LESAKA 1 SOLAR ENERGY FACILITY (PTY) LTD

Proposed Development of the Lesaka 1 Solar Energy Facility (SEF) and Associated Infrastructure near Loeriesfontein in the Northern Cape Province

Final Environmental Impact Assessment Report

Issue Date:	8 September 2023
Revision no.:	1.0
Project No.	17793
DFFE Reference Number:	14/12/16/3/3/2/2327

Date:	8 September 2023
Document Title:	Proposed Development of the Lesaka 1 Solar Energy Facility (SEF) and Associated Infrastructure near Loeriesfontein in the Northern Cape: Final Environmental Impact Assessment Report
Revision Number:	1.0
Author:	Michelle Guy (EAP) *Pr.Sci.Nat Reg No. 126338* *EAPASA Reg No. 2019/868*
Checked by:	Michelle Nevette *Cert.Nat.Sci Rev No. 120356* *EAPASA Reg No. 2019/1560*
Approved by:	Michelle Nevette *Cert.Nat.Sci Rev No. 120356* *EAPASA Reg No. 2019/1560*
Signature:	
Client:	Lesaka 1 Solar Energy Facility (Pty) Ltd

KEY PROJECT INFORMATION

PROJECT DESCRIPTION

The full application site assessed is approximately 4 894.93 hectares (ha) in extent.

In summary, the proposed Lesaka 1 SEF development will include the following components:

- Buildable area for PV approximately 596 ha.
- Export capacity of up to 240MW.
- Solar Module Technology – Monocrystalline or Polycrystalline cell type (Monofacial and/or Bifacial Photovoltaic (PV) Modules) with fixed, single or dual axis tracking mounting structures.
- Low and medium voltage cabling will link the PV facility to the facility substation / grid connection infrastructure. These cables will be either overhead or laid underground wherever technically feasible (up to 33kV).
- Access road/s to the site and internal roads between project components of up to 5m and 6m, this can increase to 8m on bends. The roads to be placed with a corridor of up to 20m width to accommodate cable trenches, stormwater channels (as required), and turning circle/bypass areas of up to 20m in some sections. Existing roads will be upgraded wherever needed, and new roads will be constructed where necessary.
- Operation and maintenance (O&M) building to be located near the IPP substation and/or BESS (including septic/conservancy tanks with portable toilets). Typical areas include: Operations building (20m x 10m = 200m$^{2)}$, Workshop (15m x 10m = 150m^2), and Stores (5m x 10m = 150m^2).
- Construction camp laydown area approximately 0.5 ha in size.
- Temporary laydown/staging area during construction phase approximately 2.2 ha in size.
- Battery Energy Storage System (BESS) will be up to 120MW / 480MWh with up to four hours of storage. It is proposed that Lithium Battery Technologies, such as Lithium Iron Phosphate, Lithium Nickel Manganese Cobalt oxides or Vanadium Redox flow technologies will be considered as the preferred battery technology however the specific technology will only be determined following Engineering, Procurement, and Construction (EPC) procurement. The main components of the BESS include the batteries, power conversion system, and transformer which will all be stored in various rows of containers. The BESS components will arrive on site pre-assembled. The approximate footprint for the BESS is 4 ha.
- Associated infrastructure such as: fencing and lighting, lightning protection system (LPS), telecommunication infrastructure, batching plant (if required), security infrastructure, access and internal roads, stormwater infrastructure, water pipelines (as needed).
- Fences will run adjacent to the solar buildable areas and outside all no-go areas.
- One new 33/132kV on-site IPP substation (facility substation) utilised for collection and connection of the internal LV and MV reticulation of the Solar PV Facility. The 132kV Switching Station may be adjacent to the respective onsite IPP Substation. The onsite IPP Substation and Switching Station combined footprint will be approximately 1 ha.
- Substation infrastructure includes: office area, operation and control room, workshop, and storage area, oil dam, including standard substation electrical equipment (feeder bays, transformers, busbars, stringer strain beams, insulators, isolators, conductors, circuit breakers, lightning arrestors, relays, capacitor banks, batteries, wave/line trappers, switchyard, metering and indication instruments, equipment for carrier current, surge protection and outgoing feeders, as may be needed).

