# Scoping Report

**For the proposed 300 MW Photovoltaic Solar Facility**

**Liselo Area**

**Location: Liselo, Zambezi Region**

## ROJECT DETAILS

| | |
|---|---|
| **Project Title:** | Draft Scoping Report for the Proposed Photovoltaic Solar Facility, Liselo Area |
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| **Project Location:** | Liselo Area, Zambezi Region Namibia |
| **Report Status:** | Scoping Report |
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## DEFINITION OF TERMS

| | |
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| EAP | An Environmental Assessment Practitioner (EAP) is a qualified professional responsible for conducting environmental assessments and managing environmental compliance for development projects. |
| EIA | Environmental Impact Assessment |
| Environment | the natural and man-made resources, both biotic and abiotic, occurring in the lithosphere and atmosphere, water, soil, minerals and living organisms, whether indigenous or exotic, and the interaction between them. |
| MW | A megawatt (MW) is a unit of power equal to 1 million watts. 1 MW = 1,000,000 watts.It measures the rate at which energy is produced or consumed. |
| Manage | Means to manage with a view to securing its protection, conservation, regulations, rehabilitation, and sustainable use. |
| Mitigate | Activities designed to compensate for unavoidable environmental damage |
| Monitor | means to assess continuously the state and trends of developments on any part of the environment as well as the actual or potential impact of any activity on the environment and human health |
| Natural Resource | The air, soils, minerals and waters of Namibia, mammals, birds, fish, trees, grasses, springs, vleis, sponges, marshes, swamps and public streams. |
| Deforestation | Total removal of trees or any other vegetation from land. |
| Pollution | any direct or indirect alteration of the physical, thermal, chemical, biological properties of the environment caused by discharge, emission, or deposit of a substance into the environment |
| Project | means any activity which has or is likely to have an impact on the environment |
| Solar Facility | A solar facility is a large scale electrical generating system |

| | |
|---|---|
| | comprised of photovoltaic (PV) modules and associated electrical infrastructure. |
| Sustainable utilization | means the use or exploitation of the environment which guards against extinction, depletion or degradation of any natural resource and permits the replenishment of natural resources by natural means or otherwise. |
| Waste | Includes domestic, commercial or industrial material, whether in liquid, gaseous or solid form, which is discharged, emitted or deposited into the environment in such volume, composition or manner as to cause pollution. |

**ABBRIVIATIONS**

| | |
|---|---|
| EAP | Environmental Assessment Practitioner |
| EIA | Environmental Impact Assessment |
| EMF | Electromagnetic Field |
| EMP | Environmental Management Plan |
| E&S | Environmental and Social Standards |
| ESKOM | South African National Electricity Utility |
| ESMP | Environmental and Social Management Plan |
| EHS | Environmental, Health, and Safety |
| EHSGs | Environmental, Health, and Safety Guidelines |
| FPIC | Free, Prior, and Informed Consent |
| IFC | International Finance Corporation |
| I&APs | Interested and Affected Parties |
| KAZA TFCA | Kavango-Zambezi Transfrontier Conservation Area |
| MEFT | Ministry of Environment, Forestry and Tourism (Namibia) |
| MME | Ministry of Mines and Energy (Namibia) |
| NamPower | Namibia Power Utility Company |
| NGO | Non-Governmental Organization |
| NIRP | National Integrated Resource Plan |
| OGEMP | Off-Grid Electrification Master Plan |
| PV | Photovoltaic |

| | |
|---|---|
| SAPP | Southern African Power Pool |
| TOR | Terms of Reference |
| WPSN | Water and Power Supply Namibia (Pty) Ltd |

# EXECUTIVE SUMMARY

Overview

Water and Power Supply Namibia (WPSN) proposes a 300 MW (AC) Photovoltaic (PV) Solar Facility with an integrated Battery Energy Storage System (BESS) near Katima Mulilo to support Namibia's growing demand for sustainable, cost-effective electricity. The project aligns with national energy objectives, including Vision 2030, the National Energy Policy (2017), and the Renewable Energy Policy, by enhancing energy security, reducing reliance on imports, and promoting environmentally responsible power generation. As a listed activity under the Environmental Management Act (2007) and EIA Regulations (2012), the project requires an Environmental Clearance Certificate (ECC), triggering this Scoping Report and the subsequent Environmental Impact Assessment (EIA). Michmat Investments has been appointed as the Environmental Assessment Practitioner (EAP) to oversee the EIA, engage stakeholders, identify key environmental and social issues, and ensure legal compliance.

The Scoping Report identifies potential impacts on biodiversity, land use, visual character, noise, soil, cultural heritage, and local communities, and considers alternatives including site layout, technology options, and a "no-go" scenario. The project is deemed environmentally and socially feasible, provided impacts are properly assessed and mitigated. Planned measures include sensitive site design, vegetation rehabilitation, biodiversity protection, erosion and water management, dust and noise control, visual impact reduction, waste management, and community engagement through employment and skills development. Findings support progressing to the full EIA phase, which will include specialist studies, detailed assessments, and a comprehensive Environmental Management Plan (EMP) to ensure sustainable outcomes.

# 1. INTRODUCTION

## 1.1. Purpose of the scoping report.

Under the Environmental Management Act (EMA), 2007 and its EIA Regulations (2012), a Scoping Report is a mandatory step in the Environmental Impact Assessment process for listed activities. The construction and operation of a Photovoltaic Solar Power Facility is a listed activity that requires an Environmental Clearance Certificate (ECC), and therefore must undergo the EIA process including scoping.

The Scoping Report serves several key purposes:

a) To Identify and Define the Scope of Potential Environmental Impacts

The Scoping Report outlines all **potential environmental, social, and economic impacts** associated with the proposed solar facility.
This includes possible effects on:

- Environmental Impacts
    - Flora, Fauna and Avifauna
    - Soil
    - Air Quality
    - Noise
    - Water Resources
    - Land use
    - Visual impacts
    - Waste generation and management
- Social and Economic Impacts
    - Land Access
    - Livelihood
    - Employment opportunities
    - Public Health
    - Community Safety
    - Community health and safety
    - Cultural Heritage
- Technical and Infrastructure Aspects

- Project Design,
- Technology Selection,
- Grid Connection,
- Access Roads,
- Water Use,
- Construction methods

b) To Provide a Detailed Project Description

The Scoping Report describes the:

- Size and capacity of the PV plant
- Location and land characteristics
- Proposed technology (e.g., fixed-tilt or tracking panels)
- Associated infrastructure (access roads, substations, transmission lines)

c) To Identify Key Issues and Concerns Through Stakeholder Engagement

The Scoping Report documents consultations with:

- Interested and Affected Parties (I&APs)
- Local communities
- Traditional authorities
- Regional and local government
- Relevant line ministries

d) To Propose Terms of Reference (ToR) for the EIA Study

The Scoping Report outlines how the full EIA will be conducted. This includes:

- Methods for baseline studies
- Impact assessment methods
- Specialist studies required (e.g., biodiversity, avifauna, heritage)
- Proposed mitigation measures

e) To Determine the Feasibility of the Project from an Environmental Perspective

The scoping process helps determine:

- Whether the project is acceptable
- What key issues must be addressed
- Whether alternatives must be considered (location, design, technology)

f) To Identify Reasonable Alternatives

The Scoping Report must outline alternatives to:

- Project location
- Design/layout
- Technology
- No-go alternative

g) To Provide an Initial Assessment of Potential Mitigation Measures

Based on preliminary findings, the report proposes early mitigation strategies such as:

- Minimizing vegetation clearing
- Managing construction impacts
- Avoiding sensitive habitats
- Ensuring safe waste management
- Community engagement strategies

## 1.2. Term of Reference (TOR)

The ToR ensures that the assessment process is systematic, transparent, and inclusive, providing a clear framework for identifying and evaluating potential environmental and socio-economic impacts associated with the project. The Terms of Reference outline the approach that the project proponent will follow to carry out the Environmental Impact Assessment (EIA) for the proposed 300 MW Solar project in accordance with the Environmental Management Act (EMA), 2007, its Regulations, and related guidelines.

The ToR includes the following:

- A description of all tasks to be performed during the assessment, including baseline environmental studies, identification of impacts, and engagement of specialists where required.
- An indication of the stages at which the Environmental Commissioner will be consulted, such as during submission of the Scoping Report, EIA Report, and Environmental Management Plan (EMP).
- A description of the methods to be used in identifying, analysing, and evaluating environmental issues and feasible project alternatives, with consideration of cumulative impacts, legal requirements, and applicable standards.
- The nature and extent of public consultation, detailing how stakeholders and interested parties will be informed and involved throughout the assessment process.

## 1.3. Background of the project and proponent.

Water and Power Supply Namibia (WPSN) is the project proponent and a Namibian-registered company operating within the national utilities and renewable energy sector. The company is committed to expanding sustainable energy generation solutions that support Namibia's growing demand for reliable, affordable, and environmentally responsible electricity supply. In alignment with national development priorities such as Namibia's Vision 2030, the National Energy Policy (2017), and the Renewable Energy Policy WPSN seeks to diversify the country's energy mix through the development of grid-connected renewable energy projects, including photovoltaic (PV) solar power facilities.

To fulfil the legal requirements of the Environmental Management Act (EMA), 2007 (Act No. 7 of 2007) and the Environmental Impact Assessment (EIA) Regulations of 2012, WPSN has appointed Michmat Investments as the Environmental Assessment Practitioner (EAP). Michmat Investments is a Namibian environmental consultancy with experience in conducting Environmental Impact Assessments, Environmental Management Plans, public participation processes, and related specialist studies across various sectors, including renewable energy developments.

Michmat Investments is responsible for conducting the EIA process for the proposed Photovoltaic Solar Facility, including the compilation of the Scoping Report, facilitation of public consultation, identification of key environmental issues, and preparation of the Terms of Reference for the full Environmental Impact Assessment study. The EAP will ensure that the project complies with the principles of environmental management outlined in Section 3 of the EMA and that decisions are informed by a transparent, participatory, and scientifically based assessment process.

## 1.4. Power Sector in Namibia

Namibia records exceptionally high annual sunshine hours and ranks among the countries with the highest solar energy potential globally. Coal is used only for electricity generation at the country's sole coal-fired facility, the Van Eck Power Station. All coal consumed in Namibia is imported, primarily from South Africa. At present, Namibia imports a large share of its electricity from South Africa and other neighbouring countries. A special agreement between NamPower and Eskom, South Africa's national power utility, allows Namibia to purchase surplus electricity from South Africa at relatively affordable prices. According to the World Bank's development indicators, access to electricity in Namibia stood at 55.2% of the population in 2019. Namibia also operates the Ruacana Hydropower Station, which consists of 80 MW generating units powered by water from a surge head bay. Electricity is generated at 11,000 volts, stepped up to 330,000 volts, and transmitted through vertical tunnels to surface switchgear before being distributed to central regions of the country.

The Ministry of Mines and Energy (MME) serves as the sole administrator of the Solar Revolving Fund (SRF), a credit facility established to encourage the adoption of renewable energy technologies. The SRF primarily targets rural and off-grid communities, while also being accessible to urban users. It forms part of the Off-Grid Energization Master Plan for Namibia (OGEMP), which aims to expand access to suitable energy technologies in rural areas. Namibia's installed electricity generation capacity is currently 498 MW, which falls short of national demand. The Namibian Integrated Resource Plan projects electricity consumption growth of approximately 4.25% per year between 2011 and 2031, further increasing reliance on electricity imports. To address this challenge, the government intends to expand domestic generation capacity and reduce dependence on imports.

The Ruacana Hydropower Plant, located on the Kunene River, remains Namibia's primary source of electricity. However, its dependence on consistent water flow poses challenges during periods of drought. Long-term solutions have been proposed, including large-scale initiatives such as the Kudu Gas Project, although its implementation has faced prolonged delays,.

These constraints present significant opportunities for renewable energy development, particularly in solar power. Namibia's abundant solar resources offer substantial potential for large-scale photovoltaic (PV) projects and increased investment in renewable energy.

## 1.5. Current Renewable Initiatives

Namibia is actively expanding its renewable energy sector to reduce dependence on imported electricity and strengthen energy security. The country plans to commission about 93 MW of new renewable capacity in the 2025/26 financial year, significantly boosting local generation from solar and wind sources.

Key projects and policies include:

- Large-scale solar development: Namibia officially broke ground in June 2025 for its largest solar photovoltaic power plant, the 100-MW Sores Gaib Power Station, marking a major step toward enhancing the country's renewable energy capacity. NamPower has partnered with Chinese firms to build a 100 MW solar plant, expected online by mid-2026, and launched a 120 MW solar tender to bring six grid-connected PV plants online under an Independent Power Producer (IPP) framework.
- Renewables target and regulatory reform: Renewables' share of Namibia's energy mix has grown to around 21 %, with a national goal to reach 70 % by 2030. Regulatory reforms like the Modified Single Buyer model aim to attract investment and allow direct power purchase agreements with IPPs.
- Battery storage and grid upgrades: A 51 MW/51 MWh Omburu Battery Energy Storage System is under construction to improve grid stability and better integrate intermittent solar and wind power.

- Biomass and other renewables: Construction has begun on a 40 MW biomass power plant in Tsumeb to diversify renewable sources.
- Green hydrogen and industrial renewables: Namibia is investing in green hydrogen initiatives, including commissioning Africa's first green-hydrogen-powered iron production facility and planning larger hydrogen projects, although some (like the Hyphen green ammonia project) have faced setbacks and investor pullbacks.
- International support: A World Bank-backed project is financing transmission expansion and utility-scale energy storage to enhance renewable integration and strengthen the national grid.

Together, these initiatives reflect a strong national push toward renewable energy growth, infrastructure modernization, and long-term energy independence.

## 1.6. Project rationale and objectives.

Project Rationale

Namibia continues to face significant energy security challenges, primarily due to its high dependence on imported electricity. The country imports approximately 60% of its electricity from neighbouring countries within the Southern African Power Pool (SAPP), particularly South Africa and Zambia. This dependence exposes Namibia to regional supply constraints, fluctuating electricity prices, and power shortages caused by ageing infrastructure and increasing demand across Southern Africa.

SADC countries, including South Africa, Botswana, Zambia, and Zimbabwe, are experiencing rising electricity demand driven by population growth, industrialisation, and economic development. Several countries within the region have struggled to consistently meet their domestic energy needs, resulting in load shedding, supply deficits, and reduced export capacity. These regional pressures increase the urgency for Namibia to strengthen its own generation capabilities.

The proposed Photovoltaic Solar Facility is therefore justified as a strategic response to these national and regional energy challenges. Solar energy represents one of Namibia's most abundant natural resources, with some of the highest solar irradiation levels globally. Harnessing this resource supports national goals of reducing import dependency, enhancing energy self-sufficiency, and transitioning toward a low-carbon and climate-resilient energy sector. Additionally, the project aligns

with Namibia's commitments under regional and international frameworks, including SADC energy cooperation efforts, the Southern African Power Pool (SAPP), and global climate change mitigation goals.

