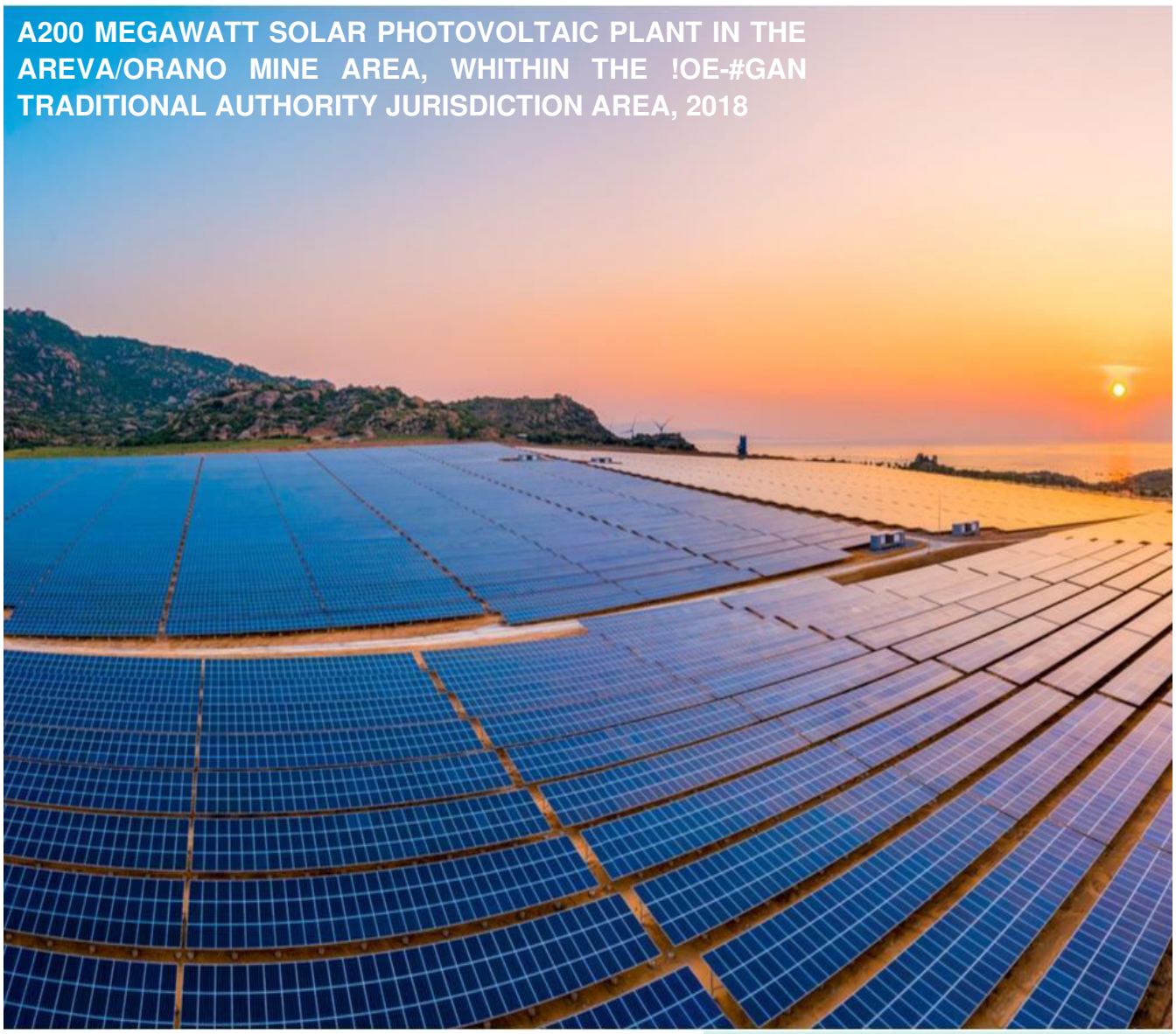
# A200 MEGAWATT SOLAR PHOTOVOLTAIC PLANT IN THE AREVA/ORANO MINE AREA, WHITHIN THE !OE-#GAN TRADITIONAL AUTHORITY JURISDICTION AREA, 2018



**ENVIRONMENTAL IMPACT ASSESSEMENT**


**BY RITTA KHIBA PLANNING CONSULTANT CC**
**R. Khiba**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# ABBREVIATIONS

| Acronym | Description |
|---|---|
| CTdTe | Cadmium Telluride |
| EIA | Environmental Impact Assessment |
| EMP | Environmental Management Plan |
| EHS | Environmental Health, and Safety |
| ERONGO RED | Erongo Regional Electricity Distributor |
| I & APs | Interested and Affected Parties (Stakeholders) |
| IPP | Independent Power Producer |
| IUCN, | International Union for Conservation of Nature |
| MME | Ministry of Mines and Energy |
| MWAF | Ministry of Water Affairs and Forestry |
| MET | Ministry of Environment and Tourism |
| MTC | Mobile Telecommunication of Namibia |
| MW | Mega Watt |
| NCCI | Namibia Chamber of Commerce and Industry |
| NGOs | National Non-Governmental Organisations |
| NamPower | Namibia National Power Corporation |
| NSA | National Statistic Agency |
| NPC | National Planning Commission |
| OEC | Office of the Environmental Commissioner |
| PV | Photovoltaic |
| PPA | Power Purchase Agreement |
| SOE | State Owned Enterprises |
| ToR | Terms of Reference |

| | |
|---|---|
| UNEP | United Nations Environment Programme |

# 1. PROJECT PARTNERS

## 1.1 Proponent

**Onkuni Energy (Pty) Ltd**
**P.O. Box 1012**
**Swakopmund**
**Namibia**

## 1.2 Project Consultant (s)


| | |
|---|---|
| R. Khiba | Town and Regional Planner / (Environmental Assessment Practitioner) Ritta Khiba Planning Consultants CC |
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Ritta Khiba Planning Consultants was appointed by the applicant as the independent EAP to conduct the EIA and prepare all required reports. Ritta Khiba has done a number of EIAs and is a suitable, qualified and experienced EAP to conduct the EIA. The expertise of the EAP responsible for conducting the EIA is also summarised in the curriculum vitae included as part of Annexure A.

## 1.3 Project Site Description and Location:


# 1.4 EXECUTIVE SUMMARY

Onkuni Energy like many upcoming entrepreneurs in specialised industries in the country, is a young and upcoming newly established business whose interest is in the renewable energy where they have found a niche to address and improve the lives of businesses, communities, governments to supply alternative sustainable energy. Their mission is to add value to the Namibian energy users as well as improve communities where they carry out energy infrastructural developments.

They do not only deal with renewable energy infrastructural development but also assist others to begot funding through their experiences to related projects. Their intention is to construct a 200MW Photovoltaic Solar Energy Plant and associated infrastructure on a portion of land situated in the Orena Mine, under the !OE-≠GAN Traditional Authority Jurisdiction, in the Daures Constituency, Erongo Region. The town of Arandis is located 35km north east of the proposed development (see Figure 1).

Onkuni Energy applied for a leasable area equal to 505ha from the !OEN-#GAN. Although a total of 505ha was approved in principle, the development will be carried out in phases. This will aid Onkuni Energy with ample expansion possibility planning time over a span of 5 – 10 years. The footprint that will accommodate the now desired PV Solar Energy Plant is approximately 30ha which will also include all the supporting infrastructure on site. The area identified for the construction of the solar plant is suitable as it is adjacent to an existing 50ha solar plant, in close proximity of the Nampower substation making it easy to connect as well. Another important feature for the selection of the site is the fact that it is relatively flat, has a gentle slope, easy to access especially with the transportation of the machinery and equipment when the construction phase starts and is adjacent to an existing solar energy plant.

Renewable energy development is listed as an activity that must not be carried out without obtaining an environmental authorisation. This report is prepared for submission to the Ministry of Environment as per the Environmental Management Act 7 of 2007 and its Regulations of 2012 to obtain an authorisation to construct the solar PV energy plant. The submission will allow for the assessment of the submission as well as the process of approval which will then give the proponent (developer) an opportunity to receive an environmental clearance certificate.

The Environmental Impact Assessment (EIA) Regulations, 2014 (as amended in 2017) determine that an environmental authorisation is required for certain listed activities, which might have detrimental effects on the environment.

As part of the EIA process, environmental impacts, mitigation as well as the residual risks of the proposed activity were set out in the environmental impact assessment report (EIR). The potential positive and negative impacts associated with the proposed development have been assessed and the potentially most significant environmental impacts associated with the development are briefly summarised below:

**Impacts during the construction phase**

It is anticipated that during the construction and operational phase, minimal impacts were identified which may have not detrimental effects on both the biophysical and socio-economic environment that may occur during the construction phase of the proposed Solar Energy plant. Potential significant impacts are fauna and flora, soils, geology, existing infrastructure, socio-economic impacts that might stir employment for the first phase. The site where the Solar Energy Plant will be constructed is indicated on **the plan below as Figure 1:**

**Figure 1: Locality of the proposed solar plant**


**Impacts during the operational phase:**

The potential impacts during the operational phase are negligible. A number of negative impacts associated with the operational phase are: fauna and flora, soils, geology, the increased consumption of water, visual impacts and dangerous goods hazards as part of battery storage facility (catching fire, exploding or leaking dangerous pollutants). The provision of sustainable service delivery also needs to be confirmed. The operational phase will have a direct positive impact through the provision of employment opportunities for its duration, and the generation of income to the local community. Additional electricity will also be generated from a clean renewable resource.

**Impacts during the decommissioning phase**

There is no need to decommission the development. It is a known fact that once a facility comes to a closure it should be restored to its original state and be decommissioned. There are however impacts that are associated with decommissioning a site such as the impacts on soils, existing infrastructure, possible heritage objects and the loss of both temporary and permanent jobs by those that are unskilled. Lastly all might not be losses as temporary jobs might be created to carry the reduced load of jobs still on site.

**Cumulative impacts**

Namibia with its free economy does not grant preferential business space of operation nor prohibit healthy competition even if activities of the same sector are in close proximity. Even though there are existing PV Solar Energy Plants, the Traditional Authority did not hesitate to allow for another plant in close proximity to the existing. This could cause cumulative impacts due to similar projects in close proximity.

Negative cumulative impacts that have a negative medium rating identified during the construction phase is the loss of indigenous natural fauna and flora, generation of waste, temporary employment opportunities, impact of construction workers on local communities, and an influx of job seekers and traffic impacts.

The cumulative impacts identified and expected during the operational phase are of medium impact and are related to visual impacts, soil erosion, generation of additional electricity, the establishment of a community trust and the development of infrastructure for the generation of clean, renewable energy. Waste generation could be a possible significant impact that is identified during the decommissioning of the project.

This report is submitted for evaluation and give the competent authority sufficient information to consider the application and to reach a decision for the issuing of the environmental clearance certificate.

# 2. PROJECT BACKGROUND

## 2.1 INTRODUCTION

A previously mentioned Onkuni Energy PTY (ltd) is proposing to develop a 200MW Solar Energy Plant on an portion of the 505ha land situated in the Orena Mine, under the !OE-≠GAN Traditional Authority Jurisdiction, in the Daures Constituency, Erongo Region, north east of Arandis Town approximately 35km of the proposed construction of the Solar Energy Plant. This Solar Energy plant will be connected to the main 220 KV overhead powerline of Nampower substation. Once this is approved, the energy supply contract will be sold through the Power Contract Agreement. This section aims to introduce the Environmental Impact Report coupled with information concerning the EAP who prepared the report as well as their expertise inclusive of their CV.

## 2.2 Purpose of the EIA Report

The EIA Report is based on the scope of work defined in the Environmental Scoping Report. The information used to compile the report varied from among others secondary data from existing sources, field-based assessments, as well as interested and affected parties who contributed to the identification and evaluation of the potential impact on the receiving environment.

## 2.3 Legal Mandate and Purpose of the Report

An EIA process should be followed for all listed activities which might have a detrimental impact on the environment. In terms of Regulations No. 1 of Environmental Impact Assessment Regulations listed activities may not be undertaken without an environmental clearance certificate. This section highlights the construction of facilities for: the generation of electricity, the transmission and supply of electricity and storage activities as listed activities that needs authorisation from the Environmental Commissioner before construction.