Component	Description / Dimensions
Location of site (centre point)	30°36'51.54"S 19°28'7.65"E
Application site area	4 894.93 ha (overall farm area)
PV development area	Approximately 596 ha
SG codes	C01500000000026400000
Export capacity	Up to 240 MW
Proposed technology	Solar Module Technology – Monocrystalline or Polycrystalline cell type. Monofacial and/or Bifacial Photovoltaic (PV) Modules. Mounting System Technology – Single-axis tracking, Dual-axis tracking, or Fixed axis tracking. Overhead or underground LV and MV cabling. Centralised inverter stations or string inverters. Power Transformers.
Max panel height from the ground	5 m
Substation area	6.5 ha
Battery Energy Storage Area (BESS)	The associated BESS storage capacity will be up to 120MW / 480MWh with up to four hours of storage. It is proposed that Lithium Battery Technologies, such as Lithium Iron Phosphate, Lithium Nickel Manganese Cobalt oxides or Vanadium Redox flow technologies will be considered as the preferred battery technology however the specific technology will only be determined following Engineering, Procurement, and Construction (EPC) procurement. The main components of the BESS include the batteries, power conversion system, and transformer which will all be stored in various rows of containers. The approximate footprint for the BESS is 4 ha.
Capacity of on-site and collector substation	33/132kV
O&M building area	Located near the onsite IPP SS and/or BESS. Septic/Conservancy tanks with portable toilets Typical areas include: - Operations building – 20m x 10m = 200m^2 - Workshop – 15m x 10m = 150m^2 - Stores – 5m x 10m = 150m^2
Construction Camp Laydown area	Typical area 100m x 50m = 5 000m^2 (0.5 ha)
Temporary laydown or staging area	Typical area 220m x 100m = 22 000m^2 (2.2 ha)
Internal roads	Access road/s to the site and internal roads between project components of up to 5m and 6m, this can increase to 8m on bends. The roads to be placed with a corridor of up to 20m width to accommodate cable trenches, stormwater channels (as required), and turning circle/bypass areas of up to 20m in some sections. Existing roads will be upgraded wherever needed, and

Component	Description / Dimensions
	new roads will be constructed where necessary.
Site Access	Access to the development area can be obtained via the AP2972, which is approximately 7 km east of the proposed development area.
Proximity to grid connection	On site via a Loop-In-Loop-Out connection to the existing 400kV line.
Associated Infrastructure	- Fencing and lighting (fences will run adjacent to the solar buildable areas and outside all no-go areas) - Lightning Protection System (LPS). - Telecommunication infrastructure. - Batching plant (if required). - Security infrastructure. - Access and internal roads. - Stormwater infrastructure (as needed). - Water pipelines (as needed).

COORDINATES

The bend point coordinates of the SEF site boundary/application site, onsite substation, O&M Building and BESS have been included below. The bend point coordinates for each buildable area for the SEF are included in **Section 5.2**.

LESAKA 1 SEF: APPLICATION SITE		
COORDINATES AT CORNER POINTS (DD MM SS.sss)		
POINT	SOUTH	EAST
1	30°34'18.06"S	19°26'38.26"E
2	30°37'12.02"S	19°30'31.88"E
3	30°38'32.50"S	19°29'46.16"E
4	30°38'32.97"S	19°28'11.14"E
5	30°38'15.94"S	19°28'27.34"E
6	30°38'2.07"S	19°28'26.28"E
7	30°38'1.32"S	19°27'44.13"E
8	30°37'29.89"S	19°27'47.76"E
9	30°37'25.49"S	19°26'24.34"E
10	30°35'1.18"S	19°26'0.30"E
COORDINATES AT CENTRE POINT (DD MM SS.sss)		
POINT	SOUTH	EAST
11	30°36'51.54"S	19°28'7.65"E

LESAKA 1 SEF: ONSITE SUBSTATION, O&M BUILDING AND BESS (6.5ha)		
COORDINATES AT CORNER POINTS (DD MM SS.sss)		
POINT	SOUTH	EAST
1	30°37'32.23"S	19°27'47.65"E

2	30°37'32.90"S	19°27'55.68"E
3	30°37'42.60"S	19°27'54.57"E
4	30°37'41.91"S	19°27'46.54"E
COORDINATES AT CENTRE POINT (DD MM SS.sss)		
POINT	**SOUTH**	**EAST**
5	30°37'37.44"S	19°27'51.00"E

LESAKA 1 SEF: TEMPORARY LAYDOWN AREAS (6.5ha)		
COORDINATES AT CORNER POINTS (DD MM SS.sss)		
POINT	**SOUTH**	**EAST**
1	30°36'10.57"S	19°27'35.24"E
2	30°36'12.08"S	19°27'43.12"E
3	30°36'21.58"S	19°27'40.70"E
4	30°36'20.08"S	19°27'32.81"E
COORDINATES AT CENTRE POINT (DD MM SS.sss)		
POINT	**SOUTH**	**EAST**
5	30°36'15.96"S	19°27'38.16"E

