

**ENVIRONMENTAL CLEARANCE CERTIFICATE (ECC) ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) FOR THE:**

**PROPOSED CONSTRUCTION AND OPERATION OF A 100 MW SOLAR PV PLANT AND OVERHEAD TRANSMISSION LINE ON PORTION I (A PORTION OF PORTION 2 FARM KLEIN SPITSKOP NO.153 IN KEETMANSHOOP, ||KARAS REGION-NAMIBIA**

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## DOCUMENT INFORMATION

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## Definitions

TERMS	DEFINITION
BID	Background Information Document
EAP	Environmental Assessment Practitioners
ECC	Environmental Clearance Certificate
ECO	Environmental Control Officer
EIA (R)	Environmental Impact Assessment (Report)
ESIA	Environmental and Social Impact Assessment
EMP	Environmental Management Plan
EMPr	Environmental Management Plan Report
GHG	Greenhouse Gasses
ISO	International Organization for Standardization
I&APs	Interested and Affected Parties
MEFT: DEA	Ministry of Environment, Forestry and Tourism's Directorate of Environmental Affairs and Forestry
NHC	National Heritage Council
NEMA	Namibia Environmental Management Act
ToR	Terms of Reference
UNFCCC	United Nations Framework Convention on Climate Change

## **i. Executive Summary**

Alpha Namibia Industries Renewable Power Limited (ANIREP) Pty Ltd (hereinafter referred to as *ANIREP* or the *Proponent*) intends to construct and operate the proposed 100 Mega-Watt, alternating current (MWac) Kokerboom (Photovoltaic (PV)) Park in Karas Region, sited on Farm Spitskop, Keetmanshoop. The proposed solar parks will be connected to the national grid via an 132Kv power line to the nearby NAMPOWER electricity substation. The generated electricity is supplied to NamPower through a Power Purchase Agreement (PPA) to be signed by both parties (NamPower and ANIREP's Representatives. Due to confidentiality of the PPA, it has been intentionally excluded in this Report.

The proposed capacity of the solar panels is 100 MW and the maximum capacity pushed in the grid is 100MWac guaranteed by the Proponent's Power Plant Controller (PPC). A Generation License will be issued to the Proponent by the Electricity Control Board (ECB) of Namibia.

According to the Environmental Management Act No 7 of 2007 and its 2012 Environmental Impact Assessment (EIA) Regulations, electricity generation, transmission and supply is one of the listed activities that that may not be undertaken without an Environmental Clearance Certificate (ECC). Subsequently, prior to the construction and operational activities of the Solar Park, ANIREP is required that an Environmental Impact Assessment (EIA) conducted for the proposed development.

To ensure that the project activities remain compliant with the national environmental legislation that also include holding a valid environmental clearance as a project Proponent, D&P Engineers and Environmental Consultants will undertake this ESIA as part of the compliance requirements process.

It is for this reason that this document has been compiled as an assessment document to the ECC application to enable compliance of the project activities. The ECC will be applied and submitted to the Ministry of Mines and Energy (MME) as the Competent Authority for the project and also submitted to MEFT as the Reviewing and Approving Authority. The date stamped copy of the ECC renewal Application (Form 1) also been uploaded on the ECC online system (Portal) of the Ministry of Environment, Forestry and Tourism (MEFT) and upon submission of an updated Environmental Management Plan (EMP) / ECC Renewal Report, a new ECC for the project will be considered by the Environmental Commissioner.

### **The Potential Adverse Impacts identified**

The potential (key) negative impacts that were identified, assessed and for which the current management measures were recommended are as follows.

**Construction (the current phase for which the potential impacts are assumed to be occurring and EMP is currently implemented):**

- **Positive impacts:** socio-Economic impact (job creations to the few people) as well as local, regional, and national economic development through green electricity supply.
- **Negative impact:** impact on biodiversity and ecosystem, soil pollution, physical soil (land) disturbance resulting in erosion, traffic (vehicular) safety, dust and air Quality, health, safety and security, waste generation (general, sewage and wastewater), visual (aesthetic) and archaeological impact, and risk of accidental fires.

The management measures were developed as part of the annexed ESMP as deemed necessary. The implementation of the EMP and compliance during the validity period of the expired environmental clearance certificate (ECC) and after the ECC's expiry is provided in this document. The evaluated and updated EMP compliance status will be carried out based on the ESMP.

**RECOMMENDATIONS AND CONCLUSIONS**

The Solar Park site was observed to assess the potential environmental and social impacts of the project. The project is of medium-scale level and activities are well limited within the site boundaries only. As the result of the site observations, it is anticipated that all potential (negative) impacts will be mitigated using a developed Environmental and Social Management Plan (ESMP).

**Recommendations**

The Environmental Consultant is therefore confident that the potential negative impacts associated with the project activities on site can be mitigated by effectively implementing the recommended management action measures and with more effort and commitment put on implementation monitoring (Bi-Annual Monitoring and reporting). It is therefore, recommended that the Solar (PV) Park Project and associated activities on site be granted a new Environmental Clearance Certificate, provided that:

- All the management measures (mitigations) provided in the initial ESMP/ESIA Report be implemented effectively with compliance emphasis pointed out in this ESIA.
- All required permits, licenses, approvals, and document renewals that may be required for the project activities in future are obtained as required.
- All the respective management (mitigation) measures provided in the project ESMP drafted are effectively implemented and monitored as stipulated to achieve full ESMP implementation compliance.
- The Proponent and all their project workers, contractors and or specialists comply with the legal requirements governing their project and its associated activities.
- All the necessary environmental and social (occupational health and safety) precautions provided are adhered to.

- **To avoid very late renewal of the ECC, the Proponent's ECO OR Environmental Consultant should effectively conduct Environmental (EMP) Compliance Bi-Annual Monitoring and most importantly, ensure timely renewal of the ECC. A Renewal application can be submitted at least 2 months before the expiry date of the valid ECC to allow time for the evaluation of the ECC Renewal report by the DEAF and approval by the Environmental Commissioner; and**

*NB: The EAP does not accept any responsibility in the event that additional information comes to light at a later stage of the process. All data from unpublished research utilised for the purposed of this project is valid and accurate. The scope of this investigation is limited to assessing the potential biophysical, social and cultural impacts associated with the proposed project.*



# 1. CHAPTER ONE: BACKGROUND

## 1.1. Introduction

Alpha Namibia Industries Renewable Power Limited (ANIREP) Pty Ltd (hereinafter referred to as *ANIREP* or the *Proponent*) intends to construct and operate the proposed 100 Mega-Watt, alternating current (MWac) Kokerboom (Photovoltaic (PV)) Park in Karas Region, sited on Farm Spitskop, Keetmanshoop. The proposed solar parks will be connected to the national grid via an 132Kv power line to the nearby Kokerboom NAMPOWER electricity substation.

In terms of the Namibian environmental legislation (Environmental Management Act (No. 7 of 2007)) and the Environmental Assessment Regulations of 2012; an EIA is required to obtain an Environmental Clearance Certificate from the Ministry of Environment and Tourism (MET) before the proposed project can proceed.

Furthermore, as per the requirements of the Environmental Management Act No. 7 of 2007, ANIREP has appointed D&P Engineers and Environmental Consultants (DPEE) to conduct an Environmental and Social Impact Assessment (ESIA) and develop an Environmental and Social Management Plan (ESMP) for the proposed solar PV park construction and operation. This has been followed by an application for Environmental Clearance Certificate (ECC) to the Ministry of Environment, Forestry and Tourism (MEFT): Directorate of Environmental Affairs and Forestry (DEAF).

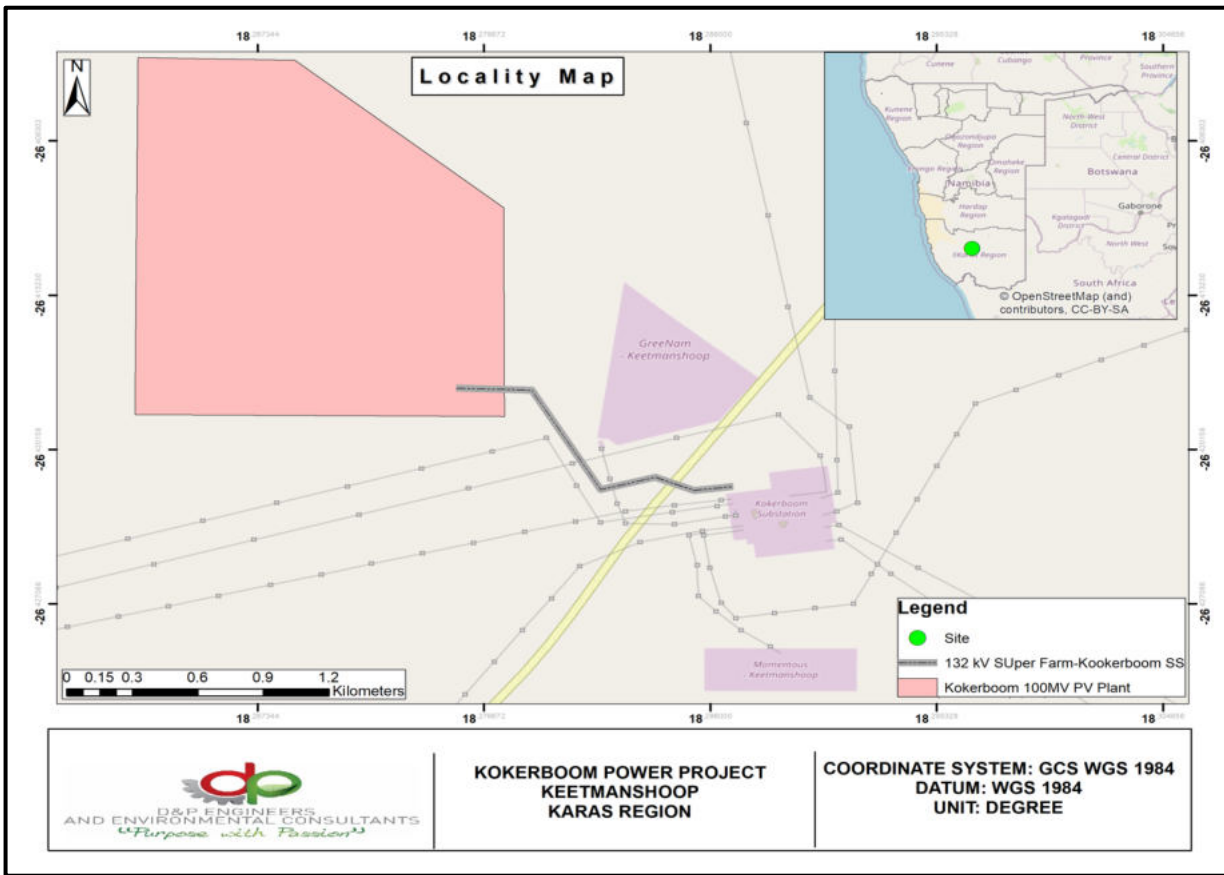
In this respect, this document forms part of the application to be made to the DEAF's office for an Environmental Clearance certificate for the proposed 100 MW PV plant, in accordance with the guidelines and statutes of the Environmental Management Act No.7 of 2007 and the environmental impacts regulations (GN 30 in GG 4878 of 6 February 2012)