The EIA Regulations No. 1& 2 of 2017 outline the activities for which an EIA should be applied for. Below are the activities identified in the EIA Regulations indicated in the Table 1 that applies to the proposed project:

**Table 1**: List of triggered activities identified in the EIA Regulations which apply to the proposed project

| Legislation/ Policy guideline | Relevant Provisions | Implications Identified |
|---|---|---|
| Namibian Constitution First Amendment Act 34 of 1998 | **Chapter 11 Article 95: Promotion of the Welfare of the People** | Ecological sustainability should inform and guide these projects.<br>**Social Protection** |
| Convention on Biological Diversity (1992) | **Article 6 (b) provides for the explicit consideration of "the conservation and sustainable use of biological diversity into relevant… plans, programs and policies"** | In keeping with national strategies, OPE needs to ensure that biodiversity is not compromised as a result of 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). It details principles which are to guide all EAs.** | The EMA and its regulations should inform and guide this EA process.<br>**ECC Renewal:** 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:<br>**Tel.: 061 284 2701 OR**<br>**Environmental Assessment Unit Mr. Damian Nchindo, Tel: 061 284 2717,**<br>**Email: damian.nchindo@met.gov.na or eie@met.gov.na** |
| Electricity Act No. 4 of 2007<br>**Regulated under the Ministry of Mines and Energy (with Licensing issued by the Electricity Control Board (ECB) of Namibia)** | All the relevant electricity permits, and license (such as **generation**, distribution, and supply licenses) should be applied for and obtained from the relevant regulatory authorities. The relevant section is Part 4 (License, section 17 – Duty to obtain a license or licenses. Subsection 1 (a) generation and (d) supply of electricity. | 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. **The Proponent should also notify the ECB (for approval) of any intentions to change or amend the License.**<br>**Electricity Control Board (ECB) of Namibia**<br>**info@ecb.org.na**<br>**Tel: +264 (0) 61 374 300 (switchboard)** OR contact<br>Mr. Francois Robinson: Manager: Regulatory Support Services<br>Tel: +264 (0) 61 374 319<br>**Email: frobinson@ecb.org.na** |
| Soil Conservation Act (No 76 of 1969)<br>**Regulated under the Ministry of Agriculture, Water and Land Reform** | 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, | 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 |

| | | |
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| | through directives declared by the Minister. | tracks and pollution from project related activities. |
| Forestry Act 12 of 2001 **Regulated under the Ministry of Environment, Forestry and Tourism** | Prohibits the removal of any vegetation within 100m 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) **Regulated under the Ministry of Education, Arts and Culture** | The Act extends the protection of archaeological and historical sites to private and communal land and defines permit procedures regarding activities at such 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. Contact: Ms. Agnes Shiningayamwe (Regional Heritage Officer) **Tel: 061 301 903, Email: rho1@nhc-nam.org** |
| The Forest Act, No. 12 of 2001 as amended by the Forest Amendment Act, No. 13 of 2005 | Tree species and any vegetation within 100 m from a watercourse may not be removed without a permit (Forestry Act S22(1)). Prohibits the removal of and transport of various protected plant species. Vegetation protection | So far no tree species have been identified that require a permit. The area has no trees, indigenous bushes or plants within its 100 meter radius. However, further northwest are a number of minor watercourses that must be be preserved. |
| Pollution Control and Waste Management Bill **Regulated under the Ministry of Environment, Forestry and Tourism** | 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."<br><br>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." | 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. **No permit or license required.** |
| **Water Act of 54 of 1956** | In the absence of the Water Resources Management Act, 2013 (No. 24 of 2004) , regulation, all water resources are still falling under the regulation of the Water Act 54 of 1956. Prohibits the polllution of underground and surface water bodies (S23 (1). | The protection of ground and surface water resources should be a priority. The main threats will most likely be concrete and hydrocarbon spills during construction and hydrocarbon spills during operation and maintenance |

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|---|---|---|
| | Lialbility of clean-up costs after closure abandonment of an actitity (S23 (2). | |
| Communal Land Reform Act (2003) | Communal Land Boards exist in terms of the act, including such a board which also governs the project area, for the use of the land. | Land Lease agreement to be finalised from the Land Board, in consultation with the community leadership once EIA is approved. |
| 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. **No permit or license required.** |
| Health and Safety Regulations GN 156/1997 (GG 1617) | **Details various requirements regarding health and safety of labourers.** | The Proponent and all its employees should ensure compliance with the provisions of these legal instruments. **No permit or license required.** |
| Public and Environmental Health Act No. 1 of 2015 **Regulated under the Ministry of Health and Social Services** | **To provide a framework for a structured uniform public and environmental health system in Namibia; and to provide for incidental matters.** | The Proponent and all its employees should ensure compliance with the provisions of these legal instruments. **No permit or license required.** |
| Road Traffic and Transport Act, No. 22 of 1999 **Regulated under the Ministry of Works and Transport** | 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. The Proponent should continue compliance with access roads and regulations as well as permit conditions that may had been issued to their host (Orano Mine) by Ministry of Works and Transport's Roads Authority.** |
| Labour Act (No. 6 of 1992) **Regulated under the Ministry of Labour, Industrial Relations and Employment Creation** | 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 | **The Proponent should ensure that the Solar Energy Plant ooperations, and maintenance works, do not compromise the safety and welfare of workers.** |
| **Namibia's Green Plan, 1992** | **Namibia's Green Plan provides for the analysis of the main** | **The Proponent should ensure that the Solar Energy Plant cooperations,** |

| | | |
|---|---|---|
| | **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.** | **and maintenance works, do not compromise the safety and welfare of workers.** |

## 2.4 Relevant International Standards, Policies and Conventions

Additional to the Namibian environmental and social legal requirements detailed above, compliance with the various International Standards is required for the Solar Plant. A number of the instruments are discussed below:

### 2.4.1 The Equator Principles

Large infrastructure and industrial Projects can have adverse impacts on people and on the environment. The equator principle encourages project proponents to identify and address potential or actual adverse risks and impacts and comply as well with the International Standards for the application of approved funding by Equator Principles Financial Institutions. These principles are to be applied to all projects including the 200MW Photovoltaic Solar Plant of Onkuni Energy. This solar plant must be a socially responsible project, which subscribe to appropriately responsible environmental management practices with a minimum negative impact on project-affected ecosystems and community-based upliftment and empowering interactions", as per the Equator Principles and how it is governed', (www.equator-principles.com).

### 2.4.2 International Finance Corporations (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 (International Finance Corporation, 2006).

### 2.4.3 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. MIGA categorizes project investments into six categories (A to F) based on an assessment of their likely environmental and social impacts. Based on their assessment, Onkuni Energy project investment is listed under Category B Project. According to this category it is defined as a project that "may have potentially limited adverse social or environmental impacts that are few in number, generally site specific, largely reversible, and readily addressed through mitigation measures". Namibia amongst many other countries was first to receive guarantees of up to $18m in support of the construction, operation and maintenance of two 5MW solar power plants. Namibia currently has a domestic installed generating capacity of around 514 MW, although its estimated peak demand is above 660 MW, and its estimated power deficit will exceed 300 MW over the next few years (Wallace, 1992). Solar Energy project such as the one of Onkuni Energy contributes to additionally address the deficit that Namibia may face in a few years to come. The proposed 200MW Solar Photovoltaic Energy project is aligned with MIGA's priorities of facilitating investments that address climate change.

### 2.4.4 The United Nations Convention to Combat Desertification (UNCCD) of 1992

The convention address land degradation in arid regions with the purpose of contributing 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. It is important for the proponent to guard against desertification (United Nations, n.d.)

### 2.4.5 The Convention on Biological Diversity 1992

The 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. The proponent should ensure that the removal of vegetation cover and destruction of natural habitats should be avoided and where not possible minimised (United Nations, n.d.).

### 2.4.6 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 (United Nations, 1972). Further, the protection of natural resources and prevention of any form of pollution should be adhered to.

### 2.4.7 National Heritage Act (No. 27 of 2004)

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 Onkuni Solar Plant Environmental Management Plan (EMP).

The legal requirements above have been listed and their objectives explained as per their relevancey to the project. The project will be carried in an environment that is sensitive in terms of its biophysical and social features. The potential and known impacts are assessed and identified based on the environmental components/features in terms of their sensitivities to the project activities. The environmental baseline of the project area and site have been identified and are included in this report. To ensure eeffective 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.

All the above listed activities implies that the proposed activity (PV Solar Energy Plant) is considered to have significant and potential impact on the environment. A consultative process was to be undertaken to ensure a transparent, open public participation process with the purpose of:

- Determine the policy and legislative context
- Describe the need and desirability of the proposed activity,
- Identify the location of the development and cumulative impacts
- Identify and suggest alternatives
- Determine probability of the impacts occurring to inform identified preferred alternatives
- Identify, avoided, managed or mitigated;
- Identify the most ideal location for the activity within the preferred site
- Identify, assess, and rank the impacts the activity will impose on the preferred location through the life of the activity;
- Identify suitable measures to avoid, manage or mitigate identified impacts; and
- Identify residual risks that need to be managed and monitored.

This report has been submitted to the registered I&APs and relevant utilities as well as all those impacted on by this project. Once comments are received, they will be incorporated in the full EIA document and be submitted. They will be requested to provide written comments within 30 days of receiving the report. All issues identified during this review period will be documented and compiled into a Comments and Response Report and be finalised and submitted in the report.

# 3. SUMMARY OF EIA APPROACH & METHODOLOGY

## 3.1 Overview of the EIA Methodology

Environmental Assessment (EA) process in Namibia is governed by the Environmental Impact Assessment (EIA) Regulations No. 30 of 2012 gazetted under the Environmental Management Act, (EMA), 2007, (Act No. 7 of 2007). In accordance with the provisions of the EIA Regulations, 2012, the key assessment steps are summarised in Fig. 1.5. A detailed outline of the methodology and approach used in this assessment is provided below.

## 3.2 Alternatives to the Project Development Process

The following is a summary of key alternatives that have been identified during the Scoping phase and evaluated further during the EIA stage:

### 3.2.1 Project Location:

**Only one location was identified and screened as part of the project identification, screening and evaluation process. The following issues were considered:**

- An existing solar plant that is an indication that there is high level of energy yields in the area;
- Principle approval by the Traditional Authority;
- Existing Nampower Substation as well as electricity connectivity and transmission support and electricity off-takers;
- A relative flat site to avoid shadowing;
- Accessibility as well as potential likely negative and positive environmental impacts.

Taking into consideration the above, the site selection was made as it meets all the requirements for as suitable for a solar energy plan.

As previously mentioned, the solar energy plant will be connected to the national electricity grid network via a Nampower overheard powerline. No alternative powerline and underground cable routes have been considered.

The size of the project will only focus on developing a 200MW plant even though a 505ha of land is approved for lease as an energy generation facility which is within the current connectivity requirements by Nampower distribution and transmission network. Possibilities of expansion to further accommodate future growth is not out of the question and provision is made for such as well. The plant has greater opportunity and the location is appropriate for the proposed 200MW energy solar plant. Should opportunities in different areas of renewable energy emerge, than will the developer engaged in possible review for further expansion in the energy industry.

### 3.2.2 Assumption and Limitations

The approach taken for this EIA study is based on the following Assumptions and Limitation:

- Information, plans and data received from the project developers
- No specialist study was carried out all of the data was submitted based on secondary information;
- A precautionary approach as adopted in instances where baseline information was insufficient or available
- Should the study be subject to review, that such will be carried out within the specified time frames based on the EIA and EMP reports by the Environmental Commissioner.

# 4 EIA METHODOLOGY

The EIA process was carried out in terms of the Environmental Impact Assessment Regulations. A summary is provided of the manner in which the EIA process and future steps to be taken. The following was carried out:

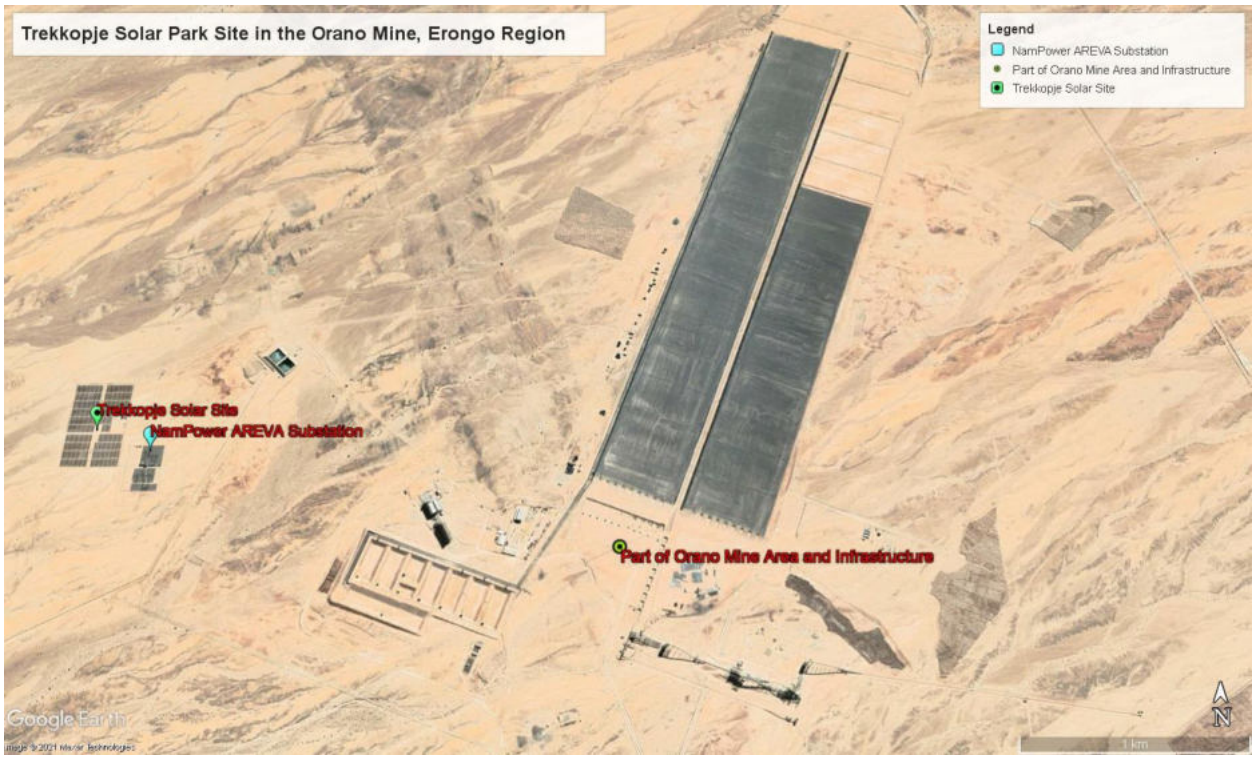
- Several site visits were carried out by the developer and his team as well as with the EAP respectively.
- A site visit was conducted with the developer on 13 December 2022 to discuss the proposed development and assess the site.
- The public participation process was initiated on 11 March 2023 and all I&APs were requested to submit their comments by 24 March 2023.
- The Environmental Impact Assessment Report has been made available to all registered I&APs and relevant Government office and agencies. They are requested to provide their comments on the report within 30 days of the notification.

# 5 PROJECT DEVELOPMENT

## 5.1 Project Location and Description

The intention is to develop a 200MW Photovoltaic solar energy plant as well as associated infrastructure. This will be constructed on a portion equal 505ha in the !OE-#GAN Traditional Authority Jurisdiction, Daures Constituency in the Erongo Region. The envisaged solar energy plant is located in the Orano Mine, Trekkopje which is approximately 35 km away from Arandis. The location is indicated in Figure 2.

**Figure 1:** Trekkopie solar park site




The 200MW Photovoltaic Solar Energy Plant will not be constructed at once but in phases. As much as the footprint of the portion is equal to 505ha, the first phase will consist of 150 ha which will accommodate approximately a 200MW solar plant. The portion will be leased from the !OE-#GAN Traditional Authority for an approximate of 99 years.

