

ENVIRONMENTAL IMPACT ASSESSMENT

Environmental Assessment Scoping Report and Environmental Management Plan for the construction and operation of a Solar PV Power Plant at Gobabis, Namibia.

Prepared for (Proponent):

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26 November 2020

Document Status

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Report Version	Final Scoping Report and Environmental Management Plan
Date	26 November 2020
Project location:	Gobabis Townlands Portion X of Farm Gobabis No.114 22°26'05.3"S 18°58'33.0"E
Document Title:	Environmental Assessment Scoping Report and Environmental Management Plan for the construction and operation of a Solar PV Power Plant at Gobabis, Namibia.
Listed Activity:	Energy Generation, Transmission and Storage Activities.

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List of Abbreviations and Acronyms

BID:	Background Information Document
°C:	Degrees Celcius
CO ₂ :	Carbon Dioxide
Db:	Decibels
EAP:	Environmental Assessment Practitioner
EIA:	Environmental Impact Assessment
EMA:	Environmental Management Act
EMP:	Environmental Management Plan
EOI:	Expression of interest
ESR:	Environmental Scoping Report
Ha:	Hectare
I&AP:	Interested and Affected Parties
MET:	Ministry of Environment and Tourism
MSDS:	Material and Safety Data Sheet
PPE:	Personal Protective Equipment
PV:	Photovoltaic

Executive Summary

Alensy Energy Solutions (Pty) Ltd (Project Proponent), is a renewable energy solutions provider and aims to construct a Solar PV Power Plant at Gobabis (on a remainder of Farm Gobabis Townlands No.114, Portion X) to provide the town of Gobabis with an economic, locally produced, renewable source of electricity. Gobabis Municipal Council has agreed to lease the site measuring 20 Ha to Alensy Energy Solutions for a period of 25 years for the purposes of constructing and operating a Solar PV Power Plant.

Namibia has the highest average Practical PV Power Potential in the world. This immense potential in combination with the known environmental benefits of solar power (reduction of; CO₂ emissions; carbon footprints; and over reliance on fossil fuels) is worthy rationalization for construction and operation of the proposed Solar PV Power Plant, amongst others; 172 jobs for local youths; and increased investment attraction for Gobabis.

Identified Environmental Impacts are summarised in the table below and range from low to high in their respective Environmental Impact Significance rating. Various mitigation strategies are recommended in the Environmental Management Plan. It is the view of the Environmental Consultant that the project is given environmental clearance from the authorities on condition that the Environmental Management Plan is implemented and adhered, and possibly further enhanced with the implementation of a functioning Health, Safety and Environmental Management System.

	Construction Phase	Operational Phase	Decommissioning Phase	Rehabilitation Phase
Environmental Impact	6.2.1 Impacts on Plants & Animals, Social Impacts and Cultural Heritage.	6.3.1 Impacts on Plants & Animals, Social Impacts and Cultural Heritage.	6.4.1 Decommissioning of Solar PV Power Plant infrastructure.	6.5.1 Environmental Restoration Fund.
	6.2.2 Traffic and Site Access.	6.3.2 Traffic and Site Access.	6.4.2 Health and Safety of Personnel.	
	6.2.3 Pollution and Fire Hazards.	6.3.3 Waste Management.	6.4.2 Waste Management.	
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	6.2.5 Health and Safety of Construction Personnel.	6.3.5 HIV/AIDS and Employee wellness.		
	6.2.6 HIV/AIDS and Employee wellness.			
	6.2.7 Noise during construction.			

1. Introduction

Alensy Energy Solutions (Pty) Ltd (Project Proponent), is a renewable energy solutions provider with interests in the engineering, procurement, construction, operation and maintenance of renewable energy projects. Ecolab Environmental cc, has been appointed by Alensy Energy Solutions (Pty) Ltd to conduct an Environmental Assessment for the construction and operation of a proposed Solar PV (photovoltaic) Power Plant in Gobabis.

Alensy Energy Solutions (Pty) Ltd, as an independent power producer aims to construct a Solar PV Power Plant at Gobabis. The purpose of the proposed Solar Power Plant shall be to provide the town of Gobabis with an economic, locally produced, renewable source of electricity.

This Environmental Assessment Report and Management Plan is aimed at providing information on the environmental consequences that will guide decision makers as well as stakeholders on the proposed development.

1.1 The Environmental Assessment Practitioner (EAP).

EcoLab Environmental cc was established in 2014 and is based in Walvis Bay. The firm has a number of skilled and experienced EAP's. The Environmental Assessment Practitioners involved in this Environmental Assessment are summarized in table 1. Detailed curriculum vitae can be found in **Appendix A**.

Table 1: Key EAP team members assigned to the project.

Designation	EAP	Contact No.	Email	Duties
Lead EA Practitioner	Mr Shapua Kalomo B.Sc. (hons) (UNAM) MBA. (UNAM) M.Sc (WMU, Sweden)	+264 811 48 2667	skalomo62@gmail.com	Supervision of the process and management of stakeholders. Compilation of Scoping Report and EMP.
Junior EA Practitioner	Ms. Sherlien Mokhatu B.Sc. (hons) (UNAM)	+264 81 420 1596	smokhatu@gmail.com	Stakeholder engagement and Compilation of reports.

1.2 Limitations of the Assessment

Information provided to the EAP Team by the proponent included the following:

- Alensy Energy Solutions EOI to the Gobabis Municipal Council (**Appendix J**).
- Council Resolution No.035 / Dated 30 April 2020 – Offer to lease 20 Ha of land for 5MW Solar Plant (**Appendix B**).
- Town Planning Application: Subdivision of from the remainder of the Farm Gobabis Townlands No. 114 into Portion X, for the development of a 5MW Solar Photo Voltaic Power Plant (**Appendix G**).

The assessment was fundamentally based on secondary data from various sources as well as on stakeholder input throughout the process as explained in Section 4 of this document. Furthermore, the assessment was limited to activities to be carried out onsite, as described in Section 2.2 of this document.

2. Project Description

2.1 Nature of the listed activity under assessment

The proposed project requires an Environmental Clearance Certificate in terms of the Environmental Management Act, (Act No.7 of 2007) and Environmental Impact Assessment (EIA) Regulations (2012). The Listed activities that thus make this specific project subject to Environmental Assessment as quoted from Government Notice No. 29 of 2012 are as follows:

Table 2: Summary of Listed Activity.

Activity	Description of Relevant Activity	Relevance to Proposed Development
Activity 1: Energy Generation, Transmission and Storage Activities.	1. The construction of facilities for – (a) the generation of electricity; (b) the transmission and supply of electricity	The construction and operation of the proposed Solar PV Power Plant will be an activity that would lead to the generation, transmission and supply of electricity.

2.2 Proposed Site and Surrounding Land Use

Gobabis Municipality is located in central-eastern Namibia within the Omaheke Region. Gobabis Municipality serves as an important gateway between the SADC countries. It links to one of the most important trade routes, the Trans-Kalahari Highway, which connects the Omaheke region to Pretoria via Gaborone. The proposed site is found within the in the town of Gobabis.



Figure 1: Location of Gobabis within the Omaheke Region.

The exact project site is within Gobabis townlands on a remainder of Farm Gobabis Townlands No.114, Portion X. Currently, the site is zoned as “Undetermined”, the proposed construction and operation of a Solar PV Power plant is a permissible activity under the current zoning. Gobabis Municipal Council has agreed to lease the site measuring 20 Ha to Alensy Energy Solutions for a period of 25 years for the purposes of constructing and operating a Solar Pv Power Plant (See **Appendix B: Council Resolution No.035/Dated 30 April 2020**).

Table 3: Summary of Proposed Location

Site Name	Coordinates	Land Owner	Size and Zoning
Portion X of Farm Gobabis.	22°26'05.3"S 18°58'33.0"E	Gobabis Municipality.	20 Hectares
		(Alensy Energy Solutions to lease land the From Gobabis Municipality/Council)	Undetermined



Figure 2: Locality of the proposed 20Ha site on Portion X from Farm Gobabis Townland No.114.

The immediate surrounding land-use of the proposed site comprises of; an existing Solar PV Power Plant; an informal settlement, an abattoir as well as the Trans Kalahari Highway (B6) by-pass.

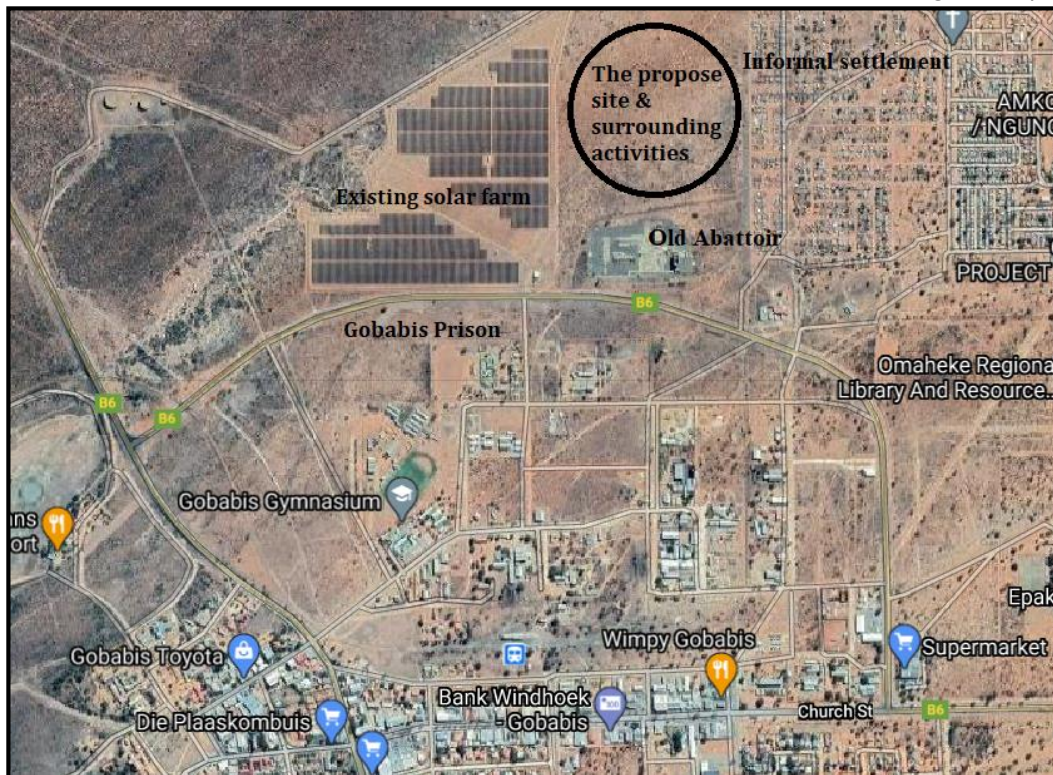


Figure 3: Aerial Image of the Site and Surrounding amenities.

