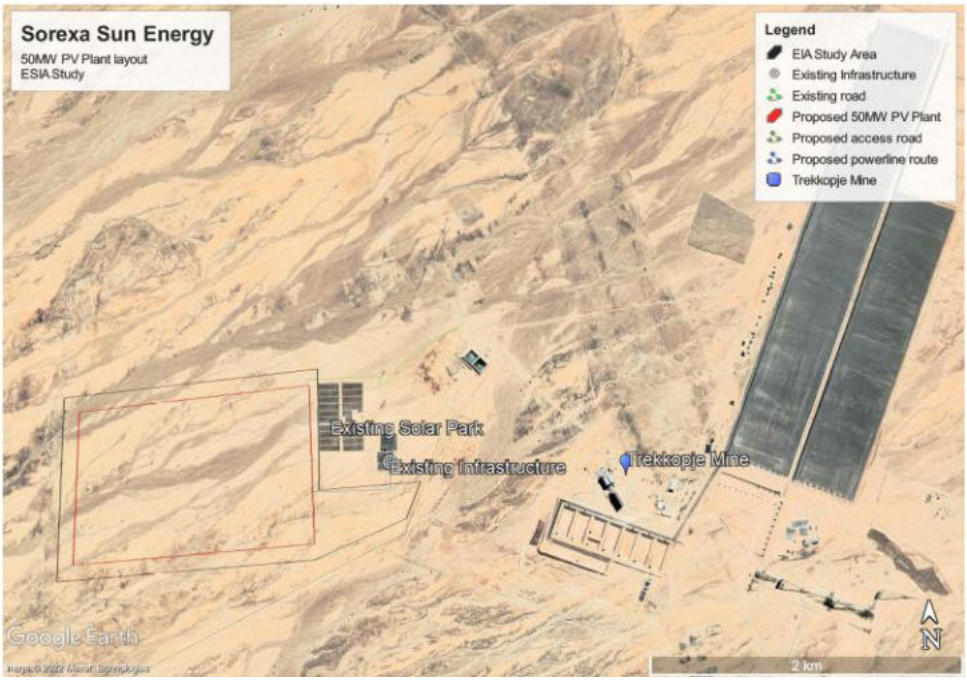
PROPOSED 50MW SOLAR PHOTOVOLTAIC PLANT ON 150HA, NORTH WEST OF ARANDIS, ERONGO REGION

FINAL SCOPING REPORT

ECC APPLIED FOR:

- 50MW Photovoltaic Solar Plant
- 0.5 km 33 kV Power line

August 2022



ENVIRO DYNAMICS
Environmental Management Consultants

Project Name	50MW PHOTOVOLTAIC SOLAR POWER PLANT WITH POWER LINE NEAR TREKKOPJE	
Associated Infrastructure	33 kv Power line from Substation to Plant 0.5km access road (extension of existing access road Fence, small office building (app. 30m2), small warehouse (app. 50m2), parking area (app. 50m2)	
Locality	25km northwest of Arandis, Erongo Region	
Co-ordinate	-22.159019° 14.799292°	
Reports	Final Scoping Report	
Stage of Report	Submission to Directorate of Environmental Affairs	
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Date of Release	August 2022	
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EXECUTIVE SUMMARY

Sorexa Sun Energy intends to develop a 50MW Solar Photovoltaic (PV) plant on a 150Ha area at the Trekkopje Mine (Figure i), near Arandis, approximately 25km northwest of Arandis and adjacent to the Trekkopje Uranium Mine. The purpose of the project is to produce electricity through a renewable source.

Figure i: Locality of the proposed Sorexa 50MW Solar PV Plant near Trekkopje

Enviro Dynamics has been instructed to apply for an Environmental Clearance Certificate (ECC), on behalf of the developer, in terms of the Environmental Management Act (2007) and Regulations (2012). For this application, Enviro Dynamics is preparing a Scoping Report (SR) and Environmental Management Plan (EMP) for submission to the Ministry of Environment, Forestry and Tourism (MEFT).

Project Details

A total of 80 job opportunities will be created for the construction period, of which up to 60 could be from the local community. The major benefit of the project, however, is the increased local electricity supply to the nation from a renewable energy source.

The site will consist of the layout of the solar panels (spread out over approximately 150Ha), an access road (existing up to the current Sertum Energy solar power plant), a 500m 33kV transmission line up to the existing substation, a battery storge facility, a small parking area, and office/storage building.

Commissioning of the project is expected in September 2023, with a project lifetime of 25-30 years.

The company signed a principle lease agreement with the Traditional Authority, which is the custodian of the Project Site and are in the process of applying to the Communal Land Board for a Certificate of Leasehold.

Site and Environment

The site is situated in the Central Namib, is generally flat with shallow drainage lines covering the area. The terrain itself is void of outcrops. Sparsely distributed vegetation is found in the drainage lines with perennial grasses covering the plains. One zone has been delineated which could potentially harbour *Lithops* (southern boundary area), but this needs to be confirmed. There is no habitation or significant socio-economic activity on the area and it is not a tourism hotspot or on a tourism route. The area has a low density of archaeological finds, with no significant sites on the particular site, as demonstrated by a previous investigation for the mine. The Consultant found the site to be generally suitable for the construction of the solar plant. Suggestions were made to avoid minor areas where conservation worthy vegetation may occur or where hydrological functioning may be significantly impeded with development. Some of these areas could potentially be developed subject to further investigations.

Consultation with stakeholders and interested and affected parties

The consultant reached out to the relevant authorities, communities and othered interested and affected parties, in order to hear their concerns and integrate their views into the scoping process. A meeting was held with the Traditional Leader of the !Oe‡Gan Traditional Authority, which governs the use of the area. A principle of Lease document was duly signed to mutually agree on the general terms of leasing the land. Furthermore, on 2 August 2022 a meeting with the #Gaingu Conservancy was held and it was recorded that Provisional Consent to proceed with the project was provided by the Conservancy, subject to agreeing on the final terms of the land lease structure and benefits. The proof of the meetings and the Principle agreement is appended with the Stakeholder Engagement Report, ***Appendix B***.

A number of people registered to receive further information on the project in response to press advertisements. From these responses it became clear that the main concern is potential job opportunities on the project. The Central Namib Botanical Gardens enquired about the possibility of sensitive vegetation being found on the site. These comments were considered during the scoping process. This report was circulated for comments, and the adjacent Orano Mine provided their constructive inputs, reported on in the Stakeholder Engagement Report.

Findings

The positive impacts of this project include the creation of some 60 job opportunities in an overall economic slump, with many jobless people in the nearby Arandis and

in the region, following downscaling of many of the mines in the area. The renewable energy mix in Namibia will be strengthened by this project, reducing the reliance for power from South Africa and other countries.

Besides impacts generally associated with all construction projects, including health and safety, waste, pollution and water use, all of which can be readily mitigated to acceptable levels on this project, with recommended management actions provided in the EMP, the following impacts require specific attention:

- ***Habitat, vegetation and fauna loss due to vegetation clearance, illegal harvesting and collection during construction***. Only the necessary vegetation should be cleared by hand and no mechanical equipment is to be used for this purpose. The vegetation is to remain under the solar panels, with the exception of larger plant specimens that are in the way. The workforce should be prohibited to move beyond the construction site. The lithops and vegetation / no-go zones (see Figure 8 in the document) should be left intact, since these are important water conduits and/or areas with potential conservation worthy vegetation. If these zones must ultimately be used, a dedicated vegetation field survey should be conducted beforehand and potential conservation worthy vegetation areas be protected or such species be relocated.
- ***Increased pressure on housing and infrastructure in Arandis caused by additional labour demand and labour influx***. A locals first policy should be adopted, employing unemployed people from the community who already have housing. Alternatively, or for those without housing, an agreement should be reached with the Arandis Town Council regarding a temporary accommodation site for the workforce.
- ***Future conflict and/or misunderstandings between the community, conservancy and leadership and the proponent***. The site is far removed from the conservancy resources of the community, which are mainly focussed around the Spitzkoppe area and the Rössing Mountain. However, there may be expectations from the community about this project. It is important that realistic expectations from the project be set in terms of labour and other opportunities be communicated to the community, including what benefits may be expected and who will be the beneficiaries. There should be a healthy communication channel with the community, and they should be involved where possible, e.g. utilising the pallets/packaging of the solar panels.
- ***Removal or reduction in function of ecosystem services, i.e. the drainage lines as water conduits, providing natural run-off and water to habitats***. It is important that this important function of the drainage lines in the area be preserved. The drainage lines are flat, therefore it is possible to level the area only slightly, leaving the natural drainage of the area intact, with the solar panels placed over it.
- ***Collisions with transmission lines or wire stays, and / or electrocution by transmission lines cause injuries and mortalities; particularly priority species***. This impact is expected to be low, based on the short length of the power line

and the lack of bird-attracting habitat at the site where the power line will be constructed. Practical advice from a bird specialist in terms of relevant mitigation measures on lines and poles should be solicited before construction.

- ***Increased waste in the area and region***, particularly caused by the need to discard the solar panels and other parts of arrays when these need to be replaced or when the project ends. Ensure that the panels are recycled as far as possible and that all components of the solar array, including infrastructure, is removed from site, and the area rehabilitated. Consult with the community for any possible future uses of some of the infrastructure.

These negative impacts can all be managed using available mitigation measures. The project is generally not situated in an ecologically or socially sensitive area and normal environmental management strategies will be adequate to address those impacts identified. They are listed in the Environmental Management Plan which needs to be implemented diligently.

It is therefore recommended that Environmental Clearance be granted to the project.

1 INTRODUCTION

1.1 BACKGROUND

Sorexa Sun Energy intend to develop a 50MW Solar Photovoltaic (PV) plant on a 150Ha area at the Trekkopje Mine (Figure 1), near Arandis. The purpose of the project is to produce electricity through a renewable source.

Figure 1: Locality of the proposed Sorexa 50MW Solar PV Plant near Trekkopje

Enviro Dynamics has been instructed to apply for an Environmental Clearance Certificate (ECC), on behalf of the developer, in terms of the Environmental Management Act (2007) and Regulations (2012). For this application, Enviro Dynamics is preparing a Scoping Report (SR) and Environmental Management Plan (EMP) for submission to the Ministry of Environment, Forestry and Tourism (MEFT). The EAP who is conducting this assessment is Stephanie van Zyl, and her CV is attached as ***Appendix D.***

The steps undertaken during this Scoping process involves the following:

1) Description of the project (Section 2)
2) Consultation with Interested and Affected Parties
3) Site visit to conduct screening and potential issues
4) Biophysical and Social Baseline description
5) Impact Assessment
6) Environmental Management Plan

The first 5 steps are reported on in this Scoping Report, while Step 6, the Environmental Management Plan is **Appendix A.**

2 THE PROPOSED DEVELOPMENT

2.1 PROJECT MOTIVATION

The purpose of the project is to produce electricity through a renewable source. The electricity will be supplied to customers in and outside Namibia through the Modified Single Buyer Framework[1] and the Southern African Power Pool (SAPP).

A total of 80 job opportunities will be created for the construction period, of which 60 could be from the local community. The major benefit of the project, however, is the increased local electricity supply to the nation from a renewable energy source, instead of the import of electricity from a non-renewable source, from outside Namibia.

2.2 LAYOUT AND LIFETIME

A preliminary layout of the site is shown in **Figure 3** below, although this layout may change following technical and environmental evaluations currently underway. Land surveys were completed in July 2022 and subsequent hydrology and geotechnical studies will be completed in August 2022 to inform the final layout design. The site will consist of the layout of the solar panels (spread out over approximately 150Ha), an access road (existing up to the current Sertum Energy solar power plant), a 33kV transmission line up to the existing substation, a small parking area, and office building. The type of solar panels to be used are shown in ***Figure 4***.

2.3 PROJECT SCHEDULE

Commissioning of the project is expected in September 2023, with a project lifetime of 25-30 years.

2.4 LAND TENURE AGREEMENT

The company signed a principle lease agreement with the Traditional Authority, which is the custodian of the Project Site and are in the process of applying to the Communal Land Board for a Certificate of Leasehold.

2.5 SITE LOCALITY

The proposed 150 Hectare plant is situated approximately 25km northwest of Arandis and adjacent to the Trekkopje Uranium Mine, which is currently on care and

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[1] *"The Modified Single Buyer framework,...allows transmission electricity consumers and Independent Power Producers (IPPs) to transact with each other directly for the supply of electricity. Transmission customers will therefore now be able to buy a portion (up to 30 percent) of their energy requirements directly from a private Generator. " ttps://www.ecb.org.na*

maintenance. ***Figure 3*** shows that the site is directly to the west of the existing Sertum Energy solar power plant and the existing NamPower Trekkopje substation. The power from the new plant will be fed into this substation.

The site selection process included the following criteria:

- Proximity to existing substations (costs of transmission line distances to substation)
- Site topography – ease of construction, erosion potential
- Solar radiation availability
- Land availability
- Geotechnical constraints

The particular site selected faired very well in terms of all these criteria, as is further discussed in ***Section 6***.

The EAP also considered the site in terms of the following criteria:

- Potential land use conflicts
- Sensitivity of the environment (potential vegetation, land degradation/modification, conservation status, heritage sites, etc.)
- Visual impact

Changes were suggested to the Proponent, to move the site away from sensitivities and further recommendations are being made in this report, to ensure ecological preservation on site (See ***Section 6*** and **7**).

Compared to other sites in the vicinity, this area is considered to be superior from a technical and environmental point of view.

2.6 INFRASTRUCTURE

- The local power source will be used for electricity purposes on site.
- A 33kV transmission line will be built from the substation to the site. A route shown in blue on Figure 5 indicates approximately 500m length. The power line structures typically consist of the elements shown in ***Figure 2*** below.

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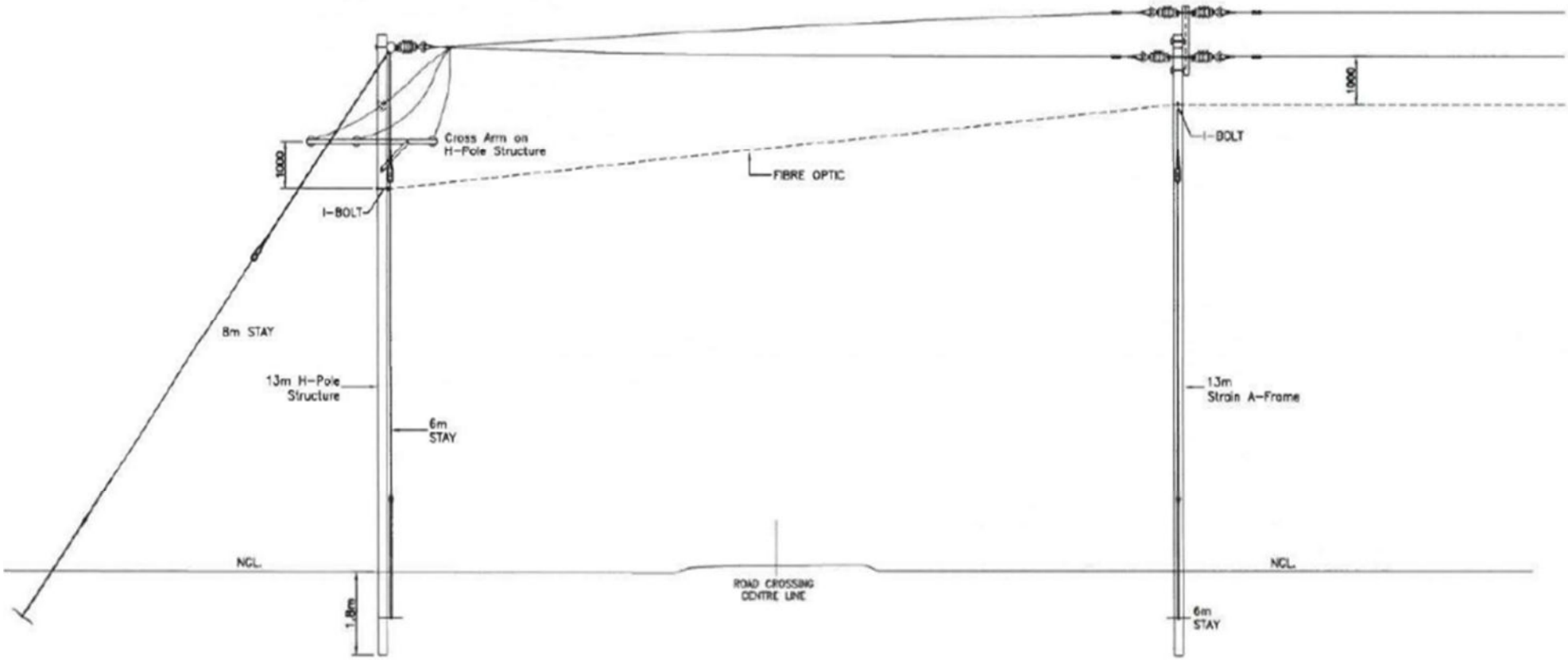

Figure 2: Elements of the 33 kV powerline

- The water demand is expected to be app. 60m^3/month during construction and app. 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 Trekkopje Mine.
- A gravel access road will be constructed which will extend from the current Sertum Energy solar power plant to the site.
- A Battery storage system is included, consisting of modular, fully integrated AC coupled systems with sealed lithium-ion battery packs, which combined form inverter blocks to build a Multi-MW Site.
- A containerised housing unit with limited accommodation capacity is included. This will function as temporary accommodation for rotating security and technical teams and small storage on site. Electricity will be provided from the PV plant, water will be supplied from the Trekkopje water supply via a 2KI tank, and sewer will be managed via a septic tank that will be maintained by the Arandis Town Council.