**Table 2:** General Site Information

| | |
|---|---|
| **Description of affected farm portion** | !OE-#GAN Traditional Authority Jurisdiction, Daures Constituency in the Erongo Region. |

| | |
|---|---|
| **21 Digit Surveyor General codes** | TBC |
| **Title Deed** | The land is exclusively communal and is being managed by various traditional authorities. |
| **Photographs of the site** | Refer to the content of the report |
| **Type of technology** | Photovoltaic solar facility |
| **Structure Height** | Panels ~5m, buildings ~ 4m and power lines ~32m Battery storage facility ~8m height |
| **Battery storage** | Up to 500 MWh battery storage facility |
| **Surface area to be covered** | Approximately 505 ha but only 150ha for 1st phase |
| **Structure orientation** | The panels will either be fixed to a single-axis horizontal tracking structure where the orientation of the panel varies according to the time of the day, as the sun moves from east to west or tilted at a fixed angle equivalent to the latitude at which the site is located in order to capture the most sun. |
| **Laydown area dimensions** | Assessed 505 hectares |
| **Generation capacity** | Up to 200MW |
| **Expected production** | 328 500 MWh per annum |

The site is located in a conservancy area and is bordered by other farms. The site survey revealed that the site currently consists of jackals, springboks etc.

## 5.2 Activity Description

The proposed development will trigger the following activities:

**Table 3:** Listed Activities

| **Relevant Legislation:** | **Activity No (s)** | **Description of each listed activity as per project description:** |
|---|---|---|
| EMA (No 7 of 2007) | **27. (2) (a)** | ***"land use and transformation."***<br>• Activity 27. (2) (a) is triggered as the proposed development will transform 505Ha to a solar PV plant. |

| | | |
|---|---|---|
| EMA (No 7 of 2007) | **27. (2) (h)** | ***"energy generation and distribution"*.**<br><br>• Activity 27. (2) (h) is triggered since the proposed photovoltaic solar facility will generate, transmit and distribute electricity.<br>• Activity 27. (2) (h) is triggered since the proposed photovoltaic solar facility will generate up to 200 MW of electricity. |
| **GG(4878) of 2012** | **Activity 4** | • "The clearance of forest areas, deforestation, afforestation, timber harvesting or any other related activity that requires authorisation in term of the Forest Act, 2001 (Act No. 12 of 2001) or any other law." |

**The most significant impacts identified are those to occur during the construction phase of the development such as:**

- **Site clearing and preparation:** The site hardly has any vegetation even though the bit that is evident is to be cleared (Please see Figure 3, below ).

**Figure 2** Physical feature of the site

**Source:** RKPC, 2023

**Figure 3:** Terrain levelling: Levelling will be minimal as the potential site chosen is relatively flat with a gentle slope. (Please see Figure 4)

**(Source RKPC, 2023**): Site location

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**Figure 4:** Laying foundation: The structures will be connected to the ground through metal screws. The exact method will depend on the detailed geotechnical analysis


**(Source,RKPC,2023)**

### 5.3 Project Timeline

The developer is in the process of securing funds for the infrastructural development of the project. It is the intention to phase out the project on the 505 ha of land as acquired on a leasehold basis. The lease is running over 99 years and it is expected that the developer will kick-start the project mid-year 2024.

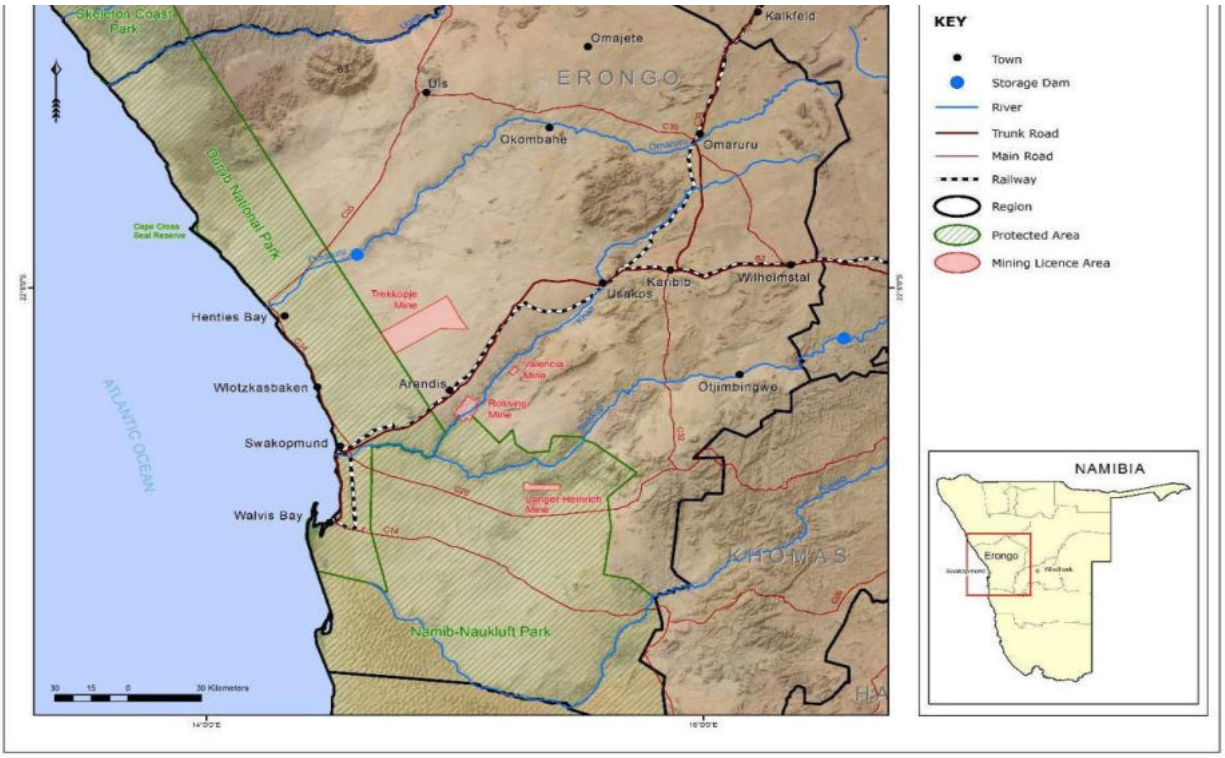
### 5.4 Lease Agreement

The !OE≠GAN Traditional Authority allocated a 505 ha of land to Onkuni Energy for purposes of constructing a 200MW Photovoltaic Solar Energy Plan on a 99 year leasehold. The letter indicating the allocation is attached as Annexure B forming part of the scoping report. This letter will become effective once the EIA process is finalised and approval is granted by the relevant competent authority.

## 5.5 Project Locality

The site as previously mentioned is located in the Areva Mining Area, Trekkopje within the !OE≠GAN Traditional Authority area in the Daures Constituency. It is situated adjacent an existing Solar Energy Plant located on a 50ha portion of land. Furthermore, it is also in close proximity of the existing Nampower Trekkopje substation. Once all the negotiations are done, a further agreement will be signed with Nampower to allow the power to be fed into the Nampower substation.

***Figure 5**: Trekkopje Orano Mine Location,2023*




(www.bing.com/images/search)

A number of variables were considered with the site selection and are discussed as follows:

- Proximity to existing substation and the 50 ha Photovoltaic Solar Energy Plant
- Site topographical features
- Solar radiation availability
- Land availability

- Geotechnical constraints
- Sensitivity of the environment
- Potential vegetation
- Land degradation
- Visual Impact

### 5.6 Infrastructure Development

Before any operation commences, there is need to construct supporting infrastructure such as buildings for office operations, changing rooms for the workers, and power source to supply the site with power. Therefore a 132 KV transmission line will be built from the existing grid to connect the substation to the site.

For Onkuni Energy to produce up to 200MW, the proposed facility will require numerous linked cells placed behind a protective glass sheet to form a panel. Multiple panels will be required to form the solar PV arrays which will comprise the PV facility. The PV panels will be tilted at a northern angle in order to capture the most sun.

### 5.7 PV Solar Infrastructure

It is imperative for the PV Solar to connect to the existing grid. This will require transformation of the voltage from 480V to 33kV to 132kV. The normal components and dimensions of a distribution rated electrical substation will be required. Output voltage from the inverter is 480V and this is fed into step up transformers to 132kV. An onsite substation will be required on the site to step the voltage up to 132kV, after which the power will be transmitted into the national grid. Onkuni Energy is yet to get approval from Nampower and as it is, there is no cost estimates for the proposed facility until the designs are quantified. The Project will inject up to 100MW into the National Grid. The installed capacity will be approximately 200MW.

The preferred power line route is located north east of the project footprint. The route from the site to the Nampower substation is approximately 1 kilometre long. The power line will feed into the Nampower substation.

An internal electrical reticulation network will be required and will be lain ~2-4m underground as far as practically possible.

Supporting Infrastructure will be constructed as part of the auxiliary buildings with basic services including water and electricity on site:

- Office (~200m²);
- Switch gear and relay room (~400m²);
- Staff lockers and changing room (~200m²)
- Security control (~40m²)
- Ablution Block (~15m²)
- Battery storage up to 50MW Battery Storage Facility with a maximum height of 5m and a maximum volume of 1,120 $m^3$ of batteries and associated operational, safety and control infrastructure.

Roads – Access will be obtained via an existing gravel road. An internal site road network will also be required to provide access to the solar field and associated infrastructure. The access and internal roads will be constructed within a 25-meter corridor.

Fencing - For health, safety and security reasons, the facility will be required to be fenced off to tighten security. A fencing with a height of 2.5 meters will be used.

### 5.8 Layout Description

A layout plan is not included in the report. The information below is provided based on the planned and envisaged PV Solar Energy Plant. Engineers are still busy putting the designs together.

**Table 4:** Technical Details for the proposed facility

| Component | Description / dimensions |
|---|---|
| Height of PV panels | 1,5 meters |
| Area of PV Array | 505 Hectares |
| Number of inverters required | Minimum 40 |
| Area occupied by inverter / transformer static / substations | Inverter Transformer Station: ~19$m^2$<br>Substation: 15 400$m^2$ |
| Capacity of on-site substation | 132kV |

| | |
|---|---|
| Area occupied by both permanent and construction laydown areas | Permanent Laydown Area: 505 Hectares<br>Construction Laydown Area: ~2000 $m^2$ |
| Area occupied by other buildings | Security Room: ~40 $m^2$<br>Office: ~200 $m^2$<br>Staff Locker and Changing Room: ~200 $m^2$ |
| Battery storage facility | Maximum height: 5m<br>Maximum volume: 1120 $m^3$<br>~ 200 $m^2$ |
| Length of internal roads | Approximately 20 km |
| Width of internal roads | Between 7 & 12 meters wide |
| Proximity to grid connection | Approximately 3 kilometers |
| Height of fencing | Approximately 2.5 meters |

**Table 5** below provide the corner coordinate points for the proposed development site as well as start, middle and end point coordinates for linear activities.

**Table 5: Map indicating coordinate points**

| **Coordinates** | | | |
|---|---|---|---|
| **EIA Footprint** | A | 28°12'51.46"S | 22°32'34.27"E |
| | B | 28°13'9.97"S | 22°33'41.94"E |
| | C | 28°13'59.72"S | 22°32'53.13"E |
| | D | 28°13'43.14"S | 22°32'6.04"E |
| **Access Road** | A | 28°12'27.31"S | 22°34'12.68"E |
| | B | 28°12'28.29"S | 22°34'12.20"E |
| | C | 28°12'30.01"S | 22°34'18.33"E |
| | D | 28°13'12.46"S | 22°33'36.84"E |

| Coordinates | | | |
|---|---|---|---|
| **Power Line to Nampower Substation** | 1 | 28°13'09.72"S | 22°33'37.54"E |
| | 2 | 28°13'10.59"S | 22°33'40.62"E |
| | 3 | 28°12'35.67"S | 22°34'14.86"E |
| | 4 | 28°12'46.49"S | 22°34'38.75"E |
| | 5 | 28°12'47.78"S | 22°34'38.78"E |
| **Power Line from Nampower to substation of the PV Solar Energy Plant** | 1 | 28°12'47.93"S | 22°34'40.18"E |
| | 2 | 28°12'46.43"S | 22°34'40.26"E |
| | 3 | 28°12'47.09"S | 22°34’51.37"E |
| | 4 | 28°12'33.27"S | 22°34'59.96"E |
| | 5 | 28°12'44.71"S | 22°35'31.31"E |
| | 6 | 28°12'39.00"S | 22°35'37.18"E |
| | 7 | 28°12'42.04"S | 22°35'42.97"E |

# 6. PHYSICAL INFRASTRUCTURE FOR SOLAR PLANT

The following sections provides information on services required on the site e.g., water, road, sewage, refuse removal, and electricity.

## 6.1 Water

Adequate water provision for the whole development is required for domestic as well as for basic cleaning. Trekkopje / Orano mine has sufficient water in the relevant catchment area to meet the requirements for the proposed project. Negotiation is ongoing with the mine to supply the needed water. The demand of water expected to be approximately 60m$^3$/month during construction and approximately 50m$^3$/month average over the period of operation. This demand can be supplied by the existing desalinated water source via the Trekkopje Pipeline and the commercial supply of this water will be negotiated and agreed directly with Orano/Trekkopje Mine. The majority of this usage is for the cleaning of the solar panels.

## 6.2 Road

There is no need to construct a new road. An existing gravel access road will be used to give access to the site and future solar energy plant.

**Figure 6:** Existing Road

### 6.3 Sanitation and waste removal

Portable chemical toilets will be utilized, that will be serviced privately or by the local municipality. Waste will be disposed at a licensed waste site of the town Council.

### 6.4 Electricity

Electricity use will be limited and will primarily be related to the lighting of the facility and domestic use. Design measures such as the use of energy saving light bulbs would be considered by the developer. During the day, electricity will be sources by the photovoltaic plant, and from the electricity connection at night.

### 6.5 Decommissioning of the facility

The operating period will be 99 years from the commencement date. Thereafter two rights of renewal periods years will be made relevant. It is anticipated that new PV technologies and equipment will be implemented, within the scope of the Environmental Authorisation, when influencing the profitability of the solar facility.
For the continuation of the project, extension of the plant's lifetime would involve putting new, more efficient, solar panels on the existing structures. This will still to be negotiated with the relevant authority.