2.3 Rationale for project

According to the World Bank report on Photovoltaic Power Potential by Country (Published June 2020), Namibia has the highest average Practical PV Power Potential of all countries in the world. This immense potential in combination with the known environmental benefits of solar power (reduction of; CO₂ emissions; carbon footprints; and over reliance on fossil fuels) is worthy rationalization for construction and operation of the proposed Solar PV Power Plant by Alensy Energy Solutions Pty Ltd. Equally, the proposed Solar PV Power Plant also offers Namibia the opportunity to further diversify its energy mix to more clean domestic energy sources.

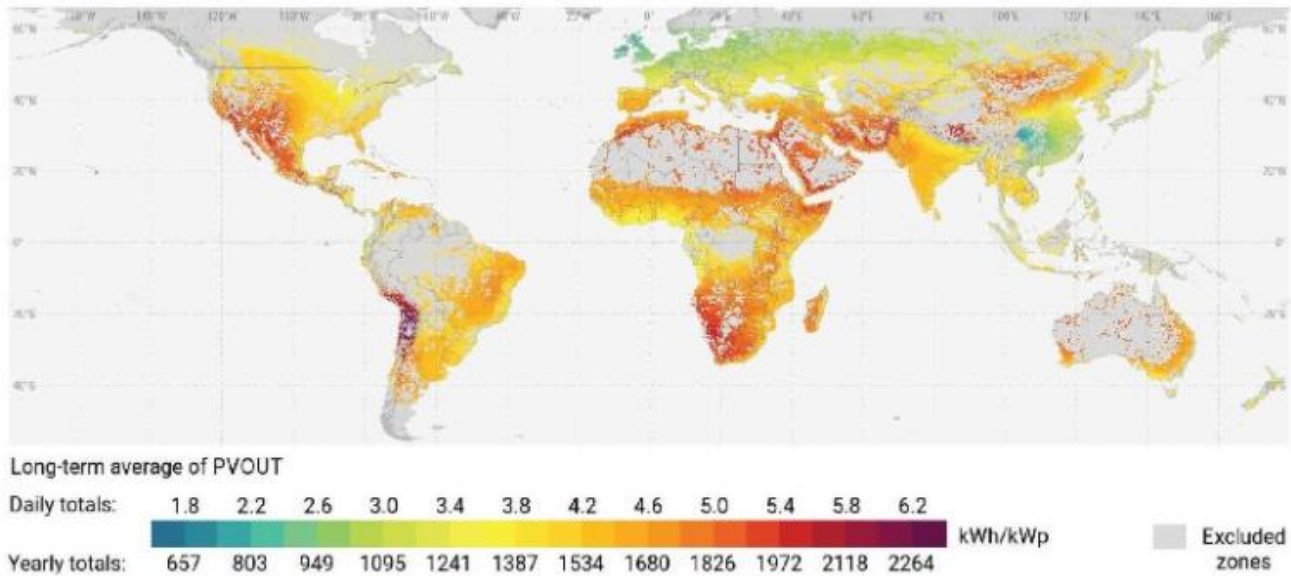


Figure 4: Global map showing Practical Solar Energy Potential after excluding for physical, environmental and other factors (Source: World Bank, 2020).

The business objectives of Alensy Energy Solutions Pty Ltd is the provision of renewable energy in Namibia, specializing in PV Solar; grid-tied, off-grid and hybrid systems. Thus, in-line with its business objectives, Alensy Energy Solutions intends on setting up a Solar PV Power Plant that will contribute to the power supply of the Municipality of Gobabis. As an independent power producer, Alensy energy solutions will enter into a 25-year Power Purchasing agreement with the Gobabis Municipal Council. The key objective of Alensy Energy Solutions Pty Ltd in terms of the proposed development is the sustainable provision of electricity to the Municipality of Gobabis at an affordable rate. This would thus capacitate the Municipality to attract more investors to the town as there will be a much more stable and affordable supply of electricity at Gobabis.

It is the view of the proponent that during the construction of proposed Solar PV Power Plant, at least 148 jobs will be created, and once the Power Plant becomes operational, a total of 24

permanent jobs will be created. The jobs that are to be created are specified in Table 4 and 5 and are exclusively reserved for Namibians, particularly local youths. This may be an essential factor for justification if one considers that youth unemployment (15-35 years old age bracket) in Namibia stood at 43.4 %¹ prior to the Covid-19 pandemic.

Table 4: Summary of Jobs to be created during the construction of the proposed Solar PV Power Plant.

Jobs to be created during the construction of the proposed Solar PV Power Plant		
Position	Nationality	Number of Staff
Project Manager	Namibian	1
Senior Management on Project	Namibian	7
Senior Site Supervision	Namibian	5
Junior Site Supervision	Namibian	11
Team Leaders (Local Citizens)	Namibian	31
General Workers (local citizens)	Namibian	93
Total Workforce during construction	100% Namibian	148

Table 5: Summary of Jobs to be created during the operation of the proposed Solar PV Power Plant.

Jobs to be created during the operation of the proposed Solar PV Power Plant		
Position	Nationality	Number of Staff
O&M Manager	Namibian	1
Technician	Namibian	1
Monitor Person	Namibian	1
Team Leader	Namibian	1
General Workers (local citizens)	Namibian	20
Total Workforce during operation	100% Namibian	24

¹<https://www.newera.com.na/2017/07/14/nsa-explains-youth-unemployment-statistics/> (retrieved 18 July 2017)

2.4 Alternatives and No-Go Alternative

The proponent has not deliberated any alternatives to the proposed site, so this assessment did not consider any other alternatives other than The “No Project” alternative, which assumes that the project as proposed does not go ahead. The implications of the “No Project” alternative are:

- the land use potential remains unlocked;
- there is no further development of solar energy facilities at this location;
- there is no change in the aesthetics of the landscape;
- CO₂ emissions; carbon footprints; and over reliance on fossil fuels not reduced;
- All environmental impacts described in section 6 of this assessment report would not be realised.

2.5 Proposed Activities

The main activities to be carried out onsite predominantly entail the construction as well as the operation of the proposed Solar PV Power Plant.

A. Construction of Solar PV Power Plant

Construction of PV solar plants entails the mounting of solar panels on supporting structures made of aluminium profiles and stainless steel fasteners. In general, there are four main types of foundations that are commonly used: driven piles, helical piles, earth-screws, and ballasted foundations. Concrete strip foundations can also be used, made of concrete blocks or constructed on site. Aluminium supports are then fastened to the foundations which carry crossbeams to which the PV modules are fastened. In certain instances, panels are equipped with trackers that allow for optimal utilization of solar irradiation. Figure 5 summarizes the construction process (Solar DAO, 2020).



Figure 5: Illustration summarising the construction of a typical Solar PV Power Plant (Source: Solar DAO, 2020)

B. Operation of Solar PV Power Plant

A typical Solar PV Power Plant, is designed to supply usable solar power by means of photovoltaics. It consists of an arrangement of several components, including solar panels/modules to absorb and convert sunlight into electricity, a solar inverter to convert the

output from direct to alternating current, as well as mounting, cabling, and other electrical accessories to set up a working system. The Proposed Solar Photovoltaic Power Plant shall consist of an array of panels and associated infrastructure covering an area of less than 16 hectares of land as well as a small O&M office building.



Figure 6: Aerial photograph of existing Gobabis Solar Plant. (Source: Alensy Energy Solutions (Pty) Ltd)

Figure 7 exemplifies the arrangement of a typical megawatt-scale grid connected solar PV power plant, similar to that of the proposed development.

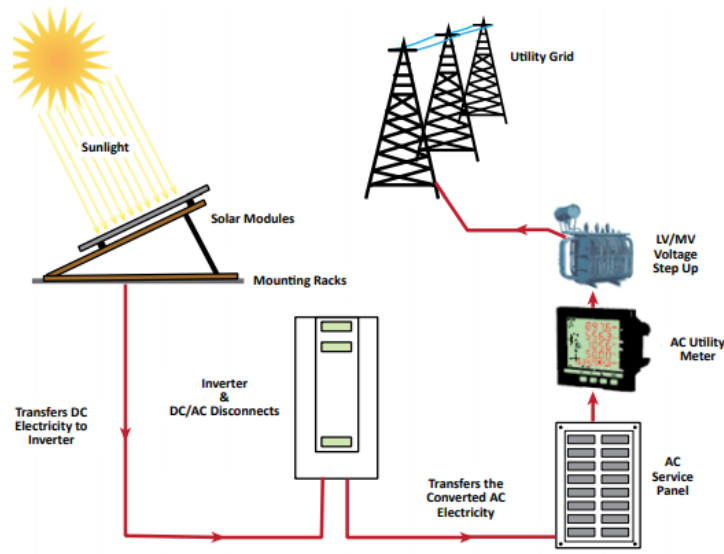


Figure 7: Typical Overview of a Solar PV Power Plant (Source: World Bank: International Finance Corporation, 2015).

C. Water and Energy Requirements:

- Water Sewage; Municipal connections will be established onsite.
- Energy: During construction, energy will be sourced from onsite generators.

3. Legal and Administrative Background

This section shall outline and briefly discuss all the various laws, policies, and national developmental plans that have been considered in the preparation of this scoping report for the proposed development.

3.1 The Namibian Constitution

Articles 91, 95 and 144 of the Namibian constitution are of particular relevance to the Scoping Exercise of the planned development.

Part of Article 95 recites: "The State shall actively promote and maintain the welfare of the people by adopting policies aimed at...The maintenance of ecosystems, essential ecological processes and biological diversity of Namibia and utilization of living natural resources on a sustainable basis for the benefit of all Namibians, both present and future..." Part of Article 91 recites "The functions of the Ombudsman shall be defined and prescribed by an Act of Parliament and shall include the following... the duty to investigate complaints concerning the over-utilization of living natural resources, the irrational exploitation of non-renewable resources, the degradation and destruction of ecosystems and failure to protect the beauty and character of Namibia". Article 144 Recites "Unless otherwise provided by this Constitution or Act of Parliament, the general rules of public international law and international agreements binding upon Namibia under this Constitution shall form part of the law of Namibia."