## 1.2. Project Location

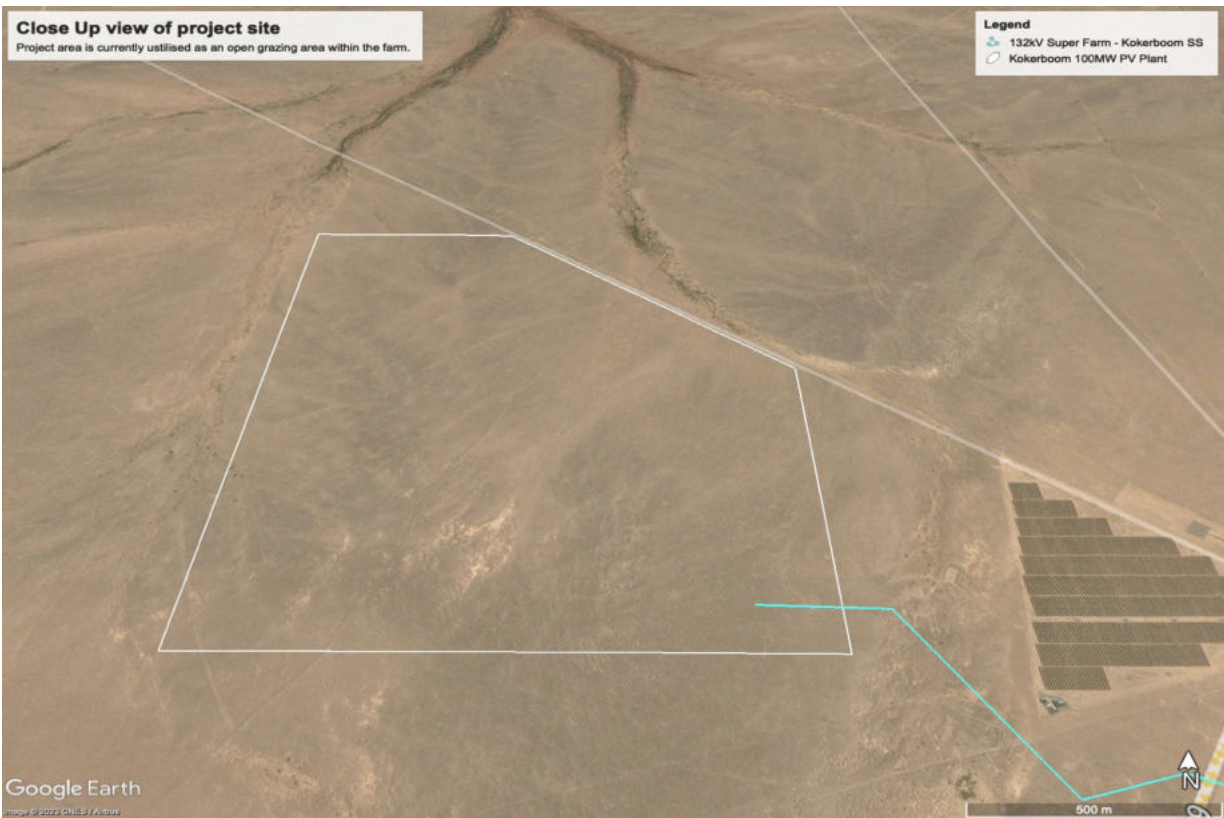
The site is on portion 1 (a portion of portion 2 Farm Klein Spitskoppe), adjacent to the existing Kokerboom substation in proximity to Keetmanshoop Town, //Karas Region measuring 250 hectares. The exact project area coordinates are as follows:

**Location:** Lat -26.412952°, Long 18.269642°E

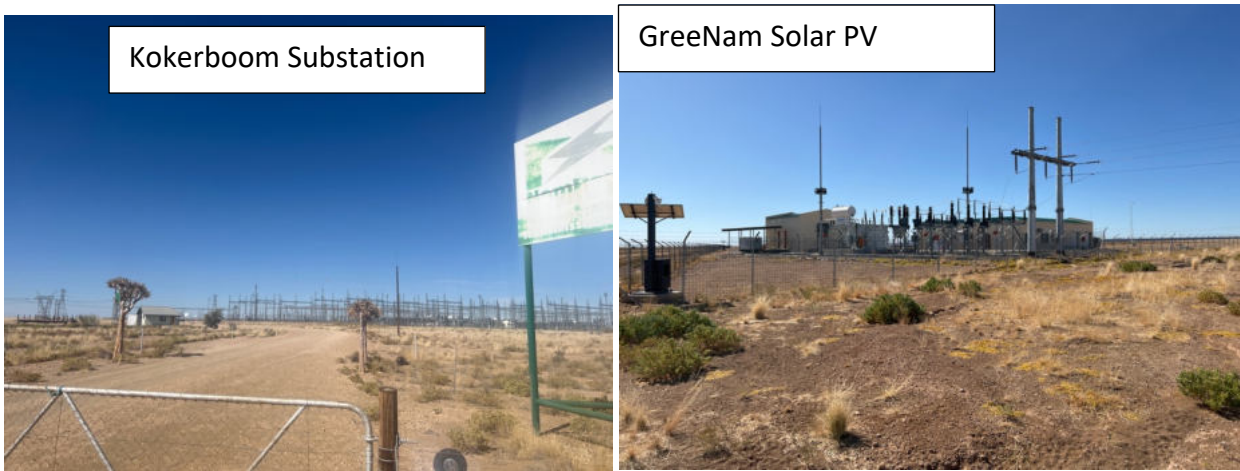
Additionally, a project Locality map is on Figure 1.



**Figure 1: Project Locality**



**Figure 2: 100MW Kokerboom solar PV Site- Close up view**



**Figure 3: Existing developments within Farm Klein Spitskop**

### 1.3. Project Overview

ANIREP intends to construct and operate a 100MW (PV) plant in Keetmanshoop. The proposed solar farm entails the construction and operation of a 100 MW PV development, associated infrastructure and services for the provision of renewable electricity to the national power grid.

This project entails the transformation of farm land to accommodate the proposed Solar Power plant, associated infrastructure and services. The infrastructure proposed for the entire Solar Power Plant (project) includes but is not limited to inter alia:

### 1.4. PV Technology Specific Infrastructure

PV systems produce energy by converting solar irradiation into electricity. A PV system consists of PV panels that encase the solar cells. Solar cells are solid-state semiconductor devices that convert light into direct-current electricity. The top layer of the silicon portion of a solar panel is made from a mixture of this silicon and a small amount of phosphorous, which gives it a negative charge. The inner layer, which constitutes the majority of the panel, is a mix of silicon and a little bit of boron, giving it a positive charge.

The place where these two layers meet creates an electric field called a junction. When light (or photons) hits the solar cell, before it gets to the silicon crystal to make electricity it passes through a glass cover on the panel and an anti-reflective coating, which stops photons from reflecting off of the panel and being lost. The photons are absorbed into the junction, which pushes electrons in the silicon out of the way (See Figure 3). If enough photons are absorbed, the electrons are pushed past the junction and flow freely to an external circuit.

To convert the Direct Current (DC) to Alternating Current (AC) an inverter will be used. The AC energy can then be used to power anything that uses electricity. In fact, they are just larger versions of the cells used in solar calculators. The front surface of the solar panel is toughened glass with an anti-reflective coating to maximise the light captured by the solar cells and reduce glare back towards the

atmosphere. The PV panels are predominantly black in appearance – when viewed directly from the front; however, from close-up, a grid of silver contacts is clearly visible.

The proposed PV developments will entail the following infrastructure –

-The DC current is converted to AC current by inverters, the Voltage is stepped up by Transformer and transmitted over transmission network.

The proposed solar farm will consist of the following:

- Photovoltaic component: numerous rows of PV panels and associated support infrastructure to generate electricity, one (1) 20 MW PV Development;
- DC-AC current inverters and transformers.
- PV module generate DC current (12V, 24V, 48V)
- Battery Storage to provide power on demand and reacting to grid variations with the same grid-stabilizing characteristics of conventional power plants through the comprehensive provision of ancillary services.
- Transmission corridor: one overhead transmission line (1.44 kilometres) located within the transmission corridor to connect the proposed onsite substation to the existing main substation, this will follow an existing powerline servitude in the area, to minimise impacts.
- On-site substation: the on-site substation to collect the electricity produced on site and step it up to the correct voltage to transfer via the transmission line to the existing main central substation.
- Buildings: operation and maintenance buildings to house equipment and a guard cabin for security.
- Additional infrastructure: includes a boundary fence for health, safety and security reasons; water supply infrastructure for groundwater abstraction and storm water infrastructure, if required.

## **1.5. Accessibility**

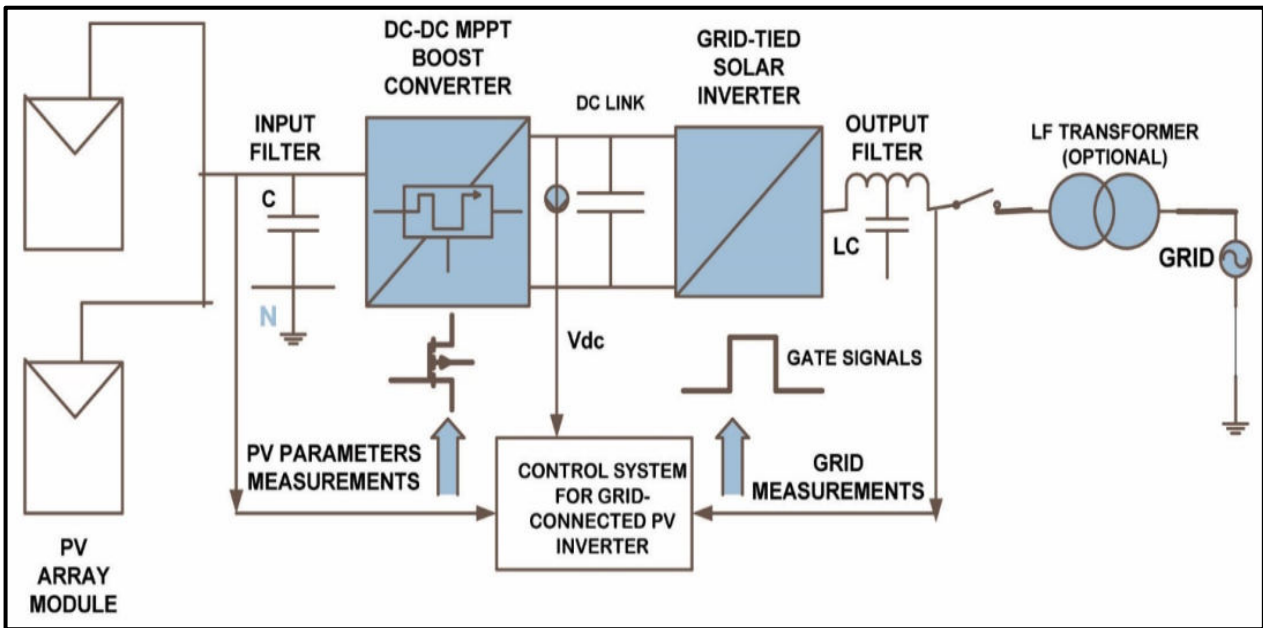
There is an existing access road connecting from the M29 gravel road to the existing Greenam solar plant and connecting to the project site.