### 6.6 The decommissioning process will consist of the following steps:

- The PV facility would be disconnected from the Nampower grid.
- The inverters and PV modules would be disconnected and disassembled.
- Concrete foundations (if used) would be removed and the structures would be dismantled.
- The underground cables would be unearthed and removed and buildings would be demolished and removed.
- The fencing would be dismantled and removed.
- The roads can be retained should the landowner choose to retain them, alternatively the roads will be removed and the compaction will be reversed.
- Most of the wires, steel and PV modules are recyclable and would be recycled to a reasonable extent. The Silicon and Aluminium in PV modules can be removed and reused in the production of new modules.

- Any rubble and non-recyclable materials will be disposed of at a registered landfill facility.

The rehabilitation of the site would form part of the decommissioning phase. The aim would be to restore the land to its original form (or as close as possible).

**6.7 The rehabilitation activities would include the following:**

- Removal of all structures and rubble,
- Breaking up compaction where required, loosening of the soil and the redistribution of topsoil,
- The surface will be restored to the original contours and hydro seeding will take place.

# 7. PROJECT OVERVIEW

Onkuni Energy is a company whose core business is renewable energy production. They specialize in producing solar and wind energy infrastructure development. With the global market seeking more sustainable and renewable sources of generating power in order to tackle climate change, Namibia is well positioned having the second highest solar irradiation regime (Namibia - Energy (trade.gov).

Onkuni Energy intends to build a 200MW solar (PV) plant in the Areva/Orano Mine Area, Usakos District, Erongo Region. The proposed 200MW solar plant will be situated on a leased 505 hectares (ha) of portion of which only a 50 ha will be utilised as first phase of the project. The site is also within close proximity of the AREVA/NamPower Substation (500 meters immediately North of the substation) which accommodates another 50 MW solar PV plant approved two years ago. Its proximity ensures easy connection to the national grid as well. The energy to be generated from the solar plant will supply electricity to numerous off takers both locally and abroad, whilst also creating socio-economic benefits for local communities within the Erongo region.

Ritta Khiba Planning Consultants has been instructed by Onkuni Energy Pty (Ltd), to apply for an Environmental Clearance Certificate (ECC), on its behalf in terms of the Environmental Management Act (2007) and its Regulations (2012). For purposes of this application, an Environmental Impact Assessment and an Environmental Management Plan has been prepared for submission to the Ministry of Environment, Forestry and Tourism (MEFT).

The area of interest to construct the 200MW Solar (PV) Plant is situated in the Trekkopje area on land under the jurisdiction of the !#OE-GAN Traditional Authority. The proposed PV plant will be serviced by the existing Nampower line that was constructed by NamPower and is to be connected to the national grid via a single existing 66 kV power line to the nearby electricity substation. The locality where the proposed Solar Energy Plant will be constructed is indicated in Figure 1 below.

# 8. ENVIRONMENTAL BASELINE DESCRIPTION: RECEIVING ENVIRONMENT

## 8.1 General Overview

The natural environment around the mine where the proposed site is situated plays a vital role in the mining activities even though the mine is not 100% active. It is regarded as an area that might in the future be fully 100% in operation and any possible change can be expected but might not necessarily affect the solar energy plant. A number of considerations of the receiving environment were identified as follow:

### 8.1.2 Technical alternatives

The technical alternatives relate to the power lines and the option of including a battery storage facility on the site.

### 8.1.3 Power lines

The proposed solar PV facility is situated in close proximity to Nampower Trekkopje substation and will tie in with the existing substation. The appointed engineers are in the process of designing the power line route and the shortest route will be considered. An overhead transmission line is the most preferred alternative for the applicant due to the following reasons:

Overhead Transmission Lines - Overhead lines are less costly to construct than underground lines. Therefore, the preference with overhead lines is mainly on the grounds of cost. Overhead lines allow high voltage operations and the surrounding air provides the necessary electrical insulation to earth. Further, the surrounding air cools the conductors that produce heat due to lost energy (Swingler et al, 2006).

The overall weather conditions in the Usakos District are less likely to cause damage and faults on the proposed overhead transmission power line. Nonetheless, if a fault occurs, it can be found quickly by visual means using a manual line patrol. Repair to

overhead lines is relatively simple in most cases and the line can usually be put back into service within a few days. In terms of potential impacts caused by overhead transmission lines include visual intrusion and threats to sensitive habitat (where applicable).

Underground Transmission Lines - Underground cables will be considered should there be a need for that as there is currently no space constraints due to the larger size applied for a lease. Since underground cables are considered to be risky of groundwater contamination, overhead lines are considered instead. Maintenance is also very difficult on underground lines compared to overhead lines. When a fault occurs in an underground cable circuit, it is almost exclusively a permanent fault due to poor visibility. Underground lines are also more expensive to construct than overhead lines, hence it was not considered as an alternative to as opposed to the overheads.

### 8.1.4 Battery storage facility

It is proposed that a nominal up to 500 MWh Battery Storage Facility for grid storage would be housed in stacked containers, with a maximum height of 5m and a maximum area of 200m$^2$ of batteries and associated operational, safety and control infrastructure. Three types of battery technologies are being considered for the proposed project: Lithium-ion, Sodium-sulphur or Vanadium Redox flow battery. The preferred battery technology is Lithium-ion.

Battery storage offers a wide range of advantages to Namibia including renewable energy time shift, renewable capacity firming, electricity supply reliability and quality improvement, voltage regulation, electricity reserve capacity improvement, transmission congestion relief, load following and time of use energy cost management. In essence, this technology allows renewable energy to enter the base load and peak power generation market and therefore can compete directly with fossil fuel sources of power generation and offer a truly sustainable electricity supply option.

## 8.2 Design and layout alternatives

Discussions on the design alternatives phase (i.e. what would be the best design option for the development) between the developer, EAP and other appointed

specialist consultants are currently underway. The final layout design will be provided to the Environmental Assessment Unit for consideration.

## 8.3 Technology alternatives

There are several types of semiconductor technologies currently available and in use for PV solar panels. Two, however, have become the most widely adopted, namely crystalline silicon, thin film or bifacial PV panels. These technologies are discussed in more detail below:

Crystalline (high efficiency technology at higher cost):

Crystalline silicon panels are constructed by first putting a single slice of silicon through a series of processing steps, creating one solar cell. These cells are then assembled together in multiples to make a solar panel. Crystalline silicon, also called wafer silicon, is the oldest and the most widely used material in commercial solar panels. Crystalline silicon modules represent 85-90% of the global annual market today (www.energy.gov/eere/solar/cystaline). There are two main types of crystalline silicon panels that can be considered for the solar facility:

**Mono-crystalline Silicon - mono-crystalline** (also called single crystal) panels use solar cells that are cut from a piece of silicon grown from a single, uniform crystal. Mono-crystalline panels are among the most efficient yet most expensive on the market. They require the highest purity silicon and have the most involved manufacturing process.

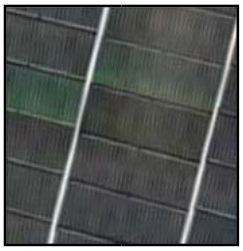
**Poly-crystalline Silicon** – poly-crystalline panels use solar cells that are cut from multifaceted silicon crystals. They are less uniform in appearance than mono-crystalline cells, resembling pieces of shattered glass. These are the most common solar panels on the market, being less expensive than monocrystalline silicon. They are also less efficient, though the performance gap has begun to close in recent years (firstsolar.com).

Thin film (low-cost technology with lower efficiency):

Thin film solar panels are made by placing thin layers of semiconductor material onto various surfaces, usually on glass. The term *thin film* refers to the amount of semiconductor material used. It is applied in a thin film to a surface structure, such as a sheet of glass. Contrary to popular belief, most thin film panels are not flexible. Overall, thin film solar panels offer the lowest manufacturing costs, and are becoming more prevalent in the industry. Thin films currently account for 10-15% of global PV module sales. There are three main types of thin film used:

• **Cadmium Telluride (CdTe)** - CdTe is a semiconductor compound formed from cadmium and tellurium. CdTe solar panels are manufactured on glass. They are the most common type of thin film solar panel on the market and the most cost-effective to manufacture. CdTe panels perform significantly better in high temperatures and in low-light conditions.

• **Amorphous Silicon** - Amorphous silicon is the non-crystalline form of silicon and was the first thin film material to yield a commercial product, first used in consumer items such as calculators. It can be deposited in thin layers onto a variety of surfaces and offers lower costs than traditional crystalline silicon, though it is less efficient at converting sunlight into electricity.



• **Copper, Indium, Gallium, Selenide (CIGS)** - CIGS is a compound semiconductor that can be deposited onto many different materials. CIGS has only recently become available for small commercial applications and is considered a developing PV technology (firstsolar.com).

Bifacial panels:

As the name suggests, bifacial solar panels have two faces, or rather, they can absorb light from both sides of the panel. A lot of potential energy transfer is lost in traditional solar cells when the light hits the back of a solar panel. Most bifacial solar panels use monocrystalline cells, whereas traditional cells use polycrystalline materials. The monocrystalline materials, alongside the clear light pathway on both sides of the panel, enable the light to be absorbed from either side of the cell, and it is thought that, that the overall efficiency of these cells can be up to 30% greater in commercial applications. Although, the exact amount is variable depending on the surface that they are installed on. The front side of the solar panel still absorbs most of the solar light, but the back side of the solar panel can absorb between 5-90% of the light absorbed by the front of the solar panel.

Traditional solar panels use an opaque back sheet. By comparison, bifacial solar panels either have a clear/reflective back sheet or have dual panes of glass. Most of these solar panels are frameless so any issues with potential-induced degradation (PID) are reduced. To efficiently convert light into electricity from both sides, bifacial

solar cells have selective-area metallization schemes that enable light to pass between the metallized areas, rather than the conventional thick metal collectors as seen with monofacial solar panels.

The technology that (at this stage) proves more feasible and reasonable with respect to the proposed solar facility is crystalline silicon panels, due to it being non-reflective, more efficient, and with a higher durability. However, due to the rapid technological advances being made in the field of solar technology the exact type of technology to be used, such as bifacial panels, will only be confirmed at the onset of the project.

Preconstruction, Construction and Operation

The preconstruction and construction stages of the proposed solar energy plan will commence once all the required approvals and permits are obtained. This are PPA, Land Lease agreement from the Land board and the Environmental Clearance Certification. The construction of the solar energy plant might take between 4 – 6 months before construction and completion of the solar energy plant.

Maintenance, Monitoring and Reporting Plan

The solar energy plant will not necessarily be manned by a full-time workforce. Once it has been commissioned, it will be self-staining and will feed power into the national grid with ongoing online monitoring and security surveillance.

Estimated Capital Investment

The Total estimated capital investment for the development of the proposed Solar Energy plan will be approximately N$4,5 billion for the whole project. However, since the project is to be constructed in phases, the first phase will approximately be 20mil N$ worth.

# 9. THE ENVIRONMENTAL ATTRIBUTES ASSOCIATED WITH THE PREFERRED ALTERNATIVE

The following sections provide general information on the biophysical and socio-economic attributed associated with the preferred alternative.

## 9.1 Biophysical environment

The biophysical environment is described with specific reference to geology, soils, agricultural potential, vegetation and landscape features, climate, biodiversity and the visual landscape. However, due to the fact that the area proposed for development exclusively consists of land used for grazing, nothing of note was identified from an ecological or conservation point of view on the site.

### 9.1.1 Geology, soils and agricultural potential

The geology is characterised by Kalahari sand plains. These soils are generally deep to very deep and well drained. Furthermore, the soils have a low agricultural potential as they are leached, have a low water-holding capacity and a low nutrient status. The foundations for mounting structures will need to be erected in sand. None of the following occur on the site:

- Shallow water table (less than 1.5m deep)
- Sinkhole or doline areas.
- Seasonally wet soils (often close to water bodies)
- Unstable rocky slopes or steep slopes with loose soil
- Dispersive soils (soils that dissolve in water)
- Soils with high clay content (clay fraction more than 40%)
- Any other unstable soil or geological feature

Soils across the site are susceptible to wind erosion. The geotechnical conditions are assessed, as suitable for the development of a solar energy facility. Because soil conditions are fairly uniform across the site, there are no more and less suitable parts of the project area for development.

The significance of all agricultural impacts is influenced by the fact that the site has climate limitations, as well as soil limitations, making it unsuitable for cultivation and the land is solely used for small livestock grazing. The very sandy soils, with very limited water holding capacity are a further limitation. These factors render the site unsuitable for any kind of mainstream cultivation without irrigation and limit it to low density grazing only. The long-term grazing capacity of the site is 15 hectares per large stock unit.

### 9.1.2 Vegetation and landscape features

The landscape is characterized by flat plains with virtually no dunes. The vegetation is dominated by parse shrubs and grasses. Negligible clearance of vegetation will be required.

**Figure 7: Vegetation and landscapes features – shrubs and grass**

(Source - RKPC,2023)

*Threatened and Protected Ecosystems*

No ecosystems that are threatened and in need of protection was recorded in or in the vicinity of the study area.

### 9.1.3 Climate

Usakos has a Subtropical desert climate (Classification: BWh). The area is characterised by an average temperature of 21.2ºC, an average of 157,5 millimeters of precipitation. With regards to the potential impact of solar panels on climate, Fthenakis and Yu (2014) published a paper on the *Analysis of the Potential for a Heat Island Effect in large Solar Farms.* The study focused on the effect on global climate due to the albedo change from widespread installations of solar panels and found that the air temperature at 2.5m of the ground in the centre of the simulated solar farm selection was 1.9°C higher than the ambient air temperature, but that it declined to the ambient temperature at the height of 5 to 18m of the ground. The data also showed a clear decline in air temperature (within 0.3°C) 300m away from the solar farm. The solar panels also cool completely at night, and it is thus unlikely that a heat island effect could occur. The simulations also showed that the access roads between the solar fields allow for substantial cooling, and therefore, it is unlikely that an increase of size of the solar farm will affect the temperature of the surroundings.

## 9.2 Visual landscape

The proposed development is located in an area with relatively low significance in elevation, meaning that the site is not located on a mountain, at the foot of a mountain or in an area with a significant difference in elevation. Areas within 5km from the proposed development might have a clear view of the proposed development without taking existing screening into account.

## 9.3 Description of the socio-economic environment

The socio-economic environment is described with specific reference to social, economic, heritage and cultural aspects.

