



Electrification of Puros

ENVIRONMENTAL IMPACT ASSESSMENT REPORT

2023

Produced by



On Behalf of



Environmental Impact Assessment (EAI)

Report for the
Proposed 300 kWp Solar Photovoltaic Power Plant
with 11 kV Powerline supported Mini-grid System

Puros Village, Sesfontein Constituency
Kunene Region, Namibia.



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Proponent Commitments

- Due to the nature of our business, customer and personnel safety will always be of highest priority.
- Educate the community about the danger associated with electricity.
- Be supplied with relevant information on demand.

Listed Activity

As per EMA Regulations 2012

- **Energy Generation, Transmission and Storage Activities.**

Environmental Statement

The proposed project is an integral part of Namibia's strategy which aims to expand the use of renewable energy while increasing access to electricity.

The project also aims to contribute to the achievement of Sustainable Development Goal (SDG) No 7 "Affordable and Clean Energy" and SDG 13 "Climate action" of the United Nations' 2030 Agenda for Sustainable Development.

Table of Contents

PROPONENT	3
LISTED ACTIVITY.....	3
ENVIRONMENTAL STATEMENT	3
DEFINITIONS.....	6
1 INTRODUCTION	7
1.1 CONTEXT	7
1.1.1 <i>Project Motivation</i>	8
1.2 NATIONAL VALUES.....	9
2 PURPOSE OF THE EIA	9
2.1 PRINCIPLES FOLLOWED	10
2.2 LEGISLATION AND LICENSING	10
2.2.1 <i>Environmental legislation</i>	11
2.2.2 <i>Electricity Licensing Requirements</i>	11
3 PROPOSED DEVELOPMENT ACTIVITY	12
3.1 SCOPE OF THE ACTIVITY	13
3.2 SITE DESCRIPTION.....	14
3.2.1 <i>Mini-Grid Site:</i>	14
3.3 CONSULTATIONS UNDERTAKEN	16
3.3.1 <i>Public</i>	16
3.3.2 <i>State Institutions Involved</i>	16
3.4 ALTERNATE SITES	17
3.5 POINTS OF CONCERN.....	17
4 SOCIO-ECONOMICS	18
4.1 POPULATION	18
4.1.1 <i>Human Development Index</i>	19
4.1.2 <i>Land and Relocations</i>	19
4.1.3 <i>Gender</i>	20
5 WATER RESOURCES	20
6 ATMOSPHERIC ENVIRONMENT	20
7 AQUATIC & MARINE ENVIRONMENT	21
8 ECOLOGY	21

9	VISUAL IMPACT	22
10	TRAFFIC AND TRANSPORTATION	22
11	NOISE AND VIBRATION	22
12	ARCHAEOLOGY	22
13	WASTE GENERATION	22
14	APPENDICES	23
14.1	ENVIRONMENTAL MANAGEMENT PLAN (EMP)	23

