Appendix H:
Heritage Study

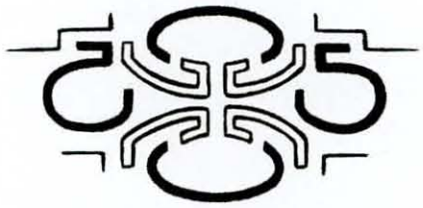
Cultural Heritage Scoping (Predictive) Survey of the Proposed Kabi Vaalkop Solar PV Facility near Orkney, Dr Kenneth Kaunda District, North West Province

For

Savannah Environmental (Pty) Ltd
PO Box 148
Sunninghill
2157
Tel: 011 234 6621
Fax: 086 684 0547
E-mail: info@savannahsa.com

By

Francois P Coetzee
Department of Anthropology & Archaeology
University of South Africa
PO Box 392
Pretoria
0003
Tel: (012) 429 6297
Fax: (012) 429 6091
coetzfp@unisa.ac.za



January 2012
Version 1: Draft Report

Executive Summary

This report contains the results of a scoping survey for the proposed Kabi Solar PV Solar Plant and the Vaalkop substation on portion of the farms Vaalkop 439 IP and Nooitgedacht 434 IP, near Klerksdorp, North West Province.

The cultural landscape in and around Klerksdorp is not only complex but it also has a deep time depth. The area is multi-layered with several compounding aspects:

- The town and surrounding area have a long period of development and western occupation
- Several features and events associated with the Second Boer War are known in the area
- Iron Age settlements occur in the area along or near the Vaal River
- Stone Age sites (including rock art) are known to occur in the area

Although the survey area might have been exposed to secondary impacts of the surrounding development activities it is recommended that a Heritage Impact Assessment (field survey) be conducted to verify if any settlements, structures, features or artefacts occur in the area.

However, also note the following:

It should be kept in mind that archaeological deposits usually occur below ground level. Should archaeological artefacts or skeletal material be revealed in the area during prospecting and mining activities, such activities should be halted, and a university or museum notified in order for an investigation and evaluation of the find(s) to take place (***cf.* NHRA (Act No. 25 of 1999)**, Section 36 (6)).

Please note that cultural heritage resources are non-renewable and that this report conveys results from a desktop (predictive) study. Most of the impacts can be mitigated by conducting a proper Phase 1 Heritage Impact Assessment. During such a study sites that have been identified in this report can be recorded, documented (surveyed) and also mitigated.

Definitions and abbreviations

Midden: Refuse that accumulates in a concentrated heap.

Stone Age: An archaeological term used to define a period of stone tool use and manufacture

Iron Age: An archaeological term used to define a period associated with domesticated livestock and grains, metal-working and ceramic manufacture

NHRA: National Heritage Resources Act (Act no 25 of 1999)

SAHRA:	South African Heritage Resources Agency
HIA:	Heritage Impact Assessment
EIA:	Environmental Impact Assessment

Contents

1. Introduction

The aim of this cultural heritage scoping (desktop) report is to conduct a predictive assessment of the proposed development on possible heritage resources in the survey area. An important aspect of this report is to predict the likelihood of cultural heritage remains occurring in the proposed area of development based on the current knowledge base available for the area. The proposed development consists of a PV solar facility and associated infrastructure. The scoping report was requested by Savannah Environmental (Pty) Ltd which will be submitted as part of the scoping phase of the EIA process.

2. Objectives

The terms of reference of this survey are as follows:

- Compile a brief contextualisation of the area's ethno-history;
- Provide a predictive (desktop) assessment of possible cultural heritage remains such as artefacts, structures (including graves), buildings and settlements occurring in the area;
- Estimate the level of significance of the existing cultural heritage within the survey area; and,
- Suggest measures relating to ground-truthing and the which aspects should be followed up during the Phase 1 HIA survey

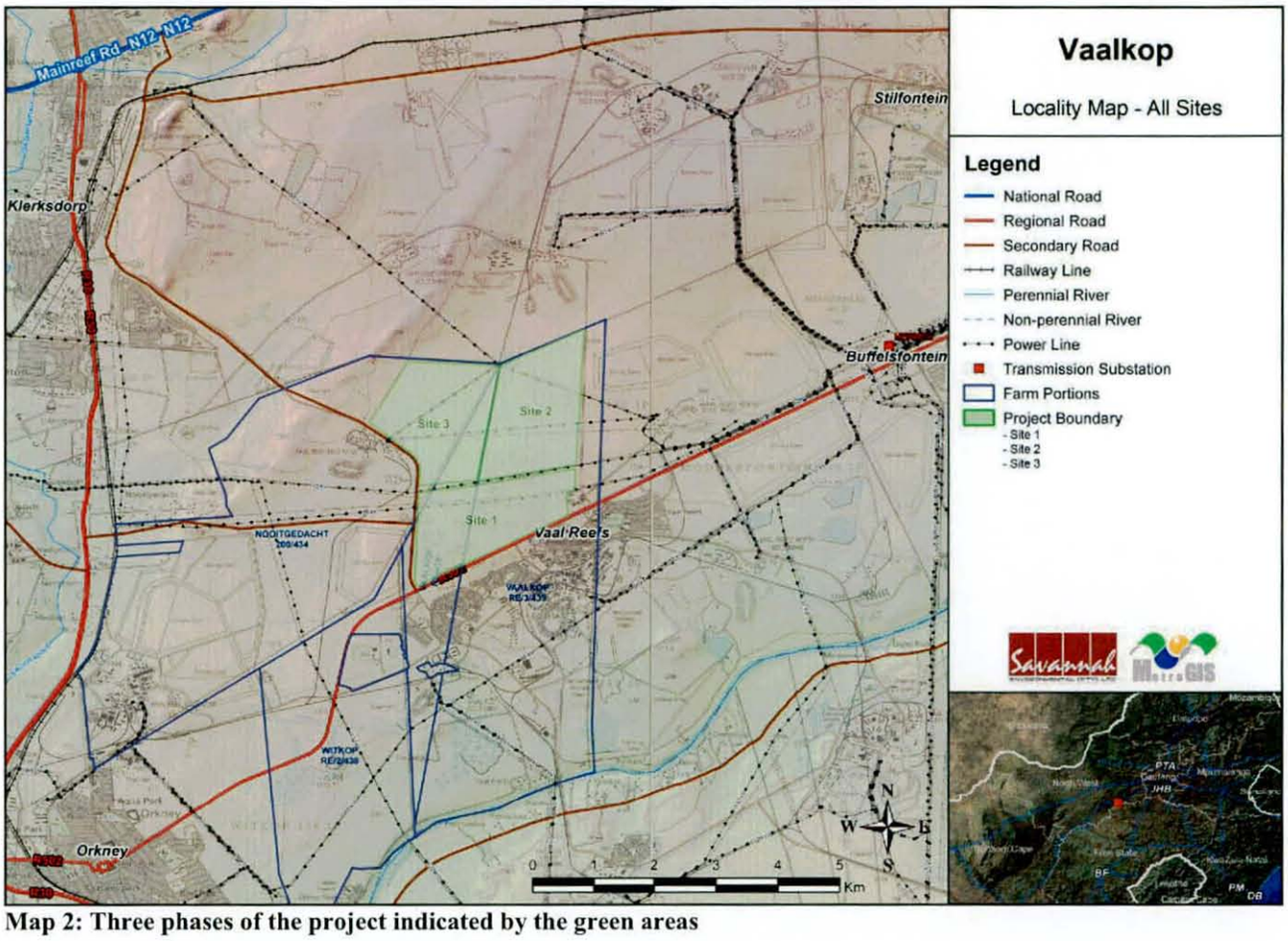
3. Study Area

Topographically the survey area is open and flat, however the region is dominated by the surrounding features which are associated with mining activities such as shaft, slimes dam, dumps and associated infrastructure.

The survey area consists of three portions which are associated with the three phases of the project. The combined survey area is approximately 779 hectares and is situated on the following farm portions (see Map 1):

- Portion 7 of the farm Vaalkop 439 IP
- A portion of the farm Vaalkop 439 IP
- A portion of portion 3 of the farm Vaalkop 439 IP
- A portion of portion 200 of the farm Nooitgedacht 434 IP

Map 1: Regional context of the survey area



Map 2: Three phases of the project indicated by the green areas

4. Proposed Project Activities

The proposed solar energy facility will consist of the following:

- Photovoltaic solar energy panels and associated infrastructure with a total generating capacity of about 208 MW, which will be developed in three phases
- An on-site substation and 6 km of new overhead power line
- Foundations to support the PV panels
- Cabling between project components
- Internal access roads
- Workshop / storage area

The proposed project will consist of four implementation phases:

- Kabi Vaalkop Solar I PV Facility
- Kabi Vaalkop Solar II PV Facility
- Kabi Vaalkop Solar III PV Facility
- Vaalkop substation and power line

5. Legal Framework

- Archaeological remains can be defined as human-made objects, which reflect past ways of life, deposited on or in the ground.

- Heritage resources have lasting value in their own right and provide evidence of the origins of South African society and they are valuable, finite, non-renewable and irreplaceable.

- All archaeological remains, features, structures and artefacts older than 100 years and historic structures older than 60 years are protected by the relevant legislation, in this case the **National Heritage Resources Act (NHRA) (Act No. 25 of 1999, Section 34 & 35)**. The Act makes an archaeological impact assessment as part of an EIA and EMPR mandatory (see **Section 38**). No archaeological artefact, assemblage or settlement (site) may be moved or destroyed without the necessary approval from the **South African Heritage Resources Agency (SAHRA)**. Full cognisance is taken of this Act in making recommendations in this report.

- Cognisance will also be taken of the **Mineral and Petroleum Resources Development Act (Act No 28 of 2002)** and the **National Environmental Management Act (Act No 107 of 1998)** when making any recommendations.

- Human remains older than 60 are protected by the **NHRA**, with reference to **Section 36**. Human remains that are less than 60 years old are protected by the **Human Tissue Act (Act 65 of 1983 as amended)**.

- **Mitigation guidelines (The significance of the site):**

- Rating the **significance of the impact** on a historical or archaeological site is linked to the significance of the site itself. If the significance of the site is rated high, the significance of the impact will also result in a high rating. The same rule applies if the significance rating of the site is low (also see Table 1).

Significance Rating	Action
Not protected	1. None
Low	2a. Recording and documentation (Phase 1) of site adequate; no further action required
	2b. Controlled sampling (shovel test pits, auguring), mapping and documentation (Phase 2 investigation); permit required for sampling and destruction
Medium	3. Excavation of representative sample, C^{14} dating, mapping and documentation (Phase 2 investigation); permit required for sampling and destruction [including 2a & 2b]
High	4a. Nomination for listing on Heritage Register (National, Provincial or Local) (Phase 2 & 3 investigation); site

	management plan; permit required if utilised for education or tourism 4b. Graves: Locate demonstrable descendants through social consulting; obtain permits from applicable legislation, ordinances and regional by-laws; exhumation and reinterment [including 2a, 2b & 3]

Table 1: Rating the significance of sites

- With reference to the evaluation of sites, the certainty of prediction is definite, unless stated otherwise.

- The guidelines as provided by the **NHRA (Act No. 25 of 1999)** in Section 3, with special reference to subsection 3, and the Australian ICOMOS (International Council on Monuments and Sites) Charter (also known as the Burra Charter) are used when determining the cultural significance or other special value of archaeological or historical sites.

- It should be kept in mind that archaeological deposits usually occur below ground level. Should archaeological artefacts or skeletal material be revealed in the area during prospecting and mining activities, such activities should be halted, and a university or museum notified in order for an investigation and evaluation of the find(s) to take place (*cf.* **NHRA (Act No. 25 of 1999)**, Section 36 (6)).

- **Architectural significance:**
  - Does the site contain any important examples of a building type?
  - Are any of the buildings important examples of a style or period?
  - Do any of the buildings contain fine details and or reflect fine workmanship?
  - Are any of the buildings the work of a major architect or builder?
  - Are the buildings important examples of an industrial, technological or engineering development?
  - What is the integrity of the buildings?
  - Are the buildings still utilised?
  - Has the buildings been altered and are these alterations sympathetic to the original intent of the design?

- **Spatial significance of architecture:**
  - Is the site or any of the buildings a landmark in the city or town?
  - Does the plant contribute to the character of the neighbourhood/region?
  - Do the buildings contribute to the character of the street or square?
  - Is the place or building part of an important group of buildings?

- **Architecture: Levels of significance** are:
  - Protect
  - Highly significant
  - Possible significance

- Least significance
- No significance

- **Architecture: Levels of protection** are:

Retain and protect	Considered to be of high significance. The building or structure can be used as part of the development but must be suitably protected. Should not include major structural alterations. If the building is older than 60 years a modification permit is required from SAHRA.
Retain and re-use	Considered to be of moderate significance. The building or structure can be altered to be accommodated within the development plans. Structural alterations can be included. If the building is older than 60 years a modification permit is required from SAHRA.
Alter and re-use	Considered to be of low significance. The building or structure can be structurally altered or destruction can be considered following further documentation. If the building is older than 60 years a modification/destruction permit is required from SAHRA.
Can be demolished	Considered to be of negligible significance and can be demolished. If the building is older than 60 years a destruction permit is required from SAHRA.

Table 2: Level of protection of buildings/structures

- A copy of this report will be lodged with the **SAHRA** as stipulated by the National Heritage Resources Act (NHRA) (Act No. 25 of 1999), Section 38 (especially subsection 4).

- Note that the final decision for the approval of permits, or the removal or destruction of sites, structures and artefacts identified in this report, rests with the SAHRA (or relevant PHRA).

6. Study Approach/Methods

To compile a desktop (predictive) report several sources were consulted to compile a framework of known heritage sites in the region. See references at the end of the report. Extensive use was made of topographic maps and GIS information to compile a spatial framework of the area.

6.1 Review of information/data

Several archaeological and historic reports and publications were consulted for information. The criteria used for the selection of the information were first, data relating to the proposed survey areas and second the regional context which will provide a baseline that was used to determine the possibility (predictability) of certain heritage features, structures and settlements occurring in the area.

The following 1:50 000 map was used to identify possible features: 2626DC.

Please note that most existing heritage reports and published material did not yield any specific cultural heritage sites or features for inclusion in the report.

6.2 Site visits

No site survey has yet been conducted.

6.3 Impact assessment

The criteria used to describe heritage resources and to provide a significance rating of recorded sites are listed in the NHRA (Act 25 of 1999) specifically Section 7(7) and Section 38). SAHRA also published various regulations including: Minimum standards: Archaeological and palaeontological components of impact assessment reports in 2006.

6.4 Assumptions, uncertainties and gaps in knowledge

No severe physical restrictions were encountered. A major assumption for the survey area is that the region has probably been severally disturbed due to secondary mining and/or farming activities. However, care should be taken not to over generalise this aspects. Also note that due to the subterranean nature of cultural remains this report should not be construed as a record of all archaeological and historic sites in the area.

7. Description of Regional Context and Possible Cultural Heritage Sites

7.1 Built Environment and Mining Activities

7.1.1 Klerksdorp

The built environment of the survey area is defined by two towns, namely Klerksdorp and Orkney and the AngloGold Ashanti gold mining operations. Klerksdorp was founded by twelve Voortrekker families who settled on the banks of the Schoonspruit in 1837. The first magistrate was Jacob de C'lerq after whom the town was named. Klerksdorp is therefore one of oldest towns in the old Transvaal.

In 1885 gold was discovered in the Klerksdorp district by MG Jansen van Vuuren on the farm Ysterspruit. In the following year (1886) AP Roos found gold in the town commonage. As a consequence, thousands of fortune-seekers descended on the so-called Schoonspruit Gold-Field. This rush turned the small town into a settlement with 70 taverns and which later even had a stock exchange of its own. However, the nature of the gold reef demanded expensive and sophisticated equipment to mine and extract the gold, causing the majority of diggers to move away in the late 1890s and leading to a decline in the gold mining industry (see Bulpin 2001).

Today, Klerksdorp is the centre for a large mining and agricultural economy and has the second largest grain co-operative in the world.

7.1.2 Orkney

The town Orkney was proclaimed on 20 March 1940 on the farm Witkoppen where the owner Simon Fraser first mined gold. He was from the Orkney Islands off the coast of Scotland. 'Orkn' is Islandic for sea lion and 'Ey' is Nordic for island. As a result the sea lion is the emblem of the town, which was proclaimed a municipality in March 1962. The town is situated near the Vaal Reefs Exploration and Mining Co. Ltd.,(today AngloGold Ashanti) (Bulpin 2001).

7.1.3 Vaal Reefs Exploration and Mining Co. Ltd

Vaal Reefs acquired from Western Reefs Exploration and Development Co. Ltd the freehold and mineral rights of portions of farms Modderfontein, Vaalkop and Zandpan. An additional portion of the farm Zandpan (Crown land on Portion C) was granted on a prospecting lease until January 1952 (Mining Year Book 1952:485).