The project also supports socio-economic development by creating employment opportunities, promoting infrastructure development, and stimulating economic activity in the project area. By increasing the share of renewable energy in the national mix, the project contributes to long-term sustainability, energy affordability, and reduced exposure to volatile regional electricity markets.

Project Objectives

The key objectives of the proposed PV solar project are:

- To increase Namibia's domestic electricity generation capacity
  Reduce the current ~60% dependency on imported power by contributing reliable, clean, and sustainable energy to the national grid.
- To enhance national energy security
  Strengthen Namibia's resilience to regional power shortages and supply fluctuations within the SAPP and SADC region.
- To support regional energy stability
  Contribute to SADC's collective efforts to improve power generation capacity, reduce load shedding, and promote cross-border energy cooperation.
- To promote renewable energy development in line with national policies
  Align with Namibia's Vision 2030, the National Energy Policy (2017), and the Renewable Energy Policy by expanding the renewable energy sector and reducing reliance on fossil-fuel-based imports.
- To utilise Namibia's high solar resource potential
  Leverage the country's exceptional solar irradiation to generate cost-effective and environmentally sustainable power.
- To reduce greenhouse gas emissions
  Support Namibia's climate commitments by increasing clean energy supply and reducing the carbon intensity of the national energy mix.
- To stimulate socio-economic development
  Create employment opportunities during construction and operations, support local procurement, and promote skills development.

- To diversify the national energy mix
  Increase the proportion of renewable energy sources to improve system flexibility, reduce long-term energy costs, and support grid stability.
- To contribute to long-term sustainable development
  Ensure that energy generation aligns with environmental stewardship, economic growth, and social wellbeing as outlined in the Environmental Management Act (2007).

## 1.7. Regulatory, Legal and institutional framework.

### 1.7.1. The Constitution

The Namibian Constitution provides a strong legal and policy foundation that supports the development of solar energy projects, even though it does not refer to solar energy explicitly. Its principles on natural resource management, environmental protection, economic development, and social welfare are directly relevant to renewable energy initiatives.

Article 95 of the Constitution commits the State to actively promote and maintain the welfare of the people by adopting policies aimed at sustainable development. This includes the responsible use of natural resources and the promotion of economic growth that benefits present and future generations. Solar development projects align closely with this objective, as they utilize an abundant natural resource sunlight while contributing to long-term energy security and economic resilience. Environmental protection is further reinforced under Article 91(c), which mandates the Ombudsman to investigate matters related to the overuse and degradation of natural resources. This constitutional emphasis on environmental stewardship encourages the adoption of clean energy technologies such as solar power, which have minimal environmental impact compared to fossil fuel-based generation.

The Constitution also supports equitable access to essential services. Expanding solar energy, particularly through off-grid and rural electrification projects, advances constitutional goals related to social justice and improved living standards. By enabling access to electricity in remote and underserved areas, solar projects contribute to reducing inequality and supporting human development.

### 1.7.2. Environmental Regulatory Framework

Environmental Management Act, 2007 (Act No. 7 of 2007)
The Environmental Management Act (EMA) provides the legal basis for environmental protection and sustainable development in Namibia. The Act requires that all listed activities undergo an Environmental Impact Assessment (EIA) and obtain an Environmental Clearance Certificate (ECC) prior to implementation.

Key requirements of the EMA include:

- Ensuring that proposed activities are environmentally sustainable.
- Promoting stakeholder participation.
- Identifying and mitigating environmental impacts.
- Applying the precautionary and polluter-pays principles.

Environmental Impact Assessment (EIA) Regulations, 2012 (GN No. 30 of 2012)
The EIA Regulations set out the procedures for conducting EIAs under the EMA. A photovoltaic solar power facility is a **listed activity** and therefore cannot proceed without:

- Submission of a Scoping Report and Terms of Reference.
- Completion of a full EIA after scoping.
- Issuance of an Environmental Clearance Certificate by the Environmental Commissioner.

Environmental Management Plan (EMP)
An EMP must be developed to guide mitigation, monitoring, and management of environmental and social impacts throughout the project lifecycle.

Soil Conservation Act (76 of 1969)
The soil Conservation Act makes provision for the prevention of soil erosion. It promotes the protection and up keeping the soil structure and vegetation and all-natural resources in the soil of the Republic of Namibia.

Water Act

Certification in terms of Sections 21(1) and 21(2) of the Water Act is required for the disposal of industrial or domestic wastewater and effluent. Prohibits the pollution of underground and surface water bodies (S23) (1) and Accountability for costs to be met in remedying the environment as soon as project abandonment (S23 (2).

National Climate Change Strategy and Action Plan (2013-2020)

The climate change action plan which identifies Climatic Change as a critical threat to sustainable development. Therefore, it must be addressed in a holistic manner.

Pollution and Waste Management Bill (Draft)

The draft of Pollution and waste management bill clearly defines different types of pollution. It also notifies on how the Government intends to control different types of pollution to uphold a clean and safe environment for all. The bill expresses the mandatory for everyone to comply with waste management to reduce pollution in any form. The failure to comply with the obligatory is considered as an offense which is punishable.

Waste Management Regulations: Local Authority Act (of 1992)

Waste Management Regulation: Local Authorities of 1992 provides guidelines on waste management, it mandates the occupier of properties must provide a secure, hygienic, adequate and readily accessible waste storage place or area on the premises.

### 1.7.3. Energy-Sector Regulatory Framework

Electricity Act, 2007 (Act No. 4 of 2007)

This Act regulates the electricity supply industry, licensing of electricity generation and distribution, and protection of consumers. Solar power generation facilities require:

- A generation licence issued by the **Electricity Control Board (ECB)**.
- Compliance with national technical and safety standards.

Renewable Energy Policy of Namibia (2017)

The policy promotes investment in renewable energy technologies, encourages private-sector participation, and supports Namibia's goal to reduce electricity import dependence. The proposed PV facility aligns directly with this policy.

National Integrated Resource Plan (NIRP)

The NIRP guides long-term electricity generation planning and prioritises the expansion of renewable energy, including utility-scale solar PV, to meet growing national demand.

### 1.7.4. Land Use, Planning, and Other Applicable Legislation

Communal Land Reform Act, 2002

If located on communal land, land rights must be approved by:

- The Traditional Authority
- The Communal Land Board

Land Policy

Namibia's national Land Policy 0f 1998 gives traditional authorities a role undertakes land administration with varying degrees of efficiency and legitimacy. Namibia's National Land Policy is based upon the principles enunciated in the Constitution and on the national commitment to redress the social and economic injustices inherited from the colonial past.

Article 10 of the Constitution of the Republic of Namibia states that all persons shall be equal before the law and that no one shall be discriminated against on the grounds of sex, colour, ethnic origin, religion, creed or social or economic status. In accordance with Article 95 (L) of the Constitution, this National Land Policy requires environmentally sustainable land and natural 'resource use.

Road Ordinance (19 of 1972)

The ordinance set the width of proclaimed roads and road reserve boundaries (S3.1) Infringements and obstructions on and interference with proclaimed roads. (S37.1) Distance from proclaimed roads at which fences are erected (S38) Control of traffic during construction activities on trunk and main roads (S27.1)

Public Health and Environmental Act (of 2015)
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.", Under this act, in section 119.

Township and Regional Planning Ordinance and Amendments
Projects within certain zoning schemes or regions may require planning approvals from local or regional authorities.

Forestry Act, 2001 (if vegetation clearing is required)
Permits may be required for:

- Removal of protected trees
- Clearing of large areas of vegetation

Heritage Act, 2004
If any heritage resources may be affected, the National Heritage Council must be consulted and, where necessary, issue permits.

Labour Act, 2007
Ensures occupational health, safety, and fair labour practices during construction and operation. This act emphasizes and regulates basic terms and conditions of employment, it guarantees prospective health, safety and welfare of employees and protects employees from unfair labour practices.

### 1.7.5. Institutional Context

Ministry of Environment, Forestry and Tourism (MEFT)
The key authority responsible for managing the EIA process.

- The **Environmental Commissioner** evaluates the Scoping Report, EIA Report, and EMP and issues the Environmental Clearance Certificate.

Electricity Control Board (ECB)

Responsible for:

Issuing generation licences

- Overseeing compliance with the Electricity Act
- Regulating tariffs (where applicable)

NamPower

As the national utility, NamPower may be involved depending on grid-connection requirements, purchase agreements, or transmission infrastructure.

Regional and Local Authorities

Involved in:

Land-use planning

- Development consent
- Provision of municipal services (if applicable)

Traditional Authorities / Communal Land Boards

Responsible for land permissions and endorsement if the project is situated on communal land.

Ministry of Mines and Energy (MME)

Responsible for national energy policy implementation and sector oversight.

### 1.7.6. Compliance Obligations

The proponent, **Water and Power Supply Namibia**, must ensure full compliance with:

- EMA and EIA Regulations
- Electricity Act licensing requirements
- Renewable energy and national planning policies
- Land, heritage, forestry, and labour legislation
- Conditions of the Environmental Clearance Certificate
- Provisions of the Environmental Management Plan (EMP)

### 1.7.7. Applicable IFC Performance Standards.

The proposed Photovoltaic Solar Facility may seek financing from international development institutions, commercial lenders, or private investors who require compliance with global environmental and social (E&S) standards. The International Finance Corporation (IFC) Performance Standards (2012) and the World Bank Group Environmental, Health and Safety (EHS) Guidelines provide the benchmark used globally for identifying, assessing, and managing E&S risks for large infrastructure projects.

While Namibia's Environmental Management Act (2007) and EIA Regulations (2012) form the national regulatory foundation, the IFC Performance Standards (PS) ensure that the project is aligned with international best practice, improves social accountability, enhances environmental sustainability, and strengthens long-term project bankability.

The following IFC Performance Standards are applicable to the proposed solar PV development:

a) **IFC Performance Standard 1: Assessment and Management of Environmental and Social Risks and Impacts**

Relevance to the Project:
PS1 is the core standard that underpins the entire EIA and environmental management process. For this solar facility, PS1 requires:

- A robust Environmental and Social Assessment (Scoping + EIA)
- Development of an Environmental & Social Management System (ESMS)
- Identification of key risks (biodiversity, land use, community safety, labour issues, pollution, waste, etc.)
- Meaningful stakeholder engagement
- A functioning Grievance Redress Mechanism
- A detailed Environmental and Social Management Plan (ESMP)

### b) IFC Performance Standard 2: Labour and Working Conditions

Relevance to the Project:
Construction and operation will involve multiple categories of workers. PS2 requires the project to:

- Ensure safe working conditions and conform to OHS best practice
- Prevent discrimination, child labour, or forced labour
- Provide contracts and fair working terms
- Implement worker accommodation standards (if camps are used)
- Establish a workers' grievance mechanism
- Protect workers from hazardous exposure (electrical hazards, heat stress, heavy machinery)

### c) IFC Performance Standard 3: Resource Efficiency and Pollution Prevention

Relevance to the Project:
Solar facilities can generate pollution and resource pressures if not well managed. Under PS3 the project must:

- Minimise water consumption, especially for panel cleaning
- Prevent soil erosion, dust, and stormwater contamination
- Manage hazardous materials (e.g., oils, batteries, electrical components)
- Prevent pollution from construction activities
- Ensure proper handling and disposal of e-waste and PV modules at end of life
- Monitor energy efficiency and potential GHG emissions reductions

### d) IFC Performance Standard 4: Community Health, Safety, and Security

Relevance to the Project:
Local communities may be affected by construction activities, project traffic, or electrical infrastructure. PS4 requires:

- Management of traffic risks and road safety
- Fire prevention and emergency preparedness
- Safe installation of electrical lines and substations
- Management of security personnel to avoid human rights violations

- Prevention of exposure to hazardous materials
- Development of a Community Health & Safety Plan

**e) IFC Performance Standard 5: Land Acquisition and Involuntary Resettlement**

Relevance to the Project:
If the solar facility requires land previously used by communities (farming, grazing, harvesting), PS5 applies. Requirements include:

- Avoiding physical and economic displacement where possible
- Fair compensation for affected land rights holders
- Documented agreements with Land Boards or Traditional Authorities
- Livelihood restoration where income sources are affected
- Transparent consultation and engagement with affected households

Even where displacement does not occur, PS5 requires documentation proving that no adverse impact on land rights occurs.

**f) IFC Performance Standard 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources**

Relevance to the Project:
Solar PV facilities affect natural ecosystems through land clearing, fencing, and infrastructure. PS6 requires:

- Biodiversity baseline studies
- Protection of sensitive ecosystems and species
- Identification of avifauna collision risks on transmission lines
- Application of the mitigation hierarchy (avoid → minimise → restore → offset)
- No Net Loss (or Net Gain) for critical habitats, if applicable
- Conservation action plans where needed

### g) IFC Performance Standard 7: Indigenous Peoples

Relevance to the Project:
This applies if the project interacts with Indigenous communities (e.g., San populations) or affects their traditional land. Requirements include:

- Culturally appropriate engagement
- Free, Prior, and Informed Consent (FPIC) if significant impacts occur
- Protection of traditional cultural practices
- Avoiding restrictions on land and resource access
  If indigenous groups are not present or affected, this standard may not apply.

### h) IFC Performance Standard 8: Cultural Heritage

Relevance to the Project:
Solar developments can disturb archaeological or cultural resources. Under PS8 the project must:

- Conduct a heritage screening and, where needed, a specialist study
- Implement a Chance-Find Procedure during ground disturbance
- Engage with the National Heritage Council
- Protect sites of cultural or spiritual significance

1.7.8. Other Relevant IFC and World Bank Group Guidelines

In addition to the Performance Standards, the project should comply with the following EHS Guidelines:

### i) World Bank Group EHS General Guidelines (2007)

Applicable to all infrastructure projects. These guidelines provide requirements for:

- Environmental management
- Occupational health and safety
- Community health and safety
- Waste and pollution control
- Construction and decommissioning practices

**j) EHS Guidelines for Renewable Energy – Solar Power Projects (2015)**

Highly relevant and specific to utility-scale PV projects. This guideline covers:

- Design and layout of solar arrays
- Glare and reflectivity issues
- Land clearing and soil management
- Drainage and stormwater management
- Fire risks associated with electrical equipment
- PV module handling, storage, and disposal
- Battery storage risks (if applicable)
- Protection of wildlife and ecosystems

**k) EHS Guidelines for Electric Power Transmission & Distribution (2007)**

Applicable if the project includes:

- A transmission line
- A substation
- Grid injection infrastructure

Topics include:

- Electromagnetic fields (EMFs)
- Avifauna protection (markers, line design)
- Electrical safety
- Right-of-way management

1.7.9. SADC and Regional Guidelines

**l) SADC Protocol on Energy**

Encourages regional integration, renewable energy promotion, and harmonisation of regulatory frameworks across member states.

**m) Southern African Power Pool (SAPP) Guidelines**

Relevant where grid integration requires compliance with regional power system stability requirements.

