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ENVIRONMENTAL IMPACT ASSESSMENT PROCESS
FINAL EIA REPORT

PROPOSED POFADDER SOLAR THERMAL
PLANT AND ASSOCIATED
INFRASTRUCTURE
NORTHERN CAPE

(DEA REF No: 12/12/20/1832)

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PROJECT DETAILS

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EXECUTIVE SUMMARY

KaXu CSP South Africa (Pty) Ltd (!KaXu CSP) , an Independent Power Producer, proposes to establish a commercial solar energy facility and associated infrastructure to generate electrical power from solar radiation, a renewable form of energy, on a site near Pofadder. This proposed development is referred to as the **Pofadder Solar Thermal Plant**. The site that has been identified for the establishment of the facility is located approximately 30 km north-east of Pofadder in the Northern Cape on Portion 4 of Scuit-Klip 92 which falls within the Khai Ma Local Municipality.

The proposed facility, which will be primarily contained within this Identified farm portion, will have a developmental footprint of approximately 11 km². The solar energy facility will have an overall maximum generating capacity of 310 MW and will be comprised of a combination of the following technologies (in any combination):

- » **100 MW** to be generated from 80 – 200 loops of parabolic troughs (i.e. to cover a total extent of approximately 200 – 300 ha) with an approximate height of 5 m.
- » **50 MW** to be generated from a field of heliostats/mirrors (i.e. approximately 4 000 – 6 000 mirrors each approximately 120 m², positioned on 6 m high pedestals) positioned around an approximately 200 m high power tower including the receiver (i.e. to cover a total extent of approximately 300 ha).

- » **10 MW** to be generated from several rows of PV panels (i.e. to cover a total extent of approximately 50 ha).

The Renewable Energy Feed-in Tariff Process (criteria not yet finalised by the National Energy Regulator of South Africa), selection process (not finalised by the Department of Energy, together with National Treasury) and the economics of the solar facility will be key in determining the final technology combination and the schedule of implementation for the facility.

The following associated infrastructural requirements will also be established within the developmental footprint of the proposed facility:

- » **Power islands** which will include a steam turbine and generator; a generator transformer and a small substation; an auxiliary steam boiler and associated vessels.
- » An **overhead power line** feeding into the Eskom electricity network at the Paulputs Transmission Substation.
- » An **abstraction point** at the Gariep (Orange) River and an associated water **supply pipeline** to the facility of approximately 30 km in length.
- » A **suspension reservoir**.
- » A **storage reservoir**.
- » Lined **evaporation ponds**.
- » **External access road** leading to the site from the R358 which branches off the N14 towards Onseepkans.
- » **Internal access road** for construction and maintenance purposes.

» Workshop, office, and storage areas.

The nature and extent of this facility, as well as potential environmental impacts associated with the construction and operation of a facility of this nature are explored in more detail in this Environmental Impact Assessment (EIA) Report which consists of the following chapters:

Chapter 1 provides background to the proposed facility and the environmental impact assessment process.

Chapter 2 provides an overview of the proposed project.

Chapter 3 provides an overview of the Regulatory and Legal Context for electricity generation projects.

Chapter 4 outlines the process which was followed during the EIA Phase, including the consultation program that was undertaken and input received from interested parties and stakeholders.

Chapter 5 describes the existing biophysical and socio-economic environment.

Chapter 6 presents the assessment of environmental impacts associated with the facility and its associated infrastructure.

Chapter 7 presents the conclusions of the EIA process, as well as an impact statement on the proposed project.

Chapter 8 provides a list of references and information sources used in undertaking the studies for this EIA Report.

The Scoping Phase of the EIA process identified potential issues associated with the proposed project, and defined the extent of the studies required within

the EIA Phase. The Scoping Phase also identified potentially sensitive areas within the study site which served to inform the placement of the facility through a funnel-down approach.

The EIA Phase addressed those identified potential environmental impacts and benefits (direct, indirect, and cumulative impacts) associated with all phases of the project including design, construction, and operation. The EIA Phase recommends appropriate mitigation measures for potentially significant environmental impacts.

The EIA report aims to provide sufficient information regarding the potential impacts and the acceptability of these impacts in order for the Competent Authority (i.e. the National Department of Environmental Affairs (DEA)) to make an informed decision regarding the proposed project.

The release of a draft EIA Report provided stakeholders with an opportunity to verify that the issues they raised through the EIA process were captured and adequately considered. The final EIA Report incorporates all issues and responses raised during the public review of the draft EIA Report prior to submission to the DEA.

The conclusions and recommendations of this EIA are the result of the assessment of identified impacts by specialists, and the parallel process of public participation. The public consultation process has been extensive and every effort has been made to include

representatives of all stakeholders in the study area.