3.2 Namibia's Environmental Assessment Policy (1995).

The Environmental Assessment Policy of Namibia declares the following: "...Achieving and maintaining sustainable development on all policies, programs and projects undertaken within Namibia. In particular, the wise utilization of the country's natural resources, together with the responsible management of the biophysical environment, must be for the benefit of both present and future generations Namibia shall place a high priority on: (i) maintaining ecosystems and related ecological processes, in particular those important for water supply, food production, health, tourism and sustainable development; (ii) observing the principle of optimum sustainable yield in the exploitation of living natural resources and ecosystems, and the wise utilization of non-renewable resources; (iii) maintaining representative examples of natural habitats; (iv) maintaining maximum biological diversity by ensuring the survival and promoting the conservation in their natural habitat of all species of fauna and flora, in particular those which are endemic,

threatened, endangered, and of high economic, cultural, educational, scientific and conservation interest." The policy also outlines an EA procedure.

3.3 Environmental Management Act of Namibia (Act 7 of 2007) and its Regulations (2012).

The Environmental Management Act (2007) aims to: promote the sustainable management of the environment and the use of natural resources by establishing principles for decision making on matters affecting the environment; to establish the Sustainable Development Advisory Council; to provide for the appointment of the Environmental Commissioner and environmental officers; to provide for a process of assessment and control of activities which may have significant effects on the environment; and to provide for incidental matters.

The Act further sets out a number of environmental objectives that; guide the implementation of the Act and any other law relating to the protection of the environment; serve as the general framework within which environmental plans must be formulated; and serve as guidelines for any organ of state when making any decision in terms of this Act or any other law relating to the protection of the environment. These Environmental Objectives include (non-exhaustive list):

- The option that provides the most benefit or causes the least damage to the environment as a whole, at a cost acceptable to society, in the long term as well as in the short term must be adopted to reduce the generation of waste and polluting substances at source;
- A person who causes damage to the environment must pay the costs associated with rehabilitation of damage to the environment and to human health caused by pollution, including costs for measures as are reasonably required to be implemented to prevent further environmental damage;
- Damage to the environment must be prevented and activities which cause such damage must be reduced, limited or controlled.

The Environmental Management Act Regulations specifies scheduled activities that may not be under taken without an Environmental Clearance Certificate from the Environmental Commissioner.

3.4 Local Authorities Act (Act No. 23 of 1992).

Powers, duties and functions of local authority councils includes the supply electricity to the residents in its area. Subject to the provisions of Part X and the Electricity Act, 2000 (Act No.2 of 2000).

3.5 Electricity Act, 2000 (Act No.2 of 2000)

The aim of the act is for the establishment the Electricity Control Board and provide for its powers and functions; to provide for the requirements and conditions for obtaining licences for the provision of electricity; to provide for the powers and obligations of licensees; and to provide for incidental matters.

3.6 Labour Act (Act No. 11 of 2007)

Provides for Labour Law and the protection and safety of employees. Labour Act, 1992: Regulations relating to the health and safety of employees at work (Government Notice No. 156 of 1997).

3.7 Hazardous Substances Ordinance (No. 14 of 1974)

The Ordinance applies to the manufacture, sale, use, disposal and dumping of hazardous substances, as well as their import and export and is administered by the Minister of Health and Social Welfare. Its serves to prevent hazardous substances from causing injury, ill-health or the death of human beings.

3.8 Nature Conservation Ordinance (No. 4 of 1975)

To consolidate and amend the laws relating to the conservation of nature; the establishment of game parks and nature reserves; the control of problem animals; and to provide for matters incidental thereto.

3.9 Water Resources Management Act (Act No. 11 of 2013)

The Act aims to provide for the management, protection, development, use and conservation of water resources; to provide for the regulation and monitoring of water services and to provide for incidental matters.

3.10 Public and Environmental Health Act (Act No. 1 of 2015)

To provide a framework for a structured uniform public and environmental health system in Namibia; and to provide for incidental matters.

3.11 National Heritage Act (Act No. 27 of 2004)

To provide for the protection and conservation of places and objects of heritage significance and the registration of such places and objects; to establish a National Heritage Council; to establish a National Heritage Register; and to provide for incidental matters.

3.12 The Convention on Biological Diversity (CBD), 1992.

The CBD has three main goals: the conservation of biological diversity (or biodiversity); the sustainable use of its components; and the fair and equitable sharing of benefits arising from genetic resources. Its objective is to develop national strategies for the conservation and sustainable use of biological diversity, and it is often seen as the key document regarding sustainable development.

3.13 United Nations Convention to Combat Desertification (UNCCD), 1994.

The UNCCD is a Convention to combat desertification and mitigate the effects of drought through national action programs that incorporate long-term strategies supported by international cooperation and partnership arrangements.

3.14 Namibia's 5th National Development Plan (NDP 5)

The fifth National Development Plan is the fifth of a series of seven 5-year national development plans that outline the objectives and aspirations of Namibia's long-term vision as expressed in Vision 2030.

4. Public Consultation

The public participation phase is an integral part of the EIA process, and continues throughout this process. By its very nature, it is a dynamic process where diverse societal interests, needs and values that must be recognised and managed. This requires that public participation provide the opportunity for participation in an open and transparent manner that would add meaningful value to the planning of the proposed project.

The EAP gave notices to all potential interested and affected parties (I&APs) as per the public consultation process requirements by doing the following:

- a) Producing Background Information Document (BID) (**Appendix C**).
- b) 21 Day public consultation period from 12 October 2020 to 2 November 2020.
- c) Advertisements placed in two (2) different newspapers that are widely distributed in Namibia in accordance with the Environmental Management Act (2007) and it's Regulations (2012). The actual copies of these newspaper adverts can be found in **Appendix D**.

Table 6: Newspaper adverts & dates.

Newspaper	Dates
The Namibian	Tuesday, 13 October 2020 Tuesday, 20 October 2020
New Era	Monday, 12 October 2020 Monday, 19 October 2020

- d) Distribution of the BID to the adjacent land users (see **Appendix I** : Register of all hand delivered BID's) and also to all the registered I&APs.
- e) A site notice was also placed at a conspicuous location at the site during the 21 day public consultation period. Similar notices were placed at: A cuca shop at the neighboring informal settlement; the Municipal Office in Town; the Municipal Office in the Location; and at Megasave Retail Outlet in Town (See photo's in **Appendix E**).
- f) Distribution of the Draft Scoping report to all I&APs and a comment period of seven (7) days was awarded, from 18 November 2020 to 25 November 2020.
- g) Stakeholders were actively identified by EcoLab Environmental and were also afforded a copy of the background Information document. Stakeholder/I&AP for the project ranged from various individuals representing a diverse multitude of institutions, such as:
 - Municipality of Gobabis
 - Omaheke Regional Council

Scoping Report & Environmental Management Plan

- All Adjacent land users/owners
- Ministry of Environment, Tourism and Forestry
- Ministry of Mines and Energy
- Ministry of Industrialisation, Trade and SME Development
- NAMPOWER
- NAMWATER
- Roads Authority
- Electricity Control Board
- National Planning Commission

A full list of all I&AP can be found in **Appendix F**. No comments were received following the distribution of the BID. Only comment received from the distribution of scoping report was from Mr. Rudi du Plessis, Engineer: Technical services, at Omaheke Regional Council: "EcoLab, no comments and no concerns raised from my office." This email is can be found in **Appendix H**.

5. Description of the Environment

The proposed site is sandwiched between an informal settlement, an abattoir as well as an existing Solar Power Plant. (See Section 2.2: Proposed Site and Surrounding Land Use, as well as Figure 2 & 3). This chapter will elaborate on the Socio-Economic as well as the Natural receiving environments in the broader milieu of Gobabis as a town.

5.1 Socio-Economic Environment

Gobabis is the most populace town in the Omaheke Region with a total population of around 21000 inhabitants, translating to over 5000 private households which are mostly headed by males (60%). The town has a literacy rate of about 80%, while the unemployment rate among the labour force at the town is around 40%. Around half of the households at Gobabis do not have electricity for lighting. The main sources of income for households at Gobabis are Wages and Salaries as well as Business Ventures (non-farming) (NSA 2011).

Table 7: Summary of Selected Demographic indicators of the Gobabis constituency as per the 2011 census (Source Namibia Statistics Agency: Omaheke Regional Profile, 2011)

Population Size		Labour force, 15+ years %	
Total	20 993	In labour force	74
Male	10 322	Employed	60
Female	10 671	Unemployed	40
Sex ratio: Males per 100 females	97	Outside Labour force	20
		Student	46
		Homemaker	19
		Retired etc.	35
Age composition, %		Households with	
Under 5 years	13	Safe Water	97
5 – 14 years	22	No toilet facility	47
15 – 59 years	60	Electricity for lighting	47
60+ years	5	Wood/Charcoal for cooking	54
Marital status: 15+ years, %		Household main source of income	
Never married	56	Farming	3
Married with Certificate	21	Wages & Salaries	66
Married Traditionally	3	Cash Remittance	9
Married consensually	15	Business, non-farming	10
Divorced/Separated	2	Pension	9
Widowed	3		
Private Households		Persons Living with Disability %	
Number	5100	With Disability	3
Average Size	3.9		

Literacy Rate, 15+years			
Never attended school	21		
Currently at school	11		
Left School	67		

5.2 Natural Environment

5.2.1 Climatic Conditions

According to the Köppen Climate Classification system, one of the most widely used climate classification systems, the climate of Gobabis is said to be a Hot Semi-Arid climate. A hot Semi-Arid climate is characterised by precipitation below potential evapotranspiration levels, but not as low as a desert climate.

5.2.2 Temperature

Average high day-time temperatures in Gobabis range between 32 and 22 degrees Celsius. With the hottest days experienced in the months of January, February, November and December.

Average low daily low temperatures in Gobabis range between 4 °C and 18 °C. With the coldest days experienced in the months of June and July each year.

