Environmental Scoping Study for the Proposed Osona Project, Okahandja, Namibia

Final Report

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Executive Summary

Project overview

Osona JCM Solar Corporation Limited (JCM), supported by JCM Power as project sponsor, proposes to develop, construct and operate a 20 megawatt alternating current (MWac) solar photovoltaic (PV) power plant on an approximately 89 hectare (ha) parcel of privately owned commercial farmland within the Omatako Constituency, Otjozondjupa Region, in the broader Osona–Okahandja area. The project site is located approximately 18 km west of Osona Village on the route toward Gross Barmen. Access is obtained from the A1 (northbound from Windhoek), turning left onto the D1972 district road and travelling for approximately 14 km in the direction of Gross Barmen. The Project is understood to be positioned in close proximity to the A1 corridor, supported by existing regional road infrastructure.

The Project includes the PV plant and associated infrastructure, internal access roads, and the construction of a short access link (approximately 300 m) from the D1972 to the site. Electricity generated by the Project will be delivered into the national grid via a ~0.5 km transmission line/cable connecting the Solar Plant Site to the existing Osona Substation. The Project has an estimated investment value of USD 35 million, is anticipated to require approximately 10 months to construct, and is expected to operate for a minimum of 20 years, with potential extension by agreement. The construction phase workforce is expected to peak at approximately 200 workers (skilled and unskilled), while the operational phase is expected to require approximately 20 skilled personnel.

Augite Environmental Consultants has been appointed by JCM to undertake the Environmental Impact Assessment (EIA) and prepare the Environmental Management Plan (EMP) in support of an application for an Environmental Clearance Certificate (ECC).

Purpose of the EIA

The purpose of the EIA is to identify and assess the potential environmental and social impacts associated with the Project across planning, construction, operation and decommissioning, to evaluate feasible alternatives, and to define mitigation and management measures that avoid, minimise and rehabilitate impacts in accordance with the mitigation hierarchy. The EIA also provides a documented public participation process, capturing stakeholder issues and demonstrating how these are addressed in the assessment and the EMP.

EIA process and methodology

The EIA process followed recognised good practice steps, including screening, scoping, baseline data collection, stakeholder engagement, impact assessment, development of mitigation/management measures, and reporting and disclosure. Impacts were assessed using a structured significance rating method that considers magnitude, receptor sensitivity, likelihood, duration and extent, with impacts rated pre-mitigation and residual (post-mitigation). The assessment applies a source–pathway–receptor approach and aligns the management framework with national expectations and international lender requirements, including IFC-aligned principles where applicable.

Public consultation and stakeholder engagement

Public participation was undertaken to ensure disclosure and provide opportunities for registration and comment. The process included:

- Placement of newspaper advertisements in two newspapers; and
- Posting of public notices at accessible community locations including Okahandja Municipal Offices, Okahandja Police Station, Osona Estate, and the Osona Mall. Key stakeholders, including Gross Barmen and the Otjozondjupa Town Council, were informed. A stakeholder register and issues tracking process were implemented to document engagement and ensure that concerns raised are addressed in the EIA and embedded into EMP commitments.

Baseline environment

Physical environment: The site is generally flat with minor hills/undulations within a semi-arid central Namibian setting. Baseline air quality is typically good, with dust as the primary concern in dry and windy conditions. Surface water is predominantly episodic, conveyed via ephemeral drainage features, with groundwater representing a key resource in the commercial farming landscape. Soils are susceptible to compaction and erosion when disturbed, making stormwater and erosion controls a key design and management requirement.

Biological environment: The site supports a thornbush/acacia savanna habitat within a commercial farm matrix, with higher ecological sensitivity expected in and near ephemeral drainage features. Fauna expected includes typical savanna/farm assemblages of birds, mammals, reptiles (including tortoises), and amphibians concentrated around temporary water after rainfall. Baseline biodiversity is best described as a mosaic of modified and natural habitat elements, requiring careful micro-siting and rehabilitation planning, consistent with PS6 screening logic.

Socio-economic environment: The Project is located within a corridor influenced by the A1 and nearby service centres, with a regional labour pool and strong demand for employment opportunities. The construction workforce and logistics introduce temporary service pressure and community safety considerations if unmanaged, but also create meaningful short-term employment and procurement benefits.

Key findings – potential impacts and mitigation (construction phase focus)

The EIA identified that most potential adverse impacts can be reduced to Low residual significance with implementation of the EMP and GIIP controls. Key outcomes include:

- Air quality (dust): Moderate unmitigated impacts are expected during earthworks and traffic; reduced to Low residual with dust suppression, speed control, stockpile management and progressive rehabilitation.
- Noise: Moderate unmitigated construction noise impacts; reduced to Low residual through day-time working, equipment maintenance and layout controls.
- Soils, erosion and sedimentation: This is a key risk area. Unmitigated impacts may be High if stormwater and erosion are unmanaged; reduced to Low–Moderate residual through an Erosion and Sediment Control Plan, drainage buffers, phased clearing, topsoil management, and post-storm inspections.
- Groundwater contamination risk: Moderate–High unmitigated risk associated with fuels and hazardous materials; reduced to Low residual through bunding, controlled refuelling, spill response readiness and compliant waste management.
- Biodiversity (habitat loss and disturbance): Unmitigated impacts are Moderate–High due to vegetation clearing and disturbance; reduced to Moderate residual because some habitat loss is permanent over the operational life, notwithstanding avoidance of sensitive drainage features, minimised clearing, fauna rescue procedures, invasive species control and rehabilitation.

- Invasive alien plants: Moderate unmitigated risk; reduced to Low residual through hygiene controls, early detection and rapid response, and timely rehabilitation.
- Landscape and visual: Moderate unmitigated construction-phase visual impacts; reduced to Low residual through good housekeeping, dust control and minimising night lighting.
- Land use and tenure: The Project is on privately owned farmland with a purchase/sub-lease arrangement. No physical displacement is expected. Economic displacement risk is generally low but requires farm interface controls and grievance management. Residual is Low–Moderate depending on land-use integration measures.

Positive impacts

The Project provides material positive benefits, including:

- Renewable electricity generation and contribution to national energy security (High positive significance);
- Climate mitigation benefits through displacement of higher-emission generation over a ≥20-year operational life (High);
- Employment creation (~200 jobs during construction; ~20 skilled jobs during operation) and local economic stimulation through procurement (Moderate to High depending on local hire/procurement commitments).

Conclusions and recommendations

The ES concludes that the Osona 20 MWac Solar PV Project is environmentally and socially feasible and can proceed provided that the mitigation measures and monitoring requirements set out in the EMP are implemented as enforceable commitments. The recommended authorisation is conditional on:

1. Appointment of an independent Environmental Control Officer (ECO) for construction;
2. Final layout micro-siting to avoid sensitive drainage features and minimise clearing;
3. Implementation of an Erosion and Sediment Control Plan / Stormwater Management Plan prior to earthworks;

4. Implementation of dust, waste, hazardous materials, traffic and labour management plans;
5. PS6-aligned biodiversity controls, invasive species prevention and measurable rehabilitation success criteria; and
6. Ongoing stakeholder engagement and grievance management through construction and operation.

Subject to these conditions, residual adverse impacts are expected to be acceptable and manageable, while the Project delivers substantial long-term national and local benefits through renewable energy generation and socio-economic upliftment.

Introduction

Project Background

This Environmental Impact Assessment (EIA) report presents the environmental and social baseline context, impact assessment findings, and recommended mitigation and management measures for the proposed 20 MW solar photovoltaic (PV) power project to be developed by JCM Power in the Osona–Okahandja area of the Otjozondjupa Region, Namibia. The report is compiled in support of an application for an Environmental Clearance Certificate (ECC) in accordance with Namibia's environmental assessment requirements, and it is intended to guide responsible project planning, construction, operation, and eventual decommissioning.

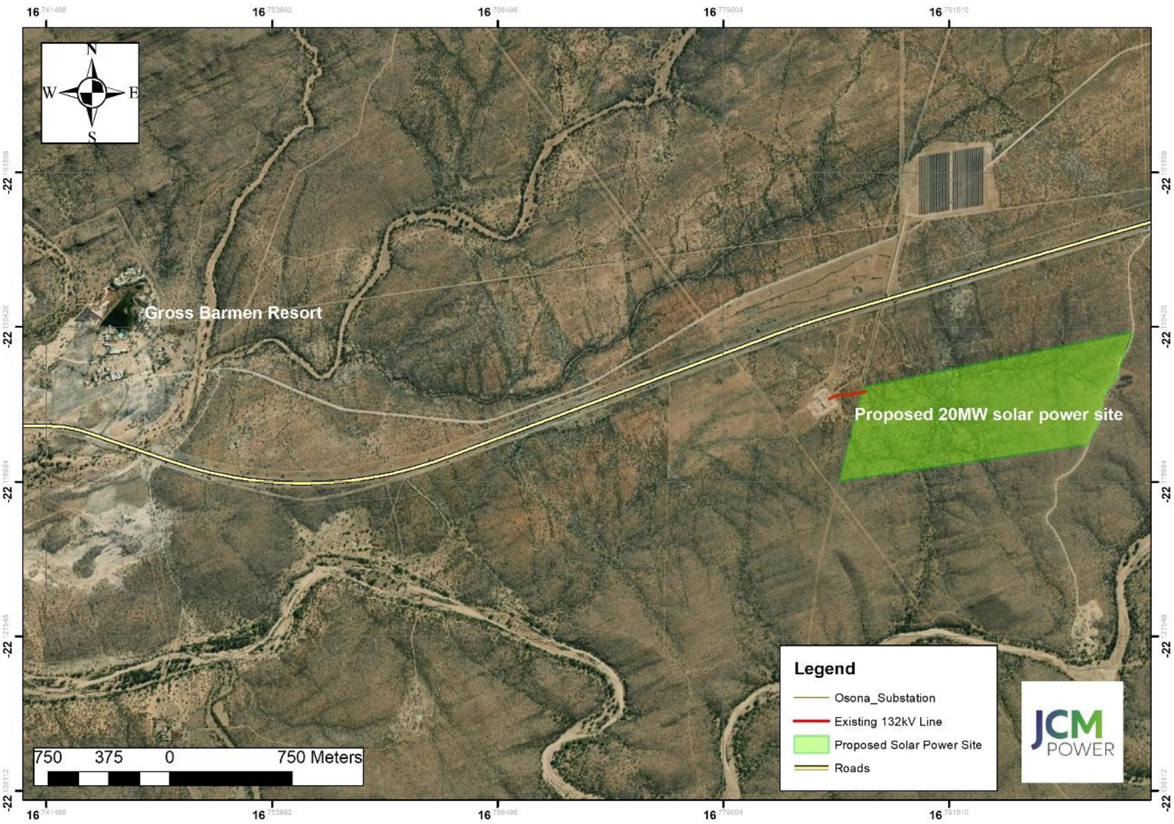

Figure 1. The location map for the 20MW solar power plant.

The proposed solar power plant site is located approximately 18 km west of Osona Village along the route toward Gross Barmen. Access to the site is obtained from the A1 road (northbound from Windhoek) by turning left onto the D1972 road and travelling for approximately 14 km in the direction of Gross Barmen. The project area is understood to be situated in close proximity to the A1 transport corridor, with site access supported by existing regional road infrastructure. This location and access configuration is favourable from a logistics perspective, reducing the need for new access road construction and enabling efficient transport of equipment, materials, and personnel during implementation.

The project is anticipated to require approximately 10 months to construct. During the construction phase, the project is expected to employ approximately 200 workers (skilled and unskilled), with workforce requirements reducing substantially during operations to approximately 20 skilled personnel. The project has an estimated capital investment value of USD 35,000,000 and is planned to operate for a minimum of 20 years, with the potential for extension by mutual agreement, subject to regulatory approvals and continued technical and commercial viability.

The project's generated electricity will be delivered directly into Namibia's national grid under a Power Purchase Agreement (PPA) with NamPower. Grid connection will be achieved via an approximately 0.5 km transmission line linking the solar facility to the Osona Substation. This short transmission distance is expected to reduce corridor disturbance and limit land-take and potential biophysical impacts associated with grid integration, provided that routing and servitude placement avoid sensitive receptors (e.g., drainage lines, protected trees, heritage features, and neighbouring infrastructure).

Augite Environmental Consultants cc has been appointed by JCM Power as the Environmental Assessment Practitioner to undertake the EIA process. The EIA will assess potential impacts associated with the construction, operation, and decommissioning phases of the solar PV development, identify feasible alternatives and design refinements, and define mitigation and monitoring measures within a project-specific Environmental Management Plan (EMP) to ensure that residual impacts are avoided where possible and reduced to acceptable levels where avoidance is not feasible.

Nature of the Project

The proposed development comprises a 20-megawatt (MW) alternating current (AC) solar photovoltaic (PV) power plant to be constructed on an approximately 89-hectare (ha) parcel of land (the Solar Plant Site) situated within the Omatako Constituency. The site is located on a commercial farming property, and the development footprint will include the PV array field, inverter stations, transformer equipment, internal access routes, underground/overhead cabling (as applicable), a perimeter security fence, and temporary construction laydown and storage areas required for the construction period.

To enable evacuation of generated electricity to the national grid, the project will also include the construction of a short transmission connection of approximately 0.5 km linking the Solar Plant Site to the Osona Substation, located north-west of the proposed solar plant site. The transmission line alignment and associated servitude will be routed to make maximum use of existing disturbed corridors where feasible and to minimise disturbance to sensitive receptors (notably drainage features, erosion-prone soils, protected vegetation, heritage resources, and neighbouring infrastructure).

Project Proponent

The Project proponent is Osona JCM Solar Corporation Limited (JCM). The Project is sponsored by JCM Power, an independent power producer (IPP) focused on accelerating social, economic, and environmental sustainability in growth markets through the development, construction, and operation of renewable energy facilities and high-voltage direct current (HVDC) transmission infrastructure. JCM Power positions its business model around mobilising private sector technical expertise and finance to deliver infrastructure projects in Sub-Saharan Africa, with an overarching objective of contributing to poverty alleviation through improved access to reliable electricity, job creation, and local value creation associated with renewable energy project development and operations.

Project Justification

The proposed 20 MW (AC) solar photovoltaic (PV) project in the Osona–Okahandja area of the Otjozondjupa Region is justified on strategic energy security, socio-economic development, and environmental sustainability grounds. Namibia's electricity supply system is characterised by a continued reliance on regional electricity imports, and national stakeholders including NamPower have indicated that the country imports a significant portion of its electricity requirements from neighbouring countries. In this context, new grid-connected domestic generation capacity contributes to improved supply adequacy, diversification of supply sources, and reduced exposure to regional market constraints and price volatility. Official national reporting further demonstrates substantial monthly electricity imports and the importance of regional suppliers, underscoring the relevance of additional local generation capacity.

From a policy and planning perspective, the project aligns with Namibia's electricity sector planning direction, including national integrated resource planning which recognises the need for continued generation expansion and the growing role of renewable energy in the least-cost supply mix. The project also supports Namibia's climate and green growth objectives as articulated through its updated Nationally Determined Contributions (NDCs), which include measures oriented toward scaling up renewable energy and cleaner electrification pathways.

The locational and technical configuration of the project strengthens its desirability. The solar plant is proposed on an ~89 ha parcel within Omatako Constituency on a commercial farm, with access achieved via the A1 Road and D1972 road, limiting the need for new access infrastructure. The grid connection is proposed via an approximately 0.5 km transmission line to the Osona Substation, which reduces the extent of new servitude disturbance and associated biophysical impacts relative to longer line routes. Economically, the project represents an investment of approximately USD 35 million, is expected to require roughly 200 workers during a ~10-month construction period and ~20 skilled workers during operations, and will contribute to local procurement and skills development over an operational life of at least 20 years.

The project proponent, Osona JCM Solar Corporation Limited, and sponsor JCM Power intend to deliver the generated electricity into the national grid under a Power Purchase Agreement arrangement with the national utility. Overall, the project is considered desirable because it delivers low-emission electricity generation with manageable, localised environmental impacts that can be effectively mitigated through the application of the mitigation hierarchy and the implementation of a robust Environmental Management Plan (EMP), while supporting national objectives related to energy security, renewable energy expansion, and sustainable economic development.

Purpose of the EIA

The purpose of this Environmental Impact Assessment (EIA) is to provide a comprehensive, defensible assessment of the potential biophysical, social, and economic impacts associated with the proposed 20 MW (AC) Solar Photovoltaic (PV) Power Plant on an ~89 ha commercial farming property in the Osona–Okahandja area (Omatako Constituency), Otjozondjupa Region, including the associated ~0.5 km transmission line connection to the Osona Substation. The EIA is prepared to support an application for an Environmental Clearance Certificate (ECC) in terms of Namibia's Environmental Management Act, 2007 (Act No. 7 of 2007) and the Environmental Impact Assessment Regulations (GN 30 of 2012).

Specifically, the EIA aims to:

1. Describe the proposed project and all associated infrastructure and activities (site establishment, construction, operation, maintenance, and decommissioning), including the workforce profile, construction period (~10 months), and operational life (≥20 years).

2. Establish the receiving environment baseline for the project area and its zone of influence, covering (as relevant) climate, topography and drainage, soils and erosion risk, groundwater/surface water sensitivity, biodiversity (flora/fauna and avifauna), land use, visual sense of place, heritage resources, and socio-economic conditions.

3. Identify, predict, and evaluate impacts and risks for all project phases, including direct, indirect, and cumulative impacts, and assess their significance using a transparent significance-rating methodology (considering magnitude, sensitivity, likelihood, duration, and reversibility).

4. Evaluate reasonable alternatives, including the no-go option, layout/micro-siting alternatives within the 89 ha parcel, and alternatives for the grid connection route/servitude (and underground vs overhead, if applicable), with the objective of avoiding or reducing impacts.

5. Apply the mitigation hierarchy (avoid–minimise–rehabilitate/restore–offset where necessary) and define practicable mitigation measures to reduce negative impacts to acceptable levels and enhance positive benefits.

6. Compile a project-specific Environmental Management Plan (EMP) that sets out clear management actions, responsibilities, performance standards, monitoring indicators, reporting requirements, and corrective measures to ensure compliance throughout construction and operations.

7. Document the public participation process by notifying and consulting Interested and Affected Parties (I&APs), capturing issues and concerns raised, and demonstrating how stakeholder input has been considered and incorporated into project design and mitigation.

8. Provide a clear conclusion and recommendation to decision-makers on the project's environmental acceptability, the conditions under which it should proceed, and the commitments required to ensure ongoing compliance with ECC conditions and the EMP.

Summary of the EIA process

In Namibia, the EIA/ECC process is a regulated, stepwise workflow managed through the Ministry of Environment, Forestry and Tourism and the Office of the Environmental Commissioner, and it typically proceeds as follows:

1. Screening (ECC application initiation)
   The proponent/EAP submits an ECC application and supporting information to determine whether the activity is listed and what level of assessment is required (e.g., scoping vs full EIA). Screening and document handling are commonly administered via the national ECC portal.

2. Scoping (define issues, alternatives, and study boundaries)
   A scoping phase identifies key environmental and social issues, confirms the project description and reasonable alternatives, defines the area of influence, and sets the terms of reference for baseline work and specialist inputs (where needed).

3. Baseline data collection (receiving environment)
   Collection and synthesis of baseline information (desktop + site verification) for physical, biological, and socio-economic receptors—e.g., soils/erosion, drainage, groundwater sensitivity, vegetation/fauna, heritage, land use, sensitive receptors.

4. Stakeholder engagement / public participation (throughout)
   Identification and notification of Interested and Affected Parties (I&APs) and authorities; disclosure of project information; recording comments; and maintaining an issues-and-responses trail. Public participation is a formal requirement and is typically run during scoping and again around report review/disclosure.

5. Impact assessment (prediction + significance evaluation)
   Identification and assessment of impacts for construction, operation, and decommissioning, including cumulative effects. Significance is evaluated transparently using criteria such as magnitude, sensitivity, likelihood, duration, and reversibility, and then re-rated after mitigation.
6. Mitigation and management planning (EMP)
   Development of practical mitigation measures and a project-specific Environmental Management Plan (EMP) defining responsibilities, method statements, monitoring indicators, reporting lines, and corrective actions.
7. Reporting, disclosure, and submission for decision-making
   Compilation of the Scoping/EIA Report + EMP (and supporting annexures such as stakeholder register, issues-and-responses, specialist studies). These are disclosed for stakeholder review (where required) and then submitted to the Environmental Commissioner for evaluation and a decision on the ECC and its conditions.
8. Decision, conditions, and ongoing compliance
   If approved, the ECC is issued with conditions. Implementation is then managed through EMP compliance, monitoring, and reporting for the duration of construction/operations, with corrective action where non-conformances occur.

ESS Methodology

This Environmental Scoping Study (ESS) applies a receptor-based, risk-and-significance methodology aligned with Namibia's environmental clearance decision-making framework and assesses the proposed 20 MW (AC) solar PV facility over its full lifecycle—site establishment, construction (~10 months), operation (≥20 years), and decommissioning—together with the associated ~0.5 km grid connection to the Osona Substation. The approach integrates desktop review and targeted site verification to characterise the receiving environment (topography, soils and erosion susceptibility, drainage and stormwater pathways, groundwater sensitivity, biodiversity and avifauna, land use and sensitive receptors, heritage potential, and socio-economic conditions), and then identifies impacts using an activity–aspect–impact linkage and PV-specific checklists. Each impact is predicted and significance-rated pre- and post-mitigation using transparent criteria (magnitude, receptor sensitivity, extent, duration, frequency, likelihood, and reversibility), with residual significance used to prioritise management actions. Reasonable alternatives—including the no-go option, layout micro-siting within the 89 ha parcel, and transmission line routing (and overhead/underground considerations where applicable)—are evaluated using the same significance logic to demonstrate impact avoidance and minimisation. Mitigation follows the hierarchy of avoid–minimise–rehabilitate/restore (and offset only where justified), and is consolidated into a project-specific Environmental Management Plan (EMP) with clear responsibilities, monitoring indicators, reporting requirements, and corrective-action procedures, while stakeholder issues and feedback are documented through an issues-and-responses trail and incorporated into the impact register and EMP commitments.