## 1.8. EIA Process

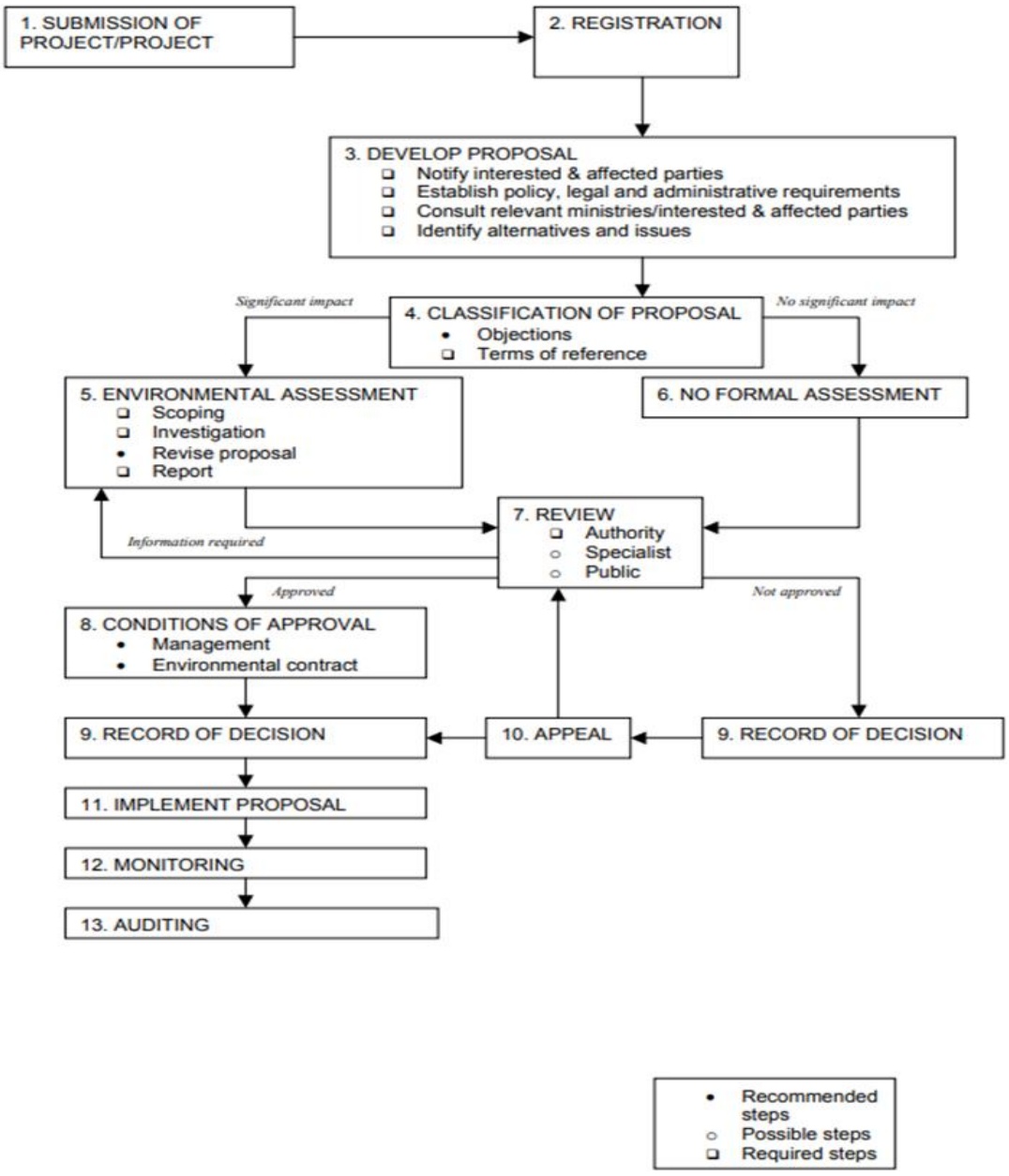


Figure1. EIA Process

# 2. PROJECT DESCRIPTION

## 2.1. Project Description and location.

Project title: Proposed 300 MW Liselo Solar and Storage Facility

Site location: Liselo, Zambezi Region,

17˚30’31.65’’S. 24˚09’08.47’’E

Description: The proposed development involves the establishment of a 300 MW (AC) solar photovoltaic (PV) power generation facility with an integrated Battery Energy Storage System (BESS) and associated supporting infrastructure. The facility will be developed on a designated site to harness solar energy for conversion into electricity, which will be supplied to the national grid.

The proposed project will consist of ground-mounted PV module arrays, inverters, transformer stations, and a 132 kV on-site substation. The BESS will be housed in purpose-built enclosures to store surplus electricity for dispatch during peak demand periods, enhancing grid stability and energy reliability. Ancillary infrastructure will include internal access roads, security fencing, operations and maintenance buildings, cabling (both overhead and underground), drainage and stormwater controls, and connection infrastructure to the nearest grid point.

The purpose of the project is to generate renewable electricity to contribute to the national energy mix, reduce dependence on fossil fuels, and support national decarbonization and energy security goals. Environmental sensitivities, such as biodiversity, soil, water, and heritage resources, will be carefully considered during the assessment and design phases to minimize impacts.

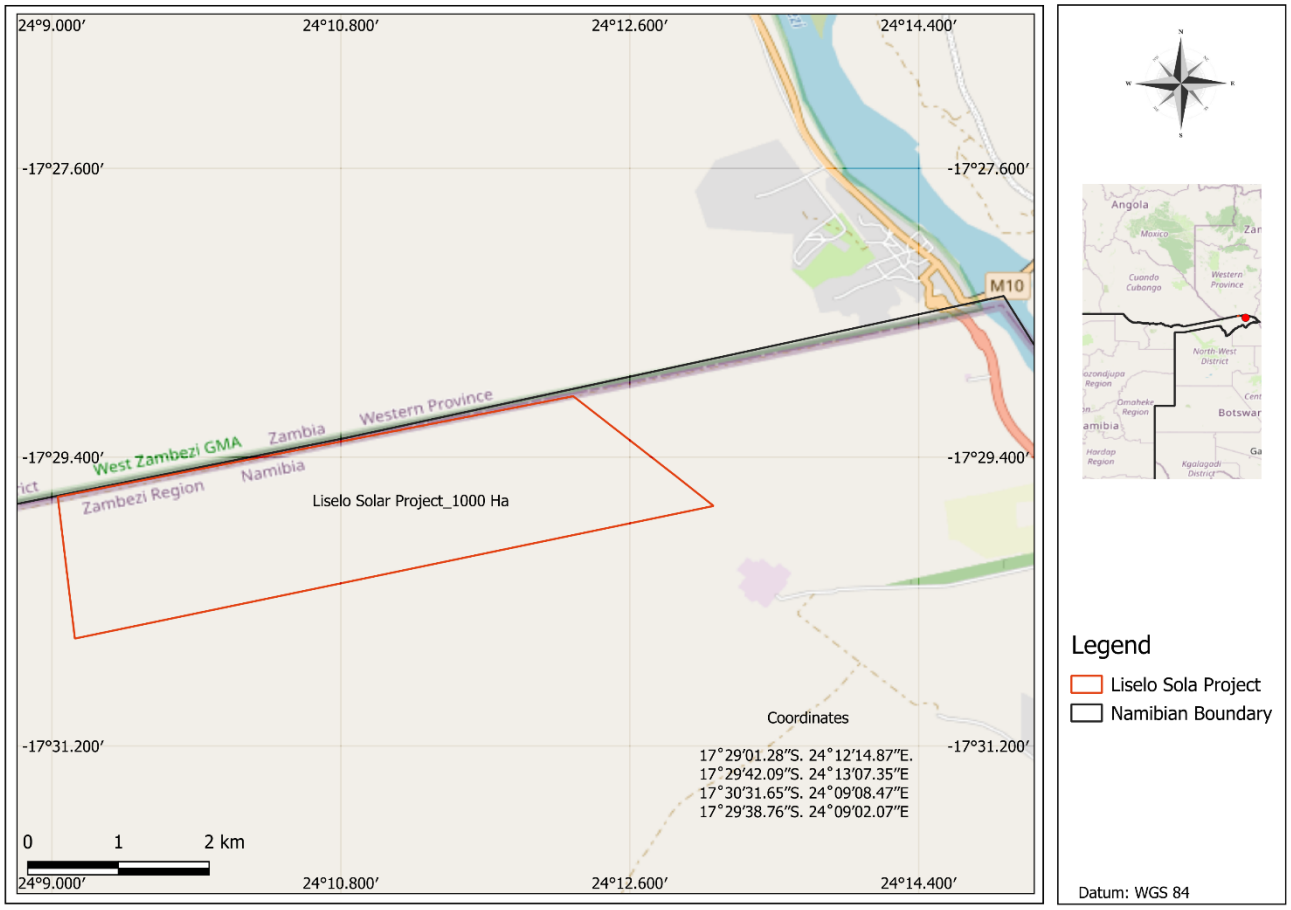


Figure 2. Locality Map

## 2.2. Project Components, Phases, and Activities (Pre-construction, Construction, Operation, Decommissioning).

Table 1. Project Phases and Activities

| Phase | Objectives | Key Activities |
|---|---|---|
| | | |
| **1. Pre-Construction** | Prepare the site for safe and efficient construction while minimizing environmental and social impacts | a) Site Clearing and Debushing (Four Tiers)<br>- Tier 1 – Perimeter Clearing: Remove invasive species, shrubs, and vegetation along site boundary for access and demarcation<br>- Tier 2 – Access Roads/Internal Tracks: Clear corridors for vehicles, equipment, and materials<br>- Tier 3 – Panel Arrays/Substation Footprint: Targeted clearing within panel and substation areas<br>- Tier 4 – Ancillary Facilities: Clear storage yards, worker camps, water and waste facilities<br>b) Perimeter Fencing<br>- Erect fencing with controlled access gates<br>- Include wildlife passages and safety signage |
| **2. Construction** | Build the solar plant infrastructure in a structured and safe manner | **Phase 1** – Civil Works: Grading, leveling, access roads, drainage, foundations, erosion control<br>**Phase 2** – Mechanical & Structural Installation: Install mounting structures, place panels, alignment checks, transformers/inverters/cabling<br>**Phase 3** – Electrical Works & Grid Connection: Substation completion, grid interconnection, testing, commissioning |

| | | |
|---|---|---|
| **3. Operations & Maintenance (O&M)** | Ensure efficient energy generation, safety, and long-term reliability | - Routine inspections of panels, inverters, transformers<br>- Regular panel cleaning (manual or automated)<br>- Vegetation management to prevent shading/fire risk<br>- Continuous monitoring via SCADA systems<br>- Repairs and component replacements |
| **4. Decommissioning** | Safely dismantle the solar facility and rehabilitate the site | - Dismantle panels, mounting structures, inverters, transformers, and cabling<br>- Transport materials for recycling or licensed disposal<br>- Refill, regrade, and replant native vegetation<br>- Remove temporary facilities, access roads, and fencing if not needed<br>- Conduct environmental monitoring post-decommissioning |

## 2.3. Materials, technologies, and inputs required.

The development of a photovoltaic (PV) solar project in the Liselo area of the Zambezi Region will require a range of materials, technologies, and operational inputs consistent with industry best practice and local environmental conditions.

### 2.3.1. Materials

Table 2. Materials

| Category | Material/Description |
|---|---|
| **Photovoltaic (PV) Modules** | High-efficiency silicon-based solar panels (monocrystalline or equivalent), suitable for high-temperature and high-irradiation environments |
| **Mounting Structures** | Galvanized steel or aluminium support structures; fixed-tilt or single-axis tracking systems; designed for local wind loads and seasonal weather |
| **Foundations** | Concrete or driven pile foundations for panel structures, inverter stations, and substations |
| **Electrical Cabling** | DC and AC cables, earthing conductors, cable trays; compliant with international and Namibian electrical standards |
| **Inverters and Transformers** | Central or string inverters; step-up transformers for voltage conversion and grid connection |
| **Substation Components** | Switchgear, protection systems, meters, and control equipment |
| **Perimeter Fencing and Security** | Fencing materials, gates, CCTV systems, and lighting for site security |
| **Access Infrastructure** | Gravel or paved access roads and internal tracks |
| **Water Storage and Supply Materials** | Tanks, pipes, and fittings for panel cleaning and construction use |

### 2.3.2. Technologies

Table 3: Technologies

| **Category** | **Technology / Description** |
|---|---|
| **PV Generation Technology** | Utility-scale photovoltaic systems optimized for high solar irradiation conditions |
| **Inverter Technology** | Grid-compliant inverters with anti-islanding protection and remote monitoring capability |
| **Monitoring & Control Systems** | SCADA systems for real-time performance monitoring, fault detection, and reporting |

| | |
|---|---|
| **Energy Management & Protection Systems** | Relays, breakers, and surge protection devices for safe operation |
| **Cleaning Systems** | Manual or semi-automated panel cleaning technologies adapted to dusty conditions |
| **Grid Interconnection Technology** | Transmission lines, substations, and communication systems for integration into the national grid |

2.3.3. Inputs

Table 4. Inputs

| **Category** | **Inputs / Description** |
|---|---|
| **Land** | Suitable land with secure tenure and appropriate zoning |
| **Water** | Limited quantities for construction activities and periodic panel cleaning |
| **Labor** | Skilled and semi-skilled workforce; opportunities for local employment |
| **Fuel & Electricity** | Diesel or other fuels for construction machinery and temporary power supply |
| **Construction Equipment** | Earth-moving machinery, cranes, pile drivers, trucks, lifting equipment |
| **Permits & Approvals** | Environmental clearance, generation licenses, grid connection approvals, land-use permits |
| **Logistics & Transport** | Transportation of equipment and materials to the site, including cross-border imports if needed |

These materials, technologies, and inputs are typical of utility-scale photovoltaic projects in Namibia and the Southern African region and will be selected to ensure technical reliability, environmental compatibility, and compliance with national regulations and international best practice.

## 2.4. Project outputs, products, or services.

The Liselo Solar Project is expected to deliver the following key outputs, products, and services over its lifecycle:

### 2.4.1. Electricity generation (primary output)

Clean, renewable electricity generated from photovoltaic solar technology. Power supplied to the national grid and/or local distribution network, contributing to energy security in the Zambezi Region and Namibia as a whole.

### 2.4.2. Renewable energy capacity addition

Installation of new utility-scale solar generation capacity, increasing Namibia's domestic electricity production. Contribution toward national renewable energy and climate change mitigation targets.

### 2.4.3. Reduction in greenhouse gas emissions

Displacement of fossil fuel–based electricity and imported power, resulting in reduced carbon dioxide and other greenhouse gas emissions.

### 2.4.4. Grid support and energy reliability

Improved stability and reliability of electricity supply in the Zambezi Region. Potential support for peak demand periods, depending on system configuration.

### 2.4.5. Local economic and social benefits

Temporary and permanent employment opportunities during construction, operation, and maintenance. Skills development and knowledge transfer to local workers and contractors.

#### 2.4.6. Energy services for development

Enhanced availability of electricity to support local economic activities, public services, and infrastructure development. Potential to support rural electrification and improved quality of life in surrounding communities.