AngloGold Limited was founded in June 1998 with the consolidation of the gold mining interests of Anglo American. Vaal Reefs is one of the mines that was incorporated into the new company. AngloGold Ashanti as it is known today, was formed in April 2004 from the business combination between AngloGold and Ashanti Goldfields. Today, AngloGold Ashanti is the third largest gold producing mining company in the world.

7.2 Second Boer War Sites (1899 – 1902)

During the Second Boer War heavy fighting occurred in the Klerksdorp area which also housed a large concentration camp.

The Battle of Rooiwal was an engagement that took place on 11 April 1902 and resulted in a victory by a British force commanded by Colonel Robert Kekewich. Two Boer commandos were led by Generals Ferdinandus Jacobus Potgieter and Jan Kemp.

The action consisted of a Boer attack on horseback on an entrenched British hillside position in the valley of Rooiwal, near Klerksdorp. The Boers were attempting to break out of a British encircling maneuver. Their attack was repulsed at some cost to the Boers in killed and injured.

The details of the battle are as follows.

"Preparing for the battle the Boers did not know of the British deployment on the hillside and they believed that Rooiwal was only lightly held. The two Boer commandos under Commandant Potgieter and General Kemp respectively, therefore tried to overrun the British position early on the morning of 11 April, in an effort to escape Hamilton's 'drive'. Commandant Potgieter had around 1,700 men, all mounted riflemen.

At around 7:15 am on 11 April, they charged the British position on horseback, firing from the saddle. A British picket of 40 mounted infantry was overrun, taking 20 casualties.

Kekewich's position was a strong one, but the sight of the charging Boers panicked some of the inexperienced British troops and a number of Yeoman units fled the scene of the battle and were not stopped until they were a mile away from the fighting. A Lieutenant Carlos Hickie managed to stop the stampede with a mixture of pleas and threats. In addition, a number of the regular British officers on the scene were very critical of the 'wild' shooting of their men.

In spite of this, however, the Boer charge was stopped about 30 metres from the British line by artillery and rifle fire. Fifty Boers were killed outright and more were wounded. Among the dead was Commandant Potgieter, wearing a distinctive blue shirt. Kekewich later commented that, 'one good company of infantry could have killed 300 Boers'. The surviving Boers made good their retreat. Boer fire, delivered from the saddle, had produced about 50 casualties in the British line.

Ian Hamilton and Rawlinson arrived on the scene just as the fighting was ending. However, Hamilton delayed the pursuit of the beaten Boers as he feared that the retreat was a ruse and that his men would fall into Boer ambushes. At about 9:45, or 90 minutes after the Boer charge had been repulsed, Hamilton sent his mounted troops in pursuit of the enemy. They captured a further 50 Boers and re-captured the artillery lost at Tweebosch (Raath 2007)".

Battle of Ysterspruit (Yzer Spruit)

The most famous of the battles around Klerksdorp, is that of the **Battle of Ysterspruit**, in which the Boer General, Koos de la Rey, achieved a great victory. He battle is one of the most celebrated of the general's career, being the battle in which the Boer soldiers pioneered the art of firing from horseback.

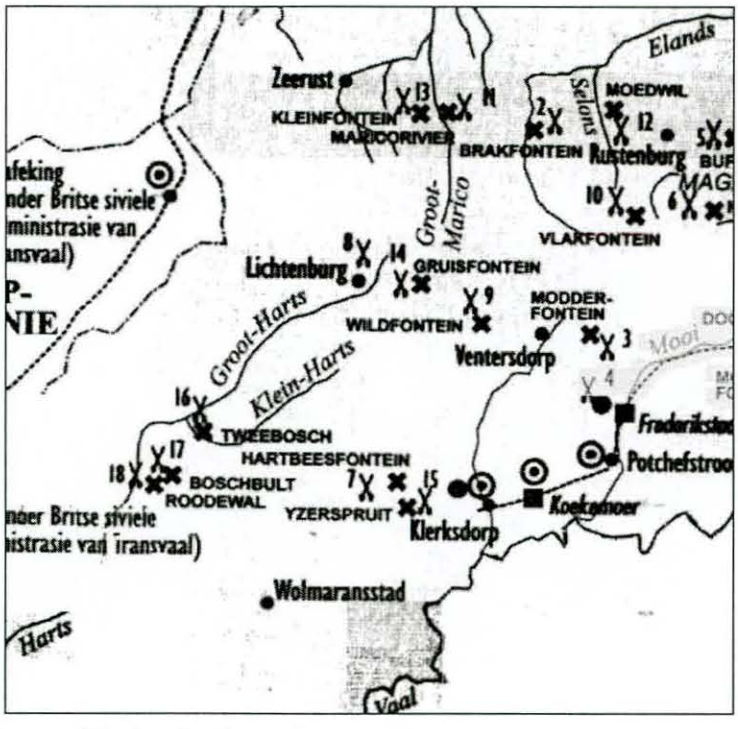
Figure 1: Some of the weapons and horses captured after the battle

The details of the battle are as follows.

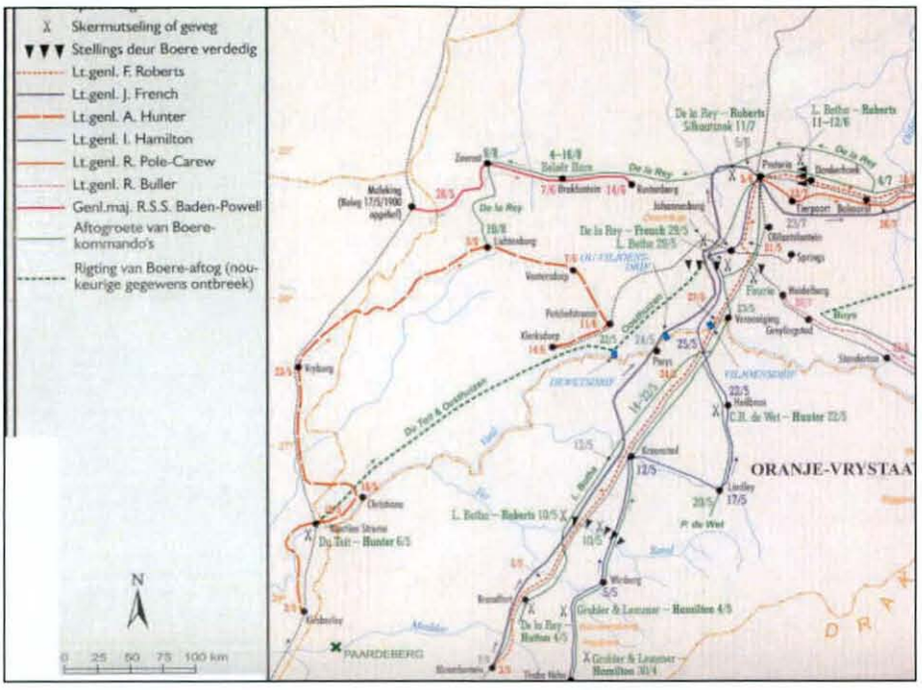
During the night of 24 February 1902 the commandos of Generals Liebenberg, Kemp and Celliers took up their positions in between Jagspruit and Ysterspruit Rivers. The aim was to attack the convoy of Colonel Anderson which was on their way to Klerksdorp.

The Boer commandos of Liebenberg and Kemp stormed the convoy three times but were repulsed. It is then that Celliers charged the convoy at full gallop and his 100 men managed to overrun the British Imperial Yeomanry. As soon as the 150 men were fleeing the battle they were pursued by the all three Boer commandos. Anderson fled to Klerksdorp with the remaining men. The 5th battalion of Imperial Yeomanry was left with 28 dead and 34 wounded. The Boers managed to capture two 15 pounder Armstrong cannons, a hand-maxim machine gun and one bom-maxim (Raath 2007).

The graves of the victims of the concentration camps, namely Boer women and children, can still be visited today in the old cemetery just outside of town, numbering just below a thousand.



Map 3: Location of some of the battles that took place in the region



Map 4: Movement of the British forces in the region.

Blockhouses

By 31 May 1902 a total of approximately 8000 blockhouses over a distance of 5920 km had been erected. These included 441 stone blockhouses, 6883 Rice-type and similar corrugated iron blockhouses and 555 so-called 'works' (fieldworks). A total of 55 000 soldiers were manning these structures (Pretoruis 2001:235).

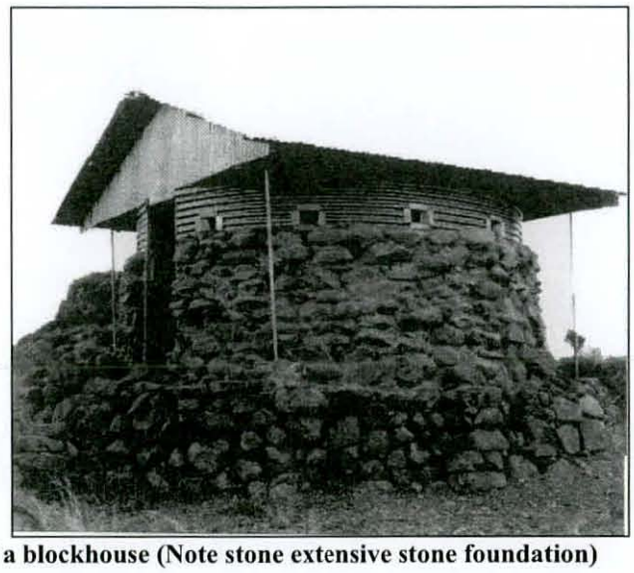
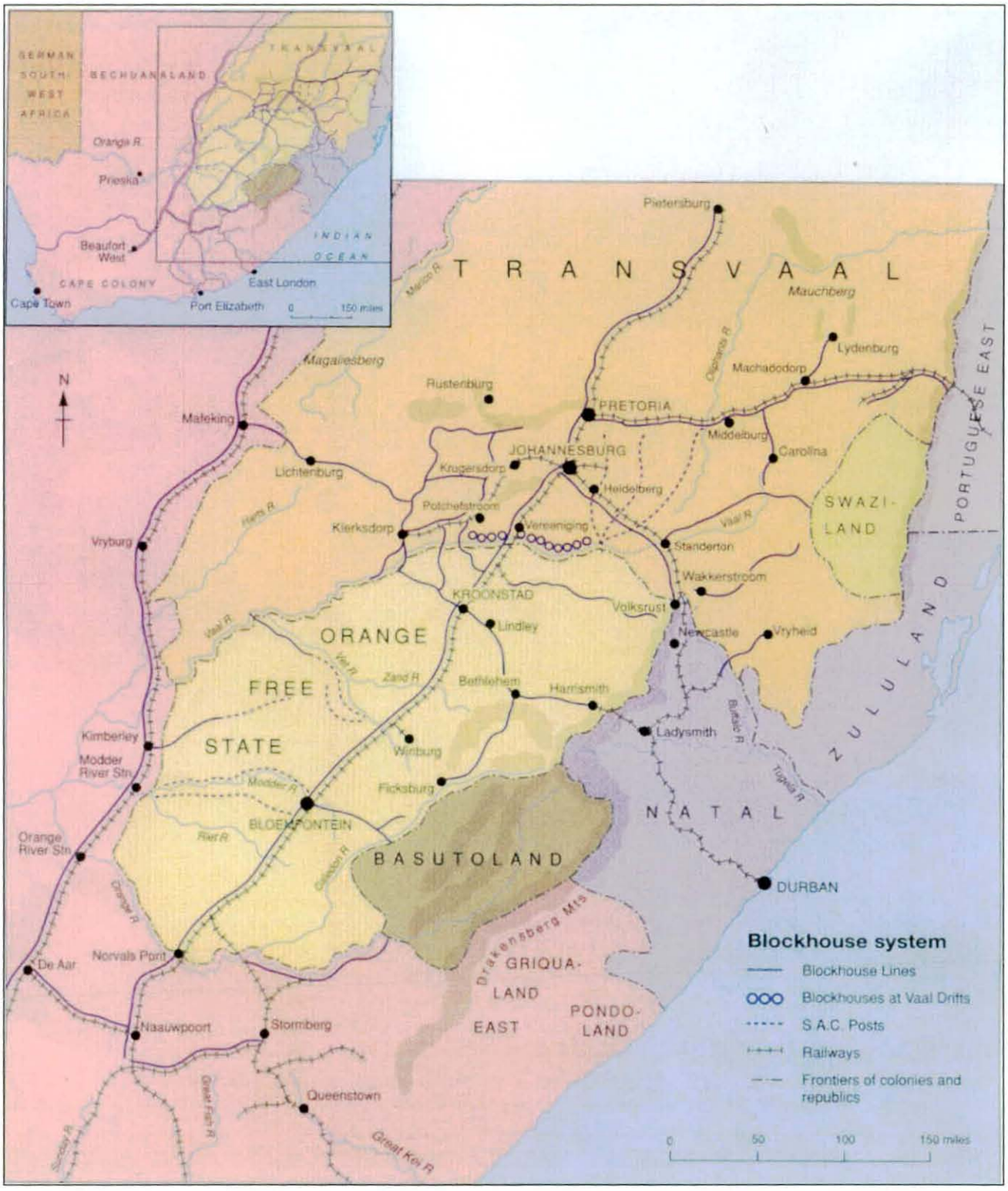


Figure 2: An example of a blockhouse (Note stone extensive stone foundation)

The 8000 strong blockhouse system mostly focused on breaking the north-south movement of the Boer commandos. Note that Klerksdorp is situated at a node where four blockhouse lines converge indicating the strategic importance of the region (Pakenham 1979:267). Two blockhouse lines emerge to the south, which is close to the survey area.

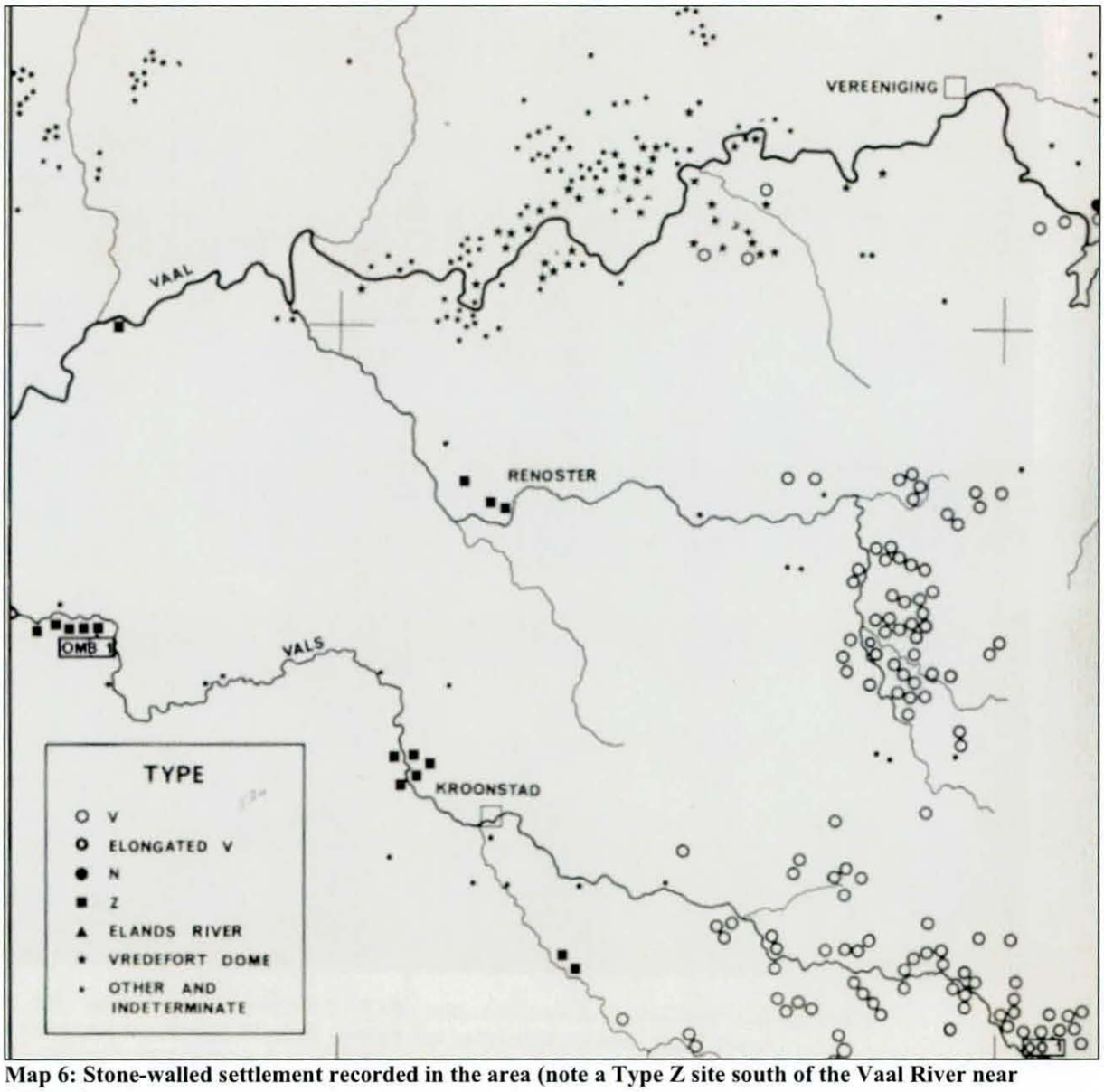


Map 5: The distribution of the blockhouse system

7.3 Iron Age Settlements and Ethno-Historical Background

The known Sotho-Tswana groups that settled in the area are Barolong Boo Seleka under chief Sehunelo and the Barolong Boo Rapulana under chief Matlaba. In circa 1775 the Seleka section moved to Thabeng (15 km north of Klerksdorp) and the Rapulana followed them. The Rapulana built their settlement at Matlwang (30 km north-east of Klerksdorp). These two Sotho-Tswana speaking groups remained in the area until the 1820s. During the later period of unrest they also settled at ThabaNchu for protection under chief Moshweshwe (Moshoeshoe) (Breutz 1989:126-136).