Project Overview and Location – Osona Solar Power Project

Osona JCM Solar Corporation Limited (JCM) proposes to construct and operate a 20 megawatt alternating current (MWac) solar photovoltaic (PV) power plant in the Osona–Okahandja area of the Otjozondjupa Region, Namibia. The Project will be developed on an approximately 89-hectare parcel situated within the Omatako Constituency on a commercial farm (the Solar Plant Site). Associated infrastructure will include PV module arrays and mounting structures, inverter/transformer stations, internal access tracks, underground cabling and trenches (as applicable), a perimeter security fence, and temporary construction laydown areas and contractor facilities.

The Project will also include the construction of a short ~0.5 km transmission line to connect the solar power plant to the existing Osona Substation, located northwest of the Solar Plant Site. Electricity generated by the solar PV facility will be delivered into the national grid under a Power Purchase Agreement (PPA) between JCM and NamPower. The Project has an estimated investment value of approximately USD 35,000,000, with an anticipated construction duration of approximately 10 months. The workforce requirement is expected to peak at approximately 200 workers (skilled and unskilled) during construction and reduce to approximately 20 skilled personnel during operations. The operational life of the Project is expected to be a minimum of 20 years, with the potential for extension by mutual agreement, subject to ongoing regulatory compliance and commercial/technical considerations.

The Solar Plant Site is located approximately 18 km west of Osona Village along the route toward Gross Barmen. Access is obtained from the A1 road (northbound from Windhoek), turning left onto the D1972 road and travelling for approximately 14 km in the direction of Gross Barmen. The Project area is understood to be positioned in close proximity to the A1 corridor, and access is supported by existing regional roads, which is expected to reduce the need for new permanent access infrastructure and limit additional land disturbance beyond the defined development footprint. The Project is sponsored by **JCM Power, an independent power producer focused on developing, constructing, and operating renewable energy facilities in growth markets.

Project Site Description

The proposed Osona Solar Power Project site is characterised by generally flat terrain with a few minor hills/low undulations, resulting in a largely favourable topographic setting for a utility-scale solar PV layout with limited earthworks anticipated outside of localised levelling for internal access tracks and equipment pads. The surrounding land use is predominantly commercial farming. However, at the time of site observation the property appeared dormant, with no livestock present and limited evidence of active agricultural operations over the last few years.

Land use in the immediate vicinity reflects a semi-rural working landscape. Notably, south of the proposed project site there is a small-scale sand mining activity, where trucks were observed extracting sand from a riverbed for use in local building construction, reportedly associated with development at the Osona Estate. This nearby activity is relevant to baseline characterisation as it indicates an existing, localised level of disturbance within the surrounding area (including traffic, dust generation, and modification of the riverbed environment), and it provides context for assessing cumulative and shared-use impacts (particularly on access routes and dust levels) during the construction period.

Vegetation across the project site appears to be predominantly natural, with no obvious planted tree lines or cultivated woodland observed. Tree cover is mainly comprised of Acacia-dominated bush/woodland (locally typical of central Namibian commercial farm landscapes), with scattered individuals and small clusters rather than dense closed-canopy stands. This natural vegetation composition has implications for the project footprint planning, particularly in relation to minimising unnecessary clearing, delineating no-go areas where sensitive habitat features may occur, and ensuring appropriate topsoil management and rehabilitation measures are implemented during construction and decommissioning.

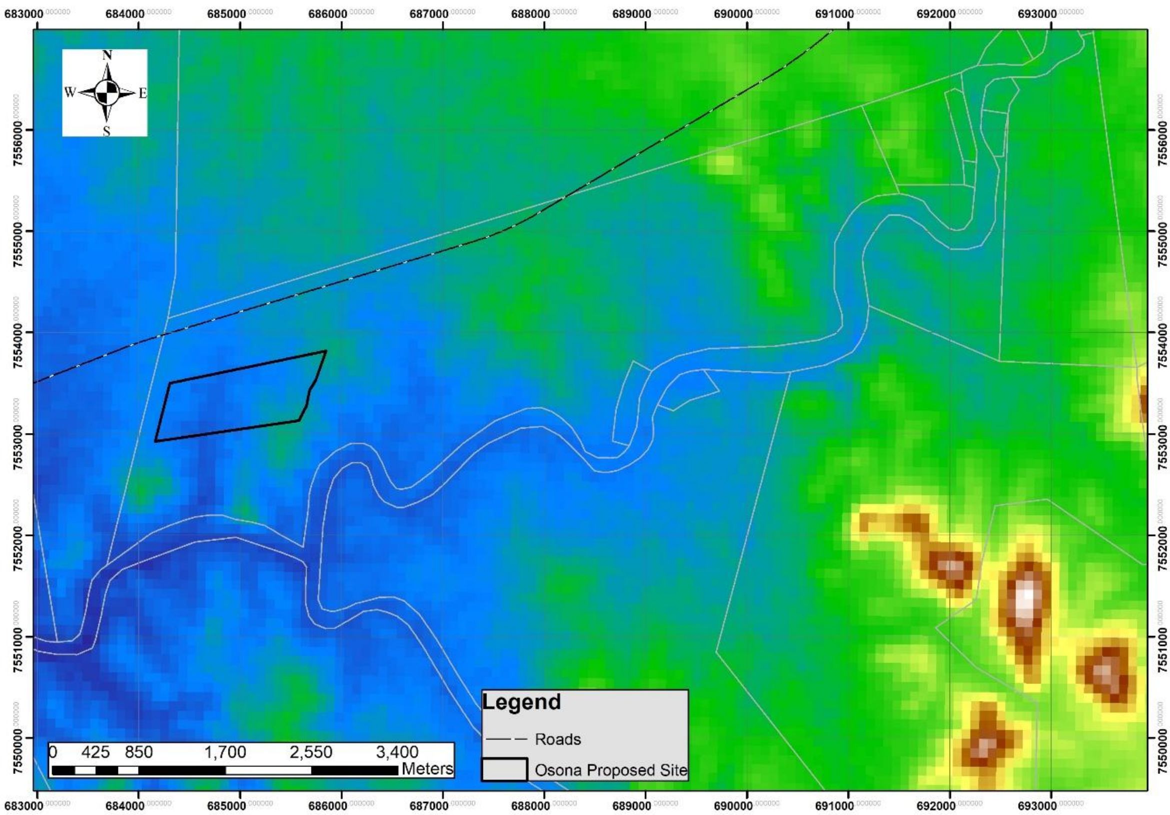

Figure 2. The topographical map of the 20MW solar power plant.

Land Ownership

The proposed project site is situated on privately owned commercial farmland. The landowner (a commercial farmer) intends to sub-lease or sell the specific portion of the property earmarked for the solar power development. The project proponent and the landowner have entered into an agreement that provides for the purchase and/or sub-lease of the designated project area, to take effect upon commencement of the project (and subject to the required statutory authorisations, including the Environmental Clearance Certificate process). This land access arrangement confirms that the proponent has a viable mechanism to secure tenure for the project footprint, while also defining the legal basis for site access, development, and ongoing operations for the duration of the project life.

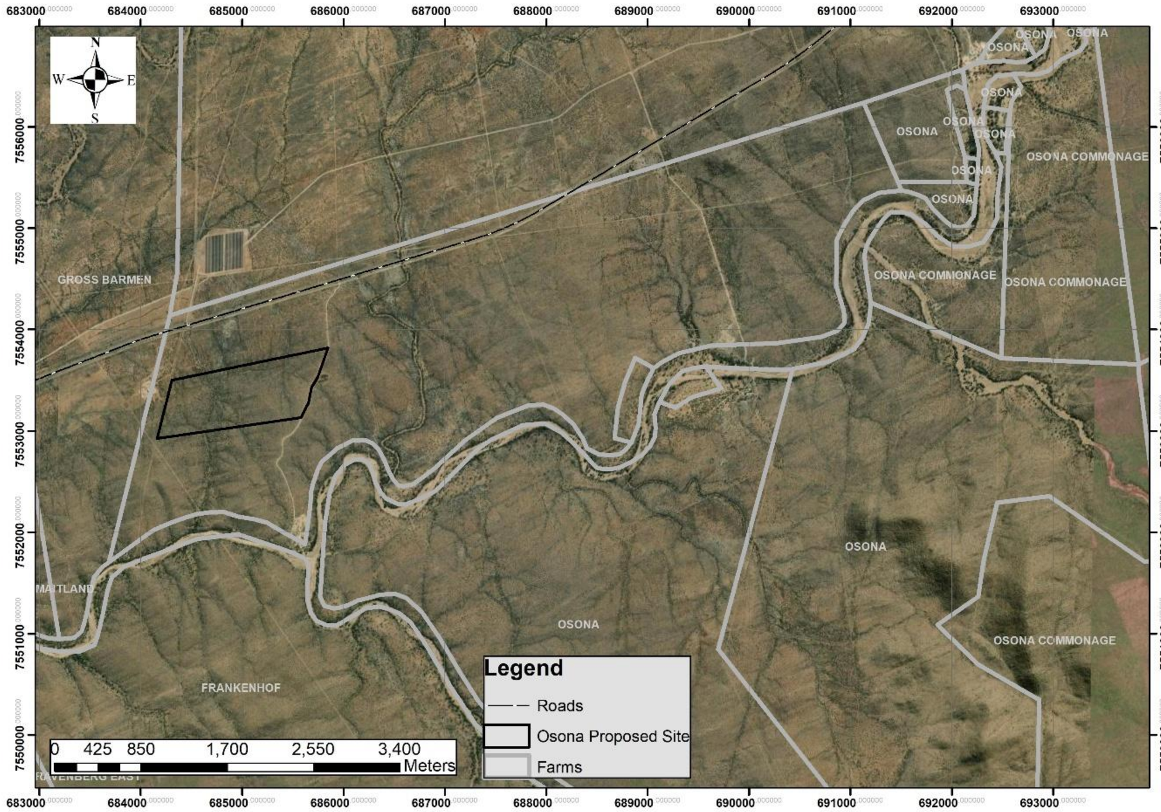

Figure 3. The surrounding farms within the area and where the solar power will be located.

Project components

The proposed Project comprises a grid-connected 20 MW (AC) solar photovoltaic (PV) power plant and all supporting infrastructure required for construction, operation, and maintenance, including a short ~0.5 km transmission line connection to the Osona Substation. The main components are summarised below.

1) Solar PV generation facility (within the ~89 ha Solar Plant Site)

- PV module arrays (solar panels) arranged in strings/blocks to achieve the required DC capacity to deliver 20 MWac at the point of interconnection.
- Module mounting structures (typically fixed-tilt or single-axis tracker—confirm final design), including piles/foundations and structural steel/aluminium supports.
- DC electrical infrastructure: string cabling, combiner boxes (as applicable), earthing/lightning protection, and cable management.

2) Power conversion and step-up infrastructure

- Inverters (string or central) to convert DC power to AC power.
- Step-up transformers (pad-mounted or within inverter stations) to raise voltage for collection/grid export.
- Medium-voltage (MV) collection system (typically underground MV cabling) connecting inverter/transformer stations to the onsite substation or switching equipment.
- Switchgear and protection systems (circuit breakers, relays, metering, SCADA interface) to ensure safe operation and grid compliance.

3) Onsite substation / switching station (if required)

Depending on the grid connection design, the Project may include:

- An onsite substation/switching station (HV/MV) with busbars, protection, metering, control building/kiosk, and communications equipment; and/or
- A point of interconnection arrangement directly at the Osona Substation (subject to grid studies and the Connection Agreement).

4) Grid connection infrastructure

- Transmission line (~0.5 km) from the Solar Plant Site to the Osona Substation, including:
    - Poles/towers and conductors (if overhead), or trenches/ducting (if underground);
    - A defined servitude corridor and associated access for maintenance; and
    - Line hardware, insulation, and safety signage.
- Connection bay / termination equipment at the Osona Substation (as specified by NamPower), including metering, protection, and communications interfaces.

5) Access and internal circulation

- Site access using existing regional roads (A1 and D1972) and an internal entrance arrangement.

- Internal access roads/tracks for construction traffic and long-term maintenance access (including turning areas for delivery vehicles).
- Drainage crossings (culverts) where internal roads intersect natural flow paths (if applicable).

6) Civil works and earthworks

- Site preparation: pegging, limited clearing and grubbing, and localised levelling.
- Equipment foundations/pads: inverter/transformer pads, control kiosks, and (if included) substation foundations.
- Cable trenches/duct banks for DC/MV/HV cabling (as applicable).
- Stormwater and erosion controls: diversion berms, cut-off drains, energy dissipaters, and stabilisation measures in accordance with the EMP.

7) Construction support infrastructure (temporary)

- Construction laydown areas for module storage and assembly.
- Contractor camp / site offices (temporary), including ablutions and potable water storage (if required).
- Temporary waste storage areas with segregation (general vs hazardous).
- Fuel storage and refuelling area (bunded), spill kits, and emergency response equipment.

8) Operational support infrastructure

- Operations and maintenance (O&M) facilities, typically a small control room/kiosk and storage container for spares and tools.
- SCADA / monitoring system for real-time performance and fault detection.
- Water supply for panel cleaning and maintenance (where applicable), with water-efficiency measures.
- Fire prevention and response measures: firebreaks (where required), extinguishers, and an emergency response plan.

9) Security and safety infrastructure

- Perimeter security fencing and controlled access gates.

- Security lighting (minimised and downward-directed) and/or CCTV where required.
- Safety signage (high voltage, restricted access, emergency contacts) and demarcation of hazardous areas.
- Earthing and lightning protection systems across the facility.

10) Decommissioning and rehabilitation components (end-of-life)

- Removal of PV modules, electrical equipment, and structures.
- Recycling of panels/metals where feasible and licensed disposal of non-recyclables.
- Recontouring, topsoil re-spreading, and rehabilitation with locally appropriate indigenous vegetation.

Project Access

Access to the proposed Osona Solar Power Project will be obtained via the existing regional road network, with entry from the D1972 road. The Project will require the construction of a short access road of approximately 300 m extending from the D1972 to the Solar Plant Site to provide a safe and durable connection for construction and operational traffic. This access link will be designed to accommodate delivery vehicles and construction plant, with appropriate drainage controls (e.g., culverts or cross-drains where needed) to prevent erosion and maintain natural surface water flow paths.

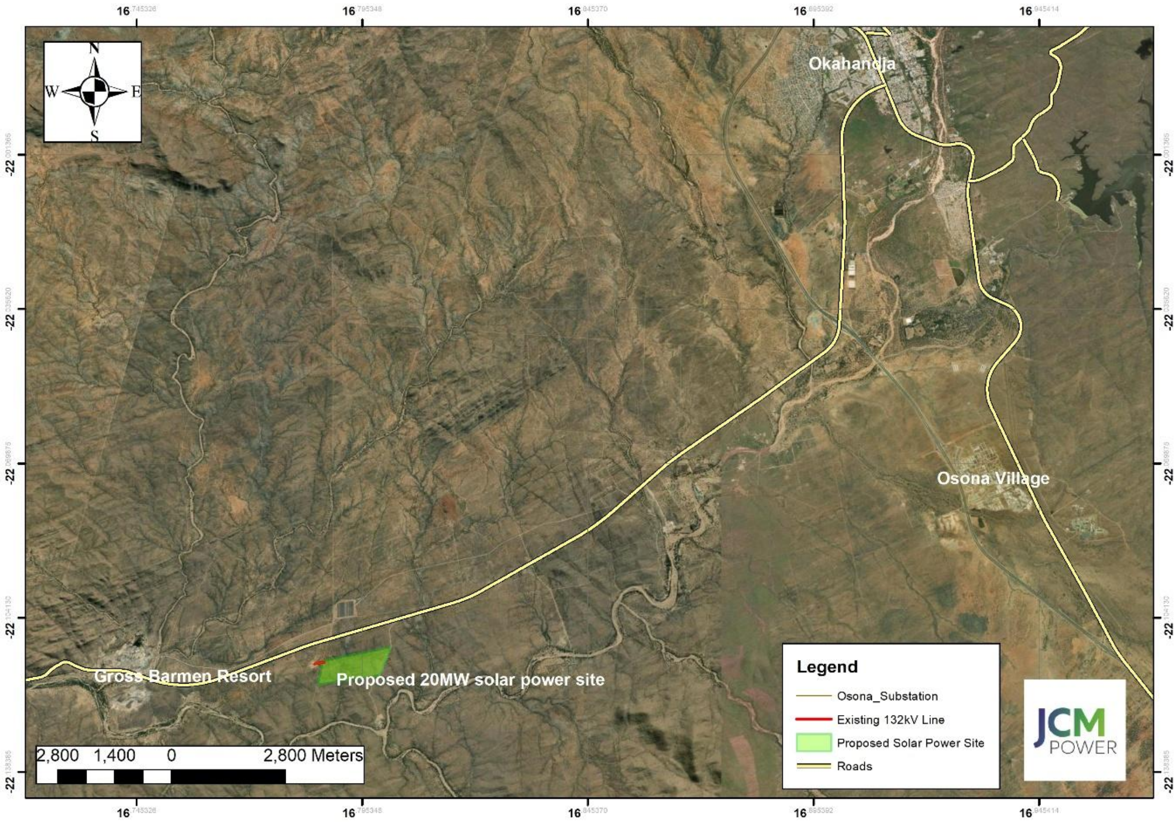

Figure 4. The location map of the 20MW solar power plant in proportion with the surrounding towns.

Within the Solar Plant Site, a network of internal access roads/tracks will be developed to service the various project components, including PV array blocks, inverter/transformer stations, laydown areas, and (where applicable) the grid connection corridor and onsite switching equipment. These internal roads will be designed to minimise land disturbance by following practical alignments, avoiding sensitive features such as drainage lines and erosion-prone areas, and limiting road widths to what is operationally necessary. During construction, the internal road network will facilitate efficient movement of materials, equipment, and personnel; during operations, it will provide reliable access for routine inspection, vegetation control, panel cleaning, and maintenance activities.

Project Phases (Osona 20 MW Solar PV Project)

1) Project Planning and Design Phase

This phase covers all pre-construction activities required to finalise the project footprint, approvals, and technical design. Key activities typically include:

- Finalisation of land access and tenure arrangements (purchase/sub-lease agreements, servitudes as required).
- Completion of required authorisations and permitting (including the ECC process), and incorporation of permit conditions into project planning.
- Detailed engineering design of the PV plant layout (array blocks, inverter/transformer locations, internal roads, drainage design) and the ~0.5 km grid connection to the Osona Substation.
- Grid studies and finalisation of interconnection requirements (protection, metering, SCADA, and connection agreement requirements as applicable).
- Final site surveys (topographic survey, geotechnical inputs where needed), constraint mapping (drainage lines, sensitive vegetation, heritage chance-find risk), and micro-siting to avoid sensitive receptors.
- Procurement planning, construction method statements, and appointment of contractors and environmental control personnel (ECO).

2) Site Preparation and Construction Phase

This phase includes establishment of the site and installation of all project infrastructure over an estimated ~10-month construction period. Key activities typically include:

- Site establishment: pegging, demarcation of the development footprint and no-go areas, setting up temporary laydown areas, site offices and ablutions, and temporary utilities.
- Vegetation clearing within the approved footprint (minimised), topsoil stripping and stockpiling, and limited earthworks/levelling where required.
- Construction of the ~300 m access road from the D1972 and development of internal access tracks to reach PV array blocks, inverter stations, and maintenance routes.
- Trenching and installation of underground cabling (DC and MV collection systems), earthing and lightning protection systems.

- Installation of PV mounting structures and PV modules, inverter/transformer stations, and (if applicable) onsite switching/substation equipment.
- Construction of the ~0.5 km transmission line and associated termination works at the Osona Substation (subject to final design).
- Installation of perimeter fencing, controlled access gates, signage, and security systems.
- Commissioning, testing, and energisation, including compliance checks against grid code and interconnection requirements.
- Progressive rehabilitation of temporarily disturbed areas and implementation of erosion and dust controls throughout.

3) Operational Phase (Operations and Maintenance)

Once commissioned, the project will operate for a minimum of 20 years (with potential extension by agreement). The operational phase typically includes:

- Routine operation and performance monitoring (SCADA) and scheduled maintenance of modules, inverters, transformers, and switchgear.
- Panel cleaning and housekeeping (with water-efficiency measures and appropriate water sourcing).
- Vegetation management under and around arrays and along internal roads to reduce fire risk and maintain access.
- Inspection and maintenance of the transmission line/servitude (if overhead) and site drainage and erosion controls, particularly after storm events.
- Waste management (general and hazardous waste handling), and ongoing health, safety, and environmental compliance monitoring.
- Security management, access control, and stakeholder communication/grievance handling where relevant.

4) Decommissioning and Rehabilitation Phase

At end-of-life (or upon earlier closure), the plant would be decommissioned and the site rehabilitated in accordance with approvals and the EMP. Typical activities include:

- Safe isolation of the facility and removal of PV modules, mounting structures, cables (where feasible), inverters, transformers, and associated electrical infrastructure.
- Dismantling/removal of ancillary infrastructure (fencing, buildings/containers, foundations where practicable) and management of all wastes.
- Recycling and take-back where feasible (modules, metals, cables) and licensed disposal for non-recyclables and hazardous materials.
- Recontouring of disturbed areas, replacement of topsoil, erosion stabilisation, and revegetation using locally appropriate indigenous species.
- Post-decommissioning monitoring (as required) to confirm rehabilitation stability and acceptable land capability for future use.

