

Executive Summary

Proposed 75 MW Kloofsig Solar PV Energy Facility, Northern Cape – Kloofsig 1 (DEA ref 14/12/16/3/3/2/951) Final Environmental Impact Report

1. Introduction

Kloofsig Solar (Pty) Ltd proposes to develop a solar photovoltaic (PV) energy generation facility and associated infrastructure on the remaining extent (portion 0) of Farm 18, Kalkpoort in the vicinity of Petrusville in the Northern Cape (Figure 2). SRK Consulting (SRK) has been appointed by Kloofsig Solar, as the independent environmental consultants to assess the environmental impacts of the proposed development according in terms of the National Environmental Management Act 107 of 1998 (NEMA) 2014 Environmental Impact Assessment (EIA) Regulations. Due the size of the proposed project, in accordance the NEMA 2014 EIA regulations the proponent needs to apply for environmental authorisation from the Department of Environmental Affairs (DEA) via a Scoping and Environmental Impact Assessment (S&EIA) process.

The proposed development consists of three project phases (Kloofsig 1, 2 and 3) of 75 MW each (with a total power generation capacity of 225 MW), covering a total area of approximately 970 ha. For technical reasons, each phase requires a separate environmental authorisation. Consequently, three separate EIA process are being conducted concurrently for each of these projects. The three phases are described as follows:

- **Kloofsig 1 (the subject of this report)** is at the centre of the site and includes a 132 kV powerline (approximately 8.5 km long) and a substation to enable connection to the grid at the existing 132 kV line running to the south-east of the site. An on-site substation and short connection to the 400 kV powerline crossing the site (this infrastructure will support all phases of the development, should they be developed) is also proposed.
- Kloofsig 2 (DEA ref 14/12/16/3/3/2/952) is on the northern-most portion and includes the on-site substation and connection to the 400 kV powerline crossing the site as described for Kloofsig 1.

- Kloofsig 3 (DEA ref 14/12/16/3/3/2/953) comprises the southern-most portion, connecting to the common infrastructure described above for Kloofsig 1.

*This report presents the findings for **Kloofsig 1**. Similar, and almost identical, reports are also available for Kloofsig 2, and Kloofsig 3. Key differences between these reports are highlighted by means of **bold text**.*

Note that the terms Phase 1, 2 and 3 are used interchangeably with the project names Kloofsig 1, 2 and 3.

2. Approach to the Study

The proposed development is subject to environmental authorisation from DEA in terms of the National Environmental Management Act of 1998. As such, an EIA is required and this Final Environmental Impact Assessment Report (Final EIR) presents an important milestone in the EIA process. An overview of the EIA process is provided in Figure 1.

The first phase of the EIA, the Scoping Study, has been completed, and included a Public Participation Process (PPP), aimed at identifying issues and concerns of interested and Affected Parties (IAPs). The objective of the Scoping Study was to identify those issues and concerns that must be investigated in more detail, and included a Plan of Study for the EIA, which was approved by the DEA on 3 November 2016.

The second phase of the EIA commenced with the Draft Environmental Impact Report (DEIR). The aim of this report was to present the results of investigations of the issues and concerns identified in the Scoping Study, identify and assess the potential impacts of the development and provide recommendations with the objectives of minimising negative environmental impacts and maximising benefits. This report (Final EIR) represents the final version of the EIR and aims to address comments raised on the DEIR.

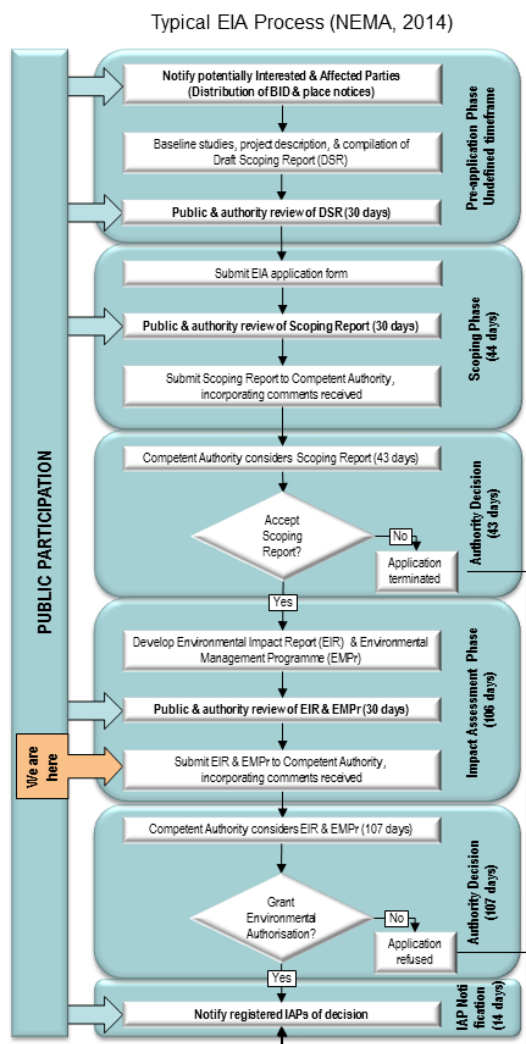


Figure 1: Flow diagram of the EIA Process, indicating when public comment will be solicited