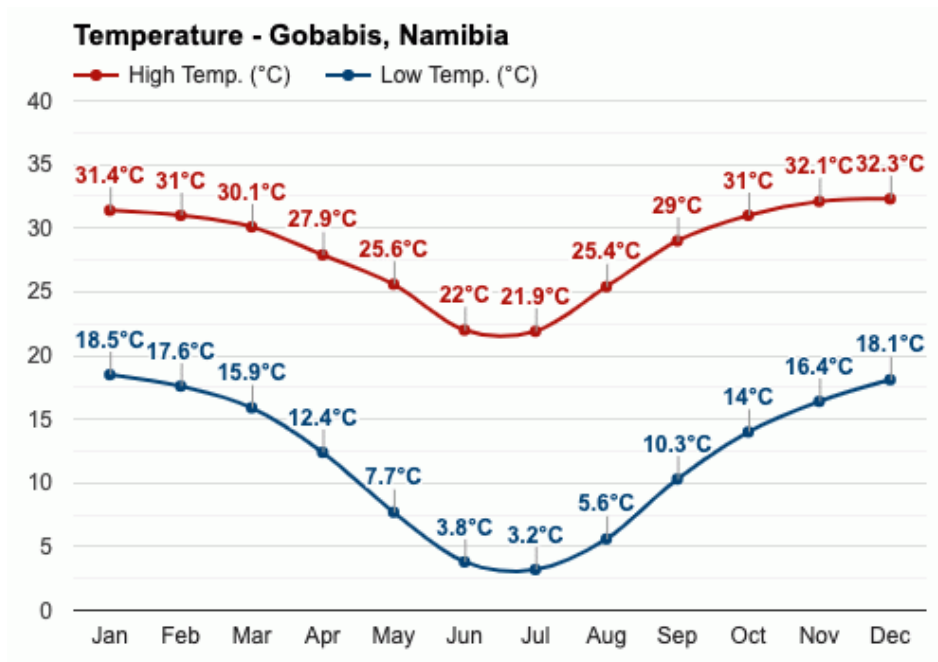


Figure 8: Annual average temperatures at Gobabis, Namibia (Source: www.weather-atlas.com).

5.2.3 Rainfall and Humidity

The rainy season at Gobabis runs from end October and peaks at around April where figures of about 80mm on average are experienced. The driest months are June, July and August where less than 4mm of rain is received on average. The total average annual rainfall at Gobabis is around 370mm/anum.

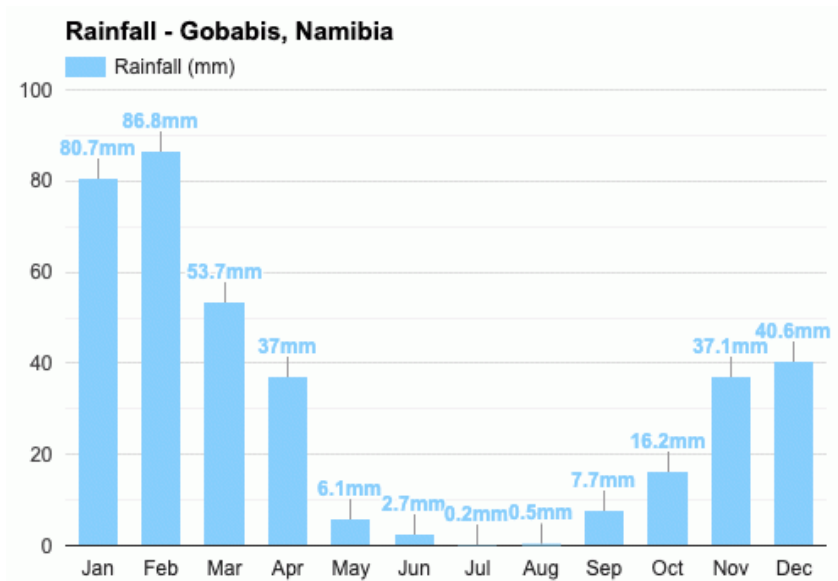


Figure 9: Annual average rainfall at Gobabis, Namibia (Source: www.weather-atlas.com).

Average humidity in Gobabis follows a similar trend to the precipitation figures, with higher humidity experienced during the rainy seasons.

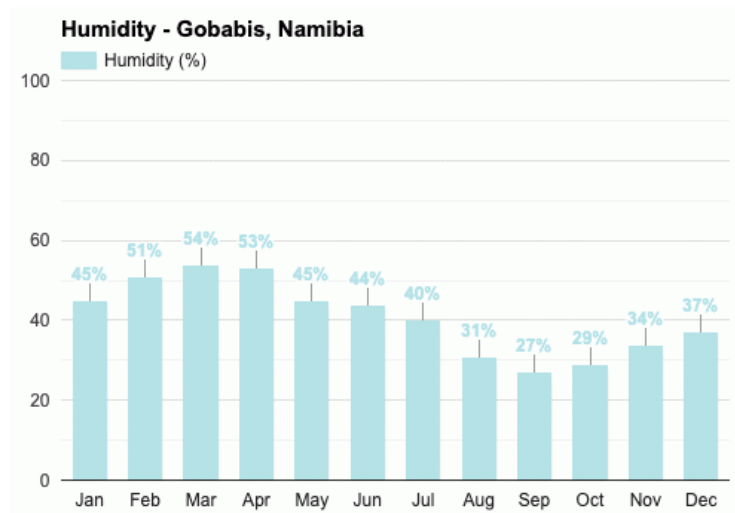


Figure 10: Annual average humidity at Gobabis, Namibia (Source: www.weather-atlas.com).

5.2.4 Daylight Hours

The Gobabis area receives many hours of daylight per year. The average amount of daylight hours' ranges between 11- 13 hrs/d.

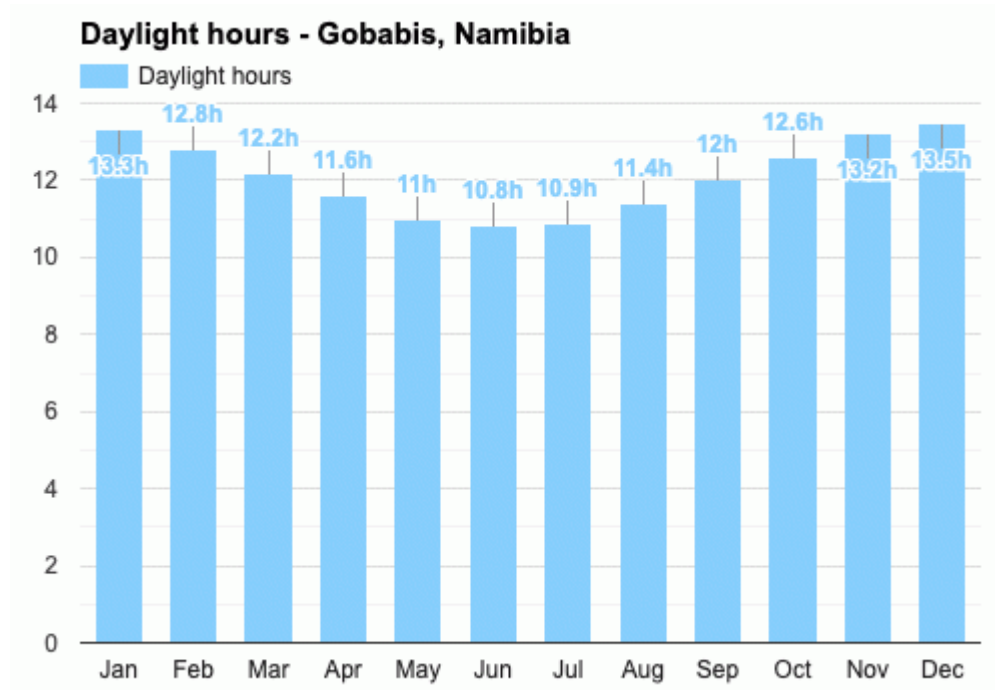


Figure 11: Annual daylight hours at Gobabis, Namibia (Source: www.weather-atlas.com).

5.2.5 Geology, Hydrology and Hydraulic Structures

The regional geology of the area is composed mainly of the Nossib Group, formed during the Damara Orogeny event which saw peak in deformation and metamorphism at around 530–500 Ma. The Nossib Group is comprised mainly of arenitic rocks like sand stones, quartzites, conglomerates and subordinate schists. Other stratigraphic structures of note in the area include: Kamtsas Formation (of the Damara sequence), the Kuibis Subgroup (of the Nama Group) and lastly, the Dwyka Formation (of the Karoo Sequence) (Christelis & Struckmeier 2011)

According to Christelis & Struckmeier (2011), much of the groundwater basin of the Gobabis area is underlain by sandstone/quartzite or schist, which brings about varying characteristics in terms of water bearing ability. However, the accepted view is that the conditions in the basin present moderate to high groundwater yields at known intersections between 60m-120m, accompanied by regular recharge (Christelis & Struckmeier 2011).

Hydraulic structures in closest proximity to the proposed site can be found at about 2 Km south east of the proposed site. These are the Black Nossib River which flows into the Tilda Viljoen Dam.

The Dam is a rockfill dam with a concrete outlet, with a wall that measures 14m in height and 630m in length. Constructed in 1964, the dam's purpose is to form part of the domestic water supply to the town of Gobabis (ORASECOM, "infrastructure catalogue", retrieved 3 November 2020)

5.2.6 Plants and Animals

The Gobabis area is characterised by its savannah landscape, primarily a mix of bush land (dry and thorn bush savannah) and thick woodland, all of which is collectively referred to as the Acacia Tree Shrub Biome. Common species of flora typical of the area include: *Acacia Melifera*, *Acacia Hebeclada*, *Tarconanthus Camphoratus*, *Catophractes Alexandri*, *Rhus Ciliatia*, *Themeda Triandra*, *Brachiaria Serrata*, *Microchloa Caffra*, *Stipagrotis Uniplumi* and *Schmidtia Kalahariensis*.

Reptiles that may be present in the area include: *Psammophis jallae*, *Mehelya Vernayi* *Stigmochelys pardalis*, *Varanus Albigularis*, *Psammobates*, *Hemirhagerhis viperrinus*, *Oculiferus*, as well as members of the *Pachydactylus* genus. Birds regarded as endangered, near threatened and vulnerable by the IUCN (2020) However, none of these birds are associated with Gobabis built up area. Mammals that may be present in the area include mongoose and baboons.

6. ENVIRONMENTAL ASSESSMENT

The Table below indicates a summary of identified environmental impacts. These impacts are categorized into the relevant stages of the life cycle of the proposed development, namely: Operational Phase, Decommissioning Phase and Rehabilitation Phase. The environmental assessment section of the Scoping Report and the consequent EMP shall also be compartmentalized into these into these phases.

Table 8: Summary of identified Environmental Impacts

	Construction Phase	Operational Phase	Decommissioning Phase	Rehabilitation Phase
Environmental Impact	6.2.1 Impacts on Plants & Animals, Social Impacts and Cultural Heritage.	6.3.1 Impacts on Plants & Animals, Social Impacts and Cultural Heritage.	6.4.1 Decommissioning of Solar PV Power Plant infrastructure.	6.5.1 Environmental Restoration Fund.
	6.2.2 Traffic and Site Access.	6.3.2 Traffic and Site Access.	6.4.2 Health and Safety of Personnel.	
	6.2.3 Pollution and Fire Hazards.	6.3.3 Waste Management.	6.4.2 Waste Management.	
	6.2.4 Waste Management.	6.3.4 Health and Safety of Personnel.		