The most significant environmental impacts associated with the proposed project, as identified through the EIA, include impacts on the water resources (i.e. drainage lines) identified in the study area and visual impacts on the natural scenic resources of the region and on sensitive receptors (i.e. primarily as a result of the power tower):

- » Local site-specific impacts resulting from the physical disturbance/modification to the site
- » Impacts on the social environment primarily resulting from the presence of construction workers on-site

The findings of the specialist studies undertaken within this EIA to assess both the benefits and potential negative impacts anticipated resulting from the proposed project conclude that:

- » There are **no environmental fatal flaws** that should prevent the proposed solar energy facility and associated infrastructure from proceeding on the identified site, provided that the recommended mitigation and management measures are implemented, and given due consideration during the process of finalising the facility layout.
- » The overall **ecological** impacts have been assessed as being of low or medium significance. If mitigation measures are put in place to manage impacts, then most

potential impacts can be reduced to having low significance.

- » The most significant threat to **avifauna** communities would be from collisions with the overhead power line. The loss of habitat, disturbance, or any interaction with the facility is not anticipated to have a significant negative impact on bird communities in the area.
- » Very sparse **heritage resources** were found during the field survey undertaken for the site. From an archaeological perspective the observed heritage resources may be regarded as being of generally low significance.
- » With respect to **geology**, the possible presence of shallow, dense residual soil, calcrete, or basement rock may help to reduce the erosion potential but this is difficult to quantify without detailed geotechnical information. However, the direct impacts are likely to be moderate to low and the cumulative significance of all the potential impacts on the geological environment is considered low due to the limited scale of the development and the dearth of development in the immediate surrounding area. With effective implementation of mitigating measures the impacts identified above can be reduced to a low level.
- » The anticipated **visual** impact is not considered a fatal flaw considering the low incidence of visual receptors in the region and the contained area of potential visual exposure.
- » The development will have both positive and negative **social**

impacts. It will create employment and business opportunities for locals during both the construction and operational phases and represent an investment in clean, renewable energy infrastructure.

- » The significance levels of the majority of identified negative impacts can generally be reduced by implementing the recommended mitigation measures. With reference to the information available at this planning approval stage in the project cycle, the **confidence** in the environmental assessment undertaken is regarded as **acceptable**.

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ABBREVIATIONS AND ACRONYMS

BID	Background Information Document
CaBEERE	Capacity Building in Energy Efficiency and Renewable Energy
CO ₂	Carbon dioxide
CSP	Concentrating Solar Power
CPV	Concentrating Photovoltaic Power
DENC	Department of Environment & Nature Conservation
DEA	National Department of Environmental Affairs
DoE	Department of Energy
DM	District Municipality
DWA	Department of Water Affairs
EAP	Environmental Assessment Practitioner
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
EPC	Engineering, Procurement and Construction
FIT	Feed-in Tariffs
GDP	Gross Domestic Profit
GDPR	Gross Domestic Profit of the Region
GIS	Geographical Information Systems
GG	Government Gazette
GN	Government Notice
GHG	Green House Gases
GWh	Giga Watt Hour
I&AP	Interested and Affected Party
IDP	Integrated Development Plan
IPP	Independent Power Producer
km ²	Square kilometres
km/hr	Kilometres per hour
kV	Kilovolt
LM	Local Municipality
LPG	Liquid Petroleum Gas
LUPO	Rezoning and Subdivision in terms of Land Use Planning Ordinance, Ordinance 15 of 1985
MA	Million years before present
MAR	Mean Annual Rainfall
m ²	Square meters
m/s	Meters per second
MW	Mega Watt
NEMA	National Environmental Management Act (Act No. 107 of 1998)
NERSA	National Energy Regulator of South Africa
NGOs	Non-Governmental Organisations
NT	Not Threatened

NWA	National Water Act (Act No. 36 of 1998)
PES	Present Ecological State
REFIT	Renewable Energy Feed-in Tariffs
SAHRA	South African Heritage Resources Agency
SANBI	South African National Biodiversity Institute
SANRAL	South African National Roads Agency Limited
SDF	Spatial Development Framework
SWMP	Storm Water Management Plan
TPV	Tracking Photovoltaic Power
VAC	Visual Absorption Capacity
VU	Vulnerable

DEFINITIONS AND TERMINOLOGY

Alternatives: Alternatives are different means of meeting the general purpose and need of a proposed activity. Alternatives may include location or site alternatives, activity alternatives, process or technology alternatives, temporal alternatives or the 'do nothing' alternative.

Archaeological material: Remains resulting from human activities which are in a state of disuse and are in or on land and which are older than 100 years, including artefacts, human and hominid remains and artificial features and structures.