The following activities have been done as part of the Impact Assessment Phase in accordance with the requirements of the NEMA EIA regulations:

- Completion of specialist studies, as per the terms of reference included in the Plan of study for EIA in the Scoping Report and additional requirements of DEA;
- Compilation of a DEIR and distribution for a 30 day comment period;
- Compilation of a FEIR, addressing comments received on the DEIR.

Details of the specialist studies that were completed as part of the EIR are provided in Table 1, and copies of the specialist study reports are included as Appendix G (included in a separate volume of appendices to the DEIR).

Table 1: List of Specialist Studies

Name	Company	Study	Appendix
Prof George Bredenkamp	EcoAgent	Biodiversity (including aquatic study)	Appendix G4
Dr Alan Kemp	Naturalists & Nomads	Avifauna	Appendix G5

Dr John Almond	Natura Viva	Palaeontology	Appendix G3
Ms Madelon Tussenius	Natura Viva	Archaeology	Appendix G2
Dr Garry Paterson	ARC-Institute for Soil, Climate and Water	Agriculture Potential	Appendix G1
Mr Keagan Allan	SRK Consulting	Visual Impact Assessment	Appendix G6
Ms Elena Broughton	Urban-Econ	Socio-economic	Appendix G7
Mr Stefan Schutte	AfriCoast Engineers	Traffic Impact Assessment	Appendix G8

3. Development Proposal

The proposed development (Kloofsig 1) includes a 132 kV overhead powerline (approximately 8.5 km) and a substation to allow connection to the existing 132 kV powerline running to the south-east of the site as well as a 132 kV switching station at the Eskom connection point. An additional on-site substation (converting 132 kV to 400 kV power) and short connection line to the existing 400 kV powerline crossing the site is also proposed, due to uncertainty regarding the future capacity of the 132 kV Eskom line to accept the connection from the proposed project at the time of development (capacity is however currently available). Although authorisation for both of the powerline connections described above is sought, the intention is that only one of these would be developed, depending on the available grid capacity at the time of development. The total footprint of Kloofsig 1 is in the order of 270 ha and includes the 31 m servitude of the 132 kV powerline to the south of the site, as shown on Figure 2.

The main components of the proposed solar energy facility, which will be similar for each of the proposed phases (Kloofsig 1, 2 and 3) are listed as follows:

- Solar panels (fixed or tracking), mounted in arrays/modules, and arranged in clusters;
- Underground low voltage cables linking solar panels within a cluster to an inverter (for converting DC to AC current);
- Substations – a 132 kV collector / step up substation for each phase (covering an area of 1 ha), as well as a central switching substation (covering an area of approximately 12.4 ha) servicing all three phases and allowing for connection to the nearby 400 kV Eskom overhead powerline. Kloofsig 1 will also include a second switching substation to the south-east of the site;
- Underground power lines (of a medium voltage) from inverter substations to a central collector/ step-up substation for each phase;
- A 132 kV above ground powerline with maximum tower height (lattice or monopole) of 24m, connecting the step-up substations with the switching

substations (both on-site and to the south-east of the site for Kloofsig 1);

- A 33kV below ground powerline with Supervisory Control and Data Acquisition (SCADA) (a system for remote monitoring and control) or fibre optics;
- Laydown areas and construction camp, – an laydown area has been set aside for each phase; and
- Offices, ablution facilities, store room- permanent office, ablution and store room facilities will be situated at the 1 ha on-site substation buildings for each phase.

Associated infrastructure includes the following:

- Access roads - Access to the site from the R 369, between Van der Kloof and Orania, is via the existing Kalkpoort gravel road to the northeast of the site. The Kalkpoort gravel road will require maintenance and expansion to extend the road to the southern side of Kloofsig 1. A second access road (approximately 500 m long) to the south of the site, connecting to the existing secondary road running south of the site is also proposed;
- Internal roads - A network of internal roads will be required, and these are envisaged to be 4- 5 m in width;
- Water supply – via existing or new boreholes on the property. The anticipated water demand during construction is 53 m³/day, and 18 m³/day during operation (including provision for fire suppression);
- Wastewater treatment - a septic tank & soak away system is proposed for treating minor quantities of domestic sewage generated during construction and operational phases. If this is not technically feasible, conservancy tank(s) will be installed; and
- Solid waste management – waste streams include construction waste (mainly packaging material), domestic waste, and scrapped equipment (during operation). Where possible this will be recycled, or if necessary disposed of off-site.