Definitions

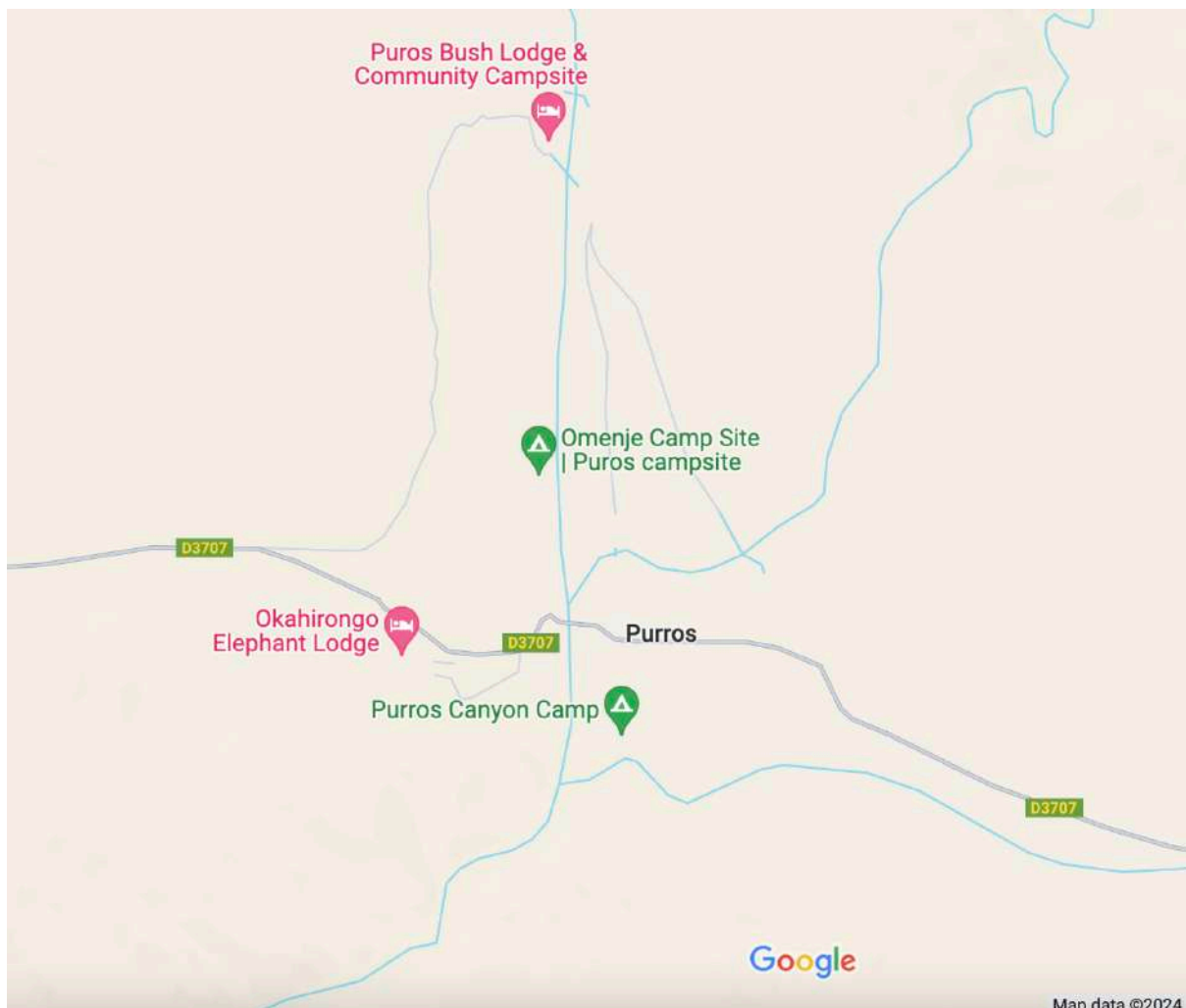
Term	Meaning
AC	Alternating Current
DC	Direct Current
ECB	Electricity Control Board
ECC	Environmental Clearance Certificate
EIA	Environmental Impact Assessment
EIF	Environmental Investment Fund
EMA (2007)	Environmental Management Act, 2007
EMA (2012)	Environmental Management Act regulations, 2012
EMP	Environmental Management Plan
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ)
GPE	Green People's Energy
ha	Hectare
HPP / HPP II	Harambee Prosperity Plans
HDI	Human Development Index
km	Kilometre
kW	Kilowatt
kV	Kilovolt
MEFT	Ministry of Environment, Forestry and Tourism
MME	Ministry of Mines and Energy
NORED	Northern Regional Electricity Distributor (Pty) Ltd.
PV	Photovoltaic
RDJ	RDJ Consulting Services CC
RED	Regional Electricity Distributor
W	Watt

1 Introduction

1.1 Context

The proposed 300 kWp solar power plant and rural electrification project is planned for the Puros Settlement in the Sesfontein Constituency of Kunene.