## **1.6. Infrastructure and Services**

Water: A borehole will be drilled on site.

Ablution: A sewer ablation system will be established on site to cater for construction and operation phases.

Communication: The site is connected with MTC, TN Mobile and satellite phones.



**Figure 4: Circuit Layout**



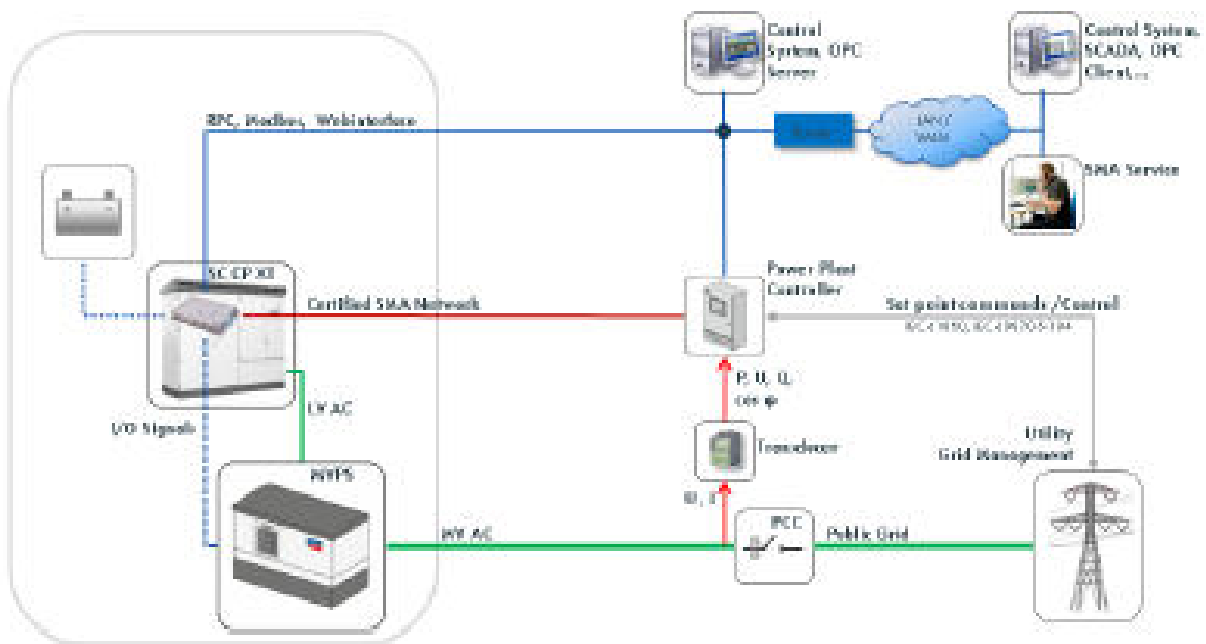
**Figure 5: Completed PV Panel Mounting**



**Figure 6: Completed PV Panel Structures**



**Figure 7: PV Panel Inverters**



**Figure 8: Battery Storage Systems**

Storage systems can dispatch energy at certain peak hours or absorb energy whenever there is an excess available. This is done in a controlled/scheduled manner or automatically reacting to the grid status based on command from the grid operator.

### 1.7. Need and Desirability

Solar (Photovoltaic (PV)) is becoming one of the most important renewable sources of energy in the world, such that most governments promote its development and uses in their countries to supply and or augment existing sources of electricity. The use of solar energy is recommended to reduce the reliance on the currently utilized non-renewable sources and use more of clean and green energy that in the long run have less to no adverse impacts on the environment and renewable. The Government of the Republic of Namibia has put in place several policies such as the Namibia Vision 2030, National Development Plans (NDPs), and the new Harambee Prosperity Plan I (HPP) with the newly launched HPP II that collectively aim to steer the country towards prosperity for the entire Namibian population. The Namibia Vision 2030 is one of the country's new development blueprint covering the period 2004 to 2030 which aims to drive Namibia towards economic, industrial, and social flourish by combining a synergy of policies that will ensure prosperity for all.

Among the NDPs, is the Fifth National Development Plan (NDP5) that extends from 2017/2018 to 2021/2022 and intends to involve up-scaling and modernizing all sectors that contribute to economic development of the country. This national development plan will require that each expanding town be well catered for in terms of coordinating better energy sources thereby necessitating this 100 megawatt alternating current (MWac) Solar Photovoltaic (PV) Park, which is a renewable source of power generation with zero carbon emissions.

The Harambee Prosperity Plans aim to usher the country into a period of economic prosperity, fully supporting initiatives such as the development of renewable energy sources under the Pillars of Energy Infrastructure development. These development policies combined aim to transform Namibia into an industrialized country with a high quality of life for all citizens and take our country to a developed nation status by 2030.

## **1.8. Project Alternatives**

### **1.8.1. Site Location Alternatives**

An integrated site selection study was done in order to identify a suitable site for the proposed solar power plant. The proposed solar plant site is considered highly desirable due to the following considerations:

- Solar resource: Analysis of available data from existing weather stations suggests that the site has sufficient solar resource for a viable solar power plant
- Site extent: Sufficient land was secured from the town council to enable sufficient power supply and to allow for a number of heliostats to make the project feasible.
- Land suitability:

-Sites that facilitate easy construction conditions (relatively flat land with few rock outcrops or water-bodies) were favoured during site selection.

-The site is located in proximity to a sub-station.

-Avoidance of environmentally sensitive areas and fatal flaws.

Consideration of the above criteria resulted in the selection of the preferred site. No further site location alternatives are considered in the EIA process.

### **1.8.2. Site Layout Alternatives**

The PV layout and project component design underwent a number of iterations based on technical aspects and the environmental and social considerations assessed during the EIA process. From a site location perspective, the position of the proposed site infrastructure was determined by the consideration of the following aspects:

-Local topographical conditions.

-Accessibility

-Pre-existing supporting infrastructure

### **1.8.3. NO-GO Alternative**

The current low environmental impact associated with current land use will be maintained and no change in land use or zoning would be required. The status quo needs to be measured against the proposed facility to determine whether the environmental and socio-economic benefits warrant the approval thereof or whether the status quo should be maintained.

This development alternative entails that the proposed PV developments not be constructed on the project site, thus result in the site being left as is. With Namibia's new focus on renewable energy and the targets set the NO-GO option will result in a zero contribution to these targets and no alleviation with regards to the current demand pressures on electricity. The non-development of the proposed PV plant will furthermore impede economic development and socio-economic progress.

Due to the numerous socio-economic benefits of the proposed project and the fact that the identified environmental impacts can be suitably mitigated it has been determined that the No Go option can be eliminated. Should the Competent Authorities (CA) refuse the authorisation of the proposed Solar Farm, the 'No Go' option will be "implemented" and the status quo of the site will remain intact - leaving the site in its present state.

#### **1.8.4. Conclusion**

The project will go ahead and will consider sustainable technologies and reduce materials required when establishing the PV plant. A non-intrusive site has also been identified, to ensure minimal environmental impacts as a result of the project development.



## 2. CHAPTER TWO: POLICY, LEGAL AND ADMINISTRATIVE FRAMEWORK

### 2.1. Introduction

An important part of the EIA is identifying and reviewing the administrative, policy and legislative frameworks concerning the proposed activity, to inform the proponent about the requirements to be fulfilled in undertaking the proposed project. This section looks at the legislative framework within which the proposed development will conform to; the focus is on the compliance with the legislation during the planning, construction and operational phases. All relevant legislations, policies and international statutes applying to the project are highlighted in the table below as specified in the Environmental Management Act, 2007 (Act No.7 of 2007) and the regulations for Environmental Impact Assessment as set out in the Schedule of Government Notice No. 30 (2012).

The project's activities are undertaken in a biophysical and social environment. These activities or some of them may even at minimum impact some of these environmental components. It is therefore necessary to consider the legislations and legal requirements governing the project and its associated activities.

The main legal framework presented herein is that of Namibia for the relevant project component under the scope of this document – detailed legislation that are applicable to the project are given in the EIA Report and then a summary of these that require permitting and licensing for certain project activities. The chapter also presents a summary of the relevant international legislations that are considered for the financing of such projects, specifically the **International Finance Corporation (IFC) Performance Standards and the Equator Principles (EPs), Local and National Legislation (Acts, Polices, Regulations, etc.) and the Environmental Management Act No. 7 of 2007.**

The Environmental Management Act No.7 of 2007 and its 2012 EIA Regulations aims to ensure that the potential impacts of the development on the environment are considered carefully and in good time; that all interested and affected parties have a chance to participate in the environmental assessments and that the findings of the environmental assessments are fully considered before any decisions are made about activities which might affect the environment.

The Act aims at promoting sustainable management of the environment and use of natural resources. The Environmental Management Act (EMA) is broad; it regulates land use development through environmental clearance certification and/or Environmental Impact Assessments. The Act provides for the clearance certification for “ **(1) The construction of facilities for (a) the generation of electricity and (b) transmission and supply of electricity**”.

- **Electricity Act No. 4 of 2007**

The Act provides information on the requirements for electricity generation, trading, transmission, supply, distribution, importation, and export.

**The Electricity Control Board (ECB) of Namibia under the Ministry of Mines & Energy** exercises control over the provision, use and consumption of electricity in Namibia; ensures efficiency and security of electricity provision; ensures a competitive environment in the electricity industry in Namibia; and promotes private sector investment in the electricity industry. The board provides for the requirements and conditions for obtaining licenses for the provision of electricity and to provide for other incidental matters.

**Implication for the proposed project:** The project will involve the generation, supply, and transmission of electricity. If required, ANIREP will need to apply for the relevant license (for electricity transmission) prior to commencing with the operational activities.

- **Namibia's Green Plan, 1992**

In 1992, Namibia's Green Plan was drafted by the Ministry of Environment, Forestry and Tourism. The document analysed the main environmental challenges facing Namibia and specified actions required to address them. This included a strategic plan for integrated and sustainable environmental management, which outlines key focus areas for sustainable development.

Other relevant legislation that was consulted and applicable to the proposed development are presented in **Table 1**.

Apart from the presented Namibian legislation in **Table 1** and the fact that the project is funded by international investors, the proposed project will be obliged to comply with certain International Standards presented under section 3.2. These are as follows:

- The Equator Principles,
- The IFC Performance Standards,
- Multilateral Investment Guarantee Agency (MIGA) of the world Bank Group,
- The United Nations Convention to Combat Desertification (UNCCD) 1992,
- The Convention on Biological Diversity 1992,
- Stockholm Declaration on the Human Environment, Stockholm 1972, and
- Good International Industry Practice (GIIP).