2.7 SOLAR PANELS: ARRANGEMENT AND TECHNOLOGY

The panels are normally spaced with driveways in between, in rows or arrays, as indicated conceptually in *Figure 3*. *Figure 4* shows the panels visually and illustrates the technology to be used. This particular design and supplier has been used on several projects by the Proponent and so far they seem to be reliable. The final decision on the particular technology to be used, will however be made prior to construction.

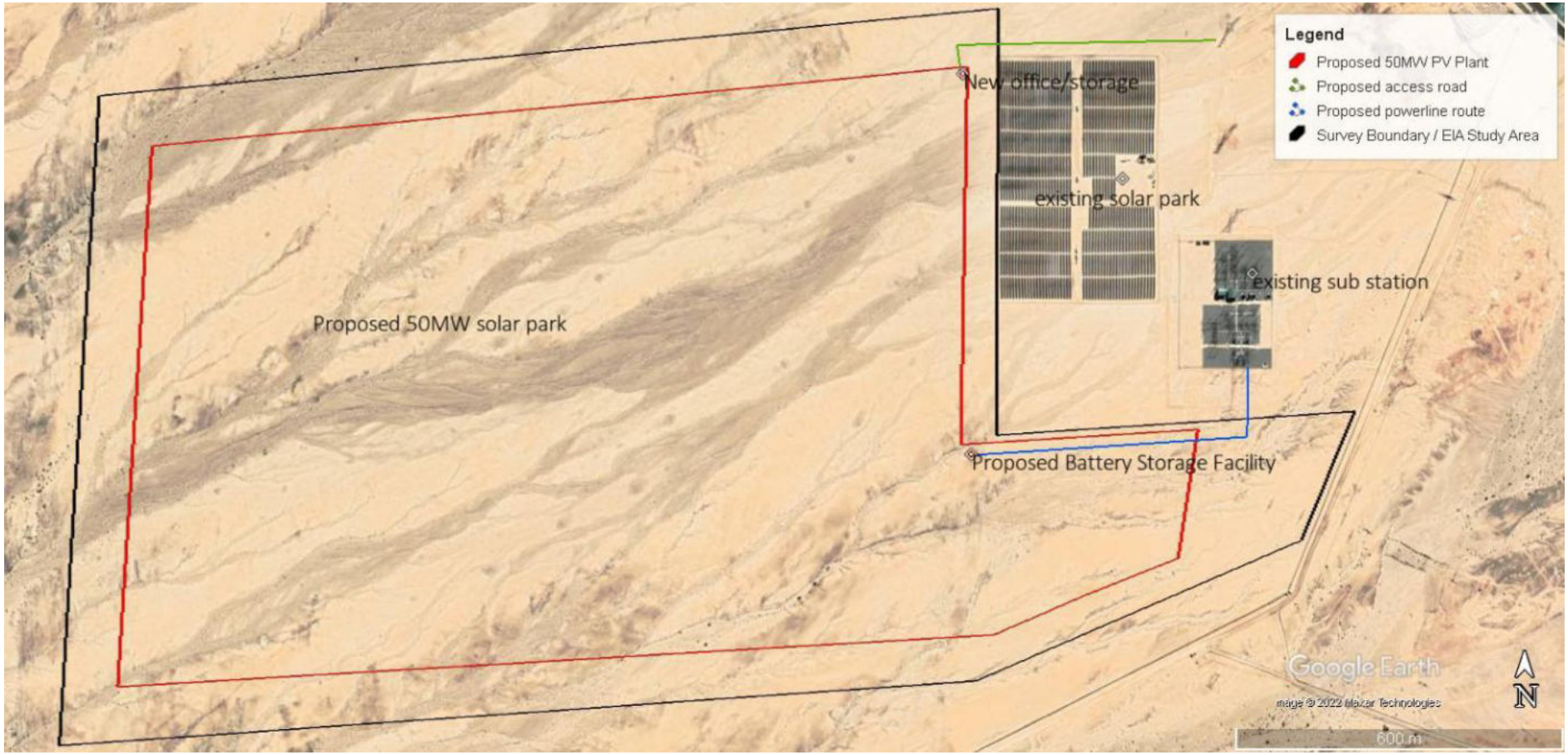

Figure 3: **Proposed site layout**

Figure 4: Solar panels to be used

2.9 OPERATION AND MAINTENANCE PHASE

Once the plant is operational it is estimated that 1 technician, 2 electricians and 2 security guards will be employed.

Maintenance for the proposed project will include the cleaning of the panels and replacing of parts. The parts that may need to be repaired or replaced in the long-term are the inverters. The expected lifespan of the PV panels is 20 years. Dust deposited on the panels, as well as excessive heat, reduces the ability of the panels to generate electricity. The panels will be cleaned on a weekly basis using purified/potable water in order to limit the amount of dust that collects on the panels. Approximately 17 500 litres of purified water will be needed per month per MW installed for cleaning during spring and summer months (August-April) and approximately 12500 litres during winter months (May-July). Semi-purified water is unsuitable for cleaning

purposes because it has dissolved solids, which would be deposited on the panels once the water evaporates. It is planned to purchase desalinated water from the Trekkopje desalination plant. A pipeline from the desalination plant near Henties Bay passes close to the site. A distribution pipeline will be installed from there to the site. 24 hour security will be put in place to safe guard the solar plant.

3 STAKEHOLDER CONSULTATION

The stakeholder consultation report is attached as Appendix B. The proposed project was advertised according to the requirements in the Regulations (2012), in two Namibian newspapers, for two consecutive weeks.

The stakeholders who were identified for this project include the following (Table 1:

Table 1: Stakeholders identified during the EIA process

	NAME/ NOTE
REGIONAL AUTHORITY	Erongo Regional Council – Arandis Constituency Councillor
TRADITIONAL AUTHORITY	!Oe‡Gan Traditional Authority
CONSERVANCY	#Gaingu Communal Conservancy
NEIGHBOURING OPERATIONS[2]	Orano Mining Namibia (Trekkopje Uranium Mine) Sertum Energy Solar Park
LAND BOARD	Responsible for Land Lease Agreement
MINISTRIES	Ministry of Mines and Energy, Electricity Control Board
NEAREST MUNICIPALITY	Arandis Town Council
UTILITIES	NamWater, NamPower
REGISTERED INTERESTED AND AFFECTED PARTIES	See Stakeholder List (Appendix B).

The project was advertised in the press, for two consecutive weeks, and those registered were added to the distribution list. The Background Information Document (BID) (Appendix B) was sent to the identified stakeholders, including the interested and affected parties for comment. Comments received were considered during the study.

Comments and interest received are the following:

- Generally, the most interest was in the job and investment opportunities of the project.

[2] The land is State Land (governed by the Traditional Authority), therefore there are no neighbouring property owners, in the true sense of the word, but the nearby operations were added to the list.

- The Central Namib Botanical Gardens are concerned about the vegetation loss on the site, due to the expected occurrence of conservation worthy vegetation in the area (see ***Appendix B***).

A meeting was held with the Traditional Leader of the !Oe‡Gan Traditional Authority, which governs the use of the area. A principle of Lease document was duly signed to mutually agree on the general terms of leasing the land. Furthermore, on 2 August 2022 a meeting with the #Gaingu Conservancy was held and it was recorded that Provisional Consent to proceed with the project was provided by the Conservancy, subject to agreeing on the final terms of the land lease structure and benefits. The proof of this communication (attendance list and principle agreement are attached to the Stakeholder Engagement Report).

The Draft Scoping Report has been circulated for comment to the distribution list. Comments were made by the Orano Mine, including the following:

- Cosmetic edits
- Emphasis that construction workers should not move around at the site and should be provided with adequate sanitation, since a lack of these management strategies will probably lead to inappropriate defecation, waste, plant removal, etc.

4 LEGAL REQUIREMENTS OF THE PROJECT

This section outlines the environmental and social legal requirements related to the project, summarised in **Table 2** below.

This review serves to inform the developer of the requirements and expectations, as laid out in terms of these instruments, to be fulfilled before the proposed project may commence.

Table 2: Relevant provisions from applicable legal instruments

LEGISLATION/ POLICY/ GUIDELINE	RELEVANT PROVISIONS	IMPLICATIONS FOR THIS PROJECT
	INTERNATIONAL	
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, programmes and policies"	In keeping with national strategies, OPE needs to ensure that biodiversity is not compromised as a result of this project.
	NATIONAL	
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.
Environmental Management Act (No 7 of 2007)	Requires that projects with significant environmental impact are subject to an environmental assessment process (Section 27). Details principles which are to guide all EAs.	The Environmental Management Act and its regulations should inform and guide this EIA process.
EIA Regulations GN No 28-30 (GG No 4878)	Details requirements for public consultation within a given environmental assessment process (GN No 30 S21). Details the requirements for what should be included in a Scoping Report (GN No 30 S8) an EIA report (GN No 30 S15).	**The Environmental Clearance Certificate is to be renewed every three years, together with a report on the implementation of the EMP.**
Forestry Act 12 of 2001 **Nature Conservation Ordinance 4 of 1975**	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.	So far no tree species have been identified that require a permit. However, the watercourses are to be preserved.
Labour Act 11 of 2007	Details requirements regarding minimum wage and working conditions (S39-47).	The proponent should ensure that all

Health and Safety Regulations GN 156/1997 (GG 1617)	Details various requirements regarding health and safety of labourers.	contractors involved during the construction, operation and maintenance of the proposed project comply with the provisions of these legal instruments.
Public Health Act 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."	
Water Act 54 of 1956	The Water Resources Management Act 24 of 2004 is presently without regulations; therefore the Water Act No 54 of 1956 is still in force: Prohibits the pollution of underground and surface water bodies (S23(1)). Liability of clean-up costs after closure/ abandonment of an activity (S23(2)).	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.
Electricity Act 4 of 2007	The Electricity Control Board (ECB) with regards to achieving its objectives must make recommendations to the Minister regarding the issue and renewing of licences. A licence is required under the act for the generating and trading of electricity.	OPE needs to adhere to the recommendations made by the ECB. OPE requires licences for the generation and trading of electricity.
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 obtained from the Land Board, in consultation with the community leadership.

The most important provisions from those listed above are those contained in the Environmental Management Act, the Electricity Act and the Forestry Act. The implementation of the Labour Act is also crucial during the construction period.

6 BIOPHYSICAL AND SOCIAL BASELINE SUMMARY

This section describes the key pertinent features of the bio-physical and social environment of the study area, especially those features which may be affected by the project implementation.

The methodologies used to obtain this information is as follows:

- Desk studies using information from published sources, as cited where applicable, as well as studies conducted in the area, namely the baseline studies for the Trekkopje Mine (adjacent to the site and covering similar habitats), as well as the proposed transmission line from Rössing substation to Walmund substation, passing north of Arandis (covering two of the habitats also found on site).
- Site visit to confirm the sensitivities of the terrain.
- Discussions with the socio-political leaders of the area.

6.1 CLIMATE

The study area is located approximately 43km from central Namib coast. This zone is characterised by extreme aridity, with an average of between 50 and 100mm of rain per year (Mendelsohn, Jarvis, Roberts, & Robertson, 2009). It is further typified by mild summers and cool winters with average minimum and maximum temperatures ranging between 10°C and 28°C. Occasional east wind conditions produce hot and dry conditions within the project area with temperatures reaching in excess of 35°C. According to Seely & Pallet (2008) fog is a prevalent characteristic, extending approximately 50 km inland over 100 days per year. Fog produces five times more moisture than rain in the central Namib and is much more predictable.

6.2 PHYSICAL GEOGRAPHY

The proposed solar plant site is located in the central Namib, between the ephemeral Ugab and Kuiseb rivers, and is bound by the Atlantic Ocean in the west and the escarpment in the east.

The site is located on the gravel plains of the central Namib. (**Figure 5**). The landscape, although mostly flat in this area, is dissected by various shallow, sandy drainage lines. Even though there are rocky ridges, particularly dolorite ridges in the vicinity, these do not occur on the site.

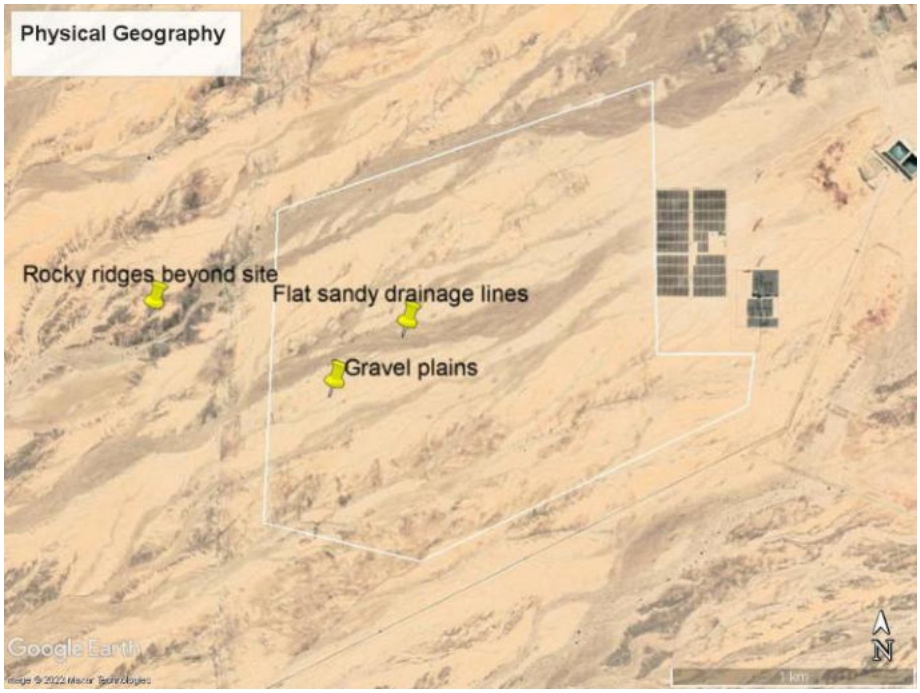

Figure 5: Topography of the project area.