<i>Utility</i>	<i>NORED</i>
Settlement Name	Puros Settlement
Constituency	Sesfontein
Region	Kunene
GPS Coordinates	-18.4452685
GPS Coordinates	12.563058
Household Estimation (to be verified)	449 inhabitants (162 Households)



1.1.1 Project Motivation

The planned/proposed project is an integral part of Namibia's strategy which aims to expand the use of renewable energy while increasing access to electricity. The Government of the Republic of Namibia through the Ministry of Mines and Energy (MME) has identified rural electrification as a program of critical importance to improve the livelihood of rural communities and promote socio-economic development in the country. Rural households grid connection has been a challenge due to dispersed rural settlements, which contributes to high costs of connection per household¹.

Following the promulgation of the Energy White Paper (1998), developed by the Ministry of Mines and Energy and published in May 1998. The energy policies contained in the White Paper were designed to achieve the following goals: Effective Governance, Security of Supply, Social Upliftment, Investment & Growth, Economic Competitiveness & Efficiency and Sustainability. [This resulted in the creation of regional electricity distributor's, RED's} and so incorporated in 2001, the northern Namibia's regional Electricity Distributor, NORED, has put itself on the world map as a reliable energy supplier². The **Regional Electricity Distributor's (RED's)** in Namibia are mandated under license to provide electricity within their geographic licence areas.

Namibia is divided into five geographical RED's areas (NORED, CENORED and ERONGO RED), of which all three are currently well developed and functional. It is a community within the NORED area that will now be activated under this Environmental Impact Assessment (EIA).

*Rural electrification, **particularly in remote areas like Puros, in the Kunene Region of Namibia**, has been a challenge across the world, and in many African countries. The lack of access to reliable electricity has significant implications for socio-economic development, healthcare, education, and overall quality of life.*

Africa has made substantial progress in rural electrification, with a growing number of countries adopting off-grid solar minigrids as a viable solution. According to the World Bank, mini-grids are the least-cost solution for half a billion people by 2030. Their impacts stretch

¹ <https://www.nored.com.na/wp-content/uploads/2023/09/GRID-CONNECTION-BROCHURE.pdf>

² <https://www.nored.com.na/about-us/>

beyond electricity access and consumption into many socioeconomic aspects of rural livelihoods (Energy Sector Management Assistance Program., 2022).

To further both the objectives of the Government of Namibia, electrification of communities in the NORED geographic area and use of abundant renewable energy, Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) in support of the Ministry of Mines and Energy (MME) through the Green People's Energy (GPE) project initiatives supports the attainment of the goals of the Namibian government as defined in Vision 2030, Fifth National Development Plan (NDP5), Harambee Prosperity Plans (HPP/HPP II) and as laid down in the Nationally Determined Contribution (NDC).

1.2 National Values

The project also aims to contribute to the achievement of Sustainable Development Goal (SDG) No 7 “Affordable and Clean Energy” and SDG 13 “Climate action” of the United Nations’ 2030 Agenda for Sustainable Development. GPE in collaboration with NORED conducted a pre-feasibility study for the electrification of the Puros community in October 2022, to look at its socio-economic context, geographic positioning of key structures such as buildings, roads and potential lands if needed for siting of a solar plant. Site visits have been concluded including stakeholder engagement with the community to solicit views, guidance and comments that ensure that all possible recommendations from the stakeholders are collected and taken into consideration. The report submitted included a scoping assessment for its potential residential energy needs and any existing or potential productive users.

2 Purpose of the EIA

The aim of the EIA Report is to assess the environmental impacts associated with the construction and operation of the planned Puros Mini-grid solar PV power plant and electricity network system. The EIA will propose practical and effective mitigation measures to prevent or reduce any potential negative implications of the construction and operation of the planned pipelines. In addition, an environmental and social management plan will be developed to ensure best environmental and social performance.

2.1 Principles Followed

- a) Environmental impacts associated with the project are assessed and examined at the earliest planning stage possible.
- b) Environmental and social impacts investigated and examined include factors that impact public health and safety as well as the natural environment, such as: air, water, soil, waste, and water usage. Social concerns include involuntary resettlement of the population, cultural heritage, landscape, gender, communicable diseases, etc.
- c) Alternative proposals and/or minimization measures to prevent or reduce adverse impacts are examined to choose a better project option in terms of environmental and social considerations. In examination of measures, priority is to be given to the prevention of environmental impact, and when this is not possible, minimization and reduction of impact must be considered next. The findings of this examination should be incorporated in the management plan (EMP).

