water treatment plant and associated infrastructure (i.e. ancillary works); sewage treatment plant; an general storage facilities.</p> <ul style="list-style-type: none"> • Possible sources of fugitive dust emission during the closure and post-closure phase include: grading of sites; infrastructure demolition; infrastructure rubble piles; transport and dumping of building rubble; transport and dumping of topsoil; and preparation of soil for revegetation. 	<p>measures, where required.</p>
Noise	<p>Potential noise impacts consist of the following:</p> <ul style="list-style-type: none"> • Impacts on the residual (existing) noise climate. • Predicted noise climate – pre-construction phase. • Predicted noise climate – construction phase. • Predicted noise climate – operational phase <ul style="list-style-type: none"> * CCGT power plant. * CCGT power plant generated traffic. 	<ul style="list-style-type: none"> • According to the final site preference ranking, Site 3 and 3b were ranked as the first preference, Site 1 as the second preference and Site 3c as the third preference for the construction of the CCGT power plant and associated infrastructure. • Once the preferred site/s is selected, detailed analysis of the noise impact situation will need to be undertaken and mitigation measures recommended, where possible. .
Social Impact Assessment	<p>The following are likely to have an impact on the social environment:</p> <ul style="list-style-type: none"> • <i>Demographic change processes</i> <ul style="list-style-type: none"> * Relocation of households and/or population segments 	<ul style="list-style-type: none"> • Site 3B emerged as the preferred site from a social perspective, followed by Site 3A and then Site 3C for the construction of the CCGT power plant and additional infrastructure.

Issue	Area of Potential Impact	Recommendations
	<ul style="list-style-type: none"> * Influx of construction workers * Influx of job seekers * Outflow of labourers * Influx of maintenance workers • <i>Economic change processes</i> <ul style="list-style-type: none"> * Attitude formation against the proposed project * Negotiation process * Additional demand on municipal services * Disaster management plan • <i>Empowerment and institutional change processes</i> <ul style="list-style-type: none"> * Integration of construction workers into local areas * Physical splintering * Safety and security * Noise pollution * Sense of place * Movement of maintenance workers * Third party tampering (on pipelines) • <i>Socio-cultural processes</i> <ul style="list-style-type: none"> * Geographical change processes * Cultivation and grazing land * Maintenance of access roads * Spatial development (future land use) * Tourism potential • <i>Biophysical change process</i> <ul style="list-style-type: none"> * Pollution and fire risk * Sanitation 	<ul style="list-style-type: none"> • A detailed assessment of the selected alternative sites will be undertaken within the EIA phase in order to adequately assess the potential impacts on the social environment as a result of the proposed project and recommend appropriate mitigation measures, where required.

Issue	Area of Potential Impact	Recommendations
	<ul style="list-style-type: none"> * Mining operations * The presence of the CCGT plan and pipelines 	
Visual	<p>Due to the large footprint and vertical dimensions of the proposed CCGT power plant, and the predominantly flat topography of the region, it becomes apparent that the facility would be well exposed. The issues relating to visual impact are the following:</p> <ul style="list-style-type: none"> • Visibility • Proximity • Exposure 	<ul style="list-style-type: none"> • Sites 1, 3b and 3c are the ideal option for the construction of the CCGT power plant and associated infrastructure. • A detailed assessment of the selected alternative sites will be undertaken within the EIA phase in order to adequately assess the potential visual impacts as a result of the proposed project and recommend appropriate mitigation measures, where required.
Heritage	<p>The potential impacts on heritage during the construction phase are as follows:</p> <ul style="list-style-type: none"> • Actually identified impacts <ul style="list-style-type: none"> * Damage to sites • Anticipated impacts <ul style="list-style-type: none"> * Looting of sites <p>The potential impacts on heritage during the operational phase are as follows:</p> <ul style="list-style-type: none"> • Actually identified impacts <ul style="list-style-type: none"> * Damage to sites • Anticipated impacts <ul style="list-style-type: none"> * Damage to sites * Looting of sites 	<ul style="list-style-type: none"> • All sites are acceptable for the construction of the CCGT power plant and associated infrastructure. • The preferred alternative site will be investigated in more detail through a Phase 1 archaeological study. The final layout must attempt to avoid significant sites; if this is not possible, detailed, site-specific mitigation and mitigation measures will then be recommended in the detailed EIA phase. This should be developed in consultation with the Mpumalanga SAHRA office.