### 9.3.1 Socio-economic conditions

In terms of the Namibia Population and Housing Census (NSA, 2011), Daures Constituency had a total population of 11 350 people in 2011 (consisting of 6 041 males and 5 308 females). The proposed development of the solar PV Plant has a variety of associated socio-economic benefits. In terms of employment the

construction phase will employ more than 50 new skilled, lows killed and semi-skilled employment opportunities over a period of 6 – 18 months. The operational phase however, will employ approximately 20 employees over a period of 20 years.

The proposed project will contribute to local economic growth by supporting industry development in line with regional goals and ensuring advanced skills are drawn to the Daures Constituency especially in the first phase of the project seeing that the majority active population of the Daures Constituency is between the ages of 10 – 50 years. With the increase of solar facilities in the country, it will eventually push to reduce the cost of the power generated through solar facilities.

### 9.3.2 Cultural and heritage aspects

Special attention was given to the identification of possible cultural or heritage resources on site. The initial site investigation concluded that there are no obvious heritage resources located on the site earmarked for development.

### 9.3.3 Traffic consideration

An existing gravel access road will be used to give access to the site and future solar energy plant. Internal site road networks to provide access to the solar PV plant and its associated infrastructure will be required. All roads will be located within a 25m corridor environmental or technical constraints that may arise in order to accommodate heavy vehicles. The proposed solar PV plant will generate additional traffic on the surrounding road network especially during the construction phase. The operational phase of this project is not expected to generate significant traffic volumes. The typical day-to-day activities will probably only be service vehicles undertaking general maintenance at the site.

## 9.4 Site Selection Matrix

Due to the nature of the proposed development, the location of the facility is largely dependent on technical and environmental factors such as solar irradiation, climatic conditions, topography of the site, access to the grid and capacity of the grid. Studies

of solar irradiation worldwide indicate that the site area has a huge potential for the generation of power from solar.

The receptiveness of the site to PV Development includes the presence of optimal conditions for the sitting of a solar energy facility due to high irradiation values and optimum grid connection opportunities. The site area is considered favourable and suitable from a technical perspective due to the following characteristics:

- Climatic conditions: Climatic conditions determine if the project will be viable from an economic perspective as the solar energy facility is directly dependent on the annual direct solar irradiation values of a particular area. The site area receives high average of direct normal and global horizontal irradiation and has a low number of rainy days and a high number of daylight hours experienced in the region.

- Topographic conditions: The surface is on which the proposed facility will be located has a favourable level topography, which facilitates work involved with construction and maintenance of the facility and ensures that shadowing on the panels do not occur.

- Extent of the site: The proposed lease area of 505Ha will be sufficient to accommodate the proposed 200MW solar PV plant.

- Site availability and access: The land is available for lease by the developer. An existing gravel access road will be used to give access to the solar PV plant.

- Grid connection: There is an existing Nampower substation located approximately 1km from the subject property. The proposed solar PV plant will feed into the Nampower substation. In order for the PV facility to connect to the national grid, the facility will have to construct an on-site substation, switching station and a power line from the project site to connect to the Nampower grid.

- Environmental sensitivities: From an environmental perspective the proposed site is considered highly desirable due to limited environmental sensitivities in terms of geology, and soils, agricultural potential, vegetation and landscape features, climate, biodiversity and the visual landscape. Due to the fact that the area proposed for development exclusively consists of land used for small

livestock grazing, nothing of note was identified from an ecological or conservation point of view on the site.

It is evident from the discussion above that the site area may be considered favourable and suitable in terms of these site characteristics.

# 10. DESCRIPTION OF THE IMPACTS AND RISKS

## 10.1 Scoping Methodology

The contents and methodology of the Environmental Impact report aimed to provide, as far as possible, a user-friendly analysis of information to allow for easy interpretation.

- Checklist (see section 10.1.1): The checklist consists of a list of structured questions related to the environmental parameters and specific human actions. They assist in ordering thinking, data collection, presentation and alert against the omission of possible impacts.

- Matrix (see section 10.1.2): The matrix analysis provides a holistic indication of the relationship and interaction between the various activities, development phases and the impact thereof on the environment. The method aims at providing a first order cause and effect relationship between the environment and the proposed activity. The matrix is designed to indicate the relationship between the different stressors and receptors which leads to specific impacts. The matrix also indicates the specialist studies that have been conducted to address the potentially most significant impacts.

### 10.1.1 Checklist analysis

The independent consultant conducted a site visit on 13 November 2022. The site visit was conducted to ensure a proper analysis of the site-specific characteristics of the study area. Table 9 provides a checklist, which is designed to stimulate thought regarding possible consequences of specific actions and so assist scoping of key issues. It consists of a list of structured questions related to the environmental parameters and specific human actions. They assist in ordering thinking, data collection, presentation and alert against the omission of possible impacts. The table highlights certain issues identified.

**Table 6:** Environmental checklist

| Question | Yes | No | Un-sure | Description |
|---|---|---|---|---|
| 1. Are any of the following located on the site earmarked for the development? | | | | |
| I. A river, stream, dam or wetland | | ┐ | | None. |
| II. A conservation or open space area | | ┐ | | None. |
| III. An area that is of cultural importance | | ┐ | | None. |
| IV. Site of geological significance | | ┐ | | None. |
| V. Areas of outstanding natural beauty | | ┐ | | None. |
| VI. Highly productive agricultural land | | ┐ | | None. |
| VII. Floodplain | | ┐ | | None. |
| VIII. Indigenous forest | | ┐ | | None. |
| IX. Grass land | | ┐ | | None. |
| X. Bird nesting sites | ┐ | | | Taller shrubs are regularly used by birds as nest sites and for perch sites for shade and roosting in the hottest times of day. |
| XI. Red data species | ┐ | | | None |
| XII. Tourist resort | | ┐ | | None. |
| 2. Will the project potentially result in potential? | | | | |
| I. Removal of people | | ┐ | | None. |
| II. Visual Impacts | ┐ | | | "*Negative Low"* impact. |
| III. Noise pollution | | ┐ | | Construction activities will result in the generation of noise over a period of months. The noise impact is unlikely to be significant. |
| IV. Construction of an access road | ┐ | | | Access will be obtained via existing gravel road. |
| V. Risk to human or valuable ecosystems due to explosion/fire/ discharge of waste into water or air. | | ┐ | | Hazards as part of battery storage facility (gas release leading to fire and/or explosion). |

| | | | | |
|---|---|---|---|---|
| VI. Accumulation of large workforce (>50 manual workers) into the site. | ┐ | | | More than 50 employment opportunities will be created during the construction phase of the project. |
| VII. Utilisation of significant volumes of local raw materials such as water, wood etc. | ┐ | | | Water demand is expected to be approximately 60m$^3$/month during construction and approximately 50m$^3$/month average over the period of operation. This demand can be supplied by the existing desalinated water source via the Trekkopje Pipeline. |
| VIII. Job creation | ┐ | | | More than 50 employment opportunities will be created during the construction and more than 20 employees during operational phases. |
| IX. Traffic generation | ┐ | | | It is estimated that less than 50 pick hour trips will be generated as a result of this development during construction and operational phases. |
| X. Soil erosion | ┐ | | | The site will need to be cleared or graded to a limited extent, which may potentially result in a degree of dust being created, increased runoff and potentially soil erosion. The time that these areas are left bare will be limited to the construction phase, since vegetation will be allowed to grow back after construction. |
| XI. Installation of additional bulk telecommunication transmission lines or facilities | | ┐ | | None. |
| 3. Is the proposed project located near the following? | | | | |
| I. A river, stream, dam or wetland | ┐ | | | None. |
| II. A conservation or open space area | | ┐ | | None. |
| III. An area that is of cultural importance | | ┐ | | None. |
| IV. A site of geological significance | | ┐ | | None. |

| | | | | |
|---|---|---|---|---|
| V. An area of outstanding natural beauty | | ┐ | | None. |
| VI. Highly productive agricultural land | | ┐ | | None. |
| VII. A tourist resort | | ┐ | | None. |
| VIII. A formal or informal settlement | | ┐ | | None. |

### 10.1.2 Matrix analysis

The matrix describes the relevant listed activities, the aspects of the development that will apply to the specific listed activity, a description of the environmental issues and potential impacts, the significance and magnitude of the potential impacts and possible mitigation measures. The matrix also highlights areas of particular concern for more in-depth assessment during the EIA process. Each cell is evaluated individually in terms of the nature of the impact, duration and its significance – should no mitigation measures be applied. This is important since many impacts would not be considered insignificant if proper mitigation measures were implemented.

In order to conceptualise the different impacts, the matrix specify the following:

- Stressor: Indicates the aspect of the proposed activity, which initiates and cause impacts on elements of the environment.
- Receptor: Highlights the recipient and most important components of the environment affected by the stressor.
- Impacts: Indicates the net result of the cause-effect between the stressor and receptor.
- Mitigation: Impacts need to be mitigated to minimise the effect on the environment.

**For ease of reference the significance of the impacts is colour-coded as follow:**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Low significance** | | **Medium significance** | | **High significance** | | **Positive impact** | |

**Table 7***: Matrix analysis*

| LISTED ACTIVITY (The Stressor) | ASPECTS OF THE DEVELOPMENT /ACTIVITY | POTENTIAL IMPACTS | Receptors | Impact description / consequence | SIGNIFICANCE AND MAGNITUDE OF POTENTIAL IMPACTS | | | | | | | MITIGATION OF POTENTIAL IMPACTS | | | SPECIALIST STUDIES / INFORMATION |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Minor | Medium | Extent | Duration | Probability | Reversibility | Irreplaceable loss of resources | Possible Mitigation | Possible mitigation measures | Level of residual risk | |
| **CONSTRUCTION PHASE** | | | | | | | | | | | | | | | |
| **Activity 27. (2) (a):** ***Land use and transformation.*** **Activity 27. (2) (h):** ***Energy generation and distribution.*** | Site clearing and preparation<br>Certain areas of the site will need to be cleared of vegetation and some areas may need to be levelled.<br>Civil works<br>The main civil works are:<br>• Terrain levelling if necessary– Levelling will be minimal as the potential site chosen is relatively flat.<br>• Laying foundation- The structures will be connected to the ground through cement pillars, cement slabs or metal screws. The exact method will depend on the detailed geotechnical analysis.<br>• Construction of access and inside roads/paths – existing paths will be used were reasonably possible. Additionally, the turning | BIOPHYSICALENVIRONMENT | Fauna & Flora | • Loss or fragmentation of habitat for faunal and floral species.<br>• Loss of indigenous faunal and floral species diversity.<br>• Loss of faunal and floral species of conservation significance. | | - | L | L | D | PR | ML | Yes | - Site clearing must take place in a phased manner, as and when required.<br>- The footprint associated with the construction related activities (access roads, construction platforms, workshop etc.) should be confined to the fenced off area and minimised where possible.<br>- No trapping or snaring to fauna on the construction site should be allowed.<br>- Also refer to the mitigation measures listed in the Ecological Fauna and Flora Habitat Survey & Avifaunal Study. | L | |
| | | | Avifauna | ⊓ Disturbance by construction and maintenance activities. | | | L | L | Pr | PR | ML | Yes | - Bird scaring techniques including rotating prisms and experimental use of | L | |

| | | | | | | | | | | | | | | | |
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| | circle for trucks will also be taken into consideration.<br>□ Trenching – all Direct Current (DC) and Alternating Current (AC) wiring within the PV plant will be buried underground. Trenches will have a river sand base, space for pipes, backfill of sifted soil and soft sand and concrete layer where vehicles will pass.<br><br><u>Transportation and installation of PV panels into an Array</u><br>The panels are assembled at the supplier's premises and will be transported from the factory to the site on trucks. The panels will be mounted on metal structures which are fixed into the ground either through a concrete foundation or a deep-seated screw.<br><br><u>Wiring to the Central Inverters</u><br>Sections of the PV array would be wired to central inverters. The inverter is a pulse width mode inverter that converts DC electricity to alternating electricity (AC) at grid frequency. | | | □ Displacement through habitat removal and construction work.<br>□ Direct collision with power line network. | | | | | | | | | Torri lines are used if birds are found to impact the PV panels.<br>- The solar panels are constructed as far as possible from water points that could attract any wetland species. - Stagger pylons (following approved bird friendly designs) to increase visibility to bustards and raptorial species<br>- All power lines must be marked with bird diverters to reduce the possible impact risk for the bustards and raptorial species. | | |
| | | | **Air** | □ Air pollution due to the increase of traffic of construction vehicles. | - | | S | S | D | CR | NL | Yes | - Dust suppression measures must be implemented for heavy vehicles such as wetting of gravel roads on a regular basis and ensuring that vehicles used to transport sand and building materials are fitted with tarpaulins or covers. | L | - |
| | | | **Soil** | □ Loss of topsoil in disturbed areas, causing a decline in soil fertility.<br>□ Soil erosion caused by alteration of the surface characteristics. | | - | S | M | Po | PR | ML | Yes | - Areas which are not to be constructed on within two months must not be cleared to reduce erosion risks.<br>- The necessary silt fences and erosion control measures must be implemented in areas | M | |

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| | | | | | | | | | | | | | where these risks are more prevalent.<br>- Vehicles and equipment shall be serviced regularly to avoid the contamination of soil from oil and hydraulic fluid leaks etc.<br>- Also refer to the mitigation measures listed in the Agricultural and Soils Impact Assessment (attached as Appendix H5). | | |
| | | | Geology | ⊓ Erodible soil.<br>⊓ Hard/compact geology. If the bedrock occurs close to surface it may present problems when driving solar panel columns.<br>⊓ Instability due to soluble rock.<br>⊓ Areas subject to seismic activity. | | - | S | S | Pr | CR | NL | Yes | - The most effective mitigation will be the minimisation of the project footprint by using the existing roads in the area and not create new roads to prevent other areas also getting compacted.<br>- If an activity will mechanically disturb below surface in any way, then any available topsoil should first be stripped from the entire surface and stockpiled for respreading during rehabilitation. | L | |
| | | | Existing services infrastructure | ⊓ The use of water.<br>⊓ Generation of waste that needs to be accommodated at a licensed landfill site.<br>⊓ Generation of sewage that needs to be accommodated by the local sewage plant. | | - | L | S | D | PR | ML | Yes | - | L | Confirmation from the Local Town Council |

| | | | | | | | | | | | | | | | |
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| | | | Ground water | ⊓ Pollution due to construction vehicles. | - | | S | S | Pr | CR | ML | Yes | - A groundwater monitoring programme (quality and groundwater levels) should be designed and installed for the site.<br>- Monitoring boreholes should be securely capped, and must be fitted with a suitable sanitary seal to prevent surface water flowing down the outside of the casing.<br>- Full construction details of monitoring boreholes must be recorded when they are drilled (e.g. screen and casing lengths, diameters, total depth, etc.).<br>- Sampling of monitoring boreholes should be done according to recognised standards. | L | - |
| | | | Surface water | ⊓ Increase in storm water runoff.<br>⊓ Pollution of water sources due to soil erosion. | - | | S | S | Pr | BR | ML | Yes | - Silt fences should be used to prevent any soil entering the storm water drains.<br>- New storm water construction must be developed strictly according to specifications from engineers in order to ensure efficiency.<br>- Any hazardous substances must be stored at least 200m from any of the water bodies on site. | M | - |