Clean development mechanism: An arrangement under the Kyoto Protocol allowing industrialised countries with a greenhouse gas reduction commitment (called Annex 1 countries) to invest in projects that reduce emissions in developing countries as an alternative to more expensive emission reductions in their own countries. The most important factor of a Clean Development Mechanism (CDM) project is that it establishes that it would not have occurred without the additional incentive provided by emission reductions credits. The CDM allows net global greenhouse gas emissions to be reduced at a much lower global cost by financing emissions reduction projects in developing countries where costs are lower than in industrialised countries. The CDM is supervised by the CDM Executive Board (CDM EB) and is under the guidance of the Conference of the Parties (COP/MOP) of the United Nations Framework Convention on Climate Change (UNFCCC)

Concentrating solar power: Solar generating facilities use the energy from the sun to generate electricity. Concentrating solar power facilities (CSP) collect the incoming solar radiation and concentrate it (by focusing or combining it) onto a single point, thereby increasing the potential electricity generation.

Concentrating photovoltaic power: Like CSP facilities, concentrating photovoltaic facilities (CPV) operate on the same principle of concentrating the incoming solar radiation. The only different is that in this case photovoltaic panels are used.

Cumulative impacts: Impacts that result from the incremental impact of the proposed activity on a common resource when added to the impacts of other past, present or reasonably foreseeable future activities (e.g. discharges of nutrients and heated water to a river that combine to cause algal bloom and subsequent loss of dissolved oxygen that is greater than the additive impacts of each pollutant). Cumulative impacts can occur from the collective impacts of individual minor actions over a period of time and can include both direct and indirect impacts.

Direct impacts: Impacts that are caused directly by the activity and generally occur at the same time and at the place of the activity (e.g. noise generated by blasting

operations on the site of the activity). These impacts are usually associated with the construction, operation or maintenance of an activity and are generally obvious and quantifiable

'Do nothing' alternative: The 'do nothing' alternative is the option of not undertaking the proposed activity or any of its alternatives. The 'do nothing' alternative also provides the baseline against which the impacts of other alternatives should be compared.

Early stone age: A very early period of human development dating between 300 000 and 2.6 million years ago.

Endangered species: Taxa in danger of extinction and whose survival is unlikely if the causal factors continue operating. Included here are taxa whose numbers of individuals have been reduced to a critical level or whose habitats have been so drastically reduced that they are deemed to be in immediate danger of extinction.

Endemic: An "endemic" is a species that grows in a particular area (is endemic to that region) and has a restricted distribution. It is only found in a particular place. Whether something is endemic or not depends on the geographical boundaries of the area in question and the area can be defined at different scales.

Environment: the surroundings within which humans exist and that are made up of:

- i. the land, water and atmosphere of the earth;
- ii. micro-organisms, plant and animal life;
- iii. any part or combination of (i) and (ii) and the interrelationships among and between them; and
- iv. the physical, chemical, aesthetic and cultural properties and conditions of the foregoing that influence human health and well-being.

Environmental impact: An action or series of actions that have an effect on the environment.

Environmental impact assessment: Environmental Impact Assessment (EIA), as defined in the NEMA EIA Regulations and in relation to an application to which scoping must be applied, means the process of collecting, organising, analysing, interpreting and communicating information that is relevant to the consideration of that application.

Environmental management: Ensuring that environmental concerns are included in all stages of development, so that development is sustainable and does not exceed the carrying capacity of the environment.

Environmental management plan: An operational plan that organises and co-ordinates mitigation, rehabilitation and monitoring measures in order to guide the implementation of a proposal and its ongoing maintenance after implementation.

Feed-in tariffs: Feed-in Tariffs (FIT) have been set to promote socio-economic and environmentally sustainable growth. They are essentially guaranteed prices for electricity supply as opposed to conventional consumer tariffs. The basic economic principle underpinning the FIT is the establishment of a tariff that covers the cost of generation plus a "reasonable profit" to entice independent power producers to invest in generation projects.

Fossil: Mineralised bones of animals, shellfish, plants and marine animals. A trace fossil is the track or footprint of a fossil animal that is preserved in stone or consolidated sediment.

Heliostat: Movable, flat reflective mirrors which are oriented according to the sun's position in order to capture and reflect the solar radiation.

Heritage: That which is inherited and forms part of the National Estate (Historical places, objects, fossils as defined by the National Heritage Resources Act of 2000).

Indigenous: All biological organisms that occurred naturally within the study area prior to 1800

Indirect impacts: Indirect or induced changes that may occur as a result of the activity (e.g. the reduction of water in a stream that supply water to a reservoir that supply water to the activity). These types of impacts include all the potential impacts that do not manifest immediately when the activity is undertaken or which occur at a different place as a result of the activity.

Integrated energy plan: A plan commissioned by the DME in response to the requirements of the National Energy Policy, in order to provide a framework in which specific energy policies, development decisions and energy supply trade-offs can be made on a project-by-project basis. The framework is intended to create a balance between the energy demand and resource availability to provide low cost electricity for social and economic development, while taking into account health, safety and environmental parameters.

Integrated strategic electricity planning: Eskom's planning process which provides strategic projections of supply-side and demand-side options to be implemented to deal with the energy management issues and meet long-term load forecasts.