The construction phase is expected to take 12 to 18 months to complete. The PV panels are designed to operate continuously for more than 20 years, unattended and with low maintenance, after which the facility would either be decommissioned or refurbished for an additional 20 year operating period.

Cleaning of the panels will be required approximately four times a year, and will require water, including small amount of biodegradable detergent.

Approximately 300 direct employment opportunities will be created during the construction phase (a maximum of 500 workers on site at any time is allowed for), workers for which will be sourced from the surrounding residential areas where possible. During operation, approximately 15 direct employment opportunities will be created. These will consist of permanent security staff as well as operational and maintenance crews, with up to 10 staff being on site at

any time. Staff for the construction and operational phases will not be accommodated on the site.

Materials and equipment will be transported to the site on flatbed trucks to the site, via Petrusville. Between 980 and 1200 standard 40 foot containers will be required, and no abnormal loads are foreseen. The preferred port of import (and shortest distance) will be the Ngqura Harbour near Port Elizabeth, to Petrusville (530km).

Local access roads to the site from Petrusville will be via two route options each approximately 20 km, as shown on Figure 2:

- 1) Northern access - mainly surfaced roads
- 2) Southern access - only gravel roads

For Kloofsig 1, it is assumed that 70% of construction traffic will use option 1 above and 30% will use option 2. During construction, it is anticipated that approximately 10 heavy vehicles and 30 standard vehicle trips per day will be required. During operation of Kloofsig 1 a daily average of 27 light vehicles (including water trucks, standard vehicles and plant) are expected.

Alternatives that were assessed as part of the EIA include:

- Fixed and tracking PV technology alternatives;
- Lattice and monopole overhead powerline masts;
- The no-go alternative (which assumes the site remains in its current state, i.e. agricultural land).

4. Findings and conclusions

The impact significance ratings for the various impacts that were identified, both before and after application of mitigation (for negative impacts) or enhancement (for positive impacts) are summarised in Table 3. Key observations with regard to the overall impact ratings, assuming mitigation measures are effectively implemented, are highlighted as follows:

- The predicted **archaeological impact**, associated with earthworks during the construction phase, is rated as *low* and *negative*.
- The predicted **palaeontological impact**, also associated with earthworks during the construction phase, is rated as *very low* and *negative*.
- The predicted **impacts on agricultural resources**, including **soil erosion** and loss of agricultural land, are rated as *low* and *negative*. The site is noted as having a low carrying capacity for grazing.
- The predicted **impacts on avifauna**, resulting from loss and changes to habitat, disturbance, and negative interactions with powerlines, are rated as *low* and *negative*.
- The predicted **impacts on vegetation**, due to loss of habitat and species, changes in species composition, and pollution, are rated as *medium* (habitat loss) to *insignificant* and *negative*. No plants of special concern were noted for the site.

- The predicted **impacts on fauna**, due to loss of habitat, ecosystem function and species, disturbance, and poaching etc., are rated as *medium* (species loss) to *insignificant* and *negative*.
- The predicted **impacts on watercourses** on and close to the site, due to destruction, sedimentation and pollution, are rated as *insignificant* and *negative*, due to the low ecological value of the watercourses.
- Both positive and negative **socio-economic impacts** are predicted. During construction, *positive* impacts are associated with increases in employment, skills development, local production, household income and government ability to deliver services (due to increased revenue). These are rated as *high to low* significance. During operation, the significance of these impacts increases to *medium to very high* (positive).
- The main predicted *negative* **socio-economic impacts** are associated with loss of agricultural land, and impacts on health, social relations, service delivery, access to social facilities and safety of the local community as a result of in-migration of job seekers and employees to the area. These are predicted to be *medium to insignificant* during construction and *low* during operation.
- The predicted **visual impacts** of the solar panels, are rated as *low* and *negative* during all phases of the development. The predicted visual impacts of the powerlines and substations are rated as *very low* and *negative*.
- The predicted impacts on **air quality** (due to dust) and ambient **noise** during construction and decommissioning is rated as having a *very low* and *negative* significance.
- The predicted impacts resulting from **waste** during construction, operation and decommissioning are rated as having a *very low* and *negative* significance.
- The predicted impacts on **traffic flow and safety** are rated as having a *very low* and *negative* significance during all phases of the proposed development.

A map combining the final layout map superimposed on the environmental sensitivities map showing sensitive areas of the site identified by the various specialists (ecological and archaeological) relative to the site layout is provided as Figure 4.