2.2 Legislation and Licensing

Legislative Form	Year	Relevance
Namibian Constitution	1990	Preservation of Namibia's natural resources and protections of ecosystems.
Petroleum Products and Energy Act No. 13 of 1990, as amended (1994, 2000, 2003)	1990	Control, use and disposal of petroleum products.
Pollution Control and Waste Management Bill (3rd Draft September 2003)	2003	the prevention and regulation of the discharge of pollutants to the air, water and land.
Environmental Management Act	2007	Describes the various rights and obligations that pertain to citizens and the Government. Also covers principles of environmental management.
Electricity Act	2007	Permits and Licencing Regulatory framework
Environmental Regulations	2012	Compliance and provides for the control of certain listed activities.
Water Resources Management Act	2013	Effluent discharge permit requirement
International Convention on Civil Liability for Oil Pollution Damage	1969	Fossil Fuel use / handling
Convention Concerning the Protection of the World Cultural and Natural Heritage	1972	Protection and preservation of Cultural and Natural Heritage

Legislative Form	Year	Relevance
World Heritage Convention	1975	Protection and preservation of Heritage
Vienna Convention for the Protection of the Ozone Layer	1985	Protection of the environment through reduced use of greenhouse gas emissions.
Framework Convention on Climate Change	1992	
Convention to Combat Desertification in those Countries Experiencing Serious Drought and/or Desertification, particularly in Africa,	1994	Prevention or restriction of activities that result in desertification.

2.2.1 Environmental Legislation

The Environmental Management Act of 2007, along with associated regulations such as the Environmental Regulations, 2012 guide the inputs to this EIA. As a result, the proposed activity is a “Listed” activity and requires an Environmental Clearance Certificate after submission of an EIA and Environmental Management Plan (EMP) needs to be submitted to the Ministry of Environment, Forestry and Tourism (MEFT).

2.2.2 Electricity Licensing Requirements

The primary regulatory authority overseeing electricity generation and distribution in Namibia is the Electricity Control Board (ECB). The key legislation that governs this sector includes the Electricity Control Act, 2007, and the Electricity Regulations, 2017. These documents outline the legal requirements, licensing procedures, and standards for off-grid generation.

To operate an off-grid mini-grid in Namibia, you must obtain the necessary licenses³ from the ECB⁴. The type of license required depends on intended use.

Generation licenses are required for entities or individuals who wish to generate electricity for their own use or for selling excess power to others, without being connected to the national grid. The process for obtaining an off-grid generation license in Namibia involves several steps and requires compliance with relevant regulations and guidelines.

³ <https://www.ecb.org.na/licensing/>

⁴ https://www.ecb.org.na/wp-content/uploads/2023/06/ECB_DOC_Guideline-for-Licence-Applications.pdf

Distribution licenses are required to operate a distribution network in Namibia. NORED has a distribution licence already for the geographic area and as such no new licence would be required.

Technical and Safety Standards

Compliance with technical and safety standards is critical. The ECB has established technical and safety regulations that mini-grid operators must adhere to. These regulations are outlined in the Grid Code and the Distribution Code, which detail the technical requirements for off-grid systems.

3 Proposed Development Activity

The project aims to develop an off-grid electrification plant in the Puros settlement, located approximately 109 kilometres (km) from Sesfontein Constituency in Kunene.



Figure 1 Tsumkwe Minigrid (<https://gruene-buergerenergie.org/>)

This settlement homes one of the marginalized areas nationally and due to its low population (449 inhabitants), has very limited economic activities and infrastructures and does not qualify for a national grid extension. The proposed mini-grid power plant will provide electricity that can potentially benefit over 162 households, a Conservancy Office, 2 lodges, 3 Camp sites, 3 other businesses, 1 school (government building) within the area.