Interested and affected party: Individuals or groups concerned with or affected by an activity and its consequences. These include the authorities, local communities, investors, work force, consumers, environmental interest groups and the general public.

Kyoto protocol: The Kyoto Protocol calls for developed countries to reduce their green house gas emissions during the commitment period (2008 - 2012) by 5.2% compared to 1990 levels. Developing countries, like South Africa, do not have a limit on their emissions.

Late stone age: In South Africa this time period represents fully modern people who were the ancestors of southern African Khoekhoen and San groups (40 000 – 300 years ago).

Middle stone age: An early period in human history characterised by the development of early human forms into modern humans capable of abstract thought process and cognition 300 000 – 40 000 years ago.

National integrated resource plan: Commissioned by NERSA in response to the National Energy Policy's objective relating to affordable energy services, in order to provide a long-term, cost-effective resource plan for meeting electricity demand, which is consistent with reliable electricity supply and environmental, social and economic policies.

Optics: Mirrors or lenses which are used to concentrate the solar radiation onto a photovoltaic cell.

Parabolic trough: A trough-shaped reflectors which focus the solar radiation onto a receiver at its focal point. It include a receiver tube/heat collection element (i.e. a metal absorber containing the heat transfer fluid surrounded by a glass envelope which absorbs the solar energy received from the parabolic trough), a sun-tracking system (i.e. an electronic control system and associated mechanical drive system used to focus the reflector onto the sun), and support structure (i.e. holds the parabolic trough in accurate alignment with incoming solar radiation while resisting the effects of the wind).

Photovoltaic cell: Semiconductors which absorb solar radiation to produce electricity

Photovoltaic effect: Electricity can be generated using photovoltaic panels (semiconductors) which are comprised of individual photovoltaic cells that absorb solar energy to produce electricity. The absorbed solar radiation excites the electrons inside the cells and produces what is referred to as the Photovoltaic Effect.

Power tower: A power tower forms part of the central receiver type solar electricity generating technology. The purpose of the tower, which may be up to 160 m high, is to

structurally support the receiver. The receiver, consisting of metal tubes which transfer the heat from the solar radiation reflected on it by mirror fields, is used for generating the steam.

Rare species: Taxa with small world populations that are not at present Endangered or Vulnerable, but are at risk as some unexpected threat could easily cause a critical decline. These taxa are usually localised within restricted geographical areas or habitats or are thinly scattered over a more extensive range. This category was termed Critically Rare by Hall and Veldhuis (1985) to distinguish it from the more generally used word "rare".

Red data species: Species listed in terms of the International Union for Conservation of Nature and Natural Resources (IUCN) Red List of Threatened Species, and/or in terms of the South African Red Data list. In terms of the South African Red Data list, species are classified as being extinct, endangered, vulnerable, rare, indeterminate, insufficiently known or not threatened (see other definitions within this glossary).

Renewable energy feed-in tariff: Renewable Energy Feed-In Tariffs (REFITs) are used to promote renewable energy and have been adopted in over 36 countries worldwide. The establishment of the REFIT in South Africa provides the opportunity for an increased contribution towards the sustained growth of the renewable energy sector, and to promote competitiveness between renewable and conventional energies in the medium and long-term. Under the National Energy Regulator Act (Act No. 40 of 2004), the Electricity Regulation Act (Act No. 4 of 2006), and all subsequent relevant amendment acts, the National Energy Regulator of South Africa (NERSA) has the mandate to determine the prices at and conditions under which electricity must be supplied by licence.

Significant impact: An impact that by its magnitude, duration, intensity, or probability of occurrence may have a notable effect on one or more aspects of the environment.

INTRODUCTION

CHAPTER 1

!KaXu CSP is proposing the establishment of a commercial solar energy facility on Portion 4 of the Farm Scuit-Klip 92, which lies approximately 30 km north-east of the town of Pofadder in the Northern Cape. Following an extensive site identification process undertaken by !KaXu CSP, a 33 km² site which falls within the Khai Ma Local Municipality was identified for consideration within an Environmental Impact Assessment (EIA) process.

A sensitivity analysis was undertaken during the Scoping Phase wherein potentially sensitive areas which should be avoided within the broader 33 km² were identified. These sensitive areas included natural drainage lines, areas of increased gradient/slope, and areas containing vegetation of conservation importance. As a result, the southern portion of the triangular shaped site was identified as a preferred area for development of the solar thermal plant, based on the following characteristics:

- » **Relief profile:** the high relief areas within the north-western and the north-eastern corners of the site should be avoided as the former includes the Konkonsieskop hill and the latter includes the Ysterberg mountain range.
- » **Centre of Endemism:** the north-western portion of the site falls within the core vegetation type of the Gariep Centre of Floristic Endemism.
- » **Proximity to the grid connection point:** being in close proximity to the point of connection to the grid will minimise the length of the power line that is required between the proposed facility and the Paulputs Substation. In turn, this would reduce the potential for the linear disturbance associated with the power line including the potential for impacts on avifauna species.