Activity Alternatives

No-Go Alternative

Under the no-go alternative, the proposed solar PV facility and associated grid connection would not be developed. This would avoid all direct construction and operational impacts (e.g., vegetation clearance, dust, erosion risk, waste generation, traffic, and visual change). However, the no-go option would also forgo the project's benefits, including additional domestic generation capacity, associated investment, employment opportunities, and contributions to renewable energy supply into the national grid. For this reason, the no-go alternative is not preferred, provided that identified impacts can be mitigated to acceptable levels through design refinement and EMP implementation.

Technology / Design Alternatives (PV plant configuration)

Fixed-tilt PV arrays vs single-axis tracking systems:

- *Fixed-tilt* systems generally have lower mechanical complexity and potentially lower maintenance requirements, with a simpler operational profile.
- *Single-axis trackers* can increase energy yield but may require more moving components and maintenance, and can influence layout spacing and ground disturbance patterns.
  The preferred option will be confirmed at detailed design stage, guided by energy yield, lifecycle costs, and potential environmental footprint, while ensuring that stormwater flow paths and sensitive habitat features are not adversely affected.

Electrical System Architecture Alternatives

Central inverters vs string inverters:

- Central inverter systems may reduce the number of inverter units but can require larger equipment pads and concentrated maintenance activities.
- String inverter systems distribute conversion across the site, potentially reducing single-point failures but increasing the number of units and service points.
  The selected architecture will be based on performance, reliability, maintenance needs, and the ability to minimise disturbance (including trenching and equipment footprint).

Grid Connection Alternatives (connection method)

Overhead vs underground connection (where technically feasible):

- *Underground cabling* can reduce visual impacts and bird collision risk but may increase trenching-related disturbance and require careful erosion and rehabilitation controls.
- *Overhead lines* typically require less ground disturbance during installation but may increase visual exposure and avifauna interaction risk and require a defined servitude with ongoing vegetation management.
  For the Osona project, the grid connection is short (~0.5 km), which increases the feasibility of routing options that minimise environmental footprint. Final selection will be informed by the connection requirements at the Osona Substation and feasibility studies.

Construction Method Alternatives

Reasonable alternatives considered to reduce construction impacts include:

- Minimising vegetation clearing through selective clearing rather than blanket clearing.
- Using existing tracks as far as practicable to reduce new road proliferation.
- Limiting earthworks through micro-siting of arrays and equipment pads on the most level ground.
- Implementing alternative stormwater controls (e.g., contour berms, cut-off drains, energy dissipaters) tailored to local drainage and erosion risk.

Water Use Alternatives (panel cleaning and dust control)

- Dry cleaning / robotic cleaning vs wet washing (where feasible) to reduce water demand.
- Controlled wet washing with water efficiency measures where dust loading requires washing.
  The preferred approach will reflect local water availability and practicality, while ensuring no contamination and appropriate runoff management.

Layout / Footprint Alternatives within the Approved Site

Within the 89 ha parcel, layout alternatives are evaluated to reduce impacts by:

- Avoiding drainage lines and low-lying areas prone to ponding.
- Maintaining buffers around sensitive vegetation or habitat features.
- Concentrating laydown areas and construction camps on already disturbed/low-value areas.
- Positioning the grid corridor to align with existing disturbed routes where feasible.

2. Location Alternatives

2.1 Site Location Alternatives (regional and local siting)

Location alternatives consider whether the project could reasonably be developed on other sites within the broader Osona–Okahandja area (or elsewhere) that could provide comparable grid access, solar resource, land availability, and logistical feasibility. In practice, solar PV site selection is constrained by:

- Proximity to suitable grid infrastructure and substation capacity,
- Land availability and tenure/security of access,
- Terrain suitability (slope/earthworks requirements),
- Environmental constraints (drainage systems, sensitive habitats, heritage),
- Access to roads for construction logistics.

The selected Osona site is preferred primarily due to its proximity to the Osona Substation (short grid tie), access via existing regional roads, and a land tenure arrangement that enables development of the defined footprint. Alternative regional sites would likely require longer transmission lines and/or additional access infrastructure, increasing both cost and potential environmental disturbance.

2.2 Micro-Siting Alternatives (within the Osona site)

Given that a practical "location alternative" often exists within the same land parcel, micro-siting is treated as a formal location alternative. The following location refinements are applied to reduce impacts:

- Drainage line and riverbed buffers: PV arrays, roads, and the transmission alignment are positioned to avoid ephemeral drainage features and the nearby sand extraction riverbed area, where applicable.
- Terrain optimisation: Array blocks are preferentially placed on the flattest areas to avoid cut-and-fill earthworks on minor hills.
- Vegetation sensitivity: Areas with denser natural Acacia stands or mature trees are avoided where feasible to reduce biodiversity impacts and clearing volumes.

- Separation distances: Where relevant, setbacks are maintained from neighbouring activities (e.g., the sand mining area) and from public roads to manage safety, dust, and visual exposure.
- Servitude optimisation: The ~0.5 km transmission route is aligned to minimise new disturbance and avoid sensitive features, using existing disturbed corridors where feasible.

2.3 Access Location Alternatives

Access alternatives focus on reducing road impacts by:

- Using the existing D1972 entry as the primary access route.
- Siting the ~300 m access road to avoid drainage crossings and erosion-prone soils.
- Aligning internal access routes to follow natural contours and minimise fragmentation of vegetation.

Technology Alternatives (How the Project is Built and Operated)

Technology alternatives consider reasonable variations in the PV system and associated infrastructure that could influence environmental footprint, operability, and impact significance. For the Osona Project, the following technology options are typically relevant:

2.1 PV Array System: Fixed-Tilt vs Single-Axis Tracking

- Fixed-tilt mounting structures
    - *Advantages:* simpler mechanical design, lower maintenance demand, generally lower risk of mechanical failure, potentially reduced disturbance associated with fewer moving components.
    - *Environmental considerations:* can allow tighter layouts but still requires careful drainage management to prevent flow concentration; typically predictable footprint.
- Single-axis tracking systems
    - *Advantages:* higher energy yield per installed capacity, potentially improving project economics and energy delivery.

  - *Environmental considerations:* may require different row spacing and can alter runoff patterns under panels; increased mechanical complexity may increase maintenance traffic and parts replacement over time.

Preferred approach (typical): Both are feasible; the preferred option is determined at detailed design based on yield, cost, and the ability to maintain stable stormwater pathways and minimise earthworks. Fixed-tilt is often favoured where simplicity and reduced operational complexity are priorities, while trackers are favoured where maximising yield is critical.

2.2 Inverter Configuration: Central vs String Inverters

- Central inverters
  - *Advantages:* fewer units, consolidated maintenance areas.
  - *Environmental considerations:* larger equipment pads and more concentrated activity in fewer locations; can simplify cabling routes.
- String inverters
  - *Advantages:* modular, distributed conversion, resilience to single-point failures.
  - *Environmental considerations:* more units distributed across the site, potentially increasing minor service access needs but sometimes reducing the size of individual pads.

2.3 Grid Connection Technology: Underground vs Overhead (for the ~0.5 km link)

- Underground cable
  - *Advantages:* reduced visual impact, reduced bird collision risk, less long-term vegetation management in the servitude.
  - *Environmental considerations:* trenching creates short-term soil disturbance and erosion risk; requires strict topsoil management and rehabilitation.
- Overhead line
  - *Advantages:* typically faster installation and potentially less trenching disturbance; easier fault detection/repair.

- *Environmental considerations:* visual intrusion, potential avifauna interaction risk, and ongoing servitude vegetation management.

Osona-specific note: Because the connection is short (~0.5 km), undergrounding is often more feasible than for long-distance lines, but the final choice must align with substation requirements, technical standards, and feasibility study outcomes.

2.4 Panel Cleaning Technology: Dry vs Wet / Water-Efficient Methods

- Dry cleaning (brush/robotic)
    - reduces water demand and wastewater management needs.
- Wet washing
    - may be required during high dust periods; should be managed with water efficiency measures and controls to avoid runoff contamination and erosion.

No-Action / No-Go Alternative

The No-Action (No-Go) alternative assumes that the proposed Osona 20 MW Solar PV Project (including the ~0.5 km grid connection to the Osona Substation and associated access/internal roads) does not proceed.

Implications and outcomes:

- Environmental: All direct project-related impacts are avoided, including vegetation clearing, soil disturbance and erosion risk, dust and noise during construction, traffic-related risks, waste generation, and any potential avifauna interactions linked to grid connection infrastructure.
- Socio-economic: The project's positive benefits are not realised, including the USD 35 million investment, approximately 200 construction jobs, approximately 20 operational jobs, local procurement opportunities, and associated skills transfer.
- Energy system: No additional renewable generation capacity is added at this location, and the opportunity to supply electricity under the PPA to the national grid via the Osona Substation is foregone.

Policy and Legal Framework

This EIA is prepared within the statutory and administrative framework governing environmental assessment and authorisations in Namibia, with specific relevance to a grid-connected 20 MWac solar PV facility and associated short transmission connection. The framework below summarises the primary "decision" instruments (EIA/ECC) and the key sectoral laws typically triggered by solar PV development, construction activities, and grid interconnection.

1) Primary EIA and ECC legislation (core decision framework)

- Environmental Management Act, 2007 (Act No. 7 of 2007) – establishes Namibia's environmental management principles, the Environmental Commissioner, and the requirement for environmental assessment and environmental clearance for listed activities.
- Environmental Impact Assessment Regulations, 2012 (GN 30 of 2012; GG 4878) – sets out the procedural requirements for screening, scoping/EIA reporting, public participation, decision-making, and compliance monitoring linked to the Environmental Clearance Certificate (ECC) process.
- The competent authority for ECC decision-making is the Office of the Environmental Commissioner (within the Ministry of Environment, Forestry and Tourism), and submission/processing is commonly administered via the national ECC portal and guidance documentation.

Relevance to the Project: The solar PV plant, associated access/internal roads, construction activities, and the ~0.5 km transmission line are assessed against these requirements, and the EIA/EMP provides the basis for ECC decision-making and conditions.

2) Electricity sector and grid interconnection regulation

- Electricity Act, 2007 (Act No. 4 of 2007) – provides for licensing and regulatory oversight of electricity generation, transmission and supply, and establishes the sector regulator (historically the Electricity Control Board).

- Electricity regulatory instruments and technical rules may apply to grid connection design, protection, metering, and operational compliance (as issued/updated by the sector regulator).

Relevance to the Project: The Project's PPA and connection arrangements (including protection, metering, and SCADA/communications) must align with the applicable requirements and approvals for interconnection to the grid.

3) Water resources, pollution prevention, and drainage protection

- Water Resources Management Act, 2013 (Act No. 11 of 2013) – provides for water resource management, water pollution control, and licensing/authorisation requirements related to abstraction, effluent, and protection of water resources.

- Water Act, 1956 (Act No. 54 of 1956) – remains commonly referenced in practice for groundwater abstraction controls and pollution-related provisions, pending full transition to newer arrangements where applicable.

Relevance to the Project: Water sourcing for construction and panel cleaning, prevention of hydrocarbon/chemical contamination, and management of stormwater/runoff (particularly around ephemeral drainage features and any nearby riverbed disturbance) must comply with water resource protection duties.

4) Biodiversity, vegetation clearing, and natural resource protection

- Forest Act, 2001 (Act No. 12 of 2001) – regulates protection and management of forest resources and provides controls relevant to the cutting/damage of protected vegetation and forest produce.

- Nature Conservation Ordinance, 1975 (Ordinance No. 4 of 1975) – provides for protection of wild fauna and flora and the declaration/management of protected areas and regulated species.

Relevance to the Project: Given the site's natural Acacia-dominated vegetation, the EIA/EMP must address footprint minimisation, avoidance of sensitive habitats, and controls for vegetation clearance, rehabilitation, and protected species encounters.

5) Heritage and archaeology

- National Heritage Act, 2004 (Act No. 27 of 2004) – provides for protection of heritage resources and permitting/management requirements where sites, graves, artefacts, or heritage places may be affected.

Relevance to the Project: A chance-finds procedure and stop-work protocol must be embedded in construction management, with permitting triggered if heritage resources are identified.

6) Hazardous substances, fuels, and chemical safety

- Hazardous Substances Ordinance, 1974 (Ordinance No. 14 of 1974) – regulates controlled hazardous substances and safe handling requirements relevant to fuels, oils, solvents, and other controlled products.

Relevance to the Project: Bunded storage, spill prevention, emergency response, and compliant transport/handling procedures are required for diesel, lubricants, transformer oils (where applicable), and any controlled substances.

7) Labour, occupational health and safety, and workforce management

- Labour Act, 2007 (Act No. 11 of 2007) – establishes labour rights and employer obligations, relevant to a large construction workforce and contracted employment arrangements.

Relevance to the Project: The EMP should interface with contractor HSE systems, worker welfare provisions, grievance mechanisms, and lawful employment practices for the ~200 construction workforce and ~20 operational staff.

8) Traffic, abnormal loads, and road safety

- Road Traffic and Transport Act, 1999 (Act No. 22 of 1999) – provides the legal basis for traffic control, vehicle and driver requirements, and road transport regulation relevant to construction deliveries and abnormal loads.

Relevance to the Project: Construction logistics (module deliveries, transformer movements, civil material haulage) require a Traffic Management Plan, signage, speed controls, and compliance with any abnormal load permitting requirements.

9) Soil protection and erosion control (good practice and applicable instruments)

- Soil Conservation Act, 1969 (Act No. 76 of 1969) (as applied historically in Namibia) and associated regulations are often referenced for erosion control and land degradation prevention measures.

Relevance to the Project: Because the site is generally flat with local undulations and nearby riverbed sand extraction activity, stormwater, erosion, and sediment control measures must be explicit and enforced through method statements and monitoring.

10) Local authority requirements and permits

Depending on the final design and contracting approach, additional approvals may be required through competent authorities (e.g., building approvals for control rooms, waste disposal arrangements at licensed sites, firefighting access, and any municipal/interface permissions). These are typically captured in the project's legal register/compliance matrix and confirmed during detailed design and pre-construction permitting.

3. International Conventions and IFC Performance Standards

Introductory narrative

This EIA for the proposed Osona 20 MWac Solar PV Project (including the ~89 ha solar plant site and the associated ~0.5 km grid connection to the Osona Substation) is prepared to satisfy Namibia's statutory ECC decision-making requirements under the Environmental Management Act and the Environmental Impact Assessment Regulations. In addition, because renewable energy projects are increasingly subject to lender and investor environmental and social (E&S) due diligence, this EIA and the accompanying EMP have been structured to align with International Finance Corporation (IFC) Performance Standards (2012) as an international benchmark for managing E&S risks across the full project lifecycle (planning, construction, operation, and decommissioning). Namibia is also a party to multiple multilateral environmental agreements (MEAs); these international commitments inform national policy and regulatory expectations and are reflected in practical management requirements addressed through the mitigation hierarchy and EMP implementation.

Convention-by-convention relevance (project-specific)

Convention on Biological Diversity (CBD)

Relevance: The project will require site establishment, selective vegetation clearing, and long-term operations on a natural, Acacia-dominated commercial farm landscape. The CBD is relevant to the EIA through the need to avoid and minimise habitat loss, manage fragmentation, prevent invasive species introduction, and ensure rehabilitation success. The EMP therefore commits to micro-siting to avoid sensitive habitat features (e.g., drainage lines), minimised clearing, topsoil management, progressive rehabilitation, and post-construction monitoring.

CITES (Convention on International Trade in Endangered Species of Wild Fauna and Flora)
Relevance: While the project does not involve trade in wildlife, CITES is relevant as a compliance driver for protecting regulated fauna/flora that may occur in the broader area and preventing unlawful collection, harm, or removal by workers. The EMP addresses this via workforce inductions, strict "no-harvest/no-hunting" rules, wildlife encounter procedures, and incident reporting.

Ramsar Convention on Wetlands

Relevance: The site context includes a nearby riverbed area where small-scale sand extraction occurs south of the project site, indicating the presence of drainage features and sediment-sensitive environments. Even where no designated Ramsar site is present, the Ramsar principles are relevant to preventing downstream sedimentation and pollution via stormwater management, erosion controls, and maintaining natural flow paths across the generally flat site. The EMP therefore includes drainage buffers, erosion and sediment control measures, and post-storm inspection/maintenance requirements.

UNFCCC and the Paris Agreement

Relevance: Grid-connected solar PV is directly aligned with climate mitigation objectives by displacing higher-emission generation on the grid and strengthening energy system resilience. For the EIA, the relevance is twofold: (i) mitigation contribution (renewable generation), and (ii) climate risk screening and adaptation in design (extreme rainfall events and erosion, heat impacts on equipment, drought/water efficiency for panel cleaning, and fire risk management). Namibia's national climate reporting confirms its participation in the UNFCCC and Paris Agreement framework.

UNCCD (United Nations Convention to Combat Desertification)

Relevance: Construction activities (access road, internal roads, trenching, laydown areas) can increase erosion, dust, and land degradation if not well controlled—particularly in semi-arid settings. The EIA therefore emphasises minimised footprint, dust suppression, topsoil conservation, stabilisation of disturbed surfaces, and rehabilitation to prevent persistent bare ground and erosion scarring.

Basel Convention (hazardous wastes) and the Rotterdam/Stockholm Conventions (hazardous chemicals/persistent pollutants)

Relevance: The project will generate regulated waste streams during construction and operation (e.g., oily wastes, contaminated absorbents, chemical containers, and end-of-life electrical components). If battery storage is added in future, additional hazardous waste considerations apply. These conventions inform robust hazardous materials and waste management: bunded storage, spill prevention, waste segregation, licensed disposal/recycling, and manifest tracking for controlled waste

IFC Performance Standards compliance table

IFC Performance Standard (2012)	Applicability to Osona 20 MWac PV	Key project risks/issues	EIA/EMP instruments and commitments
PS1: Assessment and Management of E&S Risks and Impacts	Applies	Integrated E&S risk identification; alternatives; stakeholder engagement; monitoring and adaptive management	EIA + EMP; impact register (pre/post mitigation); alternatives assessment; stakeholder engagement plan; issues & responses register; grievance mechanism; compliance monitoring and reporting
PS2: Labour and Working Conditions	Applies (high relevance)	Construction workforce (~200) labour conditions; OHS; contractor management	Labour and OHS requirements in contractor contracts; induction and training; worker welfare; incident reporting; worker grievance channel; H&S plans aligned with EMP
PS3: Resource Efficiency and Pollution Prevention	Applies	Dust; erosion/sedimentation; hazardous materials (fuels/oils); waste; water use for dust suppression/panel cleaning	Dust management; stormwater/erosion controls; bunded storage and spill response; waste segregation and manifests; water efficiency measures; pollution prevention procedures
PS4: Community Health, Safety, and Security	Applies	Traffic safety (A1/D1972 access); public safety around HV equipment; emergency response; security conduct	Traffic Management Plan; signage and speed controls; controlled access and fencing; emergency preparedness (fire/spill); security protocols proportionate to risk; stakeholder communication
PS5: Land Acquisition and Involuntary Resettlement	Likely limited, but screen	Land access via private land purchase/sub-lease; potential economic displacement (if any users are affected)	Document willing-buyer/willing-seller (or lease) arrangement; confirm no physical displacement; screen for economic displacement; implement livelihood mitigation only if a PS5 trigger is identified

IFC Performance Standard (2012)	Applicability to Osona 20 MWac PV	Key project risks/issues	EIA/EMP instruments and commitments
PS6: Biodiversity Conservation and Sustainable Management of Living Natural Resources	Applies	Vegetation clearance (Acacia-dominated natural vegetation); habitat fragmentation; invasive species; avifauna interaction (if overhead line)	Micro-siting and no-go areas; buffers to drainage lines; vegetation clearing controls; rehabilitation plan and success criteria; invasive species management; avifauna measures (line marking/undergrounding where feasible)
PS7: Indigenous Peoples	Apply only if triggered	Presence of communities meeting PS7 definition and project effects	Screening in stakeholder baseline; targeted engagement measures only if PS7 criteria are met
PS8: Cultural Heritage	Applies (screen + chance finds)	Archaeological materials or graves discovered during earthworks	Chance Finds Procedure; stop-work protocol; notification to competent authority; controlled access to finds; re-routing/micro-siting if required

International Lender Standards

The Osona 20 MWac Solar PV Project is being developed in line with the environmental and social (E&S) standards and guidelines commonly applied by international financial institutions (IFIs) and project financiers. In practice, this means the Project's EIA and EMP are structured to demonstrate Good International Industry Practice (GIIP) through systematic risk identification, application of the mitigation hierarchy, stakeholder engagement, and lifecycle management (planning, construction, operation, and decommissioning). The principal lender reference frameworks typically applied to renewable energy and associated transmission infrastructure include the IFC Performance Standards (2012), supported by the World Bank Group Environmental, Health and Safety (EHS) Guidelines (General and sector-specific), and, where applicable to the financing structure, the Equator Principles (EP4) as the benchmark adopted by many commercial project finance institutions.

IFC Performance Standards (2012)

The Project is being developed to align with the **International Finance Corporation Performance Standards on Environmental and Social Sustainability (2012), which define the E&S outcomes expected for projects financed under IFC/IFI-aligned approaches. These standards require an integrated Environmental and Social Management System (ESMS) approach under PS1, with additional standards applied depending on risk triggers (e.g., labour and working conditions; pollution prevention; community health and safety; biodiversity; cultural heritage).

Implication for Osona: the EIA/EMP must show traceable commitments for (i) contractor EHS control and worker welfare (construction workforce), (ii) pollution prevention and waste management (fuels/oils, spill control), (iii) traffic and public safety (A1/D1972 interface), (iv) biodiversity management and rehabilitation (natural Acacia vegetation), and (v) a chance-finds procedure for heritage.