3.1 Scope of the Activity

The main activities of the project comprise:

- a) Marking out of land allocated for the project,
- b) construction of the Solar PV Power Plant will include equipment such as inverters, solar photovoltaics (PV), batteries and a “backup” diesel generator.
- c) construction of the mini-grid system, consisting of distribution power lines and transformers and poles.
- d) Setting up approximately 70 independent solar streetlights around the settlement.

The mini-grid system design will include minimal diesel usage as a back plan for emergency running.

The project lifespan is set at 20 Years in the first instance and estimated at 30 years' operating life, envisioned to start in 2024 and operate until 2044 (2054 for operating life).

This is a LISTED activity and as a result:

Query Point	Response
Is this a Listed Activity?	Yes
Is a license/ permit required for the activity?	Yes, NORED is already in possession of the distribution licenses and will only require a generation license from the ECB.
Is the area already experiencing pollution or other environmental damage?	No, the project is a new activity.
Is the project an extension of an existing activity?	No, the project is a new activity.
Will the project involve land disturbance, site clearance, earthmoving, or underground workings?	Yes, the project will be constructing a solar PV power plant and mini-grid system.
Will the project involve re-zoning?	No.
Will the project involve the transport, storage, handling, production or use of toxic or hazardous substances?	No.
Will the project require the construction of facilities to bring power or water to the project?	No.
Will new roads be constructed?	No.

Will construction or operation of the project generate large volumes of traffic?	No, neither the construction nor operation of the project will bring additional traffic.
9. Will explosives be used?	No.
10. Will the project have large water requirements? (If yes, where will water be obtained?)	No, the project (mini-grid system) will be solar photovoltaic based and thus, minimal water requirements.
11. Will the project have significant energy requirements?	Yes, to be met from solar energy, once the construction of the mini-grid plant is complete the plant will employ mainly solar to generate electricity and diesel generator as a backup alternative.

3.2 Site Description

Name of the proposed project: Solar PV Mini-grid Electrification of Puros

Location of the proposed project: Puros Settlement in the Kunene Region of Namibia

Name of the Proponent/ Developer: NORED

Contact Person: Mr. Manfred Uvanga customercare@nored.com.na

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3.2.1 Mini-Grid Site:

The site selected in Puros has adequate solar irradiance as could be expected from Kunene and has adequate space for the installation of solar panels, inverters, and other necessary infrastructure. Easy access to the site is crucial for construction and maintenance and has only a concern related heavy sand requiring 4x4 access.

3.3 Consultations Undertaken

3.3.1 Public

Due to community dynamics, public participation notices were made to the community via the Conservancy Office, Regional Councillor’s Office and the Traditional Authorities. During the public stakeholder meetings (August 2022 and August 2023) which included the socio-economic feasibility study activities, the public was consulted. It must be noted that no concerns on the likely negative impacts of the proposed solar PV power plant were raised by the community. The Traditional Authority and the Puros Conservancy authorized the project go ahead.

The project will only set up a mini-grid system that can cater for Puros area electricity needs, which is originally not electrified through the national grid. Thus, the project will not have an impact on electricity export and import from the neighbouring country or its territory as a whole or in part.

3.3.2 State Institutions Involved

Institutions	Project Association
Ministry of Mines and Energy	<p>Responsibility for electrification: <i>The mandate of the Energy directorate is to ensure the adequate and affordable energy supply in a sustainable manner taking advantage of Namibia’s natural resources in support of the nation's socioeconomic development.</i></p> <p>Through the Electricity Division, engaged in coordinating, planning, managing project financing, and implementing national electricity programmes with emphasis on Rural Electrification Programme.</p>
Electricity Control Board	<p>Electricity Industry Regulator: <i>The core mandate of the ECB is to exercise control over the electricity supply industry with the main responsibility of regulating electricity generation, transmission, distribution, supply, import and export in Namibia through setting tariffs and issuance of licenses.</i></p> <p>Through the Technical Regulation Department, responsible for regulatory oversight and compliance of electricity infrastructure.</p>

Institutions	Project Association
Environmental Investment Fund	Project Funding: The Fund’s business strategy is designed to complement Namibia’s overall development agenda, which is spearheaded by high-level sustainability goals cemented in the country’s Vision 2030, the fifth National Development Plan 2017 – 2022 (NDP5) and the Harambee Prosperity Plan (HPP/HPP II).
Namibia Energy Institute	Academia guidance: Enhance public understanding of energy resources and technologies and their role in society, in order to address the barriers that hinder increased use and access to modern energy technologies.