The proposed facility, which will be primarily contained within this identified portion, will have a developmental footprint of approximately 11 km². The solar energy facility is proposed to comprise Concentrating Solar Power (CSP) and Concentrating/Tracking Photovoltaic Power (CPV/TPV) components with an overall maximum generating capacity of 310 MW. The facility will be comprised of a combination of the following technologies (in any combination):

- » Parabolic troughs (CSP system consisting of several loops of parabolic troughs)
- » Power tower plant and associated heliostats (CSP system consisting of a field of heliostats positioned around the power tower)
- » Photovoltaic (PV) plant (system consisting of several rows of PV panels)

The Renewable Energy Feed-in Tariff (REFIT) Process (criteria not yet finalised by the National Energy Regulator of South Africa (NERSA)), selection process (not finalised by the Department of Energy, together with National Treasury) and the economics of the

solar facility will be key in determining the final technology combination and the schedule of implementation for the facility.

The following associated infrastructural requirements will also be established, both outside and within the developmental footprint of the proposed facility:

- » **Power islands** which will include:
 - » A **steam turbine** and **generator** typically housed within a 2-storey building
 - » A generator **transformer** and a small **substation** located outside and adjacent to the 2-storey building.
 - » An **auxiliary steam boiler** and associated vessels (i.e. fossil fuel boiler/generator), proposed to be fired by either diesel fuel or liquid petroleum gas (LPG).
- » An **overhead power line** feeding into the Eskom electricity network at the Paulputs Substation, which is situated adjacent to the site.
- » An **abstraction point** at the Gariep (Orange) River and an associated water **supply pipeline** to the facility of approximately 30 km in length.
- » A **suspension reservoir** located approximately 6 km south of the raw water abstraction point (i.e. outside the boundaries of the identified site) to rid the raw water of particles in suspension (silt).
- » A **storage reservoir** located within the boundaries of the identified site. The water stored within the reservoir will be used during the steam generation process (boiler makeup), for washing of the heliostats/mirrors, troughs and PV panels, potable water supply and fire protection supply.
- » Lined **evaporation ponds** to allow for the evaporation of process waste water not to be re-used within the facility.
- » **External access road** leading to the site from the R358 which branches off the N14 towards Onseepkans.
- » **Internal access roads** for construction and maintenance purposes.
- » Workshop, office, and storage areas.

The nature and extent of this facility, as well as potential environmental impacts associated with the construction of a facility of this nature is assessed in more detail in this final EIA report.

1.1. The Need for the Proposed Project

Countries worldwide are being pressured to increase their share of renewable energy generation due to concerns related to climate change and the on-going, unsustainable exploitation of natural resources such as gas, oil and coal. Grid connected renewable energy is currently the fastest growing sector in the global energy market. Targets for the promotion of renewable energy now exist in more than 58 countries, of which 13 are developing countries. The South African Government has recognised the country's high

level of renewable energy potential and presently has in place targets of 10 000 GWh of renewable energy by 2013 (to be produced mainly from biomass, wind, solar and small-scale hydro). This amounts to approximately 4% (1 667 MW) of the total estimated electricity demand (41 539 MW) by 2013.

To contribute towards this target and towards socio-economic and environmentally sustainable growth, and to stimulate the renewable energy industry in South Africa, the need to establish an appropriate market based mechanism was identified, and Feed-in Tariffs (FIT) have been set. FITs are, in essence, guaranteed prices for electricity supply rather than conventional consumer tariffs. The basic economic principle underpinning the FITs is the establishment of a tariff (price) that covers the cost of generation plus a "reasonable profit" to entice investment. This is quite similar to the concept of cost recovery used in utility rate regulation based on the costs of capital. Feed-in tariffs to promote renewable energy have now been adopted in over 36 countries around the world. The establishment of the South African Renewable Energy Feed-in Tariffs (REFIT) provides the opportunity for an increased contribution towards the sustained growth of the renewable energy sector locally, regionally and internationally. It also serves to promote competitiveness for renewable energy with conventional energies in the medium- and long-term. Under the National Energy Regulator Act, 2004 (Act No. 40 of 2004), the Electricity Regulation Act, 2006 (Act No. 4 of 2006) and all subsequent relevant Amendment Acts, NERSA has the mandate to determine the prices at and conditions under which electricity may be supplied by a generation licence.

Renewable energy is recognised internationally as a major contributor in protecting our climate, nature, and the environment as well as providing a wide range of environmental, economic, and social benefits that will contribute towards long-term global sustainability. It is considered viable that long-term benefits for the community and/or society in general can be realised should this site near Pofadder prove acceptable, from a technical and environmental perspective, for the establishment of a solar energy facility. In addition, the proposed project will aid in achieving the goal of a 30% share of all new power generation being derived from independent power producers (IPPs).