World Bank Group EHS Guidelines (GIIP)

The Project is being designed and will be implemented consistent with the World Bank Group General EHS Guidelines and relevant sector guidelines. The EHS Guidelines provide technical performance levels and measures that represent GIIP, commonly used by IFIs to benchmark environmental performance, occupational health and safety, community health and safety, and pollution prevention.

Given the Project includes a short grid connection, the EHS Guidelines for Electric Power Transmission and Distribution are also relevant to the design and management of the ~0.5 km transmission connection (e.g., electrical safety, working at heights if overhead, right-of-way/servitude management, and community safety near energized infrastructure).

Implication for Osona: the EMP should explicitly incorporate GIIP controls for dust/noise, erosion and stormwater management, hazardous materials handling and bunding, waste segregation and licensed disposal, traffic management, emergency preparedness (fire/spill), and occupational safety procedures for electrical and construction activities.

Equator Principles (EP4)

Where the Project is financed under project finance or related structures involving Equator Principles Financial Institutions, the Project will be screened and managed in accordance with the Equator Principles (EP4, 2020). EP4 requires the client to develop and implement an appropriate E&S management system and action plan for Category A/B projects, with disclosure and ongoing monitoring expectations aligned to the IFC Performance Standards and World Bank Group EHS Guidelines as the technical reference point.

Implication for Osona: documentation packages typically expected by EP4-aligned lenders include an EIA/ESIA, an EMP/ESMP (and where relevant a Lender's Environmental and Social Action Plan), stakeholder engagement documentation (including a grievance mechanism), and periodic compliance reporting during construction and operations

Environmental and social setting

Physical Baseline

3..1 Climate and meteorology

The project lies within the semi-arid interior of central Namibia, broadly characterised as hot semi-arid steppe (BSh). Long-term climate summaries for the broader Okahandja area indicate a mean annual temperature of ~21.5 °C and mean annual rainfall on the order of ~360–374 mm, with rainfall strongly seasonal and concentrated in the summer months. The rainy period typically extends from roughly November into April/early May, with the highest monthly rainfall commonly occurring in mid-summer (around January–February). Meteorologically, the dry season is associated with low humidity and elevated dust potential, while the wet season is dominated by convective storm events that can generate short-duration, high-intensity runoff—an important design consideration for erosion and stormwater controls.

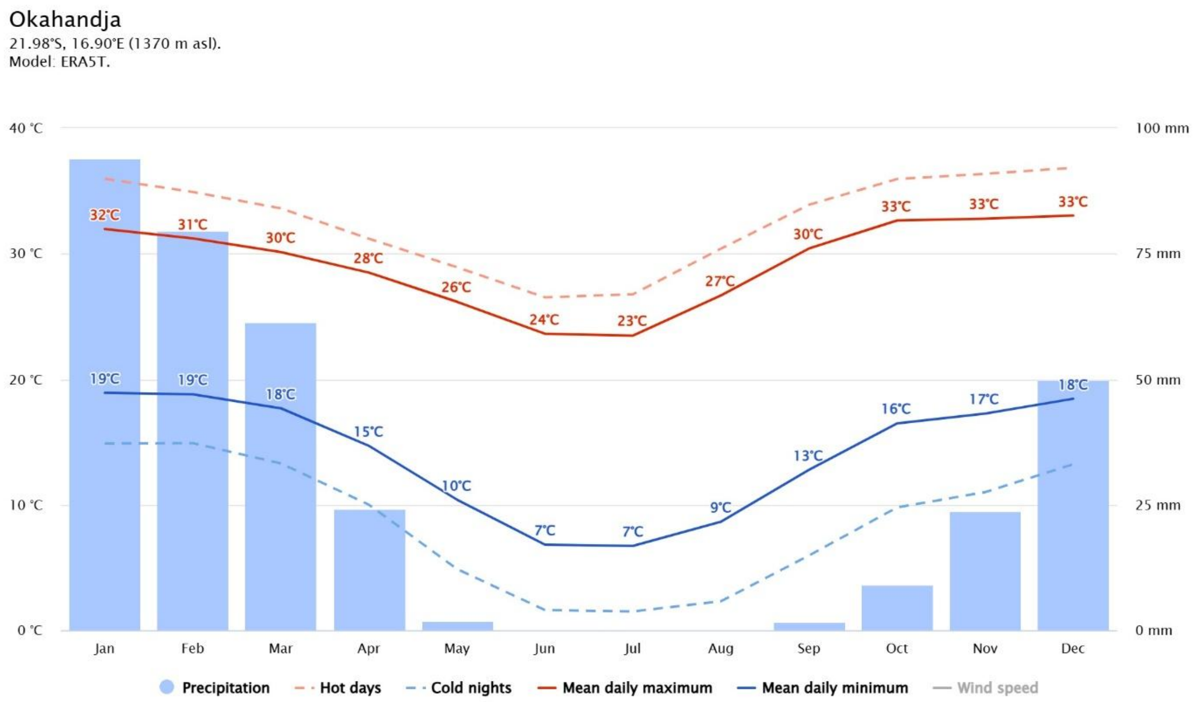

Figure 5. The climatic graphs of Okahandja which is the closest major town to the project.

3..2 Air quality

Baseline air quality in the project's rural/agricultural setting is generally expected to be good, with particulate matter (dust) representing the primary pollutant of concern in semi-arid Namibia. National pollution evidence and project-relevant Namibian studies emphasise that dust, fires, and windblown particulates are key contributors to air-quality risk, particularly where exposed soils and unpaved roads are present. At the project scale, existing dust sources are likely to include unpaved access roads, vehicle movement along local routes, dry-season wind entrainment from disturbed surfaces, and the nearby riverbed sand extraction activity south of the site. Construction activities (clearing, grading, trenching, haul traffic) will temporarily elevate dust levels unless managed through standard controls (water suppression, speed limits, stabilisation of disturbed areas, and progressive rehabilitation).

3..3 Noise

The baseline noise environment is typical of a low-density rural setting, expected to be generally quiet with intermittent sources such as passing traffic along the regional road network (including the nearby A1 road and the D1972 road), occasional farm-related activity, wind-related ambient noise, and periodic truck movements associated with the local sand extraction and construction supply chain. During construction, noise levels will increase temporarily due to earthmoving equipment, trucks, and construction crews; during operations, noise is typically low and localised (inverters/transformers and occasional maintenance traffic), provided equipment is properly specified and maintained.

3..4 Geology

The geological map indicates that the proposed **Osona 20 MW solar power plant footprint** (black polygon) is located predominantly on the **Kuiseb Formation of the Khomas Complex** (mapped as **NKs(ss)** and shown as the dominant green unit), which implies a largely **bedrock-controlled setting** typical of metamorphosed metasedimentary terrain with variable weathering profiles and locally shallow rock. In practical engineering terms, this means founding conditions across the ~90 ha footprint are likely to be **spatially variable**, with some areas characterised by shallow, competent rock or hard layers close to surface (potentially increasing the likelihood of pile refusal or requiring pre-drilling in places), and other areas underlain by thicker zones of weathered rock and soil; accordingly, earthworks and foundation installation should be planned with allowance for changing excavation effort and localised design adjustments. The map also shows a prominent sinuous corridor of **Alluvium (Qa)** associated with an ephemeral drainage system located to the south of the site; although the PV footprint is not positioned directly on the alluvium, the proximity of this drainage feature is environmentally significant because it highlights a clear pathway for **stormwater concentration, erosion, and sediment transport** if natural flow paths are disrupted or if internal roads and pads are not provided with appropriate cross-drainage.

Figure 6. The Kuiseb Formation schist which is one of the dominant lithologies on the proposed site.

A small occurrence of **Donkerhoek Granite (EgDh)** is mapped toward the northwest of the broader area and does not appear to control the geology within the proposed polygon; however, its presence in the surrounding terrain reinforces the likelihood of strong, locally shallow bedrock conditions and may influence excavation characteristics along any access or ancillary works that extend toward that unit. Overall, the geological context supports an EMP and design emphasis on strict footprint discipline (to avoid unnecessary disturbance), minimised and controlled topsoil stripping where required, careful management of compaction through route control, and robust stormwater and erosion controls—including early installation of diversion drains, stable road crossings, and post-rainfall inspections—to prevent rilling, gullying, and sediment delivery toward the alluvial corridor, while also reinforcing the need for stringent pollution prevention measures (bunded storage, designated refuelling, spill response readiness) to avoid any migration of contaminants toward higher-permeability alluvial environments.

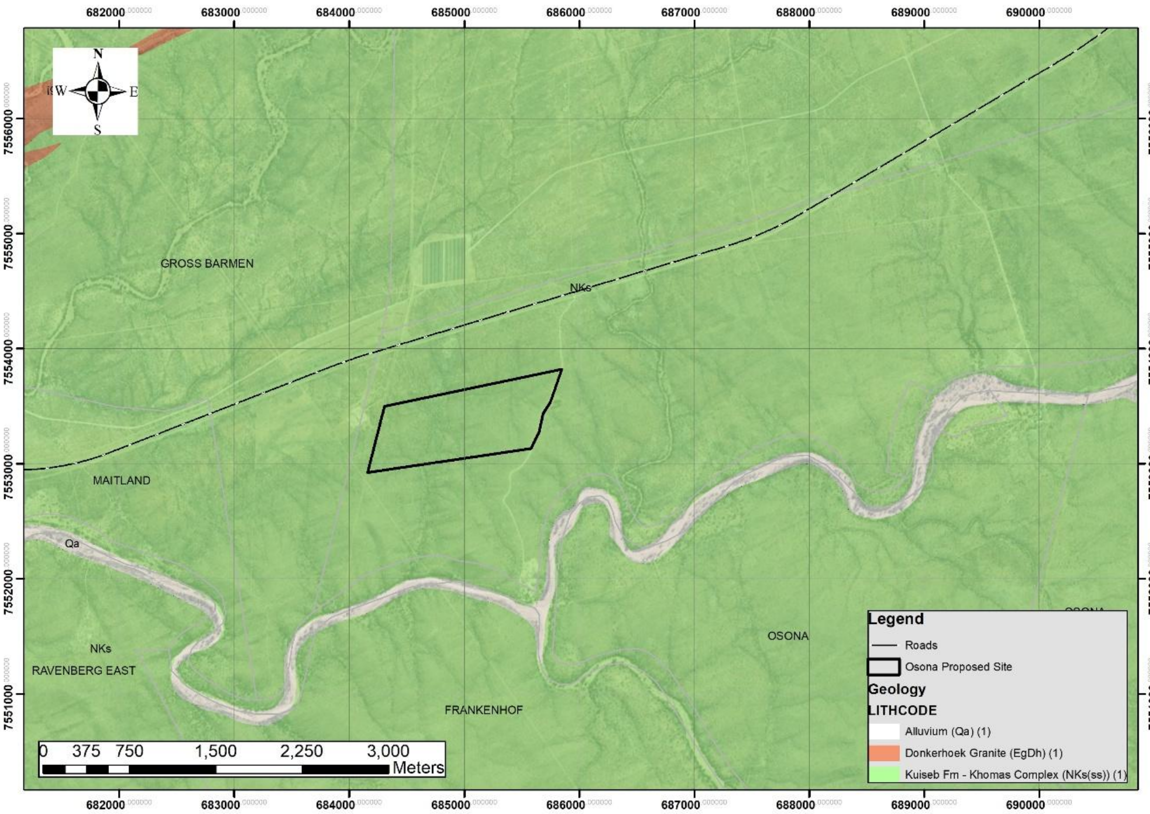

Figure 7. The geological map of the proposed site.

From an EIA perspective, the key geological relevance is the influence of bedrock and surficial materials on (i) foundation conditions for mounting structures, (ii) erodibility and sediment yield from disturbed soils, and (iii) the behaviour of ephemeral drainage features that may contain alluvial materials. The detailed geotechnical/geological suitability for foundations and trenching should be confirmed through final design surveys and, where required, targeted geotechnical investigation.

3..5 Topography

The topographic setting of the Osona project area shows a broad relief gradient from lower-lying terrain in the west and south-west (mapped in darker blue tones) toward relatively higher and more locally rugged ground in the east and south-east (green to yellow/brown highs), with runoff therefore expected to preferentially migrate toward a dominant, sinuous **ephemeral drainage corridor** that traverses the central part of the area. The proposed PV footprint is located on relatively low to mid-low terrain adjacent to (but not within) this main channel/floodplain system, meaning that while the site is generally suitable for PV development in terms of gentle regional relief, it remains hydraulically connected to the principal stormflow pathway and is therefore sensitive to any construction activities that concentrate flow, block sheet drainage, or destabilise channel margins.

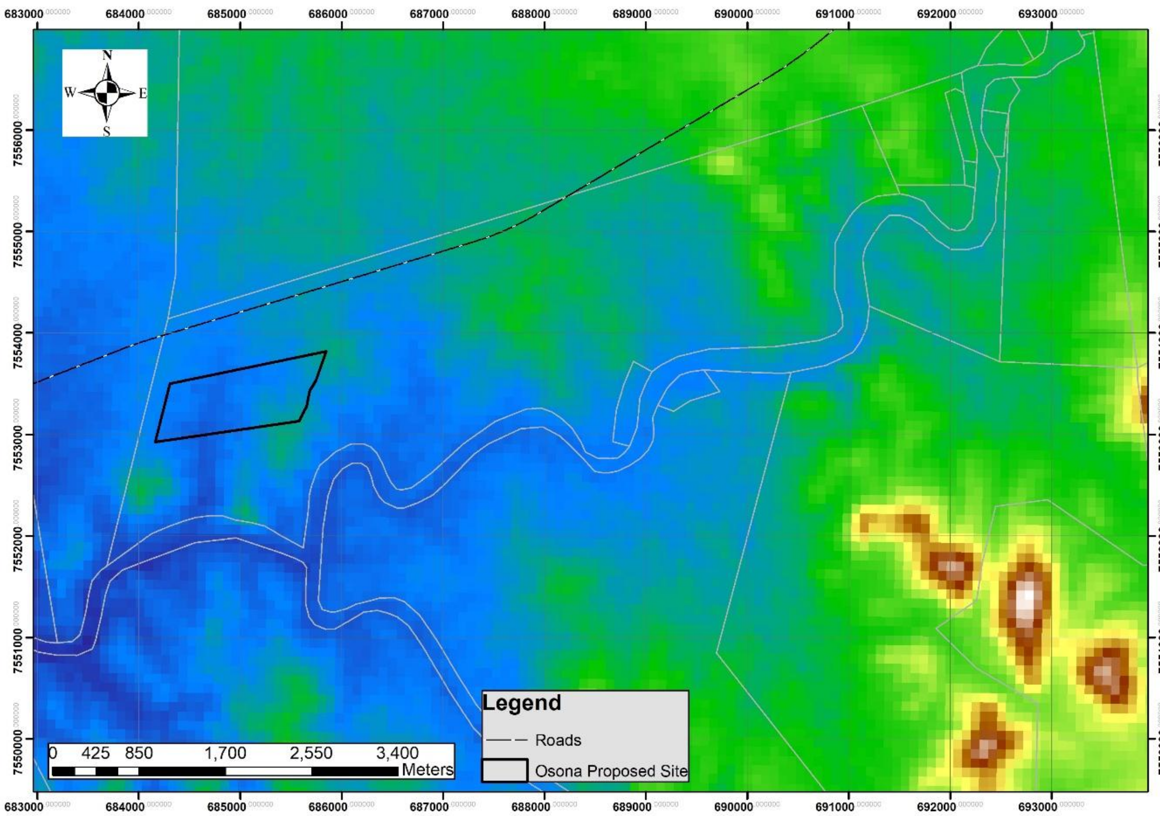

Figure 8. The topographical map of the Osona Solar Power Plant site

Consequently, the EMP requires strict protection of natural flow paths through the establishment and enforcement of **drainage buffers/no-go zones**, avoidance of construction laydown, refuelling, and hazardous storage within runoff pathways, and early implementation of **stormwater and erosion controls** (including cut-off drains/berms on up-gradient edges of disturbed areas, stable cross-drainage structures where internal roads intersect runoff routes, and energy dissipation/armouring at inlets and outlets where required). To prevent rilling, gullying, and sediment delivery to the ephemeral channel, disturbed surfaces shall be progressively stabilised and rehabilitated, and the SEO shall undertake routine inspections with mandatory **post-rainfall inspections** to identify erosion initiation, blocked drainage, or ponding; any evidence of concentrated flow, scour, sediment movement off disturbed areas, or erosion along drainage margins shall trigger immediate corrective actions and CAPA close-out in accordance with Annexure MM-01 monitoring indicators and repair timeframes.

3..6 Soils and land use

The ground surface at the Osona site appears to be a **coarse-textured, gravelly sandy soil** (a "desert pavement" type surface) with abundant **pebbles/cobbles** and **very little visible fines/organic matter**, and with **shallow, discontinuous soil cover over weathered rock** (several rock fragments/outcrop-like pieces are visible). In practical terms, this suggests a **well-drained substrate** with generally **high infiltration capacity**, but with **low cohesion** in the fine fraction—meaning that when the surface is disturbed (clearing, grading, trenching, traffic), it can become **highly erodible** by both wind (dust) and water (rilling) because the stabilising gravel "armour" and crust are broken.

Figure 9. A photo of the typical top soil observed on the proposed site.

The thin topsoil component implied by the coarse surface also means there is likely **limited recoverable topsoil** for rehabilitation, so stripping should be **minimised and targeted only where necessary**, stockpiles kept small and protected, and disturbed areas stabilised quickly to avoid loss of the fine fraction. For foundations and trenching, the abundance of gravels and possible shallow bedrock indicates **variable excavation conditions** (hard digging in places; potential pile refusal zones), so the project should expect localised pre-drilling or alternative founding solutions in some areas. From an EMP perspective, the soil type reinforces the need for strict **route discipline** (to prevent widespread compaction and surface break-up), **dust controls** during dry/windy periods, and robust **stormwater/erosion controls** (early diversion berms/cut-off drains, stable cross-drainage at roads, and post-rain inspections) to prevent disturbed areas from shedding sediment into adjacent drainage corridors.

3..7 Surface water and drainage

topographic interpretation showing a dominant ephemeral drainage corridor near the proposed Osona footprint, the site context is clearly influenced by an **active (seasonal) drainage system** with a defined channel, low-flow pathway and evidence of recent or periodic flow. The image shows a broad, shallow channel with a **fine-grained bed** and **standing or slow-moving residual water** in places, bounded by **coarse gravel/stone berms or levee-like banks** that appear to confine and direct flow along the channel. The presence of greener, denser vegetation along the margins indicates **higher soil moisture** and recurrent inundation relative to surrounding ground, which is consistent with an ephemeral river or drainage line that becomes hydraulically active after rainfall events and can sustain moisture for some time thereafter. This aligns with the earlier mapping that identified an alluvial (Qa) corridor and meandering drainage feature in the area, confirming that stormwater runoff is organised into a main conveyance route that will carry flow, sediment, and debris during intense storms.

Figure 10. Some of the local drainages observed within the surrounding area.

For EMP and design purposes, this means the project must treat drainage as a primary risk pathway, even where the PV array is not placed directly within the channel. Internal roads, cable trenches, and pads can unintentionally **intercept sheet flow** and redirect it toward the channel, increasing **flow velocity**, **bank erosion**, and **sediment delivery** into the drainage system. Therefore, the project shall maintain strict **no-go buffers** to the channel and its active floodplain, avoid any placement of laydown areas, refuelling zones, hazardous storage or waste storage in or near runoff pathways, and design site drainage to preserve natural flow dispersion. Early stormwater controls are essential, including **cut-off drains/berms** upslope of disturbed areas to divert clean runoff around work zones, **cross-drainage structures** (culverts/armoured drifts) at any necessary road crossings sized for storm events, and **energy dissipation and erosion protection** at inlets/outlets to prevent scour. Routine inspections, and mandatory **post-rainfall inspections**, should focus on identifying blocked drainage, overtopping at crossings, rilling/gullying on disturbed surfaces, and any signs of sediment plumes entering the channel; any such evidence must trigger immediate corrective action and CAPA close-out in accordance with the Mitigation & Monitoring Table (MM-01).

3..8 Groundwater

The hydrogeological map for the Osona area shows a **two-domain groundwater setting** controlled by (i) a broad **alluvial / porous aquifer corridor** and (ii) surrounding **metamorphic bedrock aquifers**, with an additional structural control from a mapped **fault**. The map's blue band represents a linear zone of **moderate groundwater potential associated with porous aquifers**, which is spatially consistent with the main drainage/alluvial corridor you identified earlier (the meandering ephemeral channel). These alluvial deposits (labelled *Alluvium*) typically comprise sands and gravels with comparatively **higher primary porosity and permeability**, meaning groundwater occurrence is more continuous and borehole yields are generally **better and more predictable** than in the surrounding bedrock. In contrast, the beige background represents **low to moderate groundwater potential** within **metamorphic rocks (including quartzite and marble bands)**, where groundwater is typically stored and transmitted through **fractures, joints, weathered zones, and lithological contacts**, resulting in more variable yields and greater sensitivity to local structure and weathering thickness.