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| | | | | | | | | | | | | | | | |
| | | | Local unemployment rate | ⊓ The creation of local employment and business opportunities, skills development and training.<br>⊓ The maximising of opportunities to local and regional SMMEs and other business for service delivery.<br>⊓ Technical support to local farmers and municipalities. | | + | P | S | D | I | N/A | Yes | - Where reasonable and practical, service providers should appoint local contractors and implement a 'locals first' policy, especially for semi and low-skilled job categories. | L | |
| | | | Visual landscape | ⊓ Potential visual impact on residents of farmsteads and surrounding informal settlements and motorists in close proximity to proposed facility. | - | | L | S | D | PR | NL | Yes | - Dust suppression will play an important role to minimise the visibility of dust.<br>- Contractors must avoid using roads not relevant to the project.<br>- Good housekeeping should be implemented.<br>- Proper rehabilitation of disturbed areas. | L | |
| | | | Traffic volumes | ⊓ Increase in construction vehicles on existing roads. | - | | P | S | Pr | CR | NL | Yes | The development may commence without influencing the levels-of service for the local road network. | L | |
| | | SOCIAL/ECONOMICENVIRONMENT | Health & Safety | ⊓ Air/dust pollution.<br>⊓ Road safety.<br>⊓ The in-migration or potential influx of job seekers that potentially might have impacts on family structures, communities, social networks and basic community services.<br>⊓ The presence of construction workers on-site and in the | | - | L | S | Pr | PR | ML | Yes | - Contractor to ensure that construction related activities that pose a potential fire risk, such as welding, are properly managed and are confined to areas where the risk of fires has been reduced.<br>- It is recommended that no construction workers, | M | |

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| | | | | impacted areas and communities.<br>Safety risk of farmers, risk of livestock theft and theft of farming infrastructure.<br>Potential impact of heavy vehicles and construction related activities, damage to roads and dust pollution.<br>The potential risk of veld fires. | | | | | | | | with the exception of security personnel, should be permitted to stay over-night on the site.<br>- Also refer to the mitigation measures listed in the Social Impact Assessment (attached as Appendix H8). | | |
| | | | Noise levels | The generation of noise as a result of construction vehicles, the use of machinery such as drills and people working on the site. | - | | L | S | D | CR | NL | Yes | - During construction care should be taken to ensure that noise from construction vehicles and plant equipment does not intrude on the surrounding residential areas.<br>- Plant equipment such as generators, compressors, concrete mixers as well as vehicles should be kept in good operating order and where appropriate have effective exhaust mufflers. | L | - |
| | | | Tourism industry | Since there are no tourism facilities in close proximity to the site, the proposed activities will not have an impact on tourism in the area. | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | - |
| | | | Heritage resources | No potential cultural or heritage resources were identified on or around the site. | | - | S | S | Po | I | ML | Yes | - Any discovered artefacts shall not be removed under any circumstances. - Any destruction of a site can only be allowed once a permit is obtained and the site has been mapped and noted. | L | |

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| | | | | | | | | | | | | | - Permits shall be obtained from the relevant authority should the proposed site affect any world heritage sites or if any heritage sites are to be destroyed or altered. | | |
| **OPERATIONAL PHASE** | | | | | | | | | | | | | | | |
| | The key components of the proposed project are described below:<br><br>• <u>PV Panel Array</u> - To produce 200MW, the proposed facility will require numerous linked cells placed behind a protective glass sheet to form a panel. Multiple panels will be required to form the solar PV arrays which will comprise the PV facility. The PV panels will be tilted at a northern angle in order to capture the most sun.<br><br>• <u>Wiring to Central Inverters</u> - Sections of the PV array will be wired to central inverters. The inverter is a pulse width mode inverter that converts direct current (DC) electricity to alternating current (AC) electricity at grid frequency.<br><br>• <u>Connection to the grid</u> - Connecting the array to the electrical grid requires transformation of the voltage from 480V to 33kV to 132kV. The normal components and dimensions of a | BIOPHYSICALENVIRONMENT | Fauna & Flora | ⊓ Loss or fragmentation of habitat for faunal and floral species.<br><br>⊓ Loss of indigenous faunal and floral species diversity.<br><br>⊓ Loss of faunal and floral species of conservation significance. | | - | S | L | D | PR | ML | Yes | - Indigenous vegetation must be maintained and all exotics removed as they appear and disposed of appropriately.<br><br>- Re-vegetation of the disturbed site is aimed at approximating as near as possible the natural vegetative conditions prevailing prior to construction.<br><br>- Implement an Avifauna Monitoring plan.<br><br>- Also refer to the mitigation measures listed in the Ecological Fauna and Flora Habitat Survey & Avifaunal Study. | M | |
| | | | Air quality | ⊓ The proposed development will not result in any air pollution during the operational phase. | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | - |
| | | | Soil | ⊓ Loss of agricultural land use caused by direct occupation of land by the energy facility footprint.<br><br>⊓ Loss of topsoil in disturbed areas, causing a decline in soil fertility.<br><br>⊓ Soil erosion caused by alteration of the surface characteristics. | | - | L | L | D | PR | ML | Yes | - An effective system of run-off control should be implemented, where it is required, that collects and safely disseminates run-off water from all hardened surfaces and prevents potential down slope erosion.<br><br>- Another important measure is to avoid | M | |

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| | distribution rated electrical substation will be required. Output voltage from the inverter is 480V and this is fed into step up transformers to 132kV. An onsite substation will be required on the site to step the voltage up to 132kV, after which the power will be evacuated into the national grid. Whilst the proposed Solar Power Plant has not yet received a cost estimate letter from Nampower, it is expected that generation from the facility will tie in with Nampower substation. The installed capacity will be up to 200MW.<br><br><u>Supporting Infrastructure</u> – Auxiliary buildings with basic services such as water and electricity will be constructed on the site. Other supporting infrastructure includes voltage and current regulators and protection circuitry.<br><br><u>Battery storage</u> – Up to 500 MW Battery Storage Facility with a maximum height of 8m. | | | | | | | | | | | | stripping land surfaces of existing vegetation by only allowing vehicles to travel on existing roads and not create new roads. | | |
| | | | Geology | ⊓ Collapsible soil.<br>⊓ Active soil (high soil heave).<br>⊓ Erodible soil.<br>⊓ Hard/compact geology. If the bedrock occurs close to surface it may present problems when driving solar panel columns.<br>⊓ Instability due to soluble rock.<br>⊓ Steep slopes or areas of unstable natural slopes.<br>⊓ Areas subject to seismic activity. | | - | S | S | Po | PR | ML | Yes | - Surface drainage should be provided to prevent water ponding.<br>- Mitigation measures proposed by the detailed engineering geological investigation should be implemented. | L | |
| | | | Existing services infrastructure | ⊓ Generation of waste that need to be accommodated at a licensed landfill site.<br>⊓ Generation of sewage that need to be accommodated by the municipal sewerage system and the local sewage plant.<br>⊓ Increased consumption of water. Approximately 4 200 000 litres of water per annum will be required for the operation of the solar plant. | | - | P | L | D | I | ML | Yes | - Waste has to be accommodated at a licensed landfill site.<br>- Water saving devices will be implemented | M | Confirmation from the Local Municipality |
| | | | Ground water | ⊓ Leakage of hazardous materials. | - | | L | L | Po | PR | ML | Yes | - All areas in which substances potentially | L | - |

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | ⊓ Roads – Access will be obtained via the existing gravel road. An internal site road network will also be required to provide access to the solar field and associated infrastructure. All site roads will be constructed within a 25 m wide corridor.<br>⊓ Fencing - For health, safety and security reasons, the facility will be required to be fenced off from the surrounding farm. | | | The development will comprise of a distribution substation and will include transformer bays which will contain transformer oils. Leakage of these oils can contaminate water supplies. | | | | | | | | | hazardous to groundwater are stored, loaded, worked with or disposed of should be securely bunded (impermeable floor and sides) to prevent accidental discharge to groundwater. | | |
| | | | Surface water | ⊓ Increase in storm water runoff. The development will potentially result in an increase in storm water runoff that needs to be managed to prevent soil erosion.<br>⊓ Leakage of hazardous materials. The development will comprise of a distribution substation and will include transformer bays which will contain transformer oils. Leakage of these oils can contaminate water supplies. | - | | L | L | Pr | PR | ML | Yes | - The storm water management plan must include the construction of appropriate design measures that allow surface and subsurface movement of water along drainage lines so as not to impede natural surface and subsurface flows. | L | - |
| | | SOCIAL/ECONOMICENVIRONMENT | Social dimension | ⊓ The creation of local employment, business opportunities, and opportunities for skills development and on-site training.<br>⊓ The potential up- and downstream economic opportunities for the impacted community.<br>⊓ The establishment of renewable energy infrastructure and the generation of clean, renewable energy.<br>⊓ The generation of additional land use income for landowners.<br>⊓ The potential positive impacts associated with the | | + | L | L | D | I | N/A | Yes | - Where reasonable and practical, service providers should implement a 'locals first' policy, especially for semi and low-skilled job categories. | N/A | |

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | establishment of a Community Trust. | | | | | | | | | | | |
| | | | Visual landscape | ⊓ Change in land-use/sense of place. The site is characterized by open veldt with a rural agricultural sense of place. The use of the area for the construction and operation of the PV plant will result in the area not being used for livestock grazing anymore.<br>⊓ Potential visual impact on residents of farmsteads and travellers in close proximity to proposed facility. | | - | L | L | D | PR | ML | Yes | - Screening should be implemented by means of vegetation in conjunction with security fencing.<br>- Security lighting should make use of down-lights to minimise light spill, and motion detectors where possible so that lighting at night is minimised.<br>- Care should be taken with the layout of the security lights to prevent motorists on the dirt road from being blinded by lights at the approach to the site. | M | |
| | | | Traffic volumes | ⊓ The proposed development will not result in any traffic impacts during the operational phase. | - | | L | L | Po | CR | NL | Yes | - | L | |
| | | | Health & Safety | ⊓ Batteries, as with most electrical equipment, can be dangerous and may catch fire, explode or leak dangerous pollutants if damaged, possibly injuring people working at the facility or polluting the environment. | | - | L | L | U | CR | NL | Yes | - The design of the BESS will comply with all the local and international standards to ensure that the risk of fire is minimal. - Each container must have a built-in fire detection and suppression system.<br>- The facility must be designed and management properly, and the batteries must be handled in the manner prescribed by the manufacturer.<br>- It is recommended that some special management actions be provided to reduce the | M | - |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | **risk of an incident and manage an incident should one ever occur.** | | |
| | | | Noise levels | ⊓ The proposed development will not result in any noise pollution during the operational phase. | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| | | | Tourism industry | ⊓ Enhance tourism in the area. The facility may become an attraction or a landmark within the region that people would want to come and see. | + | | P | L | Po | I | N/A | Yes | - | N/A | |
| | | | Heritage resources | ⊓ It is not foreseen that the proposed activity will impact on heritage resources or vice versa. | - | | S | L | Po | PR | ML | Yes | - | L | |
| | | | Electricity supply & infrastructure | ⊓ Generation of additional electricity. The facility will generate electricity that will be fed into the grid.<br>⊓ Additional electrical infrastructure. The proposed solar facility will add to the existing electrical infrastructure and aid to lessen the reliance of electricity generation from coal-fired power stations. | +<br>+ | | I | L | D | I | N/A | Yes | - | N/A | - |
| **DECOMMISSIONING PHASE** | | | | | | | | | | | | | | | | |
| - | **Dismantling of infrastructure**<br>**During the decommissioning phase the Solar PV Energy facility and its associated infrastructure will be dismantled.**<br>**Rehabilitation of biophysical environment**<br>**The biophysical environment will be rehabilitated.** | BIOPHYSICAL ENVIRONMENT | Fauna & Flora | ⊓ Re-vegetation of exposed soil surfaces to ensure no erosion in these areas. | + | | S | L | Po | N/A | N/A | Yes | - Re-vegetation of affected areas must be made a priority to avoid erosion. | N/A | - |
| | | | Air quality | ⊓ Air pollution due to the increase of traffic of construction vehicles. | - | | S | S | D | CR | NL | Yes | - Regular maintenance of equipment to ensure reduced exhaust emissions. | L | - |
| | | | Soil | ⊓ Soil degradation, including erosion. | | - | S | S | Pr | PR | M | Yes | - Re-vegetation of affected areas must be made a priority to avoid erosion. | M | Agricultural and Soils Impact Assessment |

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | ⊓ Disturbance of soils and existing land use (soil compaction).<br>⊓ Physical and chemical degradation of the soils by construction vehicles (Hydrocarbon spills). | | | | | | | | | | | | |
| | | | Geology | ⊓ It is not foreseen that the decommissioning phase will impact on the geology of the site or vice versa. | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | - |
| | | | Existing services infrastructure | ⊓ Generation of waste that need to be accommodated at a licensed landfill site.<br>⊓ Generation of sewage that need to be accommodated by the municipal sewerage system and the local sewage plant. Increase in construction vehicles. | | - | L | S | D | I | NL | Yes | - | L | - |
| | | | Ground water | ⊓ Pollution due to construction vehicles. | - | | S | S | Pr | CR | ML | Yes | - | L | - |
| | | | Surface water | ⊓ Increase in storm water runoff.<br>⊓ Pollution of water sources due to soil erosion. | - | | L | S | Pr | PR | ML | Yes | - Removal of any historically contaminated soil as hazardous waste.<br>- Removal of hydrocarbons and other hazardous substances by a suitable contractor to reduce contamination risks.<br>- Removal of all substances which can result in groundwater (or surface water) contamination. | M | - |
| | | SOCIAL/ECONOMIC ENVIRONMENT | Local unemployment rate | ⊓ The loss of employment opportunities and associated income. | | - | L | L | Po | PR | NL | Yes | - Life should ensure that retrenchment packages are provided for all staff retrenched when the facility is decommissioned. | M | |