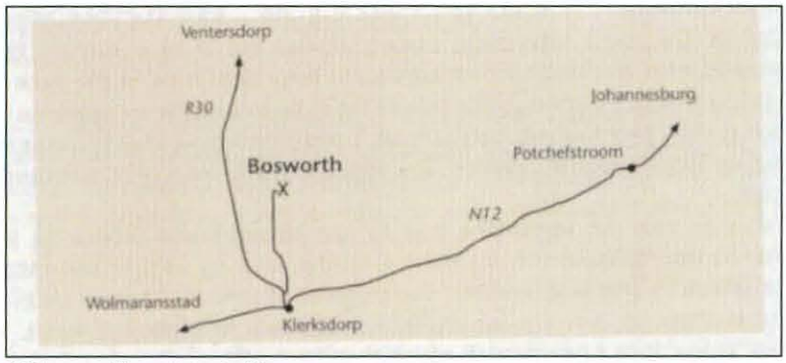
Late Iron Age stone-walled settlements were identified by Tim Maggs during his archaeological survey of the Free State in the 1960s. A Type Z settlement was recorded just south of the Vaal River near Orkney. These sites are characterised by clusters of closely packed stone-walled enclosures. Due to the double nature of some of the enclosures they are known as bilobial dwellings. Ethnographic evidence supports an association with the Barolong (Maggs 1976:37-40).



Map 6: Stone-walled settlement recorded in the area (note a Type Z site south of the Vaal River near Orkney)

7.4 Stone Age and Rock Art Sites

Rock art sites such as Bosworth is well known for its rock engravings. The site also yielded battered anvils, cores and flakes associated with the Earlier Smithfield tradition of the Later Stone Age (Mason 1962:303).



Map 8: Location of Bosworth rock art site

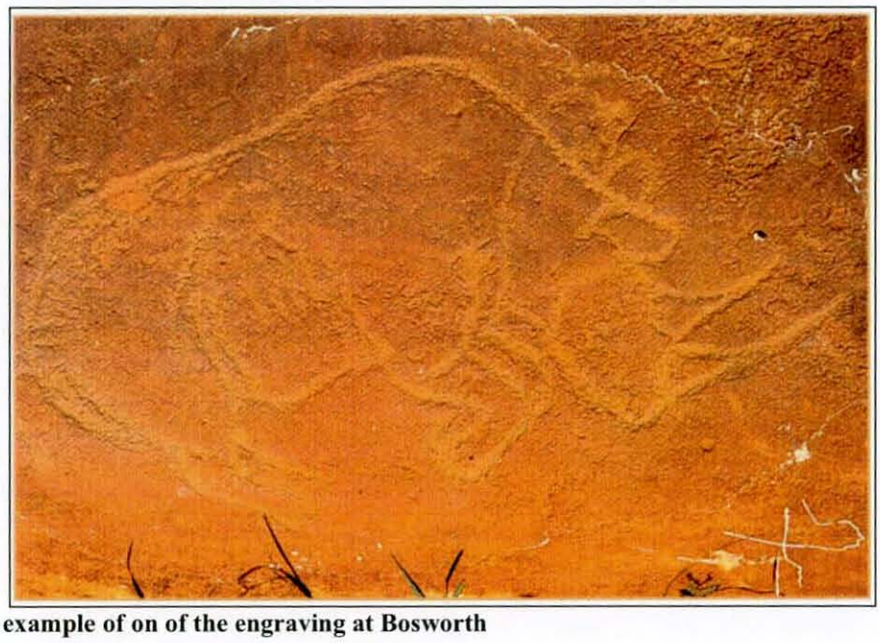


Figure 3: An example of on of the engraving at Bosworth

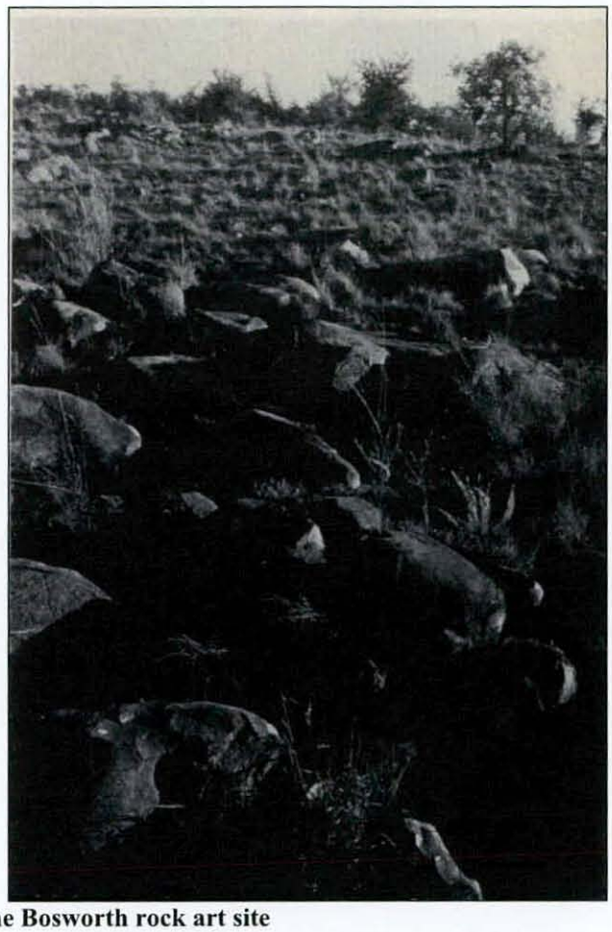


Figure 4: The extent of the Bosworth rock art site

8. Assessment of Impacts

The impact of the proposed development on the survey area has a high level of intensity with regard to both the proposed PV panels and the substation. The development will also not only affect the ground surface put also below ground due to trenching and various building activities. The impact is long-term and permanent.

9. Management (Mitigation) Measures

The cultural landscape in and around Klerksdorp is not only complex but it also has a deep time depth. The area is multi-layered with several compounding aspects:

- The town and surrounding area have a long period of development and western occupation
- Several features and events associated with the Second Boer War are known in the area
- Iron Age settlements occur in the area along or near the Vaal River
- Stone Age sites (including rock art) are known to occur in the area

Although the survey area might have been exposed to secondary impacts of the surrounding development activities it is recommended that a Heritage Impact Assessment (field survey) be conducted to verify if any settlements, structures, features or artefacts occur in the area.

10. Recommendations and Conclusions

The region surrounding Klerksdorp has a multi-layered cultural heritage component which stretches from the Later Stone Age up to historic times. It is therefore recommended that a Phase 1 Heritage Impact Assessment be conducted.

However, also note the following:

It should be kept in mind that archaeological deposits usually occur below ground level. Should archaeological artefacts or skeletal material be revealed in the area during prospecting and mining activities, such activities should be halted, and a university or museum notified in order for an investigation and evaluation of the find(s) to take place (***cf.* NHRA (Act No. 25 of 1999)**, Section 36 (6)).

Please note that cultural heritage resources are non-renewable and that this report conveys results from a desktop (predictive) study. Most of the impacts can be mitigated by conducting a proper Phase 1 Heritage Impact Assessment. During such a study sites that have been identified in this report can be recorded, documented (surveyed) and also mitigated.

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Addendum 1: Archaeological Sequence

The table provides a general overview of the chronological sequence of the archaeological periods in South Africa.

PERIOD	APPROXIMATE DATE
Early Stone Age	More than c. 2 million years ago - c. 250 000 years ago
Middle Stone Age	c. 250 000 years ago – c. 25 000 years ago
Later Stone Age (Includes San Rock Art)	c. 25 000 years ago - c. AD 200 (up to historic times in certain areas)
Early Iron Age	c. AD 400 - c. AD 1025
Late Iron Age (Stonewalled sites)	c. AD 1025 - c. AD 1830 (c. AD 1640 - c. AD 1830)

Archaeological Context

Stone Age Sequence

Concentrations of Early Stone Age (ESA) sites are usually present on the flood-plains of perennial rivers and may date to over 2 million years ago. These ESA open sites may contain scatters of stone tools and manufacturing debris and secondly, large concentrated deposits ranging from pebble tool choppers to core tools such as handaxes and cleavers. The earliest hominins who made these stone tools, probably not always actively hunted, instead relying on the opportunistic scavenging of meat from carnivore fill sites.

Middle Stone Age (MSA) sites also occur on flood plains, but are also associated with caves and rock shelters (overhangs). Sites usually consist of large concentrations of knapped stone flakes such as scrapers, points and blades and associated manufacturing debris. Tools may have been hafted but organic materials, such as those used in hafting, seldom preserve. Limited drive-hunting activities are also associated with this period.

Sites dating to the Later Stone Age (LSA) are better preserved in rock shelters, although open sites with scatters of mainly stone tools can occur. Well-protected deposits in shelters allow for stable conditions that result in the preservation of organic materials such as wood, bone, hearths, ostrich eggshell beads and even bedding material. By using San (Bushman) ethnographic data a better understanding of this period is possible. South African rock art is also associated with the LSA.

Iron Age Sequence

In the northern regions of South Africa at least three settlement phases have been distinguished for early prehistoric agropastoralist settlements during the **Early Iron Age** (EIA). Diagnostic pottery assemblages can be used to infer group identities and to trace movements across the landscape. The first phase of the Early Iron Age, known as **Happy Rest** (named after the site where the ceramics were first identified), is representative of the Western Stream of migrations, and dates to AD 400 - AD 600. The second phase of **Diamant** is dated to AD 600 - AD 900 and was first recognized at the eponymous site of Diamant in the western Waterberg. The third phase, characterised by herringbone-decorated pottery of the **Eiland** tradition, is regarded as the final expression of the Early Iron Age (EIA) and occurs over large parts of the North West Province, Northern Province, Gauteng and Mpumalanga. This phase has been dated to about AD 900 - AD 1200. These sites are usually located on low-lying spurs close to water.

The **Late Iron Age** (LIA) settlements are characterised by stone-walled enclosures situated on defensive hilltops c. AD 1640 - AD 1830). This occupation phase has been linked to the arrival of ancestral Northern Sotho, Tswana and Ndebele (Nguni–speakers) in the northern regions of South Africa with associated sites dating between the sixteenth and seventeenth centuries AD. The terminal LIA is represented by late 18th/early 19th century settlements with multichrome Moloko pottery commonly attributed to the Sotho-Tswana. These settlements can in many instances be correlated with oral traditions on population movements during which African farming communities sought refuge in mountainous regions during the processes of disruption in the northern interior of South Africa, resulting from the so-called *difaqane* (or m*fecane*).

Addendum B: Rating structure used for heritage sites

A. GENERAL SITE DESCRIPTION		
B. SITE EVALUATION		
B1. HERITAGE VALUE	**Yes**	**No**
Historic Value		
It has importance to the community or pattern of South Africa's history or precolonial history.		
It has strong or special association with the life or work of a person, group or organisation of importance in the history of South Africa.		
It has significance relating to the history of slavery in South Africa.		
Aesthetic Value		
It has importance in exhibiting particular aesthetic characteristics valued by a particular community or cultural group.		
Scientific Value		
It has potential to yield information that will contribute to an understanding of South Africa's natural and cultural heritage.		
It has importance in demonstrating a high degree of creative or technical achievement at a particular period.		
It has importance to the wider understanding of temporal changes within cultural landscapes, settlement patterns and human occupation.		
Social Value		
It has marked or special association with a particular community or cultural group for social, cultural or spiritual reasons (sense of place).		
Tourism Value		
It has significance through contributing towards the promotion of a local sociocultural identity and can be developed as a tourist destination.		
Rarity Value		
It possesses unique, uncommon, rare or endangered aspects of South Africa's natural or cultural heritage.		
Representative Value		
It is of importance in demonstrating the principal characteristics of a particular class of South Africa's natural or cultural places or objects.		
B2. REGIONAL CONTEXT		
Other similar sites in the regional landscape.		
B3. CONDITION OF SITE		
Integrity of deposits/structures.		

C. SPHERE OF SIGNIFICANCE	**High**	**Medium**	**Low**
International			
National			
Provincial			
Local			
Specific community			
D. FIELD REGISTER RATING			

National/Grade 1 [should be registered, retained]	
Provincial/Grade 2 [should be registered, retained]	
Local/Grade 3A [should be registered, mitigation not advised]	
Local/Grade 3B [High significance; mitigation, partly retained]	
Generally Protected A [High/Medium significance, mitigation]	
Generally protected B [Medium significance, to be recorded]	
Generally Protected C [Low significance, no further action]	
E. GENERAL STATEMENT OF SITE SIGNIFICANCE	
Low	
Medium	
High	
F. RATING OF POTENTIAL IMPACT OF DEVELOPMENT	
None	
Peripheral	
Destruction	
Uncertain	
G. APPLICABLE LEGISLATION AND LEGAL REQUIREMENTS	
H. PHOTOGRAPHS	

Appendix I:
Visual Study

PROPOSED VAALKOP PHOTOVOLTAIC SOLAR ENERGY FACILITY

In the City of Matlosana Local Municipality., North West Province

VISUAL ASSESSMENT - INPUT FOR SCOPING REPORT

Produced for:

Kabi Solar

Produced by:

MetroGIS (Pty) Ltd.
PO Box 384, La Montagne, 0184
Tel: (012) 349 2884/5 Fax: (012) 349 2880
E-mail: lourens@metrogis.co.za Web: www.metrogis.co.za

On behalf of:

Savannah Environmental (Pty) Ltd.
PO Box 148, Sunninghill, 2157
Tel: (011) 234 6621 Fax: 086 684 0547
E-mail: karen@savannahSA.co.za Web: www.savannahSA.com

- January 2012 -

CONTENTS:

MAPS:

MetroGIS (Pty) Ltd, specialising in visual impact assessment and Geographic Information Systems, is undertaking the visual impact assessment on behalf of Savannah Environmental (Pty) Ltd, who is preparing an Environmental Impact Assessment report for the proposed project.

Lourens du Plessis, the lead practitioner undertaking the assessment, has been involved in the application of Geographical Information Systems (GIS) in Environmental Planning and Management since 1990.

The team undertaking the visual assessment has extensive practical knowledge in spatial analysis, environmental modeling and digital mapping, and applies this knowledge in various scientific fields and disciplines. The expertise of these practitioners is often utilised in Environmental Impact Assessments, State of the Environment Reports and Environmental Management Plans.

The visual assessment team is familiar with the "Guidelines for Involving Visual and Aesthetic Specialists in EIA Processes" (Provincial Government of the Western Cape: Department of Environmental Affairs and Development Planning) and utilises the principles and recommendations stated therein to successfully undertake visual impact assessments. Although the guidelines have been developed with specific reference to the Western Cape province of South Africa, the core elements are more widely applicable.

Savannah Environmental (Pty) Ltd appointed MetroGIS (Pty) Ltd as an independent specialist consultant to undertake the visual impact assessment for the proposed Photovoltaic Solar Energy Facility. Neither the author, or MetroGIS will benefit from the outcome of the project decision-making.

1. INTRODUCTION

Kabi Solar is proposing the establishment of a Solar Energy Facility (SEF) on a site about 8 km north east of Orkney, within the City of Matlosana Local Municipality in the North-West Province.