For this Report, **Table 1** presents the information on the legal obligations (legislations, policies, and guidelines) in terms of legislation, **where permitting and/or licensing that may be required from different applicable regulatory authorities as a requirement to the ECC.**

## 2.2. Applicable International Standards, Policies and Conventions

In addition to the Namibian environmental and social legal requirements detailed above, compliance with various International Standards will be required for the ANIREP Project. These are described in Subsections below.

## 2.3. The Equator Principles

A financial industry benchmark for determining, assessing, and managing environmental and social risk in projects (August 2013). The Equator Principles have been developed in conjunction with the International Finance Corporation (IFC), to establish an International Standard with which companies must comply with to apply for approved funding by Equator Principles Financial Institutions (EPFIs). The principles apply to all new project financings globally across all sectors. These principles are an attempt to:

*'...encourage the development of socially responsible projects, which subscribe to appropriately responsible environmental management practices with a minimum negative impact on project-affected ecosystems and community-based upliftment and empowering interactions.'*

The ten (10) Equator Principles governing the projects are listed below:

- **Principle 1: Review and Categorization**
- **Principle 2: Environmental and Social Assessment**
- **Principle 3: Applicable Environmental and Social Standards**
- **Principle 4: Environmental and Social Management System and Equator Principles Action Plan**
- **Principle 5: Stakeholder Engagement**
- **Principle 6: Grievance Mechanism**
- **Principle 7: Independent Review**
- **Principle 8: Covenants**
- **Principle 9: Independent Monitoring and Reporting**
- **Principle 10: Reporting and Transparency**

## 2.4. International Finance Corporation (IFC) Standards

The International Finance Corporation's (IFC) Performance Standards are directed towards clients, providing guidance on how to identify risks and impacts, and are designed to help avoid, mitigate, and manage risks and impacts as a way of doing business in a sustainable way, including stakeholder engagement and disclosure obligations of the client in relation to project-level activities.

In the case of its direct investments (including project and corporate finance provided through financial intermediaries), IFC requires its clients to apply the Performance Standards to manage environmental and social risks and impacts so that development opportunities are enhanced.

IFC uses the Sustainability Framework along with other strategies, policies, and initiatives to direct the business activities of the Corporation to achieve its overall development objectives.

As of 28 October 2018, there are ten (10) Performance Standards (Performance Standards on Environmental and Social Sustainability) that the IFC requires a project Proponent to meet throughout the life of an investment. These standard requirements are briefly described below.

- **Performance Standard 1: Assessment and Management of Environmental and Social Risks and Impacts**

This Standards sets out the Borrower's (Proponent's) responsibilities for assessing, managing, and monitoring environmental and social risks and impacts associated with each stage of a project supported by the Bank through Investment Project Financing (IPF), in order to achieve environmental and social outcomes consistent with the Environmental and Social Standards (ESSs).

- **Performance Standard 2: Labor and Working Conditions**

ESS2 recognizes the importance of employment creation and income generation in the pursuit of poverty reduction and inclusive economic growth. Borrowers can promote sound worker-management relationships and enhance the development benefits of a project by treating workers in the project fairly and providing safe and healthy working conditions.

- **Performance Standard 3: Resource Efficient and Pollution Prevention and Management**

The Standard recognizes that economic activity and urbanization often generate pollution to air, water, and land, and consume finite resources that may threaten people, ecosystem services and the environment at the local, regional, and global levels. This ESS sets out the requirements to address resource efficiency and pollution prevention and management throughout the project life cycle.

- **Performance Standard 4: Community Health and Safety**

ESS4 addresses the health, safety, and security risks and impacts on project-affected communities and the corresponding responsibility of Borrowers to avoid or minimize such risks and impacts, with particular attention to people who, because of their circumstances, may be vulnerable.

- **Performance Standard 5: Land Acquisition, Restrictions on Land Use, and Involuntary Resettlement**

Involuntary resettlement should be avoided. Where involuntary resettlement is unavoidable, it will be minimized and appropriate measures to mitigate adverse impacts on displaced persons (and on host communities receiving displaced persons) will be carefully planned and implemented.

- **Performance Standard 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources**

This Standard recognizes that protecting and conserving biodiversity and sustainably managing living natural resources are fundamental to sustainable development and it recognizes the importance of maintaining core ecological functions of habitats, including forests, and the biodiversity they support.

ESS6 also addresses sustainable management of primary production and harvesting of living natural resources and recognizes the need to consider the livelihood of project-affected parties, including Indigenous Peoples whose access to, or use of, biodiversity or living natural resources may be affected by a project.

- **Performance Standard 7: Indigenous Peoples/Sub-Saharan African Historically Underserved Traditional Local Communities**

It ensures that the development process fosters full respect for the human rights, dignity, aspirations, identity, culture, and natural resource-based livelihoods of Indigenous Peoples/Sub-Saharan African Historically Underserved Traditional Local Communities. ESS7 is also meant to avoid adverse impacts of projects on Indigenous Peoples/Sub-Saharan African Historically Underserved Traditional Local Communities, or when avoidance is not possible, to minimize, mitigate and/or compensate for such impacts.

- **Performance Standard 8: Cultural Heritage**

The ESS8 recognizes that cultural heritage provides continuity in tangible and intangible forms between the past, present and future. ESS8 sets out measures designed to protect cultural heritage throughout the project life cycle.

- **Performance Standard 9: Financial Intermediaries (FIs)**

ESS9 recognizes that strong domestic capital and financial markets and access to finance are important for economic development, growth, and poverty reduction. FIs are required to monitor and manage the environmental and social risks and impacts of their portfolio and FI subprojects, and monitor portfolio risk, as appropriate to the nature of intermediated financing.

The way in which the FI will manage its portfolio will take various forms, depending on several considerations, including the capacity of the FI and the nature and scope of the funding to be provided by the FI.

- **Performance Standard 10: Stakeholder Engagement and Information**

ESS10 recognizes the importance of open and transparent engagement between the Borrower and project stakeholders as an essential element of good international practice. Effective stakeholder engagement can improve the environmental and social sustainability of projects, enhance project acceptance, and make a significant contribution to successful project design and implementation.

A full description of the IFC Standards can be obtained from [http://www.worldbank.org/en/projects-operations/environmental-and-social-framework/brief/environmental-and-social-standards?cg\\_ck=1522164538151#ess1](http://www.worldbank.org/en/projects-operations/environmental-and-social-framework/brief/environmental-and-social-standards?cg_ck=1522164538151#ess1).

## **2.5. The Multilateral Investment Guarantee Agency (MIGA) of the World Bank Group**

The project activities are also required to comply with the MIGA's Policy on Environmental and Social Sustainability.

This policy applies to all investment guarantees initiated after October 2013. The 2007 editions of the Policy on Social and Environmental Sustainability and Performance Standards apply to investment guarantees for which Definitive Applications were received after October 2007 and prior to October 2013. The Agency also adheres to the World Bank Group's Environmental, Health, and Safety Guidelines as available on the IFC' website (MIGA ,2012-2021a).

In accordance with our policies, we categorize projects based on an assessment of their likely environmental and social impacts. In accordance with the MIGA policies, the project investments are categorized into six categories (A to F) based on an assessment of their likely environmental and social impacts. According to MIGA (2012-2021a), The ANIREP Project investment has been listed as a Category B Project. The Category B Project is defined as *'if it may have potentially limited adverse social or environmental impacts that are few, generally site specific, largely reversible, and readily addressed through mitigation measures.'*

The development impact by MIGA stated that Namibia currently faces a significant energy shortage and has only been able to meet its energy needs through costly energy imports from its neighbouring countries. The expected development impact from the Project include: (i) diversification of Namibia's energy mix; (ii) contribution to increased generation capacity in Namibia; (iii) reduction of carbon emissions by producing green, emission-free electricity; (iv) promotion of employment and skills development during construction and operation and (v) providing positive demonstration effects for solar development in Namibia and neighbouring countries (MIGA ,2012-2021b).

The proposed project is aligned with MIGA's priorities of facilitating investments that address climate change.

## **2.6. The United Nations Convention to Combat Desertification (UNCCD) 1992**

The Convention addresses land degradation in arid regions with the purpose to contribute to the conservation and sustainable use of biodiversity and the mitigation of climate change.

The convention's objective is to forge a global partnership to reverse and prevent desertification/land degradation and to mitigate the effects of drought in affected areas to support poverty reduction and environmental sustainability.

**Project requirement/applicability:** The project activities should not be carried out in such a way that they contribute to desertification.

## **2.7. The Convention on Biological Diversity 1992**

Convention on Biological Diversity 1992 Regulate or manage biological resources important for the conservation of biological diversity whether within or outside protected areas, with a view to ensuring their conservation and sustainable use. It promotes the protection of ecosystems, natural habitats, and the maintenance of viable populations of species in natural surroundings.

**Project requirement/applicability:** Removal of vegetation cover and destruction of natural habitats should be avoided and where not possible minimised.

## **2.8. Stockholm Declaration on the Human Environment, Stockholm (1972)**

It recognizes the need for: “a common outlook and common principles to inspire and guide the people of the world in the preservation and enhancement of the human environment.

**Project requirement/applicability:** Protection of natural resources and prevention of any form of pollution.

## **2.9. Good International Industry Practice (GIIP)**

In addition to legislation provided by local Government bodies, the World Bank Group and IFC have provided a range of technical reference documents with general and industry-specific examples of Good International Industry Practice ('GIIP'). The Environmental, Health, and Safety (EHS) Guidelines are technical reference documents with general and industry specific examples of GIIP 1. These industry sector EHS guidelines are designed to be used together with the General EHS Guidelines document, which provides guidance to users on common EHS issues potentially applicable to all industry sectors. These EHS guidelines can be considered relevant to the proposed project in terms of local transmission and distribution to the adjacent NamPower Substation. These general Guidelines, as applicable to the proposed project, have been incorporated into the ANIREP's Environmental Management Plan (EMP).

The legal requirements above have been listed and explained as per their relevance to the project. The project is being carried in an environment that is sensitive in terms of its biophysical and social features. The potential and known impacts that have been assessed in the initial environmental report of the project were identified based on these environmental components/features in terms of their sensitivities to the project activities.

The environmental baseline of the project area has been presented in the EIA Report prepared by Risk Based Solutions and can be obtained from that Report.

The baseline of the environmental components on which the project impacts were identified at the time of the environmental clearance assessment was done for the site in 2015 and environmental management measures were provided for implementation. It is crucial that the implementation responsibilities of these measures are clearly indicated. Therefore, to ensure continued effective implementation of the management and mitigation measures to achieve environmental protection and management as well as sustainable development, the implementation responsibilities need to be assigned to all vital parties that are involved in the project. This is to ensure that all onsite personnel are aware of what is required of them throughout the project phases. These roles and responsibilities are presented under the Environmental Management Plan section.