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Visual landscape | ⊓ Potential visual impact on visual receptors in close proximity to proposed facility. | - | | L | S | D | CR | NL | Yes | - Locate laydown and storage areas in zones of low visibility i.e. behind tall trees or in lower lying areas. | L | |
| | | | Traffic volumes | ⊓ Increase in construction vehicles. | - | | L | S | Pr | CR | NL | Yes | - Movement of heavy construction vehicles through residential areas should be timed to avoid peak morning and evening traffic periods.<br>- In addition, movement of heavy construction vehicles through residential areas should not take place over weekends. | L | |
| | | | Health & Safety | ⊓ Air/dust pollution.<br>⊓ Road safety.<br>⊓ Increased crime levels. The presence of construction workers on the site may increase security risks associated with an increase in crime levels as a result of influx of people in the rural area. | - | | L | S | Pr | PR | ML | Yes | - Demarcated routes to be established for construction vehicles to ensure the safety of communities, especially in terms of road safety and communities to be informed of these demarcated routes.<br>- Where dust is generated by trucks passing on gravel roads, dust mitigation to be enforced.<br>- Any infrastructure that would not be decommissioned must be appropriately locked and/or fenced off to ensure that it does not pose any danger to the community. | L | - |
| | | | Noise levels | ⊓ The generation of noise as a result of construction vehicles, the use of machinery and people working on the site. | - | | L | S | D | CR | NL | Yes | - The decommissioning phase must aim to adhere to the relevant noise regulations and limit noise to within standard working hours in order to reduce | L | - |
| | | | | | | | | | | | | | disturbance of dwellings in close proximity to the development. | | |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Tourism industry | ⊓ Since there are no tourism facilities in close proximity to the site, the decommissioning activities will not have an impact on tourism in the area. | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| | | | Heritage resources | ⊓ It is not foreseen that the decommissioning phase will impact on any heritage resources. | | - | S | S | Pr | PR | ML | Yes | - | L | |

| | | | | |
|---|---|---|---|---|
| **Nature of the impact:** | (N/A) No impact | (+) Positive Impact (-) | Negative Impact | |
| **Geographical extent:** | (S) Site; | (L) Local/District; | (P) Province/Region; | (I) International and National |
| **Probability:** | (U) Unlikely; | (Po) Possible; | (Pr) Probable; | (D) Definite |
| **Duration:** | (S) Short Term; | (M) Medium Term; | (L) Long Term; | (P) Permanent |
| **Intensity / Magnitude:** | (L) Low; | (M) Medium; | (H) High; | (VH) Very High |
| **Reversibility:** | (CR) Completely Reversible; | (PR) Partly Reversible; | (BR) Barely Reversible; | - |
| **Irreplaceable loss of resources:** | (IR) Irreversible | (NL) No Loss; | (ML) Marginal Loss; | (SL) Significant Loss; | (CL) Complete Loss |
| **Level of residual risk:** | (L) Low; | (M) Medium; | (H) High; | (VH) Very High | - |

**An Environmental Awareness and Fire Management Plan is included as part of the EMP**

## 10.2 Key Issues Identified

From the above it is evident that mitigation measures should be available for potential impacts associated with the proposed activity and development phases. The scoping methodology identified the following key issues which should be addressed in more detail in the EIA report.

### 10.2.1 Impacts during the construction phase

During the construction phase the following activities will have various potential impacts on the biophysical and socio-economic environment: Land use and transformation, energy generation and distribution and the clearance of forest areas, deforestation, afforestation, timber harvesting

During the construction phase minor negative impacts are foreseen over the short term. The latter refers to a period of months. The potentially medium impacts relate to the impacts on the fauna and flora, soils, geology, existing services infrastructure, traffic impacts, socio-economic impacts such as the provision of temporary employment and other economic benefits, and the impacts on health and safety and heritage resources.

### 10.2.2 Impacts during the operational phase

During the operational phase the study area will serve as a solar plant. The potential impacts will take place over a period of 20 – 25 years. The negative impacts are generally associated with impacts on the fauna and flora, soils, geology, the pressure on existing services infrastructure and visual impacts. The provision of sustainable services delivery also needs to be confirmed. The operational phase will have a direct positive impact through the provision of employment opportunities for its duration, and the generation of income to the local community.

### 10.2.3 Impacts during the decommissioning phase

The physical environment will benefit from the closure of the solar facility since the site will be restored to its natural state. The decommissioning phase will however potentially result in impact on soils, surface water and the loss of permanent employment. Skilled

staff will be eminently employable and a number of temporary jobs will also be created in the process.

## 10.3 Aspects to be assessed

**Table 10:** Below provides a summary of the aspects that need to be assessed as part of the EIR.

**Table 8**: Aspects to be assessed

| Aspects | Potential impacts | Technical information |
|---|---|---|
| **Construction of the PV Solar facility** | ¯ Impacts on the fauna and flora | Ecological Fauna and Flora Habitat Survey |
| | ¯ Impacts on agricultural potential (soils) | Soil, Land Capability and Agricultural Potential Study |
| | ¯ Impacts associated with the geology of the site | Geotechnical study |
| | ¯ Impacts on existing services infrastructure | Confirmation from the Local Municipality |
| | ¯ Temporary employment, impacts on health and safety | Social Impact Assessment |
| | ¯ Impacts on heritage resources | Heritage Impact Assessment |
| | ¯ Impacts on Traffic | Traffic Impact Study |
| | ¯ Socio-economic impacts | Social Impact Assessment |
| **Operation of the PV Solar facility** | ¯ Impacts on the fauna and flora | Ecological Fauna and Flora Habitat Survey |
| | ¯ Impacts on agricultural potential (soils) | Soil, Land Capability and Agricultural Potential Study |
| | ¯ Impacts associated with the geology of the site | Geotechnical study |
| | ¯ Increased consumption of water | EAP assessment |
| | **Risks associated with the battery storage system** | **High level risk assessment** |

| | | |
|---|---|---|
| | **Pressure on existing services infrastructure** | **Confirmation from the Local Municipality** |
| | **Visual Impact** | **Visual Impact Assessment** |
| | **Provision of employment & generation of income for the local community** | **Social Impact Assessment** |
| **Decommissioning of the PV Solar facility** | **Impacts on agricultural potential (soil)** | **Soil, Land Capability and Agricultural Potential Study** |
| | **Impacts on heritage resources** | **Heritage Impact Assessment** |
| | **Socio-economic impacts (loss of employment)** | **Social Impact Assessment** |
| **Cumulative Impacts** | **Cumulative biophysical impacts resulting from similar developments in close proximity to the proposed activity.** | **EAP assessment & Specialist Assessment (All specialists)** |

## 10.3 Method of Environmental Assessment

The environmental assessment aims to identify the various possible environmental impacts that could results from the proposed activity. Different impacts need to be evaluated in terms of its significance and in doing so highlight the most critical issues to be addressed.

Significance is determined through a synthesis of impact characteristics which include context and intensity of an impact. Context refers to the geographical scale i.e., site, local, national or global whereas intensity is defined by the severity of the impact e.g., the magnitude of deviation from background conditions, the size of the area affected, the duration of the impact and the overall probability of occurrence. Significance is calculated as shown in Table 10.

Significance is an indication of the importance of the impact in terms of both physical extent and time scale, and therefore indicates the level of mitigation required. The total number of points scored for each impact indicates the level of significance of the impact.

## 10.4 Impact Rating System

Impact assessment must take account of the nature, scale and duration of impacts on the environment whether such impacts are positive or negative. Each impact is also assessed according to the project phases:

- planning
- construction
- operation
- decommissioning

Where necessary, the proposal for mitigation or optimisation of an impact should be detailed. A brief discussion of the impact and the rationale behind the assessment of its significance should also be included. The rating system is applied to the potential impacts on the receiving environment and includes an objective evaluation of the mitigation of the impact. In assessing the significance of each impact, the following criteria is used:

**Table 9:** The rating system

| | | |
|---|---|---|
| **NATURE** | | |
| Include a brief description of the impact of environmental parameter being assessed in the context of the project. This criterion includes a brief written statement of the environmental aspect being impacted upon by a particular action or activity. | | |
| **GEOGRAPHICAL EXTENT** | | |
| This is defined as the area over which the impact will be experienced. | | |
| **1** | **Site** | The impact will only affect the site. |
| **2** | **Local/district** | Will affect the local area or district. |
| **3** | **Province/region** | Will affect the entire province or region. |
| **4** | **International and National** | Will affect the entire country. |
| **PROBABILITY** | | |
| This describes the chance of occurrence of an impact. | | |
| **1** | **Unlikely** | The chance of the impact occurring is extremely low (Less than a 25% chance of occurrence). |
| **2** | **Possible** | The impact may occur (Between a 25% to 50% chance of occurrence). |
| **3** | **Probable** | The impact will likely occur (Between a 50% to 75% chance of occurrence). |
| **4** | **Definite** | Impact will certainly occur (Greater than a 75% chance of occurrence). |
| **DURATION** | | |
| This describes the duration of the impacts. Duration indicates the lifetime of the impact as a result of the proposed activity. | | |
| **1** | **Short term** | The impact will either disappear with mitigation or will be mitigated through natural processes in a span shorter than the construction phase (0 – 1 years), or the impact will last for the period of a relatively short construction period and a limited recovery time after construction, thereafter it will be entirely negated (0 – 2 years). |

| | | |
|---|---|---|
| **2** | **Medium term** | The impact will continue or last for some time after the construction phase but will be mitigated by direct human action or by natural processes thereafter (2 – 10 years). |
| **3** | **Long term** | The impact and its effects will continue or last for the entire operational life of the development, but will be mitigated by direct human action or by natural processes thereafter (10 – 30 years). |
| **4** | **Permanent** | The only class of impact that will be non-transitory. Mitigation either by man or natural process will not occur in such a way or such a time span that the impact can be considered indefinite. |
| **INTENSITY/ MAGNITUDE** | | |
| Describes the severity of an impact. | | |
| **1** | **Low** | Impact affects the quality, use and integrity of the system/component in a way that is barely perceptible. |
| **2** | **Medium** | Impact alters the quality, use and integrity of the system/component but system/component still continues to function in a moderately modified way and maintains general integrity (some impact on integrity). |
| **3** | **High** | Impact affects the continued viability of the system/ component and the quality, use, integrity and functionality of the system or component is severely impaired and may temporarily cease. High costs of rehabilitation and remediation. |
| **4** | **Very high** | Impact affects the continued viability of the system/component and the quality, use, integrity and functionality of the system or component permanently ceases and is irreversibly impaired. Rehabilitation and remediation often impossible. If possible, rehabilitation and remediation often unfeasible due to extremely high costs of rehabilitation and remediation. |
| **REVERSIBILITY** | | |
| This describes the degree to which an impact can be successfully reversed upon completion of the proposed activity. | | |
| **1** | **Completely reversible** | The impact is reversible with implementation of minor mitigation measures. |
| **2** | **Partly reversible** | The impact is partly reversible but more intense mitigation measures are required. |

| | | |
|---|---|---|
| **3** | **Barely reversible** | The impact is unlikely to be reversed even with intense mitigation measures. |
| **4** | **Irreversible** | The impact is irreversible and no mitigation measures exist. |
| **IRREPLACEABLE LOSS OF RESOURCES** | | |
| This describes the degree to which resources will be irreplaceably lost as a result of a proposed activity. | | |
| **1** | **No loss of resource** | The impact will not result in the loss of any resources. |
| **2** | **Marginal loss of resource** | The impact will result in marginal loss of resources. |
| **3** | **Significant loss of resources** | The impact will result in significant loss of resources. |
| **4** | **Complete loss of resources** | The impact is result in a complete loss of all resources. |
| **CUMULATIVE EFFECT** | | |
| This describes the cumulative effect of the impacts. A cumulative impact is an effect which in itself may not be significant but may become significant if added to other existing or potential impacts emanating from other similar or diverse activities as a result of the project activity in question. | | |
| **1** | **Negligible cumulative impact** | The impact would result in negligible to no cumulative effects. |
| **2** | **Low cumulative impact** | The impact would result in insignificant cumulative effects. |
| **3** | **Medium cumulative impact** | The impact would result in minor cumulative effects. |
| **4** | **High cumulative impact** | The impact would result in significant cumulative effects |
| **SIGNIFICANCE** | | |

Significance is determined through a synthesis of impact characteristics. Significance is an indication of the importance of the impact in terms of both physical extent and time scale, and therefore indicates the level of mitigation required. The calculation of the significance of an impact uses the following formula: (Extent + probability + reversibility + irreplaceability + duration + cumulative effect) x magnitude/intensity.

The summation of the different criteria will produce a non-weighted value. By multiplying this value with the magnitude/intensity, the resultant value acquires a weighted characteristic which can be measured and assigned a significance rating.

| Points | Impact significance rating | Description |
|---|---|---|
| **6 to 28** | **Negative low impact** | The anticipated impact will have negligible negative effects and will require little to no mitigation. |
| **6 to 28** | **Positive low impact** | The anticipated impact will have minor positive effects. |
| **29 to 50** | **Negative medium impact** | The anticipated impact will have moderate negative effects and will require moderate mitigation measures. |
| **29 to 50** | **Positive medium impact** | The anticipated impact will have moderate positive effects. |
| **51 to 73** | **Negative high impact** | The anticipated impact will have significant effects and will require significant mitigation measures to achieve an acceptable level of impact. |
| **51 to 73** | **Positive high impact** | The anticipated impact will have significant positive effects. |
| **74 to 96** | **Negative very high impact** | The anticipated impact will have highly significant effects and are unlikely to be able to be mitigated |
| | | adequately. These impacts could be considered "fatal flaws". |
| **74 to 96** | **Positive very high impact** | The anticipated impact will have highly significant positive effects. |

# 11 CUMULATIVE IMPACTS

## 11.1 Introduction

Cumulative impacts can be incremental, interactive, sequential or synergistic. EIAs have traditionally failed to come to terms with such impacts, largely as a result of the following considerations:

- Cumulative effects may be local, regional or global in scale and dealing with such impacts requires coordinated institutional arrangements;
- Complexity - dependent on numerous fluctuating influencing factors which may be completely independent of the controllable actions of the proponent or communities; and
- Project level investigations are ill-equipped to deal with broader biophysical, social and economic considerations.