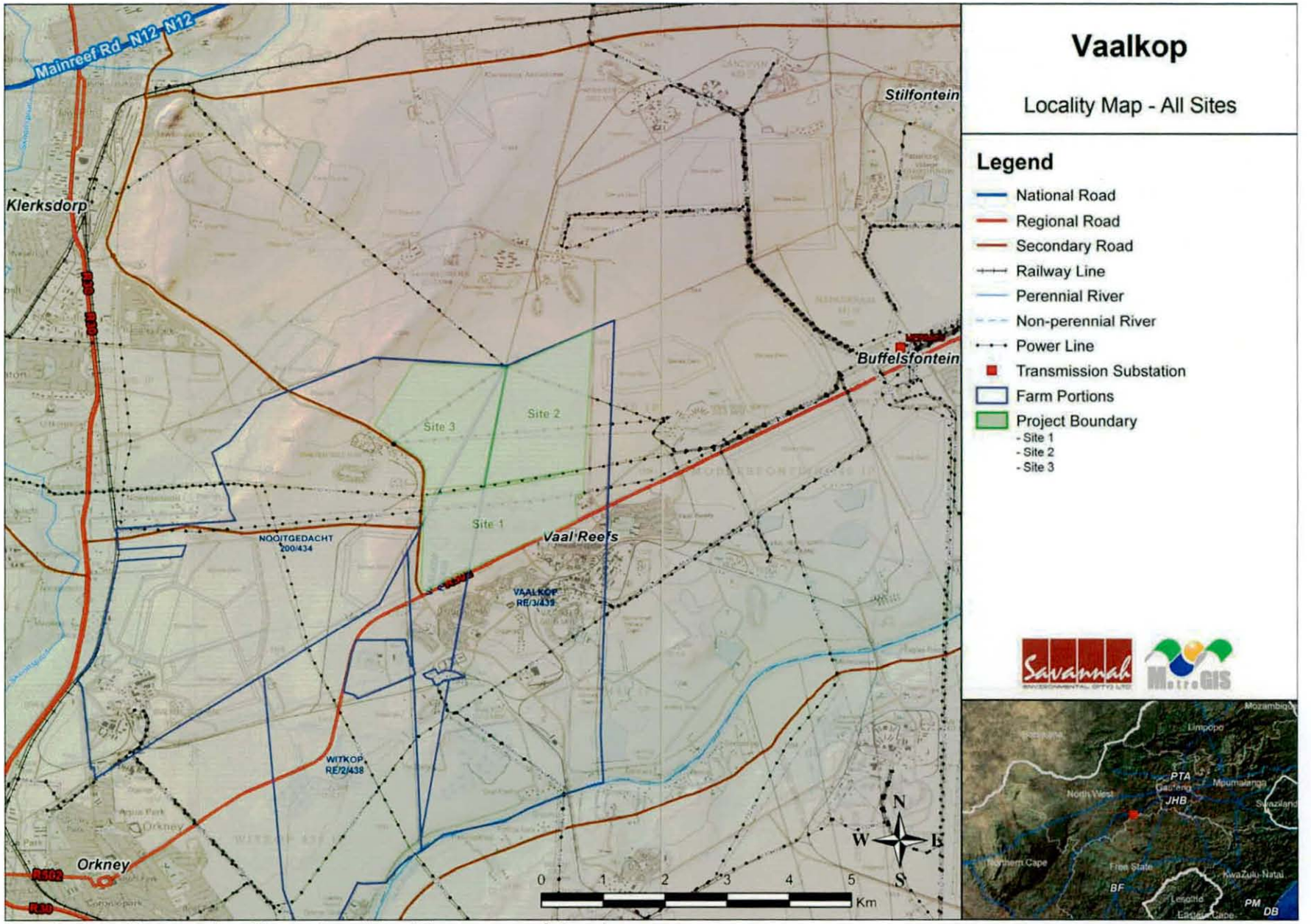
The company intends to utilise photovoltaic (PV) technology to construct an alternative energy generation facility with a total generating capacity of ~225 MW.

The project is proposed to be developed in four phases, with a total area of 778 ha, and will be located on an area comprising the following properties:

portion 7 of Farm Vaalkop 439 IP,
a portion of Farm Vaalkop 439 IP,
a portion of Portion 3 of Farm Vaalkop 439 IP, and
a portion of Portion 200 of Farm Nooitgedacht 434 IP,

These properties represent a large area and include several mines at places. The proposed development will occur in the north-eastern part of this area, as is indicated on **Map 1**.

The exact location for each of the four phases, and detailed layout with regard to the positioning of PV panels and infrastructure, is not known. For the purpose of this report the planned SEF is being dealt with in terms of all four phases, thereby simulating a worst case scenario.



Map 1: Locality map for Site 1, 2 and 3 of the proposed development.

The proposed PV Solar Energy Facility will consist of a photovoltaic (PV) solar energy component as well as associated infrastructure. A formal layout of the SEF has not yet been finalised, but infrastructure is likely to include the following:

- An array of photovoltaic solar panels;
- An onsite substation
- Underground cabling between the PV panels;
- Invertor(s);
- A power line that is likely to connect to the Hermes substation, 6km east of the site;
- An administrative building;
- Internal access roads; and
- A workshop area for maintenance and storage.

2. SCOPE OF WORK

The scope of work for the proposed SEF includes a scoping level visual assessment of the issues related to the visual impact. The scoping phase is the process of determining the spatial and temporal boundaries (i.e. extent) and key issues to be addressed in an impact assessment.

The main purpose is to focus the impact assessment on a manageable number of important questions on which decision-making is expected to focus and to ensure that only key issues and reasonable alternatives are examined.

The study area for the visual assessment encompasses a geographical area of 24x32 km (the extent of the maps displayed below) and includes a minimum 6km buffer zone from the boundaries of the proposed development area.

3. METHODOLOGY

The study was undertaken using Geographic Information Systems (GIS) technology to undertake spatial analyses and mapping. Being a desktop study, information retrieved from the maps, as well as information received from the client with regard to the type of development, will be analysed.

The procedure utilised to identify issues related to the visual impact includes the following activities:

- The sourcing of relevant spatial data. This includes contour lines, cadastral features, vegetation types, land cover, etc. These datasets were sourced from various data custodians, including the Land Surveyor General, the Directorate National Geo-spatial Information and Eskom.
- The creation of a detailed digital terrain model (DTM) of the potentially affected environment using 20m interval contours. Due to the extensive mining activity in the area, large surface components such as slimes dams and waste rock dumps have been built into the DTM.
- Performing a viewshed analysis from the proposed development area in order to determine the visual exposure and the topography's potential to absorb the potential visual impact. The viewshed analysis takes into account the placement and vertical dimensions of the proposed structures.
- The identification of sensitive environments upon which the proposed facility could have a potential impact.

This report (scoping report) sets out to identify the possible visual impacts related to the proposed SEF.

4. ANTICIPATED ISSUES RELATED TO VISUAL IMPACT

Solar energy generation is generally considered to be an environmentally friendly electricity generation option. Anticipated issues related to the potential visual impact of the SEF are few and expected to be insignificant, owing to the extreme nature of transformation in the area where mining development has transformed the topography and sense of place to a large degree. The level of visual absorption capacity of these developments is to be determined on a site visit during the EIA phase of the project.

The issues relating to visual impact that have been identified thus far, include the following:

- The visibility of the facility to, and potential visual impact on, observers travelling along main and secondary roads within the study area, specifically the roads abutting the development area.
- The visibility of the facility to, and potential visual impact on towns and residential areas affected by visual exposure, especially Orkney.
- The visibility of the facility to, and potential visual impact on holiday resorts and other tourist facilities or places of leisure along the Vaal river.
- The potential visual impact of the facility on aircraft approaching or taking off from the airfield north of the site in terms of the reflection of sunlight from the solar panels.
- The potential visual impact of ancillary infrastructure (i.e. power line, administrative building, internal access roads and workshop) on observers in close proximity to the proposed facility.
- The potential visual impact of operational, safety and security lighting of the facility at night on observers residing in close proximity of the facility.
- Potential visual impacts associated with the construction phase.
- The potential of the landscape, having been transformed by mining activity, to visually absorb the appearance of the PV panels and ancillary infrastructure.
- The potential to mitigate visual impacts and inform the design process.

It is envisaged that the issues listed above may constitute a visual impact at a local scale.

These anticipated visual impacts should be assessed in greater detail during the EIA phase of the project as this report is only focussed on defining the potential visual exposure of the proposed development and identifying the potential issues associated with the visibility of the development.

5. THE AFFECTED ENVIRONMENT

Regionally, the site is located in an extensive mining area, and is surrounded by several mines and towns. The main towns are Orkney, Stilfontein and Klerksdorp, with the latter being a major regional centre.

Mines occur in a dense pattern around the site. As indicated on **Map 2**, discard rock dumps and slimes dams of the Vaal Reef Gold Mine are located in close proximity to the development area (within 1.5km).

Infrastructure in terms of roads and power lines is well developed in the area. Roads include the N12 national road, the R502 and a number of secondary roads. The proposed development site is bordered by roads on the southern and western boundaries. At least five power lines intersect the development site, with others criss-crossing the study area in all directions. The Eskom Transmission Hermes Substation is located approximately 6 km east of the site.

The Klerksdorp aerodrome is located 4km north of the development site.

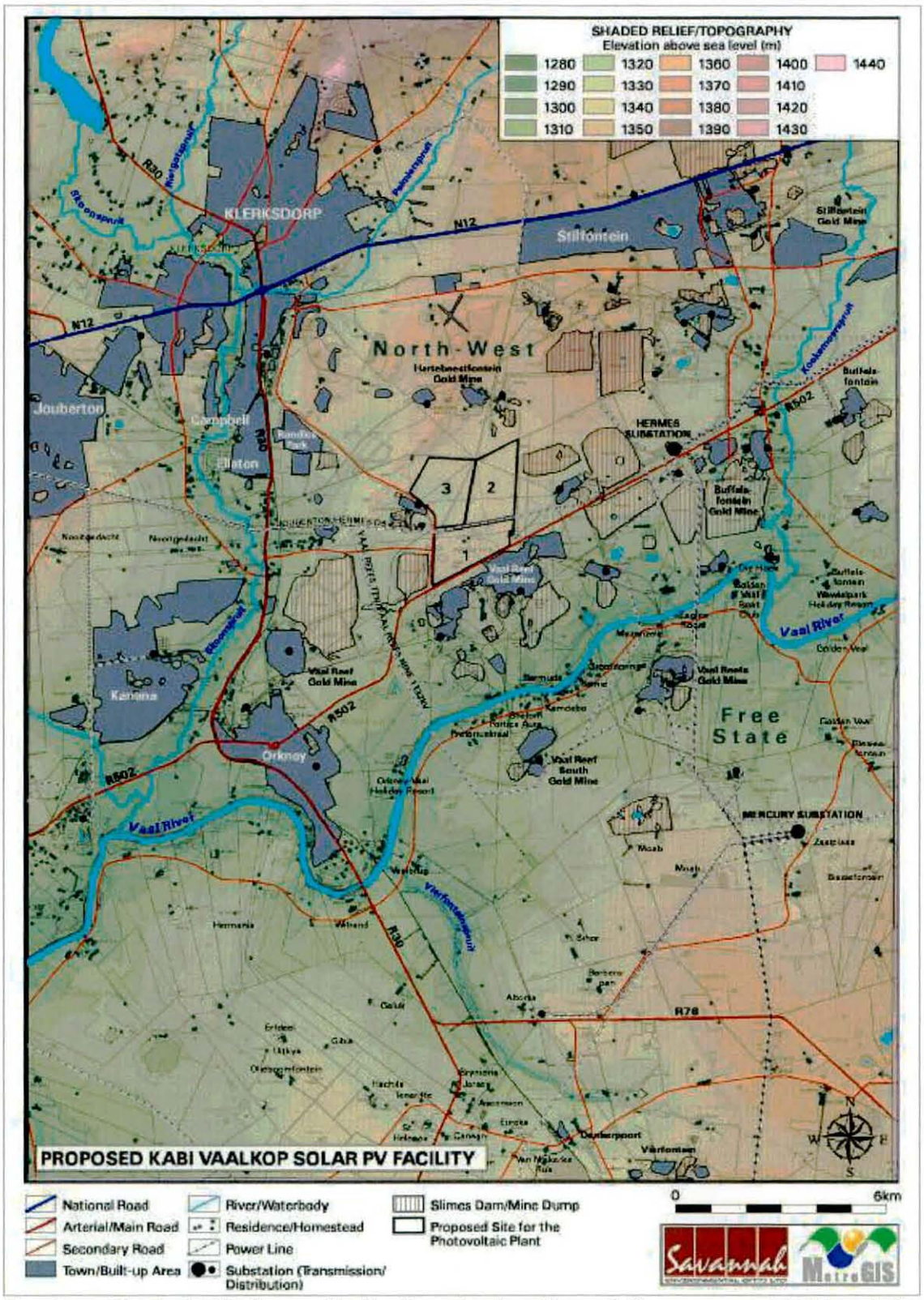
The topography is characterised by generally flat land with a few low lying ridges and koppies. The sense of place of the area is dominated by the large number of slimes dams and waste rock dumps that have altered the topography substantially by virtue of their large footprint and vertical dimensions.

The Vaal River with a number of tributaries, such as Koekemoerspruit and Skoonspruit are the main hydrological features in the area.

Development in the study area is dominated by mining, which is the major economic force for development in close-by towns. The population density in towns is high, with more than 1000 people per km². Whereas towns such as Orkney and Stilfontein exist mainly as mine towns, Klerksdorp has grown into a major regional centre, providing secondary and tertiary services to a large geographical area, including the wider agricultural community.

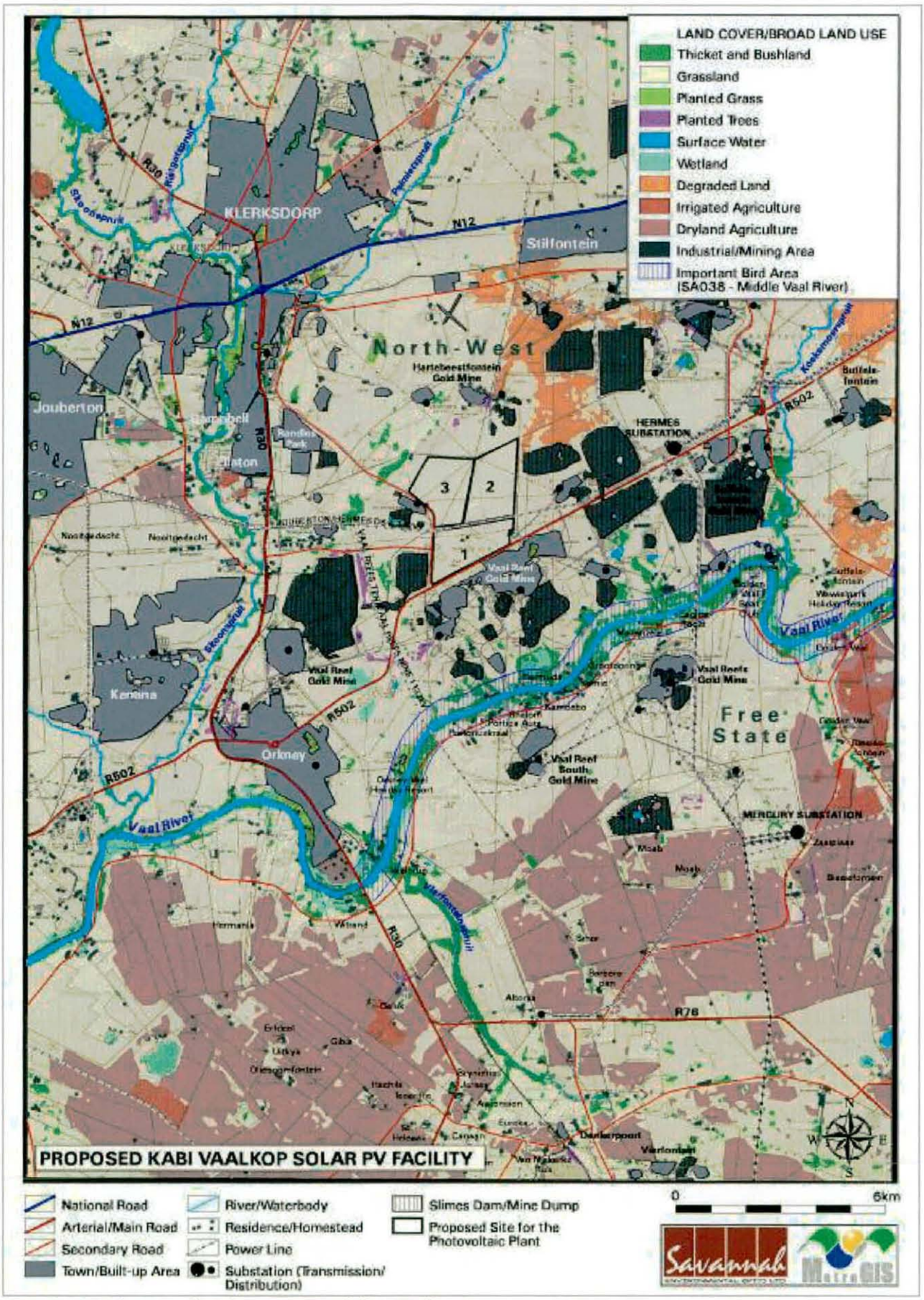
Farming activities are limited to areas outside of mining land, and include mainly areas north of the N12 national road and south of the Vaal River, where cultivation (primarily maize) is predominant.

Potential sensitive receivers are possibly found in residential areas of towns in the study area. Farmsteads that might be influenced by possible visibility are only located in the southern part of the study area, but because of distance, the level of exposure of the homesteads to all phases of the SEF will be low.