3.4 Alternate Sites

During the public stakeholder meeting (August 2023), the request was made to the community for alternative sites for evaluation. **This was rejected by the community and the proposed site was insisted on by the community.**

3.5 Points of Concern

The indicated challenges of great concern include:

- **High food prices,**
- **bad road infrastructure between Puros and Sesfontein** (*a distance of 100 km, that takes a minimum of 4 hours to navigate*),
- **poor MTC network services which affects them especially in emergency cases** (*MTC indicates it is a V-Sat service at 2G level of service*),
- **lack of community available transportation** (*Only 1 vehicle exists and is used for the entire constituency area of Sesfontein which includes Puros*),
- **high youth unemployment rate** (*80% of the population is youth between 20-30 years old*) and
- **water scarcity** (Puros needs an additional borehole).

4 Socio-Economics

The socio-economic outlook for Puros reveals both challenges and opportunities. Addressing the identified challenges and harnessing the opportunities can lead to sustainable development and an improved quality of life for the residents. A multi-sectoral approach involving government, NGOs, private sector, and community participation is essential to drive positive change in Puros. Thus, electrification of the community is urgent.

The site is located in the Puros Conservancy where Income is derived from conservation hunting, crafts, and tourism. Wildlife includes elephant, lion, leopard, black rhino, and cheetah. The general landscape is a mix of hills, plains, wooded river valleys and spectacular dunes and includes the Hoarusib river. There are 449 people in the community according to records. Puros conservancy was registered in 2000.

During two separate visits (2022 and 2023) to Puros, the community were consistent in the challenges impacting the development and day to day lives of the residents. The community did not understand the need for the second visit as they felt that they have already expressed their needs and demands during the (pre-feasibility) first visit in 2022.

In accordance with the feedback received from the Puros community, it has been conveyed to the research team that the community's needs exhibit a high degree of homogeneity, characterized by shared aspirations and objectives. Consequently, it has been determined that the originally envisaged approach of conducting individual household surveys may not be warranted.

4.1 Population

Will the project provide housing and other facilities for the workforce? Temporary camping is expected or use of the existing Lodges. The project however seeks to employ as many people as possible from within the Puros area.

Will project involve employment of large numbers of workers? No, it will not result in large numbers of workers. Although the project will create temporary employment, it is estimated to employ an average of 10-15 employees in total at any one time during the construction phase.

4.1.1 Human Development Index

The Human Development Index (HDI) is *a composite index measuring average achievement in three basic dimensions of human development—a long and healthy life, knowledge and a decent standard of living.*

The HDI of Namibia is stated to be 0.646 in 2020 and a global HDI Rank (out of 189) of 129. The rank is medium but Puros in isolation could be considered low human development index rating. This therefore means that Puros needs development in several areas to meet the national mean.

4.1.2 Land and Relocations

Is the project located in or near a game reserve? Yes, the project is located in a conservancy area.

Is the project located in an area with unique landscape or scenery? Yes, tourists tend to be attracted by the area due to the culture of the himba people.

Is the project located in an area with unique wildlife? Yes, Puros Conservancy has unique wildlife such as black rhino, lions, giraffe amongst others.

Is the project located in an area with unique Plant life? No, Puros settlement does not have unique Plant life in the project area which forms part of the Settlement.

Will the project be located in a densely populated area or in the vicinity of residential property or other sensitive land uses (e.g. schools, hospitals, community facilities)? No, the project will not be in a densely populated area. The project site is identified and allocated by the Puros Traditional Authority councillors reserved for the project's purpose.