#### 2.4.7. Technology and infrastructure development

Deployment of modern solar PV technology, grid infrastructure, and monitoring systems. Strengthening of regional energy infrastructure and technical capacity.

#### 2.4.8. Long-term sustainable energy service

Provision of a reliable, low-impact energy service over the project's operational lifespan (typically 25-30 years). Overall, the Liselo Solar Project will provide clean electricity as its core product, while also delivering broader environmental, economic, and social services that support sustainable development in the Zambezi Region and Namibia.

## 2.5. Project Alternatives

### 2.5.1. Location

The current location proposed for the Liselo Solar Project is considered the most suitable and preferred option when assessed against technical, environmental, and socio-economic criteria.

The project site is strategically located near the existing power station in the Zambezi Region, which presents a major advantage for the development of a solar power facility. The proximity to existing electrical infrastructure significantly reduces the need for extensive new transmission lines, thereby lowering construction costs, minimizing land disturbance, and reducing potential environmental and social impacts associated with long-distance power transfer. The close location also facilitates efficient connection, transfer, and distribution of electricity into the regional grid, improving overall system reliability.

In terms of accessibility, existing road infrastructure is already available in the project area. While some sections may require upgrading to accommodate construction vehicles and equipment, the presence of roads eliminates the need for constructing entirely new access routes. This reduces land clearing, soil disturbance, and associated environmental impacts, while also improving logistical efficiency during both the construction and operational phases.

The site is also located close to the Zambezi River, which provides a potential water source should limited quantities of water be required during construction (e.g., for dust suppression

### 2.5.2. No-go Areas

A comprehensive review of environmental, cultural, and land-use constraints was undertaken to determine whether any no-go areas exist within or adjacent to the proposed Liselo Solar Project site. No-go areas are typically defined as locations where development is legally restricted or environmentally unacceptable due to the presence of sensitive ecological features, cultural heritage resources, or protected land designations.

#### Cultural and Heritage Resources

Desktop studies, consultation with available heritage registers, and preliminary site assessments indicate that no known cultural, archaeological, or historical heritage sites have been identified within the proposed project footprint or its immediate surroundings. The area does not fall within any zone designated under the National Heritage Act, 2004, and no declared monuments, graves, sacred sites, or historical structures are recorded in the vicinity. As such, the project does not conflict with nationally protected heritage resources, and the likelihood of impacting cultural heritage is considered low.

#### Protected and Conservation Areas

The proposed Liselo Solar Project site is not located within or adjacent to any proclaimed protected areas, such as national parks, conservancies, forest reserves, or community conservation areas. There are also no internationally recognised conservation areas (including Ramsar wetlands, Important Bird Areas, or biodiversity hotspots) overlapping the site. This significantly reduces the risk of adverse

impacts on sensitive ecosystems or conservation-priority species.

Ecological Sensitivity

The project area is situated on previously undeveloped land with low ecological sensitivity, characterised by common vegetation types typical of the Zambezi Region. No rare, endemic, or threatened plant or animal species have been identified as being dependent on the site. The absence of wetlands, riparian buffers, or critical wildlife corridors within the project footprint further supports the conclusion that the area does not qualify as a no-go zone from an ecological perspective.

Land Use and Community Constraints

The site is not currently used for agriculture, settlement, or grazing, and no competing land uses of social or economic significance have been identified. The land is free of active livelihoods or community infrastructure, thereby minimising the risk of displacement, land-use conflict, or loss of community resources. Additionally, the area does not overlap with communal land allocations or traditional land claims that would restrict development.

Regulatory Compliance

Based on current information, the site complies with national environmental and land-use legislation, and no statutory exclusions apply that would prohibit the development of a solar energy facility. Consequently, there are no legal or regulatory no-go constraints associated with the selected location

## 3. LAND OWNERSHIP AND PROJECT TENURESHIP

The project site is owned by the Mafwe Traditional Authority and will remain under its ownership throughout the project lifecycle. The land will be leased to Water and Power Supply Namibia (Pty) Ltd for the purpose of developing and operating the solar project. The lease agreement between Mafwe Traditional Authority and Water and Power Supply Namibia (Pty) Ltd will be for a period of 25 years, corresponding with the anticipated operational lifespan of the project. Upon expiry of the lease, land use and tenure arrangements will be subject to the terms and conditions agreed upon

between the Mafwe Traditional Authority and Water and Power Supply Namibia (Pty) Ltd.

# 4. NEED AND DESIRABILITY

## 4.1. Strengthening National Energy Security and Reducing Import Dependence

Namibia remains highly dependent on imported electricity, with imports historically covering roughly 60% of consumption, primarily from South Africa's Eskom and other Southern African Power Pool (SAPP) partners. This makes the country vulnerable to external supply shocks, contractual uncertainties, price volatility, and regional power shortages.

- Imports are costly and expose Namibia's economy to high electricity tariffs.
- Major power purchase agreements (such as with Eskom) are subject to renegotiation and expiration, creating future supply risks.
- A local solar facility would generate clean electricity domestically, reducing reliance on imports, stabilizing supply, and supporting long-term energy independence.

## 4.2. Mitigating Vulnerability to Regional Power Crises

South Africa's power sector has experienced periodic generation challenges, financial constraints, and reliability issues, which affect the stability of imports. Although recent agreements have improved supply security, the situation remains sensitive to maintenance issues, load shedding, and fluctuating generation capacity.
Energy News Africa Plus

By diversifying the supply mix with solar generation in the Zambezi Region, Namibia can buffer itself against external disruptions and foster resilience in national electricity delivery.

## 4.3. Utilizing Abundant Solar Resources

Namibia has world-class solar irradiation potential, making utility-scale PV projects highly efficient and cost-effective. Solar power can generate clean, sustainable energy with minimal operational fuel costs, unlike imported coal-based electricity or expensive long-distance grid supply.

This advantage is particularly suitable for the Zambezi Region, which receives high solar insolation and can host large PV installations.

## 4.4. Supporting Regional Economic and Social Development

- A solar plant in the Liselo area offers tangible local development benefits, such as:
- Job creation during construction and operations.
- Skills transfer and local capacity building.
- Improved electricity access for communities in a region that traditionally has limited local generation capacity.
- ESME and local developmental support

These economic gains improve livelihoods and help drive broader regional development.

## 4.5. Strategic Border Location Benefits

The Zambezi Region's location near international borders positions it strategically for cross-border energy opportunities:

- It can serve as a solar energy hub that supports regional grid stability and potential future export of renewable energy.
- It aligns with broader SAPP integration goals that encourage renewable generation and power trading across Southern Africa.

Proximity to neighboring markets could facilitate economies of scale and shared infrastructure development, strengthening regional energy cooperation.

## 4.6. Aligning with National Renewable Energy Goals

Namibia's energy policy aims to increase renewable generation capacity, reduce import dependency, and support sustainable development. Planned solar IPP projects including those in regions such as Zambezi form part of this strategy, demonstrating government commitment to renewables.

A solar facility in the Liselo area supports national objectives to:

- Expand solar generation capacity.
- Lower electricity costs over time by reducing reliance on imported power.
- Align with climate commitments and carbon reduction pathways

# 5. BASELINE ENVIRONMENTAL AND SOCIAL CONTEXT

## 5.1. Physical environment (climate, rainfall, temperature, topography, soil, surface and ground (Hydrogeology), air quality

### 5.1.1. Climate

The Liselo area, located within Namibia's Zambezi Region, experiences a tropical savanna climate characterized by distinct wet and dry seasons. The wet season runs from November to March/April, during which most of the region's rainfall occurs, influenced by the Intertropical Convergence Zone and convective storms typical of the sub-tropics. Annual rainfall in the region generally ranges between 600 mm and 1,000 mm, making it the wettest part of Namibia compared to the national average of less than 250 mm.

Temperatures are consistently warm to hot year-round. Daytime highs frequently exceed 30-35 °C, especially in the late dry season (October-December), while cooler months (May-August) see temperatures around 20-28 °C during the day. Nighttime temperatures in the dry season can drop to around 10 °C or lower. Humidity is relatively high, particularly during the rainy months, but declines in the dry season.

### 5.1.2. Rainfall and Hydrology

Rainfall in the Liselo area is highly seasonal and variable in intensity, with the heaviest rainfall occurring between December and March. This rainfall contributes to flooding of adjacent floodplains and wetlands, fed by the broader Zambezi Basin's hydrology. Major rivers in the region the Zambezi, Kwando, Linyanti, and Chobe-create a network of perennial and seasonal watercourses that recharge floodplains and support rich surface water dynamics.

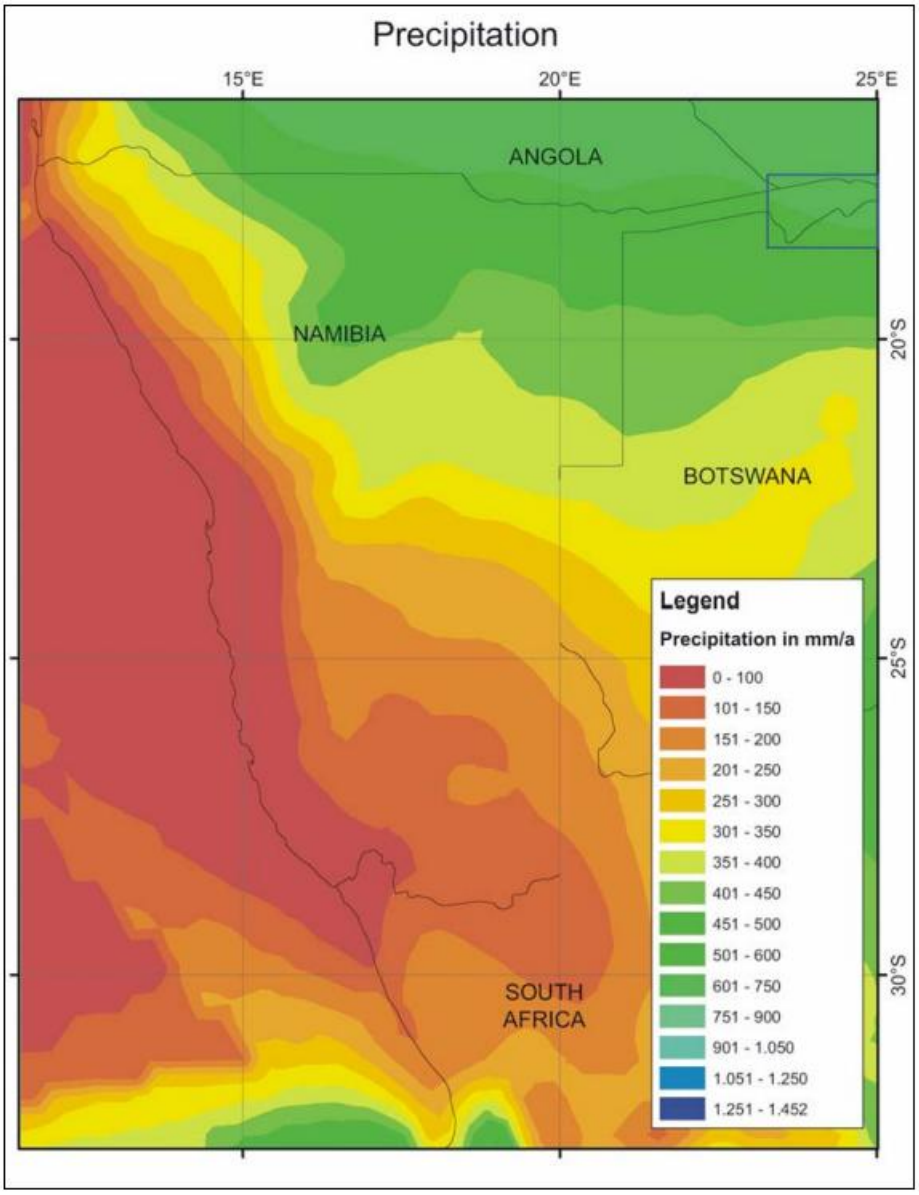


Figure 3. Spatial Rainfall Distribution in Namibia.

### 5.1.3. Flooding

The Atlas of Namibia (compiled by John Mendelsohn, Alice Jarvis, Carole Roberts & Tony Robertson), which includes broad hydrological and environmental maps for the Caprivi/Zambezi Region, shows that the Zambezi River's floodplain including towns and rural settlements near Katima Mulilo and Liselo lies within a flood-prone landscape. Although the Atlas is a broad-scale source, it is based on extensive, systematic environmental data and longstanding field knowledge of

the region's hydrology and ecology. The specific area where the project is intended seems to be in a low flood risk area.

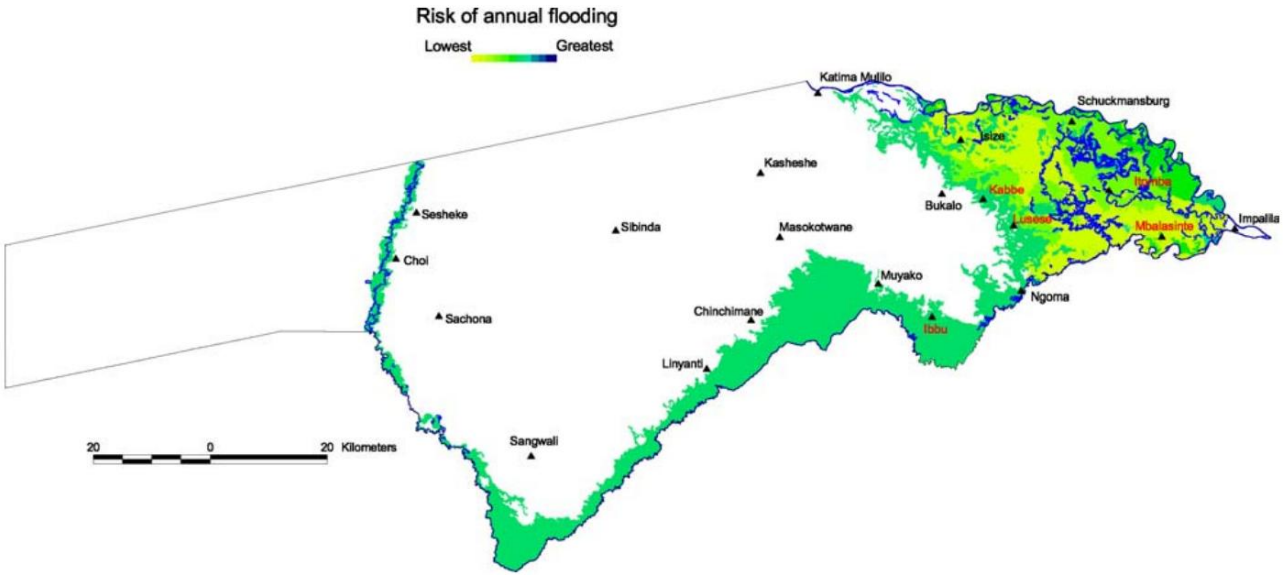


Figure 4. Annual Flood Risk Map

### 5.1.4. Topography

From a topographical and geological point of view, Caprivi/Zambezi region lies almost at the bottom of a vast sand pit, more formally known as the Kalahari Basin. The landscape of Liselo and the broader Zambezi Region is predominantly flat to gently undulating, reflecting its position within the Zambezi River floodplain system. Elevations typically range from about 930 m to 1,100 m above sea level, with the terrain sloping gently from west to east. Extensive floodplains, wetlands, and marshy lowlands dominate the geography, interspersed with woodland savanna and grassland. Seasonal flooding during the wet season affects broad areas, creating saturated soils and surface water bodies.