Map 2: Shaded relief map (indicating the location of the proposed SEF and the topography and elevation above sea level) of the study area.

The vegetation in the region is largely grassland and thicket with limited visual absorption capabilities (refer to **Map 3**).



Map 3: Land cover/land use map of the study area.

There are no formally protected areas. A few holiday resorts are located adjacent to the Vaal River, which are generally associated with leisure and water sports / activities. The level of exposure to the SEF from these facilities will be determined during the EIA phase of the project.

6. POTENTIAL VISUAL EXPOSURE

The result of the preliminary viewshed analysis for the proposed SEF is shown on the map overleaf (**Map 4**). The initial viewshed analysis was undertaken at offsets of 4m above average ground level (i.e. the approximate maximum height of the PV structures).

This was done in order to determine the general visual exposure of the area under investigation, simulating the proposed structures associated with the SEF. It must be noted that the viewshed analysis does not include the effect of vegetation cover. However, the effect of large structures such as slimes dams and waste rock dumps has been modelled by incorporating the elevation data of these into the digital terrain model (DTM).

The viewshed analysis was based on a provisional zone identified for the development of the PV structures on site. Once a final layout of the SEF is completed, the viewed analysis will be regenerated and refined to reflect the visual exposure of the development according to its actual position in the landscape. This will be undertaken during the EIA phase of the project.

Map 4 indicates the areas from where the SEF will potentially be visible as well as proximity radii from the proposed development area. Due to the topographical characteristics of the area, as well as the existence of slimes dams and dumps with high vertical dimensions, the visibility of each phase of the SEF is restricted to the immediate surrounding (less than 3km) and further concentrated in the southern and western part of the study area (further than 6km). The following is evident from the viewshed analysis:

- Each phase of the proposed SEF has a core zone of potentially high, but limited visual exposure to the site, particularly within **3km** around the site.

  For the most part, this core area includes only mine land. Vaal Reef Gold Mine has a small residential area, which is situated directly south of the development site, with primarily mine workers resident in this area.

  Travellers on the R502 will experience views of the SEF, especially as they drive past south of the development site.

- Potential visual exposure in the medium distance (i.e. between 3km and 6km), is very limited, and will only occur at isolated spots. In the south this zone is dominated by the Vaal River, with a high concentration of residential property, which are mostly unaffected by visual exposure of the SEF. Permanent residents in this area that may potentially be affected are located at Eagles Roost located just south of the Vaal River. A section of the R502 in the south-west will be exposed to the SEF.

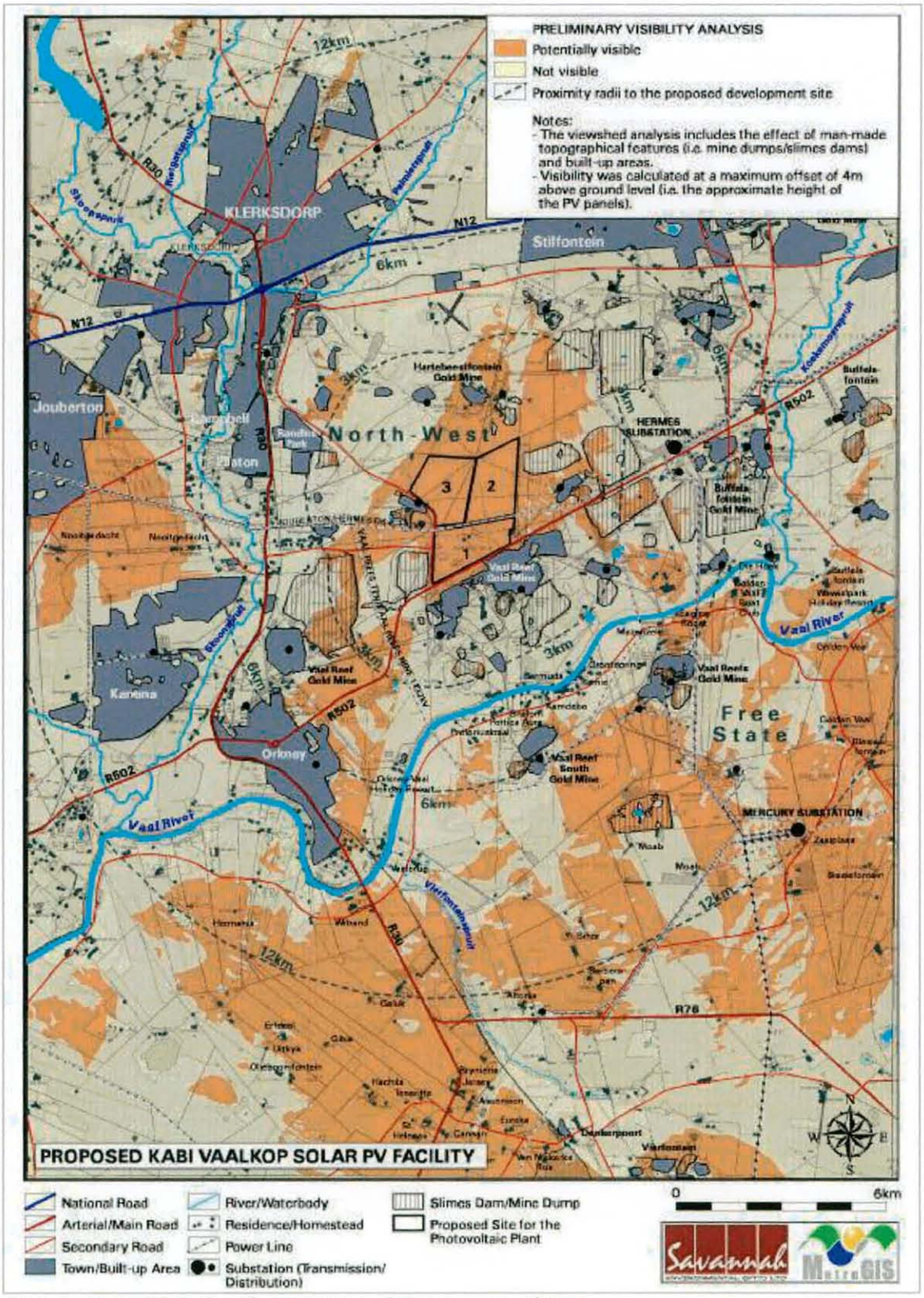
- The potential for visual exposure extends further west and south in the medium to longer distance (i.e. **between 6km and 12km**), and includes the town of Orkney, and a number of farmsteads south of the Vaal river. Visual exposure may also occur in the west, effecting the Nooitgedacht farming area and part of Jouberton.

In the east, a few recreation and holiday resorts are located. This includes the following:

- Golden Vaal Boat Club,
- Wawielpark Holiday Resort,

The following farmsteads south of the Vaal river have been identified in this zone:

- Hermania,
- Witrand,
- Sihor, and
- Golden Vaal.



Map 4: Potential visual exposure of the proposed SEF.

It is envisaged that the proposed facility would be visible to limited numbers of observers in towns, travelling along roads, residing on farmsteads or visiting the region, especially within an 6km radius of the proposed SEF. It must be noted, however, that views of the SEF will most likely also include views of mine components, being it slimes dams, rock dumps, shafts or a combination of these.

Due to the largely transformed and industrialised character of the environment, the facility would constitute a low to moderate visual prominence, with a low probability of it resulting in a visual impact.

7. CONCLUSIONS AND RECOMMENDATIONS

The construction and operation of the proposed Photovoltaic Solar Energy Facility will in all likelihood not have a negative visual impact. Potentially sensitive visual receptors are located within (but not restricted to) a 6km radius of the facility.

The landscape is considered to have little pleasing value in terms of sense of place, mainly due to the transformed and flat landscape with virtual no visual resources of high quality. Views of the landscape are dominated by the appearance of mining related developments, especially extensively large features such as slimes dams and waste rock dumps, which are visible over far distances.

Although the study area is not regarded as a visually sensitive area, the issues as listed in Section 4 above, need to be investigated and confirmed, based on detailed design information with regard to the layout of the facility (the positions and orientation of PV panels, buildings and ancillary infrastructure). It is therefore recommended that additional spatial analyses be undertaken in order to create a visual impact index that will further aid in determining potential visual impact. Inputs from the public participation process would also be required to confirm the author's assessment of the landscape in terms of visual quality.

Specific spatial criteria need to be applied to the visual exposure of the proposed facility in order to successfully determine visual impact and ultimately the significance of the visual impact. In this respect, the Plan of Study for EIA is as follows:

- **Determine Visual Distance/Observer Proximity to the facility**

  In order to refine the visual exposure of the facility on surrounding areas/receptors, the principle of reduced impact over distance is applied in order to determine the core area of visual influence.

  Proximity radii for the proposed development site are created in order to indicate the scale and viewing distance of the facility and to determine the prominence of the facility in relation to their environment.

  MetroGIS determined the proximity radii based on the anticipated visual experience of the observer over varying distances. The distances are adjusted upwards for larger facilities and downwards for smaller facilities (i.e. depending on the size and nature of the proposed infrastructure). MetroGIS developed this methodology in the absence of any known and/or acceptable standards for South African solar energy facilities.

  The proximity radii (calculated from the boundary lines of the farm) are as follows:

  - 0 - 3km. Short distance view where the facility would dominate the frame of vision and constitute a high visual prominence.
  - 3 - 6km. Medium distance view where the facility would be easily and comfortable visible and constitute a moderate visual prominence.
  - 6 - 12km. Medium to longer distance view where the facility would become part of the visual environment, but would still be visible and recognisable. This zone constitutes a low visual prominence.
  - Greater than 12km. Long distance view of the facility where it could potentially still be visible though not as easily recognisable. This zone

constitutes a very low visual prominence for the facility where any views of it will be regarded as insignificant.

- **Determine Viewer Incidence/Viewer Perception**

  The number of observers and their perception of a structure determine the concept of visual impact. If there are no observers, then there would be no visual impact. If the visual perception of the structure is favourable to all the observers, then the visual impact would be positive.

  It is therefore necessary to identify areas of high viewer incidence and to classify certain areas according to the observer's visual sensitivity towards the proposed SEF and its related infrastructure.

  It would be impossible not to generalise the viewer incidence and sensitivity to some degree, as there are many variables when trying to determine the perception of the observer; regularity of sighting, cultural background, state of mind, and purpose of sighting which would create a myriad of options.

- **Determine the Visual Absorption Capacity (VAC) of the natural vegetation**

  This is the capacity of the receiving environment to absorb or screen the potential visual impact of the proposed facility. The VAC is primarily a function of the vegetation, and will be high if the vegetation is tall, dense and continuous. Conversely, low growing sparse and patchy vegetation will have a low VAC.

  The digital terrain model utilised in the calculation of the visual exposure of the facility does not incorporate the potential visual absorption capacity (VAC) of the natural vegetation of the region. It is therefore necessary to determine the VAC by means of the interpretation of the vegetation cover, supplemented with field observations.

- **Determine the Visual impact index**

  The results of the above analyses are merged in order to determine where the areas of likely visual impact would occur. These areas are further analysed in terms of the previously mentioned issues (related to the visual impact) and in order to judge the severity of each impact.

The above exercise should be undertaken for each phase of the SEF as well as the ancillary infrastructure.

The site-specific issues (as mentioned earlier in the report) and potential sensitive visual receptors should be measured against this visual impact index and be addressed individually in terms of nature, extent, duration, probability, severity and significance of visual impact.

In addition, cumulative visual impact should be addressed, especially as a three phased development is considered, with subsequent phases adding to the visual clutter of previously erected SEF infrastructure.

Mitigation measures for all identified impacts (if any), and a management plan suggesting possible management actions with regard to the implementation of these, will also be proposed.

8. REFERENCES/DATA SOURCES

Chief Director of National Geo-Spatial Information, varying dates. *1:50 000 Topo-cadastral maps and digital data.*

CSIR/ARC, 2000. *National Land-cover Database 2000 (NLC 2000)*

Department of Environmental Affairs and Tourism, 2001. *Environmental Potential Atlas for the North-West Province (ENPAT North-West).*

National Botanical Institute (NBI), 2004. *Vegetation Map of South Africa, Lesotho and Swaziland (Unpublished Beta Version 3.0)*

Appendix J:
Social Specialist Study

Social Impact Assessment

Scoping Report

PROPOSED KABI VAALKOP SOLAR PV FACILITY ON A SITE NEAR ORKNEY, NORTH WEST PROVINCE

Phase 1: DEA Ref. 12/12/20/2513/1

Phase 2: DEA Ref. 12/12/20/2513/2

Phase 3: DEA Ref. 12/12/20/2513/3

Phase 4: DEA Ref. 12/12/20/2513/4

16 January 2012

Prepared by:

Ms. Marchelle Terblanche

Integrated Rural and Urban Development Expertise (Pty) Ltd t/a INDEX

PO Box 26275
Monument Park 0105
Tel: (012) 346 5307
Fax: 086 6441160
e-mail: marchelle1@vodamail.co.za

Prepared for:

Ms. Karen Jodas

Savannah Environmental (Pty) Ltd

PO Box 148
Sunninghill
2157
Tel: (011) 2346621
Fax: 086 684 0547

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List of Acronyms

DEA	Department of Environmental Affairs
DKK	Dr Kenneth Kaunda
EAP	Economic Active Population
EIA	Environmental Impact Assessment
EIR	Environmental Impact Report
EMP	Environmental Management Plan
I&AP	Interested and Affected Party
IDP	Integrated Development Plan
KOSH	Klerksdorp, Orkney, Stilfontein and Hartbeesfontein
PV	Photovoltaic
SDF	Spatial Development Framework
SIA	Social Impact Assessment
SMME	Small Medium and Micro Enterprise
SPV	Special Purpose Vehicle

1. INTRODUCTION

1.1 INTRODUCTION

Kabi Solar (Pty) Ltd ("Kabi Solar") is proposing to establish a solar photovoltaic (PV) energy facility, as well as associated infrastructure, on a site approximately 8 km north-east of Orkney, in the North West Province. An Environmental Impact Assessment (EIA) has to be done and in order to obtain authorization, comprehensive, independent environmental studies must be undertaken in accordance with EIA Regulations. A Social Impact Assessment (SIA) is required and forms part of the EIA process. The EIA process consists of two phases, namely the Scoping and detailed EIA Phases.

The Scoping phase is primarily a desktop study wherein potential issues / impacts (positive and negative) associated with the proposed development are identified and evaluated, and those issues requiring further investigation through the EIA Phase are highlighted. This Social Scoping report will:

- Describe the socio-economic profile of the region and surrounding communities;
- Provide the findings of the preliminary social assessment undertaken during the Social Scoping Phase;and
- Determine the need and content of future social studies to be undertaken as part of the detailed Social Assessment for the EIA study.

Implementation of the project will take place in four phases and each of these phases will be constructed and operated by a separate Special Purpose Vehicle (SPV).Separate Environmental Authorizations are thus required and as such, each of these four phases has been registered with the National Department of Environmental Affairs under separate applications.

1.2 PROJECT BACKGROUND

The proposed facility is envisaged to make use of photovoltaic technology with a maximum total generating capacity of 225 MW. The study area is considered to be highly desirable for the establishment of a solar PV facility based on several key factors, such as resource, climatic conditions, extent of the site, orographic conditions, availability of land and grid connection. Eskom's Hermes Substation is approximately 6 km east of the site, and the second and third

phases of the facility is proposed to connect directly into the substation via a new distribution power line.

The solar PV facility is proposed to accommodate an array of PV panels with a generating capacity of up to 225MW that will be developed in four phases – one of those phases being the construction of a new 6km powerline from the proposed Vaalkop Substation to Hermes Substation. It is proposed that the solar PV facility be established in this phased approach, with each phase being developed and operated by a separate SPV. The phases proposed are:

Table 1. Proposed phases of the Kabi Vaalkop Solar PV facility.

Phase	Locality / Description	Capacity	Evacuation of power
I	• A portion of Portion 200 of farm Nooitgedacht 434 IP; • A portion of Portion 3 of the farm Vaalkop 439 IP; and • A portion of farm Vaalkop 439 IP.	75 MW	Existing Jouberton – Hermes 132 kV power line that crosses the site via the new on-site substation.
II	• A portion of Portion 3 of the farm Vaalkop 439 IP.	75 MW	Via a new on-site substation and a new proposed power line to connect directly into the Eskom – Hermes Substation.
III	• A portion of Portion 3 of the farm Nooitgedacht 434 IP; and • A portion of farm Vaalkop 439 IP.	75 MW	Via a new on-site substation and a new proposed power line to connect directly into the Eskom – Hermes substation.
	Proposed Vaalkop Substation and power line to connect to the Eskom grid. Located on: • A portion of Portion 3 of the farm Vaalkop 439 IP; and • On a portion of farm Vaalkop 439 IP.	-	A new power line (less than 6km) will connect the new substation to the Hermes – Eskom substation, which lies to the east of the site. The new overhead power line is to be used to evacuate the power from the second and third phases of the proposed development.