**Table 1: Policies, legal and administrative regulations**

Legislation/Policy/ Guideline	Relevant Provisions	Implications for this project
Environmental Management Act EMA (No 7 of 2007)	Requires that projects with significant environmental impacts are subject to an environmental assessment process (Section 27).  The details principles which are to guide all EAs.	The EMA and its regulations should inform and guide this EA process.  <b>ECC Renewal:</b> An ECC should be renewed every 3 years prior to its expiry date (as indicated on the new ECC format). The contact details at the Department of Environmental Affairs and Forestry (DEAF) are as follows:
Environmental Impact Assessment (EIA) Regulations GN 28-30 (GG 4878)  <b>Regulated under the Ministry of Environment, Forestry and Tourism</b>	Details requirements for public consultation within a given environmental assessment process (GN No 30 S21).  The details the requirements for what should be included in an Environmental Scoping Report (GN No 30 S8) and an EIA report (GN No 30 S15) were already incorporated in the initial reports submitted for the expired ECC in 2015.	Tel.: 061 284 2701 OR Environmental Assessment Unit Mr. Damian Nchindo, Tel: 061 284 2717, Email: <a href="mailto:damian.nchindo@met.gov.na">damian.nchindo@met.gov.na</a> or <a href="mailto:eie@met.gov.na">eie@met.gov.na</a>  The project is already in its operational phase. However, if necessary and required, constant consultations and engagements with the interested and affected parties (stakeholders) should be continued. In case of grievances raised by the neighbouring land users or their host (Owner at Kokerboom) to the Proponent, this should be addressed and resolved amicably.



Legislation/Policy/ Guideline	Relevant Provisions	Implications for this project
<p>Electricity Act No. 4 of 2007</p> <p><b>Regulated under the Ministry of Mine and Energy (with Licensing issued by the Electricity Control Board (ECB) of Namibia)</b></p>	<p>All the relevant electricity permits, and license (such as <b>generation</b>, distribution, and supply licenses) should be applied for and obtained from the relevant regulatory authorities. The relevant Part if Part 4 (License, section 17 – Duty to obtain a license or licenses. Subsection 1 (a) generation and (d) supply of electricity.</p>	<p>The Proponent should comply with the relevant Sections of Part 4 of the Act that govern the proposed project activities and ensure timely renewals or as stipulated. The General License should be renewed on time as per the existing License conditions. <b><u>The Proponent should also notify the ECB (for approval) of any intentions to change or amend the License.</u></b></p> <p><b>Electricity Control Board (ECB) of Namibia</b></p> <p><b><a href="mailto:info@ecb.org.na">info@ecb.org.na</a></b></p> <p><b>Tel: +264 (0) 61 374 300 (switchboard) OR contact</b></p> <p><b>Mr. Francois Robinson: Manager: Regulatory Support Services</b></p> <p><b>Tel: +264 (0) 61 374 319</b></p> <p><b>Email: <a href="mailto:frobinson@ecb.org.na">frobinson@ecb.org.na</a></b></p>
<p>Soil Conservation Act (No 76 of 1969)</p> <p><b>Regulated under the Ministry of Agriculture, Water and Land Reform</b></p>	<p>The Act makes provision for the prevention and control of soil erosion and the protection, improvement and conservation of soil, vegetation and water supply sources and resources, through directives declared by the Minister.</p>	<p>Duty of care must be applied to soil conservation and management measures must be included in the EMP. This is mainly aimed at soil disturbance through unnecessary creation of new tracks and pollution from project related activities.</p>

Legislation/Policy/ Guideline	Relevant Provisions	Implications for this project
Petroleum Products and Energy Act (No. 13 of 1990) Regulations (2001)  <b>Regulated under the Ministry of Mine and Energy</b>	Regulation 3(2)(b) states that “No person shall possess or store any fuel except under authority of a licence or a certificate, excluding a person who possesses or stores such fuel in a quantity of 600 litres or less in any container kept at a place outside a local authority area”	There are no fuel tanks kept on site. However, care must be exercised when handling hydrocarbon products on site, regardless of volume.
Forestry Act 12 of 2001  <b>Regulated under the Ministry of Environment, Forestry and Tourism</b>	Prohibits the removal of any vegetation within 100 m from a watercourse (Forestry Act Section 22(1)). The Act prohibits the removal of and transport of various protected plant species.	There is seldom appearance of small desert vegetation at very few areas of the site. Although not considered protected species, they should not be disturbed nor destroyed.
The National Heritage Act (No. 27 of 2004)  The National Monuments Act (No. 28 of 1969)  <b>Regulated under the Ministry of Education, Arts and Culture</b>	The Act extends the protection of archaeological and historical sites to private and communal land and defines permit procedures regarding activities at such sites.  The Act enables the proclamation of national monuments and protects archaeological sites.	Should heritage resources (e.g., human remains, etc.) are discovered at some point on and or around the site, these should be reported to the National Heritage Council of Namibia for relocation.  <b>Contact: Ms. Agnes Shiningayamwe (Regional Heritage Officer)</b>  Tel: 061 301 903, Email: <a href="mailto:rho1@nhc-nam.org">rho1@nhc-nam.org</a>
Pollution Control and Waste Management Bill  <b>Regulated under the Ministry of Environment, Forestry and Tourism</b>	The bill aims to “prevent and regulate the discharge of pollutants to the air, water and land” Of particular reference to the Project is: Section 21 “(1) Subject to sub-section (4) and section 22, no person shall cause or permit the discharge of pollutants or waste into any water or watercourse.”	The Proponent and their workers should continue with the good waste management work (directly or indirectly) to ensure that the waste does not cause environmental threat and risk.  <b>No permit or license required.</b>

Legislation/Policy/ Guideline	Relevant Provisions	Implications for this project
	Section 55 “(1) No person may produce, collect, transport, sort, recover, treat, store, dispose of or otherwise manage waste in a manner that results in or creates a significant risk of harm to human health or the environment.”	
Public Health Act (No. 36 of 1919)	Section 119 states that “no person shall cause a nuisance or shall suffer to exist on any land or premises owned or occupied by him or of which he is in charge any nuisance or other condition liable to be injurious or dangerous to health.”	The Proponent and all its employees should ensure compliance with the provisions of these legal instruments.  <b>No permit or license required.</b>
Health and Safety Regulations GN 156/1997 (GG 1617)	Details various requirements regarding health and safety of labourers.	
Public and Environmental Health Act No. 1 of 2015  <b>Regulated under the Ministry of Health and Social Services</b>	To provide a framework for a structured uniform public and environmental health system in Namibia; and to provide for incidental matters.	
Road Traffic and Transport Act, No. 22 of 1999  <b>Regulated under the Ministry of Works and Transport</b>	The Act provides for the establishment of the Transportation Commission of Namibia; for the control of traffic on public roads, the licensing of drivers, the registration and licensing of vehicles, the control and regulation of road transport across Namibia's borders; and for matters incidental thereto.	Mitigation measures should be provided for if the roads and traffic impact cannot be avoided. The relevant access road permits must therefore be applied for.

Legislation/Policy/ Guideline	Relevant Provisions	Implications for this project
<p>Labour Act (No. 6 of 1992)</p> <p><b>Regulated under the Ministry of Labour, Industrial Relations and Employment Creation</b></p>	<p>Ministry of Labour (MOL) is aimed at ensuring harmonious labour relations through promoting social justice, occupational health and safety and enhanced labour market services for the benefit of all Namibians. This ministry ensures effective implementation of the Labour Act No. 6 of 1992, specifically its Regulations, No. 156 Labour Act, 1992: Regulations relating to the health and safety of employees at work</p>	<p>The Proponent should ensure that the Solar Park operations, and maintenance works, do not compromise the safety and welfare of workers.</p> <p><b>No permit or license required.</b></p>

### 3. EXPECTED ENVIRONMENTAL IMPACTS

#### 3.1. Introduction

From previous experience with developments of this nature and comments received from Affected Parties, a solar plant and associated transmission lines might have the following key impacts on the receiving environment:

##### **Socio-economic impacts:**

- Additional employment will be created during construction and operation
- Green energy will be generated
- Namibia's reliance on imported electricity will be lowered
- Stock theft and illegal hunting might increase during construction
- Noise and dust pollution from construction operations.
- Community health issues - transmission of diseases from construction team and support staff to local community
- Increase in criminal activities
- Cultural/heritage impacts
- Increase of traffic on nearby roads

##### **Biophysical impacts:**

- Surface drainage and stormwater impacts including sedimentation and erosion (flow of surface draining systems might be disturbed)
- Impact on surface water resources
- Possibility of air pollution (dust during construction)
- Possibility of noise pollution
- Visually the site might be unpleasing
- Effect on natural and general ambience of the area and surroundings
- Effect on vegetation (grass, shrubs and trees directly in areas to be cleared for construction of infrastructure)
- Impact on agricultural resources
- Effect on movement of animals
- Effect on birds (the overhead powerlines)
- Concerns if the area can be restored / rehabilitated to an acceptable status once the infrastructure have been constructed and / or removed
- Impact of construction waste on the environment
- Storage of hazardous substances on site
- Disposal of end-of-life solar panels / batteries

Although it is generally accepted that a photovoltaic plant with battery storage is one of the most environmentally friendly ways of generating and storing electricity there are concerns on what happens once the solar panels or batteries reach the end of its efficient production life. In general, solar panels have an efficient lifespan of 20 – 30 years whereafter it must be replaced to ensure efficient generation of electricity. The expected efficient lifespan of lithium-ion (Li-ion) batteries are ±5 years whereafter it must be replaced.

Solar panels are recyclable, although infrastructure to collect, process, and repurpose the equipment is lacking in Namibia. The end-of-life panels are crushed and the different materials – glass, aluminium frames, connection housing, cables – are separated. These materials are then sorted extremely precisely and reused in other industrial sectors: for example, the glass is recovered as clean cullet for glass manufacturing and the plastic becomes recovered fuel for cement works. In total, 94% of panel components are recovered, the remaining 6%, in the form of dust, is captured by filters and sometimes used as a substitute for sand in the construction industry. Other types of panel technology (such as cadmium telluride panels, which account for about 30% of volume) are sent to other specialist treatment plants. It is expected that facilities for the recycling of solar panels will be developed in Namibia over time as the use of solar panels increase.

## 4. CHAPTER THREE: RECEIVING ENVIRONMENT

### 4.1. Introduction

In this chapter, the findings of the EIA Team on baseline surveys, public consultation and desk reviews undertaken are in respect to the ecology, society, economy and geo-political set up of the proposed project area. The geological make up and meteorology of the project site will also be discussed in this chapter to give an in-depth understanding of the project area in question.

### 4.2. Socio-Economic status

The The project development is proposed by Keetmanshoop urban, and the statistics shown below are derived from the 2011 Namibia Population and Housing Census (Namibia Statistics Agency, 2013), and presented from a local and regional perspective.

**Table 2: Statistics of the Keetmanshoop Urban Constituency and //Karas Region (Namibia Statistics Agency, 2011)**

Attribute	Indicator
<b>Keetmanshoop Urban</b>	
Population	19,447
Females	9,970
Males	9,477
Population under 5 years	11%
Population aged 5 to 14 years	20%
Population aged 15 to 59 years	63%
Population aged 60 years and above	7%
Female: male ratio	95:92
Literacy rate of 15 years old and above	97%
People above 15 years who have never attended school	3%
People above 15 years who are currently attending school	12%
People above 15 years who have left school	83%
People aged 15 years and up who belong to the labour force	72%
Population employed	65%
Homemakers	10%
Students	44%
Income from pension	10%
Income from business and non-farming activities	7%
Income from farming	1%
Income from cash remittance	5%
Wages and salaries	73%
<b>//KARAS REGION</b>	
Population	77,421

Rural population	46%
Females	38,014
Males	39,407
Main Language	Afrikaans (36%)

The construction team will be based in Keetmanshoop. As with most parts of Namibia, HIV/Aids is also a significant issue in Karas Region, therefore awareness session must be conducted with construction team prior to the start of the project

In this respect, the proposed development will propel the local economy during construction and operation through employment creation as well as backward and forward economic linkages emanating from the proposed development.