A distinctive feature of the gravel plain soils is the presence of a calcrete layer at the base of the soil profile, and the surface crust or capping. In general, the soils are highly sensitive, overlying an evaporate layer of varying thickness and density (calcrete) that occurs above the host rock geology (Irish, 2012). Due to higher lichen and biological soil crust incidence towards the west, substrates are more sensitive west of Arandis than east of it.

The key sensitivities related to the physical geography are contained in **Table 3.**

Table 3: Sensitivities relating to Physical Geography

ENVIRONMENTAL FEATURE	DESCRIPTION	SENSITIVITY	POTENTIAL IMPACT
Gravel plains	Soil surface comprised of a biological soil crust.	Disruption, typically vehicles and earthmoving machinery, destroy the surface layer of soil. Because of slow ecological processes under desert conditions, biological soil crusts may take centuries to re-form.	Loss of biological soil crusts result in reduced environmental productivity, while physical habitat is also made unsuitable for other life forms.
Drainage lines	Flat sandy conduits, less than 0,5m deep, with sparse vegetation carrying run-off which is slow and low flow.	The life lines of the plains, carrying run-off and acting as habitat and food source to vegetation, birds, insects, rodents and other animals.	Destruction of habitat . Erosion due to destruction of natural water conduits.

6.3 FLORA

Mannheimer (2022) conducted a desk top study and impact assessment for this Scoping Study. Her desk study was confirmed during the site visit undertaken by Norman and Stephanie van Zyl.

6.3.1 INTRODUCTION

Mannheimer (2022) confirmed that the study area falls into the Central Namib vegetation zone, according to the classification of Geiss (1998), a trusted classification system used widely by botanists. Recorded species diversity for all quarter-degree squares in the central Namib, excluding exceptionally diverse squares, including the Rössing Mountain and the Swakop and Khan River canyons, is approximately 38 taxa. Of these, a large proportion are annual species, succulent and geophyte species. A number of species are restricted, or largely restricted, to koppies, ridges, drainage lines and rivers.

Based by previous work done by Mannheimer in the area (cited in Mannheimer, 2022) previous studies confirmed that diversity in the general Trekkopje area is high, at 190 species. This is because there are diverse habitats in the area, including sandy and gravel plains, washes, and rocky outcrops.

6.3.2 ENDEMICITY

Over 30% of the Namib Desert plants in Namibia are believed to be endemic to that area. Even though this is high, Mannheimer explains that the highest area of endemicity of the area are the Kaokoveld and the southern Namib, both regarded as major centres of endemicity in Namibia (Maggs et al, 1998, cited in Mannheimer 2022)). Levels of plant endemicity are around 13% in the Central Namib, and therefore not regarded as a 'hotspot' of endemics restricted to that zone.

6.3.3 EXPECTED DIVERSITY ON-SITE

The project site includes only two of the habitats that were observed during the fieldwork done for the Trekkopje Mine project – shallow washes and gravel plains. That work was done during a good rainy season and is likely to be reasonably comprehensive.

Appendix C provides an annotated list of the 56 species likely to be present in those two habitats. Of those, 12 are endemic and 11 near-endemic.

"Two protected species of conservation concern are present. The near-endemic *Larryleachia marlothii* and the restricted range endemic *Lithops gracilidelineata*, although the identity of the latter needs to be confirmed. Regardless, all *Lithops* species are protected in Namibia and the other species it could be, i.e. *Lithops ruschiorum*, is also endemic and has also been impacted by the uranium rush. In the Trekkopje study area the *Lithops* was found in the vicinity of a shallow wash." (Mannheimer, 2022). Figure 6 below depicts the areas where conservation worthy vegetation is likely to be found.

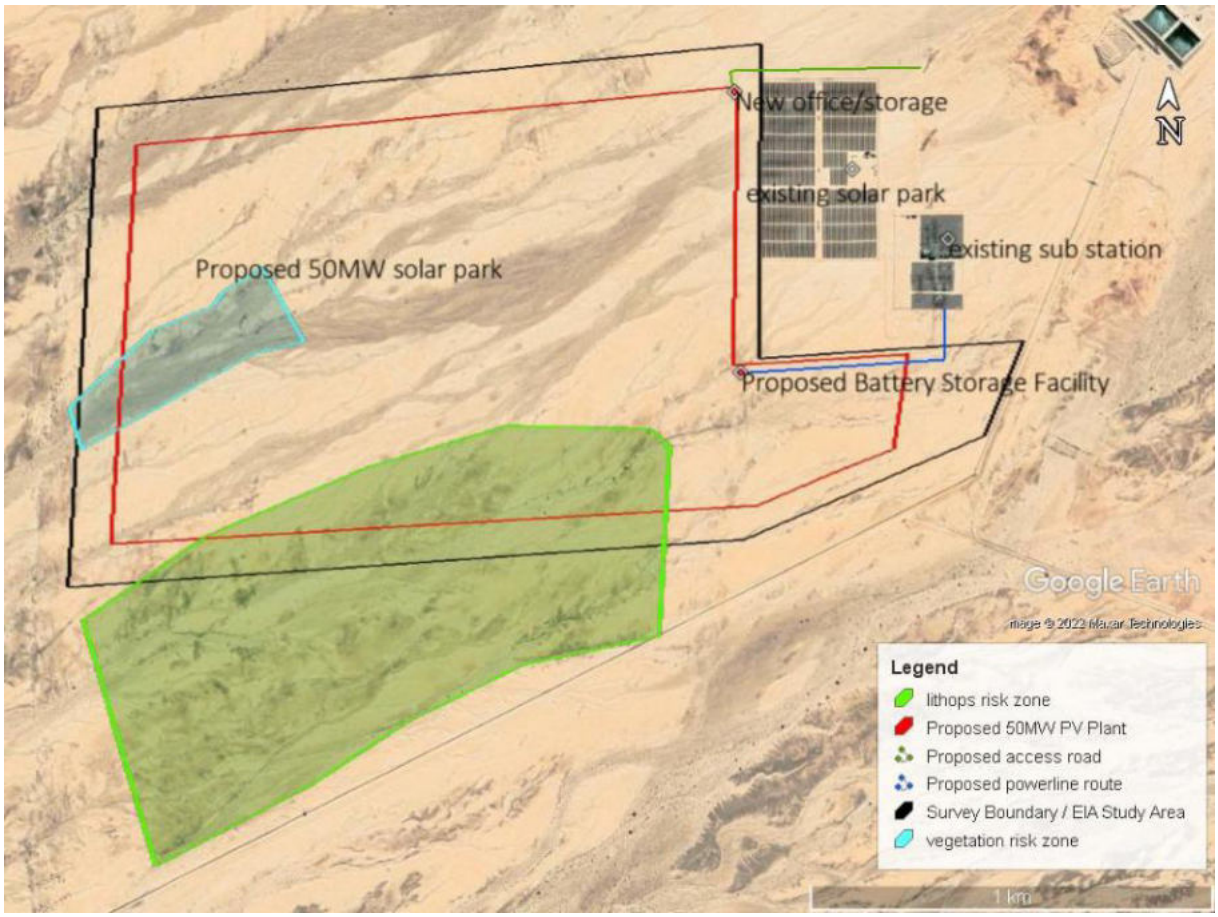

Figure 6: Areas with potentially sensitive vegetation.

6.4 FAUNA

Irish (2012) conducted a study on the fauna occurring in the area for a proposed power line from Rossing to Walmund substation in the vicinity of Arandis. The information in this section gleans from that study, together with what was observed on site, as well as from other secondary sources, as cited.

6.4.1 REPTILES, MAMMALS & AMPHIBIANS

Faunal occurrences within the area are largely determined by the vegetation communities and habitats (Seely & Pallet, 2008).

There are no inhabitants on the site affected, but human impact has caused modified habitats to the east at the Trekkopje Mine sites, the existing solar site and the Trekkopje water pipeline.

According to Irish (2012) a total of 18 mammal species, 24 reptiles and at least 179 invertebrates are known or expected to occur in the area (**Table 4**). Of these, 78 species are of potential concern (endemic, threatened or legal status). A complete list of these species is detailed in Irish (2012).

Table 4: Total number of species known or expected to occur in the study area. Species presence in some cases is non-resident and represented by occasional vagrants only (Irish, 2012)

GROUP	NUMBER OF SPECIES	ENDEMIC SPECIES	THREATENED SPECIES	SPECIES WITH LEGAL STATUS
Mammals	18	7	1	2
Reptiles	24	15	0	0
Amphibians	0	0	0	0
Invertebrates	179	53	0	0
Total:	**221**	**75**	**1**	**2**

Of the species of potential concern (Irish, 2012) none are restricted in distribution to the project area. Most are mobile and wide ranging, and although they may occasionally pass through the area, they are not residents in it. Resident species are mostly rodents, reptiles and all invertebrates.

Despite this, Irish (2012) confirms that the two habitats identified (i.e. gravel plains, and drainage lines) are sensitive to disturbance. The gravel plains are sensitive since impact on them will not easily recover. The majority of permanent plant life in the area is associated with the drainage lines. Since these habitats are important sources of both food and shelter for animals, disruption of these substrates will affect the biodiversity of the area.

6.4.2 BIRDS

Scott (2012) conducted a study on the birds of the area. Sensitive habitats described above also resemble areas sensitive to the distribution of birds.

Scott & Scott (2012) describe habitats that emerge as being particularly important and/or sensitive for birds. Gravel plains are frequented by birds such as Ludwig's bustard, while drainage lines are a linear oasis with both temporary and permanent vegetation which provide food and shelter for birds and their prey species, and serve as flight paths for groups such as bustards, flamingos and raptors.

A total of 193 bird species have been recorded in the eight quarter degree squares that include the line route of the previous project and adjacent areas and would be similar to the habitats of the current site. For that study, the focus was towards species that have a high biological significance, primarily Red Data species and species sensitive to power line interactions. Twenty of the 193 bird species recorded within the whole of the area, have conservation status (Scott & Scott, 2012).

The at-risk species were divided into the following main groups of birds, namely:

- "Large terrestrial birds: Ludwig's Bustard, Kori Bustard; Rüppell's Korhaan, Red-crested Korhaan, Northern Black Korhaan. The main potential impacts are collisions on power lines and stay wires, disturbance from construction activities; and poaching. Bustards are especially sensitive to disturbance during nesting periods, and may easily desert the nest. Nesting of Ludwig's Bustard has been observed in the area (J Kinahan, pers. com.).
- Raptors: Martial Eagle, Booted Eagle, Lappet-faced Vulture, Verreauxs' Eagle, Cape Eagle-Owl, Black-chested Snake-Eagle, Peregrine Falcon; Lanner Falcon and Spotted Eagle-Owl. The main potential impacts are collisions on power lines and associated structures, as well as disturbance.
- Aquatic birds: Great White Pelican, Greater Flamingo, Lesser Flamingo, Maccoa Duck. The main potential impact is collisions with power lines.
- Namib (sedentary) endemics with a restricted distribution: Gray's Lark, Rüppell's Korhaan. The main potential impacts are disturbance from construction and habitat loss."" (Scott and Scott, 2012).

6.4.3 SENSITIVITIES RELATED TO BIRDS

Table 5: Sensitivities relating to Fauna

ENVIRONMENTAL FEATURE	DESCRIPTION	SENSITIVITY	POTENTIAL IMPACT
Fauna	**Drainage lines and adjacent sandy flats:** The majority of permanent plant life in the area is associated with drainage lines. This represents a major source of both food and shelter for animals.	Plants grow slowly under desert conditions, and any that are destroyed through the clearing will not be replaced quickly, if at all.	Loss of plants reduces habitat availability and food sources for many animals, either directly or through the effect on prey species.
Birds	Drainage lines crossing the site	Drainage lines are attractive to birds as shelter, fodder, nesting sites and possible flight paths.	• Breeding disturbance • Loss of habitat
	• Lack of large trees • Ephemeral vegetation (including grass)	• Nesting on power supply structures • Response to ephemeral resources results in nomadism	• Electrocutions • Collisions with conductors

6.5 ARCHAEOLOGY

Kinahan (2020) **(Appendix D)** has performed previous archaeological surveys in the area, and has found relatively low density of archaeological sites. These are shown on the map in **Figure 7.**

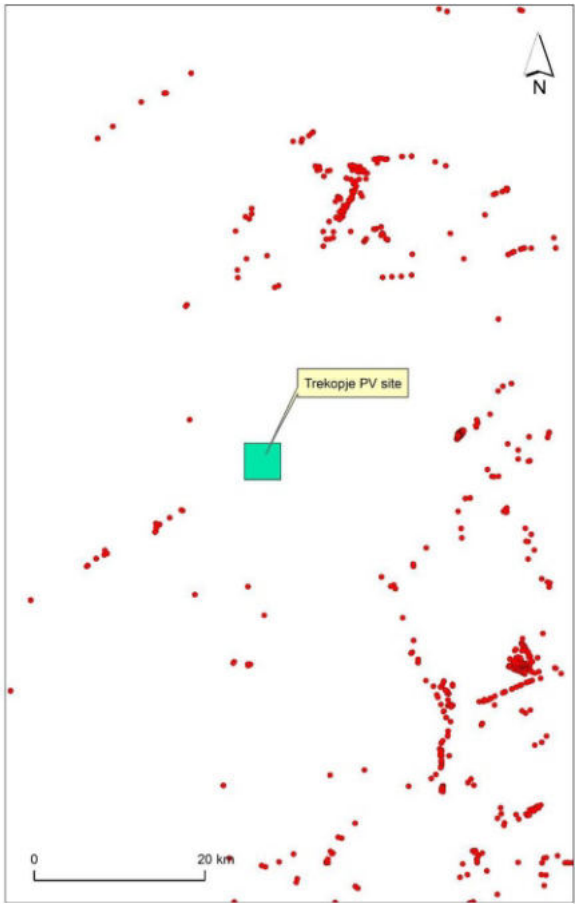

Figure 7: Distribution of archaeological site near the project site (Kinahan, 2022).

They are from the Late Pleistocene to late Holocene periods. These sites are normally found on outcrops, and within 5km radius from reliable water sources. The proposed project site is located on a site is situated between outcrops, but is void of the features typical of these sites.

The specialist does recommend a chance-find procedure to be included in the Environmental Management Plan.

There is also an historical tin mine at the current Trekkopje mine site, as well as some historical sites of the 1915 Allied invasion of German South West Africa. The locality of which are well established based on previous fieldwork. None of these are on or near the current site.

There is also no indication of early historical farming or mining activity at the site.

Hence, based on previous work in the area, the site is not archaeologically sensitive. A chance-find procedure is however still prescribed for inclusion in the EMP.

6.6 SOCIO-ECONOMIC ENVIRONMENT

6.6.1 OVERVIEW OF THE ERONGO REGION

According to the 2011 National Housing and Population Census Preliminary Results, the Erongo Region had a population of 150 400 people, resulting in a 39,7 % growth rate for the period 2001-2011. The region comprises seven constituencies, namely Karibib, Daures, Omaruru, Arandis, Brandberg, Walvis Bay Rural, Walvis Bay Urban and Swakopmund. Compared to other regions in Namibia, the Erongo Region has the second highest level of development and the second lowest rate of human poverty.

The economic activities of the Erongo Region revolve around its natural resources both renewable such as fish, as well as non-renewable resources which include minerals. Namibia had experienced an unprecedented interest its uranium deposits, resulting in the establishment of a number of uranium mines in this region. Uranium prices, scarcity

of water in the region, and other economic influences however caused a downward trend in international uranium prices, forcing the mines to scale down on the production, or to put their production on care and maintenance, such as the case with the Trekkopje Uranium Mine adjacent to this project. Recently, prices have improved and there is a general upturn in activity. The unemployment rate and increased costs of living are however still placing tremendous pressure on the livelihoods of the people in the region, particularly also on this residing in Arandis, with many job losses and associated poverty and resulting desperation, being prevalent.