1.2. Project Overview

The proposed site being considered for the development of the Pofadder Solar Thermal Plant falls within the Khai Ma Local Municipality (i.e. that forms part of the Namakwa District Municipality) in the Northern Cape. The site is situated approximately 30 km north-east of Pofadder, on Portion 4 of the Farm Scuit-Klip 92 (refer to Figure 1.1).

The overarching objective for the proposed solar energy facility is to maximise electricity production through exposure to the solar resource, while minimising infrastructure, operational, and maintenance costs, as well as social and environmental impacts. !KaXu CSP undertook an extensive site selection process that identified Portion 4 of Scuit-Klip

92 as a suitable option for development. However, the layout development requires the assessment of environmental and planning issues in detail. As such these issues have been considered within site-specific studies through the EIA process in the Scoping and EIA Phases. During the Scoping Phase, areas of sensitivity within the broader site were identified which ultimately served to inform the general placement of the facility within the broader site (i.e. the southern corner/region). The exact positioning or detailed layout of the facility's components within the boundaries of the broader site and beyond these boundaries (i.e. in terms of the abstraction point; pipeline and de-gritting reservoir) have been developed by taking cognisance of environmental sensitivities and technical constraints identified through the EIA Phase.

This EIA report documents the assessment of environmental impacts that may occur as a result of the establishment of the proposed facility. The scope of the proposed facility, including details of all elements of the project (for the construction, operation, and decommissioning phases) is discussed in more detail in Chapter 2.

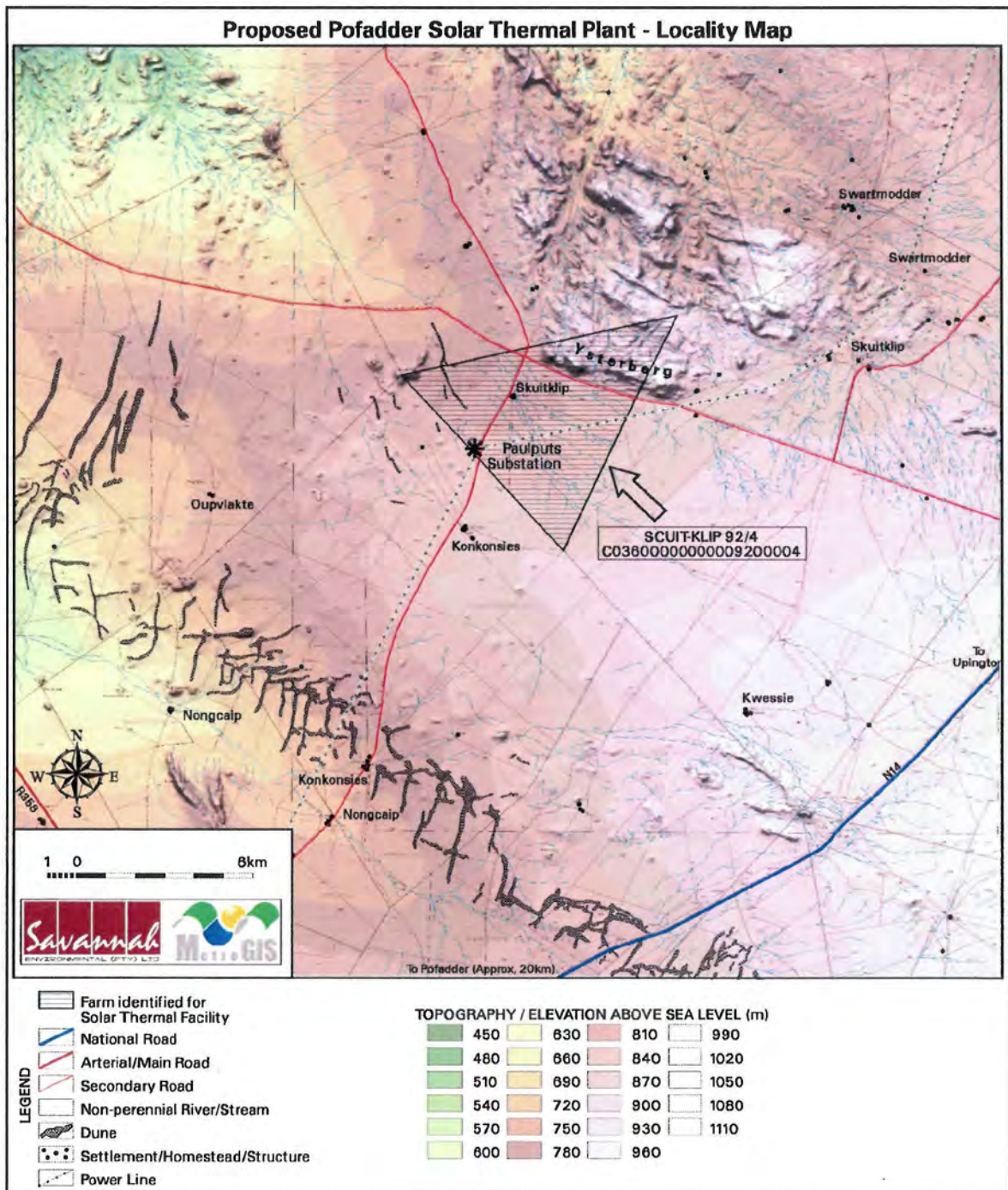


Figure 1.1: Map illustrating Portion 4 of Scuit-Klip 92 identified for the proposed facility