6.2.5 Health and Safety of Construction Personnel.	6.3.5 HIV/AIDS and Employee wellness.		
6.2.6 HIV/AIDS and Employee wellness.			
6.2.7 Noise during construction.			

6.1 Impact Evaluation Criterion used

The evaluation criterion used for the assessment of the impacts is taken from the Rhodes University, Department of Environmental Sciences in the Environmental Impact Assessment Short Course Training. The identified impacts were evaluated in terms of their magnitude considering Temporal (Duration/Frequency) and Spatial (Local, National and Regional) scales as well Severity and Likelihood of occurrence as explained in *tables 6 to 9*. From the points scored by a particular impact in terms of its effect (*tables 5 to 7*) and Likelihood (*table 9*) the sum of these points were then used to determine the overall significance of the particular impact through the use of a Matrix as indicated in *Table 10*. From *table 10*, the colour category in which a particular impact falls under is then used in order to determine the significance of the impact as shown below in *table 11*, either; Low, Moderate, High, Very High. The entire process is repeated for each impact assuming suggested mitigation measures.

Table 9: Ranking evaluation criterion for the effects of impacts over temporal scales

Temporal Scale	Description	Score
Short term (ST)	Less than 5 years	1
Medium term (MT)	Between 5-20 years	2
Long term (LT)	Between 20 & 40 years (a generation) and from a human perspective also permanent	3
Permanent (P)	Over 40 years & resulting in a permanent lasting change that will always be there	4

Table 10: Ranking evaluation criterion for the effects of impacts over spatial scales

Spatial Scale	Description	Score
Localized (L)	At localized scale and a few hectares in extent	1
Study Area (S)	The proposed site and its immediate environments	2
Regional (R)	District and Regional level	3
National (N)	Country	4
International (I)	Internationally	5

Table 11: Ranking evaluation criterion for the Severity or Benefits of impacts.

Severity	Description (Severity / Beneficial effects)	Score
Slight (SL)	Slight impacts to the affected system(s) and/or party(ies)	1
Moderate (M)	Moderate impacts of the affected system(s) and/or party(ies)	2
Severe (SE)	Severe impacts of the affected system(s) and/or party(ies)	4
Very Severe (VS)	Very Severe impacts of the affected system(s) and/or party(ies)	8

Table 12: Ranking evaluation criterion for the likelihood of potential impacts.

Likelihood	Description	Score
Unlikely (U)	The Likelihood of these impacts occurring is slight	1
May occur (M)	The likelihood of these impacts occurring is possible	2
Probable (P)	The likelihood of these impacts occurring is probable	3
Definite (D)	The likelihood that this impact will occur is definite	4

Table 13: Matrix used to determine the overall significance of the impact based on the likelihood and effect of the impact.

		Effect													
		3	4	5	6	7	8	9	10	11	12	13	14	15	16
Likelihood	1	4	5	6	7	8	9	10	11	12	13	14	15	16	17
	2	5	6	7	8	9	10	11	12	13	14	15	16	17	18
	3	6	7	8	9	10	11	12	13	14	15	16	17	18	19
	4	7	8	9	10	11	12	13	14	15	16	17	18	19	20

Table 14: Description of Environmental significance ratings and associated range of scores

Significance Rate	Description	Score
Low	Acceptable impact for which mitigation is desirable but not essential. The impact by itself is insufficient even in combination with other low impacts to prevent the development from being approved.	4 - 7
Moderate	An important impact which requires mitigation. The impact is insufficient by itself to prevent the implementation of the project but which in conjunction with other impacts may prevent project implementation. These impacts will usually result in either a positive or negative medium to long-term effect on the social and/or natural environment.	8 - 11

High	A serious impact if not mitigated, and may prevent the implementation of the project (if it's a negative impact). These impacts would be considered by society as constituting a major and usually a long-term change to the (natural and/or social) environment and result in severe effects.	12 – 15
Very High	A very serious impact which, if negative, may be sufficient by itself to prevent implementation of the project. The impact may result in permanent change. Very often these impacts are immitigable and usually result in very severe effects, or very beneficial effects.	16 - 20

6.2 Construction Phase Impacts

6.2.1 Impacts on Plants & Animals, Social Impacts and Cultural Heritage.

DESCRIPTION: During the construction of the proposed Solar PV Power Plant, impacts on fauna, flora, social and cultural heritage are likely to be expected and include the following: Site clearing and Grading that may cause dust and habitat loss; Establishment of a temporary construction camp and mobile site office; Community grievances; Archaeological Discoveries on site.

MITIGATION: It is recommended that Site clearing and Grading should be done with the assistance of the Ministry of Environment, Tourism and forestry so as to avoid habitat destruction and guidance with possible non-toxic dust suppression measures. Soil erosion may be caused by exposed surfaces and can be reduced by scheduling earthmoving works in a manner that avoids heavy rainfall periods as well as contouring and minimizing length and steepness of slopes as well as mulching to stabilize exposed areas. While the introduction of exotic plants onsite should be avoided as far as possible and should only be permitted with the express consent of the relevant authorities. Prior to commencement of construction, the proponent should agree on a Community Grievance mechanism with the local communities in conjunction with the authorities. In the unlikely event of any heritage or archaeological discoveries during the construction phase of the project, the Local Authority and National Heritage Council (NHC) should be contacted immediately for guidance regarding the discovery. Cutting down trees for firewood and feeding of any wildlife should not be permitted.

	Temporal	Spatial	Severity	Likelihood	Significance Rate
Score Before Mitigation	(MT) 2	(S) 2	(M) 3	(P) 3	6 MODERATE
Score Considering Mitigation	(ST) 1	(L) 1	(SL) 1	(U) 1	4 LOW

The overall rating of this impact is moderate in unmitigated conditions and low under mitigated conditions. Mitigation is therefore recommended as best practice and as a means of remaining pro-active through construction as well as reducing impacts.

6.2.2 Traffic and Site Access.

DESCRIPTION: During the construction of the proposed Solar PV Power Plant, access roads to the construction site would have to be established.

MITIGATION: Planning of access roads needs to be done in consultation with the Local Authorities as well as the Roads Authority of Namibia. Planning of access roads should be mindful of limiting gradients in order to reduce run-off induced erosion. Existing roads that link the site to neighbouring areas should not be obstructed or damaged through construction endeavours. Transportation through community areas should be discouraged by all means. Operators of vehicles used during construction, particularly heavy equipment (Graders and trucks etc.) should be mindful of their limited fields of view and be on the lookout for possible pedestrians. The proponent should also restrict access to the site with a focus on high risk structures or areas depending on the site-specific situations through interventions such as; fencing, signage, and communication of risks to the local community. Hazardous conditions that cannot be controlled effectively through site access restrictions should be removed entirely. A visitor orientation program should be developed and all visitors to the site should comply with all safety protocols on site. Lastly, regular communication between the proponent and neighbouring land users and communities with regard to traffic matters should be agreed upon prior to construction, and communication in this regard should be ongoing with possible changing conditions during construction with such discussions documented and relevant recommendations followed up on.

	Temporal	Spatial	Severity	Likelihood	Significance Rate
Score Before Mitigation	(LT) 3	(S) 2	(M) 2	(D) 4	11 MODERATE
Score Considering Mitigation	(ST) 1	(L) 1	(SL) 1	(M) 2	5 LOW

The overall rating of this impact is moderate under unmitigated circumstances and low under mitigated conditions. Mitigation is therefore recommended as best practice and as a means of remaining pro-active through construction as well as reducing impacts.

6.2.3 Pollution and Fire hazards.

DESCRIPTION: Dealing with hazardous substances that may be kept and/or handled onsite, presents a pollution and fire risk that the proponent should not neglect and should take responsibility for and manage accordingly. These hazards include: paints, solvents, gases and hydrocarbons (non-exhaustive list).

MITIGATION: Initially, the proponent should develop an Emergency Response Plan that is to be followed in the event of emergencies that may arise from the handling and storage of hazardous substances onsite. Material and Safety Data Sheets (MSDS) should be readily available onsite at

all times and the contents of these documents should be adhered to. MSDS documents must also be considered in the development of the recommended Emergency Response Plan. Drip trays should be placed under oil leaking vehicles/equipment and the contents of these trays should be disposed of in a manner that is approved by the local authority. Corrosive, oxidising and reactive chemicals present similar hazards and require similar control measures as flammable substances. The spillage of any hydrocarbon exceeding 200 liters should be reported to the Ministry of Mines and Energy without delay. All incidents with regard to Pollution and Fire hazards should be documented, investigated the outcomes/corrective action implemented in order to prevent re-occurrence by all means.

There are a range of instruments/measures that can be used to bring a fire under control or avoid a fire entirely. These include but are not limited to (non-exhaustive list):

- Detailed operational procedures for hazardous substance handling as well as related emergency protocols endorsed and supported by management. These need to be reviewed from time to time and must be complimented by regular drills to assess and improve upon their effectiveness.
- Provision of manual firefighting equipment that is easily accessible and easy to use. Training on the use of the equipment should be provided.
- Fire and emergency systems that are both audible and visible where practically possible.
- Storing of flammables away from ignition sources and oxidizing materials.
- No cell phones or Smoking allowed at high risk areas onsite to avoid distractions and unwanted ignition of fires.
- General good housekeeping practices as well as a culture of safety and compliance to procedures, rules and protocols within the construction team should be fostered.

	Temporal	Spatial	Severity	Likelihood	Significance Rate
Score Before Mitigation	(P) 4	(R) 3	(SE) 4	(P) 3	12 Moderate
Score Considering Mitigation	(ST) 1	(L) 1	(SL) 1	(M) 3	6 LOW

The overall rating of this impact is moderate under unmitigated circumstances and low under mitigated conditions. Mitigation is therefore strongly recommended as best practice and as a means of remaining pro-active through construction as well as reducing impacts.

6.2.4 Waste Management

DESCRIPTION: During the day-to-day activities of the construction of the proposed Solar PV Power Plant, different kinds of waste are expected to be generated. These include: general domestic waste, building rubble, site clearing debris, packaging, chemical/mobile toilets etc.

MITIGATION: All domestic waste onsite should be disposed of in receptacles that promote good housekeeping and can hold all waste until such a time that the waste is to be removed from the site without causing any pollution. All waste is to be removed from the site on a regular basis and should under no circumstances be allowed to accumulate to uncontrollable levels. Waste from site clearing shall have to be disposed of in a manner that is in line with national laws and to the satisfaction of the Municipality of Gobabis. Contaminated products that cannot be re-used and domestic waste should be disposed of in accordance with Local Authority Requirements. Chemical/Mobile toilets to be used onsite should comply with applicable national and local authority requirements. Chemical/Mobile toilets that are to be used onsite should complement the number of people that would make use of them in accordance with national laws. No waste should be buried and littering should be strictly prohibited.