Besides the economic downturn in the mining industry, Covid lockdowns causing market insecurities and global economic slump have also influenced Namibia and the Erongo Region.

6.6.2 ARANDIS

Arandis is the closest town to the site. It was established by Rössing Uranium Limited in 1976 in order to provide housing for workers and their families (Arandis Town Council, 2010). Up until 1990, Rössing Uranium Limited managed the mining town, while building schools, sport fields and a hospital. In 1994, Arandis was proclaimed as a town with the Arandis Town Council (ATC) taking of the administrative functions of the town (Stubenrauch Planning Consultants, 2011).

The National Housing Census data provided an estimate of 10,200 people for Arandis in 2011. (NPC, 2011). Unfortunately, current figures for the town are not available, and it is difficult to forecast due to possible exits in the population to find alternative sources of income following job losses.

Typically, of a mining town such as Arandis, the majority of the people were historically employed either by the mine or contractors working for Rössing Uranium Limited, and were thus solely dependent on the Mine. Many of the residents are however now also employed at Husab Mine.

According to Stubenrauch Planning Consultants, the town has 2,254 proclaimed erven (Stubenrauch Planning Consultants, 2011). Approximately 78 % of the houses in Arandis are built with cement bricks, but over 45% of their roofs are made from asbestos sheeting (Ashby, 2012). There was a house occupancy rate of 100 %, which in turn also curbs vandalism (Ashby, 2012).

The economic environment of Arandis mainly revolves around the mine. Other economic activities include light manufacturing, retail, shebeens and restaurants as well as food supply and accommodation (Arandis Town Council, 2010). The town historically had no supermarkets, but this has changed, contributing to the local retail industry.

Consequently, it has been realised that economy of this town needs to be diversified. The Local Economic Development Strategy has been adopted by the ATC in order to facilitate and stimulate the development of this town.

6.6.3 #GAINGU CONSERVANCY

The project area falls within the #Gaingu Conservancy, which is a communal conservancy Governed by 9 committee members. The resources available in this community comprise mainly the Spitzkoppe National Monument Area and the Rössing Mountain. Wildlife in the area comprise mainly Kudu, gemsbok, springbok, leopard.

The project site is far removed from the hotspot tourism area utilised by the conservancy and as confirmed by the committee representative, no conflict with the proposed project is anticipated.

6.6.4 SENSITIVITIES

The following socio-economic sensitivities are likely to result from the proposed project (**Table 6**):

Table 6: Sensitivities relating to Socio-Economic Environment

ENVIRONMENTAL FEATURE	DESCRIPTION	SENSITIVITY	POTENTIAL IMPACT
Socio-economic environment	Economic slump and associated high unemployment rate	High interest in the project	Positive – creation of jobs during construction.
	Workforce accommodation	No accommodation facilities near the site	Additional impact on the natural environmental due to accommodation of workforce at the site.
	#Gaingu Conservancy	The site falls within this conservancy's boundaries	Possible conflict with conservancy efforts.

7 IMPACT ASSESSMENT

7.1 METHODOLOGY EMPLOYED FOR THE IMPACT ASSESSMENT

Each of the identified impacts listed above were assessed to determine the true significance of the proposed project on the environment. The criteria used to describe the significance of the impact on the particular environmental component (i.e. vegetation, biodiversity, birds, archaeology and socio-economic environment) are contained in the **Table 7** below:

Table 7: Criteria for the assessment of impacts

DESCRIPTION	
Nature	Reviews the type of effect that the proposed activity will have on the relevant component of the environment and includes "what will be affected and how?".
Extent	Geographic area. Indicates whether the impact will be within a limited area (on site where construction is to take place); local (limited to within 15 km of the area); regional (limited to ~100 km radius); national (limited to the coastline of Namibia); or international (extending beyond Namibia's boarders).
Duration	Whether the impact will be temporary (during construction only), short term (1-5 years), medium term (5-10 years), long term (longer than 10 years, but will cease after operation) or permanent.
Intensity	Establishes whether the magnitude of the impact is destructive or innocuous and whether or not it exceeds set standards, and is described as none (no impact); low (where natural/ social environmental functions and processes are negligibly affected); medium (where the environment continues to function but in a noticeably modified manner); or high (where environmental functions and processes are altered such that they temporarily or permanently cease and/or exceed legal standards/requirements).
Probability	Considers the likelihood of the impact occurring and is described as uncertain, improbable (low likelihood), probable (distinct possibility), highly probable (most likely) or definite (impact will occur regardless of prevention measures).
Significance	Significance is given before and after mitigation. Low if the impact will not have an influence on the decision or require to be significantly accommodated in the project design, Medium if the impact could have an influence on the environment which will require modification of the project design or alternative mitigation (the route can be used, but with deviations or mitigation) High where it could have a "no-go" implication regardless of any possible mitigation (an alternative route should be used).
Status of the impact	A statement of whether the impact is positive (a benefit), negative (a cost), or neutral. Indicate in each case who is likely to benefit and who is likely to bear the costs of each impact.
Degree of Confidence in Predictions	Is based on the availability of specialist knowledge and other information.

7.2 ASSESSMENT OF IMPACTS

Table 8 displays the list of impacts and provides the ratings according to the criteria above. It provides impact significance in the scenario when mitigation has not been applied, and after mitigation, i.e. when mitigation has been implemented.

The assessment is for the construction and operational phases. The decommissioning phase is similar to the construction phase, with the difference that the focus is more on the choices of the future of all the structural elements on the site. A decommissioning plan will therefore be a requirement for the decommissioning phase.

Generic impacts with associated mitigation such as waste management, pollution control and water conservation, and health and safety principles applicable to all projects have been included in the Environmental Management Plan. Specific impacts and measures in this regard, of particular concern to this project, are mentioned in the table below.

Table 8: Impact assessment of the proposed solar park and associated infrastructure, including the access road, powerline, water and sewage storage facilities.

PROJECT ASPECT	IMPACT STATUS/ NATURE	EXTENT	DURATION	INTENSITY	PROBABILITY	DEGREE OF CONFIDENCE	SIGNIFICANCE		
							PRE-MITIGATION	MITIGATION/ ENHANCEMENT (ELABORATED ON IN THE ESMP)	POST MITIGATION
CONSTRUCTION PHASE[3]									
Overall implementation of the project	Positive Increased power security for the country and curb increase in future cost of energy.	National	Long term	Medium	Definite	High	Medium	N/A	Medium
	Positive Reduced need to import ESKOM coal generated electricity followed by reduced overall carbon	International	Long term	Medium	Definite	High	Medium	Continue replacing greener energy with energy generated from non-renewables where feasible.	Medium

[3] The activities of the construction phase are similar to the decommissioning phase. Therefore, the impact assessment for the former also applies to the latter phase.

PROJECT ASPECT	IMPACT STATUS/ NATURE	EXTENT	DURATION	INTENSITY	PROBABILITY	DEGREE OF CONFIDENCE	SIGNIFICANCE		
							PRE-MITIGATION	MITIGATION/ ENHANCEMENT (ELABORATED ON IN THE ESMP)	POST MITIGATION
	footprint.								
	Positive Contribution to job security, livelihoods and economic spinoffs in the region and Arandis	Regional	Short term	Medium	Definite	High	Low	Locals first policy	Low to medium
	Negative Increased pressure on housing and infrastructure in Arandis caused by additional labour demand and labour influx.	Local	Short term	High	Highly probable	High	Medium	Locals first policy – local residents continue living in existing housing with minimum additional housing required. Should this not suffice, identify with Arandis Town Council, a temporary site for housing in case the mining industry recruits again. Negotiate all infrastructure provision with Arandis Town Council.	Low

PROJECT ASPECT	IMPACT STATUS/ NATURE	EXTENT	DURATION	INTENSITY	PROBABILITY	DEGREE OF CONFIDENCE	SIGNIFICANCE		
							PRE-MITIGATION	MITIGATION/ ENHANCEMENT (ELABORATED ON IN THE ESMP)	POST MITIGATION
	Negative Future conflict and/or misunderstandings between the community, conservancy and leadership and the proponent	Regional – conservancy stretches to Spitzkoppe	Short	High	Probable	High	Medium - High	Avoid conflict by managing expectations within the community, have regular meetings to communicate activities, participation opportunities and hear grievances, implement a grievance mechanism.	Low
	Negative Physical destruction of vegetation, including species of conservation concern, due to illegal collection of species and wood collection.	Local (only around plant footprint locations, access road, laydown areas etc.)	Long term	Medium	Definitive	High	Medium	No accommodation of workforce on site. Provide wood/gas to workforce for cooking. Prohibit species and wood collection. Limit the movement of people to the site only.	Low
Vegetation clearance	Negative Decline in populations of endemic plant and animal species of high concern and loss of	Local	Long term	Medium	Probable	High	Medium	Avoid the identified risk zones, keep collateral damage to a minimum. Implement and monitor, Specialist involved to identify Lithops before	Low

PROJECT ASPECT	IMPACT STATUS/ NATURE	EXTENT	DURATION	INTENSITY	PROBABILITY	DEGREE OF CONFIDENCE	SIGNIFICANCE		
							PRE-MITIGATION	MITIGATION/ ENHANCEMENT (ELABORATED ON IN THE ESMP)	POST MITIGATION
	important fauna and flora habitats , including displacement of associated biota such as birds and their food sources. (vegetation listed in red in **Table 1, Appendix C**).							construction, DO NOT remove the vegetation underneath the solar panels, except larger species which are in the way of the panels. DO NOT allow any mechanical equipment for site levelling or the removal of vegetation. Use designated roads / tracks only.	
Levelling and introduction of stormwater systems	Removal or reduction in function of ecosystem services, i.e. the drainage lines as water conduits, providing natural run-off and water to habitats.	Local to regional	Long term	Medium	High	High	Medium	Do not use the identified risk zones for panels. If it needs to be utilised, source a vegetation specialist to survey the risk zones and identify areas of protection. Retain the drainage lines for natural flow of rainwater.	

PROJECT ASPECT	IMPACT STATUS/ NATURE	EXTENT	DURATION	INTENSITY	PROBABILITY	DEGREE OF CONFIDENCE	SIGNIFICANCE		
							PRE-MITIGATION	MITIGATION/ ENHANCEMENT (ELABORATED ON IN THE ESMP)	POST MITIGATION
								Do not alter or flatten the drainage lines. Do not remove vegetation from the drainage lines.	
OPERATIONAL PHASE									
Existence of 500m power line pylons and conductors.	Negative Collisions with transmission lines or wire stays, and / or electrocution by transmission lines cause injuries and mortalities; particularly priority species.	Site	Long-term	Low	Uncertain	Low	Low	Fit the power line poles with anti- perch devices and air-safety gaps as per advice of a bird specialist from the region. Fit the lines with flight diverters as per advice of a bird specialist from the region Monitor all structures for any impacts, and apply retro-mitigation as appropriate.	Low

PROJECT ASPECT	IMPACT STATUS/ NATURE	EXTENT	DURATION	INTENSITY	PROBABILITY	DEGREE OF CONFIDENCE	SIGNIFICANCE		
							PRE-MITIGATION	MITIGATION/ ENHANCEMENT (ELABORATED ON IN THE ESMP)	POST MITIGATION
DECOMMISSIONING PHASE[4]									
Waste disposal	Negative Increased waste in the area and region, particularly caused by the need to discard the solar panels and other parts arrays.	Regional	Permanent	High	Definite	High	Medium	Agree with a recycling company to recover the recyclable components of the panels and to dispose of the remaining parts in a responsible way, removing all elements from the site.	Medium-low

[4] General impact management of this phase, including the need for rehabilitation, is contained in the ESMP, and the construction impacts will generally also be applicable to this phase.

8 CONCLUSIONS AND RECOMMENDATIONS

The positive impacts of this project include the creation of some 60 job opportunities in an overall economic slump, with many jobless people in the nearby Arandis and in the Region, following downscaling of many of the mines in the area. The renewable energy mix in Namibia will be strengthened by this project, reducing the reliance for power from South Africa and other countries.

Besides impacts generally associated with all construction projects, including health and safety, waste, pollution and water use, all of which can be readily mitigated to acceptable levels on this project, with recommended management actions provided in the EMP, the following impacts require specific attention:

- Habitat, vegetation and fauna loss due to vegetation clearance, illegal harvesting and collection during construction. Only the necessary vegetation should be cleared by hand and no mechanical equipment is to be used for this purpose. The vegetation is to remain under the solar panels, with the exception of larger plant specimens that are in the way. The workforce should be prohibited to move beyond the construction site. The lithops and vegetation/no-go zones ***(Figure 8)*** should be left intact, since these are important water conduits and/or areas with potential conservation worthy vegetation. If these zones must ultimately be used, a dedicated vegetation field survey be conducted beforehand and potential conservation worthy vegetation areas be protected or such species be relocated.

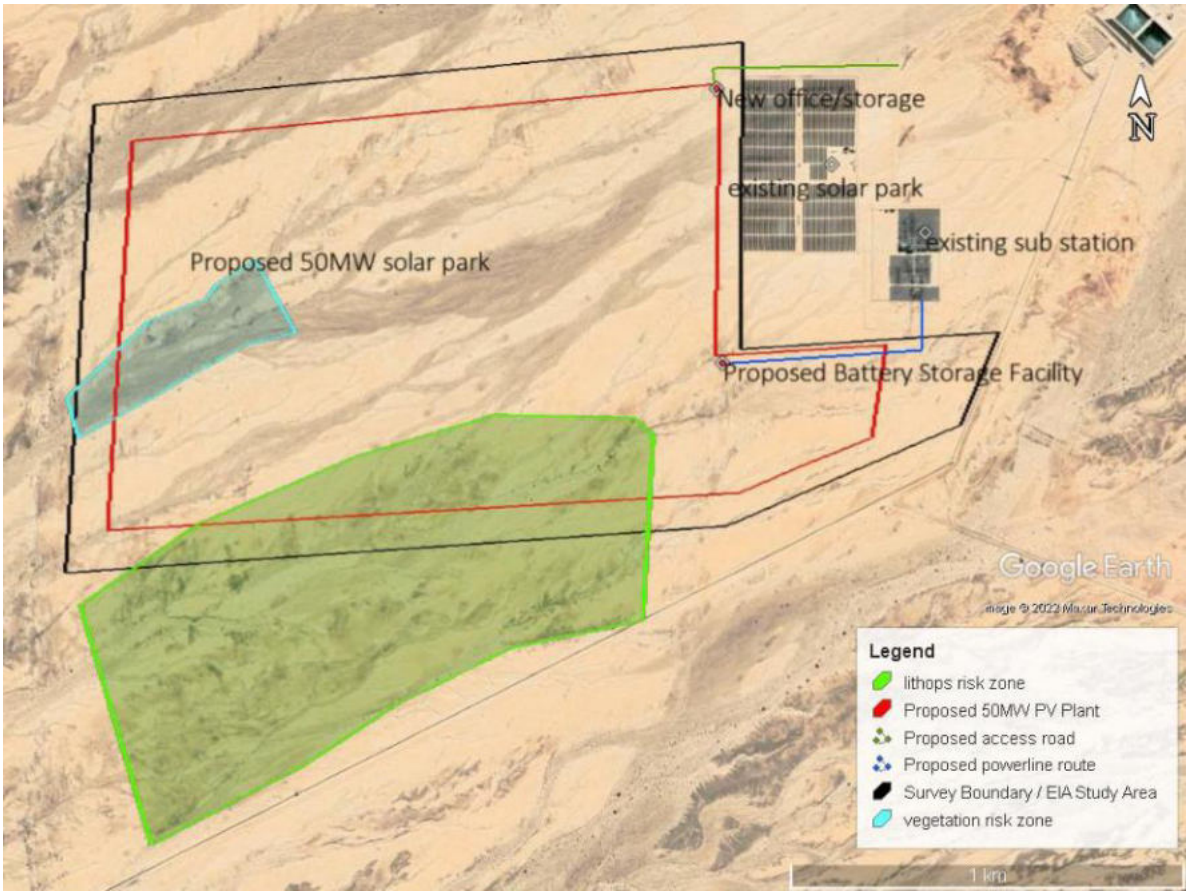

Figure 8: Vegetation risk zones to be avoided.