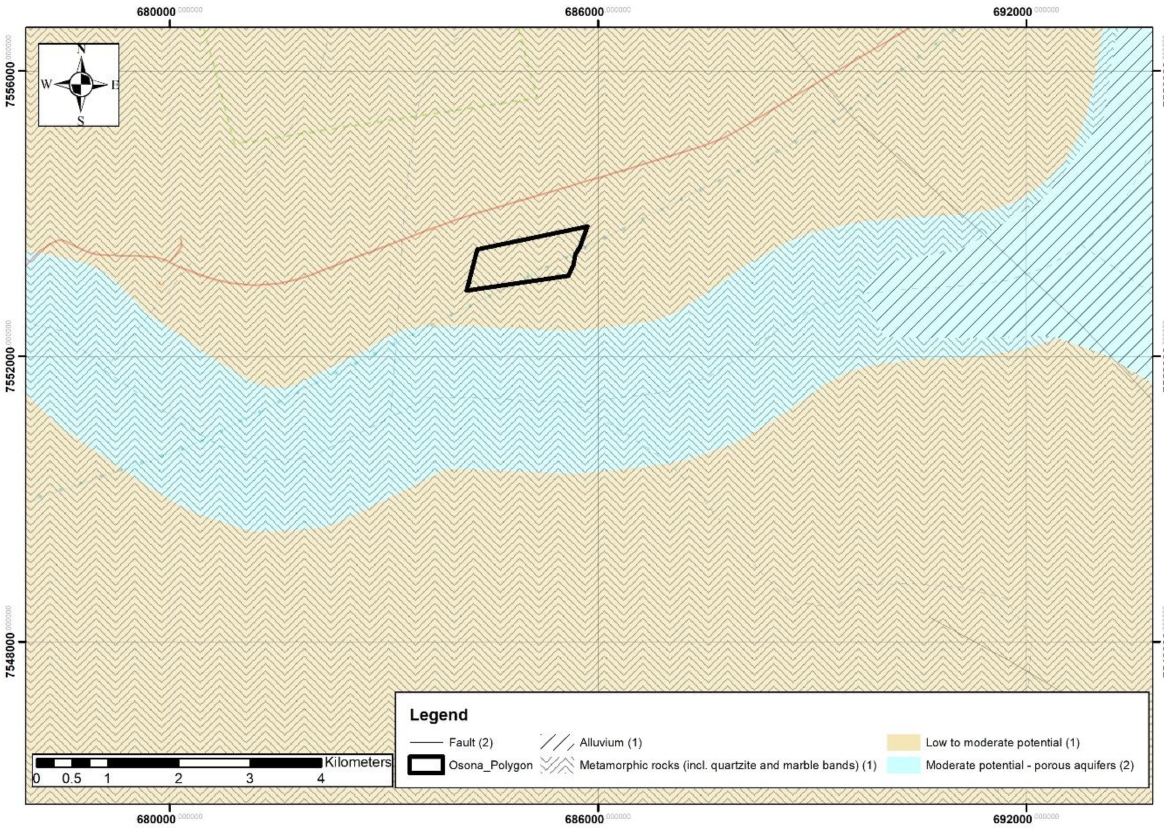

Figure 11. The hydrogeological map of the Osona proposed site.

The proposed solar site polygon lies predominantly within the **low to moderate potential bedrock domain**, but it is positioned **very close to the boundary** of the blue alluvial/porous aquifer corridor. This means the site itself is likely to have **variable but generally modest groundwater prospects** typical of fractured metamorphic terrain, while the nearby alluvial corridor represents a **more favourable groundwater target** should project water supply be required (subject to licensing and verification by site investigation). The red line mapped across the northern part of the area indicates a **fault**, which is important because faults and associated fracture zones can locally enhance secondary permeability and groundwater movement within bedrock; the proximity of the site to this structural feature suggests that groundwater occurrence and yields could be locally improved along fracture networks, but also that groundwater flow paths may be more connected and therefore more sensitive to contamination if pollutants are released.

From an EMP and design perspective, the map implies that the **alluvial/porous aquifer corridor is the more hydrogeologically sensitive zone** due to higher permeability and likely shallower groundwater, and it should therefore be treated as a higher-vulnerability receptor. Accordingly, the project should maintain robust **setbacks/no-go buffers** to the alluvial drainage corridor, prohibit refuelling and hazardous storage in runoff pathways, enforce **bunded storage and designated refuelling**, and maintain strong spill prevention and response readiness to prevent any contaminant migration toward the porous aquifer zone. Sanitation and greywater controls should similarly be conservative (no discharge to ground or drainage lines; serviced facilities with records). Finally, if groundwater abstraction is contemplated for construction (dust suppression) or operations, the map supports targeting boreholes **near (but not within) the alluvial corridor and/or structurally favourable zones**, with yields and water quality confirmed through appropriate hydrogeological investigation and permitting, while ensuring abstraction does not adversely affect downstream users or the ecological functioning of the drainage corridor.

Terrestrial ecoregions and habitat context (IFC Performance Standard approach)

Terrestrial ecoregions and vegetation setting

The proposed Osona Solar Power Project is situated within central Namibia's savanna biome, in a landscape that is widely described as Thornbush Savanna / Tree-and-Shrub Savanna (Thornbush Shrubland) in the broader Osona–Okahandja / Otjozondjupa context. This vegetation type is typically characterised by woody Acacia-dominated shrub and low tree cover, with a variable grass layer responding to seasonal rainfall and grazing pressure—consistent with site observations of largely natural Acacia stands and an apparent period of reduced recent farming activity (dormant land use). The surrounding landscape is primarily commercial farmland, with localised existing disturbance features (tracks/roads and a small sand extraction activity in a riverbed south of the site), which is relevant when interpreting habitat condition and cumulative disturbance.

IFC Performance Standard context (PS6)

The biological baseline is framed to support screening and impact assessment in line with International Finance Corporation Performance Standard 6 (PS6), which differentiates modified habitat, natural habitat, and critical habitat, and requires application of the mitigation hierarchy (avoid–minimise–restore, with offsets only as a last resort and under strict conditions). PS6 recognises that both natural and modified habitats may contain important biodiversity values and therefore requires a structured screening process to identify sensitive receptors and any potential critical habitat triggers.

Methodology applied to the biological baseline (desktop + field surveys)

Desktop studies

Desktop screening is used to establish the regional ecological context and to guide field survey effort and impact scoping. This typically includes:

- Review of national/regional vegetation context (savanna biome and vegetation-type descriptions).
- Review of available project-area evidence from comparable environmental documents in the Osona–Okahandja area that identify the prevailing vegetation type as Thornbush Savanna/Thornbush Shrubland.
- PS6-oriented sensitivity screening using publicly available conservation/biodiversity layers and GIIP references where relevant (to flag potential triggers for critical habitat screening and to define likely sensitive receptors).

Field surveys (site reconnaissance and habitat verification)

Fieldwork is used to ground-truth desktop findings and characterise the site's habitat condition and ecological sensitivities. For a solar PV footprint, field surveys typically include:

- Habitat walkover and mapping: delineation of habitat units (e.g., open Acacia savanna vs denser shrub patches; drainage-line vegetation; disturbed zones).

The woody vegetation observed within the proposed Osona 20 MW solar power plant footprint is characteristic of **thornveld/savanna shrubland**, dominated by thorny leguminous trees and shrubs that are most consistent at genus-group level with the **Vachellia/Senegalia ("acacia") complex**, based on the dense, multi-branched growth form and the fine, feathery bipinnate leaves visible in the photographs. While species-level identification cannot be confirmed from these images alone without diagnostic features such as thorn type, pods, and close-up bark characteristics, the vegetation structure is typical of central Namibian bush/shrub communities that provide important ecological functions, including **soil stabilisation**, **microhabitat and nesting structure for birds**, refuge for small mammals and reptiles, and browse resources for grazing and browsing fauna.

Figure 12. Some of the local trees that are observed in the proposed site.

The presence of these thornveld species is also consistent with the site's broader environmental setting described previously—namely coarse, gravelly sandy soils with limited organic topsoil and an ephemeral drainage influence—where woody root systems play a key role in binding surface materials and reducing susceptibility to wind erosion and rilling during storm events. From an EMP perspective, disturbance or removal of this woody cover can therefore disproportionately increase **dust generation**, reduce surface roughness and stability, and accelerate **runoff concentration and erosion**, particularly if clearing occurs near micro-topographic lows or drainage buffers. Accordingly, vegetation management for the project shall prioritise avoidance and minimisation by restricting clearing strictly to the demarcated footprint, maintaining no-go areas and drainage buffers, and implementing progressive rehabilitation to reinstate stable surfaces. In addition, because certain indigenous tree species may be subject to regulatory protection and permitting requirements, the EMP should treat woody species as potentially protected until verified, requiring the SEO and ECO to confirm status prior to removal, to obtain any necessary approvals where applicable, and to maintain a clearing register supported by photographic evidence and site plans to ensure that vegetation disturbance remains controlled, justified, and auditable.

- Indicator observations: evidence of disturbance (tracks, clearing, erosion), presence/absence of notable habitat features (termite mounds, rocky outcrops, drainage depressions), and any sensitive microhabitats.
- Photographic record and GPS points: to support defensible mapping and impact assessment.

Habitat description and condition (Project Site and immediate surrounds)

Project site habitat type

Based on the site description and regional context, the project footprint is best characterised as savanna shrub/woodland typical of central Namibia, dominated by natural Acacia-type woody vegetation, with a variable understory that is seasonally responsive. The land is used as commercial farmland but appears to have been dormant in recent years (no livestock observed), which may influence vegetation structure (e.g., denser shrub layer where grazing pressure has been low) and is relevant to rehabilitation potential.

Immediate surrounding habitat context

The broader area comprises a working rural landscape (commercial farms and linear infrastructure), with localised disturbance sources. A noteworthy nearby feature is the riverbed-associated sand extraction activity south of the site, which indicates (i) an ephemeral drainage feature with alluvial habitat elements and (ii) an existing disturbance footprint that should be considered when assessing cumulative impacts (dust/traffic, sediment risk, and habitat alteration along drainage features). The presence of existing transport corridors (A1/D1972) also suggests edge effects and baseline fragmentation in the immediate wider area.

PS6 habitat classification and critical habitat screening (site-level interpretation)

Modified vs natural habitat (screening outcome)

For PS6 purposes, the site is likely to comprise a mosaic of:

- Natural habitat elements (where indigenous savanna vegetation structure and ecological function remain largely intact), and
- Modified habitat elements (where farming land use, tracks, prior disturbance, and edge effects have altered species composition and ecological processes).

This mosaic classification is typical for renewable energy projects on commercial farmland and is important because PS6 obligations can apply meaningfully even where land use is agricultural, particularly where natural vegetation persists.

Critical habitat (trigger screening)

A PS6 critical habitat assessment is a trigger-based screening, not a presumption. At scoping level, critical habitat is typically considered unlikely unless one or more of the following are present or strongly indicated:

- confirmed or likely habitat for Critically Endangered/Endangered species,
- key areas for restricted-range/endemic species,
- migratory/breeding/roosting areas of high importance (notably for birds),

- or other high biodiversity value areas meeting PS6 criteria.

For the Osona site, the appropriate approach is therefore:

1. confirm the habitat mosaic and any sensitive microhabitats (especially drainage-line vegetation),
2. screen for species/habitat triggers during field surveys, and
3. only proceed to a formal critical habitat assessment if triggers are identified.

Key biodiversity sensitivities for a solar PV footprint (what the baseline must capture)

To align with PS6 expectations and provide a robust impact pathway, the baseline should explicitly capture:

- Drainage-line/riparian habitat features (even ephemeral), because these often concentrate biodiversity values and are sensitive to sedimentation and clearing.
- Woody vegetation structure and mature trees, because clearing drives the primary direct habitat loss pathway in savanna systems.
- Habitat fragmentation and edge effects (roads, fence lines, existing disturbances).
- Invasive alien species risk associated with construction movement and soil disturbance (requiring prevention and early detection in the EMP).
- Rehabilitation potential and topsoil/seedbank considerations, which strongly influence restoration outcomes in savanna shrublands.

Baseline fauna context (PS6-aligned)

The fauna baseline is prepared to support International Finance Corporation Performance Standard 6 (PS6) screening and impact assessment by (i) describing the likely faunal assemblages associated with the thornbush/acacia savanna–commercial farm mosaic, (ii) identifying habitat features that concentrate biodiversity value (notably ephemeral drainage lines/riverbeds, shrub–tree structure, and any rocky rises), and (iii) confirming sensitivities through desktop screening and field verification. PS6 requires explicit differentiation between modified and natural habitat and a trigger-based screening for any critical habitat features or species of conservation concern, with management commitments implemented through the EMP and the mitigation hierarchy.

Avifauna baseline

Desktop context

Bird communities in central Namibian savanna systems typically comprise a mix of resident savanna species (seed-eaters, insectivores, and raptors), with seasonal variation linked to rainfall and productivity pulses. Studies from savanna settings in Namibia show that bird richness and assemblage composition shift across habitat structure and seasonality, which is relevant to the project's acacia-dominated shrub/woodland context and to any drainage-line vegetation that can act as a local habitat focus.

A key PS6 and GIIP consideration for solar projects is interaction risk between birds and electrical infrastructure where overhead lines are used (collision and electrocution risk), as this has been documented and assessed in Namibia in relation to transmission lines. The presence/absence of an overhead connection (vs underground) and the routing relative to drainage features therefore meaningfully influences residual avifaunal risk.

Field survey focus (what is verified on site)

Field verification should document:

- habitat structure (open vs denser acacia patches) and any nesting/roosting features (large trees, protected trees),
- bird use of drainage lines/riverbeds (foraging and movement corridors),
- presence of raptors (perching and hunting activity) and any sensitive species indicators,
- the "line-of-sight" exposure and bird flight paths if an overhead line option is under consideration.

Mammals baseline

Desktop context

At a national scale, Namibia supports high mammal diversity dominated by small mammals (rodents and bats) alongside a smaller suite of larger herbivores and carnivores, with regional variation driven by habitat, water availability, and land use. In commercial farming landscapes around Okahandja–Osona, mammal assemblages are typically a mosaic of (i) adaptable generalist species tolerant of disturbance and fencing, (ii) small mammal communities linked to shrub cover and soil substrate, and (iii) occasional larger species presence depending on farm management and permeability of fences.

Field survey focus

Fieldwork should confirm mammal activity through:

- indirect signs (tracks, scat, burrows, runways) and camera trapping where warranted,
- identification of movement corridors (especially along drainage lines and farm tracks),
- presence of sensitive features (dens, burrow complexes, large termitaria),
- potential human–wildlife conflict pathways during construction (attraction to waste, water points, or contractor camps).

Reptiles baseline

Desktop context

Namibia is an arid to semi-arid country with high reptile diversity relative to amphibians; reptile communities are often closely tied to microhabitats such as sandy substrates, rocky outcrops, shrub cover, and riverbed/alluvial settings. For a thornbush savanna–farm mosaic site, reptiles of relevance typically include lizards, snakes, and tortoises, with conservation concern often higher for tortoises due to threats and sensitivity to habitat disturbance and road mortality.

Field survey focus

Field verification should include:

- active searching and refuge checks (under shrubs, rocks, debris; along sandy patches),
- recording of any tortoise presence/signs and avoidance buffers where applicable,
- assessment of likely road mortality risk along the new access road/internal tracks,
- invasive/feral predator indicators (which can affect reptile recruitment in disturbed landscapes).

Amphibians baseline

Desktop context

Amphibian diversity in Namibia is lower than reptiles and is strongly constrained by the country's aridity; many species are not dependent on permanent wetlands and instead exploit temporary water and rainfall-driven breeding opportunities. Central Namibia can nonetheless be relevant for amphibian conservation patterns (including endemism patterns at national scale), but at project scale amphibian presence is typically concentrated near ephemeral pools, drainage depressions, and riverbeds where short-lived surface water can occur after storms.

Field survey focus

Fieldwork should therefore:

- identify any seasonal wet spots (pans/depressions, drainage sumps) and their connectivity,
- include opportunistic night listening/visual checks after rainfall events where feasible,
- ensure construction management prevents creation of artificial breeding traps (poorly drained borrow/track depressions) and prevents contamination of temporary waters (hydrocarbons, cement washout).

PS6 habitat interpretation for fauna (site-level)

Based on the current project description (commercial farm with largely natural acacia vegetation, adjacent riverbed disturbance south of the site), the fauna baseline is expected to characterise the area as a mosaic of modified and natural habitat, with drainage-line/riverbed features functioning as higher-sensitivity microhabitats. PS6 "critical habitat" is not assumed; it is addressed through trigger-based screening during desktop review and field verification, with escalation to targeted specialist work only if species of conservation concern, key habitat features, or significant congregations/flight paths are indicated.

Avifauna baseline for the Osona Solar PV Project area (desktop + indicative field context)

Baseline approach and IFC PS framing

The proposed solar site sits in a central Namibian savanna / thornbush–farm mosaic, where bird use is typically driven by (i) acacia thornveld structure (for perching, nesting, and insect foraging), (ii) open ground / pasture and fallow fields (for seed-eaters, coursers, bustards and generalists), and (iii) nearby aquatic features (ephemeral drainage lines, farm dams, and regional impoundments), which can concentrate waterbirds and raptors seasonally. Vegetation in the wider thornbush zone is commonly dominated by Acacia/Vachellia spp., often with bush-encroachment species such as blackthorn (Acacia mellifera) and sickle bush (Dichrostachys cinerea), which creates structurally dense habitat for small passerines and edge species.

From an IFC Performance Standard perspective, the avifauna baseline should:

- define the species pool and key functional guilds (raptors/scavengers, ground-nesters, waterbirds, passerines),
- identify Species of Conservation Concern (SCC) likely to occur in the region (especially large raptors and bustards), and
- provide the basis for assessing solar-specific pathways: habitat loss/disturbance, collision/electrocution risk (notably on the 0.5 km line and any distribution infrastructure), and potential attraction/misperception ("lake effect") in some PV contexts (normally screened during impact assessment).

Key desktop data sources used for the "species pool"

1. Regional checklist (Okahandja area): Avibase provides a compiled checklist for the Okahandja area (308 species; last modified 2025-10-12), which is suitable for defining the broader *potential* species pool for the central region baseline.
2. Local waterbird context (Von Bach Dam, just outside the Okahandja area): A Namibia Bird Club note documents birds observed at Von Bach Dam and lists examples of regularly seen species and water-associated birds (e.g., cormorants, herons, pelican, jacana).

3. Atlasing context: SABAP2 is a recognised southern African bird distribution and relative abundance initiative and is useful for triangulating likelihood of occurrence by pentad when you compile the final baseline annexure.

Indicative bird species expected / likely in the project's receiving environment

Below is a practical, EIA-ready "expected/likely" list for an acacia thornveld–farmland setting with nearby aquatic features, compiled from the Okahandja regional checklist and local dam observations. It is not exhaustive (your final EIA should present the complete list as an annexure and then highlight SCC and priority receptors).

A) Water-associated birds (most likely near dams, pools, and drainage lines)

- African Jacana (*Actophilornis africanus*)
- Great White Pelican (*Pelecanus onocrotalus*)
- Reed Cormorant (*Microcarbo africanus*)
- Great Cormorant (*Phalacrocorax carbo*) — note that "white-breasted cormorant" is sometimes used locally for the *Great Cormorant complex*
- African Darter (*Anhinga rufa*)
- Gray Heron (*Ardea cinerea*)
- Squacco Heron (*Ardeola ralloides*)
- Knob-billed Duck (*Sarkidiornis melanotos*)

B) Raptors and large birds (priority receptors for impact assessment)

These are important because they are large-bodied, wide-ranging, and are often the focus of collision risk screening and SCC evaluation.

- African Fish-Eagle (*Icthyophaga vocifer*)
- Secretarybird (*Sagittarius serpentarius*)
- Martial Eagle (*Polemaetus bellicosus*)
- Steppe Eagle (*Aquila nipalensis*)
- Tawny Eagle (*Aquila rapax*)

- White-backed Vulture (*Gyps africanus*) and other vulture spp. recorded in the regional pool
- Kori Bustard (*Ardeotis kori*) and Ludwig's Bustard (*Neotis ludwigii*) in the regional pool (open areas/farmland interface)

C) Savanna/thornveld and farmland passerines (high-likelihood site users)

- Brubru (*Nilaus afer*)
- Crimson-breasted Gonolek (*Laniarius atrococcineus*) — often called "crimson-breasted shrike" in older/local usage
- Marico Flycatcher (*Bradornis mariquensis*)
- Short-toed Rock-Thrush (*Monticola brevipes*)
- Marico Sunbird (*Cinnyris mariquensis*)
- Black-chested Prinia (*Prinia flavicans*)
- Cape Wagtail (*Motacilla capensis*)
- Green-winged Pytilia (*Pytilia melba*) — older common name often given as "Melba Finch"
- Black-faced Waxbill (*Brunhilda erythronotos*) and other estrildids typical of thornveld edge habitats

Mammals baseline (project site and immediate surrounds)

Habitat controls and PS6 context

Mammal presence in the Osona–Okahandja setting is primarily controlled by (i) acacia thornbush/savanna structure, (ii) disturbance and fencing associated with commercial farming, and (iii) access to water points (boreholes, troughs, dams) and ephemeral drainage lines. Regionally, the project falls within the Acacia tree-and-shrub savanna context that supports a suite of common freehold-farm mammals, including grazing/browsing antelope and associated meso-predators.

In IFC PS6 terms, the site is typically interpreted as a mosaic of modified habitat (farm landscape/edge effects) and natural habitat elements (intact thornbush patches and drainage-line habitat); baseline work therefore focuses on confirming movement corridors, den sites/burrow complexes, and any species of conservation concern indicators.

Desktop sources and field verification approach

- Desktop screening: regional wildlife context for central Namibia savanna/farm landscapes (expected guilds and distribution patterns).
- Field verification: walkover transects targeting tracks/scat, burrows, dens, game paths, and drainage-line corridors; opportunistic camera trapping (if warranted) near likely movement routes/water points; and mapping of any sensitive features requiring buffers.