	Temporal	Spatial	Severity	Likelihood	Significance Rate
Score Before Mitigation	(LT) 3	(S) 2	(S) 4	(P) 4	13 HIGH
Score Considering Mitigation	(ST) 1	(L) 1	(SL) 1	(M) 1	4 LOW

The overall rating of this impact is high under unmitigated circumstances and low under mitigated conditions. Mitigation is therefore recommended as best practice and as a means of remaining pro-active through construction as well as reducing impacts.

6.2.5 Health and Safety of Construction Personnel

DESCRIPTION: All construction phase related activities require human labour, directly or indirectly, and thus pose an inherent health and safety risk to construction personnel.

MITIGATION: It is the responsibility of the proponent to comply with the provisions set forth in the Labour Act 11 of 2007, with special attention to Chapter 4 that primarily outlines Health and Safety in the work place, as well as all other national legislations in this regard.

Recommended mitigating measures include, but not limited to (Non-exhaustive list):

- Covid-19 regulations as set forth by the National Authorities should be adhered to on site without exception.
- Periodic internal safety compliance audits.
- Health and Safety training and speciality programs should be provided as needed to ensure workers are oriented to the specific hazards of individual work assignments and all other present hazards.

- Hazard Risk Identification within Job Profiles/Machinery/Equipment/Work Areas and Tasks that are to be performed.
- Appointment of Safety Officers as custodians of safety within the workplace. In addition to these, Peer Educators and Health and Safety Representatives can also be nominated in constituent working teams in order to foster a culture of health and safety at the construction site.
- Documented Safe Operational and Work Procedures as well as Emergency (including Medical) Procedures and drills. These need to be periodically reviewed for their effectiveness and should be constantly improved upon whenever the opportunity presents itself, particularly following an event of note (including near-misses).
- Daily crew safety talks prior to the commencement of every shift.
- Monthly/Weekly Peer education topics encouraging healthy lifestyle choices, safety at the construction site and outcomes of investigations into near-misses and incident investigations.
- Good housekeeping practices in order to avoid unforeseen hazards and obstructions.
- General permits to work and Personal Protective Equipment/Clothing
- Conspicuous signs displaying all potential hazards, PPE requirements, assembly points, waste receptacles of all kinds, emergency numbers for respective emergencies that may arise, MSDS Sheets etc.
- Communication of lessons learnt from previous incidents and corrective action taken to avoid re-occurrence as soon as these are known following an investigation.
- Investigations into the improvement of current practices from a health and safety perspective.

	Temporal	Spatial	Severity	Likelihood	Significance Rate
Score Before Mitigation	(P) 4	(S) 2	(SE) 4	(D) 4	10 HIGH
Score Considering Mitigation	(ST) 1	(S) 2	(SL) 1	(M) 2	4 LOW

The overall rating of this impact is high under unmitigated and low under mitigated conditions. Thus mitigation is recommended as best practice and as a means of remaining pro-active through construction. Alensy Energy Solutions is strongly recommended to devise an HSE Policy which should enjoy management commitment in its implementation.

6.2.6 HIV/AIDS and Employee Wellness

DESCRIPTION: The proposed development is expected to employ a large number of people (project staff as well as contractors). Should those recruited (particularly contractors) relocate to Gobabis from other towns, it could contribute to the spread HIV/AIDS infections.

MITIGATION: The proponent should encourage and promote HIV/AIDS and health awareness among employees and contractors.

	Temporal	Spatial	Severity	Likelihood	Significance Rate
Score Before Mitigation	(P) 4	(N) 4	(SE) 4	(M) 2	12 HIGH
Score Considering Mitigation	(ST)1	(L) 1	(M) 2	(M) 2	3 LOW

The overall rating of this impact is high under unmitigated conditions and low under mitigated conditions. Mitigation is recommended as best practice and as a means of remaining pro-active through operations as well as reducing impacts.

6.2.7 Noise during construction

DESCRIPTION: The proposed development is expected to make use of earthmoving equipment and various kinds of machinery that may generate noise.

MITIGATION: The proponent should limit working hour's onsite to 07h00 to 19h00 and coordinate working high noise generating tasks in such a manner that provides the least nuisance to neighbouring land users. No employee should be exposed to a noise level greater than 85Db for a duration of more than 8 hours per day without hearing protection, and the use of hearing protection should be enforced actively.

	Temporal	Spatial	Severity	Likelihood	Significance Rate
Score Before Mitigation	(ST) 1	(S) 2	(SE) 4	(M) 4	10 MODERATE
Score Considering Mitigation	(ST)1	(L) 1	(M) 2	(M) 2	3 LOW

The overall rating of this impact is high under unmitigated conditions and low under mitigated conditions. Mitigation is recommended as best practice and as a means of remaining pro-active through operations as well as reducing impacts.

6.3 Operational Phase Impacts

All operational related impacts of the proposed development shall be discussed in this section in terms of the description of the impact as well as its effects (temporal, spatial & severity), as well as the likelihood of occurrence and proposed mitigation measures.

6.3.1 Impacts on Plants & Animals, Social Impacts and Cultural Heritage.

DESCRIPTION: During the operation of the proposed Solar PV Power Plant, impacts on fauna, flora, social and cultural heritage may occur.

MITIGATION: It is recommended that Alensy Energy Solutions establishes an Environmental Management Auditing regime. Furthermore, the fence surrounding the site should be grey or green in colour in order to blend in with the surroundings and located as close as possible around the Solar PV Power Plant as practically possible. Lighting at the facility should be kept at a minimum to reduce light spillage and pollution. While the introduction of exotic plants onsite should be avoided as far as possible and should only be permitted with the express consent of the relevant authorities. In the unlikely event of any heritage or archaeological discoveries during the operation phase of the project, the Local Authority and National Heritage Council (NHC) should be contacted immediately for guidance regarding the discovery. Cutting down trees for firewood and feeding of any wildlife should not be permitted.

	Temporal	Spatial	Severity	Likelihood	Significance Rate
Score Before Mitigation	(MT) 2	(S) 2	(M) 3	(P) 3	6 MODERATE
Score Considering Mitigation	(ST) 1	(L) 1	(SL) 1	(U) 1	4 LOW

The overall rating of this impact is moderate in unmitigated conditions and low under mitigated conditions. Mitigation is therefore recommended as best practice and as a means of remaining pro-active through operations as well as reducing impacts.

6.3.2 Traffic and Site Access.

DESCRIPTION: During the operation of the proposed Solar PV Power Plant, access roads to the site that were established during the construction of the Solar PV Power Plant would be fully operational and would have to be managed.

MITIGATION: Any changes to the existing access roads needs to be done in consultation with the Local Authorities as well as the Roads Authority of Namibia. The proponent should also restrict

access to the site with a focus on high risk structures or areas depending on the site-specific situations through interventions such as; fencing, signage, and communication of risks to the local community. Existing roads that link the site to neighbouring areas should not be obstructed or damaged through any endeavours of the operation of the Solar PV Power Plant. A visitor orientation program should be developed and all visitors to the site should comply with all safety protocols on site. Lastly, regular communication between the proponent and neighbouring land users with regard to traffic issues should be unending.

	Temporal	Spatial	Severity	Likelihood	Significance Rate
Score Before Mitigation	(LT) 3	(S) 2	(M) 2	(D) 4	11 MODERATE
Score Considering Mitigation	(ST) 1	(L) 1	(SL) 1	(M) 2	5 LOW

The overall rating of this impact is moderate under unmitigated circumstances and low under mitigated conditions. Mitigation is therefore recommended as best practice and as a means of remaining pro-active through construction as well as reducing impacts.

6.3.3 Waste Management

DESCRIPTION: During the day-to-day activities of the operation of the proposed Solar PV Power Plant, different kinds of waste are expected to be generated. These include: general domestic waste, packaging etc.

MITIGATION: It is recommended that Alensy Energy Solutions establishes an Environmental Management Auditing regime. All domestic waste onsite should be disposed of in receptacles that promote good housekeeping and can hold all waste until such a time that the waste is to be removed from the site without causing any pollution. All waste is to be removed from the site on a regular basis and should under no circumstances be allowed to accumulate to uncontrollable levels. Waste from site clearing shall have to be disposed of in a manner that is in line with national laws and to the satisfaction of the Municipality of Gobabis. Contaminated products that cannot be re-used and domestic waste should be disposed of in accordance with Local Authority Requirements. No waste should be buried and littering should be strictly prohibited.

	Temporal	Spatial	Severity	Likelihood	Significance Rate
Score Before Mitigation	(LT) 3	(S) 2	(S) 4	(P) 4	13 HIGH
Score Considering Mitigation	(ST) 1	(L) 1	(SL) 1	(M) 1	4 LOW

The overall rating of this impact is high under unmitigated circumstances and low under mitigated conditions. Mitigation is therefore recommended as best practice and as a means of remaining

pro-active through operations as well as reducing impacts. Also, it is recommended that Alensy Energy Solutions establishes an Environmental Management Auditing regime.

6.3.4 Health and Safety of Operation Personnel

DESCRIPTION: All operation phase related activities require human labour, directly or indirectly, and thus pose an inherent health and safety risk to O&M personnel.

MITIGATION: It is recommended that Alensy Energy Solutions establishes a Health and Safety Auditing Regime. It is the responsibility of the proponent to comply with the provisions set forth in the Labour Act 11 of 2007, with special attention to Chapter 4 that primarily outlines Health and Safety in the work place, as well as all other national legislations in this regard. **Additionally, (Points discussed in section 6.2.5 of the environmental assessment are essential and note-worthy in this regard)**

Recommended mitigating measures include, but not limited to (Non-exhaustive list):

- Covid-19 regulations as set forth by the National Authorities should be adhered to on site for the duration of the construction phase without exception.
- Periodic internal safety compliance audits.
- Health and Safety training (Confined spaces, Working at heights, First Aid Courses, Toolbox Safety Talks etc.)
- Hazard Risk Identification within Job Profiles/Machinery/Equipment/Work Areas and Tasks that are to be performed.
- Personal Protective Equipment/Clothing (dust masks, gloves, overalls, safety boots, hardhats etc.).

	Temporal	Spatial	Severity	Likelihood	Significance Rate
Score Before Mitigation	(P) 4	(S) 2	(SE) 4	(D) 4	10 HIGH
Score Considering Mitigation	(ST) 1	(S) 2	(SL) 1	(M) 2	4 LOW

The overall rating of this impact is high under unmitigated and low under mitigated conditions. Thus mitigation is recommended as best practice and as a means of remaining pro-active through operations. Alensy Energy Solutions is strongly recommended to devise an HSE Policy which should enjoy management commitment in its implementation. Also it is recommended that Alensy Energy Solutions establishes a Health and Safety Auditing Regime.