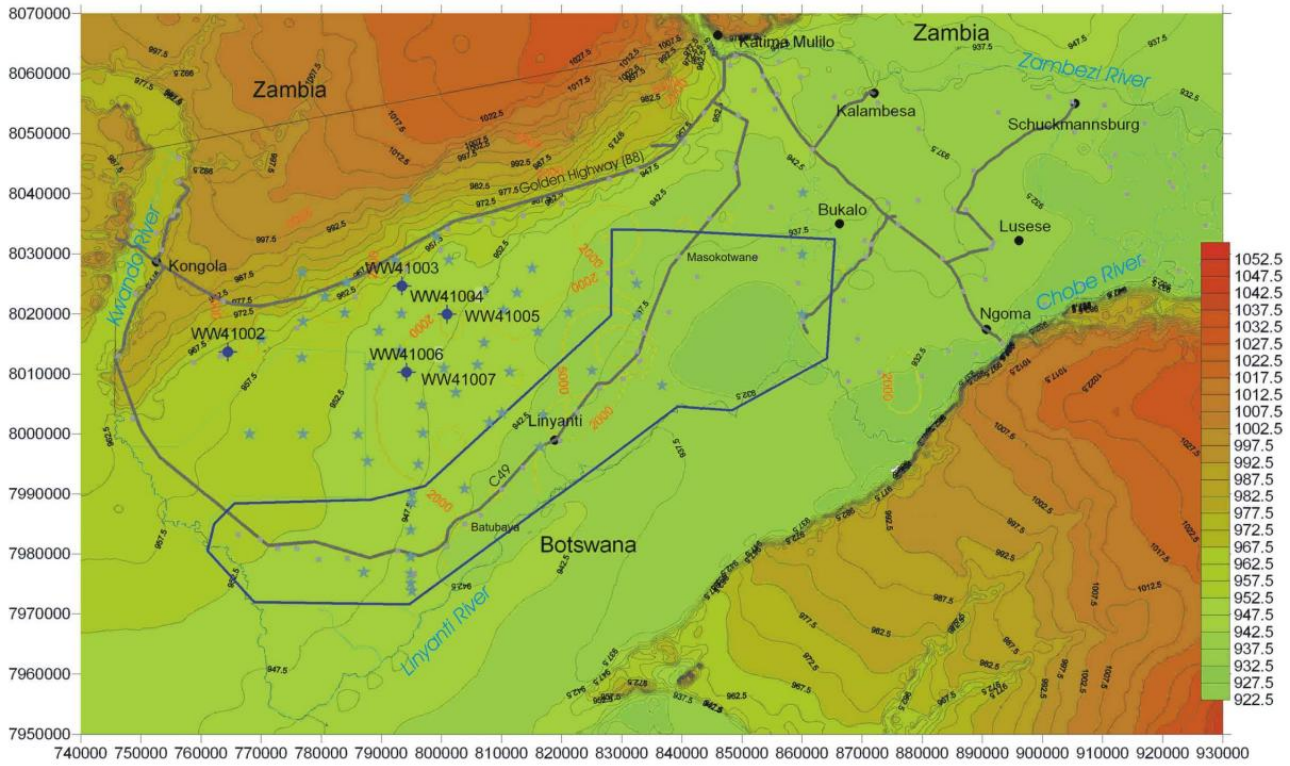


Figure 5. General Topography.

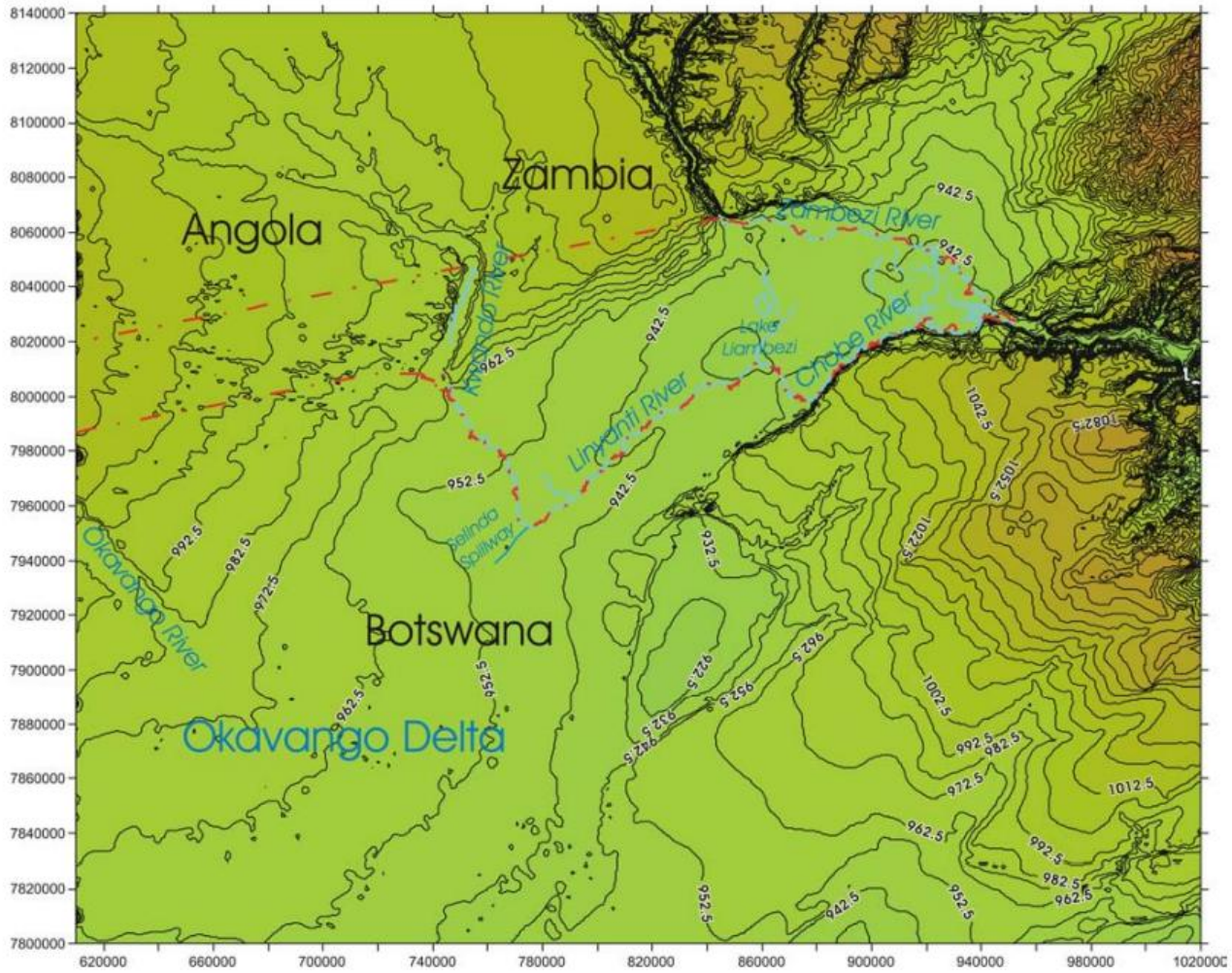


Figure 6. Topographical Gradient

### 5.1.5. Soils

Soil conditions in the Liselo area are influenced by the region's hydrological and climatic regime.

According to the Atlas of Namibia (MENDELSOHN et al., 2002), arenosols are dominating in the western part of the Eastern Caprivi Region whereas fluvisols predominantly occur in its eastern part (Figure 7). Soil texture is clayey in the lowlying areas and sand content generally increases with elevation .

In much of the central part of the Eastern Caprivi the soils consists of clayey loam. Therefore possibilities for infiltration are low. Since at the same time evaporation mostly exceeds rainfall, it is very likely that groundwater recharge over much of the Eastern Caprivi is negligible.

Kalahari sands: Widespread across much of the region, these sandy soils have low water retention and are typically nutrient-poor, common to much of northeastern Namibia.

Hydromorphic and alluvial soils: Along river corridors and floodplains, soils tend to be fertile clay loams and fluvisols, enriched by periodic alluvial deposition. These soils support richer vegetation growth and floodplain agriculture.

The combination of sandy and clay-rich soils affects water infiltration, groundwater recharge, and suitability for agriculture and infrastructure.

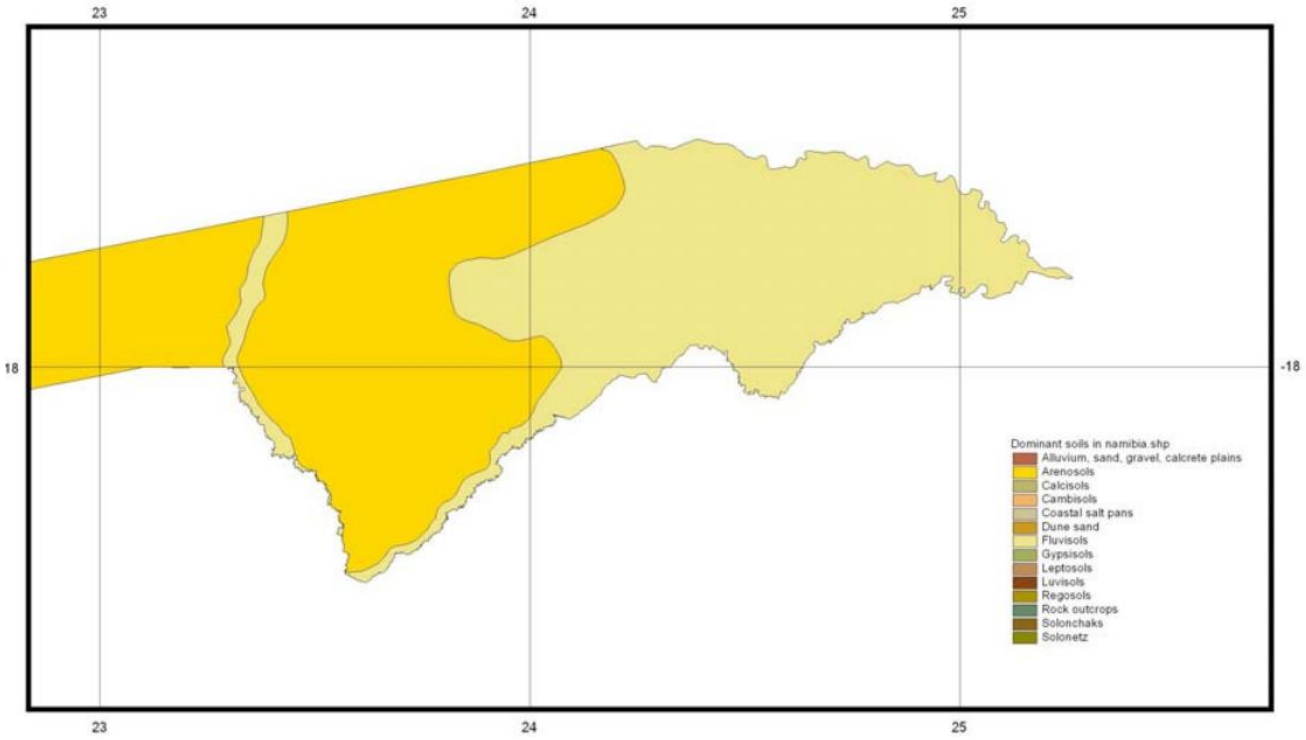


Figure 7. Dominant Soil Types.

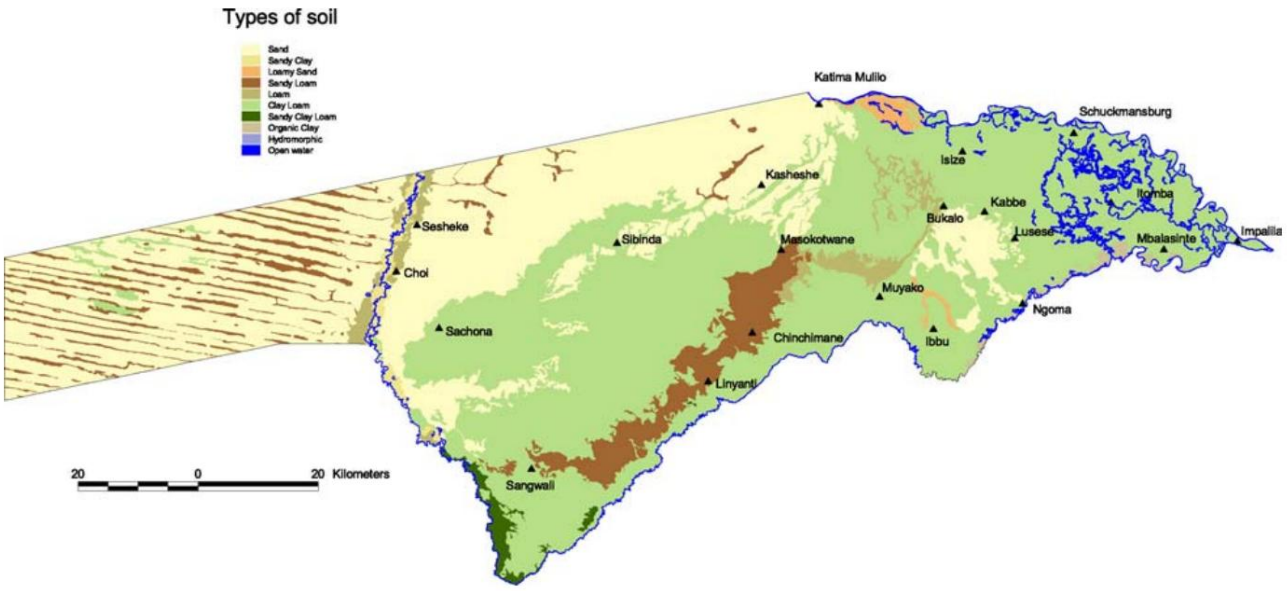


Figure 8. Types of Soils

### 5.1.6. Surface and Groundwater (Hydrogeology)

Surface water is abundant relative to other Namibian regions due to perennial rivers and seasonal floodwaters. The Zambezi Basin's river systems contribute to extensive wetlands and floodplain inundation, which provides important ecological services and temporary surface water storage. Flood peaks typically occur shortly after the peak rainy season and may inundate wide areas.

Groundwater conditions in the broader region are complex. The superficial aquifers are generally associated with Kalahari sand deposits, which may have low infiltration potential due to clayey layers, limiting groundwater recharge in places. Groundwater may be available from deeper alluvial deposits near rivers, but detailed hydrogeological data for the Liselo area specifically are limited.