LESAKA 1 SOLAR ENERGY FACILITY

FINAL ENVIRONMENTAL IMPACT ASSESSMENT REPORT

EXECUTIVE SUMMARY

INTRODUCTION AND PROJECT DESCRIPTION

Lesaka 1 Solar Energy Facility (Pty) Ltd is proposing to construct the Lesaka 1 Solar Energy Facility (SEF) and associated infrastructure approximately 35 km north of Loeriesfontein in the Hantam Local Municipality and the Namakwa District Municipality, in the Northern Cape Province (**DFFE Reference Number: 14/12/16/3/3/2/2327**)**.** The overall objective of the proposed development is to supply suitable private off-taker initiatives (direct supply or wheeling agreements, as applicable), or be bid into the government coordinated Renewable Independent Power Producer Programme (REIPPP) or similar procurement program under the Integrated Resource Plan (IRP). The proposed development will have a maximum total esport capacity of up to 240 megawatt (MW).

SiVEST Environmental Division has subsequently been appointed as the independent Environmental Assessment Practitioner (EAP) to undertake the Environmental Impact Assessment (EIA) process for the proposed construction and operation of the Lesaka 1 SEF and associated infrastructure. The proposed development requires an Environmental Authorisation (EA) from the National Department Forestry, Fisheries and the Environment (DFFE). However, the provincial authority (i.e. the Northern Cape Department of Agriculture, Environmental Affairs, Rural Development and Land Reform) will also be consulted. The EIA for the proposed development will be conducted in terms of the EIA Regulations, 2014 (as amended) promulgated in terms of Chapter 5 of the NEMA. In terms of these regulations, a full EIA process is required for the proposed development. All relevant legislation and guidelines will be consulted during the EIA process and will be complied with at all times.

One additional SEF is currently being considered on the same property by way of a separate environmental impact assessment process contained in the 2014 Environmental Impact Assessment Regulations (GN No. R982, as amended) for listed activities contained Listing Notices 1, 2 and 3 (GN R983, R984 and R985, as amended). This project is known as Lesaka 2 Solar Energy Facility (**DFFE Reference Number: 14/12/16/3/3/2/2328**).

In order to evacuate the energy generated by the SEF's to supplement the national grid, the applicant is proposing a new 132/400kV Main Transmission Substation which will be constructed on site. This MTS will connect to the existing Helios Juno 1 400kV line crossing the site via a Loop-In-Loop-Out connection.

The grid connection will be assessed in a separate application once a preferred solution is identified. The proposed grid connection infrastructure has however been included and assessed cumulatively along with the proposed Lesaka SEF.

Although the SEF's will be assessed separately, a single public participation process is being undertaken to consider both of the proposed projects.

APPLICABILITY OF NEMA EIA REGULATIONS, 2014 (AS AMENDED IN 2017)

The following activities are applied for:

Activity No(s):	Relevant activities as set out in Listing Notices 1, 2 and 3 of the EIA Regulations, 2014 as amended	Describe the portion of the proposed project to which the applicable listed activity relates.
Relevant Basic Assessment Activities as set out in Listing Notice 1		
11 (i)	**GN R. 327 (as amended) Item 11:** The development of facilities or infrastructure for the transmission and distribution of electricity— (i) outside urban areas or industrial complexes with a capacity of more than 33 but less than 275 kilovolts.	New on-site substations/collector switching stations will be constructed as part of the proposed development. The proposed substation / collector switching stations will be located outside urban areas and will have capacities of 33/132kV respectively. The substations will be connected via underground/overhead powerlines.
12 (ii) (a) (c)	**GN R. 327 (as amended) Item 12:** The development of: ii) infrastructure or structures with a physical footprint of 100 square metres or more; where such development occurs- (a) within a watercourse; (c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse.	Drainage lines and watercourses are located across the proposed site. One or more roads and/or powerlines and/or services will cross these watercourses or drainage lines or be within 32m thereof. The proposed developments will therefore entail the construction of infrastructure with physical footprints of approximately $100m^2$ or more within a surface water feature / watercourse or within 32m of a surface water feature / watercourse.
14	**GN R. 327 (as amended) Item 14**: The development of facilities or infrastructure, for the storage, or for the storage and handling, of a dangerous good, where such storage occurs in containers with a combined capacity of 80 cubic metres or more but not exceeding 500 cubic metres.	"Dangerous goods" that are likely to be associated with the project include fuel stored during the construction phase and/or hazardous chemical substances at the substation during the operational phase. Threshold of 80 m^3 expected to be exceeded. The Facility will require storage and handling of dangerous goods, including fuel, cement and chemical storage onsite, that will be greater than $80m^3$ but not exceeding $500m^3$. The following estimated maximum capacities of dangerous good will be stored on site: • Concrete Batching: ~125 m^3