Infrastructure associated with each of the three PV facilities will include:

- Solar PV panels;
- Foundations to support the PV panels;
- Cabling between the project components to be laid underground where practical;
- Internal access roads; and
- Workshop area for operations, maintenance and storage.

The overall aim of the design and layout of the facility is to maximize electricity production through exposure to the solar radiation, while minimizing infrastructure, operation and maintenance costs, and social and environmental impacts. The use of solar energy for power generation can be described as non-consumptive use of natural resources, which emits zero

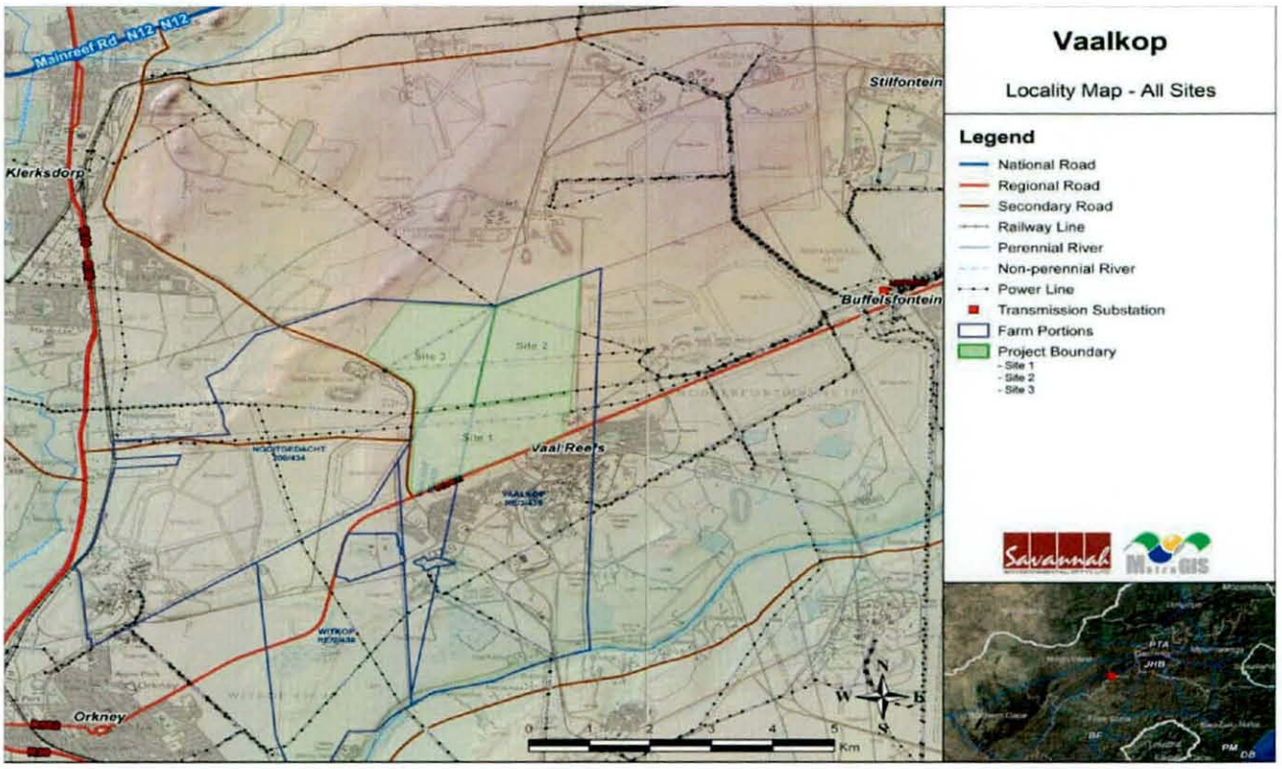
greenhouse gas emissions. The generation of renewable energy contributes to South Africa's electricity generating market, which has been dominated by coal-based power generation.The PV panels will be fixed to a support structure set at an angle so as to receive the maximum amount of solar radiation. The angle of the panel is dependent on the latitude of the proposed facility and the angles may be adjusted to optimize for summer or winter solar radiation characteristics.

Construction is labour-intensive and is estimated to take place over a 24-month period. The PV panels are designed to operate continuously for more than 20 years, unattended and with low maintenance, whereafter it will be decommissioned. The decommissioning phase would take place over a 6-month period and, at this stage, it is unclear whether or not in 20 years time, such decommissioning processes will be labour intensive at all.

1.3 LOCALITY

The study area is situated in the Dr. Kenneth Kaunda (DKK) District Municipality and the City of Motlasana Local Municipality, North West Province. The DKK District Municipality borders the Free State in the south and Gauteng to the west. The facility is proposed on a portion of Portion 200 of farm Nooitgedacht 434 IP, a portion of Portion 3 of the farm Nooitgedacht 434 IP, a portion of Portion 3 of the farm Vaalkop 439 IP and a portion of farm Vaalkop 439 IP near Orkney, which lies approximately 180km from Johannesburg. The site is bordered to the south by the R502 from Orkney.

Figure 1. Locality of the proposed Kabi Vaalkop Solar PV facility.



2. DEFINITION OF A SOCIAL IMPACT ASSESSMENT

A Social Impact Assessment (effects and consequences) can be defined as and includes "the processes of analyzing, monitoring and managing the intended and unintended social consequences, both positive and negative, of planned interventions (policies, programs, plans, projects) and any social change processes invoked by those interventions. Its primary purpose is to bring about a more sustainable and equitable biophysical and human environment." *(International Association for Impact Assessment)*.

SIAs are done to help individuals, communities, as well as government and private-sector organizations understand and anticipate the possible social consequences of proposed project development or policy changes on human populations and communities. SIAs should be done as part of the planning process at the beginning stages of a proposed plan or project, and should therefore alert the planner and the project proponent (through the social assessor) to the likelihood of social impacts.

The scoping process usually takes the social characteristics of the area into account. As part of the data gathering process, the consultants would study and refer to the IDP, Spatial

Development Framework and LED Strategy of the region. Like a biological, physical, or economic impact, social impacts have to be pointed out and measured in order to be understood and communicated to the impacted population and decision-makers.

SIAs provide a realistic appraisal of possible social consequences and suggestions for project alternatives and possible mitigation measures. Social impacts are responsive to perceptions and therefore the intensity and significance thereof could change as and when new perceptions or policy guidelines are formed.

3. METHODOLOGY FOR THE SIA SCOPING PHASE

The broad steps followed as part of the Social Scoping study are outlined below:

3.1 SCOPE OF THE ASSESSMENT

Based on information received from Savannah Environmental, the scope of the assessment was determined. A site visit has taken place to orientate the consultant and determine the potential social impacts that could emerge through the process.

3.2 DESKTOP STUDIES AND LITERATURE REVIEW

Various secondary data sources were used to extrapolate information and to determine and analyze the social and economic characteristics of the study area. Such data included maps, census data, internet searches and municipal documents.

3.3 PROJECTING ANTICIPATED IMPACTS

Preliminary anticipated impacts to be expected during the construction and operational phases have been identified and noted in the Scoping Report.

3.4 REPORTING

Data and information obtained during the above three steps were included and presented as part of the Social Scoping Report.

4. KEY DEMOGRAPHIC INFORMATION

Demographic and economic data of the region and the communities that would be affected by the proposed development is presented in this section of the report.

4.1 LOCAL GOVERNMENT

The City of Motlasana is one of the four municipalities that falls under Dr. Kenneth Kaunda (DKK) District Municipality and comprises the following entities:

- Klerksdorp urban area;
- Stilfontein urban area;
- Orkney urban area;
- Hartbeesfontein urban area; and
- Rural remainder (farms and mining areas).

Executive functions of the local municipality are mainly executed from Klerksdorp. The proposed project is located in Ward 29. Under the new demarcation the old Ward 30 was subdivided to form Wards 28 and 29, and is now known as the Greater Orkney area. Where ever statistics could be obtained, the target community of the Greater Orkney area is described in more detail.

4.2 BRIEF HISTORY AND OVERVIEW

Klerksdorp was founded in 1837 when the Voortrekkers settled on the banks of the Schoonspruit, which flows through the town. It is one of the oldest European (white) settlements of the former province of Transvaal. At almost the same time gold was discovered in the Witwatersrand, gold was also discovered in the Klerksdorp region (1886). The tranquility of the town was shattered by the influx of thousands of fortune-seekers that descended on the small village. However, the nature of the gold reef demanded expensive and sophisticated equipment to mine and extract the gold, causing the majority of diggers to move away in the late 1890s and thus leading to a decline in the gold mining industry. The gold mining industry was revived by large mining companies in 1932, causing the town to undergo an economic revival, which accelerated after World War II.Today Klerksdorp is the hub of the gold and uranium mining industry of the Far West Rand *(www.yourcity.co.za)*.

The town of Orkney was proclaimed in 1940 on the farm Witkoppen, where the owner, Simon Fraser (one of the gold mining pioneers of the 1880s), had first started gold mining. Fraser

hailed from the Orkney Islands, off the coast of Scotland, hence the name of the town *(www.tourismnorthwest.co.za; www.wikipedia.org).*

4.3 Population Dynamics

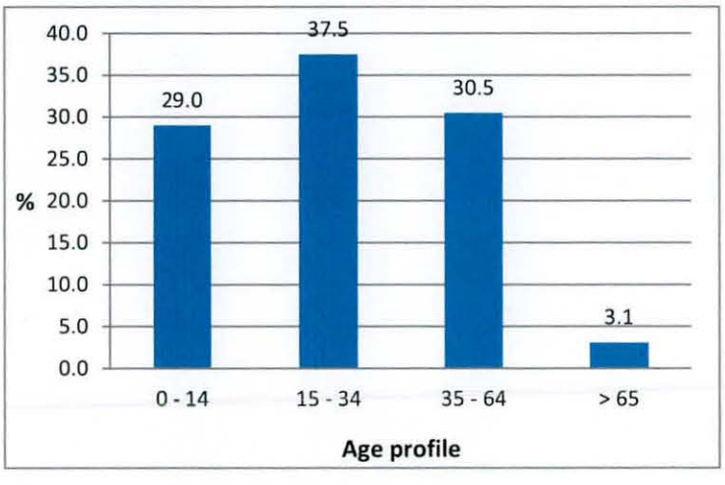
4.3.1 Population growth and settlement patterns

In 2003 the total population for the KOSH-area (Klerksdorp / Orkney / Stilfontein / Hartbeesfontein) was calculated at 517 781, of which 95% is spatially concentrated in urban areas. Only 4% of the population is living in rural areas (3,6% live on farms and 0,4% in rural villages)*(Klerksdorp SDF, 2010).*

The 2008 population was estimated at 555 457 and with a population growth rate of 1,125% (1,3% in the urban areas and 0,95% in rural areas) the City of Motlasana's population could today be as high as 574 415. This growth is lower than a typical African society but still implies pressure on the future economic development and infrastructure and service delivery of the area.Despite a general decrease in the overall in-migration of the North West Province (according to the North West Spatial Development Framework, 2002), the Motlasana Municipality, and in particular Klerksdorp, proves to be the most popular attraction in the province for both local and international migrants. This trend of densification (migration and urbanization) is characterized by poverty and unemployment due to a declining mining output.

4.3.2 Age and gender profile

Figure 2. Age profile of Ward 30 (old demarcation) *(Census 2001).*



The gender profile of the area displays an almost equal (49,6% male and 50,4% female) ratio, which correlates with the rest of the provincial profile *(Klerksdorp SDF, 2010).*

In Motlasana 34% of the population is either younger than 18 years or older than 65 years of age and are, in other words, economically inactive (30% are younger than 18 years of age and 4% older than 65 years).

This suggests a large dependency ratio on the current labour force which ultimately implies specific challenges to be faced in the area in terms of job creation for the future (in an already declining economy together with the rise in unemployment) and the pressure on the provision of social facilities (schools, crèches, hospitals and old age homes).

The age profile of the Greater Orkney area is reflected in Figure 2. The majority of the population in this ward (68%) is between 15 and 64 years of age. Great pressure is thus placed on government and the private sector to absorb the available labour force within the local economy.

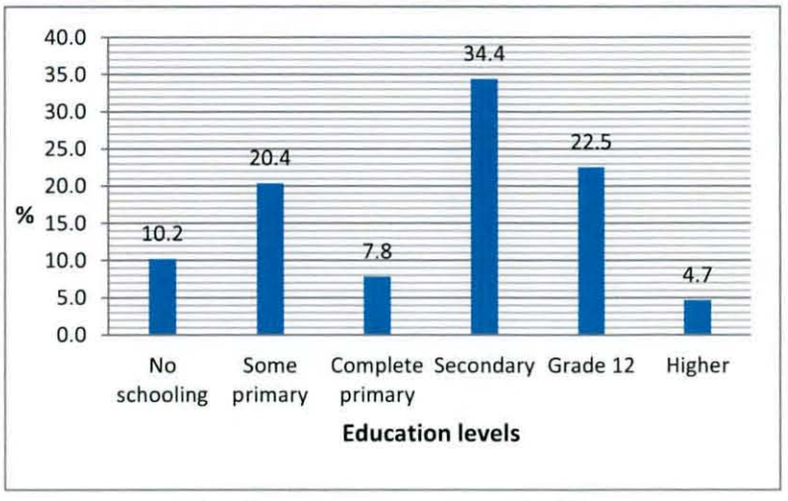
4.3.3 Racial profile

The majority of the population in the affected wards is African (76,7%), followed by Whites (22,6%). A very small number of Coloured and Indian people reside here *(Statistics SA, Census 2001)*.

4.3.4 Education and skills profile

The literacy rates in the City of Motlasana have shown a slight general improvement of 7% over a 5 year time period (from 60% in 1996 to 72% in 2001) *(Klerksdorp SDF, 2010).*

Figure 3. Education levels of people 20 yrs and older in Ward 30 (old demarcation).



The education levels in Ward 28 and 29 (previously Ward 30) have also improved between 1996 and 2001. The number of people with a Grade 12 education has increased with 90,6% and those with a tertiary education with 3,15% during this period *(Statistics SA, Census 2001)*. Education levels of people 20 years and older are reflected in Figure 3.

4.4 ECONOMIC ANALYSIS

4.4.1 Unemployment

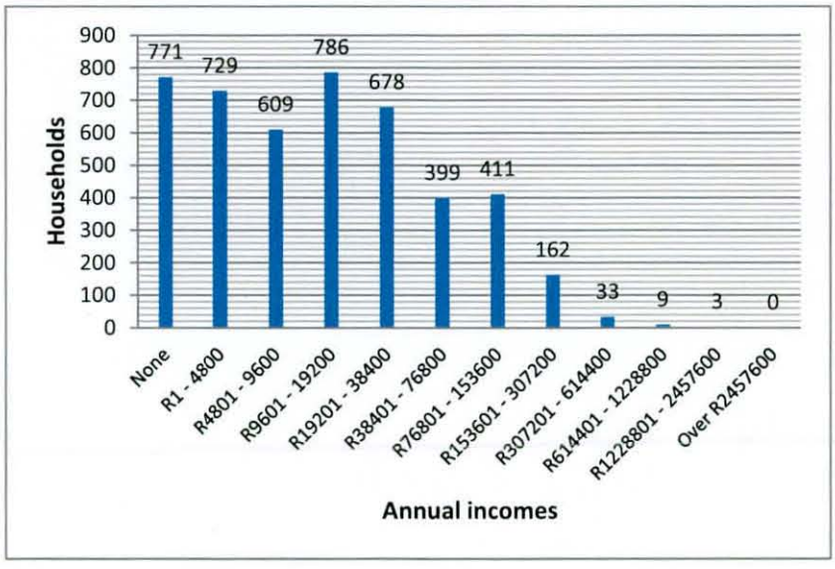
Unemployment rates in the DKK District (with specific reference to Klerksdorp) are not as drastic compared with the rest of the North West province, although it remains an important issue as the poverty gaps between population groups are increasing. Unemployment has increased by 15% between 1996 and 2001. The drastic decrease in mining employment (41% in 1996 and 23% in 2001) is undoubtedly a major determinant in the rise of unemployment in the district *(Klerksdorp SDF, 2010).*

Unemployment in the Greater Orkney area was estimated at 38,7% in 2001 (a 22,7% increase since 1996) and the Not Economic Active (NEA) portion of the population (persons between 15 and 65 years not actively seeking employment) has remained the same at 37% *(Census 2001).*

4.4.2 Incomes and poverty analysis

Income levels in the Klerksdorp area slightly decreased between 1997 and 1998 as well as between 2000 and 2001. However, the DKK district still remains above average compared to the North West province and experienced an overall increase in income levels since 1996. There are, however, still clear challenges to address regarding inequalities in income distribution.