The fundamental decision is whether to allow a development that is in line with the country's targets with regard to renewable energy sources, which is also in line with global trends. It is also noted that the proposed development is not predicted to pose significant negative environmental or social impacts that cannot be mitigated to acceptable levels, and none of the specialists have noted any fatal flaws relating to the development. Significant positive socio-economic impacts are also predicted to result from the proposed project, and the power generated from the proposed solar facility will contribute towards stabilising the Eskom power supply grid and provide a much needed additional source of power.

With the above in mind, and in terms of meeting the objectives of sustainable development, the EAP is of the view that the DEA should authorise the development of the proposed Kloofsig 1 Solar PV Facility, subject to effective implementation of the mitigation measures and Environmental Management Programme (EMPr) proposed in this EIA (Chapter 7 of the Draft EIR).

Key recommendations, which are considered essential, are:

1. Implement the EMPr to guide construction and operations activities and to provide a framework for the ongoing assessment of environmental performance;
2. Appoint an Environmental Control Officer (ECO) to oversee the implementation of the EMPr and supervise any construction activities in particularly sensitive habitats;
3. Minimise the physical footprint of the development and areas disturbed by construction activities;
4. Obtain other permits and authorisations as may be required, including, but not limited to Water Use Authorisations.
5. The revegetation and habitat rehabilitation plan, alien invasive vegetation management plan, and open space management plan (all included in Appendix H1 of the Draft EIR) must be implemented during the construction and operational phases. Rehabilitation must be undertaken as soon as possible after completion of construction activities to reduce the amount of habitat converted at any one time and to speed up the recovery to natural habitats.
6. The post-construction Avifaunal Monitoring Plan (Appendix H2 of the Draft EIR) must be implemented during the operational phase.
7. The transportation plan (included as part of the Traffic Impact Assessment report in Appendix G8 of the Draft EIR) for the transport of large pieces of equipment, must be implemented (mainly applicable to the construction and decommissioning phases of the development).
8. The Stormwater Control and Erosion Management plan (Appendix H3 of the EIR) must be implemented during the construction and operational phases.
9. The fire management plan (included in Appendix H1 of the EIR) must be implemented during the construction and operational phases.

5. Public Participation

A Public Participation Process (PPP) aimed at allowing the public to be involved in the environmental process is being carried out.

The following PPP activities have taken place as part of the Environmental Impact Assessment Process:

- Distribution of the DEIR to public venues, identified government departments, as well as the distribution of an executive summary to all registered IAPs, and a

provision of a 30 day comment period (10 January – 9 February 2017);

- Responding to all comments received on the Draft EIR by means of a comments and response table in the Final EIR (this report), and where required making amendments in the EIR to accurately reflect responses;
- Submission of the FEIR to the DEA for a decision, and distribution of copies of the report to commenting authorities;
- Notifying all registered IAPs of the submission and distribution of an executive summary (this document).

The following activity is still to be completed:

- Notifying all registered IAPs of the DEA's decision and the appeals process.

A summary of comments and responses raised by IAPs and stakeholders to date as part of the EIA process is provided in Chapter 4 of the Final EIR.

6. The Way Forward

The public participation programme has given IAPs an opportunity to assist with the identification of issues and

Table 2: Activities and Timetable

Stage / activity	Start	End
Submit Final EIR to DEA for a decision	21 February 2017	-
DEA decision making period (legislated timeframe)	21 February 2017	3 June 2017

Table 3: Summary of potential impacts of the proposed Kloofsig 1 Solar PV Facility and associated infrastructure

Impact group		Impact Description	+ / -	Significance - no mitigation	Significance - with mitigation
CONSTRUCTION					
Archaeological		A1: Destruction of archaeological resources	-	Low	Low
Paleontological		P1: Disturbance, damage or destruction of significant fossils	-	Very Low	Very Low
Soil and Agriculture		SA1: Loss of arable land use	-	Low	Low
		SA2: Increased susceptibility to water erosion	-	Low	Low
Avifauna		AV2: Disturbance of birds	-	Low	Very Low
		AV4: Degradation of habitat	-	Medium	Low
Biodiversity and aquatic	Impacts on Vegetation and Flora	EC1: Habitat destruction and loss of plant species	-	High	Medium
		EC2: Loss of red data, protected or other plant species of concern	-	Very Low	Insignificant
		EC3: Change in plant species composition: increase in alien species	-	Low	Low
		EC4: Impact of fuel and chemical spills on vegetation	-	Insignificant	Insignificant
	Impacts on Vertebrate Fauna	EC7: Loss of mammal and herpetofaunal habitat and ecosystem function	-	Medium	Very Low
		EC8: Loss of mammal and herpetofaunal species	-	High	Medium
		EC9: Noise and lighting	-	Very Low	Insignificant
	EC11: Increased human activities, illegal hunting and poaching	-	Very Low	Insignificant	

potential impacts. The Final EIR has incorporated all comments received from IAPs, and will be submitted to DEA for a decision on the proposed development. This Executive Summary of the Final EIR has been distributed to all registered IAPs:

The report can be accessed as an electronic copy on SRK Consulting's webpage via the 'Public Documents' link <http://www.srk.co.za/en/page/za-public-documents>

The Final Environmental Impact Report has been distributed to all relevant authorities and distributed to DEA for a decision regarding environmental authorisation.