### 4.3. Climate

#### 4.3.1. Precipitation

**Classification of climate:** The climate in Keetmanshoop is classified as BWh by Köppen and Geiger. It is situated in a semi-desert climate.

**Average rainfall:** There is virtually no rainfall during the year, in a year, the average rainfall is 231mm

**Temperature:** In Keetmanshoop, the average annual temperature is 21.8°C. There is high evaporation and high daytime temperatures.

#### 4.3.2. Temperature

The area has a desert climate prevailing. The daytime temperature is warm to hot, while it can also be cold at night. The average annual temperature is 26° degrees. It is dry for 265 days a year with an average humidity of 35% and an UV-index of 5. The general local project area has the following three temperatures related seasons:

- A dry and relatively cool season from April to August with average daytime highs of 23°C and virtually no rainfall during this period;
- A hot and dry season from September to December with minimal and variable rainfall falling (<20mm per month) and average daytime highs of 30°C, which regularly exceed 40°C, and;
- A hot and dry season from September to December with minimal and variable rainfall falling (50mm per month falling during this period (although this is extremely variable) and average high temperatures of 29°C.

#### 4.3.3. Wind Patterns

The prevailing winds in the general area, seems to be dominated by winds from the east, south eastern and southwest quadrants. Locally, the situation may be different due various influences



including topographic surroundings effects and structures. Seasonal variations in the wind fields are presented by the regional average wind data for January, April, July and October. An increase in the north to north-easterly winds during summer (January) and autumn (April) is likely. Winter months may be characterised by the highest frequency of these north-eastern winds.

Generally, the southerly and south-westerly winds that are prevalent in this part of Namibia and may reach a maximum speed of 30.6 m/s particularly during the dry summer periods. During the rainy season, winds are much more variable, typically with low average velocities. Low clouds and dust storms sometimes affect the visibility but the influence is limited to fewer than five hours or even minute.

#### 4.4. Terrestrial Ecology

##### 4.4.1. Flora

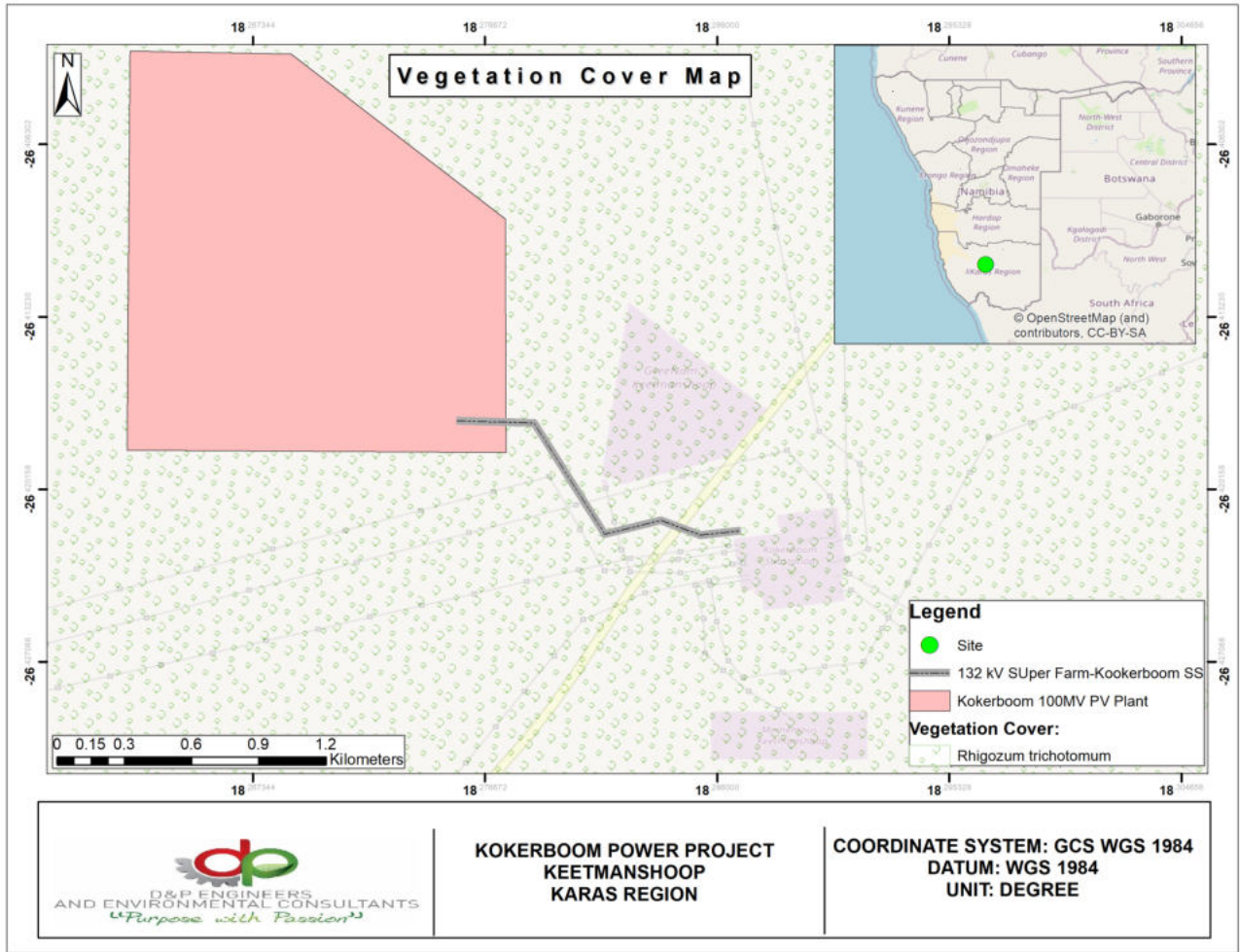
The vegetation in Keetmanshoop and surroundings where the solar plant and transmission line will be constructed and operated forms part of the Nama Karoo Biome. The vegetation type in the area is that of Karas Dwarf Shrubland. On the plains, an open tall shrubland, with a relatively high grass cover, is found. The total number of species is estimated to be around 259. Shrubs such as *Catophractes alexandri*, *Boscia foetida*, *Parkinsonia africana* and *Rhigozum trichotomum* dominate the vegetation. On the dolerite outcrops the vegetation is characterized by a short open woodland formed by the distinctive *Aloe dichotoma* (Quiver Tree). It is however noted that no such outcrops are situated within or in close proximity to the project site. The project site is showing evidence of human inference, informal tracks are present on some areas of the site and a few gravel roads are present and some vegetation was cleared.



**Figure 9: Shrubs and grass cover over the project area**

The project area has an open patch of overgrazed grassland and browsed shrubs within the project environment. There are no major trees or protected plant species within the envisaged development area.

The vegetation cover map below gives an overview of vegetation coverage in the area.



**Figure 10: Vegetation cover structure and type**

**4.5. Fauna**

Farms Klein Spitskop is already affected by existing Kokerboom Nampower sub station, GreeNam solar plant operational activities as well as farm activities such as general cattle grazing and farm infrastructure erection within the project area.

The general area has limited occurrence of wildlife due to the aridity and farming activities proliferation of the project area. Animals said to be occurring predominantly within the project area are springbok, eland, kudu, zebra and small animals such as rabbits and squirrels. No wildlife was observed during the baseline assessment of the project area.

Domestic animals such as cattle, sheep and goats are domesticated at Farm Klein Spitskop for farm subsistence. In general, the proposed project will not have any detrimental and irreversible effect on the general fauna carrying capacity of the project area.

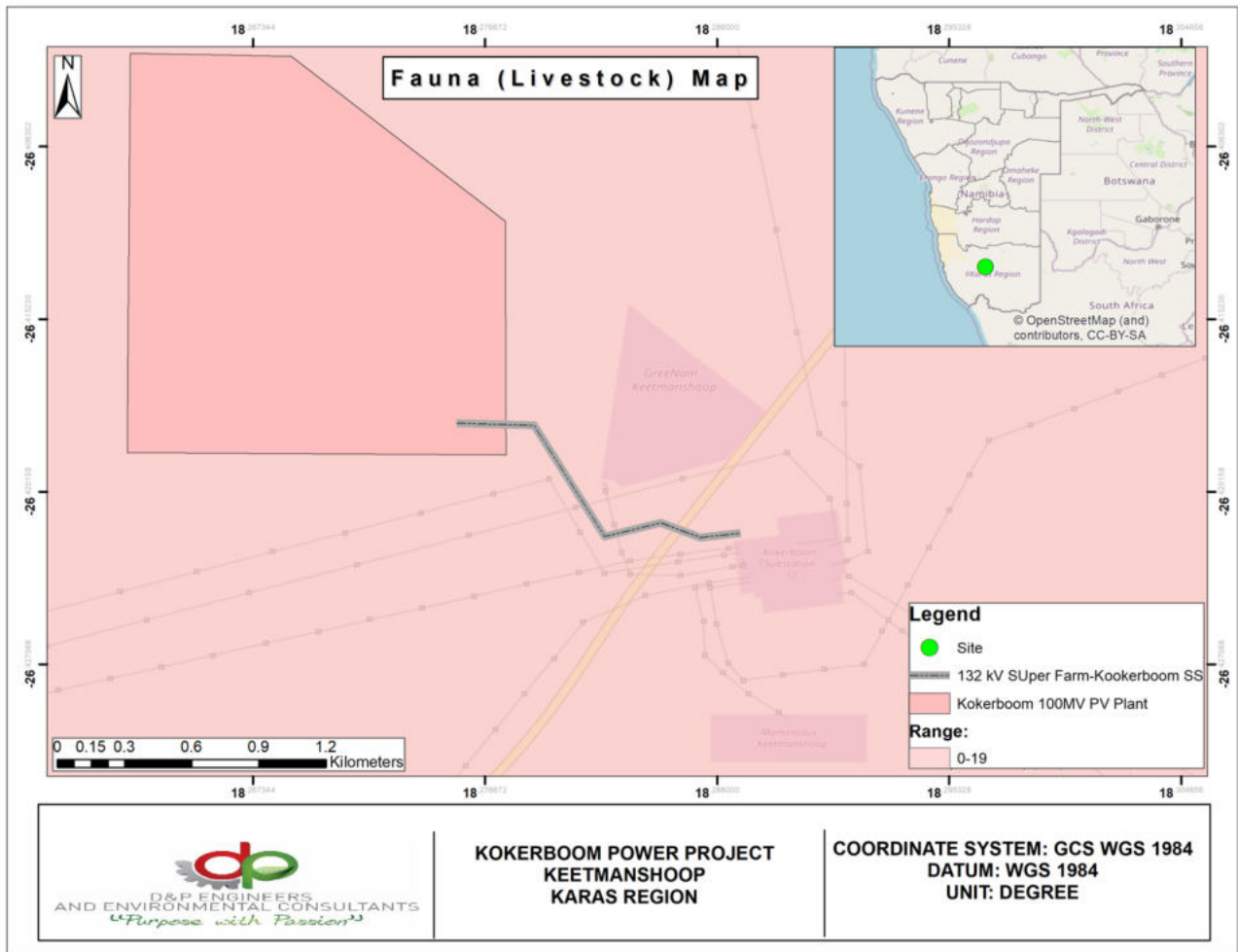


Figure 11: Fauna -Livestock occurrence ion the project area

#### 4.5.1. Amphibians Diversity

The overall reptile diversity in the Keetmanshoop area is estimated at between 41 to 50 species (Mendelsohn et al. 2002). The most important reptiles in the general Keetmanshoop area are viewed as those classified as vulnerable and protected game under Namibian legislation, these being the *Leopard tortoise (Stigmochelys pardalis)*, *Kalahari tent tortoise (Psammobates oculiferus)*, *Bushmanland tent tortoise (Psammobates tentorius verroxii)*, *Southern African python (Python natalensis)* and *Rock Monitor (Varanus albigularis)*.