6.2.5 HIV/AIDS and Employee Wellness

DESCRIPTION: The proposed development is expected to employ an O&M team during the operation phase. Should those recruited (O&M contractors) relocate to Gobabis from other towns, it could contribute to the spread HIV/AIDS infections.

MITIGATION: The proponent should encourage and promote HIV/AIDS and health awareness among O&M employees and contractors.

	Temporal	Spatial	Severity	Likelihood	Significance Rate
Score Before Mitigation	(P) 4	(N) 4	(SE) 4	(M) 2	12 HIGH
Score Considering Mitigation	(ST)1	(L) 1	(M) 2	(M) 2	3 LOW

The overall rating of this impact is high under unmitigated conditions and low under mitigated conditions. Mitigation is recommended as best practice and as a means of remaining pro-active through operations as well as reducing impacts.

6.4 Decommissioning Phase Impacts

All decommissioning phase impacts shall be discussed in this section in terms of the description of the impact as well as effects, likelihood and mitigation.

6.4.1 Decommissioning of Solar PV Power Plant infrastructure.

DESCRIPTION: It is expected that the proposed Solar PV may be operational for decades (considering the 25 year power purchasing agreement that is to be entered into) and as such may produce new habitats and ecological niches for plants and animals. Upon demolition and decommissioning of the facility, these newly established habitats and or niches will vanish.

MITIGATION: The proponent would have to ensure that no new habitats are created on site (**Points discussed in section 6.2.1 of the environmental assessment are essential and note-worthy in this regard**). Prior to decommissioning, inspections would have to be carried out to confirm that the taking apart and removal of established onsite infrastructure would not result in the unintended destruction of newly formed habitats and niches.

	Temporal	Spatial	Severity	Likelihood	Significance Rate
Score Before Mitigation	(ST) 2	(S) 2	(M) 2	(M) 2	8 MODERATE
Score Considering Mitigation	(SP) 1	(L) 1	(SL) 1	(U) 2	5 LOW

The overall rating of this impact is moderate under unmitigated conditions and low under mitigated conditions. Mitigation is recommended as best practice and as a means of remaining pro-active through operations as well as reducing impacts.

6.4.2 Health and Safety of Personnel.

DESCRIPTION: During the Decommissioning Phase similar risks to human beings as with the Operational Phase will be present. All other risks associated with demolitions must be considered.

MITIGATION: The decommissioning of onsite infrastructure can cause serious health and safety risks to workers on site i.e injuries and medical treatment incidents. For this reason, adequate measures must be put in place to ensure safety of staff on site, and includes:

- **Mitigation measures discussed in section 6.2.5 of the environmental assessment should be re-implemented in this regard.**

	Temporal	Spatial	Severity	Likelihood	Significance Rate
Score Before Mitigation	(P) 4	(S) 2	(SE) 4	(D) 4	10 HIGH
Score Considering Mitigation	(ST) 1	(L) 2	(SL) 1	(U) 2	4 LOW

The overall rating of this impact is high under unmitigated and low under mitigated conditions. Thus mitigation is recommended as best practice and as a means of remaining pro-active through decommissioning.

6.4.3 Waste Management.

DESCRIPTION: Upon decommissioning waste will be produced in the form of building rubble, old solar panels and associated structures.

MITIGATION: All waste should be disposed of appropriately considering the type of waste. No waste should be piled up onsite once decommissioning is completed. The municipal dumpsite should be used for wastes that can be accommodated in this regard, waste that cannot be disposed of at the municipal dump site should be discarded off appropriately at such adequate facilities. No waste should be buried and littering should be strictly prohibited.

	Temporal	Spatial	Severity	Likelihood	Significance Rate
Score Before Mitigation	1	2	2	2	5 LOW
Score Considering Mitigation	1	2	1	1	4 LOW

The overall rating of this impact is low under unmitigated and mitigated conditions. Mitigation is recommended as best practice and as a means of remaining pro-active through operations as well as reducing impacts.

6.5 Rehabilitation Phase Impacts

Rehabilitation phase impacts shall be discussed in this section in terms of the description of the impact as well as effects, likelihood and mitigation.

6.4.1 Environmental Restoration Fund

DESCRIPTION: As a good corporate citizen, Alensy Energy Solutions has the responsibility to establish an Environmental Restoration fund for future environmental restoration once the project has reached the end of its life span, in order to fund for a responsible environmental legacy.

MITIGATION: The purpose of the Environmental Restoration Fund is to finance activities aimed at ecological restoration of the project site should project activities cease and the site is decommissioned and/or repurposed by the local authority.

	Temporal	Spatial	Severity	Likelihood	Significance Rate
Score Before Mitigation	4	4	4	2	12 HIGH
Score Considering Mitigation	1	1	2	2	3 LOW

The overall rating of this impact is high under unmitigated conditions and low under mitigated conditions. Mitigation is recommended as best practice and as a means of remaining pro-active through operations as well as reducing impacts.

7. Environmental Management Plan

7.1 The Environmental Management Plan

An Environmental Management Plan (EMP) is a site-specific plan developed to ensure that the developer/contractor/operator complies with the environmental conditions of approval for the project. The EMP essentially links environmental impacts assessed and project activities into environmental actions to be taken to mitigate assessed impacts.

It is further recommended that Alensy Energy Solutions establishes; 1) a Health and Safety Audit Regime 2) an Environmental Management Audit Regime, to be used in combination with this EMP for greater effectiveness.

7.2 Overall EMP Responsibility

Roles and responsibilities in the implementation of the planned Solar PV Power Plant are displayed below in Table 12:

Table 15: Responsibilities of roles players in the EMP.

Role Player	Obligation
Proponent	The Proponent is to ensure that mitigation recommendations within the EMP are adhered to, as far as reasonably practical. By checking that all approvals, licenses and permits as required by legislation are obtained before specific activities are carried out.
EAP	Compilation of Scoping Report and EMP. May be involved in external environmental audits.
Environmental Compliance Officer	Oversee the implementation of the EMP. Develop and document an Environmental Management System. Perform environmental compliance (internal) audits and follow-up on corrective actions from incidents to ensure compliance. Should be on the vigilant of emergent impacts not identified in the EMP.
Ministry of Environment, Tourism and Forestry/ Municipality of Gobabis	Enforcement of environmental regulations, EMP obedience inspectors and conduct regular project reviews on environmental and incident reports.

8. Construction Phase: EMP

Table 16: Proposed mitigation and monitoring measures for Environmental impacts during construction

Environmental Impact	Mitigation Measures	Monitoring	Responsibility
Impacts on Plants & Animals, Social Impacts and Cultural Heritage.	It is recommended that Site clearing and Grading should be done with the assistance of the Ministry of Environment, Tourism and forestry so as to avoid habitat destruction and guidance with possible non-toxic dust suppression measures. Soil erosion may be caused by exposed surfaces and can be reduced by scheduling earthmoving works in a manner that avoids heavy rainfall periods as well as contouring and minimizing length and steepness of slopes as well as mulching to stabilize exposed areas. While the introduction of exotic plants onsite should be avoided as far as possible and should only be permitted with the express consent of the relevant authorities. Prior to commencement of construction, the proponent should agree on a Community Grievance mechanism with the local communities in conjunction with the authorities. In the unlikely event of any heritage or archaeological discoveries during the construction phase of the project, the Local Authority and National Heritage Council (NHC) should be contacted immediately for guidance regarding the discovery. Cutting down trees for firewood and feeding of any wildlife should not be permitted.	Weekly/Monthly review of Monitoring should be done through Environmental Incidents / Non-conformities reported as well as corrective action taken and should be documented in a report for auditing purposes.	ECO / Proponent
Traffic and Site Access.	Planning of access roads needs to be done in consultation with the Local Authorities as well as the Roads Authority of Namibia. Planning of access roads should be mindful of limiting gradients in order to reduce run-off induced erosion. Existing roads that link the site to neighbouring areas should not be obstructed or damaged through construction endeavours. Transportation through community areas should be discouraged by all means. Operators of vehicles used during construction, particularly heavy equipment (Graders and trucks etc.) should be mindful of their limited fields of view and be on the lookout for possible pedestrians. The proponent should also restrict access to the site with a focus on high risk structures or areas depending on the site-specific situations through interventions such as; fencing, signage, and communication of risks to the local community. Hazardous conditions that cannot be controlled effectively through site access restrictions should be removed entirely. A visitor orientation program should be developed and all visitors to the site should comply with all safety protocols on site. Lastly, regular communication between the proponent and neighbouring land users and communities with regard to traffic matters should be agreed upon prior to construction, and	Weekly/Monthly review of Monitoring should be done through Environmental Incidents / Non-conformities reported as well as corrective action taken and should be documented in a report for auditing purposes.	ECO / Proponent

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	communication in this regard should be ongoing with possible changing conditions during construction with such discussions documented and relevant recommendations followed up on.		
Pollution and Fire hazards.	<p>Initially, the proponent should develop an Emergency Response Plan that is to be followed in the event of emergencies that may arise from the handling and storage of hazardous substances onsite. Material and Safety Data Sheets (MSDS) should be readily available onsite at all times and the contents of these documents should be adhered to. MSDS documents must also be considered in the development of the recommended Emergency Response Plan. Drip trays should be placed under oil leaking vehicles/equipment and the contents of these trays should be disposed of in a manner that is approved by the local authority. Corrosive, oxidising and reactive chemicals present similar hazards and require similar control measures as flammable substances. The spillage of any hydrocarbon exceeding 200 liters should be reported to the Ministry of Mines and Energy without delay. All incidents with regard to Pollution and Fire hazards should be; documented, investigated the outcomes/corrective action implemented in order to prevent re-occurrence by all means.</p> <p>There are a range of instruments/measures that can be used to bring a fire under control or avoid a fire entirely. These include but are not limited to (non-exhaustive list):</p> <ul style="list-style-type: none"> • Detailed operational procedures for hazardous substance handling as well as related emergency protocols endorsed and supported by management. These need to be reviewed from time to time and must be complimented by regular drills to assess and improve upon their effectiveness. • Provision of manual firefighting equipment that is easily accessible and easy to use. Training on the use of the equipment should be provided. • Fire and emergency systems that are both audible and visible where practically possible. • Storing of flammables away from ignition sources and oxidizing materials. • No cell phones or Smoking allowed at high risk areas onsite to avoid distractions and unwanted ignition of fires. • General good housekeeping practices as well as a culture of safety and compliance to procedures, rules and protocols within the construction team should be fostered. 	Weekly/Monthly review of Monitoring should be done through Environmental Incidents / Non-conformities reported as well as corrective action taken and should be documented in a report for auditing purposes.	ECO / Proponent
Waste Management	All domestic waste onsite should be disposed of in receptacles that promote good housekeeping and can hold all waste until such a time that the waste is to be removed from the site without causing any	Weekly/Monthly review of Monitoring should be done	ECO / Proponent