All relevant authorities and IAPs registered for the process will be informed as soon as a decision is communicated by DEA.

Note that the intention is for the EIAs for Kloofsig 1, 2 and 3 to run concurrently, with separate but similar reports being issued for each project according to the estimated timeframes indicated below. Authorities and IAPs will therefore be provided with three separate reports for review and comment, and clearly indicate which of the project(s) their comments relate to.

	Impacts on Wetlands and Aquatic Systems	EC12: Destruction of wetland / aquatic habitats			
		Wetland 1	-	Insignificant	Insignificant
		Wetland 2	-	Low	Insignificant
		EC13: Sedimentation into wetlands / aquatic systems			
		Wetland 2	-	Insignificant	Insignificant
Socio-economic	Impact on Natural Capital	SE2: disruption of agricultural activities	-	Very Low	Very Low
	Impact on Human Capital	SE3: Increased employment	+	Low	Low
		SE4: Enhancement of skills and knowledge	+	Low	Low
		SE5: Impact on health (and nutrition) of the community	-	Medium	Low
	Impact on Social Capital	SE6: Impact on social relations	-	High	Medium
		SE7: Impact on Personal Safety and Security	-	Low	Insignificant
	Impact on cultural / spiritual capital	SE8: Change in Sense of Place	-	Low	Low
	Impact on Physical Capital	SE9: Increased local production	+	High	High
		SE10: Impact on Road Infrastructure	-	Low	Very Low
		SE11: Impact on Social Facilities	-	Low	Very Low
SE12: Impact on Basic Service Delivery		-	Low	Low	
Impacts on financial capital	SE13: Increased Household Income and Financial Resources	+	Low	Low	
Impacts on Political and Institutional Capital	SE15: Increased government revenue and ability to service community	+	Medium	Medium	
Visual	V1: Visual Impact of solar panels		-	Medium	Low
	V2: Visual Impact of powerlines		-	Low	Very Low
	V3: Visual Impact of Substations		-	Low	Very Low
Noise	N1: Noise disturbance		-	Very Low	Very Low
Air Quality	AQ1: Impact of dust		-	Low	Insignificant
Waste	W1: Impact of construction waste		-	Low	Insignificant
Traffic	T1: Impact on traffic flows and safety		-	Low	Very Low
OPERATION					
Soils and Agriculture		SA2: Increased susceptibility to water erosion	-	Low	Low
Avifauna	AV1: Effects of development on avian habitat under Solar PV arrays		-	Low	Low
	AV2: Disturbance of birds		-	Low	Low
	AV3: Negative bird-powerline interactions		-	Medium	Low
Biodiversity and aquatic	Impacts on Vegetation and Flora	EC3: Change in plant species composition: increase in alien species	-	Low	Low
		EC4: Impact of fuel and chemical spills on vegetation	-	Insignificant	Insignificant
		EC5: Impact of shading on plant species	-	Medium	Low
Impacts on Vertebrate Fauna	EC9: Noise and lighting		-	Low	Very Low
	EC10: Power lines, collision and electrocution		-	Very Low	Very Low
	EC11: Increased human activities, illegal hunting and poaching		-	Very Low	Insignificant
Impacts on Wetlands and Aquatic Systems	EC12: Sedimentation into wetlands / aquatic systems				
	Wetland 1	-	Insignificant	Insignificant	
	Wetland 2	-	Insignificant	Insignificant	
	Wetland 3	-	Insignificant	Insignificant	