Will the project be located on land of high agricultural value? No.

Will the project be located in an area of recreational/ tourist importance? No. Please note it is located within a Conservancy.

Will the project require any people to be moved or resettled? No, no people will be required to move or resettled.

Will the project attract a large number of people into the area? Yes, due to the benefits of electrification on development the project is expected to attract additional number of people and businesses into the area in the long term.

Will the project result in demolition of structures or occupation of homes, gardens, businesses? No. The site is a greenfield.

Will the existing population be physically divided as a result of a project? No, the existing population will not be physically divided as a result of a project since the project site is an already existing piece of land.

4.1.3 Gender

The need for gender understanding is important to a projects' deliverable of "fairness". It is well documented that in rural settings, women are more likely to connect to electricity than men. However, women are more economically disadvantaged than men, introducing a barrier to access. The Gender composition of gender headed households in Puros is currently 55% female versus 45% male.

Thanks to the role of the Conservancy team, the attendance and inputs of females, was high on both occasions, with their interests for productive use of electricity noted.

5 Water Resources

Will the project adversely affect the quality, flow or volume or surface or groundwater? No.

The project will have minimal water demands associated primarily with domestic use for personnel working on the plant build. It must be noted that the location is water constrained.

6 Atmospheric Environment

Will the project generate emissions to the air from fuel combustion, production processes or other sources? Yes, occasionally, the project will produce emissions from using diesel fuel in the generator as a backup plan to cater for excess electricity demand.

Will the project involve disposal of waste through burning in the open air (e.g. slash material and construction debris)? No, the project will not have disposal waste.

Will the project give smell/ odour emissions? No.

7 Aquatic & Marine Environment

This is a desert environment, located more than 100 km from the Namibian Atlantic Coastline.

Will the project require disposal of large volumes of sewage or industrial effluent? No, there is no disposal of large volumes of sewage or industrial effluent.

Will the project require channel dredging or straightening or crossing of streams? No, this is a solar project to generate electricity and thus, no channel dredging or straightening or crossing of streams will be required.

Will the project require the construction of piers or seawalls? No, the project will be on land.

Will the project require the construction of offshore structures? No, this a land-based solar electrification project.

Will the project be located in or close to wetlands, rivers or any other waterbody (including groundwater)? No.

8 Ecology

Will the project result in loss or disturbance of valuable habitats or ecosystems? No, the project will not result in loss or disturbance of valuable habitats or ecosystems.

Will the project disturb wildlife migration, feeding or breeding? No.

Will the project cause the introduction of alien (exotic) plants or animals (excluding livestock)? No, this a renewable energy electrification project.

Will the project significantly increase the risk of veldfires? No, although the project will include electrical connections and appliances, which can lead to fires if there are issues with

cables (damaged cables) there is a zero probability that the project can independently increase veldfires due to the natural absence of vegetation.

9 Visual Impact

Will the project be visible to the public? Yes, the mini-grid plant and system will be visible but care will be taken as established in the EMP to minimise impact.

10 Traffic and Transportation

Due to the nature of the location, minimal through traffic exists and the planned project will not impact the status quo. Any disruption however will be limited to the period of construction slated to last less than 6 months.

11 Noise and Vibration

Will the project cause noise, vibration, light, heat or other radiation into the environment?
No. Generators to be used are expected to have silent running casings. Transport activities will be limited to daylight hours.

12 Archaeology

Are there any archaeological features nearby? No.

Are there any national monuments nearby? No.

13 Waste Generation

Will the project generate overburden or mine process wastes? No.

Will the project generate domestic or industrial wastes? No.

Could the project contaminate soil or groundwater? Minimal chance, although the chances are minimal the project can contribute to water and soil contamination from waste and by products such as from diesel spills and leaks if not handled properly. This will be mitigated by following Ministry of Mines and Energy procedures under the Petroleum Regulations.

14 Appendices

14.1 Environmental Management Plan (EMP)

Refer to **EMP Document** provided under separate cover.