	<p>pollution. All waste is to be removed from the site on a regular basis and should under no circumstances be allowed to accumulate to uncontrollable levels. Waste from site clearing shall have to be disposed of in a manner that is in line with national laws and to the satisfaction of the Municipality of Gobabis. Contaminated products that cannot be re-used and domestic waste should be disposed of in accordance with Local Authority Requirements. Chemical/Mobile toilets to be used onsite should comply with applicable national and local authority requirements. Chemical/Mobile toilets that are to be used onsite should complement the number of people that would make use of them in accordance with national laws. No waste should be buried and littering should be strictly prohibited.</p>	<p>through Environmental Incidents / Non-conformities reported as well as corrective action taken and should be documented in a report for auditing purposes.</p>	
<p>Health and Safety of Construction Personnel</p>	<p>It is the responsibility of the proponent to comply with the provisions set forth in the Labour Act 11 of 2007, with special attention to Chapter 4 that primarily outlines Health and Safety in the work place, as well as all other national legislations in this regard.</p> <p>Recommended mitigating measures include, but not limited to (Non-exhaustive list):</p> <ul style="list-style-type: none"> • Covid-19 regulations as set forth by the National Authorities should be adhered to on site without exception. • Periodic internal safety compliance audits. • Health and Safety training and speciality programs should be provided as needed to ensure workers are oriented to the specific hazards of individual work assignments and all other present hazards. • Hazard Risk Identification within Job Profiles/Machinery/Equipment/Work Areas and Tasks that are to be performed. • Appointment of Safety Officers as custodians of safety within the workplace. In addition to these, Peer Educators and Health and Safety Representatives can also be nominated in constituent working teams in order to foster a culture of health and safety at the construction site. • Documented Safe Operational and Work Procedures as well as Emergency (including Medical) Procedures and drills. These need to be periodically reviewed for their effectiveness and should be constantly improved upon whenever the opportunity presents itself, particularly following an event of note (including near-misses). • Daily crew safety talks prior to the commencement of every shift. 	<p>Weekly/Monthly review of Monitoring should be done through Environmental Incidents / Non-conformities reported as well as corrective action taken and should be documented in a report for auditing purposes.</p>	<p>ECO / Proponent</p>

	<ul style="list-style-type: none"> • Monthly/Weekly Peer education topics encouraging healthy lifestyle choices, safety at the construction site and outcomes of investigations into near-misses and incident investigations. • Good housekeeping practices in order to avoid unforeseen hazards and obstructions. • General permits to work and Personal Protective Equipment/Clothing • Conspicuous signs displaying all potential hazards, PPE requirements, assembly points, waste receptacles of all kinds, emergency numbers for respective emergencies that may arise, MSDS Sheets etc. • Communication of lessons learnt from previous incidents and corrective action taken to avoid re-occurrence as soon as these are known following an investigation. • Investigations into the improvement of current practices from a health and safety perspective. 		
<p>HIV/AIDS and Employee Wellness</p>	<p>The proponent should encourage and promote HIV/AIDS and health awareness among employees and contractors.</p>	<p>Weekly/Monthly review of Monitoring should be done through Environmental Incidents / Non-conformities reported as well as corrective action taken and should be documented in a report for auditing purposes.</p>	<p>ECO / Proponent</p>
<p>Noise during construction</p>	<p>The proponent should limit working hours onsite to 07h00 to 19h00 and coordinate working high noise generating tasks in such a manner that provides the least nuisance to neighbouring land users. No employee should be exposed to a noise level greater than 85Db for a duration of more than 8 hours per day without hearing protection, and the use of hearing protection should be enforced actively.</p>	<p>Weekly/Monthly review of Monitoring should be done through Environmental Incidents / Non-conformities reported as well as corrective action taken and should be documented in a report for auditing purposes.</p>	<p>ECO / Proponent</p>

9. Operational Phase: EMP

Table 17: Proposed mitigation and monitoring measures for Environmental impacts, aspects and risks during operation

Environmental Impact	Mitigation Measures	Monitoring	Responsibility
Impacts on Plants & Animals, Social Impacts and Cultural Heritage.	It is recommended that Alensy Energy Solutions establishes an Environmental Management Auditing regime. Furthermore, the fence surrounding the site should be grey or green in colour in order to blend in with the surroundings and located as close as possible around the Solar PV Power Plant as practically possible. Lighting at the facility should be kept at a minimum to reduce light spillage and pollution. While the introduction of exotic plants onsite should be avoided as far as possible and should only be permitted with the express consent of the relevant authorities. In the unlikely event of any heritage or archaeological discoveries during the operation phase of the project, the Local Authority and National Heritage Council (NHC) should be contacted immediately for guidance regarding the discovery. Cutting down trees for firewood and feeding of any wildlife should not be permitted.	Weekly/Monthly review of Monitoring should be done through Environmental Incidents / Non-conformities reported as well as corrective action taken should be documented in a report for auditing purposes.	ECO / Proponent
Traffic and site access	Any changes to the existing access roads needs to be done in consultation with the Local Authorities as well as the Roads Authority of Namibia. The proponent should also restrict access to the site with a focus on high risk structures or areas depending on the site-specific situations through interventions such as; fencing, signage, and communication of risks to the local community. Existing roads that link the site to neighboring areas should not be obstructed or damaged through any endeavors of the operation of the Solar PV Power Plant. A visitor orientation program should be developed and all visitors to the site should comply with all safety protocols on site. Lastly, regular communication between the proponent and neighboring land users with regard to traffic issues should be unending.	Weekly/Monthly review of Monitoring should be done through Environmental Incidents / Non-conformities reported as well as corrective action taken should be documented in a report for auditing purposes.	ECO / Proponent
Waste Management	It is recommended that Alensy Energy Solutions establishes an Environmental Management Auditing regime. All domestic waste onsite should be disposed of in receptacles that promote good housekeeping and can hold all waste until such a time that the waste is to be removed from the site without causing any pollution. All	Weekly/Monthly review of Monitoring should be done through Environmental Incidents / Non-conformities reported as well as corrective action taken should be	ECO / Proponent

	<p>waste is to be removed from the site on a regular basis and should under no circumstances be allowed to accumulate to uncontrollable levels. Waste from site clearing shall have to be disposed of in a manner that is in line with national laws and to the satisfaction of the Municipality of Gobabis. Contaminated products that cannot be re-used and domestic waste should be disposed of in accordance with Local Authority Requirements. No waste should be buried and littering should be strictly prohibited.</p>	<p>documented in a report for auditing purposes.</p>	
<p>Health and Safety of Operation Personnel</p>	<p>It is recommended that Alensy Energy Solutions establishes a Health and Safety Auditing Regime. It is the responsibility of the proponent to comply with the provisions set forth in the Labour Act 11 of 2007, with special attention to Chapter 4 that primarily outlines Health and Safety in the work place, as well as all other national legislations in this regard. Additionally, (Points discussed in section 6.2.5 of the environmental assessment are essential and note-worthy in this regard)</p> <p>Recommended mitigating measures include, but not limited to (Non-exhaustive list):</p> <ul style="list-style-type: none"> •Covid-19 regulations as set forth by the National Authorities should be adhered to on site for the duration of the construction phase without exception. •Periodic internal safety compliance audits. •Health and Safety training (Confined spaces, Working at heights, First Aid Courses, Toolbox Safety Talks etc.) •Hazard Risk Identification within Job Profiles/Machinery/Equipment/Work Areas and Tasks that are to be performed. •Personal Protective Equipment/Clothing (dust masks, gloves, overalls, safety boots, hardhats etc.). 	<p>Weekly/Monthly review of Monitoring should be done through Environmental Incidents / Non-conformities reported as well as corrective action taken should be documented in a report for auditing purposes.</p>	<p>ECO / Proponent</p>

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<p>HIV/AIDS and Employee Wellness</p>	<p>The proponent should encourage and promote HIV/AIDS and health awareness among O&M employees and contractors.</p>	<p>Weekly/Monthly review of Monitoring should be done through Environmental Incidents / Non-conformities reported as well as corrective action taken should be documented in a report for auditing purposes.</p>	<p>ECO / Proponent</p>
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10. Decommissioning EMP

Table 18: Proposed mitigation and monitoring measures for Environmental impacts, aspects and risks during decommissioning

Environmental Impact	Mitigation Measures	Monitoring	Responsibility
Decommissioning of Solar PV Power Plant Infrastructure.	The proponent would have to ensure that no new habitats are created on site (Points discussed in section 6.2.1 of the environmental assessment are essential and note-worthy in this regard). Prior to decommissioning, inspections would have to be carried out to confirm that the taking apart and removal of established onsite infrastructure would not result in the unintended destruction of newly formed habitats and niches.	Weekly/Monthly review of Monitoring Incidents / Non-conformities reported as well as corrective action taken should be documented in a report for auditing purposes.	ECO / Proponent
Waste Management	All waste should be disposed of appropriately considering the type of waste. No waste should be piled up onsite once decommissioning is completed. The municipal dumpsite should be used for wastes that can be accommodated in this regard, waste that cannot be disposed of at the municipal dump site should be discarded off appropriately at such adequate facilities. No waste should be buried and littering should be strictly prohibited.	Weekly/Monthly review of Monitoring Incidents / Non-conformities reported as well as corrective action taken should be documented in a report for auditing purposes.	ECO / Proponent

11. Rehabilitation EMP

Table 19: Proposed mitigation and monitoring measures for Environmental impacts during rehabilitation

Environmental Impact	Mitigation Measures	Monitoring	Responsibility
Environmental Restoration Fund	The purpose of the Environmental Restoration Fund is to finance activities aimed at ecological restoration of the project site should project activities cease and the site is decommissioned and/or repurposed by the local authority.	Weekly/Monthly review of Monitoring Incidents / Non-conformities reported as well as corrective action taken should be documented in a report for auditing purposes.	ECO / Proponent

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12. Conclusion

All the identified risks to the proposed project can be well managed and mitigated through the implementation of the Environmental Management Plan.

Management and mitigation of risks can further be enriched through the establishment of a functioning Health, Safety and Environmental Management System.

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