- Increased pressure on housing and infrastructure in Arandis, caused by additional labour demand and labour influx. A locals first policy should be adopted, employing unemployed people from the community who already have housing. Alternatively, or for those without housing, an agreement should be reached with the Arandis Town Council regarding a temporary accommodation site for the workforce. It is of utmost importance that the workforce not be accommodated on site. **Furthermore, it is important that adequate ablution facilities be provided on site to ensure they do not move around and defecate in the area.**
- Future conflict and/or misunderstandings between the community, conservancy and leadership and the proponent. The site is far removed from the conservancy resources of the community, which are mainly focussed around the Spitskoppe area and the Rössing Mountain. However, there may be expectations from the community about this project. It is important that realistic expectations from the project be in terms of labour and other opportunities be communicated to the community, including what benefits may be expected and who will be the beneficiaries. There should be a healthy communication channel with the community, and they should be involved where possible, e.g. utilising the pallets/packaging of the solar panels.
- Removal or reduction in function of ecosystem services, i.e. the drainage lines as water conduits, providing natural run-off and water to habitats. It is important that this important function of the drainage lines in the area be preserved. The drainage lines are flat, therefore it is possible to level the area only slightly, leaving the natural drainage of the area intact, with the solar panels placed over it.
- Collisions with transmission lines or wire stays, and / or electrocution by transmission lines cause injuries and mortalities; particularly priority species. This impact is expected to be low, based on the short length of the power line and the lack of bird-attracting habitat at the site where the power line will be constructed. Advice from a bird specialist in terms of relevant mitigation measures on lines and poles should be solicited before construction.
- Increased waste in the area and region, particularly caused by the need to discard the solar panels and other parts arrays when these need to be replaced or when the project ends. Ensure that the panels are recycled as far as possible and that all components of the solar array, including infrastructure, is removed from site, and the area rehabilitated. Consult with the community for any possible future uses of some of the infrastructure.

- These negative impacts can all be managed using available mitigation measures. The project is generally not situated in an ecologically or socially sensitive area and normal environmental management strategies will be adequate to address those impacts identified. They are listed in the Environmental Management Plan which needs to be implemented diligently.

It is therefore recommended that Environmental Clearance be granted to the project.

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APPENDIX C

Table 9: Annotated list of species likely to occur on the proposed site.

Species	Protected by Nature Conservation Ordinance No. 4 of 1975, including amendments	Notes	Shallow washes	Gravel plains
Endemic				
Near Endemic				
Protected				
Adenolobus pechuelii (Kuntze) Torre & Hillc. subsp. pechuelii		Widespread and reasonably common in the central Namib, restricted to washes		
Amphiasma merenskyanum Bremek.		Widespread, reasonably common	1	
Anticharis ebracteata Schinz		Reasonably widespread, frequent where it occurs, unlikely to be substantially affected by this project		1
Anticharis inflata Marloth & Engl.		Reasonably widespread, frequent where it occurs, unlikely to be substantially affected by this project		1
Aristida parvula (Nees) De Winter		Reasonably widespread, common		1
Asparagus pearsonii Kies			1	
Blepharis grossa (Nees) T. Anderson		Reasonably widespread, common	1	
Brachiaria glomerata (Hack.) A. Camus			1	
Calicorema capitata (Moq.) Hook. F.			1	
Centropodia glauca (Nees) Cope			1	
Chascanum garipense E. Mey.			1	
Citrullus ecirrhosus Cogn.			1	
Cleome angustifolia Forssk. subsp. diandra (Burch.) Kers				1
Cleome foliosa Hook. F. var. lutea (Sond.) Codd & Kers		Reasonably widespread, common	1	
Codon schenckii Schinz		Reasonably widespread, common	1	
Commicarpus squarrosus (Heimerl) Standl.			1	
Corallocarpus welwitschii (Naudin) Hook.f. ex Welw.			1	
Enneapogon scaber Lehm.				1
Euphorbia glanduligera Pax			1	
Euphorbia phylloclada Boiss.			1	
Fagonia isotricha Murb. var. spinescens (Schwarz) Hadidi		Reasonably widespread, common	1	
Forsskaolea candida L.f.			1	

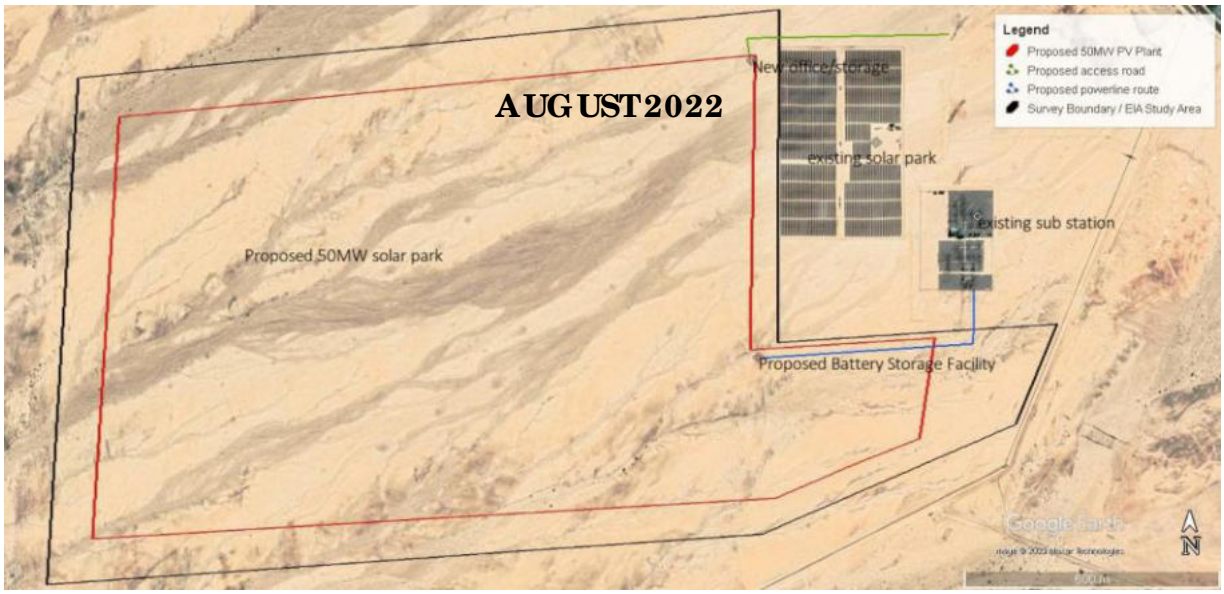
Species	Protected by Nature Conservation Ordinance No. 4 of 1975, including amendments	Notes	Shallow washes	Gravel plains
Heliotropium oliveranum Schinz		Reasonably widespread, common		1
Hermannia complicata Engl.		Reasonably widespread, occasional, usually found in seasonal depressions		1
Hermannia solaniflora K. Schum.		Reasonably widespread, common	1	1
Hermbstaedtia spathulifolia (Engl.) Baker		Reasonably widespread, common	1	
Indigofera auricoma E. Mey.				1
Indigofera heterotricha DC.			1	
Kissenia capensis Endl.			1	
Kohautia caespitosa Schnizl. subsp. brachyloba (Sond.) D.Mantell			1	
Larryleachia marlothii (N.E. Br.) Plowes	X	Reasonably widespread but never common	1	
Limeum argute-carinatum Wawra & Peyr				1
Lithops sp.	X	Likely to be *Lithops gracilidelineata* subsp *delineata*, which is both endemic and protected. It is restricted to the central Namib and has already been impacted by several uranium projects.		1
Lophiocarpus polystachyus Turcz.			1	
Lycium bosciifolium Schinz			1	
Monechma cleomoides (S. Moore) C.B. Clarke		Widespread, common		1
Monechma genistifolium (Engl.) C.B. Clarke subsp. genistifolium		Widespread, comon	1	
Ornithogalum stapffii Schinz		Widespread, comon	1	1
Petalidium lanatum (Engl.) C.B. Clarke				1
Petalidium variabile (Engl.) C.B. Clarke		Reasonably widespread, reasonably common	1	
Salsola sp.			1	
Sesuvium sesuvioides (Fenzl) Verdc.			1	1
Sporobolus nebulosus Hochst.		Reasonably widespread, common	1	
Stipagrostis ciliata (Desf.) De Winter var. capensis (Trin. & Rupr.) De Winter			1	1
Stipagrostis damarensis (Mez) De Winter		Reasonably widespread, common	1	
Stipagrostis hirtigluma (Trin. & Ropr.) subsp. hirtigluma				1
Stipagrostis obtusa (Delile) Nees				1
Stipagrostis subacaulis (Nees) De Winter		Widespread, common		1
Stipagrostis uniplumis (Licht.) De Winter				1
Tribulus zeyheri Sond. subsp. zeyheri			1	

Species	Protected by Nature Conservation Ordinance No. 4 of 1975, including amendments	Notes	Shallow washes	Gravel plains
Trichodesma africanum (L.) Lehm.			1	
Tricholaena monachne (Trin.) Stapf ex C.E. Hubb.			1	
Zygophyllum cylindrifolium Schinz		Reasonably widespread, common		1
Zygophyllum simplex L.				1
Zygophyllum spongiosum Van Zyl			1	
Zygophyllum stapfii Schinz		Widespread, common	1	

APPENDIX A

PROPOSED 50MW SOLAR PHOTOVOLTAIC PLANT ON A 150HA SITE NORTH WEST OF ARANDIS, ERONGO REGION

ENVIRONMENTAL MANAGEMENT PLAN



AUGUST 2022

ENVIRO DYNAMICS
Environmental Management Consultants

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LIST OF ABBREVIATIONS

AIDS	Acquired Immune Deficiency Syndrome
DEA	Directorate of Environmental Affairs
ECC	Environmental Clearance Certificate
ECO	Environmental Control Officer
EA	Environmental Assessment
EMP	Environmental Management Plan
ER	Employer's Representative
GG	Government Gazette
GN	Government Notice
HIV	Human Immunodeficiency Virus
I&APs	Interested and Affected Parties
MVA	Mega Volt-Ampere
NHC	National Heritage Council
PPE	Personal Protective Equipment
PV	Photovoltaic
TB	Tuberculosis

1 INTRODUCTION

Sorexa Energy plans to establish a 50MW photovoltaic (PV) solar plant at Trekkopjie. This document details the Environmental Management Plan (EMP) as informed by the Environmental Scoping Report conducted for this project.

The proposed site is approximately 150 ha in size. The following are the main project components:

- The solar panels and support structures;
- Inverters and step-up transformers; and
- 11 kV transmission line supported by monopole structures.

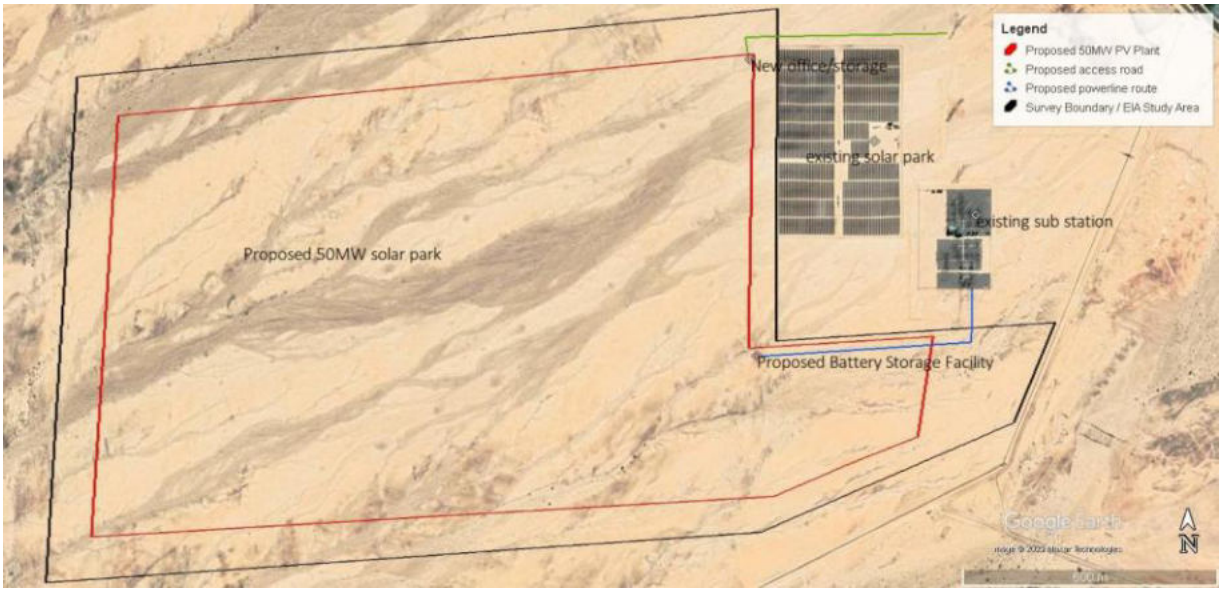

Figure 1: Proposed project site and transmission line route

An EMP is one of the most important products of an Environmental Assessment (EA) process. An EMP synthesises all recommended mitigation and monitoring measures, laid out according to the various stages of a project life cycle, with clearly defined follow-up actions and responsibility assigned to specific actors. This EMP has been drafted in accordance with the Namibian Environmental Management Act (No. 7 of 2007) and its Environmental Impact Assessment Regulations (2012). This plan describes the mitigation and monitoring measures to be implemented during the following phases of the development:

- Planning and design;
- Construction tender preparation; and
- Operation and maintenance.

The explicit decommissioning of this project is not foreseen, however some mitigation measures will be provided for, in the event that decommissioning takes place.

The commitments described here form part of the Environmental Clearance Certificate (ECC) between Sorexa and the state, as represented by the Ministry of Environment, Forestry and Tourism. Non-compliance is considered illegal and may have legal consequences. The amendment, transfer or renewal of the ECC for this project, as well as any changes to this EMP, should be communicated to the Environmental Commissioner as stipulated in the Environmental Management Act of 2007 (S 39-42).

2 RESPONSIBILITIES

The responsibility for the implementation of the EMP ultimately lies with the Sorexa, who is also responsible for the eventual operation of the project. The implementation of this EMP requires the involvement of several stakeholders, each fulfilling a different but vital role to ensure sound environmental management during each phase of this project.

The Developer should appoint an Employer's Representative (ER) to oversee all aspects of this project (including all contracts for work outsourced) – one for the construction phase and one for the operational phases (both of these positions may be assigned to one person). The ER will in turn appoint an Environmental Control Officer (ECO) to oversee the implementation of the whole EMP (if no ECO is appointed this responsibility remains with the ER). The following positions and their respective responsibilities will be outlined below:

- Employer's Representative;
- Environmental Control Officer; and
- Contractor (Construction and Operations and Maintenance).

2.1 EMPLOYERS REPRESENTATIVE (ER)

The ER is appointed by the Developer to manage all contracts for work/services that are outsourced during the construction, operations and maintenance and decommissioning phases. This position may be filled by any competent OPE employee. Any official communication regarding work agreements is delivered through this person. The ER should with the commencement of the project appoint a competent ECO who will represent the Developer on-site.

The ER shall assist the ECO where necessary and will have the following responsibilities regarding the implementation of this EMP:

- Ensuring that the necessary legal authorisations and permits (see **Table 1**) have been obtained by the Contractor;
- Assisting the Contractor in finding environmentally responsible solutions to problems with input from the ECO where necessary;
- Ordering the removal of person(s) and/or equipment not complying with the EMP;
- Issuing fines for transgression of site rules and penalties for contravention of the EMP; and

- Providing input into the ECO's ongoing internal review of the EMP. This review report is submitted on a monthly basis to the Developer.