Issue	Area of Potential Impact	Recommendations
Risk	<p>A risk assessment on human health due to the CCGT power plant would concentrate on possible fires, explosions and toxic clouds from an accidental release of the gas.</p>	<ul style="list-style-type: none"> • All sites are acceptable for the construction of the CCGT power plant and associated infrastructure from a risk perspective. • The further people are located from the point of release, the less they would experience the impact of an accidental release. As all the prospective sites are located in rural areas with some distance to larger populations, differences in risk between the sites would not be sufficient to give a site preference. • A detailed assessment of the selected alternative sites will be undertaken within the EIA phase in order to adequately assess the potential risk impacts as a result of the proposed project and recommend appropriate mitigation measures,
Traffic	<ul style="list-style-type: none"> • Impact of all traffic during construction. • Impact of employee traffic during operation. • Impact of coal supply traffic to the existing Majuba Power Station.. 	<ul style="list-style-type: none"> • All sites are acceptable for the construction of the CCGT power plant and associated infrastructure from a traffic perspective. • A detailed traffic impact study will be undertaken for the preferred sites as determined by this Environmental Scoping Study to identify possible traffic concerns for the specific sites.

10.2. Rating Matrix

- *Environmental and Social Criteria*

Table 10.2 outlines unweighted and weighted ranking scores for environmental and social criteria allocated based on the results of the various specialist studies undertaken. The methodology and calculations provided in the table below is presented in Chapter 7.

Table 10.2 Environmental and social criteria matrix

	Weighting	Unweighted						Weighted					
		Site 1	Site 2a	Site 2b	Site 3a	Site 3b	Site 3c	Site 1	Site 2a	Site 2b	Site 3a	Site 3b	Site 3c
Biophysical Criteria													
Hydrogeology	1.7	4	3	3	4	3	3	6.8	5.1	5.1	6.8	5.1	5.1
Hydrology	2	4	3	3	3	4	3	8	6	6	6	8	6
Flora	2	4	2	2	4	5	3	8	4	4	8	10	6
Fauna	2	3	1	1	3	5	3	6	2	2	6	10	6
Social Criteria													
Noise	1.8	3	2	2	3	3	3	5.4	3.6	3.6	5.4	5.4	5.4
Social	2.2	3	3	2	4	5	3	6.6	6.6	4.4	8.8	11	6.6
Visual	1.7	5	1	1	5	5	5	8.5	1.7	1.7	8.5	8.5	8.5
Heritage	1.2	3	3	3	3	3	3	3.6	3.6	3.6	3.6	3.6	3.6
Risk	2.3	3	3	3	3	3	3	6.9	6.9	6.9	6.9	6.9	6.9
Traffic	1.6	3	3	3	3	3	3	4.8	4.8	4.8	4.8	4.8	4.8
Total Score		35	24	23	35	39	32	64.6	44.3	42.1	64.8	73.3	58.9

It should be noted that the specialist studies found no fatal flaws at any of the six sites that would eliminate any site. According to the matrix, Site 3b is considered to be the ideal site for the development of the CCGT power plant. However, there is only a 0.2 point difference between the score of Site 1 and Site 3a and therefore both sites could be recommended for further study in the Environmental Impact Assessment Phase. In terms of environmental, social and economic (macro-level) criteria, **Sites 1; 3a and 3b** are the preferred sites and will be investigated further in the EIA phase.

- **Technical Criteria**

In order to provide a balanced approach to the site selection process, the technical criteria which play a role in the selection of sites have been included within the overall evaluation of the candidate sites. The inclusion of the technical criteria in the site selection process stems from the BATNEEC (Best Available Techniques Not Entailing Excessive Costs) Principle. This principle introduces the need for a development proposal to be technically and economically feasible in addition to being environmentally feasible. In this way the site recommended is acceptable from all aspects of the environment, namely natural, social and economic, thereby ensuring that the project strives to embrace the principles of sustainable development.