### 5.1.7. Geology

The geology of the Liselo area near Katima Mulilo in the Zambezi Region (formerly Caprivi Strip) is strongly influenced by superficial sedimentary deposits and regional sedimentary cover, rather than by exposed ancient bedrock. Although detailed bespoke geological maps from the Geological Survey of Namibia (GSN) for Liselo are limited, multiple environmental and geological baseline reports provide a clear understanding of the underlying geology typical for this part of northeastern Namibia.

## Geology and Sedimentary Cover

### Dominance of Kalahari Sequence Deposits

The Liselo area lies within the Kalahari Basin, and the geology is principally comprised of unconsolidated Kalahari Sequence sediments that overlie older rock units. These sediments form a thick blanket of sands, gravels, and minor clay horizons that cover most of the landscape, extending across the floodplains and upland terraces.

Kalahari sands: Fine- to coarse-grained, sub-angular quartz-rich sands dominate the near surface, often up to 30 m or more in thickness. These aeolian sands are generally off-white to reddish where iron staining occurs but are clay-poor in the uppermost horizons.

Duricrusts and calcretes: Hardpan or calcrete layers may occur locally within the sequence, indicative of past arid conditions that cemented sediments near the surface.

Alluvium and lacustrine deposits: In proximity to the Zambezi River and smaller tributaries, recent alluvial sediments, including fine sands, silts, and clays, are present in floodplain settings. These result from episodic river flooding and sediment deposition over the Quaternary period.

### Pleistocene Fluvial Gravels

Localized coarse pebbly gravels in the upper sedimentary layers are linked to ancient river channels, likely related to paleo-Zambezi fluvial systems active during the Pleistocene. These gravels are typically less than 0.5 m thick and represent reworked, older alluvial deposits.

### Underlying Older Sedimentary Units (Karoo Sequence)

While not widely exposed at the surface, the Karoo Sequence including units such as the Kalkrand Formation is thought to underlie the thick Kalahari cover at depth. These older sediments are more consolidated and may influence deeper groundwater flow and aquifer properties.

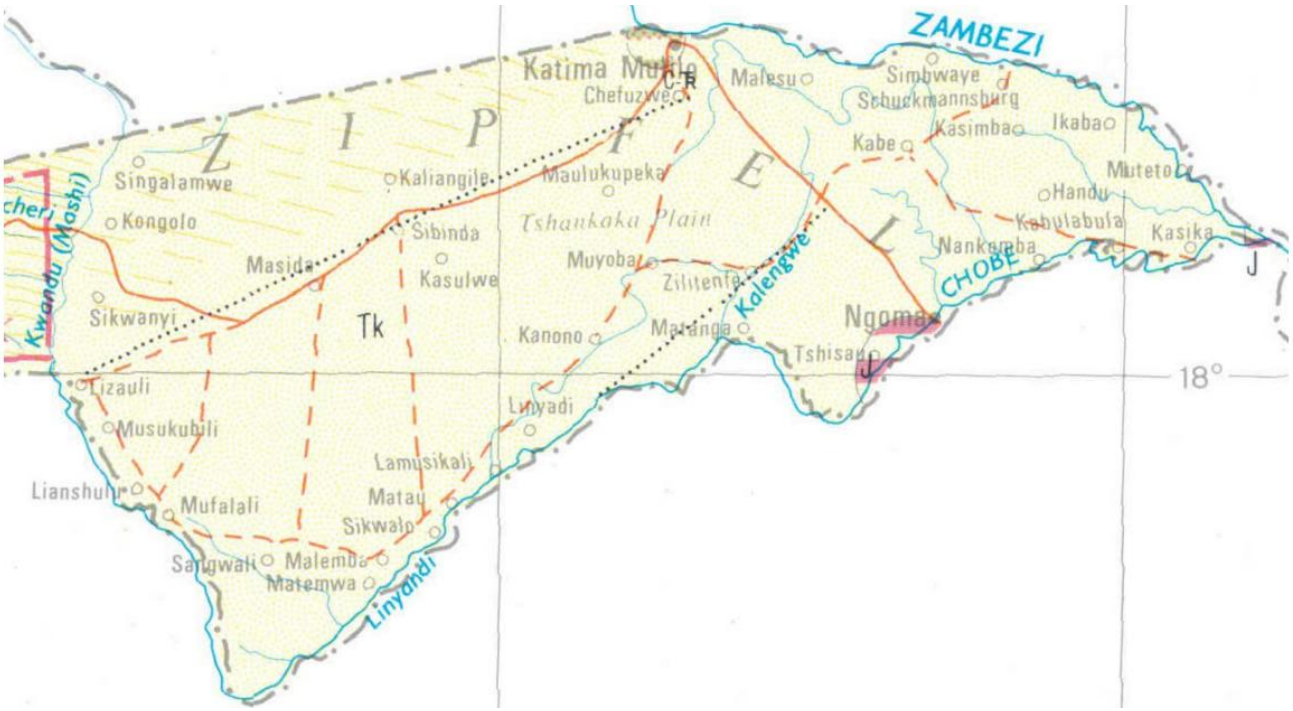


Figure 9. Geological set up based on (1:1000,000 Geological Map of Namibia 1980).

### 5.1.8. Air Quality

The Zambezi Region, including the Liselo area, is predominantly rural with minimal heavy industry. As a result, background ambient air quality is generally good, with few persistent sources of industrial air pollutants. Occasional local emissions may arise from dust during dry, windy conditions, agricultural burning, and biomass cooking or heating in villages. These are typically intermittent and localized rather than chronic or severe. No major urban air quality monitoring stations exist in the immediate Liselo area, but rural conditions generally result in low baseline pollutant concentrations.

## 5.2. Biological environment (flora, fauna, Avifauna, Reptiles,).

### 5.2.1. Flora (Vegetation)

The Zambezi Region, including Liselo area, is one of Namibia's most biologically diverse areas due to its tropical savanna climate, high rainfall, and riverine systems. The area supports a mix of vegetation types including riverine forests, woodlands, floodplain grasses, and savanna.

Common vegetation communities and species include:

Riverine and riparian forests along the Zambezi River and tributaries, dominated by large hardwood trees. Woodland and savanna species such as African teak (Pterocarpus angolensis), Burkea (Burkea africana), Jackalberry (Diospyros mespiliformis), Mopane (Colophospermum mopane), camel-thorn (Acacia erioloba), and silver cluster-leaf (Terminalia sericea). Other indigenous trees and palms include Makalani palm (Hyphaene petersiana), sausage tree (Kigelia africana), and baobab (Adansonia digitata).

Grasses and floodplain vegetation flourish in seasonally inundated areas, especially near river channels, wetlands, and floodplain soils, providing high productivity during the wet season. This diverse vegetation structure provides habitat and resources for a wide range of animal species and contributes to the ecological complexity of the region.

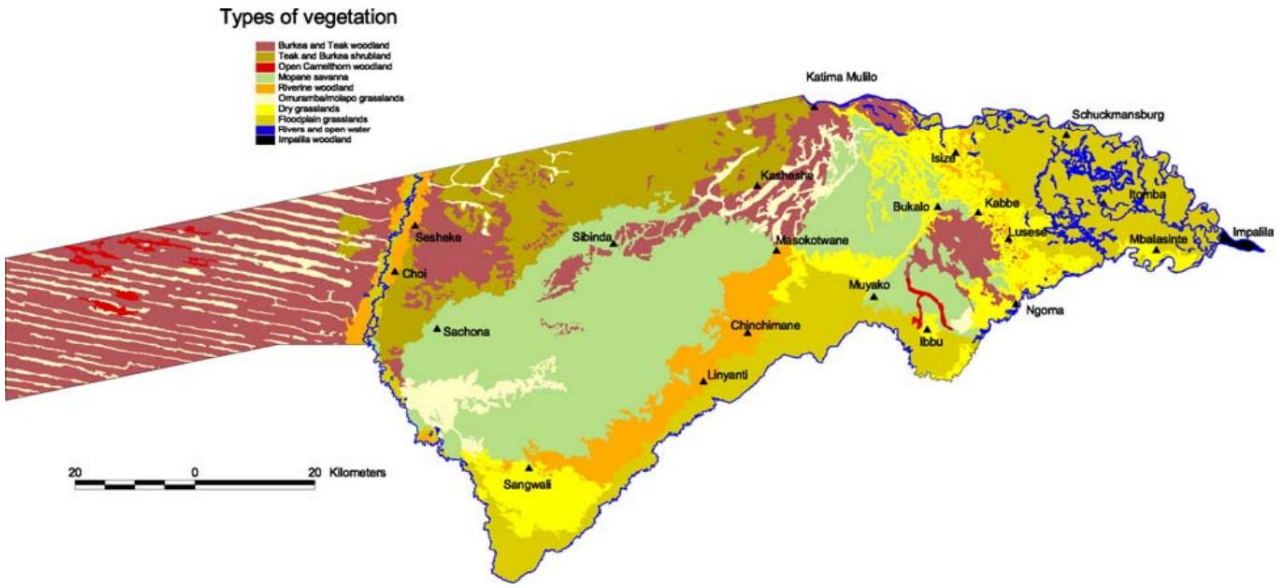


Figure 10. Types of vegetation

5.2.2. Fauna (Mammals and Other Wildlife)

Liselo Area and specifically the identified solar facility site is situated at the geographic heart of the KAZA TFCA landscape in the northeast of Namibia, making it and its surrounding lands part of the broader Transfrontier area. While the facility area itself is not inside a core protected area, it lies

within the KAZA conservation landscape and serves as a strategic hub for tourism, wildlife corridors, and conservation cooperation.

Notable fauna includes:
Large mammals: African elephant, Cape buffalo, lion, leopard, and spotted hyena. Ungulates and other herbivores: Common impala, kudu, red lechwe, reedbuck, sable and roan antelope, warthog, and waterbuck. Wetland species: Hippopotamus and Nile crocodile occur in the river systems and floodplain channels. Small mammals and other species: Spotted-necked otter and various smaller nocturnal mammals inhabit riverbanks, woodlands, and grasslands.

Protected areas near Liselo and Katima Mulilo, such as Nkasa Rupara (formerly Mamili) and Mudumu National Parks, support many of these species and act as core wildlife corridors between neighbouring Botswana, Zambia, and Angola.

### 5.2.3. Avifauna (Birds)

The Zambezi Region is considered Namibia's premier birding area, with exceptionally high species richness due to varied habitats including riverine forest, floodplains, woodlands, and wetlands.

Bird diversity and highlights:
Over 400-430 bird species have been recorded within the region's protected areas and floodplain habitats. Wetland and waterbird species include African skimmers, African fish eagles, African finfoots, pygmy geese, jacanas, herons, and waders. Migratory species such as carmine bee-eaters gather seasonally along the Zambezi River sandbanks between September and November. Woodland and savanna birds include Schalow's turaco, trumpeter hornbill, coppery sunbird, eastern bearded robin, western-banded snake eagle, and various raptors and hornbills. The region's bird communities are both resident and migratory, making it a critical avifaunal hotspot within Namibia.

### 5.2.4. Reptiles

The eastern Zambezi Region supports a rich reptile fauna that reflects both the wetland and savanna environments. Reptile diversity includes:

An estimated 70-80 reptile species in the general Katima Mulilo area, including snakes, lizards, geckos, terrapins, and crocodiles. Crocodile species: Crocodylus niloticus (Nile crocodile) is common along rivers and large waterways, an iconic wetland reptile. Other notable reptiles: Nile monitor (Varanus niloticus), various snake species, skinks, geckos, and terrapins. Some species such as Varanus niloticus have specific conservation listings (vulnerable or protected status). The mosaic of aquatic and terrestrial habitats across floodplain, riverbank, and woodland supports diverse reptilian life.

## 5.3. Socio-economic environment (demography, livelihoods, land use, cultural heritage, health).

### 5.3.1. Demography

The Zambezi Region has experienced steady population growth. The 2023 Census estimates the regional population at approximately 142,373 people, with a population density around 9.7 persons/km², higher than the national average, reflecting relative settlement pressure in this part of Namibia. Katima Mulilo, the regional capital, had an estimated 46,401 residents in 2023, with density in the urban constituencies above 1,000 persons/km² due to concentrated settlement and services.

Historically, the region's population skewed slightly younger, with many residents in the economically active age group (15–59 years), and urban areas like Katima Mulilo attracting youth from rural surroundings. Liselo itself functions as a peri-urban/rural settlement area relying on proximity to Katima Mulilo for access to services; it does not have large independent population data but reflects broader regional rural demographics.

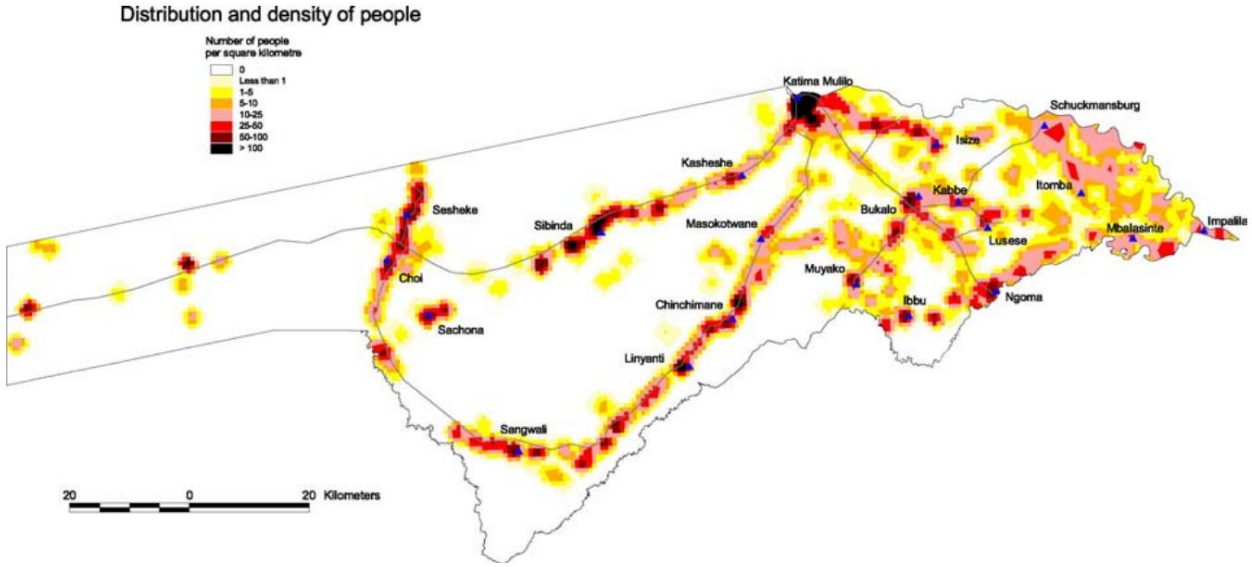


Figure11. Distribution and Density of People.

### 5.3.2. Livelihoods and Economic Activities

The main economic activities in the Zambezi Region are subsistence agriculture, fishing, and small-scale commerce, often integrated with seasonal natural resource harvesting (e.g., reeds, fish, bush products). Many households cultivate maize, sorghum, millet, beans, groundnuts and vegetables, especially through mixed farming systems.