Indicative mammals likely / expected (not exhaustive)

The following are typical, high-likelihood species for central Namibian savanna/freehold farm settings and are commonly encountered in similar habitats:

- Greater kudu (*Tragelaphus strepsiceros*)
- Steenbok (*Raphicerus campestris*)
- Common duiker (*Sylvicapra grimmia*)
- Red hartebeest (*Alcelaphus buselaphus*) – characteristic of the Acacia savanna biome
- Common warthog (*Phacochoerus africanus*)
- Chacma baboon (*Papio ursinus*)
- Black-backed jackal (*Canis mesomelas*)
- Bat-eared fox (*Otocyon megalotis*) and/or Cape fox (*Vulpes chama*)
- Aardwolf (*Proteles cristata*)
- Caracal (*Caracal caracal*) and African wildcat (*Felis lybica*)
- Small nocturnal mammals (e.g., genets, mongooses) are also typical in these systems.

Baseline sensitivities to record for the EIA: road-kill risk on the new access/internal roads, attraction to food waste at construction areas, and corridor function of drainage lines (avoid unnecessary fencing barriers across key paths).

Reptiles baseline (project site and immediate surrounds)

Habitat controls and PS6 context

Reptile diversity in Namibia is high (multiple reptile orders with large representation of squamates), and in central thornbush/savanna settings reptiles are strongly tied to microhabitats: sandy substrates, shrub/root zones, termite mounds, rocky rises, and riverbed/alluvial features. For solar PV projects, the baseline emphasis is on tortoises and larger lizards (disturbance and road-kill sensitivity), plus snakes (worker safety + encounter management), and verifying whether any near-endemic/endemic taxa are plausibly present.

Desktop sources and field verification approach

- Desktop screening: Namibia reptile diversity and habitat associations (national biodiversity baseline and checklists).
- Field verification: timed visual searches (morning/late afternoon), refuge checks (under shrubs/rocks/debris), recording of tracks/scute marks for tortoises, and mapping of rocky microhabitats/termite mounds. Any encounters trigger an avoidance/relocation procedure aligned with permitting requirements.

Indicative reptiles likely / expected (not exhaustive)

- Leopard tortoise (*Stigmochelys pardalis*) – widespread in Namibia and typical of semi-arid thorny/grassland mosaics
- Kalahari tree skink (*Trachylepis spilogaster*) – savanna bushveld-associated; near-endemic status noted in Namibian biodiversity records
- Western giant plated lizard (*Matobosaurus maltzahni*) – recorded in the wider Okahandja species pool (indicative)
- Additional expected groups include agamas, geckos, and snakes typical of thornbush/savanna mosaics; species-level confirmation is made via field observations and (where needed) specialist inputs consistent with the national reptile baseline literature.

Baseline sensitivities to record for the EIA: tortoise presence and crossing routes (road mortality risk), worker-snake encounters (OHS), and any rocky outcrops that may concentrate reptile diversity.

Amphibians baseline (project site and immediate surrounds)

Habitat controls and PS6 context

Amphibians in central Namibia are generally rainfall-driven and concentrate around temporary waters (storm pools, pans, drainage depressions, and riverbeds) and around permanent artificial water points where present. Namibia has a documented national frog fauna with habitat associations, and central Namibia includes species tied to rocky outcrops as well as widespread "opportunistic breeders" that respond quickly after rains.
For a solar PV project, amphibians are usually a seasonal sensitivity: the baseline should identify any potential breeding sites (even if dry at the time of survey) and ensure construction does not create polluted or trapping depressions.

Desktop sources and field verification approach

- Desktop screening: national frog checklist and Namibian amphibian guides for likely taxa and habitat types.
- Field verification: reconnaissance of drainage lines and low-lying depressions; opportunistic night listening/visual surveys after rainfall events (where feasible), and checks around water points.

Indicative amphibians likely / expected (not exhaustive)

- Giant bullfrog (*Pyxicephalus adspersus*)
- Bubbling kassina (*Kassina senegalensis*)
- Plain grass frog (*Ptychadena anchietae*)
- African clawed frog (*Xenopus laevis*) (where permanent water is present)
- Power's toad (*Sclerophrys poweri*) – recorded in the broader Okahandja pool (indicative)
- Hoesch's pygmy toad / "Okahandja toad" (*Poyntonophrynus hoeschi*) – documented as occurring in west/central Namibia associated with rocky outcrops

Baseline sensitivities to record for the EIA: any temporary pools/pans or drainage depressions, proximity of laydown/fuelling to flow paths, and strict controls to prevent hydrocarbon/cement contamination of stormwater.

Habitat sensitivity (PS6-aligned) – Osona Solar PV Project

How habitat sensitivity is defined (IFC PS6 logic)

Under IFC Performance Standard 6, "habitat sensitivity" is determined by (i) habitat condition and ecological function, (ii) the presence of priority biodiversity features (Species of Conservation Concern, restricted-range/endemic species, congregatory/migratory use), and (iii) the habitat's role as a corridor or key ecological process area (e.g., drainage lines). Sensitivity is therefore assessed as a site-level mosaic rather than a single label for the entire 89 ha parcel, and it informs: (a) what should be avoided through micro-siting, (b) what can be minimised through design/controls, and (c) what requires rehabilitation targets and monitoring.

Socio-economic Baseline

Demographic Profile (Population, Migration, Ethnicity, Religion, Language)

(i) Narrative baseline

The proposed Osona Solar Power Project is located within the Osona–Okahandja corridor in the Otjozondjupa Region, with the project footprint situated in Omatako Constituency on privately owned commercial farmland. National demographic conditions provide the strategic context for labour availability and stakeholder sensitivity: Namibia's population is 3,022,401 (2023 Census) and remains comparatively youthful, with approximately 71% under 35 years, indicating a large cohort of potential job seekers relevant to construction-phase employment. The Otjozondjupa Region population is reported at 220,811 (2023), while Omatako Constituency is reported at 18,283 (2023), reflecting a lower-density constituency within a region anchored by corridor towns and service centres.

Population movement in the receiving environment is best characterised by corridor-linked mobility and ongoing urbanisation trends, with Okahandja functioning as a regional service node and employment focus along the A1. In practical project terms, temporary construction labour demand (peak ~200 workers) can induce short-term in-migration and increased pressure on accommodation and local services if not actively managed. The demographic setting is culturally and linguistically mixed; in Otjozondjupa, household main-language distributions indicate strong representation of Herero languages, Nama/Damara, and Oshiwambo, with Afrikaans and English also present—an important consideration for inclusive public participation and workforce communication. At a broad national level, the population is predominantly Christian, which is relevant mainly for engagement scheduling and culturally appropriate community interaction rather than project constraints.

(ii) Demographics table (national / region / constituency / nearby town)

Spatial unit	Population (latest available)	Key demographic notes (EIA relevance)	Source
Namibia (national)	3,022,401 (2023)	Youthful profile (~71% under 35); growing urbanisation affects labour mobility and service demand	
Otjozondjupa Region	220,811 (2023)	Regional labour pool and stakeholder base for Okahandja/Osona corridor projects	
Omatako Constituency	18,283 (2023)	Lower-density constituency; project likely draws labour/services from wider region	
Okahandja (town)	~45,159–46,061 (2023)	Primary nearby service centre; likely accommodation/supply base during construction	

Language baseline (proxy for cultural-linguistic diversity): Otjozondjupa household main languages (2011 profile) indicate Herero languages ~27.1%, Nama/Damara ~21.1%, Oshiwambo ~21.4%, Afrikaans ~9.4%, English ~3.1%, with smaller shares for other languages.

(iii) Implications for Impact Assessment (linked to workforce and local procurement)

Construction workforce (peak ~200) – key impact pathways

- Labour influx and accommodation demand: Short-term in-migration may increase pressure on housing, informal accommodation, water, sanitation, and waste services in Okahandja/Osona corridor nodes. This should be assessed under community health and safety, service pressure, and social cohesion risks.
- Local employment expectations: The youthful demographic profile increases sensitivity to perceived unfairness in recruitment. Recruitment procedures should be transparent and prioritise local hiring where skills allow (Omatako/Okahandja/Otjozondjupa), with clear criteria for skilled vs unskilled roles.

- Language and worker communication: Induction and safety communication should be delivered in English with practical capacity to communicate in Otjiherero and Afrikaans (and accommodate other languages depending on workforce composition) to reduce H&S risk and improve grievance accessibility.

Local procurement – key impact pathways

- Positive economic effect: Use of local suppliers for aggregates, fencing, transport, catering, and basic services can create measurable local benefit, particularly through Okahandja-based businesses.
- Risk controls: Procurement should avoid contributing to non-compliant extraction and transport impacts (e.g., uncontrolled sourcing of sand/aggregates). Contracts should specify legal sourcing, dust control, traffic management, and supplier compliance requirements.

Operational workforce (~20 skilled) – key impact pathways

- Impacts are typically limited and long-term, centred on stable skilled employment, local service demand at low intensity, and ongoing stakeholder interaction through grievance mechanisms and EMP reporting.

Land Ownership and Use

Ownership and tenure

The proposed Osona Solar Power Project is located on privately owned commercial farmland. The property is owned by a commercial farmer who intends to sub-lease and/or sell the portion of land earmarked for the solar PV development. The Project Proponent and the landowner have an agreement in place that provides for the purchase or sub-lease of the project area upon project commencement (and subject to the required statutory authorisations, including issuance of an Environmental Clearance Certificate). This arrangement establishes secure land access and defines the legal basis for site access, construction, operation, and long-term maintenance over the expected project life (≥20 years).

Current land use (baseline)

The receiving environment is a commercial farming landscape, consistent with the broader Osona–Okahandja rural corridor. At the time of site observation, the project area appeared largely dormant, with no livestock present and limited visible evidence of recent active farming operations on the specific portion proposed for the solar development. The site remains part of a working agricultural property, but the proposed footprint is currently not being utilised intensively for crops or active grazing.

Agriculture and cultivation

No active cultivation or planted tree lines were observed within the proposed project footprint. Vegetation on site appears to be predominantly natural savanna/thornbush vegetation, with Acacia-dominated woody species and no indication of recent clearing for crop production. This suggests that the land parcel proposed for the solar facility is functioning primarily as extensive rangeland within the farm system rather than intensive agriculture.

Livestock and grazing

Although the broader farm is a commercial agricultural unit, livestock were not observed within the proposed project area during the site visit, and the area appeared to have been unused for grazing for a number of years. Where livestock grazing occurs elsewhere on the farm, the project will require controls to prevent animal access to construction areas and operational electrical infrastructure (perimeter fencing and controlled gates), and the land take for the PV plant would represent a permanent conversion of part of the farm's potential grazing area for the duration of operations.

Adjacent land use and local activities

Land use in the immediate surroundings remains predominantly agricultural, with localised non-farming activity present. South of the proposed project site, a small-scale sand extraction activity was observed within a riverbed, with trucks removing sand for local building construction (reportedly linked to development at the Osona Estate). This indicates an existing disturbance footprint and provides context for cumulative considerations (dust, traffic, and riverbed sensitivity) during the construction phase.

Figure 13. Opposite the proposed site, there is an existing 5 MW solar power plant.

Land use sensitivity and implications for the EIA

From an EIA perspective, land ownership and use considerations translate into:

- Land take and livelihood effects: potential reduction in available grazing area (even if currently unused) and changes to farm management flexibility;
- Compatibility: solar PV is generally compatible with extensive agricultural landscapes where micro-siting avoids sensitive drainage features and clearing is minimised;
- Access and conflict management: clear access controls during construction and operation to avoid interference with remaining farm activities;
- Rehabilitation and end-of-life: decommissioning commitments to restore land capability as far as practicable at closure.

Impact Assessment Methodology (EIA)

1) Purpose and approach

The impact assessment method provides a transparent, repeatable basis for identifying, predicting, and evaluating the significance of environmental and social impacts associated with the Osona 20 MWac Solar PV Project across planning, construction, operation, and decommissioning. The methodology applies a source–pathway–receptor logic and the mitigation hierarchy (avoid–minimise–rehabilitate/restore–offset) to ensure that impacts are reduced to acceptable residual levels and clearly translated into enforceable EMP commitments.

2) Impact identification

Impacts are identified through an integrated process combining:

- Project description and activity-aspect mapping: each project activity (e.g., clearing, trenching, traffic, waste handling, grid connection) is linked to potential environmental/social aspects and impact pathways.
- Baseline sensitivity screening: receptors are defined for physical, biological and socio-economic settings (e.g., drainage lines, soils, Acacia habitat, nearby road users, local workforce).
- Stakeholder issues: inputs from I&APs and authorities are incorporated through the issues-and-responses register to ensure locally material concerns are assessed.
- Professional judgement and GIIP checklists: solar PV-specific checklists are used to avoid omissions (dust, stormwater, avifauna risk, traffic safety, community H&S, hazardous materials, waste, visual impacts).

Impacts are categorised as direct, indirect, induced, and cumulative and assessed for each project phase.

3) Assessment boundaries and receptors

- Spatial boundary: includes the project footprint (89 ha), the ~0.5 km grid connection corridor, the ~300 m access road link, internal roads, and the wider area influenced by dust/noise/traffic/visual effects and downstream drainage sensitivity.

- Temporal boundary: covers construction (~10 months), operations (≥20 years), and decommissioning/rehabilitation.
- Receptors: physical (air, noise, soils, water), biological (habitats, avifauna, fauna), and socio-economic (workers, nearby residents/road users, landowner/farm operations).

4) Significance rating framework

Each impact is rated before mitigation (unmitigated) and after mitigation (residual). Significance is determined using defined criteria:

A) Intensity / magnitude (M)
Degree of change from baseline (negligible → high).

B) Receptor sensitivity / value (S)
Importance and vulnerability of the affected receptor (low → high).

C) Extent (E)
Site → local → regional.

D) Duration (D)
Short-term (construction) → medium → long-term/permanent.

E) Frequency (F)
Once-off → intermittent → continuous.

F) Likelihood / probability (L)
Unlikely → possible → likely.

G) Reversibility (R)
Reversible → partly reversible → irreversible.

Significance determination (defensible rule):

- Initial significance is derived primarily from Magnitude × Sensitivity (i.e., how big the change is, on how sensitive a receptor).
- The rating is then refined using likelihood, duration, extent, and reversibility to classify the impact as: Negligible / Low / Moderate / High.

This same framework is used consistently across environmental and social impacts so comparisons are meaningful.

5) Mitigation and residual impact evaluation

Mitigation measures are developed using the hierarchy:

1. Avoid (re-route, buffer, micro-site away from drainage lines / dense vegetation)
2. Minimise (controls: dust suppression, erosion control, spill prevention, traffic management)
3. Rehabilitate/restore (topsoil management, re-vegetation, progressive rehabilitation)
4. Offset (only if residual impacts remain significant and offsetting is feasible/required)

Residual significance is then re-rated to confirm whether impacts are acceptable and manageable under the EMP.

6) Cumulative impact assessment

Cumulative impacts are evaluated by considering:

- existing baseline disturbance (roads, farming landscape, nearby riverbed sand extraction),
- other known/plausible developments in the corridor (where information is available),
- additive or interactive effects on key receptors (dust, traffic safety, drainage/sedimentation, habitat fragmentation, visual character).

7) Confidence, assumptions, and limitations

Each impact rating is assigned a confidence level (high/medium/low) reflecting:

- availability and quality of baseline data,
- seasonal constraints (biodiversity),

- design certainty (e.g., overhead vs underground grid connection),
- reliance on assumptions to be confirmed at detailed design.

Where uncertainty exists, the assessment applies a precautionary approach by strengthening mitigation and monitoring.

8) Presentation of results (Impact Register)

All impacts are consolidated into an Impact Register that records, for each impact:

- activity and phase,
- impact pathway and receptor,
- unmitigated significance,
- mitigation measures (EMP commitments),
- residual significance,
- monitoring indicators, frequency, and responsibility (contractor/ECO/proponent).

Consequence significance matrix

C = Magnitude (M) × Sensitivity (S)

Consequence class thresholds

- 1–4 = Negligible (N)
- 5–9 = Low (L)
- 10–16 = Moderate (M)
- 17–25 = High (H)

Matrix (cell shows: score (class))

Magnitude (M) \ Sensitivity (S)	1	2	3	4	5
1	1 (N)	2 (N)	3 (N)	4 (N)	5 (L)
2	2 (N)	4 (N)	6 (L)	8 (L)	10 (M)
3	3 (N)	6 (L)	9 (L)	12 (M)	15 (M)
4	4 (N)	8 (L)	12 (M)	16 (M)	20 (H)
5	5 (L)	10 (M)	15 (M)	20 (H)	25 (H)

Overall significance (risk) matrix

RS = Consequence (C) × Likelihood (Lk)

Risk class thresholds

- 1–10 = Negligible (N)
- 11–30 = Low (L)
- 31–60 = Moderate (M)
- 61–125 = High (H)

To keep this clean, the matrix below uses Consequence classes (not every score 1–25). Use the midpoint of each class as the representative C value:

- Negligible C = 3
- Low C = 7
- Moderate C = 13
- High C = 21

Likelihood scale (Lk): 1 Unlikely | 2 Possible | 3 Likely | 4 Very likely | 5 Almost certain

Consequence class (representative C) \ Likelihood (Lk)	1	2	3	4	5
Negligible (C=3)	3 (N)	6 (N)	9 (N)	12 (L)	15 (L)
Low (C=7)	7 (N)	14 (L)	21 (L)	28 (L)	35 (M)
Moderate (C=13)	13 (L)	26 (L)	39 (M)	52 (M)	65 (H)
High (C=21)	21 (L)	42 (M)	63 (H)	84 (H)	105 (H)

Outcome of Scoping

1) Purpose of scoping and overall outcome

Scoping is the structured step in the EIA process used to (i) define the scope of assessment, (ii) identify key environmental and social issues, (iii) confirm the baseline information needs, and (iv) determine the specialist studies, methods, and management plans required to support an Environmental Clearance Certificate (ECC) decision. For the Osona Solar Project, scoping confirmed that the Project is feasible to assess and potentially develop within the proposed footprint, provided that design refinement and EMP controls are applied to address the priority risks identified below.

2) Project activities confirmed for assessment

Scoping confirmed that the EIA must assess the full lifecycle and associated infrastructure, including:

- Solar PV plant (20 MWac) within the ~89 ha footprint (site establishment, clearing, foundations/piling, cabling, inverters/transformers, fencing).
- Access infrastructure: ~300 m access road from the D1972 and internal access roads/tracks.
- Grid connection: ~0.5 km transmission line/cable and the connection works at the Osona Substation.
- Construction and decommissioning activities: laydown areas, temporary services, waste management, traffic logistics, rehabilitation and closure.

3) Key issues identified during scoping

The following were confirmed as the priority issues to be assessed in detail (unmitigated and residual significance), with explicit linkages to the EMP:

3.1 Physical environment

- Soils, erosion and stormwater management: risk of soil loss, gullying, sediment movement and altered drainage patterns during clearing, trenching, and road construction—especially given nearby riverbed features and existing sand extraction south of the site.

- Surface water and drainage line protection: maintenance of natural flow paths, avoiding infrastructure in ephemeral drainage features, and preventing downstream sedimentation/pollution.
- Groundwater protection: contamination risk from fuels/oils, refuelling, transformer oil (if applicable), and poor waste handling.
- Air quality (dust): dust generation from earthworks and vehicle movement on unsealed surfaces, potentially cumulative with nearby sand extraction and construction activities.
- Noise and vibration: temporary construction noise affecting the immediate rural setting and road users; low operational noise localised to inverters/transformers.

3.2 Biological environment (PS6 screening outcomes)

- Habitat loss and fragmentation: clearing of natural Acacia/thornbush savanna vegetation and potential loss of mature trees.
- Drainage-line / riverbed habitat sensitivity: higher ecological function zones requiring buffers and avoidance.
- Avifauna interaction risk: particularly relevant if any overhead line is used for the 0.5 km grid connection (collision/electrocution screening; line marking or undergrounding feasibility).
- Fauna disturbance and mortality: construction traffic causing roadkill risk (notably tortoises and small mammals), and disturbance from increased human activity.
- Invasive alien species risk: introduction and spread via construction vehicles/materials and disturbed soils.
- Rehabilitation feasibility: topsoil handling and restoration success criteria as key to residual biodiversity outcomes.

3.3 Socio-economic and land use environment

- Land take and land use compatibility: conversion of part of a privately owned commercial farm; potential loss of future grazing capacity even if currently dormant.

- Employment and local economic benefits: construction workforce (~200) and local procurement opportunities; need for transparent recruitment and local content measures.
- Labour influx and community health & safety: accommodation demand, worker conduct, GBV/SEA risk management, public safety near construction sites and high-voltage infrastructure.
- Traffic and road safety: construction logistics on A1/D1972 and local routes; abnormal loads; interface with other road users.
- Stakeholder engagement and grievance handling: ensuring inclusive communication in relevant local languages and establishing accessible grievance mechanisms.

3.4 Heritage and archaeology

- Chance finds risk: potential for previously unrecorded heritage/archaeological resources during excavation and trenching, requiring a formal chance-finds procedure and stop-work controls.

4) Specialist inputs and baseline requirements confirmed

Scoping confirmed the need for the following baseline characterisation and/or specialist screening to support defensible significance ratings:

- Topography and drainage screening to inform micro-siting, erosion controls, and stormwater design (including buffers to drainage lines).
- Ecological walkover / habitat sensitivity mapping (PS6-aligned), focusing on thornbush vegetation structure, drainage-line habitat, and invasive species risk.
- Avifauna screening proportionate to grid connection type and route (enhanced assessment if overhead line is proposed).
- Heritage screening with a Chance Finds Procedure embedded in construction method statements.
- Socio-economic profiling at region/constituency/town scale, and workforce influx risk screening linked to worker management plans.

5) Alternatives confirmed for consideration

Scoping confirmed that the EIA must assess:

- No-go alternative (project does not proceed).
- Technology alternatives (fixed-tilt vs tracker; inverter options; overhead vs underground connection where feasible).
- Layout and micro-siting alternatives within the 89 ha footprint to avoid sensitive receptors.
- Access alignment alternatives for the ~300 m access road to minimise erosion/drainage impacts.