Figure 4. Annual household incomes (Ward 30, old demarcation) *(Census 2001).*



Ward 28 and 29's household incomes (previously Ward 30) are reflected in Figure 4. More than 63% of the households in the affected wards survive on less than R1600 per month *(Statistics SA, Census 2001).* Many of these households support six or more family members. According to Census 2001 statistics the number of households with no income has increased with 7,3% between 1996 and 2001. This does not, however, seem accurate, as

nationally there has been a general increase in the number of families that access government social grants. However, incomes in the Greater Orkney area are very low with obvious inequalities in the poverty gap and income distribution.

4.4.3 Local economy

The composition of the DKK District's economy is dominated by the mining industry (refer Table 2). While the rest of the South African economy is increasingly less dependent on the primary sector, the district is to a large extent still dependant on this sector, which is characterized by low-skilled, resource intensive production.

Table 2. Economic composition of Dr Kenneth Kaunda District.

Sector	Percentage
Primary sector (mining and agriculture)	34%
Secondary sector	11%
Tertiary sector	55%

(Source: Klerksdorp SDF, 2010)

Together with Rustenburg, the City of Motlasana (and specifically Klerksdorp) forms the economic heart of North West Province. It is still one of the hubs of the South African gold mining industry, although there has been a significant decline in mining since 1996. In addition, it is expected to be a large uranium producer in the future. The district is also a major player in South African agriculture, with maize, sorghum,groundnuts and sunflowers as the most important crops cultivated here. The area is further known for its Sussex cattle herds *(www.yourcity.co.za)*. This dependence on the primary sector makes the district more volatile to the risk of an external shock in the economy than the rest of the province *(Klerksdorp SDF, 1020).*

Apart from the primary sector, Klerksdorp is also positioned as a notable medical, retail and education centre for North West Province and Northern Free State. Shares of trade and government have increased slightly since 1996, whereas manufacturing and construction seem to have maintained a constant share over the 1996 to 2001 period.

The City of Motlasana has, however, reflected a negative growth rate of 3,65% (1996 to 2001) and is thus listed as one of the negative economic performers in the North West province. As noted in the previous sections, the Municipality is one of the most densely populated areas in the province with huge poverty gaps. In addition to the high in-migration levels,

unemployment and large poverty gaps, other challenges that stifles economic development in the City of Motlasana include:

- Inadequate flexibility in terms of economic base (mainly dependent on primary activities such as mining and agriculture);
- A lack of innovative economic opportunities; and
- A lack of skills development and ways to uplift the population.

4.5 HOUSING

According to the Housing Department of the City of Motlasana the current demand for housing in Orkney town now stands at 4 232 stands with the current predicted population growth rate *(Klerksdorp SDF 2010).*

4.6 COMMUNITY FACILITIES

4.6.1 Educational

The number of educational facilities in the City of Motlasana is listed below:

Table 3. Educational facilities in the City of Motlasana.

Level of education	Number of facilities				Total
	Klerksdorp	Orkney	Stilfontein	Hartbeesfontein	
Pre-primary / Crèche	50	33	12	5	100
Primary school	25	14	13	3	55
Secondary school	14	5	4	1	24
Technical school	1	1	0	0	2
Private schools	2	0	0	1	3
Special schools	2	0	0	0	2
Tertiary institutions	2	0	0	0	2
TOTAL	96	53	29	10	188

(Source: Klerksdorp SDF, 2010)

There is an average of between 34 and 38 learners per classroom, reflecting the inadequate school infrastructure and insufficient number of teachers.

4.6.2 Health

The following table indicates the existing health care facilities in the Municipality.

Table 4. Existing Health Care Facilities in City of Motlasana.

Level of care	Classification	Influence sphere	Number of facilities			
			Klerksdorp	Orkney	Stilfontein	Hartbees-fontein
1	District Hospitals	50 km	3	1	1	0
2	Regional & Provincial Hospitals	25 km	2	0	0	0
3	Clinics	5 km	7	4	5	3
TOTAL			12	5	6	3

(Source: Klerksdorp SDF, 2010)

An ambulance service is available in Orkney, Klerksdorp and Stilfontein.

4.6.3 Public Safety and Emergency

In terms of public safety and emergency, a total of seven police stations are located in the City of Motlasana area, of which two are in Orkney.

There is one fire brigade that is situated in the centre of Orkney town, and a total of five stations service the wider municipal area *(Klerksdorp SDF, 2010)*.

4.6.4 Sport & recreation

The area is relatively well serviced with regards sport and recreation facilities. Orkney has three permanent, three mobile and three depot libraries, seven sport grounds, 91 open spaces and eleven community halls *(Klerksdorp SDF, 2010)*. The current condition of these facilities has not been determined at this stage.

The Harry Oppenheimer stadium, situated in close proximity north of the proposed development site, is a popular sports field for some of the bigger schools' athletics competitions and was originally considered as one of the host cities for the 2010 FIFA World Cup.

4.7 TRANSPORT

The major transport links in the City of Motlasana are road based infrastructure. The main links are:

- The N12 national road, the R30 linking with Ventersdorp in the north and with the Free State Province in the south, as well as the R503 linking with Lichtenburg and Mafikeng.
- The rail line through Klerksdorp to Johannesburg and Kimberley, which is mainly used as a long distance passenger line. The railway line also branches off to Hartbeesfontein and Ottosdal mainly as a freight line.
- A local airfield consisting of two gravel and one asphalt runways that also serves Klerksdorp.

Public Transport mobility is provided through public transport services i.e. taxis operating on taxi routes, busses operating on bus routes and trains on the rail network according to timetables. Taxis are currently the dominant public transport mode in Klerksdorp and for most of the public transport users are the only public transport mode available. Taxis are served by 31 ranks within the municipal area of which 25 are informal and six formal ranks *(Klerksdorp SDF, 2010)*.

4.8 CRIME AND SAFETY

In comparison to other major towns and cities in South Africa, Klerksdorp and surrounds are still considered one of the safer locations in the country. The latest crime statistics for Orkney Police Precinct (April 2003 to March 2011) indicates a general decline in contact crimes (crimes against a person, such as murder, sexual crimes, assault and common robbery). Stock-theft has remained relative unchanged and burglaries (at residential and non-residential premises) have also shown a slight decline over this same period. Drug-related and commercial crime has increased substantially *(www.saps.org.za)*.

4.9 HIV / AIDS

Approximately 30% of deaths in the North West Province in the year 2000 were AIDS related. Over four in ten deaths in children under 5 years old were due to HIV/AIDS and HIV/AIDS deaths were also exceptionally high in young adult men and women *(Burden of Disease Research Unity, 2000)*.

A broad range of interventions are required, including improved access to health care, promotion of a healthy lifestyle and ensuring that basic needs such as water and sanitation are met. Social cohesion needs to be fostered to ensure safe and caring communities.

4.10 TOURISM AND LEISURE

The City of Motlasana is extremely rich in terms of cultural heritage resources and boasts five provincial heritage sites in Klerksdorp (there are 48 provincial heritage sites located in the North West Province). These five heritage sites include the following *(Klerksdorp SDF, 2010)*:

- Rock engravings in Bosworth and Doornhoek;
- Station building and flag room in Delver Street;
- Fountain Villa (dwelling house) in Hendrik Potgieter Street;
- Iron House 13 and 15 in Convent Avenue; and
- The Dutch Reformed Mother Church in Anderson Street.

The region is an outdoor adventurer's paradise, offering hiking trails, mountain biking trails, canoeing, white water rafting, mountain climbing, abseiling and so forth. Lodges along the Vaal River afford some of the best angling and fly-fishing opportunities in South Africa. Some of the culture-historical sites, attractions and nature reserves in the DKK District Municipality are listed below *(www.tourismnorthwest.co.za; www.sa-venues.com):*

- Klerksdorp Museum and Hartbeesfontein Museum;
- Oudorp hiking trail, a 12 km long trail that winds its way through the oldest parts of Klerksdorp town;
- *Goudkoppie* (Gold Hill), Klerksdorp's latest tourist attractionsituated near both the N12 highway and the Johannesburg-Cape Townrailway line;
- Klerksdorp Mine Tours;
- Historical cemetery;
- Faan Meintjies Nature Reserve, Bloemhof Dam Reserve, Boskop Dam Reserve, Klerksdorp Dam, Vaal River, Orkney Vaal Resort, Bird Sanctuary, Wolwespruit Nature Reserve and a number of other game reserves;
- Likkewaan hiking trails on the banks of the Vaal River;
- Vredefort Dome; and
- Ground Nut Factory, the biggest nut-shelling factory in the Southern Hemisphere.

5. PRELIMINARY IMPACTS IDENTIFIED

At this stage of the SIA process the following potential impacts (positive and negative) have been identified and will be investigated, rated and mitigated in the detailed SIA phase for the proposed Kabi Vaalkop Solar PV facility:

5.1 CONSTRUCTION PHASE

- Employment creation would be a positive impact during the construction phases of the proposed development, which would be intensified if the majority of job opportunities (unskilled, semi- and highly skilled positions) are reserved for locals.
- Skills development, which leads to capacity building, is an important positive impact resulting from the employment process. This would enable temporary employees to find work at similar developments once their contracts have expired.
- As a result of high unemployment levels there is a possibility that an influx of workers will take place as soon as reports of a large infrastructure development project become public knowledge. The local municipality currently experiences high levels of densification (in-migration and urbanization) and the influx of workers attracted by this proposed development could contribute further to this trend. Potential impacts, should an 'outside workforce' remain in the area, could include an increase in the local unemployment base once contracts have expired and additional pressure on infrastructure and services.
- Positive impacts on the local economy are to be expected. Local procurement of goods and services (where possible), contracts with local SMME's and local contractors, an increase in salaries and spending power resulting in positive impacts for local merchandisers (groceries and other consumables) would be advantageous for the local and regional economy. The overall severity of the impact would depend on the developer's policies with regards to local employment and procurement.
- Negative impacts on property values during construction (short-term) are possible, but not likely, as land that surround the site, as well as the properties located in Vaal Reefs, largely belongs to AngloGold Ashanti Ltd.
- Possible visual impacts on Vaal Reefs and motorists on the R502 are possible and a visual impact assessment would be required in this regard.
- Noise and dust impacts during the construction phase are a possibility, as large machinery and construction vehicles would be utilized to transport, construct and assemble structures.
- Impacts on the sense of place of the local community will be investigated and should emerge through the public participation process. This impact is generally more prominent if a proposed development would take place in close proximity to sensitive receptors, which is not the case for the proposed Kabi Vaalkop Solar PV facility.
- An increase in traffic would occur and negative impacts on living and movement patterns could be expected on the R502 and smaller access roads that lead to the site. Damage to the road infrastructure could result, especially since large construction vehicles would be

used to transport infrastructure needed (PV panels, transformers, cables, electrical frames, etc.) for the facility to the site over the 24-month construction period.

- An impact on local emergency and health services could be experienced in the case of construction related accidents and road accidents.
- Safety and security is always a concern in the vicinity of large construction projects. The erection of a construction camp to house the workforce could increase safety and security issues even further. A construction camp is, however, not anticipated at this stage as a local labour force would receive preference.
- Mismanagement of the construction site could result in numerous environmental and social impacts, such as pollution and degradation of the natural environment, health issues for the workforce (lack of clean water and sanitation facilities) and unacceptable social behavior, such as prostitution and short-term relations with locals, resulting in the spreading of HIV/AIDS, unwanted pregnancies and thereby placing pressure on local health facilities and social welfare.

5.2 OPERATIONAL PHASE

- Although limited, a number of permanent employment positions (unskilled, semi- and highly skilled) would be filled during the 20-year operational period. This would include security, site maintenance and cleaning of the modules. From time-to-time temporary employees would be required dependent on the number of cleaning cycles and the duration of the cleaning cycles.
- Skills development and capacity building would result as on-site training is likely. Also, skilled local operators would be sourced for the maintenance of the plant and training would take place in Spain on existing similar plants.
- During the operational phase the facility could contribute indirectly to the local economy by becoming a tourist attraction, and exposing the abundant tourist and leisure amenities of the area to visitors who might not necessarily have been aware of the region's rich history and diverse tourist attractions.
- Once in operation, the solar plant might be visible (negative visual impact) to surrounding properties and from the R502. This impact is closely related to possible impacts on the 'sense of place' of the surrounding area, should the plant permanently alter the visual environment.
- On a regional and national level the proposed facility would have a positive impact by contributing to electricity supply without the negative environmental impacts that are usually associated with coal-fired power stations.

6. GENERAL CONCLUSION

The following conclusions and recommendations can, at this stage, be made regarding the construction and operation of the proposed Kabi Vaalkop Solar PV facility:

- The proposed development will take place in a region that is experiencing a general increase in its unemployment and poverty rates, largely attributed to the decline in the mining sector. The labour force in the City of Motlasana is growing and the area is a victim of densification due to high levels of in-migration and urbanization.
- There are clear challenges to address regarding inequalities in income distribution.
- Positive impacts of the proposed development pertain to temporary and permanent employment creation, skills development and capacity building and impacts on the local economy during the construction and operational phases.
- A number of anticipated negative impacts during the construction period have been identified in the scoping phase, although they are generally short-term in nature and would most likely be responsive to mitigation.
- A negative impact on the 'sense of place' of the local community could materialize, especially if the plant permanently alters the visual impact on sensitive receptors. The Visual Impact Assessment to be done as part of this EIA would identify and investigate this in more detail.
- During the detailed SIA phase the preliminary, as well as additional impacts that emerge through public involvement and through further investigations, will be included, assessed, rated and mitigated, as set out in Section 7 of this scoping report.

7. SPECIALIST SIA STUDY TO BE CONDUCTED DURING THE EIA PHASE

The detailed SIA study will commence once the DEA approves the Plan of Study for EIA.

7.1 FURTHER LITERATURE REVIEW

7.1.1 Baseline analysis

The assessment of secondary data is an effective way to narrow the focus of a social assessment. Such data would include census data, Internet searches, project specific market research and the IDP, SDF and LED Strategy of the City of Motlasana Local Municipality.

7.1.2 Primary Data

The consultant would elaborate on the social setting and characteristics of the study area, as well as the key economic activities. A second site visit would be undertaken to obtain relevant information regarding the social characteristics of the area. As part of the primary data gathering, links would be established with the public participation process that would be done for the EIA phase of this project.

7.2 CONSULTATION AND FIELDWORK

Public participation for the SIA would include interviews with key stakeholders and questionnairesfor the purpose of generating data. In addition, information gathered and social issues identified and verified during the EIA public participation process would serve as key input to the social assessment.

7.3 ANALYSIS OF DATA COMPILED BY PARALLEL STUDIES

Similar studies that were done in the City of Motlasana and the broader region, if any, would be used and the information and results compared with data obtained for this SIA.

7.4 IMPACT VARIABLES TO BE ASSESSED

The following variables are usually assessed within a Social Impact Assessment (Burdge, 1995):

- Population impacts, including population change (ethnic composition, size, etc.), inflow or outflow of temporary workers, presence of seasonal residents and relocation of individuals and families.
- Socio-economic impacts, including job creation, enhanced economic equity, change in employment equity, changes in the industrial/commercial focus of the community.
- Individual and family level impacts, including disruption in daily living and movement patterns, disruption in social networks, introduction of new social classes, tourism and leisure impacts.
- Community/institutional arrangements, such as attitude formation, interest group activity and alteration in size and structure of local government.
- Public health, safety and security impacts.
- Community infrastructure, including changes in community infrastructure, land acquisition and disposal, effects on known cultural, historical and archaeological sites.

- Intrusion impacts, including noise pollution, light pollution, visual pollution, air pollution and malodour pollution.

These impacts relate to the construction and operational phases of the proposed development and would be adapted to guide the specific assessment of the full range of social impacts relevant to the specific project.

7.5 Assessment and Rating of Impacts

To ensure uniformity across the various specialist studies and to facilitate comparison of impacts, the following rating approach would be used as per instruction by Savannah Environmental (lead consultant).

The significance of all potential impacts that would result from the proposed project will be determined in order to assist decision-makers, and is shown below:

Table 5. Significance rating.

CATEGORY	DESCRIPTION
Nature	A description of what causes the effect, what will be affected, and how it will be affected.
Extent	Whether the impact will be local (limited to the immediate area or site of development) or regional. A value between 1 and 5 will be assigned as appropriate (1 = low and 5 = high).
Duration	Where it will be indicated whether: The lifetime of the impact will be of a very short duration of 0 – 1 years: Assigned a score of 1 The lifetime of the impact will be of a short duration of 2 – 5 years: Assigned a score of 2 Medium term of 5 – 15 years: Assigned a score of 3 Long term (> 15 years): Assigned a score of 4 Permanent: Assigned a score of 5
Magnitude	This is quantified on a scale of 0-10, where 0 is *small* and will have no effect on the environment; 2 is *minor* and will not result in an impact on processes; 4 is *low* and will cause a slight impact on processes;

CATEGORY	DESCRIPTION
	6 is *moderate* and will result in processes continuing but in a modified way; 8 is *high* where processes are altered to the extent that they temporarily cease; and 10 is *very high* and results in complete destruction of patterns and permanent cessation of processes.
Probability	The probability of occurrence describes the likelihood of the impact actually occurring. Probability will be estimated on a scale of 1-5, where: 1 is *very improbable* (probably will not happen) 2 is *improbable* (some possibility, but low likelihood) 3 is *probable* (distinct possibility) 4 is *highly probable* (most likely) 5 is *definite* (impact will occur regardless of any prevention measures)
Significance	The significance shall be determined through a synthesis of the characteristics described above and can be assessed as *low, medium or high*. The significance weightings for each potential impact are as follows: < 30 points: Low (i.e. where this impact would not have a direct influence on the decision to develop in the area) 30-60 points: Medium (i.e. where the impact could influence the decision to develop in the area unless it is effectively mitigated) > 60 points: High (i.e. where the impact must have an influence on the decision process to develop in the area) The significance is calculated by combining the criteria in the following formula: S = (E+D+M)P S= Significance weighting E= Extent D= Duration M= Magnitude P= Probability
Status	The Status will be described as *positive, negative, or neutral*.
Reversibility	The degree to which the impact can be reversed.