Agriculture is a major employment sector, employing over 42% of the region's workforce in agriculture, forestry, and fishing, indicating heavy reliance on natural resource–based livelihoods.

In Katima Mulilo, wage employment and formal sector jobs are also important, with many people working in education, administrative services, wholesale/retail trade, tourism-related activities, and cross-border commerce due to the town's strategic location.

Although economic diversification exists, unemployment remains significant in the region, with many economically active persons under- or unemployed, highlighting the need for new employment opportunities and economic stimulation.

### 5.3.3. Land Use and Land Use Practices

Land use in the Zambezi Region is characterised by subsistence farming and livestock keeping, with villages and rural settlements occupying communal lands along roads and near water sources. Many villagers practice dry land and riverine cropping, reflecting reliance on seasonal rainfall and floodplain moisture.

Agriculture and grazing activities are central to livelihoods, although large areas of fertile land remain under-utilised, according to regional political leaders calling for enhanced agricultural investment due to the region's productive soils.

Urban and peri-urban land use around Katima Mulilo includes residential plots, informal settlements, commercial zones, open markets, institutional land (schools, clinics), and transport corridors, with growth driven by border trade and migration.

### 5.3.4. Cultural Heritage and Social Dynamics

The Zambezi Region is culturally diverse, inhabited by ethnic groups such as the Mafwe, Subia, Lozi, Mayeyi, and Mbukushu, each with distinct languages, customs, music, dance, and artisanal craft traditions. Katima Mulilo's culture blends traditional practices with modern influences, celebrated through festivals such as the Zambezi Bream Festival, showcasing fishing heritage, cultural displays, music, and community activities.

Local markets, craft centres, and cultural villages promote traditional arts and crafts, providing both economic opportunities and cultural preservation platforms. Despite cultural richness, infrastructure and service challenges such as informal settlements and uneven access to utilities reflect ongoing social development needs.

#### 5.3.5. Health, Education and Social Services

The Zambezi Region's health infrastructure is limited relative to population needs, with one main hospital and several health centres and clinics serving wide rural areas. This infrastructure supports Katima Mulilo and surrounding communities but often struggles with demand. Liselo relies on health and education services in Katima Mulilo, as local facilities (e.g., a primary school) are limited and clinics or higher-level services are accessed in town.

Education levels in Katima Mulilo and the region show a relatively high literacy rate in urban areas, with many residents able to read/write and access schools, while rural education access remains a priority for improvement. Health challenges include constraints in service access, high disease burdens, and issues related to sanitation, with the town historically reporting periodic outbreaks of diarrhoeal diseases linked to inadequate infrastructure.

# 6. TECHNICAL AND INFRASTRUCTURE ASPECTS

## 6.1. Project design

Located 2 km Northwest of Katima Mulilo town, the proposed facility within an area of 1,000 hectares, can easily accommodate the energy potential of approximately 680,000,000 kWh of electricity per year for Phase 1, 150MWp, (340,000,000 kWh). Water and Power Supply Namibia Pty Ltd, plans to secure the solar farm project and will have exclusive rights to explore, develop and utilize the solar energy resources. Details of the facility will be made available before the pre-construction phase of the project, once the turnkey EPC contract has been awarded.

System Design Designing the site layout for a 150MW solar farm involves careful consideration of various factors such as topography, solar irradiance, environmental impact, accessibility, and future expansion possibilities.

#### 6.1.1. Site Selection

- A location with high solar irradiance and minimal shading. Use solar resource maps and on-site measurements to assess solar potential.

- Consideration of the topography of the site, aiming for a relatively flat terrain to minimize construction costs and maximize solar exposure.

### 6.1.2. Array Orientation and Tilt

- Optimize the orientation and tilt of solar panels for maximum energy production. In most cases, panels face south in the northern hemisphere and north in the southern
- hemisphere.
  The tilt angle should be adjusted based on the latitude of the site.

### 6.1.3. Spacing and Density

- Determine the spacing between rows and the distance between individual solar panels. This is crucial to avoid shading and ensure efficient land use.
- Consider the type of solar technology (fixed-tilt, single-axis tracking, or dual-axis tracking) to determine the optimal density.

### 6.1.4. Access Roads and Infrastructure

- Plan access roads for construction, maintenance and emergency vehicles. Ensure they can handle heavy equipment during construction.
- Install necessary infrastructure for power collection, inverters and substations.

### 6.1.5. Security and Fencing

- Implement security measures, including perimeter fencing and surveillance systems to protect the solar farm from unauthorized access and potential theft.

### 6.1.6. Environmental Considerations

- Assess the impact on local flora and fauna. Design the layout to minimize disruption to the natural habitat and comply with environmental regulations.

- Consider erosion control measures, especially during the construction phase.

6.1.7. Interconnection and Substation

- Plan the layout of the electrical infrastructure, including inverters, transformers, and the substation.
- Ensure proper spacing and access for maintenance.

6.1.8. Storm-water Management

- Implement storm-water management measures to prevent soil erosion and water runoff. This is especially important during construction.

6.1.9. Future Expansion

- Allow for potential future expansion by designing the layout with scalability in mind. Leave space for additional solar arrays and infrastructure.

6.1.10. Community and Stakeholder Engagement:

- Engage with the local community and stakeholders to address concerns and ensure a positive relationship. This can include visual screening, noise reduction measures and other considerations.

6.1.11. Regulatory Compliance

- Ensure compliance with local zoning regulations, environmental laws and other relevant permits. Work closely with local authorities throughout the planning and construction phases.

It's crucial to work with a team of experts, including engineers, environmental consultants and project managers to create a site layout that maximizes efficiency, minimizes environmental impact and complies with all regulations.

## 6.2. Technology Selection

Namibia offers some of the most favourable solar conditions in the world for power generation. The country receives an average direct solar irradiation of approximately 2,200 kWh/m² per year, coupled with minimal cloud cover. In southern Namibia, solar resources are even stronger, with an average of about 11 sunshine hours per day and direct solar radiation reaching roughly 3,000 kWh/m² per year. The most widespread application of photovoltaic (PV) technology in Namibia is solar-powered water pumping, particularly for cattle farming. Other common uses include rural electrification, such as providing power for lighting, radios, televisions, and fans.

The proponent intends to deploy innovative single-cell design solar panels that deliver significantly higher energy output and cost savings compared to conventional front-contact panels. These panels have been installed in more than 60 countries and are currently regarded as the leading single-cell PV technology on the global market, making them well suited for large-scale solar power plants. The technology provider has designed, developed, constructed, operated, and supplied over 5 GW of this advanced solar technology worldwide. Compared to conventional panels, these solar modules generate up to 75% more energy over a 25-year lifespan and hold the world record for the highest-efficiency silicon solar panel. The technology is engineered to start generating earlier in the day, operate more effectively, and continue producing power later into the evening. Due to their superior efficiency and performance at high temperatures, the panels convert more sunlight into electricity while operating at lower temperatures, resulting in higher real-world energy yields even under extreme climatic conditions.

## 6.3. Grid Connection

Solar grid connection cost depends on the size of the solar plant project and to whom the project is selling the power (off taker). The project needs to acquire a Generation License and Transmission License from the Electricity Control Board (ECB).

The company also needs to fill in an Application for Grid Connection and pay a Transmission application fee which will be based on the study which will then determine the numbers of transformers needed. The number of transformers required for the operation it depends on the location, size and distance from the suppliers to the consumers. The transmission fees can only be

discussed after the study and all technical information's about the project are provided. The Application for a Solar Grid connection depends on the size of the solar plant project/how much energy the project is capable of generating.

## 6.4. Access Roads

### 6.4.1. Existing Access Infrastructure

The proposed Liselo Solar Project is advantageously located within proximity to Katima Mulilo and the main regional power substation, providing good access to existing transport and electricity infrastructure. The project site can be accessed via:

Primary access roads: The regional and trunk road network linking Katima Mulilo to surrounding settlements and border posts (including the Trans-Caprivi Corridor) provides reliable access for heavy vehicles transporting construction materials, solar panels, transformers, and other equipment.
Secondary and local roads: Gravel and earth roads maintained by the regional and local authorities provide direct access to the Liselo area. These roads are commonly used by local communities for daily transport and agricultural activities.

### 6.4.2. Project-Related Road Development

Use of existing roads: The project will primarily utilize existing public and farm access roads to minimize new land disturbance and avoid unnecessary vegetation clearance.

Upgrading and maintenance: Temporary upgrading may be required during construction, including grading, compaction, and dust suppression to allow safe passage of heavy construction vehicles.

Internal access roads: Within the project footprint, internal gravel access tracks will be developed to connect panel arrays, inverter stations, substations, and maintenance areas. These will be designed to:

- Follow natural contours where possible
- Avoid low-lying or flood-prone areas
- Minimize soil erosion and vegetation removal

### 6.4.3. Traffic and Safety Considerations

Construction traffic will increase temporarily during the construction phase. Traffic management measures will include:

- Speed restrictions
- Warning signage
- Controlled access points

Community access will be maintained where existing roads are shared with local residents. Overall, the site's proximity to the main substation significantly reduces the need for long new access routes and transmission corridors, thereby lowering environmental and social impacts.

## 6.5. Water use

Water Requirement

Water use for the Liselo Solar Project will be moderate and non-consumptive, mainly associated with construction and operational activities. No water-intensive industrial processes are involved.

### 6.5.1. Construction Phase Water Use

During construction, water will be required for:

- Dust suppression on access roads and cleared areas
- Concrete works, including foundations for mounting structures and substation infrastructure
- General construction activities, such as equipment cleaning and limited domestic use by workers

### 6.5.2. Operational Phase Water Use

During operations, water demand will be significantly lower and mainly used for:

- Periodic cleaning of solar panels to maintain efficiency, especially during dry and dusty periods
- Routine maintenance activities
- Limited domestic use by on-site operational staff

### 6.5.3. Water Sources

Potential water sources include:

- Municipal water supply from Katima Mulilo, subject to availability and approval by the relevant local authority
- Licensed boreholes, permitted and drilled, in accordance with the Namibian Water Resources Management Act
- Water delivery by tanker, particularly during peak construction periods

No abstraction from rivers, groundwater is anticipated without formal authorization.

### 6.5.4. Water Management and Conservation

- Water use will follow a water-efficient management approach, prioritizing minimal consumption.
- Dry or semi-dry panel cleaning methods will be considered where feasible.
- Water storage tanks will be used to regulate supply and avoid over-extraction.
- Spill prevention and control measures will be implemented to protect soil and groundwater quality.

## 6.6. Construction Methods

Possible Construction Methods: Liselo Solar Project (Construction Phase)

The construction of the Liselo Solar Project will follow **standard, proven photovoltaic (PV) construction methods** that are widely applied in Namibia and Southern Africa. These methods are designed to ensure efficiency, safety, and minimal environmental disturbance.

### 6.6.1. Site Preparation and Earthworks

- **Selective clearing and debushing** will be undertaken only within approved construction footprints (panel arrays, access roads, inverter pads, substation areas).
- Heavy machinery such as **bulldozers, graders, and excavators** will be used to:

    - Clear vegetation
    - Level and compact surfaces
    - Prepare access routes and equipment pads
- Topsoil will be **stripped, stockpiled, and reused** during rehabilitation to maintain soil fertility.
- **Cut-and-fill techniques** will be minimized to reduce erosion and maintain natural drainage patterns.

6.6.2. Foundation Installation Methods

The mounting structures for solar panels will be installed using one or a combination of the following methods, depending on soil conditions in Liselo:

a) Driven Pile Foundations

- Steel piles are driven into the ground using **hydraulic or pneumatic pile drivers**.
- This method:
    - Requires minimal excavation
    - Produces little construction waste
    - Is fast and cost-effective
- Commonly used in Namibian solar projects where soils allow pile penetration.

b) Augered or Concrete Foundations

- Holes are drilled using **augers or drilling rigs**.
- Concrete is poured to secure mounting posts.
- Used where soils are loose, sandy, or where pile driving is unsuitable.

6.6.3. Access Road and Internal Track Construction

- Existing roads will be upgraded using **grading and compaction techniques**.
- Internal roads will be constructed using:
    - Gravel surfacing
    - Compacted natural soils
- Drainage culverts and berms will be installed where necessary to manage stormwater and prevent erosion.

6.6.4. Mechanical Installation of Solar Arrays

- Pre-fabricated **steel or aluminium mounting structures** will be assembled on-site.
- Structures will be aligned and oriented to maximize solar exposure.
- **Solar PV modules** will be installed manually or with mechanical lifting aids and secured to the mounting structures using standardized fastening systems.

6.6.5. Electrical Installation Methods

- **DC cabling** will be laid in underground trenches or secured above ground on cable trays.
- **Inverters and transformers** will be mounted on concrete plinths or pre-cast foundations.
- **AC cabling** will connect inverter stations to the on-site substation.
- Trenching will be backfilled and compacted once cabling is installed.

Substation and Grid Connection Works

- Construction of the on-site substation will involve:
    - Foundation construction
    - Installation of transformers, switchgear, and protection systems
- The short transmission line or cable linking the plant to the nearby main substation will be installed using **overhead line erection or underground cabling methods**, depending on design and approvals.

6.6.6. Panel Cleaning and Commissioning

- Panels will be cleaned using **water-efficient methods** before commissioning.
- Testing and commissioning will involve:
    - Electrical testing
    - Performance verification
    - Safety inspections
- The plant will be synchronized with the grid following approval by NamPower and the relevant authorities.

6.6.7. Workforce and Construction Camp Methods

- Temporary construction camps will be established using **modular units**.
- Waste management systems (solid and liquid) will be installed.
- Occupational health and safety procedures will be strictly applied.

6.6.8. Environmental Control Measures During Construction

- **Dust suppression** using water sprays.
- **Erosion control** using berms, silt fences, and revegetation.
- **Noise control** through restricted working hours and equipment maintenance.
- Controlled storage and handling of fuels and chemicals.

# 7. STAKEHOLDER ENGAGEMENT

## 7.1. Identification of key stakeholders

Table 5. Key Stakeholders

| Category | Stakeholder | Role or Interest |
|---|---|---|
| | | |
| Regulatory | -Mafwe Traditional Authority<br>-Zambezi Regional Council<br>-Katima Mulilo Town Council<br>-MEFT | Environmental, health, safety, compliance and land use |
| Emergency Services | Rundu Fire Brigade, Police | Emergency response coordination |
| Community | Nearby residents and industrial neighbours | Employment Opportunities, Developmental |
| NGOs / Public | Local environment and civic groups | Transparency, sustainability, Environmental Protection |

## 7.2. Stakeholder engagement approach during scoping.

- Newspaper Notification (Minimum of 2 newspapers)
- Notification letters sent to relevant authorities via email
- Site notices posted around town/public areas

- Public Participation Meeting

## 7.3. Summary of early consultations, concerns, and expectations.

### 7.3.1. Early Consultations

- Engagements with local community leaders, traditional authorities, and regional government officials to introduce the project and gather initial feedback.
- Discussions with relevant regulatory bodies, including environmental and energy authorities, to clarify permitting requirements.
- Engagements with potentially affected landowners and community members to explain project scope and benefits.