2.2 ENVIRONMENTAL CONTROL OFFICER (ECO)

The ECO should be a competent person appointed by the ER. The ECO is the Developer's on-site representative primarily responsible for the monitoring and review of on-site environmental management and implementation of the EMP by the Contractor. If no ECO is appointed the duties of the ECO fall upon the ER.

The ECO's duties include the following:

- Assisting the ER in ensuring that the necessary environmental authorisations and permits have been obtained;
- Maintaining open and direct lines of communication between the ER, Developer, Contractor, and Interested and Affected Parties (I&APs) with regard to this EMP and matters incidental thereto;
- Monthly site inspection of all construction areas with regard to compliance with this EMP;
- Physical presence during crucial times of the implementation of this EMP, such as during site establishment (clearance of vegetation) and during site clean-up.
- Monitor and verify adherence to the EMP (audit the implementation of the EMP) and verify that environmental impacts are kept to a minimum;
- Taking appropriate action if the specifications of the EMP are not adhered to;
- Assisting the Contractor in finding environmentally responsible solutions to problems;
- Monthly inspection to verify whether or not new personnel have received environmental awareness training;
- Advising on the removal of person(s) and/or equipment not complying with the specifications of the EMP in consultation with the ER;
- Recommending the issuing of fines for transgressions of site rules and penalties for contraventions of the EMP; and
- Undertaking a continual review of the EMP and recommending additions and/or changes to the document.

2.3 CONTRACTOR

The Contractor is responsible for the implementation, onsite monitoring and evaluation of the EMP. It is envisaged that various contractors will be appointed at various times and for various tasks throughout the life cycle (construction through to decommissioning phase) of this project. These can be broadly grouped into Construction Contractors and Operations and Service Contractors. In order to ensure sound environmental management, the relevant sections of this EMP should be included in all contracts of work outsourced, thus legally binding all appointed contractors. All contractors shall ensure that adequate environmental awareness training (see **Section E**) of senior site personnel takes place and that all construction workers and newcomers receive an induction presentation on the importance and implications of this EMP. The presentation shall be conducted, as far as is possible, in the employees' language of choice.

The Contractor should keep records of all environmental training sessions, including names, dates and the information presented.

3 MANAGEMENT REQUIREMENTS

This EMP has been structured so as to provide its various intended recipients (Developer, ER, consulting engineers and contractors) with mitigation measures immediately applicable to their respective scopes of work. The management requirements for the various recipients carrying out work for this project are divided according to the main project phases:

- Permit and relevant legal requirements (**Table 1**);
- Planning and Design Phase requirements (**Table 2**);
- Construction Tender Preparation Phase requirements (**Table 3**);
- Construction Phase management requirements (**Table 4**); and
- Operation and Maintenance Phase management requirements (**Table 5**).

3.1 PERMITS AND RELEVANT LEGAL PROVISIONS

Table 1: Relevant legislated permit requirements

THEME	LEGISLATIVE INSTRUMENT	MANAGEMENT REQUIREMENTS
Archaeology	National Heritage Act 27 of 2004	All protected heritage resources (e.g. human remains etc.) discovered, need to be reported immediately to the National Heritage Council (NHC) and require a permit from the NHC before they may be relocated.
Electricity	Electricity Act 4 of 2007	Licences are required for the generation and trading of electricity.
Environmental	EIA Regulations GN 57/2007 (GG 3812)	The amendment, transfer or renewal of the Environmental Clearance Certificate (S19 & 20).
Forestry	Forest Act 12 of 2001 Nature Conservation Ordinance 4 of 1975	• Protected tree species and any vegetation within 100 m from a watercourse may not be removed without a permit. • A Harvesting Permit is required if wood is to be collected (harvested) for use as fuel.
Labour	Labour Act 11 of 2007 Health and Safety Regulations (HSR) GN 156/1997 (GG 1617).	Adhere to all applicable provisions of the Labour Act and the Health and Safety regulations.
Land lease	Communal Land Reform Act (2003)	Land Lease Agreement in place.
Water	Water Act 54 of 1956	A permit is required for the purification of effluent (Section 21)

3.2 PLANNING AND DESIGN PHASE

The management requirements detailed in the table below need to be carried out before any tender documents are drafted for the construction of various aspects of this project. These management requirements are also applicable for the period during which detailed engineering designs/drawings are carried out.

Table 2: Management requirements for the Planning and Design phase

ASPECT	MANAGEMENT REQUIREMENT
Cleaning of PV tables	Investigations regarding water conserving designs should be carried out and consider as a minimum the following alternative/supplementary cleaning methods: • Options for using recycled water; • Use of industrial leaf blowers; • Use of self-cleaning methods: – Use of electrostatic charge to repel dust and force it to the edges of the panels; – Use of vibrations to shake dust off of panels. The tarring of service roads should be considered as an additional dust suppression method. Vegetation on site is very sparse. Annual grasses should be kept intact as this will assist in lowering dust on site.
Borrow pit investigation	Borrow pit investigations need to include environmental considerations and requirements: • As first option investigate/explore the use of local building sand suppliers to supply the project's building sand requirements. • Ensure that all borrow pits utilised, commercial or private, have environmental clearance and Environmental Management Plans in place, which are being implemented. • Avoid sensitive areas (e.g. areas with high biodiversity, protected archaeological sites, rivers or drainage lines).
Erosion and preservation of gypsum crust	Consideration should be given to the erosion control design. The existing drainage lines should be kept intact as far as possible, suing natural methods for embankments, water flow diversion such as gabions, only where necessary. The design needs to consider the following: The operations of the construction team needs to be organised in such a way that the sensitive gypsum crust in the area is avoided and that the area of impact is limited as far as possible. No mechanical equipment will be allowed to remove vegetation on site. All vegetation clearance works will be done manually.
EMP Implementation	Sorexa needs to appoint an Employer's Representative (ER) to act as the Employer's on-site implementing agent. This person will be responsible to ensure that OPE's responsibilities are executed in compliance with relevant legislation and this EMP.

ASPECT	MANAGEMENT REQUIREMENT
Workforce accommodation	Consideration should be given to the accommodation of the workforce, which will not in Arandis (prohibited on site). It is preferred that workers from Arandis be appointed who are already residing there. For those not from Arandis, consultation is to take place with the Arandis Town Council, to find suitable accommodation or to create a temporary site with suitable infrastructure for this purpose.
Vegetation study	Employ a vegetation specialist to identify any potential plants of conservation concern in the areas indicated on the map below (Figure 2) The Green zone could be used on condition that a vegetation specialist investigates the occurrence of *Lithops* species and provides recommendations of how they should be preserved/removed prior to construction. The Blue area is to remain free of development, since it is also an important drainage line.

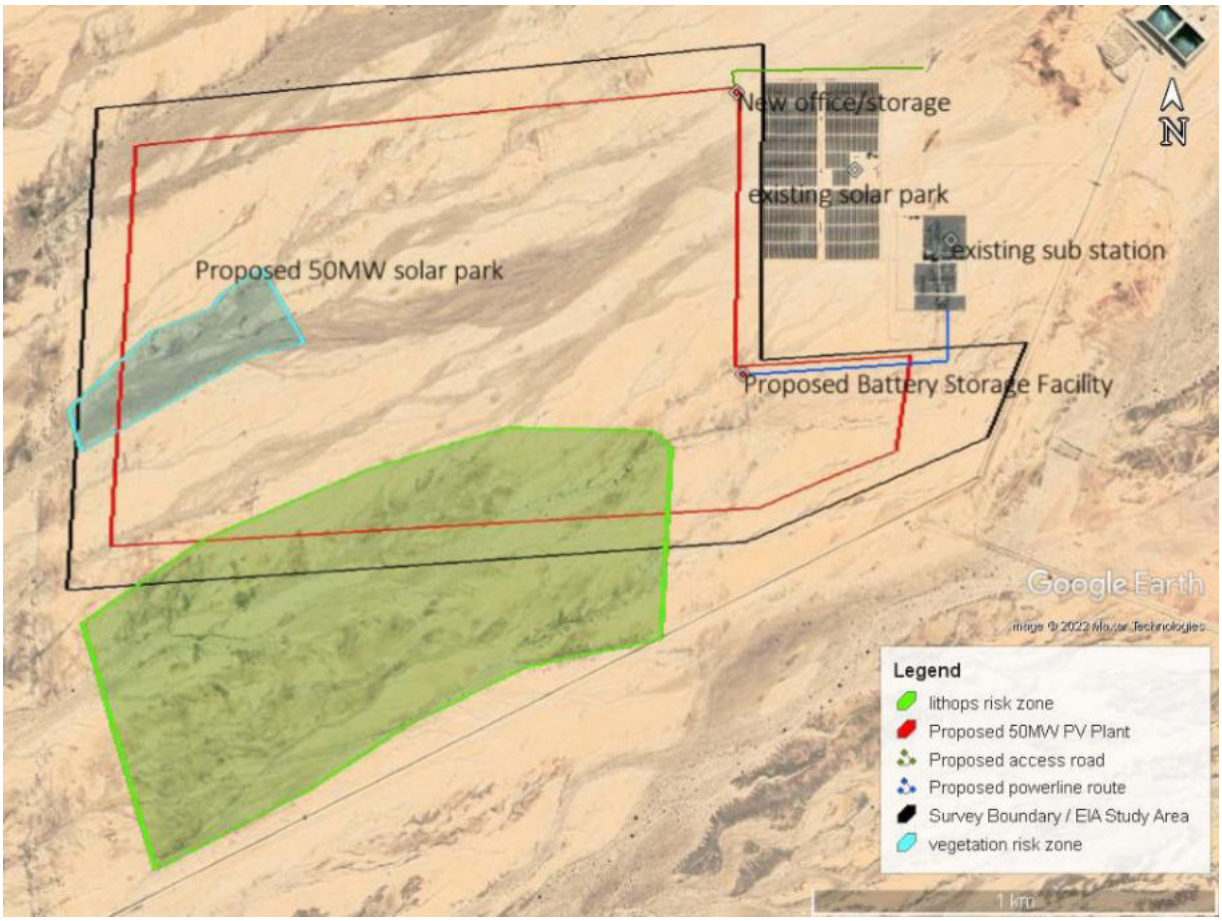

Figure 2: **Blue area: important drainage line and potential area of vegetation concern, green area: potential area of vegetation concern.**

3.3 CONSTRUCTION TENDER PREPARATION PHASE

The management requirements described below should be consulted and carried out whenever a construction tender document is prepared.

Table 3: Construction tender preparation phase management requirements

ASPECT	MANAGEMENT REQUIREMENTS
EMP implementation	Relevant sections of this EMP should be included in the tender documents for all development so that tenderers can make provision for implementation of the EMP.
Financial provision	• Financial provision for the compilation of a **Waste Management Plan** should be included as a cost item within tenders concerning the operation and maintenance of services infrastructure. • Financial provision for topsoil management and the rehabilitation of borrow pits should be included as a cost item within construction tender documents. • Financial provision for the co-opting of a health officer from the Ministry of Health and Social Services to facilitate HIV/AIDS and TB education programmes periodically on-site during the construction phase should be included as a cost item within construction tender documents. • Financial provision for the facilitation of an induction programme for both senior, casual construction personnel as well as subcontractors and associated personnel should be included as a cost item within tenders concerning the construction and/or maintenance of services infrastructure. • Financial provision for the implementation of a labour intensive project should be made in the tender documents. • Financial provision for the accommodation of the workforce in Arandis, for those not accommodated there, and for the provision of meals and cooking facilities (no wood is to be removed from site) on site. • Financial provision for the drafting of a **Communication Plan** should be included as a cost item within construction tender documents.
Recruitment	• Provisions designed to maximise the use of local labour should be included within tenders concerning the construction and/or maintenance of services infrastructure. • A provision stating that all unskilled labour should be sourced from local communities should be included within tenders concerning the construction and/or maintenance of services infrastructure. • Specific recruitment procedures ensuring local firms receive preference during tender adjudication should be included within tenders concerning the construction and/or maintenance of services infrastructure. • Provisions promoting gender equality pertaining to recruitment should be included within tenders concerning the construction and/or maintenance of services infrastructure. – Women should be given preference for jobs, which are less toil-intensive.

3.4 CONSTRUCTION MITIGATION DETAILS

The following table provides a large scale overview of all the major environmental management themes pertaining to both generic and site specific construction mitigation details. This table serves to act as quick reference, for the detailed mitigation details that follow below, for the implementation of the construction component of this EMP.

Table 4: Generic and site-specific environmental management actions for the construction phase

THEME	OBJECTIVE	MITIGATION DETAIL	
		GENERIC	SITE-SPECIFIC
Waste management	Avoid and where not possible minimise all pollution associated with construction.	Section A	N/A
Borrow pits	Ensure topsoil protection and post-construction rehabilitation.	Section B	N/A
Health and safety	Safeguard health and safety of labourers and general public.	Section C	N/A
Dust and noise	Avoid and where not possible minimise dust and noise associated with construction.	Section D	N/A
Environmental training and awareness	Awareness creation regarding the provisions of the EMP as well as importance of safeguarding environmental resources.	Section E	N/A
Environmental conservation	Minimise construction activity footprint and safeguard biodiversity in ecologically sensitive areas.	Section F	Section F
Employment/ Recruitment	Minimise negative conflict through legal and fair recruitment practices.	Section G	N/A
Stakeholder communication	Provide a platform for stakeholders to raise grievances and receive feedback and hence minimise negative conflict	Section H	Section H
Socio-economic and Miscellaneous	Ensure due consideration is given to matters regarding the cultural and general wellbeing of the affected community and matters incidental thereto.	Section I	N/A

SECTION A: WASTE MANAGEMENT

ASPECT	MITIGATION MEASURE
GENERIC MITIGATION DETAILS	
Waste management plan	• The Contractor should compile a Waste Management Plan which should address as a minimum the mitigation measures included below. • "Waste" is defined as any matter, whether gaseous, liquid or solid or any combination thereof, which is an undesirable or superfluous by-product, emission, residue or remainder of any process or activity.
Hazardous waste	• All heavy construction vehicles and equipment on site should be provided with a drip tray. – Drip trays are to be transported with vehicles wherever they go. – Drip trays should be cleaned daily and spillage handled, stored and disposed of as hazardous waste. • All heavy construction vehicles should be maintained regularly to prevent oil leakages. • Maintenance and washing of construction vehicles should be take place only at a designated workshop area. – The workshop area should be lined with concrete. – The workshop should be contoured so that run-off from the servicing and washing of vehicles and equipment drains into an oil-water separator, silt trap or lined pit (which should also be installed). • Spilled concrete (wet or dry) should be treated as hazardous waste and disposed of by the end of each day in the appropriate hazardous waste containers. • All hazardous substances (e.g. fuel etc.) or chemicals should be stored temporarily in labelled, safe and sealable containers at a specific location on an impermeable surface, which is bunded. The bunded area should be able to contain 1.5 times the volume of the hazardous material to be stored in the bunded area. • Battery systems should be sealed and not opened or serviced on site.
Sewage and grey water	• Do not allow sewage (black water) to be discharged directly onto open soil along drainage lines, or any unspecified area. • All sewage must be removed regularly and disposed of at a recognised (municipal) sewage treatment facility. • The water collected from equipment cleaning areas (grey water), should not be left standing for long periods of time as this promotes parasite and bacterial proliferation. Grey water should, if practicable, be recycled: – Used for dust suppression; – Used to clean equipment. • If grey water will not be recycled it should be removed along with the black water on a regular basis.