Activity No(s):	Relevant activities as set out in Listing Notices 1, 2 and 3 of the EIA Regulations, 2014 as amended	Describe the portion of the proposed project to which the applicable listed activity relates.
		• Fuel stores (Petrol and/or Diesel): ~250m³ • Paint, grease, transformer oils, construction chemicals, lubricants: ~100m³
19	**GN R. 327 (as amended) Item 19**: The infilling or depositing of any material of more than 10 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 10 cubic metres from a watercourse;	The proposed development will involve the excavation, removal, infilling or depositing of any material of more than 10m³ into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 10m³ from some of the identified surface water features / watercourses. Although the layout of the proposed developments will be designed to avoid the identified surface water features / watercourses as far as possible, some of the internal and/or access roads/project related infrastructure may need to traverse the identified surface water features / watercourses. In addition, during construction, soil will need to be removed from some of the identified surface water features / watercourses.
24 (ii)	**GN R. 327 (as amended) Item 24:** The development of a road - ii) with a reserve wider than 13,5 meters, or where no reserve exists where the road is wider than 8 metres.	Internal access roads will be required to access the PV panels and substations. The roads to be placed within a corridor of up to 20m width to accommodate cable tranches, stormwater channels (as required), and turning circle/bypass areas of up to 20m in some sections. Existing roads will be used wherever possible, although new roads will be constructed where necessary.
28 (ii)	**GN R. 327 (as amended) Item 28:** Residential, mixed, retail, commercial, industrial or institutional developments where such land was used for agriculture, game farming, equestrian purposes or afforestation on or after 01 April 1998 and where such development: (ii) will occur outside an urban area, where the total land to be developed is bigger than 1 hectare;	The total area to be developed for the proposed renewable energy facilities is greater than 1ha and occurs outside an urban area in an area currently zoned as agricultural land.
48 (i) (a) (c)	**GN R. 327 (as amended) Item 48:** The	The proposed development will

Activity No(s):	Relevant activities as set out in Listing Notices 1, 2 and 3 of the EIA Regulations, 2014 as amended	Describe the portion of the proposed project to which the applicable listed activity relates.
	expansion of- (i) infrastructure or structures where the physical footprint is expanded by 100 square metres or more; where such expansion occurs— (a) within a watercourse; or (c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse;	entail the expansion (upgrading) of roads and other infrastructure by 100m^2 or more within a surface water feature / watercourse or within 32m from the edge of a surface water feature / watercourse. Although the layouts of the proposed developments will be designed to avoid the identified surface water features / watercourses as far as possible, some of the internal and access roads and project related infrastructure to be upgraded will need to traverse the identified surface water features / watercourses and construction will occur within some of the surface water features / watercourses and/or be within 32m of some of the surface water features / watercourses.
56 (ii)	**GN R. 327 Item 56:** The widening of a road by more than 6 metres, or the lengthening of a road by more than 1 kilometre - (i) where the existing reserve is wider than 13,5 metres; or (ii) where no reserve exists, where the existing road is wider than 8 metres –	Internal access roads will be required to access the PV panels and the substation. Existing roads will be used wherever possible, although new roads will be constructed where necessary. The existing access roads will need to be upgraded by widening them more than 6m, or by lengthening them by more than 1km.
Relevant Scoping and EIA Activities as set out in Listing Notice 2 of the EIA Regulations, 2014 as amended		
1	**GN R. 325 (as amended) Item 1:** The development of facilities or infrastructure for the generation of electricity from a renewable resource where the electricity output is 20 megawatts or more.	The proposed development will entail the construction of a SEF where the respective electricity output will be up to 240 MW. In addition, the proposed SEF development will be located outside urban areas.
15	**GN R. 325 (as amended) Item 15:** The clearance of an area of 20 hectares or more of indigenous vegetation.	The proposed SEF development will involve the clearance of more than 20 ha of indigenous vegetation. Clearance will also be required for the proposed substations, internal access roads and other associated infrastructure.
Relevant Basic Assessment Activities as set out in Listing Notice 3 of the EIA Regulations, 2014 as amended		
4 (g)(ii)(ee)	**GN R. 324 (as amended) Item 4:** The development of a road wider than 4m with a reserve less than 13.5 metres.	The development of the SEF facility and associated infrastructure will require the development of roads