The amphibian diversity at the project site will be restricted by the lack of suitable habitat: the project area is characterised by low rainfall and limited catchments with which water could remain stored for extended periods of time.

#### 4.5.2. Mammals Diversity

Of the at least 88 species of mammals known and/or expected to occur in the general Karas/Hardap areas, 10 species (11.4%) as endemic while the Namibian legislation further classifies 5 species as vulnerable, 2 species as rare, 3 species as specially protected game, 9 species as protected game and 5 species as insufficiently known.

Common mammalian species expected to occur at and around the project site include Cape ground squirrel (*Xerus inauris*), Springbok (*Antidorcas marsupialis*), Jackal (*Canis mesomelas*), Kudu (*Tragelaphus strepsiceros*), Steenbok (*Raphicerus campestris*), African Caracal (*Caracal caracal*) and Cape ground squirrel (*Xerus inauris*). The most important species from the general area are probably those classified as rare (e.g. *Cistugo seabrai* & *Atelerix frontalis angolae*) and vulnerable (e.g. *Galago moholi*, *Proteles cristatus*, *Hyaena brunnea*, *Acinonyx jubatus*, *Felis silvestris*, *Otocyon mega loti* and *Vulpes chama* (IUCN 2016).

#### 4.5.3. Reptile Biogeography

The overall reptile diversity in the Keetmanshoop area is estimated at between 41 to 50 species (Mendelsohn et al. 2002). The most important reptiles in the general Keetmanshoop area are viewed as those classified as vulnerable and protected game under Namibian legislation, these being the Leopard tortoise (*Stigmochelys pardalis*), Kalahari tent tortoise (*Psammobates oculiferus*), Bushmanland tent tortoise (*Psammobates tentorius verroxii*), Southern African python (*Python natalensis*) and Rock Monitor (*Varanus albigularis*).

The high percentage of endemic reptile species (43%) associated with the rocky escarpment region of southern Namibia underscores the importance of this area without formal state protection. The most important species expected to occur in the general area are viewed as the tortoise *Stigmochelys pardalis*; pythons – *P. anchietae* and *P. natalensis*–*Varanus albigularis* and some of the endemic and little known gecko species – e.g. *Pachydactylus* species. Tortoises, snakes and monitor lizards are routinely killed for food or as perceived threats. Other important species are those viewed as “rare” – i.e. *Rhinotyphlops lalandei*, *Mehelya vernayi* & *Afroedura africana* – although very little is known about these species. An important, albeit little known and understudied species occurring in the Karibib area, is the Namibian Wolf Snake (*Lycophidion namibianum*) (Haacke and Branch pers. com.). Indiscriminate killing of snakes is a threat to little known species. The most important habitat is the rocky outcrops and the project area will not affect rocky kopjes.

#### 4.6. Avifauna

One of the most crucial aspects of this EIAR, is in relation to avifauna in the project environment because of the proposed 1.5km electricity transmission line. Power lines worldwide kill thousands of birds each year (Bevanger 1998, Lehman et al. 2007) either by electrocution or by direct collision. The NamPower/Namibia Nature Foundation Strategic Partnership (<http://www.nnf.org.na/project/nampowernnf-partnership/13/5/5.html>) has documented wildlife and power line incidents from 2006 to the end of 2016, involving some 630 animals, mostly birds.

Examples of power line incidents (mainly collisions, but also electrocutions) recorded in the vicinity of the study area to date are shown in Figure 27 (NamPower/NNF Strategic Partnership database, EIS 2017). Obviously, many more incidents have been recorded throughout the country.

On Limited bird activities were observed during the site visit. There are 10 Endemic and 26 Near Endemic resident species occupying the Quarter Degree Square within which the site is located. The residents have 4 listed species, these being two (2) Near Threatened, and two (2) Vulnerable. The Vulnerable species identified within the area are the Kori Bustard (*Ardeotis kori*) and Martial Eagle (*Polemaetus bellicosus*).

Bustards are susceptible to collisions due to their nomadic habits, a large body size with low maneuverability, and a visual "blind spot" when flying forwards (Martin & Shaw 2010). This proneness to collision is believed to be shared by korhaans, and has also been demonstrated in vultures, storks, snake-eagles and other groups. High mobility of bird species, e.g. among ephemeral food sources, may also render them more prone to power line interactions.



**Figure 12: Observed Bird fatalities on existing powerline**

The consultant observed bird fatalities along the Kokerboom-Luderitz powerline, this indicated the need to ensure that ANIREP installs bird flight detectors on their powerline for visibility.



**Figure 13: Farming land use on the other portion of Farm Klein Spitskop**

Observed on the project area within its surrounding, the farmer has a demarcated area for cattle, goat and sheep farming. The consultant took time to observe and establish the potential interference of the development with existing activities. There is a clear restriction between farming area and solar/energy generation designated area. There will be minimal to no impacts on the farming activities.

The farm relies on borehole water and pollution prevention will be ensured at all times through compliance monitoring and borehole water analysis (level and quality) on a quarterly basis.

## 4.7. Ground components

### 4.7.1. Local Geology

The surroundings of Keetmanshoop in southern Namibia are characterized by the bizarre rock formations of the Keetmanshoop Dolerite Complex, which is allied to the incipient break-up of the Gondwana supercontinent that united the landmasses of the southern hemisphere. Interspersed with sedimentary rocks of the Karoo Supergroup, which demonstrate a major climate change from glacial to subtropical, the dolerite covers an area of more than 18 000km, verging on the Kalahari sandveld (Ministry of Mines and Energy).

The information suggests that the area in general has poor groundwater potential and the predominant geology in the area results in very little risk of groundwater contamination, *unless* pollutants end up in geological structures acting as preferential groundwater flow paths (faults or open joints) or along the river courses where groundwater flow in the alluvial sediments will be higher. Under such conditions the transmissivity is higher; therefore, the potential to easily transmit pollutants can also be moderate to high.

Groundwater pollution can have a negative effect on the receiving environment as well as on the surrounding areas. Soil, geological and geo-hydrological characteristics of the site indicate that the potential significance that water resources will be damaged is very small. For ground water to be contaminated, large amounts of oil or fuel will have to seep through the soil over a period. The Water Resource Management Act (No. 24 of 2004) stipulates that even the potential source of pollution still requires attention namely planning, controlling and managing the possible pollution of the receiving environment as the cumulative impact of many environmentally harmful incidents will in the long run have a detrimental impact on the downstream water sources, resources and users. With precautionary measures that are in place, groundwater contamination is easily prevented, and the proposed operations are not expected to have a detrimental impact on water resources in the area.

The Hydrogeological Map of Namibia shows that the study area falls in a zone of rock bodies with little groundwater potential (generally low; locally moderate potential) in an area of metamorphic rocks.

It can therefore be concluded that the geological and geohydrological settings limit the flux of groundwater between different groundwater bodies or aquifers in the bedrock, thus limiting the movement of potential pollutants within this rock type; limit the probability that groundwater utilisation in one area will adversely affect groundwater availability in surrounding areas and could result in higher flux within homogenous layers (Geological Survey of Namibia, 2015).

#### **4.7.2. Surface Water and Water Sources**

Water supply around farm Klein Spitskop is from the farm homestead which is located about 10km from the project site. Groundwater resources are also used to supply water a network of boreholes in the area. Groundwater as well as surface water (only during the rainy season) from ephemeral river channels is the sources of water supply in the area as well as much of the Karas Region.

Surface water flow in a catchment is largely determined by rainfall (quantity and intensity), potential evapotranspiration and catchment relief. A drainage system comprises all the elements of the landscape through which or over which water travels within that drainage basin. These elements include the soil, vegetation growing on it, geological materials underlying the soil, stream channels carrying surface water and the zones where water is held in the soil and moves below the surface. It also includes constructed elements such as pipes and culverts, cleared and compacted land surfaces, and pavement and other impervious surfaces unable to absorb water. The hydrology of a region is thus characterised by the collection, movement and storage of water through a drainage basin.

Alteration of a natural drainage basin through for instance urbanisation can impose dramatic changes in the movement and storage of water. These changes can have negative impacts on other parties that use water for industrial, domestic and livestock watering purposes in the immediate vicinity or downstream.

Increased storm water and run-off due to vegetation removal during construction can cause pollution. Potential pollution can also be due to storage, handling or spillage of hazardous substances and chemicals, potential pollution due to transportation and due to sewage disposal and storm water.

Erosion and sedimentation could result from soils that are being exposed during the clearing of land, grading and the installation of underground utilities namely water pipes or related infrastructure, etc. Erosion and sedimentation could further result in the degradation of habitats in the rainy season. Severe impacts may occur if erosion and sedimentation impacts are not taken into consideration namely loss of valuable topsoil, vegetation and habitat.

The infrastructure that will be constructed on the site is believed to have a limited impact on erosion and sedimentation since drainage channels will be kept open and will be incorporated in the operations.

### 4.7.3. Water Vulnerability

The proposed project is likely to have no major negative impacts on the water resources. The local area does not seem to have economic water resources. Therefore, the development of the proposed project is likely to have no negative impacts on water resources. The combined effects of unsaturated and saturated flow probabilities were used as indicator for groundwater vulnerability. However, groundwater or surface water will only be vulnerable to contamination if the following three (3) component are all present at the same time and at a site-specific area within project area:

(i) Contaminant sources resulting from proposed construction programme;

(i) Potential pathways for contaminant migration such as major high order discontinuities (ephemeral river channels, valleys and gullies;

(ii) (iii) Targets (economic water resources) present within the project area. Overall, the limited local groundwater resources found in the area form part of the poorly developed metamorphic rocks based confined and unconfined aquifer system that is moderately vulnerable to any sources of pollution

### 4.8. Culture, Heritage and Archaeology

The proposed construction activities is not taking place in an area that has significant archaeological or heritage resources. However, should these be encountered during the upgrade activities, mitigation measures need to be in place to ensure that these resources are not harmed. Without any mitigation measures implemented, the impact can be rated as of a “low” significance. After the implementation of the mitigations, the impact will be still retain “low” rating.