ASPECT	MITIGATION MEASURE
General waste	• The construction site should be kept tidy at all times. All domestic and general construction waste produced on a daily basis should be cleaned and contained daily. • No waste may be buried or burned. • Waste containers (bins) should be emptied regularly and removed from site to a recognised (municipal) waste disposal site. All recyclable waste needs to be taken to the nearest recycling depot. • A sufficient number of separate waste containers for hazardous and domestic/general waste must be provided on site. These should be clearly marked as such. • Construction labourers should be sensitised to dispose of waste in a responsible manner and not to litter. • No waste may remain on site after the completion of the project

SECTION B: BORROW PITS

ASPECT	MITIGATION MEASURE
GENERIC MITIGATION DETAILS	
Topsoil	The Contractor should adhere to prescribed measures emanating from the borrow-pit investigation (see **Table 2**) and the design for excavations and disposal of spoil material.
Rehabilitation	• Upon completion of the construction phase consultations should be held with the local community regarding the post-construction use of the borrow pit(s). • In the event that no post-construction uses are requested, all borrow pits need to be rehabilitated as follows: – Borrow pits may only be backfilled with clean or inert fill. No material of hazardous nature (e.g. sand removed with an oil spill) may be dumped as backfill. – Rehabilitated borrow pits need to match the contours of the existing landscape. – Take note of drainage channels in the vicinity of the borrow pit. The rehabilitated area should not be higher (or lower) than a drainage channel. This ensures the efficiency of revegetation and reduces the chances of potential erosion. – Topsoil is to be spread across borrow pit areas evenly. – Deep ripping is required, not just simple scarification, so as to enable rip lines to hold water after heavy rainfall. – Ripping should be done along contour lines, not up and down a slope, which could lead to enhanced erosion. – Rehabilitated borrow pits need to remain fenced-off after they have been decommissioned to prevent livestock from removing the newly established vegetation on the area.

APPENDIX C: HEALTH AND SAFETY

ASPECT	MITIGATION MEASURE
GENERIC MITIGATION MEASURES	
HIV/AIDS and TB training	The Contractor should approach the Ministry of Health and Social Services to co-opt a health officer to facilitate HIV/AIDS and TB education programmes periodically on site during the construction phase.
Road Safety	• Demarcate roads clearly. • Provide warning signage where appropriate. • Off-road driving should not be allowed. • All vehicles that transport materials to and from the site must be road-worthy. • Drivers that transport materials should have a valid driver's license and should adhere to all traffic rules. • Loads upon vehicles should be properly secured to avoid items falling off the vehicle.
Safety Around Excavated and Work Areas	• Excavations should be left open for an absolute minimum time. • Excavate short lengths of trenches and box areas for services or foundations in such a way that the trench will not be left unattended for more than 24 hours. • Demarcate the following areas with danger tape: – All excavation works; – Soil and other building material stockpiles; and – Temporary waste stockpiles • Provide additional warning signage in areas of movement and in "no personnel" areas where workers are not active. • Borrow pits are to be fenced off with steel wire fencing. • Work areas must be set out and isolated with danger tape on a daily basis with additional warning signage where appropriate. • All building materials and equipment are to be stored only within set-out and demarcated work areas. • Only construction personnel will be allowed within these work areas. • 2 fire extinguishers should be available at the fuel storage area • Comply with all mitigation measures laid out in **Section A** (Waste Management mitigation measures)
Toilets	• Separate toilets should be available for men and women and should clearly be indicated as such. • Portable toilets (i.e. easily transportable) should be available at every construction site: – 1 toilet for every 25 females. – 1 toilet for every 50 males.

ASPECT	MITIGATION MEASURE
	– **Toilets should be no further than 250m from any worker.** – Sewage waste needs to be removed on a regular basis to an official (municipal) sewage disposal site. Alternatively, pump sewage into sealable containers and store it until it can be removed. – **Its important that the adequacy of the number of toilets on sites be monitored. Construction workers should not be allowed to roam off site to relieve themselves. Should this start to happen, corrective measures are needed, including training and communication to test the adequacy of the number of and distance to toilets. Rectify as necessary.** – Workers responsible for cleaning the toilets should be provided with latex gloves and masks.
Open fires	No open fires may be made anywhere on site.
General	• All workers should have appropriate Personal Protective Equipment (PPE) and records of the distribution of PPE should be kept/maintained • Dust protection masks should be provided to workers if they complain about dust. • Potable water should be provided to workers. • No person should be allowed to smoke close to fuel storage facilities or portable toilets (if toilets are chemical toilets – the chemicals are flammable). • No workers should be allowed to drink alcohol during work hours. • No workers should be allowed on site if under the influence of alcohol.

SECTION D: DUST AND NOISE

ASPECT	MITIGATION MEASURE
GENERIC MITIGATION DETAILS	
Dust	• A watering truck should be used on gravel roads with the most heavy vehicle movement especially during dry and windy conditions. However, due consideration should be given to water restrictions during times of drought. • Ensure that adequate ventilation is available in the event of sanding or grinding work. • Stockpiles of building materials and earth material to be kept moist or the surfaces stabilised • Limit the size of stockpiles of large quantities of soil, topsoil and other fine material. • Improve awareness of ambient air quality and consideration regarding wind speed and direction when undertaking dust generating activities
Noise	• Work hours should be restricted to between 07h00 and 17h00 where construction involving the use of heavy equipment, power tools and the movement of heavy vehicles is less than 500 m from residential areas. • In the event that work is necessary outside the designated working hours, all receptors (residents or businesses within 500 m from the work areas) will need to be notified at least 2 days in advance.

SECTION E: ENVIRONMENTAL TRAINING AND AWARENESS

ASPECT	MITIGATION MEASURE
GENERIC MITIGATION DETAILS	
Environmental Induction (Training)	All construction workers are to undergo environmental induction (training) which should include as a minimum the following: • Explanation of the importance of complying with the EMP. • Discussion of the potential environmental impacts of construction activities. • Employees' roles and responsibilities, including emergency preparedness. • Explanation of the mitigation measures that must be implemented when particular work groups carry out their respective activities. • Explanation of the specific mitigation measures within this EMP especially unfamiliar provisions.

SECTION F: ENVIRONMENTAL CONSERVATION

ASPECT	MITIGATION MEASURE
GENERIC MITIGATION DETAILS	
Conservation of vegetation	• No driving beyond demarcated areas and off established roads. • No movement of staff or visitors beyond the project site. • The collection of plants or wood for cooking beyond the project site should be strictly prohibited.
Conservation of water	• Water effective equipment should be used. • All leaking fittings need to be repaired or replaced timeously. • Brooms should be used to clean floors rather than hosing them down with a pipe. • Use buckets or high pressure hoses to clean areas, equipment or vehicles instead of a regular hose pipe.
Materials camp and lay-down areas	Suitable locations for the materials camp and lay-down areas should be identified with the assistance of the ER and the following should be considered in selecting these sites: • Avoid sensitive areas (see Figure 2). • The areas designated for the proposed services infrastructure should be used as far possible as lay-down areas. • Second choice should be degraded land.
SPECIFIC MITIGATION DETAILS	
Conservation of vegetation	• No construction or movement should take place beyond the site boundaries or in the demarcated area unless approved by a specialist (**Figure 2**).
Birds	• Consult an avifauna specialist for practical advice how to protect birds from collision and electrocution on the transmission line before construction.
Conservation of water	The provisions contained in the Water Management Plan (see **Table 2**) should be implemented.

SECTION G: EMPLOYMENT/ RECRUITMENT

ASPECT	MITIGATION MEASURE
GENERIC MITIGATION DETAILS	
Legislation	Adhere to the legal provisions in the Labour Act (see **Table 1**) for the recruitment of labour (target percentages for gender balance, optimal use of local labour and SME's, etc.) in the Contract.
Recruitment	The Contractor should compile a document to be used as a guide for the recruitment process, which should include the following provisions as a minimum: • The local authority (town council, local headman etc.) should assist with the recruitment process. • Recruitment should not take place at construction sites. • Ensure that all sub-contractors are aware of recommended recruitment procedures and discourage any recruitment of labour outside the agreed upon process. • Contractors should give preference in terms of recruitment of sub-contractors and individual labourers to those from the project area and only then look to surrounding towns. • Clearly explain to all job-seekers the terms and conditions of their respective employment contract (e.g. period of employment etc.) – make use of interpreters when necessary.

SECTION H: STAKEHOLDER COMMUNICATION

ASPECT	MITIGATION MEASURE
GENERIC MITIGATION DETAILS	
Communication plan	The Contractor should draft a Communication Plan, which should outline as a minimum the following: • How stakeholders, who require ongoing communication for the duration of the construction period, will be identified and recorded and who will manage and update these records; • How these stakeholders will be consulted on an ongoing basis; • Make provision for grievance mechanisms – i.e. how concerns can/ will be lodged/ recorded and how feedback will be delivered as well as further steps of arbitration in the event feedback is deemed unsatisfactory.
General communication matters	• The ER should appoint an ECO to liaise between the Contractor, stakeholders, Developer, and consultants. The appointed Contractor shall appoint a person from the construction team to take responsibility for the implementation for all provisions of this EMP. • The Contractor shall at every site meeting report on the status of the implementation of all provisions of the EMP. • The Contractor should implement the environmental awareness training as stipulated in **Section E**. • The Contractor must list the stakeholders of the project and their contact details with whom ongoing communication would be required for duration of the contract. This list, together with the Communication Plan must be agreed upon and given to the ER before construction commences. • The Communication Plan, once agreed upon by the Developer, shall be binding. • All communication with the stakeholders must take place through the ECO. • A copy of the EMP must be available at the site office and should be accessible to all stakeholders • Key representatives from the above mentioned list need to be invited to attend monthly site meetings to raise any concerns and issues regarding project progress. • The Contractor should liaise with the Developer regarding all issues related to community consultation and negotiation before construction commences. • A procedure should be put in place to ensure that concerns raised have been followed-up and addressed. • All people on the stakeholders list should be informed about the availability of the complaints register in writing by the ER prior to the commencement of construction activities.
SPECIFIC MITIGATION DETAILS	
Communication with property owners	At the outset (i.e. before commencement) of the construction programme, all residents along the route will have to be informed about construction activities within the reserve

	in front of their property. This should be done in cooperation with the applicable constituency councillors.

SECTION I: SOCIO-ECONOMIC AND MISCELLANEOUS

ASPECT	MITIGATION MEASURE
GENERIC MITIGATION DETAILS	
Archaeology and Heritage Resources	• Should a heritage site or archaeological site be uncovered or discovered during the construction phase of the project, a "chance find" procedure should be applied in the order they appear below: – If operating machinery or equipment stop work; – Demarcate the site with danger tape; – Determine GPS position if possible; – Report findings to foreman; • Action taken by foreman: – Report findings, site location and actions taken to superintendent; – Cease any works in immediate vicinity; • Action taken by Superintendent: – Visit site and determine whether work can proceed without damage to findings; – Determine and demarcate exclusion boundary; – Site location and details to be added to the project's Geographic Information System (GIS) for field confirmation by archaeologist; • Action taken by archaeologist – Inspect site and confirm addition to project GIS; – Advise the National Heritage Council (NHC) and request written permission to remove findings from work area; and – Recovery, packaging and labelling of findings for transfer to National Museum. • Should human remains be found, the following actions will be required: – Apply the chance find procedure as described above; – Schedule a field inspection with an archaeologist to confirm that remains are human; – Advise and liaise with the NHC and Police; and – Remains will be recovered and removed either to the National Museum or the National Forensic Laboratory as directed.

3.5 OPERATION AND MAINTENANCE PHASE

The following mitigation measures should be complied with and carried out during any operation and maintenance works associated with the project facilities and services infrastructure for the proposed project.

Table 5: Operation and maintenance phase mitigation measures

ASPECT	MITIGATION MEASURE
Maintenance of associated infrastructure	Maintenance works for the associated infrastructure within the project area should adhere to all provisions contained in Sections A to G of the construction mitigation measures of this EMP (**Chapter 3.4**).
Post-construction borrow pit usage	Borrow pits to be utilised post-construction should adhere to the same topsoil and rehabilitation measures outlined within construction mitigation measures of this EMP (**Chapter 3.4**) above.
Post-construction environmental training and awareness	All contractors appointed for maintenance work on the respective services infrastructure must ensure that all personnel are aware of necessary health, safety and environmental considerations applicable to their respective work.
Cleaning of PV tables	• A Water Management Plan should be compiled by the Developer and should include as a minimum the following: – All measures emanating from the Investigations regarding water conserving designs (see **Table 2**); and – Water effective equipment should be used (i.e. high-pressure hoses instead of regular hose pipes).

3.6 DECOMMISSIONING

ASPECT	MITIGATION MEASURE
Dismantling of project components and associated waste	• All materials produced from the dismantling of project components (which will not be sold) should be sorted into recyclable and non-recyclable materials. Recyclable material should be transported to the nearest recycling depot. • No waste should be left on site after the project has been decommissioned
Construction-like activities	Many of the activities involved in decommissioning a large project have considerable overlap with the activities for which mitigation measures have been provided for in **Chapter 3.4**. Where applicable these should be complied with

APPENDIX B
PROPOSED 50MW SOLAR PHOTOVOLTAIC PLANT ON A 150HA SITE NORTH WEST OF ARANDIS, ERONGO REGION

STAKEHOLDER CONSULTATION REPORT

August 2022

ENVIRO DYNAMICS
Environmental Management Consultants

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1 INTRODUCTION

Sorexa Energy plans to develop a Solar PV Plant near Trekkopje. This document is an Appendix to the Environmental Scoping Report for the project, which is being submitted to the Ministry of Environment, Forestry and Tourism to obtain an Environmental Clearance Certificate. This document details the proof of the consultation process, and outlines the outcomes of the same.

2 NOTICES IN THE PRESS

The notice of the start of the EIA process was advertised in the press according to the Regulations (2012), on 10 and 17 June respectively, in the Republikein and Namibian newspapers (Figure 1). Readers were invited to register in order to receive the Background Information Document, so they can participate in the EIA process.

Figure 1: Press notice proofs

3 STAKEHOLDER DATABASAE

Those who registered in response to the above notices were added to a distribution list (Figure 2). The requirement organisations according to the Regulations, including the authorities which are custodians of the land, and the neighbours of the land were added to the list. Any other organisations which may have an interest in the project were also added. The list is shown in Table 1.

Table 1: Stakeholder distribution list

STAKEHOLDERS LIST	
TREKKOPJE SOLAR PARK	
Name	**Organisation**
Namwater	
Ms. Paulina Shetukana	Local Namwater
Ministry of Agriculture, Water and Land Reform	
Mr Bruce Gariseb	MAW&LR – Land lease
Ministry of Urban and Rural Development - Erongo Regional Council and Traditional Authorities	
Henro Iitoppe	Erongo Regional Council
Ms. L. H. Doëses	Erongo Regional Council
Cllr B Imbamba	ERC
MR S //Areseb	ERC
Ms Isabella Kavendjii	ERC
Ms S Kauari	Erongo Regional Council: Directorate Planning and Development Services
Benjamen Naruseb	Gangu Conservancy and Traditional leader
Immanuel /Gaseb	!Oe‡Gan Traditional Authority
Mr Nossib	Arandis Town Council
Mining	
Tommie Gouws	Orano Mining
Registered Stakeholders	
Frank Lohnert	Namib Botanical Gardens
Jimmy	China Civil Engineering
Tobias Mureko	| Optima Energy & Resources
Jennifer Stride	Private
Marko Zhang	Sinohydro Namibia (pty) Ltd.
John Shooya	Private
Gys Louw	Rent-a-drum
Julius Paulus	Private
Namupula	Electrical Engineering
Nangula Amutenya Amatsi	Municipality of Walvis Bay
Linus Uushini	Onghanga Energy
Hafeni Hiveluah	Private
Stevo Gariseb	Private
William McCallum	Thompson Transport
Uazuva Kaumbi (Dr)	Private
Joseph Kondja Amushila	Private
Mr William Herman tjikusere	Private
Gotty Gaoseb	Private

4 THE BACKGROUND INFORMATION DOCUMENT

The Background Information Document (Figure 2 below) was sent to all on the stakeholder list. All of those participating have e-mail addresses and all confirmed that they are able to read the document and that they do understand it.