		EC13: Pollution into wetlands and potential to affect water quality			
		Wetland 1	-	Insignificant	Insignificant
		Wetland 2	-	Insignificant	Insignificant
		Wetland 3	-	Insignificant	Insignificant
Socio-economic	Impact on Natural Capital	SE1: Loss of agricultural land	-	Medium	Low
	Impact on Human Capital	SE3: Increased employment	+	High	High
		SE4: Enhancement of skills and knowledge	+	High	High
	Impact on cultural and spiritual capital	SE8: Change in Sense of Place	-	Low	Low
	Impact on Physical Capital	SE9: Increased local production	+	Very High	Very High
	Impacts on financial capital	SE13: Increased Household Income and Financial Resources	+	Medium	Medium
		SE14: Impact on property values	-	Insignificant	Insignificant
Impacts on Political and Institutional Capital	SE15: Increased government revenue and ability to service community	+	Very High	Very High	
Visual	V1: Visual Impact of solar panels		-	Medium	Low
	V2: Visual Impact of powerlines		-	Low	Very Low
	V3: Visual Impact of Substations		-	Low	Very Low
Waste	W2: Impacts due to waste		-	Low	Very Low
Traffic	T1: Impact on traffic flows and safety		-	Very Low	Very Low
DECOMMISSIONING					
Soil and Agriculture	SA2: Increased susceptibility to water erosion		-	Low	Low
Avifauna	AV2: Disturbance of birds		-	Low	Very Low
Visual	V1: Visual Impact of solar panels		-	Medium	Low
	V2: Visual intrusion of turbines		-	Low	Very Low
	V3: Visual intrusion of powerlines		-	Low	Very Low
Waste	W3: Impact due to Waste		-	High	Very Low
Biodiversity and aquatic	Impacts on Vegetation and Flora	EC6: Habitat destruction	-	Medium	Low
		EC3: Change in plant species composition: increase in alien species	-	Low	Low
		EC4: Impact of fuel and chemical spills on vegetation	-	Insignificant	Insignificant
	Impacts on Vertebrate Fauna	EC9: Noise and lighting	-	Very Low	Insignificant
		EC11: Increased human activities, illegal hunting and poaching	-	Very Low	Insignificant
	Impacts on Wetlands and Aquatic Systems	EC12: Destruction of wetland / aquatic habitats	-	Insignificant	Insignificant
		EC13: Sedimentation into wetlands / aquatic systems	-	Insignificant	Insignificant
EC14: Pollution into wetlands and potential to affect water quality		-	Insignificant	Insignificant	
Noise	N1: Noise disturbance		-	Very Low	Very Low
Air Quality	AQ1: Impact of dust		-	Low	Insignificant
Traffic	T1: Impact on traffic flows and safety		-	Low	Very Low