6) Preliminary mitigation and design commitments arising from scoping

Scoping produced early commitments to be carried forward into design and the EMP, including:

- Apply drainage buffers and avoid infrastructure in ephemeral channels/riverbed environments.
- Implement a stormwater and erosion control plan (cut-off drains, berms, energy dissipation, stabilisation, progressive rehabilitation).
- Enforce dust controls (speed limits, water suppression, stabilisation of disturbed surfaces).
- Implement hazardous materials management (bunded storage, controlled refuelling, spill kits, incident response).
- Adopt a Traffic Management Plan for A1/D1972 interface and construction logistics.
- Implement biodiversity controls: minimise clearing, protect mature trees where feasible, invasive species prevention, and rehabilitation success criteria.
- Confirm and manage avifauna risk for the grid connection (route optimisation and line marking/undergrounding feasibility where applicable).
- Establish labour management and influx controls (recruitment protocol, worker code of conduct, accommodation standards if used, grievance mechanisms).

- Apply a Chance Finds Procedure for heritage resources.

7) Conclusion of scoping (scoping statement)

The scoping process concludes that the Project's key environmental and social risks are manageable provided that (i) sensitive drainage-line habitats are avoided, (ii) stormwater/erosion controls and pollution prevention are implemented to GIIP, (iii) biodiversity impacts are minimised and rehabilitated with measurable targets, and (iv) labour, traffic, and stakeholder engagement risks are actively managed through enforceable plans and monitoring.

Assessment of Positive Impacts

Positive impacts are assessed using the same significance logic applied to negative impacts (magnitude, extent, duration, likelihood), but framed as benefits rather than risks. Residual benefit ratings assume implementation of the Project as designed and adherence to the EMP and associated management plans.

1) Renewable energy generation and contribution to energy security

Impact pathway: Construction and operation of a grid-connected 20 MWac solar PV facility supplying electricity under a PPA into the national grid via the Osona Substation. Expected benefit: Increased domestic renewable electricity supply, diversification of generation sources, and improved resilience of electricity supply (reduced exposure to fuel price volatility and supply constraints).

- Extent: Regional/national (benefit realised at grid level)
- Duration: Long-term (≥20 years)
- Likelihood: Almost certain (once commissioned)
- Significance (positive): High (Long-term, high likelihood, national-scale relevance)

2) Climate change mitigation (GHG emissions avoidance)

Impact pathway: Solar PV generation displaces higher-emission electricity on the grid over the operating life.
Expected benefit: Avoided greenhouse gas emissions relative to a fossil-heavy baseline; contribution to national climate objectives and decarbonisation pathways.

- Extent: National/global (mitigation benefit)
- Duration: Long-term (≥20 years)
- Likelihood: Very likely to almost certain
- Significance (positive): High

Note: The EIA can quantify this benefit if a grid emissions factor is available/accepted for Namibia (or by adopting a recognised methodological source used by lenders).

3) Employment creation and household income effects (construction phase)

Impact pathway: Labour demand during site establishment and construction (~200 workers, skilled and unskilled).
Expected benefit: Short-term employment, wages injected into the local economy, skills transfer through on-the-job training, and reduced unemployment pressure.

- Extent: Local to regional (Okahandja/Osona corridor and wider Otjozondjupa)
- Duration: Short–medium (construction period ~10 months)
- Likelihood: Almost certain
- Significance (positive): Moderate to High (depends on share of local hires and duration of employment)

Enhancement measures (to strengthen benefit):

- Transparent recruitment process with local priority and gender inclusion.
- Contractor reporting of local employment statistics and training outcomes.

4) Employment and skills development (operations phase)

Impact pathway: Long-term operational staffing (~20 skilled positions) for operations, maintenance, security, and administration.
Expected benefit: Stable long-term skilled employment; development of renewable-energy operational competencies.

- Extent: Local/regional
- Duration: Long-term
- Likelihood: Very likely
- Significance (positive): Moderate (smaller workforce but long duration)

5) Local procurement and business opportunities

Impact pathway: Procurement of goods and services during construction and operations (civil works, transport, fencing, aggregates, catering, accommodation, maintenance services). Expected benefit: Revenue and growth opportunities for local suppliers (especially Okahandja-based businesses), increased cash flow in the local economy, and potential enterprise development.

- Extent: Local to regional
- Duration: Short–medium (construction), with ongoing moderate benefits (operations)
- Likelihood: Very likely
- Significance (positive): Moderate (can be High if a structured local content plan is implemented)

Enhancement measures:

- Local procurement targets and supplier development measures.
- Contract clauses requiring legal sourcing and compliance (to avoid unintended negative effects).

6) Infrastructure and services strengthening (indirect benefit)

Impact pathway: Improvement and maintenance of access routes, upgraded site management practices, and improved service coordination with local providers during the project lifecycle. Expected benefit: Potential incremental improvements to local road conditions near site access and increased demand that supports local service providers.

- Extent: Local
- Duration: Medium to long-term (depending on maintenance commitments)
- Likelihood: Possible to likely
- Significance (positive): Low to Moderate

7) Technology transfer and renewable energy market development

Impact pathway: Investment in modern PV technology, grid integration experience, and local workforce exposure to renewable energy construction and O&M. Expected benefit: Strengthened local capacity in renewable energy development, improved contractor competencies, and support for Namibia’s broader energy transition.

- Extent: Regional/national
- Duration: Long-term
- Likelihood: Likely
- Significance (positive): Moderate

Summary of Positive Impact Significance (EIA-ready)

Positive impact	Extent	Duration	Likelihood	Overall positive significance
Renewable energy & energy security	National	Long-term	Almost certain	High
Climate mitigation (avoided GHG)	National/Global	Long-term	Very likely–Almost certain	High
Construction employment (~200)	Local/Regional	Short–medium	Almost certain	Moderate–High
Operational employment (~20)	Local/Regional	Long-term	Very likely	Moderate
Local procurement/business benefits	Local/Regional	Short–medium + ongoing	Very likely	Moderate (→ High with targets)
Infrastructure/service strengthening	Local	Medium	Possible–Likely	Low–Moderate
Technology transfer/market development	Regional/National	Long-term	Likely	Moderate

Benefit enhancement commitments (recommended)

To ensure positive impacts are realised and measurable, include the following in the EMP/ESMP:

- Local employment and procurement targets, with monthly reporting during construction.
- Skills development plan (apprenticeships, on-the-job training hours, competency sign-off).
- Stakeholder engagement and grievance mechanism to manage expectations and reduce conflict.
- Local supplier compliance screening (legal sourcing, H&S, labour compliance).

Positive Impacts (Focused: Electricity Generation and Employment)

1) Generation of electricity and grid contribution (energy security)

Impact description: The Project will add 20 MW of renewable generation capacity and supply electricity into the national grid via the ~0.5 km connection to the Osona Substation under the PPA arrangement.

Benefit pathway: Increased domestic generation capacity improves grid supply adequacy, supports peak/shoulder demand, and contributes to diversification away from higher-emission or supply-constrained sources.

Receptors/beneficiaries: National electricity consumers, the national grid operator, and the broader economy.

Phase: Operation (benefits accrue once commissioned).

Characterisation:

- Extent: National
- Duration: Long-term (≥20 years)
- Likelihood: Almost certain (post-commissioning)
- Overall positive significance: High

Enhancement measures: maximise availability through robust O&M, spares strategy, and performance monitoring; minimise downtime via planned maintenance scheduling.

2) Climate benefit through renewable electricity (emissions avoidance)

Impact description: Solar PV generation displaces higher-emission generation on the grid over the operational life.

Benefit pathway: Reduced lifecycle greenhouse gas emissions associated with electricity supply, supporting national climate objectives and energy transition pathways.

Receptors/beneficiaries: National/global environment and climate system; Namibian policy commitments.

Phase: Operation.
Characterisation:

- Extent: National to global
- Duration: Long-term
- Likelihood: Very likely to almost certain
- Overall positive significance: High

Enhancement measures: consider quantifying avoided emissions using an accepted grid emission factor for reporting to lenders/investors.

3) Employment creation (construction phase)

Impact description: The Project is expected to employ approximately 200 workers (skilled and unskilled) during the ~10-month construction phase.
Benefit pathway: Temporary employment increases household incomes, supports local spending, and can provide training and work experience that improves longer-term employability.
Receptors/beneficiaries: Local households (Osona/Okahandja), wider Otjozondjupa job-seekers, local service providers.
Phase: Construction.
Characterisation:

- Extent: Local to regional
- Duration: Short–medium (construction period)
- Likelihood: Almost certain
- Overall positive significance: Moderate to High (depends on local hire proportion and wage duration)

Enhancement measures (recommended):

- transparent recruitment process with local priority (where feasible),
- minimum training hours per worker,
- contractor reporting on local hire %, gender inclusion, and skills transfer.

4) Employment and skills development (operations phase)

Impact description: The Project is anticipated to require approximately 20 skilled workers during operation.
Benefit pathway: Stable long-term employment supports livelihoods and builds local technical capacity in renewable energy O&M.
Receptors/beneficiaries: Skilled workers, local technical labour market, local economy.
Phase: Operation.
Characterisation:

- Extent: Local/regional
- Duration: Long-term
- Likelihood: Very likely
- Overall positive significance: Moderate

Enhancement measures: structured skills development and certification pathways; prioritise Namibian technicians where possible.

5) Indirect local economic stimulation (local procurement)

Impact description: Construction and operations will require procurement of goods and services (transport, fencing, aggregates, catering, accommodation, minor civil works, security, maintenance).
Benefit pathway: Increased local demand supports business revenue, employment multipliers, and enterprise development.
Receptors/beneficiaries: Local suppliers and SMEs (especially Okahandja corridor), informal and formal service providers.
Phase: Construction + operation.
Characterisation:

- Extent: Local to regional
- Duration: Short–medium (construction) with ongoing low–moderate benefits (operation)
- Likelihood: Very likely

- Overall positive significance: Moderate (can trend to High with explicit local content targets)

Enhancement measures: local procurement targets, supplier development, and prompt payment commitments (while ensuring legal sourcing and compliance).

Positive impact	Phase	Extent	Duration	Likelihood	Positive significance
Electricity generation / grid support (20 MWac)	Operation	National	Long-term	Almost certain	High
Climate benefit (emissions avoidance)	Operation	National/Global	Long-term	Very likely–Almost certain	High
Construction employment (~200)	Construction	Local/Regional	Short–medium	Almost certain	Moderate–High
Operational employment (~20)	Operation	Local/Regional	Long-term	Very likely	Moderate
Local procurement / economic multiplier	Both	Local/Regional	Short–medium + ongoing	Very likely	Moderate

Assessment of Potential Negative Impacts (Construction Phase Focus)

Assumptions for significance ratings

- Significance is rated pre-mitigation (unmitigated) and post-mitigation (residual) using the EIA's significance matrix (Magnitude × Sensitivity, moderated by likelihood, extent and duration).
- Ratings below reflect typical conditions for an 89 ha solar PV site with ~10 months construction, ~200 workers, ~300 m access road, internal roads, and a ~0.5 km grid connection to the Osona Substation.

1) Air Quality (Dust and emissions)

Baseline condition

The site is a rural commercial farm landscape in a semi-arid setting where baseline air quality is generally good, with dust being the primary pollutant of concern during dry and windy conditions. Existing dust sources include unpaved roads/tracks and nearby local disturbance (including riverbed sand extraction south of the site).

Potential construction impacts

- Increased fugitive dust (PM) from vegetation clearing, grading, trenching, stockpiles, and traffic on unsealed roads.
- Temporary exhaust emissions from construction machinery and haul trucks.
- Nuisance dust affecting workers, nearby road users, and any nearby receptors along access routes.

Construction impact assessment (unmitigated)

- Magnitude: Moderate (dust spikes likely during earthworks and haulage)
- Sensitivity: Low–Moderate (rural setting but receptors exist along roads and on-site workforce)
- Duration: Short–medium (construction period)

- Extent: Site to local (access roads)
- Unmitigated significance: Moderate

Mitigation measures

- Dust suppression (water carts; prioritise high-traffic segments; avoid over-watering/erosion).
- Speed limits on site and on access tracks; signage; enforceable site rules.
- Cover/contain fine materials; limit stockpile heights; stabilise stockpiles.
- Progressive rehabilitation and surface stabilisation of disturbed areas.
- Vehicle and equipment maintenance; no excessive idling.
- Stop/adjust activities during extreme wind events where dust becomes uncontrolled.

Residual impact significance

- Residual significance: Low (with consistent dust management and monitoring)

2) Noise and vibration

Baseline condition

Baseline noise is typical of a low-density rural area: generally quiet with intermittent road traffic noise (A1/D1972) and occasional farm activity.

Potential construction impacts

- Temporary elevated noise from graders, excavators, compactors, trucks and workforce activity.
- Intermittent vibration from compaction and heavy vehicle movements.

Construction impact assessment (unmitigated)

- Magnitude: Moderate
- Sensitivity: Low–Moderate (few nearby sensitive receptors expected, but road users and any nearby farm dwellings matter)
- Duration: Short–medium

- Extent: Site-local
- Unmitigated significance: Moderate

Mitigation measures

- Limit noisy activities to daytime working hours.
- Fit and maintain mufflers; equipment maintenance programme.
- Site layout to place noisiest plant away from any nearby dwellings (if present).
- Community/farm owner notifications for unusually noisy activities or abnormal loads.

Residual impact significance

- Residual significance: Low

3) Soils, erosion, and sedimentation

Baseline condition

The site is generally flat with minor undulations; soils are typical of central Namibian farm landscapes and are susceptible to compaction and wind/water erosion when stripped or disturbed. Drainage features and a riverbed system in the broader local area indicate that sediment mobilisation is a key sensitivity.

Potential construction impacts

- Loss of topsoil, compaction, and reduced infiltration capacity.
- Erosion from exposed surfaces, stockpiles, tracks, and trenches.
- Sediment movement into ephemeral drainage lines and downstream riverbeds.
- Creation of preferential flow paths by roads and trenches (channelisation).

Construction impact assessment (unmitigated)

- Magnitude: High (if unmanaged, erosion/sedimentation can be significant even on gentle slopes)
- Sensitivity: Moderate–High (soil is the key medium for rehabilitation; drainage lines are high sensitivity)

- Duration: Medium (can persist if erosion scars form)
- Extent: Site-local to downstream local
- Unmitigated significance: High

Mitigation measures

- Detailed Erosion and Sediment Control Plan (ESCP) and Stormwater Management Plan integrated into method statements.
- Strip and store topsoil separately; protect stockpiles (berms, temporary cover, no compaction).
- Minimise footprint; phased clearing; stabilise disturbed surfaces quickly.
- Maintain natural flow paths; install diversion drains, contour berms, check dams, energy dissipaters.
- Avoid infrastructure in drainage lines; apply buffers; no vehicle crossings without designed culverts.
- Progressive rehabilitation and re-vegetation; rip compacted areas where necessary.
- Post-storm inspections and rapid repair of erosion controls.

Residual impact significance

- Residual significance: Low–Moderate (low if controls are implemented early and maintained; moderate if extreme rainfall occurs during exposed works)

4) Groundwater and contamination risk (incl. surface-water pathway)

Baseline condition

Groundwater is the main water resource in the commercial farm setting (boreholes), with sensitivity primarily linked to pollution prevention rather than abstraction volumes. Ephemeral drainage lines and alluvial zones can increase vulnerability during storm events.

Potential construction impacts

- Hydrocarbon spills (diesel, oils, greases) contaminating soil and infiltrating groundwater.

- Contamination via runoff into drainage features (especially from poor housekeeping).
- Improper storage/disposal of hazardous waste (oily rags, filters, containers).

Construction impact assessment (unmitigated)

- Magnitude: Moderate–High (spill events can be severe locally)
- Sensitivity: Moderate (groundwater is valuable; vulnerability increases near drainage features)
- Duration: Medium–long (if contamination occurs)
- Likelihood: Possible (without strict controls)
- Unmitigated significance: Moderate–High

Mitigation measures

- Bunded storage for fuels/chemicals; controlled refuelling areas with drip trays.
- Spill kits at all high-risk points; trained staff; spill response procedure and reporting.
- No refuelling/maintenance within buffer zones of drainage lines.
- Waste management plan: segregate hazardous wastes, label, secure, and dispose at licensed facilities.
- Concrete washout control (if any civil works) and prohibition of dumping on bare ground.
- Emergency preparedness and incident investigation/close-out actions.

Residual impact significance

- Residual significance: Low (with GIIP storage, refuelling, and spill response)

5) Biodiversity – habitat loss and fauna disturbance

Baseline condition

The site supports predominantly natural Acacia/thornbush savanna within a commercial farm landscape, with higher sensitivity expected along ephemeral drainage features and in mature tree patches. Fauna is expected to comprise typical savanna/farm assemblages (birds, small mammals, reptiles including tortoises; amphibians mainly seasonal near temporary waters).

Potential construction impacts

- Direct habitat loss from clearing for panels, roads, trenching, laydown areas.
- Disturbance/displacement of fauna from noise, vehicle movement, lighting (if any), and increased human presence.
- Fauna injury/mortality from machinery and traffic (notably reptiles/tortoises; small mammals).

Construction impact assessment (unmitigated)

- Magnitude: Moderate (footprint is large; clearing is the primary driver)
- Sensitivity: Moderate (natural habitat elements present; drainage microhabitats are higher)
- Duration: Long-term for cleared footprint; short-term for disturbance
- Unmitigated significance: Moderate–High

Mitigation measures

- Micro-siting to avoid drainage-line/riparian vegetation and mature tree clusters where feasible.
- Minimise clearing (selective clearing); clearly demarcate "no-go" areas.
- Pre-clearance walkdown by ECO; rescue/relocation procedure for tortoises and other fauna where permitted.
- Speed limits; driver awareness; prohibition of night driving where practicable.
- Waste control to avoid attracting predators/scavengers; no hunting/collection rule.
- Progressive rehabilitation of temporarily disturbed areas.

Residual impact significance

- Residual significance: Moderate (habitat loss is not fully avoidable, but can be reduced and compensated via rehabilitation; disturbance-related effects reduce to low with controls)

6) Biodiversity – increased risk of invasive alien plants

Baseline condition

Invasive alien plant presence is often associated with disturbed soils, road verges, and material import areas. Construction disturbance increases the probability of establishment and spread.

Potential construction impacts

- Introduction via contaminated soil, aggregate, vehicles, and equipment.
- Spread along roads, trenches, and disturbed areas; reduced rehabilitation success.

Construction impact assessment (unmitigated)

- Magnitude: Moderate
- Sensitivity: Moderate (invasives can alter vegetation structure and ecosystem function)
- Duration: Long-term if established
- Unmitigated significance: Moderate

Mitigation measures

- Invasive Alien Species Management Plan (IASMP): hygiene for vehicles, clean fill only, inspect materials.
- Early detection and rapid response (EDRR): routine inspections, removal before seeding.
- Re-vegetate disturbed areas promptly; protect topsoil/seedbank.
- Prohibit planting of alien ornamentals in any operational landscaping.

Residual impact significance

- Residual significance: Low

7) Biodiversity – disruption of ecosystem services

Baseline condition

Ecosystem services in the thornbush savanna/farm mosaic include: soil stabilisation, infiltration and groundwater recharge support, runoff attenuation, habitat provision, pollination/seed dispersal, and cultural/landscape values linked to rural land character.

Potential construction impacts

- Reduced infiltration and increased runoff due to compaction/road networks.
- Reduced soil stability and increased erosion risk.
- Reduced habitat function and local biodiversity support.

Construction impact assessment (unmitigated)

- Magnitude: Moderate
- Sensitivity: Moderate
- Duration: Medium–long (depends on rehabilitation success)
- Unmitigated significance: Moderate

Mitigation measures

- Topsoil conservation; minimise compaction; rip and rehabilitate temporary work areas.
- Maintain drainage connectivity; stormwater controls and buffers.
- Rehabilitation plan with measurable success criteria (vegetation cover targets, erosion stability).

Residual impact significance

- Residual significance: Low–Moderate (low if rehabilitation is demonstrably successful)

8) Landscape and visual impacts

Baseline condition

The area is a rural farming landscape with open savanna character and some existing infrastructure influence (A1 corridor and regional roads). Visual sensitivity is generally moderate, with higher sensitivity from road viewpoints and any nearby farm dwellings.

Potential construction impacts

- Visual intrusion from construction plant, temporary laydown areas, stockpiles.
- Night-time lighting (if used) causing light spill.
- Dust plumes reducing visual amenity along roads.

Construction impact assessment (unmitigated)

- Magnitude: Moderate
- Sensitivity: Low–Moderate
- Duration: Short–medium (construction)
- Unmitigated significance: Moderate

Mitigation measures

- Keep laydown areas tidy; limit stockpile heights; progressive cleanup.
- Avoid unnecessary night lighting; use down-shielded lights where needed.
- Dust control (as above); maintain a clean site boundary along public viewpoints.

Residual impact significance

- Residual significance: Low

9) Land acquisition and displacement (physical and economic)

Baseline condition

The project site is privately owned commercial farmland, with an agreement in place to purchase or sub-lease the project portion. The specific footprint appears dormant with no livestock observed at time of survey, but it remains part of a productive agricultural unit.

Potential construction impacts

- Economic displacement risk is generally low where the transaction is willing-buyer/willing-seller and no third-party users rely on the land; however, potential impacts include loss of future grazing flexibility and changes to farm operations (movement, access, fencing).

- Labour influx can affect local services if unmanaged (handled under social impacts rather than displacement per se).