Most of those registered wanted to be informed of any job opportunities becoming available through the implementation of the project.

Frank Lohnert, the representative of the Namib Botanical Gardens, commented, : "*In the knowledge …there is substantial endemic Namib flora in the area, it is important that a dedicated flora assessment is done under the scoping report within the biodiversity component of the EIA, as well as inclusion thereof in the project's EMP*."

This comment was noted and Ms Coleen Mannheimer was commissioned to conduct a vegetation study; the results of which are contained in the main document, and which also informed the EMP.

Julius Paulus, a private individual, commented as follows:

"*Am very much interested in this project because as i have studied renewable energy - they don't cause any pollution and it can be used to supply free electricity to the community*."

We responded that the electricity cannot be provided for free, since there are costs involved in supplying the infrastructure, maintaining it and providing a profit to the developing and operating companies.

As stated, a number of companies and individuals were keen to keep abreast of the progress with the project, in order to be aware of job and business opportunities.

5 FOCAL COMMUNICATIONS

We were in contact with the Traditional Leader of the !Oe‡Gan Traditional Authority, Mr. Immanuel /Gaseb and the Committee Leader of the Gangu Conservancy, Mr. Benjamen Naruseb, via physical meetins and phone calls. The proposed project were in turn discussed at the meetings held by these committees, in their meetings. They had no concerns or objections to the project.

A meeting was held with the Traditional Leader of the !Oe‡Gan Traditional Authority, which governs the use of the area. A principle of Lease document was duly signed to mutually agree on the general terms of leasing the land. Furthermore, on 2 August 2022 a meeting with the #Gaingu Conservancy was held and it was recorded that Provisional Consent to proceed with the project was provided by the Conservancy,

subject to agreeing on the final terms of the land lease structure and benefits. The proof of the meetings and the Principle agreement is provided in Figure 3 below.

6 COMMUNICATION FOLLOW UP

The documents were distributed to all on the stakeholder list, for comment. Feedback was received from Orano Mining, as follows:

- Cosmetic comments, all incorporated
- It should be stressed that the workforce should not be allowed to move outside the project site. There should also be adequate latrines made available to avoid inappropriate defecation on site and beyond.

Ongoing communication with stakeholders is important before, during and after project implementation. This requirement has been stated in the EMP.

BACKGROUND INFORMATION DOCUMENT
PROPOSED 50MW SOLAR PV PLANT AT TREKKOPJIE

Sorexa Sun Energy intend developing a 50MW Solar Photovoltaic (PV) plant on a 150Ha site at the Trekkopje Mine area (Figure 1), near Arandis. The purpose of the project is to produce electricity through a renewable source. The electricity will be supplied to customers in and outside Namibia through the Modified Single Buyer Framework[1] and the Southern African Power Pool (SAPP).

A preliminary layout of the site is shown in Figure 2 below, although this layout may change following technical, geotechnical and environmental evaluations. The site will consist of the layout of the solar panels (spread out over 150Ha), an access road (existing up to the current Sertum Energy solar power plant), a 33kV transmission line up to the existing substation, a small parking area and office building. The type of solar panels to be used are shown in Figure 3.

Commissioning of the project is expected in September 2023, with a project lifetime of 25-30 years. A total of 80 job opportunities will be created for the construction period, of which 60 could be from the local community. The major benefit of the project, however, is the increased local electricity supply to the nation from a renewable energy source, instead of the import of electricity from a non-renewable source, from outside Namibia.

The company signed a principle lease agreement with the Traditional Authority, which is the custodian of the Project Site and are in the process of applying to the Communal Land Board to sign a Land-Lease agreement.

Enviro Dynamics has been instructed to apply for an Environmental Clearance Certificate (ECC), on behalf of the developer, in terms of the Environmental Management Act (2007) and Regulations (2012). For this application, Enviro Dynamics is preparing a Scoping Report (SR) and Environmental Management Plan (EMP) for submission to the Ministry of Environment, Forestry and Tourism (MEFT).

The following issues need to be investigated and/or addressed:

- Potential archaeological sites
- Water source and quality
- Ecological features, mainly water courses
- Vegetation
- Birds (mainly interaction with the transmission line structures)
- Waste and pollution
- Community impact, health and safety

This list is not exhaustive and the purpose of this document is to solicit comments from Interested and Affected Parties regarding issues to be addressed during the process. You are therefore invited to submit your comments and/or concerns to the contact below.

Contact
Stephanie van Zyl
E-mail address: stephanie@envirod.com
Tel: 0811287002

[1] *"The Modified Single Buyer framework...allows transmission electricity consumers and Independent Power Producers (IPPs) to transact with each other directly for the supply of electricity. Transmission customers will therefore now be able to buy a portion (up to 30 percent) of their energy requirements directly from a private Generator." ttps://www.ecb.org.na*

Figure 1: Locality of the proposed Sorexa 50MW Solar PV Plant near Trekkopje

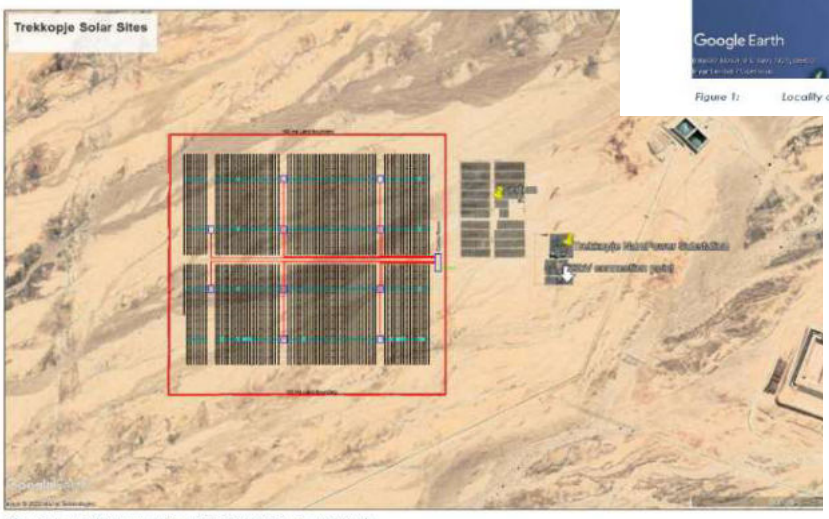

Figure 2: Layout of the proposed Sorexa 50MW Solar PV Plant near Trekkopje

Figure 3: Solar panels to be used

Figure 2: Background Information Document

Appendix 1 Proof of focal meetings and consent

Meeting date	21 June 2022 14h00
Meeting place	Traditional Council Offices, Harald Pupkewitz str, Windhoek
Attendants:	Norman van Zyl – Enviro Dynamics
	Chief Immanuel /Gaseb - !Oe-#Gan community
Minutes	
The need for the ESIA process was discussed	Chief /Gaseb was aware of the project and the need for the ESIA process, specifically consultation.
The technical content of the project process was discussed.	Chief /Gaseb expressed his satisfaction with the locality of the project adjacent to the NamPower substation and the Trekkopjie uranium mine. The project does not interfere with community activities.
	The opportunity of temporary job opportunities during construction for the local community was stressed.
Discussion on consulting with the Gaingu Conservancy.	Chief /Gaseb proposed to contact the conservancy via his office. He will discuss the project with the conservancy and inform the consultant if a consulting meeting is necessary or if further comments will be conveyed via his office with minutes of an internal meeting. Further arrangement will then be made.
Meeting end	21 June 2022 14h30

!Oe-ǂGân Traditional Authority

/Â-ǂGomeb (Okombahe)

PO Box 21164, Windhoek, NAMIBIA
Tel: 061 26161 (a/h) • Cell: 081 242 2607

Chief Immanuel /Gaseb
Acting Chairperson of the Council of Traditional Leaders
!Oe‡Gan Traditional Authority

InnoSun Energy Holding (Pty) Ltd
2 Schutzen Street
PO BOX 27527
Windhoek
Namibia

Letter of Intent to allocate land for solar project

Dear Mrs Imbili,

Pursuant to our recent discussion, I am happy to hereby confirm my intention through this letter of intent to allocate land for the solar project InnoSun Energy Holding (Pty) Ltd (« InnoSun ») is developing.

1. The project

I understood that InnoSun is developing a solar project in order to sell power to Constestable Customers in Namibia, including mines, smelters, REDs, municipalities... InnoSun would require up to one hundred and fifty (150) hectares for the project, near the Trekkopje substation owned by NamPower. The area InnoSun is looking for falls under the !Oe‡Gan Traditional Authority.

2. Intention to allocate land

On behalf of !Oe‡Gan Traditional Authority, I would like to confirm our intention to enter into a Land-Lease Agreement with InnoSun for the solar project. This Land-Lease Agreement would be valid for the project lifetime and benefits to both InnoSun and the !Oe‡Gan Traditional Authority.

I hope you find the above in order, please feel free to contact me if you need more information.

Yours sincerely,

Chief Immanuel /Gaseb

APPENDIX C

Table 1: Annotated list of species likely to occur on the proposed site.

Species	Protected by Nature Conservation Ordinance No. 4 of 1975, including amendments	Notes	Shallow washes	Gravel plains
Endemic				
Near Endemic				
Protected				
Adenolobus pechuelii (Kuntze) Torre & Hillc. subsp. pechuelii		Widespread and reasonably common in the central Namib, restricted to washes		
Amphiasma merenskyanum Bremek.		Widespread, reasonably common	1	
Anticharis ebracteata Schinz		Reasonably widespread, frequent where it occurs, unlikely to be substantially affected by this project		1
Anticharis inflata Marloth & Engl.		Reasonably widespread, frequent where it occurs, unlikely to be substantially affected by this project		1
Aristida parvula (Nees) De Winter		Reasonably widespread, common		1
Asparagus pearsonii Kies			1	
Blepharis grossa (Nees) T. Anderson		Reasonably widespread, common	1	
Brachiaria glomerata (Hack.) A. Camus			1	
Calicorema capitata (Moq.) Hook. F.			1	
Centropodia glauca (Nees) Cope			1	
Chascanum garipense E. Mey.			1	
Citrullus ecirrhosus Cogn.			1	
Cleome angustifolia Forssk. subsp. diandra (Burch.) Kers				1
Cleome foliosa Hook. F. var. lutea (Sond.) Codd & Kers		Reasonably widespread, common	1	
Codon schenckii Schinz		Reasonably widespread, common	1	
Commicarpus squarrosus (Heimerl) Standl.			1	
Corallocarpus welwitschii (Naudin) Hook.f. ex Welw.			1	
Enneapogon scaber Lehm.				1
Euphorbia glanduligera Pax			1	
Euphorbia phylloclada Boiss.			1	
Fagonia isotricha Murb. var. spinescens (Schwarz) Hadidi		Reasonably widespread, common	1	
Forsskaolea candida L.f.			1	

Species	Protected by Nature Conservation Ordinance No. 4 of 1975, including amendments	Notes	Shallow washes	Gravel plains
Heliotropium oliveranum Schinz		Reasonably widespread, common		1
Hermannia complicata Engl.		Reasonably widespread, occasional, usually found in seasonal depressions		1
Hermannia solaniflora K. Schum.		Reasonably widespread, common	1	1
Hermbstaedtia spathulifolia (Engl.) Baker		Reasonably widespread, common	1	
Indigofera auricoma E. Mey.				1
Indigofera heterotricha DC.			1	
Kissenia capensis Endl.			1	
Kohautia caespitosa Schnizl. subsp. brachyloba (Sond.) D.Mantell			1	
Larryleachia marlothii (N.E. Br.) Plowes	X	Reasonably widespread but never common	1	
Limeum argute-carinatum Wawra & Peyr				1
Lithops sp.	X	Likely to be *Lithops gracilidelineata* subsp *delineata*, which is both endemic and protected. It is restricted to the central Namib and has already been impacted by several uranium projects.		1
Lophiocarpus polystachyus Turcz.			1	
Lycium bosciifolium Schinz			1	
Monechma cleomoides (S. Moore) C.B. Clarke		Widespread, common		1
Monechma genistifolium (Engl.) C.B. Clarke subsp. genistifolium		Widespread, comon	1	
Ornithogalum stapffii Schinz		Widespread, comon	1	1
Petalidium lanatum (Engl.) C.B. Clarke				1
Petalidium variabile (Engl.) C.B. Clarke		Reasonably widespread, reasonably common	1	
Salsola sp.			1	
Sesuvium sesuvioides (Fenzl) Verdc.			1	1
Sporobolus nebulosus Hochst.		Reasonably widespread, common	1	
Stipagrostis ciliata (Desf.) De Winter var. capensis (Trin. & Rupr.) De Winter			1	1
Stipagrostis damarensis (Mez) De Winter		Reasonably widespread, common	1	
Stipagrostis hirtigluma (Trin. & Ropr.) subsp. hirtigluma				1
Stipagrostis obtusa (Delile) Nees				1
Stipagrostis subacaulis (Nees) De Winter		Widespread, common		1
Stipagrostis uniplumis (Licht.) De Winter				1
Tribulus zeyheri Sond. subsp. zeyheri			1	

Species	Protected by Nature Conservation Ordinance No. 4 of 1975, including amendments	Notes	Shallow washes	Gravel plains
Trichodesma africanum (L.) Lehm.			1	
Tricholaena monachne (Trin.) Stapf ex C.E. Hubb.			1	
Zygophyllum cylindrifolium Schinz		Reasonably widespread, common		1
Zygophyllum simplex L.				1
Zygophyllum spongiosum Van Zyl			1	
Zygophyllum stapfii Schinz		Widespread, common	1	

APPENDIX D

Curriculum Vitae **Van Zyl Stephanie**

Position:	Environmental Assessment Practitioner
Name of firm:	Enviro Dynamics cc
Date of birth:	20 December 1970
Years with firm:	since 1999
Nationality:	Namibian

Relevant Experience:
Stephanie has twenty-five years' experience in Environmental Management and Public Participation and Facilitation (Environmental and Social Assessment, Environmental Management Plans, Environmental Education, Environmental Management Systems, Environmental Monitoring and Evaluation), Urban and Regional Development Planning, Socio-Economic Research, Land Use Planning, and Project Co-ordination.

She has been involved in or acted as the principle consultant for a number of large-scale environmental and social assessments in the following sectors: infrastructure including roads, railway lines, power lines, and water supply networks; tourism including tourism development plans and lodges; mining; processing and manufacturing projects; agriculture; and power generation projects.

Tertiary Education:
Bachelaureus (Town and Regional Planning) University of Pretoria 1992
Masters (Environmental Management) University of the Orange Free State 1999

Membership in Professional Societies:
- South African Institute of Ecologists and Environmental Scientists (SAIES) – professional member
- International Association of Impact Assessment (IAIASA) - member
- Namibian Institute of Town and Regional Planners (NITRP) – professional member
- Namibian Council of Town and Regional Planners (CTRP) – professional member
- Environmental Assessment Professionals Association of Namibia (EAPAN) – founder member

Selected Project Experience:

- Renewable energy projects, including review of Proposed Diaz Wind Park, various solar PV parks.
- The proposed Xaris LNG Plant at Walvis Bay.
- Various infrastructure construction projects, including NamPower lines, water pipelines for Namwater and City of Windhoek, Roads for Roads Authority and City of Windhoek.
- Agricultural processing EIAs such as Abattoirs, seal slaughtering and processing, poultry farms, etc.
- EIAs and EMPs, including reviews of various township developments in Windhoek, Karibib, Katima Mulilo, Rundu.
- SEAs and environmental review work of various large scale planning projects, including the Integrated Spatial Development Plan for Walvis Bay, the ISDF for Henties Bay, Ondangwa, Rundu and Katima Mulilo.
- Town Planning applications and review work at the City of Windhoek.