The following technical criteria are considered vital to the success of the proposed project:

- Proximity and co-existence with current technology – The possibility of identifying synergies between the existing Majuba Power Station and the proposed development.
- Transmission integration – Ease with which power would be disseminated from the proposed power station to the transmission grid.
- Operational efficiency – The risk of reliability of supply increases with the distance that these input resources have to be transported (or the distance from other operational requirements), i.e. proximity to fuel source, water source infrastructure (e.g. roads, etc).

The relative ratings for each of the technical criteria are included in Table 10.3 overleaf.

Key (Applicable both environmental and social and technical criteria tables)

1 = Sensitive
2 = Not Preferred
3 = Acceptable
4 = Preferred
5 = Ideal

The technical criteria provided by Eskom, was given equal importance (weighting factor = 1) therefore the results displayed in Table 10.4 represents the weighted values.

Table 10.3 Technical criteria

Site Selection Elements	Site 1	Site 2a	Site 2b	Site 3a	Site 3b	Site 3c
Proximity to and co-existence with existing technology (existing Majuba Power Station)	4	3	3	4	5	4
Operational Efficiency	5	3	3	4	4	2
Transmission Integration	3	3	3	3	3	3
Total	12	9	9	11	12	9
Site Preference Rating	4	3	3	4	4	3

- **Combined Matrix**

In order to evaluate the sites in terms of environmental and technical factors, the alternative sites were weighted against one another taking the identified environmental and technical issues into consideration. This data was used in a combined matrix (Table 10.4). This matrix therefore ranks the alternative sites in terms of environmental and technical factors, and the option with the highest score is considered to be the most favourable alternative.

Table 10.4 Environmental, social and technical criteria matrix

	Weighting	Unweighted						Weighted (with Technical Criteria)					
		Site 1	Site 2a	Site 2b	Site 3a	Site 3b	Site 3c	Site 1	Site 2a	Site 2b	Site 3a	Site 3b	Site 3c
Biophysical Criteria													
Hydrogeology	1.7	4	3	3	4	3	3	6.8	5.1	5.1	6.8	5.1	5.1
Hydrology	2	4	3	3	3	4	3	8	6	6	6	8	6
Flora	2	4	2	2	4	5	3	8	4	4	8	10	6
Fauna	2	3	1	1	3	5	3	6	2	2	6	10	6
Social Criteria													
Noise	1.8	3	2	2	3	3	3	5.4	3.6	3.6	5.4	5.4	5.4
Social	2.2	3	3	2	4	5	3	6.6	6.6	4.4	8.8	11	6.6
Visual	1.7	5	1	1	5	5	5	8.5	1.7	1.7	8.5	8.5	8.5
Heritage	1.2	3	3	3	3	3	3	3.6	3.6	3.6	3.6	3.6	3.6
Risk	2.3	3	3	3	3	3	3	6.9	6.9	6.9	6.9	6.9	6.9
Traffic	1.6	3	3	3	3	3	3	4.8	4.8	4.8	4.8	4.8	4.8
Technical Criteria													
Technical Criteria	1.0	4	3	3	4	4	3	4	3	3	4	4	3
	Total Score	39	27	26	39	43	35	68.6	47.3	45.1	68.8	77.3	61.9

In terms of the combined matrix, Site 3c is considered to be the preferred site for the development of the CCGT power plant. However, there is only a 0.2 point difference between the score of Site 1 and Site 3a. In terms of the above combined matrix table Site 1, 3a and 3b would be recommended for further study in the Environmental Impact Assessment Phase.

10.3. Recommendations

Based on the specialist studies, no environmental fatal flaws have been identified as a result of the proposed project on any of the sites evaluated. However, a number of potentially significant environmental impacts have been identified that requires further in-depth study.

Therefore, an EIA is to be undertaken in order to provide an assessment of these potential impacts and recommend appropriate mitigation measures, where required.

In the consideration of the environmental, social and economic criteria along with the technical criteria, the nominated sites for further study within an environmental impact assessment would be:

- **Sites 1 (Portions 1, 3 and 7 of the farm Palmietspruit 68 HS; Portion 6 of the farm Strydkraal 53 HS; Portion 1 of the farm Roodekopjes 67 HS);**
- **Site 3a (Portions 1, 2, 6, 10 and 11 of the farm Witkoppies 81 HS); and**
- **Site 3b (Portions 1, 5 and 6 of the farm Witkoppies 81 HS).**