1.3. Requirement for an Environmental Impact Assessment Process

The development of the proposed facility is subject to the requirements of the EIA Regulations published in terms of Section 24(5) of the National Environmental Management Act (NEMA, No 107 of 1998). The EIA Phase, which follows the Scoping Phase, was conducted in accordance with the requirements of these regulations. This

section provides a brief overview of EIA Regulations and their application to this project. !KaXu CSP appointed Savannah Environmental to conduct the independent EIA process for the proposed Pofadder Solar Thermal Plant.

NEMA is the national legislation that provides for the authorisation of certain controlled activities known as 'listed activities'. In terms of Section 24(1) of NEMA, the potential impact on the environment associated with these listed activities must be considered, investigated, assessed and reported on to the competent authority (the decision-maker) charged by NEMA with granting of the relevant environmental authorisation. As this is a proposed electricity generation project (which is considered to be of national importance) the National Department of Environmental Affairs (DEA) is the competent authority for this project. An application for authorisation has been accepted by DEA (under application reference number **12/12/20/1832**). Through the decision-making process, the DEA will be supported by the Northern Cape Department of Environment and Nature Conservation (DENC).

The need to comply with the requirements of the EIA Regulations ensures that decision-makers are provided the opportunity to consider the potential environmental impacts of a project early in the project development process, and assess if environmental impacts can be avoided, minimised or mitigated to acceptable levels. Comprehensive, independent environmental studies are required to be undertaken in accordance with the EIA Regulations to provide the competent authority with sufficient information in order for an informed decision to be made.

An EIA is an effective planning and decision-making tool for the project proponent. It allows for the identification and management of environmental impacts/issues that may occur through the establishment and operation of such a facility. Furthermore, an EIA allows for resolution of the issue(s) reported on in the Scoping and EIA reports as well as dialogue with affected parties.

In terms of sections 24 and 24D of NEMA, as read with Government Notices R385 (Regulations 27 – 36) and R387, a Scoping process and an EIA process are required to be undertaken for this proposed project as it includes the following activities listed in terms of GN R386 and R387 (GG No 28753 of 21 April 2006):

Relevant Notice	Activity	Description of listed activity
Government Notice R387 (21 April 2006)	1(a)	<i>The construction of facilities or infrastructure, including associated structures or infrastructure, for the generation of electricity where (i) the electricity output is 20 megawatts or more; or (ii) the elements of the facility cover a combined area in excess of 1 hectare.</i>
Government Notice R387 (21	1(l)	<i>The construction of facilities or infrastructure, including associated structures or infrastructure, for the transmission and</i>

April 2006)		<i>distribution of above ground electricity with a capacity of 120 kV or more.</i>
Government Notice R387 (21 April 2006)	2	<i>Any development, activity, including associated structures and infrastructure, where the total area of the developed area is, or is intended to be 20 ha or more.</i>
Government Notice R386 (21 April 2006)	1(m)	<i>Any purpose in the one in ten year flood line of a river or stream, or within 32 metres from the bank of a river or stream where the flood line is unknown, excluding purposes associated with existing residential use, but including (i) canals; (ii) channels; (iii) bridges; (iv) dams; and (v) weirs.</i>
Government Notice R386 (21 April 2006)	7	<i>The above ground storage of a dangerous good, including petrol, diesel, liquid petroleum gas or paraffin, in containers with a combined capacity of more than 30 cubic metres but less than 1 000 cubic metres at any one location or site.</i>
Government Notice R386 (21 April 2006)	12	<i>The transformation or removal of indigenous vegetation of 3 hectares or more or of any size where the transformation or removal would occur within a critically endangered or an endangered ecosystem listed in terms of section 52 of the National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004).</i>
Government Notice R386 (21 April 2006)	13	<i>The abstraction of groundwater at a volume where any general authorisation issued in terms of the National Water Act, 1998 (Act No. 36 of 1998) will be exceeded.</i>
Government Notice R386 (21 April 2006)	14	<i>The construction of masts of any material of type and of any height, including those used for telecommunications broadcasting and radio transmission, but excluding (a) masts of 15m and lower exclusively used by (i) radio amateurs; or (ii) for lightening purposes (b) flagpoles; and (c) lightening conductor poles.</i>
Government Notice R386 (21 April 2006)	15	<i>The construction of a road that is wider than 4 m or that has a reserve wider than 6 m, excluding roads that fall within the ambit of another listed activity or which are access roads of less than 30 m long.</i>
Government Notice R386 (21 April 2006)	16(b)	<i>The transformation of undeveloped, vacant or derelict land to residential mixed, retail, commercial, industrial or institutional use where such development does not constitute infill and where the total area to be transformed is bigger than 1 hectare.</i>