Construction impact assessment (unmitigated)

- Magnitude: Low–Moderate (site-specific, depends on farm use patterns)
- Sensitivity: Moderate (private livelihoods and land capability considerations)
- Duration: Long-term (land converted for ≥20 years)
- Unmitigated significance: Moderate *(primarily due to duration)*

Mitigation measures

- Document land transaction terms and confirm no physical displacement and no third-party land users.
- Develop a Farm Interface Plan: access protocols, fencing/gate controls, firebreaks, livestock controls (if reintroduced elsewhere), and compensation for any proven damages.
- Maintain grievance mechanism for landowner and adjacent users.
- Decommissioning commitment to restore land capability as far as practicable.

Residual impact significance

- Residual significance: Low–Moderate (low where land transaction is voluntary and farm-interface measures are implemented; moderate if farm operations are materially constrained)

Aspect	Unmitigated significance	Residual significance
Air quality (dust)	Moderate	Low
Noise	Moderate	Low
Soils/erosion/sedimentation	High	Low–Moderate
Groundwater contamination	Moderate–High	Low
Biodiversity: habitat loss/fauna disturbance	Moderate–High	Moderate
Biodiversity: invasive alien plants	Moderate	Low
Biodiversity: ecosystem services disruption	Moderate	Low–Moderate
Landscape/visual	Moderate	Low
Land acquisition/economic displacement	Moderate	Low–Moderate

Public Consultation and Stakeholder Engagement

Approach and objectives

Public consultation for the Osona 20 MWac Solar PV Project was undertaken to (i) disclose the proposed project and the EIA process to Interested and Affected Parties (I&APs), (ii) provide accessible opportunities for stakeholders to register and submit comments, and (iii) ensure that issues raised by stakeholders are captured, assessed in the EIA, and addressed through appropriate mitigation and management measures in the EMP. Engagement was implemented in line with Namibia's EIA public participation expectations and consistent with GIIP principles (early disclosure, inclusivity, transparency, and documented responses).

Disclosure methods and outreach activities

To ensure broad and practical access to information, a combination of print media and local notice placement was used:

1. Newspaper advertisements

- Public notices announcing the EIA and inviting registration/comments were placed in two newspapers to reach both local and national audiences and to maximise stakeholder awareness beyond the immediate project area.

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Catholic Health Services

CHS

CATHOLIC HEALTH SERVICES INVITES APPLICANTS FOR THE FOLLOWING VACANT POSTIONS:

Catholic Health Services is Namibia's second largest health services provider with four hospitals and twelve Health Centers and Clinics, mainly in rural areas.

We welcome applications from suitable candidates for the following positions,

DIVISION: **TONDORO HEALTH CENTRE**
SECTION: **HUMAN RESOURCES**
POST DESIGNATION: **HUMAN RESOURCE PRACTITIONER GRADE 8**
NO OF POST: **ONE (1)**
DUTY STATION: **TONDORO HEALTH CENTRE x 1**
SALARY SCALE:
N$238 825-285 420

AUGITE ENVIRONMENTAL CONSULTANCY CC

PUBLIC CONSULTATION ANNOUNCEMENT

Environmental Impact Assessment for a 20MW Solar Power Plant close to Osona Sub-Station in the vicinity of the Osona Village and Okahandja, in the Otjozondjupa Region

Notice is hereby given that an application for an **Environmental Clearance Certificate (ECC)** will be submitted to the Environmental Commissioner in terms of the **Environmental Management Act, 2007 (Act No. 7 of 2007)** and the **Environmental Impact Assessment Regulations (GN 30 of 2012)** for the proposed project described below.

Proposed Activity:
Development of a **20 MW Solar Photovoltaic (PV) Power Plant** (including associated infrastructure such as internal access roads, PV arrays, inverter stations, boundary fencing, temporary construction laydown areas, and grid connection infrastructure where applicable).

Project Location:
The proposed solar power plant area is located approximately **18 km west of Osona Village** on the route towards **Gross Barmen**. The site is on the **left-hand side of the A1** when travelling from **Windhoek**. Access is obtained by turning **left from the A1 onto the D1972** district road and travelling for approximately **14 km** toward Gross Barmen.

Public Participation:
All **Interested and Affected Parties (I&APs)** are invited to **register** and submit **comments, concerns, or recommendations** regarding the proposed development. Registered I&APs will receive project updates and will be notified of key consultation milestones (including availability of draft reports and any public meetings, where applicable).

How to Register / Submit Comments:
Please submit your **name, contact details, and interest in the project**, and any comments, to the Environmental Assessment Practitioner (EAP) using the contact details below.

Closing Date for Registration and Initial Comments: 16 February 2026

Environmental Assessment Practitioner (EAP):
Augite Environmental Consultants cc
Attention: **Dr Ismael Kangueehi**
Tel: **+264 817069 027**
Email: **kkangueehi0@gmail.com**
Postal Address:
P O Box 87099 Eros

Proponent: JCM Power

Availability of Information:
Project information and the registration/comment forms can be requested from the EAP via email/ WhatsApp, and will be shared with registered I&APs.

REPUBLIC OF NAMIBIA MINISTRY

- CHANGE OF SURNAME -

Figure 14. Newspaper adverts in the local daily newspaper.

2. On-site and community notice placements
   In addition to newspaper notices, hard-copy adverts were displayed at accessible public

locations within the receiving environment to support community-level awareness and participation. Notices were pasted at:

- Okahandja Municipal Offices
- Okahandja Police Station
- Osona Estate
- Osona Mall

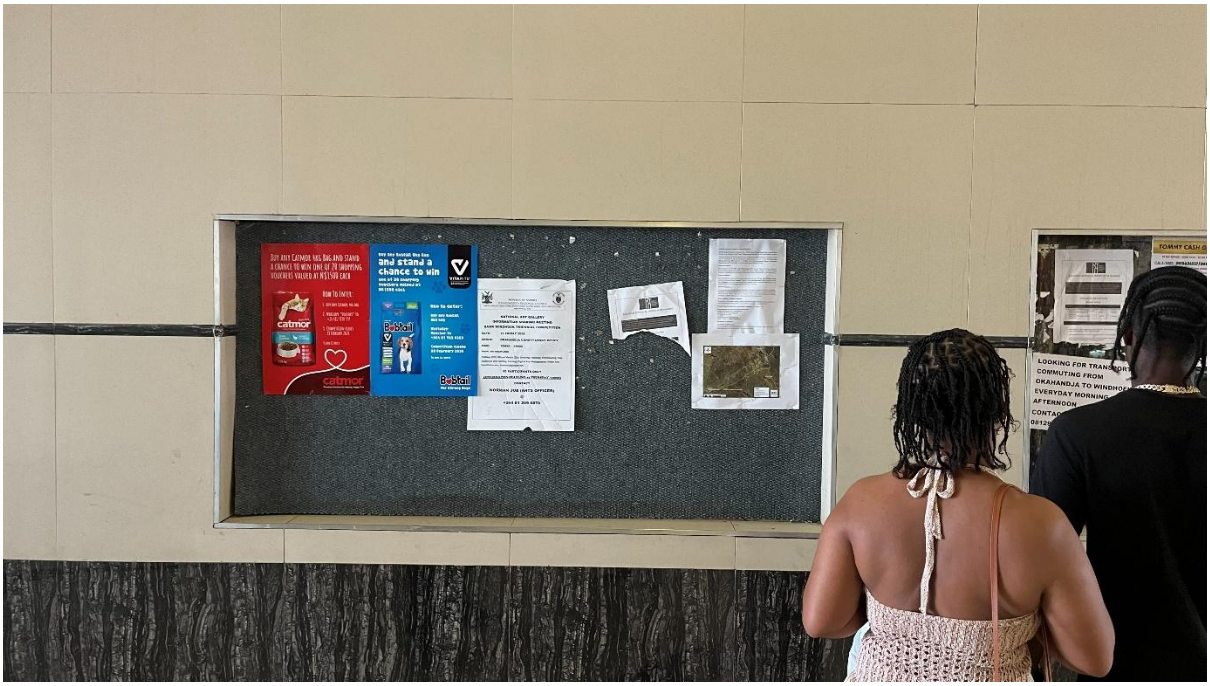

Figure 15. Some of the adverts were posted on local notice boards in malls and at the police station.

Figure 16. Notices also pasted at the Okahandja local municipality building.

These locations were selected because they are frequented by community members and provide practical access points for residents, local businesses, and commuters along the Okahandja–Osona corridor.

Stakeholder notifications (direct engagement)

Beyond public advertisements, direct notifications were issued to key institutional stakeholders to ensure that authorities and decision-makers with jurisdictional or planning interests were informed of the proposed development and the EIA process. Stakeholders informed include:

- Gross Barmen (relevant local authority/stakeholder given proximity and corridor linkages)
- Otjozondjupa Town Council / relevant regional-local governance structures

This direct engagement supports early identification of governance-related concerns (e.g., alignment with local planning, road safety, service pressure, and emergency response coordination) and improves the quality of the EIA by integrating institutional inputs.

Stakeholder register, comments, and issues tracking

All stakeholders who registered or were directly contacted are recorded in a Stakeholder Register (Annexure X). Comments received through the consultation period are captured in an Issues and Responses Report (Annexure Y), which documents:

- stakeholder name/organisation (where provided),
- date and method of comment,
- issue raised,
- how the issue is addressed in the EIA (impact assessment section reference), and
- corresponding commitments included in the EMP.

Ongoing engagement and grievance mechanism

Stakeholder engagement is treated as a continuing process through construction and operation. A project grievance mechanism will be maintained to enable stakeholders to submit concerns, with defined response timeframes and escalation procedures. This supports effective issue management during construction (traffic, noise, dust, employment queries) and operation (site access, safety, visual concerns), and ensures accountability through documented close-out of grievances.

Stakeholder Mapping Matrix (EIA-ready)

Stakeholder group	Interest (Low/Med/High)	Influence (Low/Med/High)	Engagement method	Frequency / timing	Responsibility	Evidence / records
Environmental authorities / Environmental Commissioner process	High	High	Formal submission of EIA/EMP; statutory correspondence; follow-up meetings/briefings as required	Key milestones (scoping launch, draft EIA, final submission, ECC decision); as requested	Proponent (JCM) + EAP (Augite)	Submission receipts; correspondence log; meeting minutes; final EIA/EMP
Sector authorities (energy/electricity / permitting bodies as applicable)	Medium–High	High	Formal notifications; technical briefings on grid connection, safety, compliance	Milestones and as required	Proponent + Grid interface team	Letters/emails; technical notes; meeting minutes
Grid operator / substation interface stakeholder (Osona Substation connection)	High	High	Technical interface meetings; method statements; outage/safety planning; site safety coordination	Design finalisation; pre-construction; prior to energisation; periodic during works	Proponent + EPC contractor + Utility interface lead	Interface meeting minutes; approvals; method statements; commissioning records
Roads/transport authority (A1/D1972 access and haulage)	Medium	High	Notification of haul routes; Traffic Management Plan	Pre-construction; as permits	EPC contractor + EAP oversight	Permits; TMP; correspondence; incident reports

Stakeholder group	Interest (Low/Med/High)	Influence (Low/Med/High)	Engagement method	Frequency / timing	Responsibility	Evidence / records
			sharing; abnormal load permits (if applicable)	required; incident-driven		
Labour / OHS authorities (as applicable)	Medium	Medium–High	Compliance notifications (if required); audits/inspections support; OHS plan availability	Pre-construction and during inspections	EPC contractor (primary) + Proponent oversight	H&S plans; training registers; inspection reports; incident logs
Heritage / archaeology authority	Medium	Medium	Notification of Chance Finds Procedure; engagement if finds occur	Pre-construction (procedure in place); event-driven	EPC contractor + ECO + EAP	Chance Finds Procedure; toolbox talks; stop-work records; authority correspondence
Okahandja Municipality (municipal offices and local governance)	High	High	Direct notification; briefings; disclosure materials; issue follow-up	Scoping launch; draft EIA disclosure; as issues arise	EAP (Augite) + Proponent	Letters/emails; proof of notice placement; meeting notes; issues register
Otjozondjupa regional/local authority structures (Town/Regional Council as applicable)	High	High	Direct notification; targeted meetings/briefings; disclosure	Scoping launch; draft EIA; prior to construction	EAP + Proponent	Correspondence; minutes; stakeholder register; issues & responses report

Stakeholder group	Interest (Low/Med/High)	Influence (Low/Med/High)	Engagement method	Frequency / timing	Responsibility	Evidence / records
Okahandja Police / emergency services	Medium	Medium	Notification of construction programme; emergency response coordination; traffic safety coordination	Pre-construction; incident-driven; periodic during peak haulage	EPC contractor + Proponent	Letters/emails; emergency response plan; incident records
Gross Barmen stakeholders (local governance/tourism/service stakeholders)	Medium	Medium	Direct notification; information sharing; issue follow-up	Scoping/draft EIA; as needed	EAP + Proponent	Correspondence; stakeholder register; issues register
Private landowner (commercial farmer)	High	High	Bilateral meetings; land access agreements; farm-interface planning (access, fencing, firebreaks)	Ongoing (monthly or as required) from planning through construction	Proponent + EPC site manager	Signed agreements; meeting notes; farm-interface plan; grievance log
Adjacent landowners/farm managers and farm workers	Medium–High	Medium	Targeted notifications; site boundary walkdowns; grievance channel	Pre-construction; quarterly or as issues arise	EAP + EPC site manager	Attendance registers; notices; grievance log; issues register
Local communities / residents (Okahandja–Osona corridor users)	Medium–High	Low–Medium	Newspaper adverts; public notice placements; public meetings (if held);	During scoping and draft EIA disclosure; ongoing	EAP (consultation	Newspaper tear sheets; photo log of notices; stakeholder

Stakeholder group	Interest (Low/Med/High)	Influence (Low/Med/High)	Engagement method	Frequency / timing	Responsibility	Evidence / records
			comment channels (email/phone/forms)	updates as required	lead) + Proponent	register; comments database
Osona Estate and Mall management / tenants	Medium–High	Medium	Direct engagement; disclosure notices; coordination on construction traffic and safety	Pre-construction; monthly during peak activity	EPC contractor + Proponent	Letters/emails; notice proof; meeting minutes; issues register
Local businesses / SMEs / suppliers	Medium–High	Medium	Supplier briefings; local procurement notices; tender transparency	Pre-construction procurement window; periodic refresh during construction	Proponent procurement + EPC procurement	Procurement records; supplier meeting notes; local content reporting
Construction workforce (employees and subcontractors)	High	Medium	Inductions; toolbox talks; worker engagement sessions; worker grievance mechanism	Daily toolbox; weekly H&S meetings; continuous grievance access	EPC contractor (primary) + Proponent oversight	Induction registers; toolbox records; H&S minutes; grievance log
Vulnerable groups (job seekers, women, informal service providers)	High	Low–Medium	Accessible disclosure; targeted communication via local nodes; fair	During recruitment;	Proponent + EPC + EAP	Recruitment protocol; communications;

Stakeholder group	Interest (Low/Med/High)	Influence (Low/Med/High)	Engagement method	Frequency / timing	Responsibility	Evidence / records
			recruitment messaging; GBV/SEA awareness	periodic during construction		GBV/SEA training records; grievances
Road users (A1/D1972)	Medium	Low	TMP implementation; signage; speed control; public safety messaging	Continuous during construction haulage	EPC contractor	TMP; signage/photo log; incident/near-miss logs; inspection checklists
Interested NGOs / environmental groups (if registered)	Medium	Low–Medium	Information sharing; response to submissions; disclosure of draft EIA	During disclosure; as submissions received	EAP	Stakeholder register; correspondence; issues & responses report

Overall Conclusion

The Environmental Impact Assessment (EIA) for the proposed Osona 20 MWac Solar PV Project (including the ~89 ha solar plant site, ~300 m access linkage from the D1972, internal access roads, and the ~0.5 km grid connection to the Osona Substation) concludes that the Project is environmentally and socially feasible, provided that the mitigation hierarchy is applied and the Environmental Management Plan (EMP) is implemented as a binding project control instrument.

The receiving environment is a commercial farming landscape characterised by generally flat terrain with minor undulations, semi-arid conditions, and predominantly natural Acacia/thornbush savanna vegetation retained within the farm matrix. Baseline environmental quality is generally good, with the key sensitivities being (i) soils and erosion potential during earthworks, (ii) protection of ephemeral drainage lines/riverbed systems from sedimentation and pollution, and (iii) avoidance and minimisation of habitat loss and fauna disturbance within a PS6 natural/modified habitat mosaic. Socially, the Project is situated within the Okahandja–Osona corridor context of Otjozondjupa, where employment demand is high and stakeholder expectations are sensitive to fairness in recruitment and procurement, while construction-phase logistics create manageable but material risks related to traffic safety, dust/noise nuisance, and labour influx.

The assessment finds that most negative impacts during construction—particularly dust, noise, and groundwater contamination risk—can be reduced to Low residual significance through standard GIIP controls (dust suppression, controlled working hours, bunded storage and spill response, good housekeeping, and compliant waste management). The most material residual impacts relate to biodiversity: while disturbance effects can be reduced to low, the permanent conversion of part of the thornbush habitat footprint results in a Moderate residual impact despite mitigation, because habitat loss is partly unavoidable over the operational life of the facility. This residual impact is considered acceptable in the project context where (a) sensitive drainage-line habitats are avoided, (b) clearing is minimised, (c) rehabilitation and invasive species controls are implemented with measurable success criteria, and (d) the Project's positive benefits—renewable electricity supply, long-term climate mitigation contribution, and local/regional employment and procurement—are realised and documented.

Overall, the EIA supports proceeding with the Project and recommends that it be authorised subject to strict conditions tied to the EMP, monitoring, and stakeholder engagement commitments.

Recommendations

A) Authorisation recommendation (ECC)

It is recommended that the competent authority issues an Environmental Clearance Certificate for the Project subject to conditions, including:

1. Implementation of the EMP as a contractual and enforceable document for the Proponent and all contractors.
2. Appointment of an independent Environmental Control Officer (ECO) for the full construction period.
3. Final layout micro-siting to avoid ephemeral drainage features and any identified high-sensitivity habitat patches.
4. Submission and approval (prior to construction) of the key management plans listed below.

B) Priority management plans required before construction

Before any site clearing or earthworks commence, the following plans should be finalised, approved internally by the Proponent, and included in contractor method statements:

1. Erosion and Sediment Control Plan (ESCP) + Stormwater Management Plan (SWMP)
    - drainage buffers and no-go zones,
    - diversion drains/berms and energy dissipation,
    - post-storm inspection and rapid repair protocol.
2. Dust Management Plan
    - speed limits, watering triggers, wind-stop rules,
    - stockpile stabilisation and progressive rehabilitation.
3. Traffic Management Plan (TMP)

- A1/D1972 interface safety controls, signage, speed controls,
- abnormal load procedure (if applicable),
- community safety coordination (police/emergency services).

4. Hazardous Materials and Spill Prevention Plan
    - bunded fuel/chemical storage, controlled refuelling,
    - spill response training and incident reporting.
5. Waste Management Plan
    - segregation, licensed transport/disposal,
    - controlled handling of hazardous waste streams.
6. Biodiversity Management Measures (PS6-aligned)
    - pre-clearance walkdown; fauna rescue/relocation protocol (where allowed),
    - protection of drainage-line vegetation,
    - invasive alien species prevention and early detection,
    - rehabilitation success criteria (cover, erosion stability, weed thresholds).
7. Labour and Influx Management Controls (PS2/PS4-aligned)
    - transparent recruitment procedure with local hiring priority where feasible,
    - worker code of conduct and GBV/SEA awareness,
    - worker grievance mechanism separate from public grievances.
8. Chance Finds Procedure (Heritage)
    - stop-work protocol, notification steps, and documentation requirements.

C) Design and layout recommendations (impact avoidance)

1. Avoid drainage lines and riverbed-associated features: keep PV arrays, laydown areas, refuelling zones, and waste storage outside buffers and maintain natural flow paths.

2. Minimise footprint: reduce unnecessary internal roads; use existing disturbed areas for laydown and staging.
3. Grid connection optimisation: where feasible, reduce avifauna risk by selecting routing that avoids drainage corridors and applying bird-safe design measures (especially if any overhead line is used).
4. Lighting minimisation: avoid permanent lighting where not required; use down-shielded, motion-activated lighting if security lighting is necessary.

D) Monitoring and compliance recommendations

1. Construction compliance monitoring
    - weekly ECO inspections (minimum) and post-storm inspections,
    - dust/noise observation logs and corrective actions,
    - spill/incident reporting and close-out tracking,
    - rehabilitation progress checks and invasive species inspections.
2. Operational monitoring
    - stormwater infrastructure inspections and maintenance,
    - waste handling audits,
    - periodic biodiversity and invasive species checks along disturbed edges and access routes,
    - grievance log reporting and response time tracking.
3. Performance reporting
    - monthly construction E&S reports summarising incidents, non-compliances, corrective actions, and stakeholder grievances,
    - local employment and procurement reporting (local hire %, training hours, local spend).

E) Enhancement recommendations (maximising positive impacts)

1. Implement a Local Content Plan (local procurement targets, supplier engagement, transparent tendering).
2. Implement a Skills Development Plan (training hours, mentorship, competency sign-off for local workers).
3. Maintain ongoing stakeholder engagement (clear contact points, grievance mechanism, updates at key milestones).

Subject to implementation of the EMP and associated management plans, and subject to strict adherence to drainage-line protection, erosion and sediment controls, biodiversity mitigation and rehabilitation commitments, traffic and labour management measures, and ongoing stakeholder engagement and grievance management, the proposed Osona 20 MWac Solar PV Project is recommended for authorisation. The residual environmental and social impacts are expected to be acceptable and manageable, while the Project provides substantial long-term benefits through renewable electricity generation, climate mitigation contribution, and local and regional socio-economic upliftment.