Despite these challenges, cumulative impacts have been afforded increased attention in this Scoping Report and for each impact a separate section has been added which discusses any cumulative issues, and where applicable, draws attention to other issues that may contextualise or add value to the interpretation of the impact. This chapter analyses the proposed project ‘s potential cumulative impacts in more detail by: (1) defining the geographic area considered for the cumulative effects analysis; (2) providing an overview of relevant past and present actions in the project vicinity that may affect cumulative impacts; (3) presenting the reasonably foreseeable actions in the geographic area of consideration; and (4) determining whether there are adverse cumulative effects associated with the resource areas analysed.

The term "Cumulative Effect" has for the purpose of this report been defined as: the summation of effects over time which can be attributed to the operation of the Project itself, and the overall effects on the ecosystem of the Project Area that can be attributed to the Project and other existing and planned future projects.

## 11.2 Geographic Area of Evaluation

The geographic area of evaluation is the spatial boundary in which the cumulative effects analysis was undertaken. The spatial boundary evaluated in these cumulative effects analysis generally includes an area of a 50km radius surrounding the proposed development.

The geographic spread of PV solar projects, administrative boundaries and any environmental features (the nature of the landscape) were considered when determining the geographic area of investigation. It was argued that a radius of 50km would generally confine the potential for cumulative effects within this particular environmental landscape. A larger geographic area may be used to analyse cumulative impacts based on the specific temporal or spatial impacts of a resource. For example, the socioeconomic cumulative analysis may include a larger area, as the construction workforce may draw from a much wider area. The geographic area of analysis is specified in the discussion of the cumulative impacts for that resource where it differs from the general area of evaluation described above.

## 11.3 Temporal Boundary of Evaluation

A temporal boundary is the timeframe during which the cumulative effects are reasonably expected to occur. The temporal parameters for these cumulative effects analysis is the anticipated lifespan of the Proposed Project, beginning in 2024 and extending out at least 20 years, which is the minimum expected project life of the proposed project. Where appropriate, particular focus is on near-term cumulative impacts of overlapping construction schedules for proposed projects in the area of evaluation.

## 11.4 Other Projects in the Area

### 11.4.1 Existing projects in the area

There is an existing 50Ha solar PV plant adjacent to the subject site. It is quite possible that future solar farm development may take place within the general area. The next section of this report will aim to evaluate the potential for solar projects for this area in the foreseeable future.

## 11.5 Potential Cumulative Effects

The receptors (hereafter referred to as Valued Ecosystem Components (VECs) presented above (refer to the matrix analysis) have been examined alongside other past, present and future projects for potential adverse cumulative effects. Table 12 indicates the potential cumulative effects VECs and the rationale for inclusion/exclusion.

**Table 10:** Potential Cumulative Effects for the proposed project

| Valued Ecosystem Components (VECs) | Rationale for Inclusion / Exclusion | Level of Cumulative Effect |
|---|---|---|

| Construction Phase | | |
|---|---|---|
| **Loss or fragmentation of indigenous natural fauna and flora** | The loss of habitat on-site has the potential to add to the cumulative impacts that habitat loss in the region is having on avifauna. Other projects will also constitute the removal of indigenous vegetation and may have a regional impact. | - Medium |
| **Avifauna** | Development of multiple solar energy facilities in this region may have cumulative impacts on birds, this will happen via the same factors identified here: collision, avoidance and displacement. | - Medium |
| **Loss or fragmentation of habitats** | Removal of shrubs and grass may have a significant effect on loss of habitats. | - Medium |
| **Soil erosion** | The largest risk factor for soil erosion will be during the operational phase when storm water run-off from the surfaces of the photovoltaic panels could cause erosion. Should these impacts occur, there may be a cumulative impact on storm water runoff in the study area. The specialist rated the cumulative impact of soil erosion as negligible. | - Low |
| **Impacts of the geology on the proposed development** | A fatal flaw cannot be identified that may prematurely terminate the development of the proposed solar farm. | N/A |
| **Generation of waste** | An additional demand for landfill space could result in significant cumulative impacts if services become unstable or unavailable, which in turn would negatively impact on the local community. | - Medium |
| **Employment opportunities** | The community will have an opportunity to better their social and economic well-being, since they will have the opportunity to upgrade and improve skills levels in the area. | + Medium |

| | | |
|---|---|---|
| **Visual intrusion** | The construction of the PV plant and an evacuation line may increase the cumulative visual impact together with farming and mining activities and people using the gravel road adjacent to site. Dust will be the main factor to take into account. | - Low |
| **Increase in construction vehicles** | If damage to roads is not repaired, then this will affect the farming and mining activities in the area and result in higher maintenance costs for vehicles of locals and other road users. The costs will be borne by road users who were no responsible for the damage. | - Negligible |
| **Impact of construction workers on local communities & influx of job seekers** | Impacts on family and community relations that may, in some cases, persist for a long period of time. Also in cases where unplanned / unwanted pregnancies occur or members of the community are infected by an STD, specifically HIV and or AIDS, the impacts may be permanent and have long term to permanent cumulative impacts on the affected individuals and/or their families and the community. | - Medium |
| **Risk to safety, livestock and farm infrastructure.** | If fire spreads to neighbouring properties, the effects will be compounded. Negligible cumulative effects, provided losses are compensated for. | - Negligible |
| **Increased risks of grass fires.** | The risk of grass fires can be mitigated and managed. | - Negligible |
| **Operational Phase** | | |
| **Loss of agricultural land** | It is preferable to incur a higher cumulative loss in a region with low agricultural potential, than to lose agricultural land with a higher production potential elsewhere in the country. Because of the very low agricultural potential of the site considered in this report, its contribution to any cumulative impact is low. | - low |
| **Change in land use** | Overall loss of farmland could affect the livelihoods of the affected farmers, their families, and the workers on the farms and their families. The impacts can however be mitigated via relocation of farm workers and disturbed areas can be rehabilitated after the construction phase. | - Low |

| | | |
|---|---|---|
| **Visual intrusion** | The operation of the PV plant and an evacuation line may increase the cumulative visual impact together with the existing Nampower infrastructure, mining in the area and agricultural infrastructure. | - Low |
| **Consumption of water** | An additional demand on water sources could result in a significant cumulative impact with regards to the availability of water. | - Medium |
| **Generation of additional electricity** | The evacuation of generated electricity into Nampower grid will strengthen and stabilize the grid (especially in the local area). | + Medium |
| **Establishment of a community trust** | Promotion of social and economic development and improvement in the overall well-being of the community. | + Medium |
| **Change in the sense of place** | The construction of the solar PV plant and associated infrastructure will increase the cumulative change in the sense of place due to industrial type infrastructure that is being proposed and the existing mining infrastructure in the region. | - Low |
| **Development of infrastructure for the generation of clean, renewable energy** | Reduce carbon emissions via the use of renewable energy and associated benefits in terms of global warming and climate change. | + Medium |
| **Decommissioning Phase** | | |
| **Visual intrusion** | The decommissioning of the PV plant and the evacuation line may increase the cumulative visual impact together with farming and people using the existing gravel roads adjacent to site. Dust and housekeeping will be the main factors to take into account. | - Low |
| **Generation of waste** | An additional demand on municipal services could result in significant cumulative impacts with regards to the availability of landfill space. | - Medium |

## 11.6 Conclusion

This chapter of the Environmental Impact Report (EIR) addressed the cumulative environmental effects of the construction, operation and decommissioning project phases. The information to date has shown that no significant adverse residual impacts are likely apart from the removal of indigenous vegetation. However, cumulative impacts could arise as other similar projects are constructed in the area.

The potential most significant cumulative impacts relate to:

- Cumulative effects during construction phase:
- Loss or fragmentation of indigenous natural fauna and flora (- Medium)
- Loss or fragmentation of habitats (- Medium)
- Generation of waste (- Medium)
- Temporary employment (+ Medium)
- Impact of construction workers on local communities & influx of job seekers (- Medium)
- Traffic impacts (- Medium)

- Cumulative effects during the operational phase:
- Consumption of water (- Medium)
- Establishment of a community trust (+ Medium)
- Development of infrastructure for the generation of clean, renewable energy (+ Medium)

- Cumulative effects during the decommissioning phase:
- Generation of waste (- Medium)

# 12. PUBLIC PARTICIPATION PROCESS

The following section provides a detailed overview of the public participation process. It is important to mention that this application has not yet gone through a publicly advertised generation license application process by the Electricity Control Board. All the identified stakeholders are fully aware of the proposed project as this report has been circulated to each one of them for comments, input and or registration of concerns.

## 12.1 General

The public participation process was conducted strictly in accordance with the Environmental Management Act 7 of 2007. The following three categories of variables were taken into account when deciding the required level of public participation:

- The scale of anticipated impacts
- The sensitivity of the affected environment and the degree of controversy of the project
- The characteristics of the potentially affected parties

Since the scale of anticipated impacts is low, the low environmental sensitivity of the site and the fact that no conflict was foreseen between potentially affected parties, no additional public participation mechanisms were considered at this stage of the process. The following public participation process was conducted:

- Newspaper advertisement

  Since the proposed development is unlikely to result in any impacts that extend beyond the municipal area where it is located, it will be deemed sufficient to advertise in a local newspaper. An advertisement will be placed in English in the local newspaper, notifying the public of the EIA process and requesting Interested and Affected Parties (I&APs) to register with, and submit their comments to Ritta Khiba Planning Consultants. I&APs will be given the opportunity to raise their comments/inputs regarding the proposed development.

- Site notices

Site notices will be placed on site in English, in order to inform surrounding communities and immediately adjacent landowners of the proposed development. Photographic evidence of the site notices will be provided.

- Direct notification of identified I&APs

  Identified I&APs, including key stakeholders representing various sectors, will be directly informed of the proposed development via registered mail and/or email. The I&APS and key stakeholders includes:

  - !Oe-#Gan Traditional Authority
  - Department of Environmental Affairs and Forestry (DEAF);
  - NAMPower;
  - Roads Authority;
  - Usakos Town Council;
  - Erongo Regional Council.
  - Registered and Interested Parties.

- Direct notification of surrounding land owners and occupiers

  Written notices will be sent to surrounding land owners and occupiers via registered mail/email. The surrounding land owners will be given the opportunity to raise comments on the proposed development.

- Circulation of Draft Scoping Report

  The Draft Scoping Report will also be circulated to the above mentioned registered I&APs and key stakeholders.

## 12.2 Consultation process

It is a requirement that the municipality, relevant ward councillor and any organ of state having jurisdiction in respect of any aspect of the activity should be given written notice of the activity.

## 12.3 Registered I&APs

I&APs include all stakeholders who deem themselves affected by the proposed activity. According to Regulation 43(1) "*A registered interested and affected party is entitled to* comment, in writing, on all reports or plans submitted to such party during the public participation process contemplated in these Regulations and to bring to the attention of the proponent or applicant any issues which that party believes may be of significance to

the consideration of the application, provided that the interested and affected party discloses any direct business, financial, personal or other interest which that party may have in the approval or refusal of the application."

# 13. ENVIRONMENTAL IMPACT STATEMENT

## 13.1 Summary of Key Findings and Assessment Results

Based on the contents of the report the following key environmental issues were identified, which were addressed in this EIA report:

- Impacts during construction phase:
  - Impacts on the fauna and flora (- Low)
  - Impacts on soil (- Low)
  - Impacts associated with the geology of the site (- Low)
  - Impacts on existing services infrastructure (- Low)
  - Temporary employment and other economic benefits (+ Medium)
  - Impacts on heritage resources (- Low)
  - Traffic impacts (- Low)

- Impacts during the operational phase:
  - Impacts on the fauna and flora
    - Avifauna Fatalities (- Medium)
    - Nesting for Birds (+ Medium)
  - Impacts associated with the soil (- Low)
  - Impacts associated with the geology of the site (- Low)
  - Increase in employment and other economic benefits (+ Medium)
  - Visual impacts (- Low)
  - Generation of income to the Local Community (+ Medium)
  - Pressure on existing services infrastructure and water sources (- Low)
  - Impacts on heritage resources (- Low)
  - Additional electricity generation (+ Medium)
- Impacts during the decommissioning phase:

- Loss of permanent employment (- Low) & the creation of temporary employment (+ Low)
- Impacts on heritage resources (- Low)
- Generation of waste (- Low)

Cumulative biophysical impacts resulting from similar development in close proximity to the proposed activity.

### 13.2 Recommendation of EAP

The final recommendation by the EAP considered firstly if the legal requirements for the EIA process had been met and secondly the validity and reliability of the substance of the information contained in the EIA report.

In terms of the contents and substance of the EIA report the EAP is confident that:

- All key environmental issues were identified during the scoping phase. These key issues were adequately assessed during the EIA phase to provide the environmental authority with sufficient information to allow them to make an informed decision.

The final recommendation of the EAP is that:

It is the opinion of the independent EAP that the proposed development will have a net positive impact for the area and will subsequently ensure the optimal utilisation of resources. All negative environmental impacts can further be effectively mitigated through the proposed mitigation measures. Based on the contents of the report it is proposed that an environmental clearance certificate be issued, which states (amongst other general conditions) that the proposed solar PV plant and associated infrastructure by Onkuni Energy in the Areva/Orano Mine Area,!Oe-#Gan Traditional Authority Jurisdiction Area, Usakos District, Daures Constituency, Erongo Region be approved subject to the following conditions:

- Implementation of the proposed mitigation measures set out in the EMP.
- The proposed solar facility must comply with all relevant national environmental laws and regulations.
- All actions and task allocated in the EMP should not be neglected and a copy of the EMP should be made available onsite at all times.

- Should archaeological sites or graves be exposed during construction work, it must immediately be reported to a heritage practitioner so that an investigation and evaluation of the finds can be made.

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# LIST OF ANNEXURES

Annexure A:  EAP Declaration and CV

Annexure B: The !OE≠GAN Traditional Authority allocation letter to Onkuni Energy