1.4. Objectives of the Environmental Impact Assessment Process

The Scoping Phase refers to the process of **identifying** potential impacts (i.e. positive and negative) associated with the proposed project, and defining the **extent of studies** required within the EIA phase. The Scoping Phase culminated in the identification of a preferred area for development within the broader 33 km² site (i.e. the southern corner/portion of the site). The Scoping Phase included input from the project proponent, specialists with experience in the study area as well as

in EIAs for similar projects, as well as a public consultation process with key stakeholders that included both government authorities and interested and affected parties (I&APs).

The EIA Phase focuses on the preferred area for development identified during the Scoping Phase. It addresses identified environmental impacts (direct, indirect, and cumulative as well as positive and negative) associated with all phases of the project including design, construction, operation, and decommissioning. The EIA phase also recommends appropriate mitigation measures for potentially significant environmental impacts. The release of the draft EIA report provided stakeholders with an opportunity to verify that issues they raised through the EIA process have been captured and adequately considered. The final EIA report incorporates all issues and responses raised during the public review of the draft EIA report prior to submission to DEA.

This EIA report consists of the following sections:

- Chapter 1:** Provides background to the proposed facility and the environmental impact assessment process.
- Chapter 2:** Provides an overview of the proposed project.
- Chapter 3:** Provides an overview of the Regulatory and Legal Context for electricity generation projects
- Chapter 4:** Outlines the process which was followed during the EIA Phase, including the consultation program that was undertaken and input received from interested parties and stakeholders.
- Chapter 5:** Describes the existing biophysical and socio-economic environment.
- Chapter 6:** Presents the assessment of environmental impacts associated with the facility, its associated infrastructure.
- Chapter 7:** Presents the conclusions of the EIA process, as well as an impact statement on the proposed project
- Chapter 8:** Provides a list of references and information sources used in undertaking the studies for this EIA Report.

1.5. Details of the Environmental Assessment Practitioner and Expertise to conduct the EIA Process

Savannah Environmental was contracted by !KaXu CSP as the independent consultants to undertake an EIA process for the proposed project, as required by the NEMA EIA Regulations. Neither Savannah Environmental, nor any its specialist sub-consultants on this project are subsidiaries of, or are affiliated to !KaXu CSP. Furthermore, Savannah Environmental does not have any interests in secondary developments that may arise out of the authorisation of the proposed project.

Savannah Environmental is a specialist environmental consulting company providing a holistic environmental management service, including environmental assessment and planning to ensure compliance and evaluate the risk of development; and the development and implementation of environmental management tools. Savannah Environmental benefits from the pooled resources, diverse skills and experience in the environmental field held by its team.

The Savannah Environmental team has considerable experience in environmental assessment and environmental management and have been actively involved in undertaking environmental studies for a wide variety of projects throughout South Africa and neighbouring countries. Strong competencies have been developed in project management of environmental processes, as well as strategic environmental assessment and compliance advice, and the assessment of environmental impacts, the identification of environmental management solutions and mitigation/risk minimising measures.

Savannah Environmental has gained extensive knowledge and experience on potential environmental impacts associated with electricity generation projects through their involvement in related EIA processes. Savannah Environmental has completed the EIA process and received environmental authorisations for:

- » The Eskom Wind Energy Facility on the West Coast.
- » The Umoya Energy Hopefield Wind Energy Facility in the Western Cape.
- » The African Clean Energy Development Cookhouse Wind Energy Facility in the Eastern Cape.

Savannah Environmental is currently undertaking the EIA process and reporting for *inter alia*:

- » The Renewable Energy Investments South Africa Kathu Solar Energy Facility in the Northern Cape.
- » The VentuSA Energy Sishen Solar Energy Facility in the Northern Cape.
- » The Thupela Energy Waterberg Photovoltaic Plant in the Limpopo Province.
- » The VentuSA Energy Wag'nbiekiespan Solar Energy Facility in the Free State.
- » The Noblesfontein Solar and Wind Energy Facility in the Northern Cape.
- » The Moyeng Energy Suurplaat Wind Energy Facility in the Northern Cape.
- » The !Kha CSP South Africa Upington Solar Thermal Plant in the Northern Cape.

Savannah Environmental has developed a valuable understanding of impacts associated with the construction and operation of renewable energy facilities. Savannah Environmental has successfully managed and undertaken EIA processes for other power generation projects throughout South Africa. Curricula vitae for the Savannah Environmental project team consultants are included in Appendix A.

In order to adequately identify and assess potential environmental impacts, Savannah Environmental has appointed several specialist consultants to conduct specialist studies, as required. The curricula vitae for the EIA specialist consultants are also included in Appendix A.