CATEGORY	DESCRIPTION
Irreplaceable loss of resources?	The degree to which the impact may cause irreplaceable loss of resources.
Can impacts be mitigated?	The degree to which the impact can be mitigated.
Mitigation	Description of mitigation measures.
Cumulative impacts	Identification of cumulative impacts.
Residual impacts	Identification of residual (remaining) impacts after mitigation.

7.6 REPORTING

The SIA Report would, as a minimum, include the following:

- A background description of the social environment including demographic and socio-economic characteristics;
- Linkages with the integrated development planning processes in the area;
- An assessment and rating of the anticipated impacts on the socio-economic conditions – negative and positive (including core aspects needing attention);
- Mitigation measures to enhance the positive and curb and/or alleviate the negative impacts;
- Total social impact of the proposed development; and
- Conclusions and recommendations.

8. ADDENDA

8.1 SOURCES CONSULTED

8.1.1 Documents

- Burden of Disease Research Unity. (2000) South African National Burden of Disease Study: Estimates of Provincial Mortality.
- Klerksdorp Spatial Development Framework (2010).

8.1.2 Web research

www.statssa.gov.za

www.statsonline.gov.za

www.sahealthinfo.org

www.sahistory.org.za

www.saps.org.za

www.socialimpactassessment.net

www.wikipedia.org

8.2 QUALIFICATIONS AND EXPERIENCE OF SPECIALIST

INDEX was formed in 1992 with the aim of providing a professional, technical and project management service that integrates the expertise of its members and of those appointed for specific tasks required for each project. INDEX believes that joint planning and broadly accepted implementation strategies have become the essential ingredients of success in many different arenas. The resent age of environmental and social responsible development demands that natural resources are optimized and that all touched by developments will be consulted. To this end, INDEX uses a 'people oriented' approach that levers the experience, expertise, insights and wisdom of experts and affected parties to create the best possible planning solutions.

The expertise within INDEX has extensive practical experience in environmental planning and natural and social resource management. INDEX has mainly worked in Southern Africa (South Africa, Mozambique, Botswana, Swaziland and Zimbabwe), but has also completed projects in Ghana, Tanzania and Kenya. The structure of INDEX makes provision for a core group of expertise that manages each type of project. However, it also allows flexibility to appoint external support expertise when required.

Ms. Marchelle Terblanche has a BA degree in Development Studies and has participated in numerous social assessment, development and community participation projects since 1994. Her experience as member of a larger team and as independent sub-consultant for engineering and environmental organizations includes human resource assessment and skills analysis, social impact assessments, socio-economic surveys, public participation programmes, awareness campaigns and feasibility studies to predict the impacts of development on social environments. Recent SIA projects she has completed successfully are:

- SIA for the proposed construction of the Wadrift Dam, an off-stream storage dam on the farm Doukama Portions 10 & 13, Bitou Local Municipality, Western Cape Province.
- SIA for the proposed housing development on Rietfontein 115IR (Harry Gwala informal settlement) near Wattville, Ekurhuleni Metropolitan Municipality, Gauteng province.
- SIA for the proposed Coega Ridge Housing Development (46 000 units) north of Motherwell, Nelson Mandela Bay Municipality, Eastern Cape.
- SIA for the proposed development of Laguna Bay Resort and Visitor Centre, Jeffrey's Bay, Eastern Cape.
- SIA and public participation for the proposed Residential development on Portion 76 of the farm Hammanskraal 112JR, Gauteng.
- Public Participation and SIA for the closure planning of the Xstrata Alpha Mine defund operations, Vryheid, KZN.
- SIA for the upgrading of the Wemmershoek Waste Water Treatment Works and the decommissioning of the Franschhoek WWTW and the construction of a transfer and outfall sewer between the two, Western Cape.
- Public participation and Social Scoping for a proposed housing development on various portions of the farm Hansmoeskraal 202, George, Western Cape.
- Social Scoping and public participation for two proposed Medical Waste Processing Plants in City Deep (Johannesburg) and Killarney Gardens (Cape Town).
- Public participation and Social Scoping for the preliminary design for the proposed N12 / Elizabeth Road half diamond interchange, Ekurhuleni Metropolitan Municipality – Gauteng Blue IQ Project.

Appendix K:
Project Maps

Vaalkop

Locality Map - All Sites

Legend

- National Road
- Regional Road
- Secondary Road
- Railway Line
- Perennial River
- Non-perennial River
- Power Line
- Transmission Substation
- Farm Portions
- Project Boundary
  - Site 1
  - Site 2
  - Site 3

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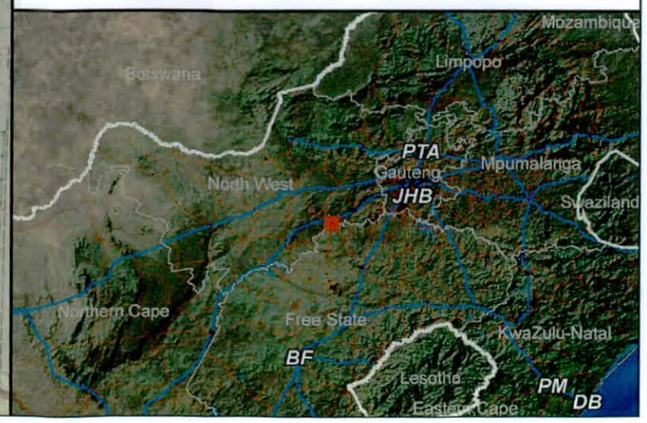
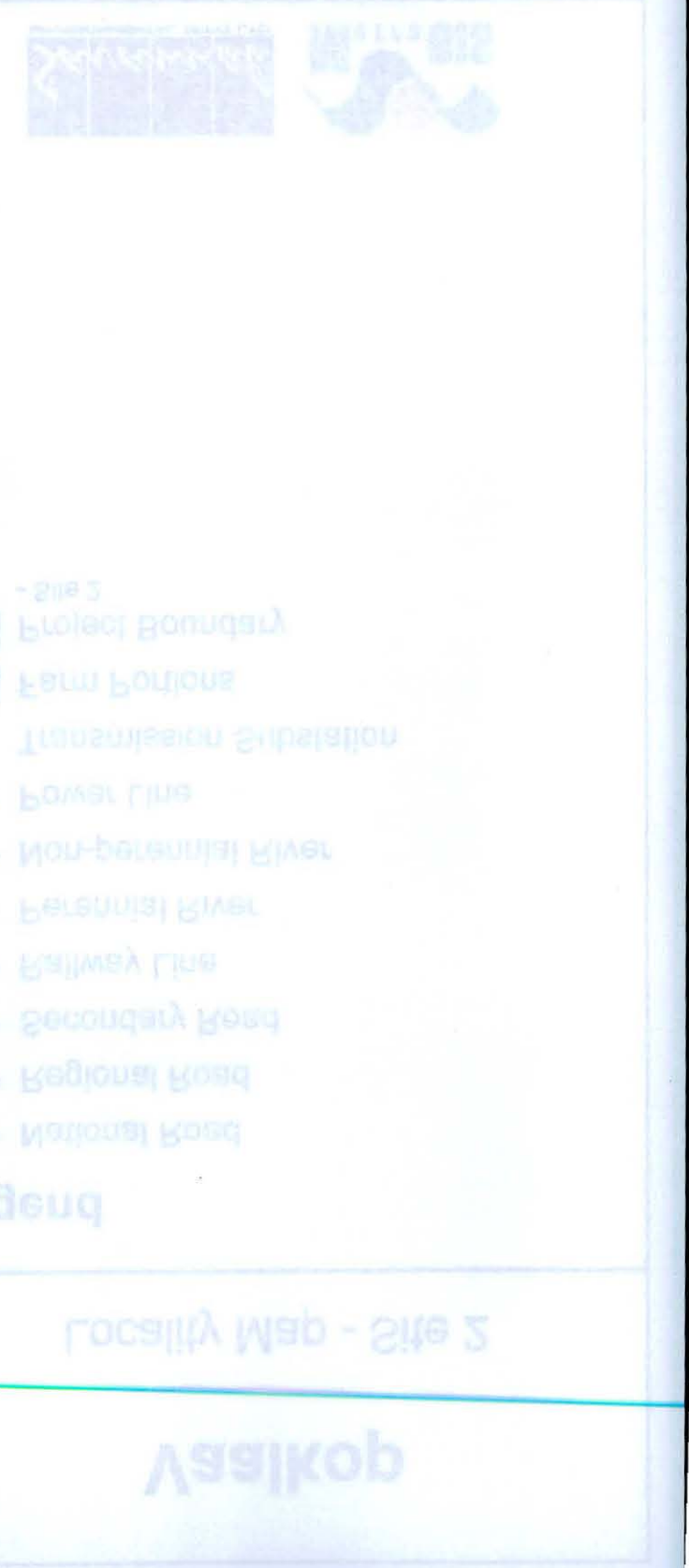
MetroGIS



Mainreef Rd
N12
N12
Klerksdorp
R30
R30
Orkney
R502
R30
Stilfontein
Buffelsfontein
HERMES
Vaal Reefs
Site 1
Site 2
Site 3
NOOITGEDACHT 200/434
VAALKOP RE/3/439
WITKOP RE/2/438
R502
N
W
E
S
0 1 2 3 4 5 Km


Legend
Project Boundary
Farm Portions
Transmission Substation
Power Line
Non-perennial River
Perennial River
Railway Line
Secondary Road
Regional Road
National Road
Locality Map - Site 2
Assikop

Vaalkop

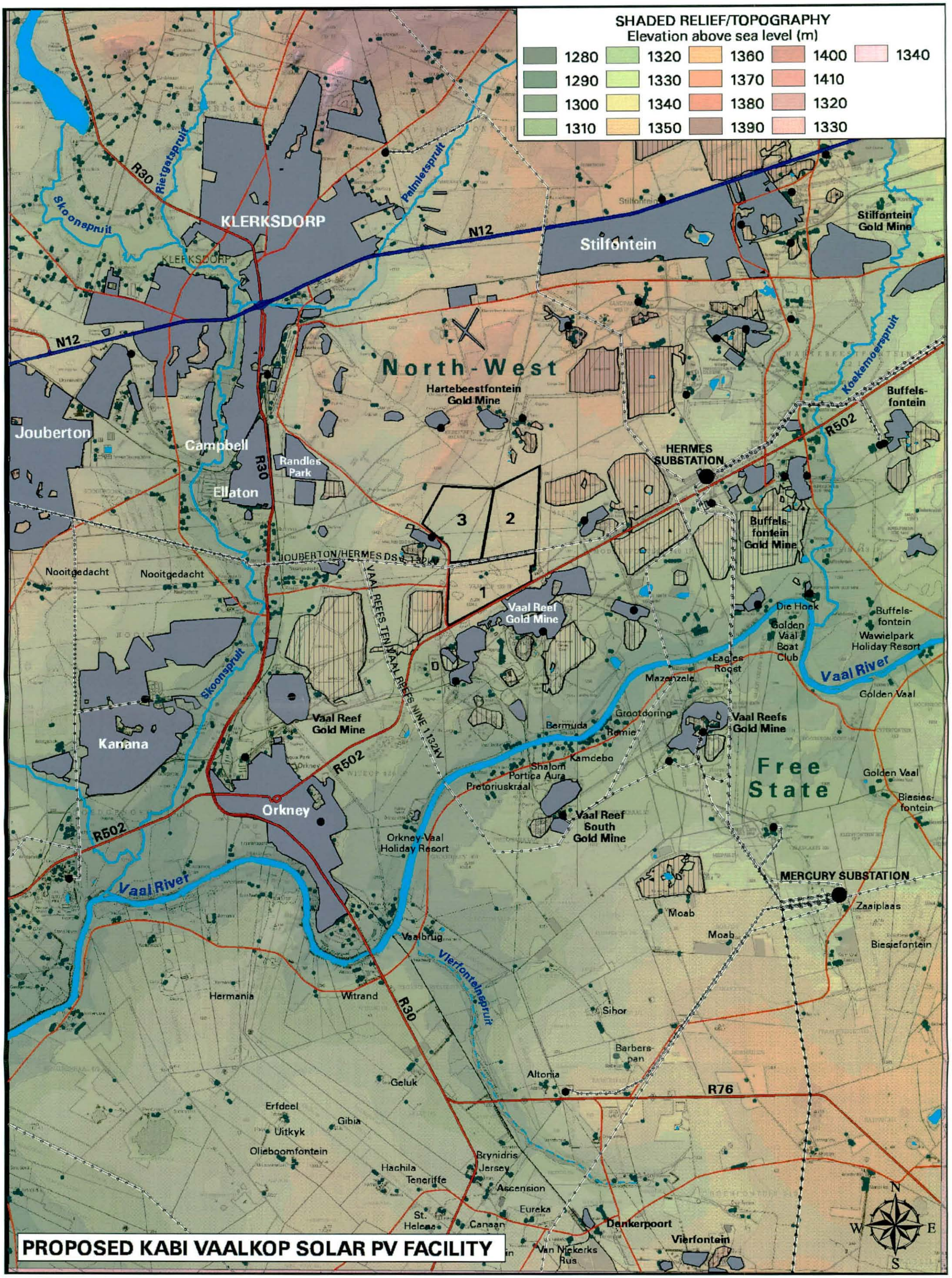
Locality Map - Site 3

Legend

- National Road
- Regional Road
- Secondary Road
- Railway Line
- Perennial River
- Non-perennial River
- Power Line
- Transmission Substation
- Farm Portions
- Project Boundary - Site 3

Savannah Environmental (Pty) Ltd

MetroGIS



PROPOSED KABI VAALKOP SOLAR PV FACILITY

- National Road
- Arterial/Main Road
- Secondary Road
- Town/Built-up Area
- River/Waterbody
- Residence/Homestead
- Power Line
- Substation (Transmission/ Distribution)
- Slimes Dam/Mine Dump
- Proposed Site for the Photovoltaic Plant

0 6km

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PRELIMINARY VISIBILITY ANALYSIS

Potentially visible

Not visible

Proximity radii to the proposed development site

Notes:
- The viewshed analysis includes the effect of man-made topographical features (i.e. mine dumps/slimes dams) and built-up areas.
- Visibility was calculated at a maximum offset of 4m above ground level (i.e. the approximate height of the PV panels).

12km
6km
3km
KLERKSDORP
Stilfontein
Hartebeestfontein Gold Mine
Jouberton
Campbell
Randles Park
Ellaton
North-West
Nooitgedacht
Nooitgedacht
JOUBERTON/HERMES DS
Vaal Reef Gold Mine
Kanana
Orkney
Vaal Reefs Gold Mine
Free State
Orkney-Vaal Holiday Resort
Vaal Reef South Gold Mine
HERMES SUBSTATION
Buffelsfontein Gold Mine
Buffelsfontein
Wawielpark Holiday Resort
Die Hoek
Golden Vaal Boat Club
Eagles Roost
Mazenzele
Golden Vaal
Bermuda
Grootdoring
Remie
Kamdebo
Shalom Portica Aura
Pretoriuskraal
Biesiesfontein
MERCURY SUBSTATION
Zaaiplaas
Moab
Moab
Biesiefontein
Vaalbrug
Hermania
Witrand
Sihor
Barbers-pan
Altonia
Geluk
Erfdeel
Gibia
Uitkyk
Olieboomfontein
Hachila
Teneriffe
Brynidris
Jersey
Ascension
Eureka
St. Helena
Canaan
Denkerpoort
Vierfontein
Van Niekerks Rus
N12
R30
R502
R76
Rietgatspruit
Palmietspruit
Skoonspruit
Koekemoerspruit
Vaal River
VAAL REEFS TEN-MAAL REEFS NINE 132kV
Vierfontein Spruit
1
2
3

PROPOSED KABI VAALKOP SOLAR PV FACILITY

- National Road
- Arterial/Main Road
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- Town/Built-up Area
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- Slimes Dam/Mine Dump
- Proposed Site for the Photovoltaic Plant

0 6km

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