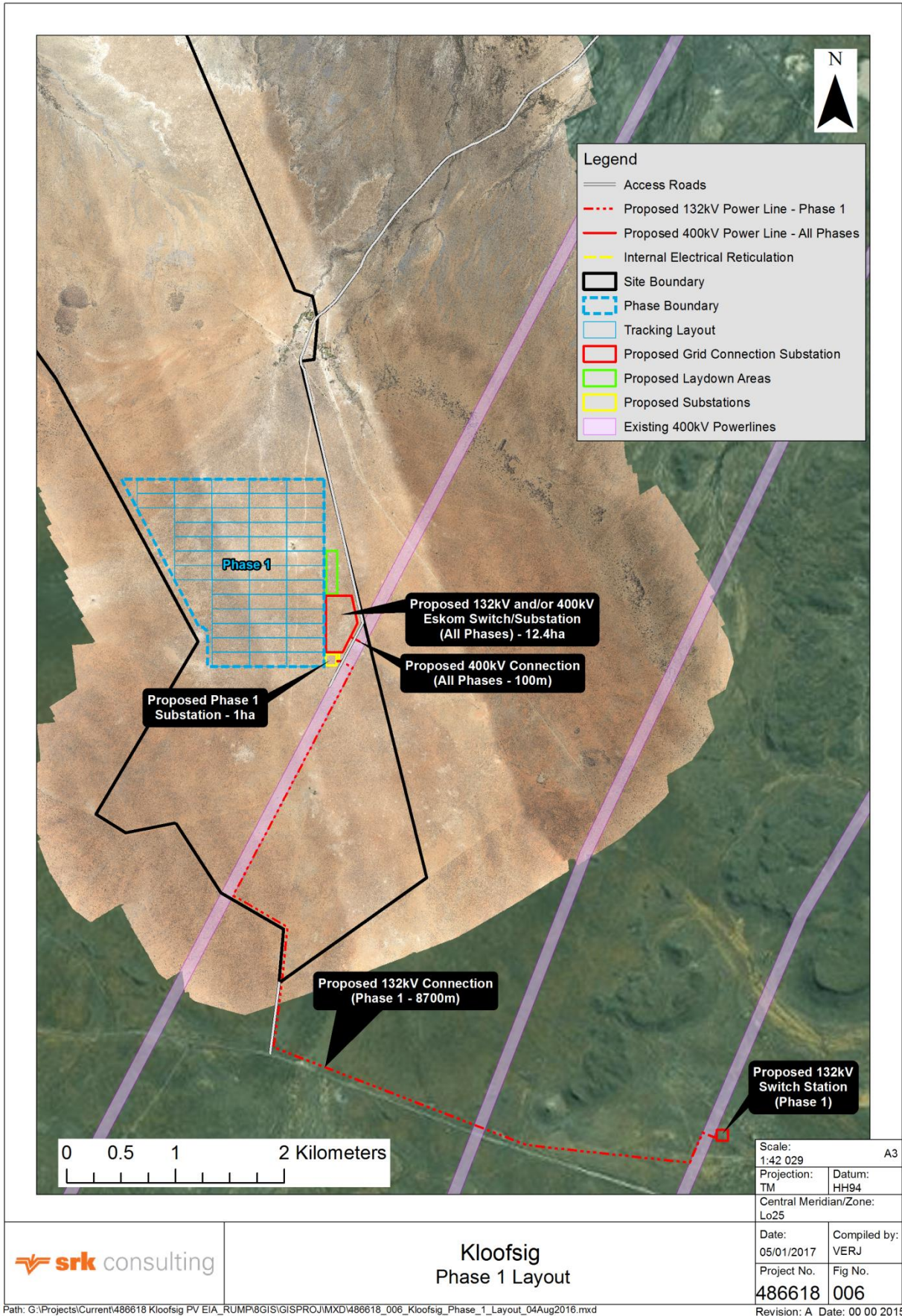


Figure 2: Preliminary layout plan for Kloofsig 1

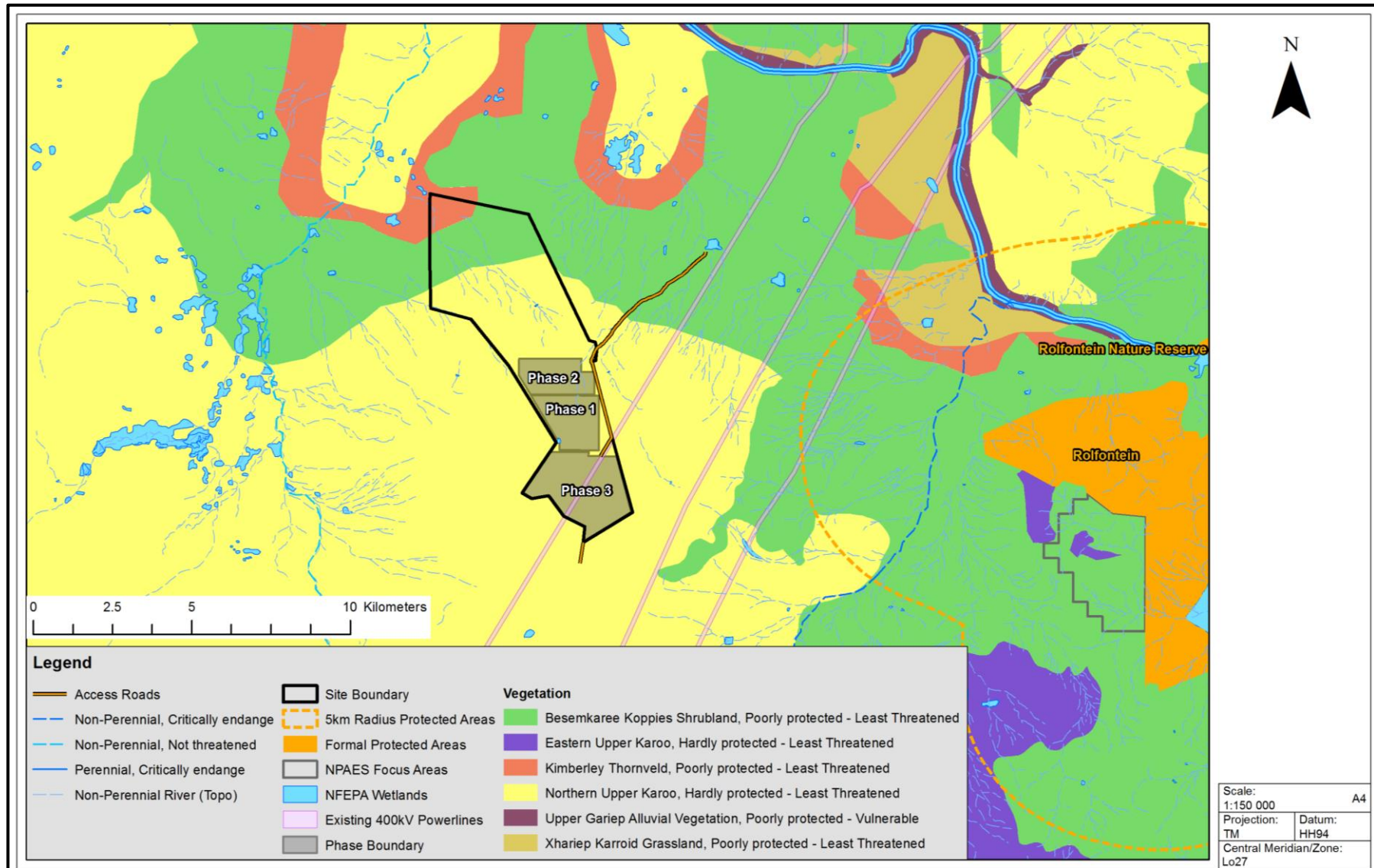