### 7.3.2. Potential Concerns Raised

- Environmental impacts: Possible effects on local flora and fauna, water resources, and land use.
- Social impacts: Potential changes to local livelihoods, community dynamics
- Infrastructure and services: Concerns about increased traffic, pressure on local roads, and provision of electricity or other utilities.
- Health and safety: Worries about dust, noise, or other construction-related disturbances.

### 7.3.3. Expectations from the Project:

- Employment opportunities: Preference for local hiring during pre-construction, construction and operation phases.
- Community development: Requests for support for schools, healthcare facilities, water supply, cultural events and other community infrastructure.
- Environmental stewardship: Implementation of mitigation measures to minimize ecological disruption.
- Transparency and communication: Regular updates on project progress and decision-making processes.
- Long-term benefits: Assurance that the solar facility contributes to sustainable energy access and regional development.

## 7.4. Plan for continued stakeholder engagement during EIA process.

The ongoing stakeholder engagement plan aims to ensure transparent, inclusive, and effective communication throughout the Environmental Impact Assessment (EIA) process. Key elements include:

### 7.4.1. Regular Communication

- Provide periodic updates to stakeholders on project progress, EIA milestones, and key findings.
- Maintain multiple communication channels, including community meetings, newsletters, local radio, and social media updates.

### 7.4.2. Consultative Meetings:

- Conduct targeted meetings with local communities, traditional authorities, and regional government representatives at each stage of the EIA.
- Organize public disclosure sessions where the draft EIA report is presented and feedback is actively sought.

### 7.4.3. Stakeholder Feedback Mechanism:

- Establish a formal system (e.g., email, or direct phone line) for stakeholders to submit questions, concerns, or comments.

Ensure all feedback is recorded, tracked, and addressed promptly.

### 7.4.4. Focused Engagement with Vulnerable Groups:

- Ensure participation of women, youth, and other marginalized groups to capture diverse perspectives.
- Use culturally appropriate methods to encourage meaningful input.

### 7.4.5. Documentation and Reporting

- Document all consultations, concerns raised, and responses provided.
- Include a stakeholder engagement summary in the final EIA report, demonstrating how input

influenced project planning and mitigation measures.

7.4.6. Adaptive Engagement

- Update engagement strategies based on stakeholder feedback and evolving project activities.
- Maintain flexibility to address unforeseen issues or emerging community concerns promptly.

# 8. SCOPING METHODOLOGY

## 8.1. Approach to impact assessment

- Screening
- Scoping
- Scoping Terms of Reference
- Identification of Stakeholder
- Public Consultation
- Baseline Assessment
- Identification of Key Issues
- Impact Assessment, prediction, and mitigation).
- Submission and Review

## 8.2. Methods for data collection

- Site visit
- Field surveys
- Literature review
- Desktop study
- Stakeholder engagement

## 8.3. Criteria for impact significance evaluation.

Table 6. Criteria for evaluation

| Criteria | Description / Assessment | Category Options (Tick or Specify) |
|---|---|---|
| **Extent**<br>*(The physical and spatial scale of the impact)* | Describe the area affected (e.g., limited to site, surrounding community, or broader region). | **Local** - Confined to the immediate area<br>**Site** -Limited to the development footprint<br>**Regional** - Extends beyond local boundaries |
| **Duration** | Define how long the impact is expected to last. | **Short Term** - 0 to 5 years<br>**Medium Term** -5 to 15 years<br>**Long Term** - 15 to 30 years<br>**Permanent** - Beyond project life / irreversible |
| **Intensity** | Describe the magnitude or degree of change caused by the impact. | **Low** - Minor change, easily reversible<br>**Medium** - Noticeable change, manageable with mitigation<br>**High** - Major change, possibly irreversible |
| **Probability** | Indicate the likelihood of the impact occurring. | **Improbable** - Unlikely under normal conditions<br>**Possible** - Could occur occasionally<br>**Likely** - Expected to occur regularly<br>**Highly Likely** - Occurs frequently<br>**Definite** - Will occur regardless of controls |
| **Determination of Significance – Without Mitigation** | Rate the overall significance before implementing mitigation measures. | **No Significance**<br>**Low**<br>**Medium**<br>**High** |
| **Determination of Significance – With Mitigation** | Rate the significance after mitigation is applied. | **No Significance**<br>**Low**<br>**Medium**<br>**High** |

## 8.4. Integration with IFC Performance Standards

Table 7. IFC Performance Standards

| IFC Performance Standard | Relevant to Liselo Solar Facility | Proposed Action/Mitigation Measures |
|---|---|---|
| **PS1: Assessment and Management of Environmental and Social Risks and Impacts** | Ensures systematic identification and management of E&S risks across the project lifecycle | Conduct ESIA, implement Environmental & Social Management System (ESMS), monitor compliance |
| **PS2: Labor and Working Conditions** | Protects workers' health, safety, and rights during construction and operation | Safe working conditions, non-discrimination, training programs, grievance mechanisms |
| **PS3: Resource Efficiency and Pollution Prevention** | Promotes sustainable use of water, energy, and materials, and prevents pollution | Optimize resource use, implement waste management, control dust, minimize emissions |
| **PS4: Community Health, Safety, and Security** | Protects nearby communities from project-related risks | Traffic and safety management, emergency response plans, responsible security measures |
| **PS5: Land Acquisition and Involuntary Resettlement** | Ensures fair treatment of affected persons if land is acquired | Engage landowners early, provide fair compensation, maintain transparent communication |
| **PS6: Biodiversity Conservation and Sustainable Management of Living Natural Resources** | Minimizes impact on local ecosystems and species | Conduct biodiversity assessments, avoid sensitive areas, implement habitat restoration if needed |
| **PS7: Indigenous Peoples** | Protects rights of indigenous or marginalized groups in the project area | Conduct meaningful consultations, respect cultural and social rights, incorporate community input |
| **PS8: Cultural Heritage** | Protects tangible and intangible | Identify heritage resources, |

| | | |
|---|---|---|
| | cultural heritage sites | avoid or mitigate impacts, develop management plans with local input |

# 9. SCOPE OF ASSESSMENT

The scope of assessment for the draft scoping report defines the environmental and social aspects to be evaluated for the proposed solar energy project in Zamezi Region, Liselo Area. The scoping phase aims to identify potential impacts, including cumulative effects, determine key issues for further study, and guide the level of detail required for the full Environmental Impact Assessment (EIA).

## 9.1. Identification of environmental and social receptors

The assessment will identify environmental and social receptors that may be affected by the project. These include terrestrial flora and fauna, avifauna, soil, surface and groundwater resources, ambient air quality, noise-sensitive receptors, landscape and visual characteristics, existing land uses, nearby settlements, community services, and the socio-economic conditions of surrounding communities.

## 9.2. Key issues to be assessed during the full EIA

Key issues requiring detailed assessment include land clearance and habitat loss, impacts on biodiversity and avifauna, dust and noise generation during construction, water abstraction and potential impacts on geohydrology, waste generation and management, visual impacts, occupational and community health and safety, and socio-economic effects such as employment creation and land access. Potential cumulative impacts, particularly in combination with existing and planned developments in the Zambezi Region, Liselo area (such as other energy, infrastructure, or agricultural projects), will also be identified and assessed.

## 9.3. Geographic and temporal boundaries of the assessment

The geographic scope will include the proposed project site, all associated infrastructure (access roads, transmission lines, substations), and surrounding areas where indirect or cumulative impacts may occur. The temporal scope will address impacts during all phases of the project life cycle, including construction, operation, maintenance, and decommissioning, with consideration of short-, medium-, and long-term effects.

## 9.4. Level of detail and specialist studies required

The level of assessment will be proportionate to the scale of the project and the sensitivity of the receiving environment. Specialist studies anticipated for the full EIA include flora and fauna assessments, avifauna studies, air quality and noise assessments, geohydrological investigations, visual impact assessments, and a social baseline study. These studies will also consider cumulative impacts by evaluating the combined effects of the proposed project together with other existing or reasonably foreseeable developments in the area.

This scope of assessment ensures that all significant direct, indirect, and cumulative environmental and social impacts associated with the proposed solar project in Zambezi Region, Liselo area are systematically identified and addressed in line with Namibian environmental legislation and best practice.

# 10.ASSAMPTIONS AND LIMITATIONS

## 10.1. Possible Assumptions

- Solar resource availability
  It is assumed that the Liselo area receives adequate and consistent solar irradiation throughout the year to support the technical and economic viability of the proposed solar project.
- Land availability and suitability
  The project assumes that sufficient land is available, free of major physical constraints, and that land tenure and access issues can be resolved without significant conflict.

- Grid access and capacity
  It is assumed that the existing electricity grid infrastructure in the Zambezi Region has sufficient capacity, or can be upgraded, to accommodate the proposed solar plant and enable reliable power evacuation.
- Regulatory approvals
  The project assumes that all required environmental authorizations, permits, and licenses will be obtained within reasonable timeframes in accordance with Namibian legislation.
- Stakeholder acceptance
  It is assumed that local communities and stakeholders will generally support the project following effective consultation and engagement.
- Theft
  The development of the solar facility, fencing combined with modern security measures such as drone monitoring and security guard patrols, will reduce the risk of stock and property theft on-site. And in the region.

## 10.2. Possible Limitations

- Environmental data constraints
  Baseline environmental data for the Liselo area may be limited due to seasonal variation and time the assessment was conducted, particularly for biodiversity and avifauna, which could restrict the accuracy of impact predictions.
- Seasonal and climatic variability
  Variations in weather patterns, flooding, or extreme climatic events common in the Zambezi Region may affect construction activities and long-term operational performance.
- Sensitive environmental features
  The presence of sensitive habitats, possible wildlife movement corridors, could limit site layout options therefore requiring additional mitigation measures.
- Infrastructure constraints
  Limited road access, distance to substations, or insufficient grid capacity may increase project costs or delay implementation.
- Cumulative impacts from other developments
  Existing or planned developments in the Liselo area may contribute to cumulative

environmental and social impacts, potentially constraining project design or scale.

- Socio-economic considerations
  Competing land uses, traditional land rights, or community expectations regarding employment and benefits may pose challenges if not carefully managed.
- Political interference
  Regional and national political interference can impact the planning, approval, and implementation of the solar facility, potentially causing delays, increased costs, or changes to project scope

These assumptions and limitations highlight key uncertainties and constraints that will need to be addressed and refined through detailed studies and stakeholder engagement during the Environmental Impact Assessment process.

# 11.PRELIMINARY MITIGATION MEASURES

## 11.1. Preliminary Mitigations

The following preliminary mitigation measures are identified to address potential environmental and social impacts associated with the proposed solar project. These measures will be refined and expanded during the full Environmental Impact Assessment (EIA) and incorporated into an Environmental Management Plan (EMP).

**Land use and vegetation**

Minimize the project footprint through careful site layout and avoid ecologically sensitive areas where possible. Limit vegetation clearing to essential areas only and demarcate no-go zones prior to construction. Rehabilitate disturbed areas after construction using indigenous vegetation where feasible.

**Biodiversity and fauna (including avifauna)**

Conduct pre-construction biodiversity and avifauna surveys to identify sensitive species and habitats. Schedule construction activities to avoid critical breeding or nesting periods where possible. Install

bird-friendly infrastructure and design panel layouts to reduce collision and disturbance risks. Implement measures to prevent wildlife entrapment and allow safe movement across the site.

**Soil, erosion, and water resources**

Implement erosion and stormwater management measures, particularly in areas prone to seasonal flooding. Avoid contamination of surface and groundwater through proper fuel handling, storage, and spill response procedures. Limit water abstraction and promote efficient water use during construction and operation.

**Air quality and noise**

Control dust through water spraying and speed limits on access roads during construction. Ensure construction equipment is well maintained to minimize emissions and noise. Restrict noisy activities to daytime hours to reduce disturbance to nearby communities.

**Visual impacts**

Use low-profile infrastructure and non-reflective materials where practicable. Maintain natural vegetation buffers around the site to reduce visual intrusion.

**Waste management**

Implement a waste management plan emphasizing waste minimization, reuse, and recycling. Dispose of hazardous and non-hazardous waste at licensed facilities in accordance with Namibian regulations.

**Social and community impacts**

Engage local communities and traditional authorities throughout the project lifecycle. Prioritize local employment and skills development where feasible. Implement health and safety measures to protect workers and nearby communities.

**Cumulative impacts**

Coordinate project planning with other existing or proposed developments in the Liselo area to minimize cumulative environmental and social impacts. Monitor key indicators and adjust mitigation measures as necessary to address combined effects. These preliminary mitigation measures aim to reduce potential negative impacts while enhancing positive outcomes associated with the proposed solar project in the Region.

## 11.2. Consideration of mitigation hierarchy consistent with IFC PS approach.

The following preliminary mitigation measures for the Liselo solar project are structured according to the mitigation hierarchy consistent with the IFC Performance Standards (PS) approach: Avoid → Minimize → Restore → Offset. These measures will be refined during the full Environmental Impact Assessment (EIA) and incorporated into an Environmental and Social Management Plan (ESMP).

Table 8. IFC Performance Standards (PS): Mitigation Hierarchy

| **Mitigation Hierarchy** | **Key Measures** | **Examples / Application for Liselo Solar Project** |
|---|---|---|
| **Avoid** | Prevent potential impacts before they occur | - Select project site away from ecologically sensitive areas and critical wildlife habitats<br>- Avoid culturally or socially sensitive sites, including communal lands and settlements<br>- Design layout to minimize land clearing and preserve natural corridors |
| **Minimize** | Reduce the intensity, duration, and extent of impacts | - Limit vegetation clearance to essential areas only<br>- Control dust and noise during construction (water spraying, speed limits, timing of works)<br>- Implement buffer zones around sensitive species and habitats<br>- Apply erosion control and proper stormwater management<br>- Use low-profile, non-reflective panels to reduce visual impact |

| | | |
|---|---|---|
| **Restore / Rehabilitate** | Re-establish conditions to as close to baseline as possible | - Re-vegetate cleared or disturbed areas using native plant species<br>- Remove temporary construction facilities and restore land to pre-project condition<br>- Repair access roads or disturbed terrain post-construction |
| **Offset / Compensate** | Address residual impacts that cannot be fully mitigated | - Implement biodiversity offsets for unavoidable habitat or species impacts in consultation with authorities<br>- Support community programs to compensate for residual land use restrictions or disruption of livelihoods |
| **Additional Measures** | Cross-cutting actions to support all stages | - Continuous environmental and social monitoring (biodiversity, air, noise, water, soil)<br>- Stakeholder engagement and communication with local communities and authorities<br>- Occupational and community health and safety protocols throughout construction and operation |

These mitigation hierarchy ensures that the project first seeks to avoid impacts, then minimizes unavoidable effects, restores affected areas, and finally offsets residual impacts, in line with IFC Performance Standards and international best practice.

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