The sites with historical significance are in Keetmanshoop Urban and the Quiver tree forest, site surveys in both of these EPLs did not yield any sites of historical significance. and therefore, the impact is expected to be **LOW**.



## 5. CHAPTER FOUR: PUBLIC CONSULTATION

Public and Stakeholder involvement, is a key component of the EA process. The public consultation process, as set out in Section 21 of Regulation No 30 of EMA, has been followed during this assessment and the details thereof documented below.

### 5.1. Printed Media

#### 5.1.1. Background Information Document

A Background Information Document (BID) was drafted at the onset of the EA process to act as a useful information handout about the proposed project development. In addition, the BID provided details on the public consultation process with contact details for further information. This document was advertised for availability through various means of newspaper articles, public meeting and electronic mail; see Appendix B of this document.



#### 5.1.2. Newspaper Advertisements & Articles

Newspaper notices about the proposed project and related Environmental Assessment processes was circulated in two newspapers for two weeks. These notices appeared in the “Confidante” and “New Era” newspapers, shown in Appendix B.



#### 5.1.3. Site Notices

A site notice was placed at the project site. These provided information about the project and related EA while providing contact details of the project team.

**Figure 14(top): Site Notice Farm Klein Spitskop.**

**Figure 15(centre) Figure 16: (Bottom) Site visit with farm owner and neighbors consultation and notification to existing solar park**



#### **5.1.4. Building a Stakeholder Database**

A stakeholder database for the project collected through a variety of means. During the advertisement of the project (through public notices in local newspapers and site-notices) the list was augmented as Interested & Affected Parties (I&AP) registered and contact information of stakeholders updated, please refer to Appendix B.

#### **5.1.5. Stakeholder Meetings & Key Conversations**

A public meeting was scheduled on 30 July 2022 and only affected farm owners were consulted, due to COVID-19 restrictions. However, the consultant ensured that public consultation was adequately conducted through farm-to-farm consultation and providing for an online platform for commenting. The consultant administered questionnaires through email to all members who attended the meeting as well as other members who were recommended by the public that they should be consulted.

#### **5.1.6. Comments and review period**

From the onset of the public consultation process and the initial information sharing through the BID, newspaper and site notices, various stakeholders have registered and provided comments. All of the immediate neighbours are not in support of the initiative due to several reasons. The Scoping Report and Environmental Management Plan was made available to the public and stakeholders for comment and review. Questionnaires and proof of stakeholder's engagement are attached in appendix B of this EAR.

## 6. CHAPTER FIVE: ENVIRONMENTAL AND SOCIO-ECONOMIC IMPACTS

### 6.1. Overview

ANIREP has committed to sustainability and environmental compliance through coming up with a corrective action plan for all anticipated environmental impacts associated with the project. This is also in line with the Namibian Environmental Management legislation and International best practices on Solar PV infrastructure. The proponent will implement an Environmental Management Plan (EMP) in order to prevent, minimise and mitigate negative impacts. The environmental management plan is being developed to address all the identified expected impacts, the plan will be monitored and updated on a continuous basis with aim for continuous improvement to addressing impacts.

### 6.2. Assessment Of Impacts

This section sets out the overall approach that was adopted to assess the potential environmental and social impacts associated with the project. To fully understand the significance of each of the potential impacts each impact must be evaluated and assessed. The definitions and explanations for each criterion are set out below in Table 3: Assessment Criteria and

**Table 3: Assessment Criteria**

<b>Duration – What is the length of the negative impact?</b>	
None	No Effect
Short	Less than one year
Moderate	One to ten years
Permanent	Irreversible
<b>Magnitude – What is the effect on the resource within the study area?</b>	
None	No Effect
Small	Affecting less than 1% of the resource
Moderate	Affecting 1-10% of the resource
Great	Affecting greater than 10% of the resource
<b>Spatial Extent – what is the scale of the impact in terms of area, considering cumulative impacts and international importance?</b>	
Local	In the immediate area of the impact
Regional / National	Having large scale impacts
International	Having international importance
<b>Type – What is the impact</b>	
Direct	Caused by the project and occur simultaneously with project activities
Indirect	Associated with the project and may occur at a later time or wider area

Duration – What is the length of the negative impact?	
Cumulative	Combined effects of the project with other existing / planned activities
Probability	
Low	<25%
Medium	25-75%
High	>75%

*(Adopted from ECC-Namiba, 2017)*

**Table 4: Impact Significance**

Class	Significance	Descriptions
1	Major Impact	Impacts are expected to be permanent and non- reversible on a national scale and/or have international significance or result in a legislative non- compliance.
2	Moderate Impact	Impacts are long term, but reversible and/or have regional significance.
3	Minor	Impacts are considered short term, reversible and/or localized in extent.
4	Insignificant	No impact is expected.
5	Unknown	There are insufficient data on which to assess significance.
6	Positive	Impacts are beneficial

**(Adopted from ECC-Namiba, 2017)**

**Table 5: Environmental Impacts and Aspects Assessment**

Environmental Impact	Valued Ecosystem Component	Impact	Project Phase	Duration	Magnitude	Extent	Type	Probability	Significance	Infrastructure
<b>TOPOGRAPHY</b>	Landscape Scenery	Visual aesthetic impact	Construction and Operation	Moderate	Moderate	Local	Direct	Medium 25 - 75%	Minor	PV Plant & Transmission line
<b>SOIL</b>	Soil	Contamination to soil from waste disposal	Construction and Operations	Moderate	Small	Local	Direct	Low <25%	Minor	PV Plant
	Soil	Spillages of fuel, oil and lubricants.	Construction	Short	Small	Local	Direct	Low <25%	Minor	PV Plant & Transmission line
	Soil	Erosion	Operations	Moderate	Small	Local	Direct	Low <25%	Minor	PV Plant & Transmission line
<b>LAND CAPABILITY</b>	Terrestrial ecology and aquatic ecosystems	Change in land use	Construction and Operations	Permanent	Great	Local	Direct	Low <25%	Moderate	PV Plant
	Carrying capacity	Increase in human activities in the environment	Construction and Operations	Moderate	Moderate	Regional	Direct	Medium 25 - 75%	Moderate	PV Plant & Transmission line
<b>WATER</b>	Surface water quality	Water pollution from oils and lubricants from vehicles and machinery.	Construction and Operations	Moderate	Moderate	Local	Direct	Medium 25 - 75%	Moderate	PV Plant and Transmission line
	Surface water quality	Turbidity and high sediment load	Construction	Moderate	Small	Local	Direct	Low <25%	Moderate	PV Plant
	Soil, Vegetation, Infrastructure	Flooding	Construction & Operation	Permanent	Moderate	Local	Direct	Medium 25 - 75%	Moderate	PV Plant
<b>AIR QUALITY</b>	Air Quality	Construction phase dust	Construction	Short	Small	Local	Direct	Low <25%	Minor	PV Plant
<b>WASTE</b>	Groundwater quality	Hazardous waste such as waste oil and lubricants.	Construction and Operations	Short	Small	Local	Direct	Low <25%	Minor	PV Plant

Environmental Impact	Valued Ecosystem Component	Impact	Project Phase	Duration	Magnitude	Extent	Type	Probability	Significance	Infrastructure
	Surface water quality	Threatened from plant stormwater discharge into the river.	Construction and operations	Moderate	Moderate	Regional	Direct	Medium 25 - 75%	Moderate	PV Plant
	Topography and Landscape	Visual impacts due to use of unsustainable disposal methods	Construction and Operations	Short	Small	Local	Direct	Low <25%	Minor	PV Plant and transmission line
<b>FAUNA</b>	Terrestrial ecology and biodiversity	Loss of habitat and driving away of local animals and aquatic animal species	Construction and Operations	Moderate	Moderate	Local	Direct	High >75%	Minor	PV Plant & Transmission line
	Avifauna	Bird electrocution, and physical crashes	Operations	Moderate	Small	Local	Direct	Low <25%	Minor	Transmission line
	Aquatic life	Antifouling paints	Operations	Moderate	Small	local	Direct	Low <25%	Minor	PV Plant
	Terrestrial ecology and biodiversity	Destruction of vertebrate fauna (e.g. road kills; fence and powerline mortalities)	Construction and Operations	Long	Moderate	Local	Direct	Low <25%	Minor	PV Plant & Transmission line
<b>FLORA</b>	Terrestrial ecology and biodiversity	Proliferation of invasive species inland	Construction and Operations	Long	Moderate	Local	Direct	High >75%	Moderate	PV Plant & Transmission line
	Terrestrial ecology and biodiversity	Illegal collection of firewood	Construction and Operations	Long	Moderate	Local	Direct	Low <25%	Minor	PV Plant & Transmission line
	Terrestrial ecology and biodiversity	Loss of unique flora and special habitats in the local environment because of general	Construction and operations	None	Small	Local	Direct	Low <25%	Moderate	PV Plant & Transmission line

Environmental Impact	Valued Ecosystem Component	Impact	Project Phase	Duration	Magnitude	Extent	Type	Probability	Significance	Infrastructure
		nuisance and animal migrate.								
	Terrestrial ecology and biodiversity	Uncontrolled fires	Construction	Long	Great	Regional / National	Direct	Low <25%	Major	PV Plant & Transmission line
<b>SOCIAL</b>	Noise Pollution	Increased noise levels	Construction and operations	Moderate	Small	Local	Direct	Low <25%	Minor	PV Plant & Transmission line
	Socio Economic Activities	Temporary and permanent employment prospects.	Construction and operations	Long	Moderate	Regional	Direct	Medium 25 – 75%	Positive	PV Plant & Transmission line
	Socio Economic Activities	Climate change impacts	Operations	Long	Moderate	Regional / National	Direct	High >75%	Positive	PV Plant & Transmission line
	Contribution to National Economy	Employment, local procurement, duties and taxes.	Construction and Operations	Short	None	Regional / National	Direct	Low <25%	Positive	PV Plant & Transmission line
<b>Heritage/Archaeology</b>	Artefacts, archaeological high value components	Destruction or affecting paleontological and archaeological artefacts	Construction and Operation	Moderate	Moderate	Local	Direct	Medium 25 – 75%	Moderate	PV Plant & Transmission line
<b>HEALTH AND SAFETY</b>	Health Sanitation	Poor ablation and waste management facilities may be detrimental to human health.	Construction and Operation	Moderate	Moderate	Local	Direct	Medium 25 – 75%	Moderate	PV Plant & Transmission line
	Property and human life	Electrocution, fires resulting in fatalities, damage to properties, veldt	Construction and Operation	Moderate	Great	Local	Direct	Medium 25 – 75%	Major	PV Plant & Transmission line

Environmental Impact	Valued Ecosystem Component	Impact	Project Phase	Duration	Magnitude	Extent	Type	Probability	Significance	Infrastructure
		fires and power surges.								



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## APPENDICES