Figure 3: Geographical areas map for Kloofsig 1, 2 and 3, based on BGIS, July 2016

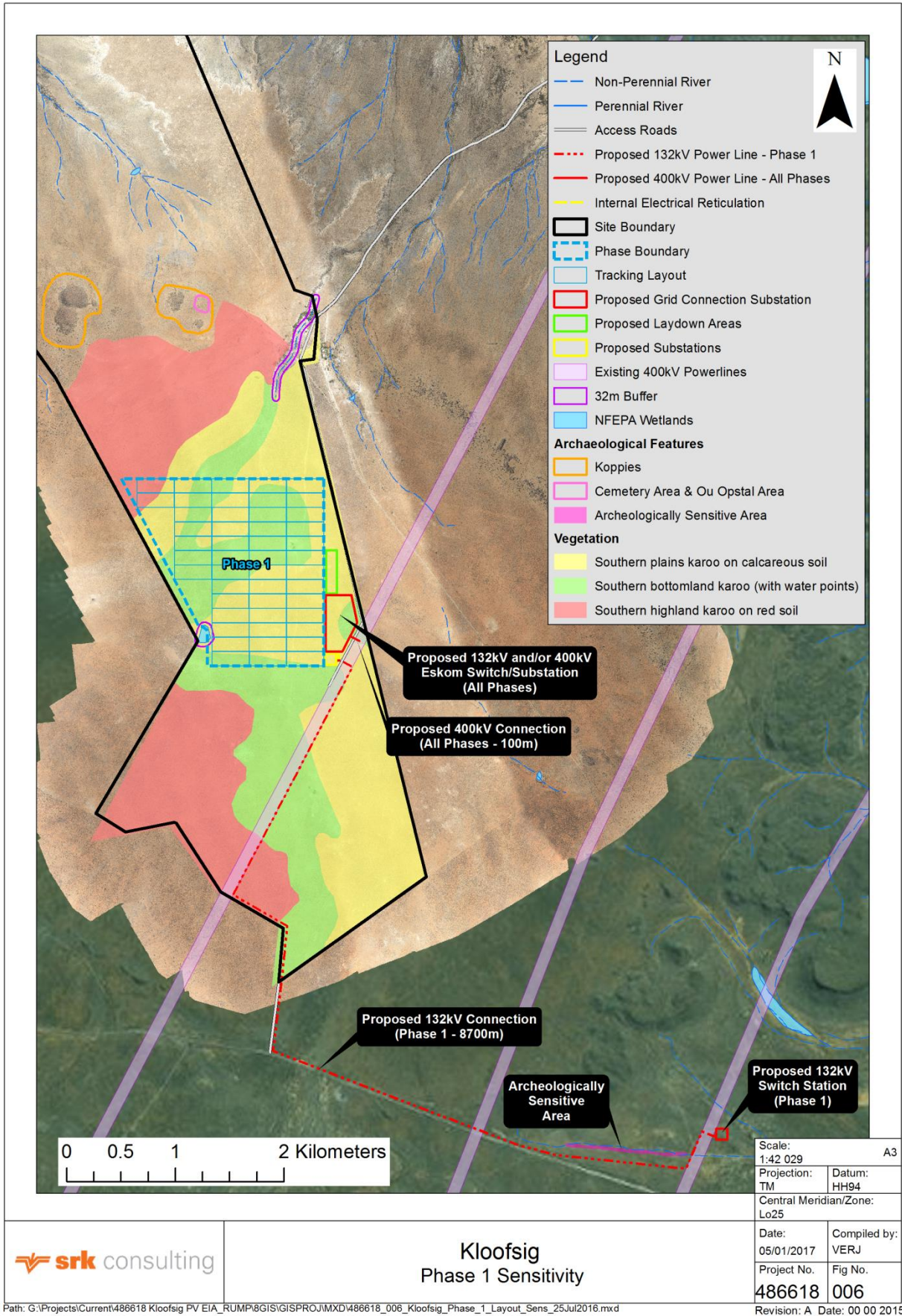


Figure 4: Site sensitivity map for Kloofsig 1