Activity No(s):	Relevant activities as set out in Listing Notices 1, 2 and 3 of the EIA Regulations, 2014 as amended	Describe the portion of the proposed project to which the applicable listed activity relates.
	g. Northern Cape ii. Outside Urban Areas: (ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans.	wider than 4 m with a reserve of less than 13.5 m within a CBA 1 and CBA 2 area. These roads will occur within the Northern Cape Province, outside urban areas.
12 (g)(ii)	**GN R. 324 (as amended) Item 12:** The clearance of an area of 300 square metres or more of indigenous vegetation except where such clearance of indigenous vegetation is required for maintenance purposes undertaken in accordance with a maintenance management plan. **g. Northern Cape** (ii) Within critical biodiversity areas identified in bioregional plans.	The proposed development will entail the construction of infrastructure with physical footprints of approximately 300 m^2 or more within areas identified as CBA 1 and CBA 2 area. As such, approximately 300 m^2 or more of indigenous vegetation will likely be cleared as part of the respective proposed developments.
14 (ii)(a)(c)(g)(ii)(ff)	**GN R. 324 (as amended) Item 14:** The development of— (ii) infrastructure or structures with a physical footprint of 10 square metres or more; where such development occurs— (a) within a watercourse; or (c) if no development setback has been adopted, within 32 metres of a watercourse, measured from the edge of a watercourse; excluding the development of infrastructure or structures within existing ports or harbours that will not increase the development footprint of the port or harbour. **g. Northern Cape** ii. Outside urban areas: (ff) Critical biodiversity areas or ecosystem service areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans;	The proposed development will entail the development of infrastructure with physical footprints of 10m^2 or more within a watercourse / surface water feature or within 32 m from the edge of a watercourse / surface water feature. The construction of the infrastructure for the development will occur within CBA Areas 1 and 2 and Ecosystem Support Areas.
18 (g)(ii)(ee)(ii)	**GN R. 324 (as amended) Item 18:** The widening of a road by more than 4 meters, or the lengthening of a road by more than 1 kilometer- **g. Northern Cape** ii. Outside urban areas:	Internal access roads will be required to access the solar panels as well as the substation. Existing roads will be used wherever possible. Internal access roads will thus be widened by more than 4 m or lengthened by more than 1 km.

Activity No(s):	Relevant activities as set out in Listing Notices 1, 2 and 3 of the EIA Regulations, 2014 as amended	Describe the portion of the proposed project to which the applicable listed activity relates.
	(ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans; (ii) Areas within a watercourse or wetland; or within 100m from the edge of a watercourse or wetland.	These roads will occur within the Northern Cape Province, outside urban areas. The widening of the roads will occur within a CBA 1 and 2 area as well as a watercourse or wetland or within 100 m from the edge of a watercourse or wetland.
23 (ii)(a)(c) (g)(ii)(ee)	**GN R. 3245 (as amended) Item 23**: The expansion of— (ii) infrastructure or structures where the physical footprint is expanded by 10 square metres or more; where such expansion occurs— (a) within a watercourse; (c) if no development setback has been adopted, within 32 metres of a watercourse, measured from the edge of a watercourse; excluding the expansion of infrastructure or structures within existing ports or harbours that will not increase the development footprint of the port or harbour. **g. Northern Cape** ii. Outside urban areas: (ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans;	The proposed development will entail the development and expansion of roads and other infrastructure by $10m^2$ or more within a watercourse or within 32m from the edge of a watercourse. The expansion of the infrastructure will occur within the Northern Cape Province, outside urban areas, within a CBA 1 and 2 area. Although the layout of the proposed development will be designed to avoid the identified surface water features as far as possible, some of the existing internal and access roads will need to traverse some of the identified surface water features.

DETAILS OF ALTERNATIVES CONSIDERED

No site alternatives have been considered during the EIA process for this proposed development. The placement of solar energy facilities is dependent on the factors discussed above, all of which are favourable at the proposed site location. The proposed project site has topography which is suitable for the development of a SEF and is in close proximity to a grid connection that has been identified to have sufficient capacity to evacuate the generation. In addition, the proposed site is easily accessible off the public gravel roads R355 and AP2972. The site is therefore considered highly suitable for the proposed development of a SEF and no other locations have been considered.

No other activity alternatives have been considered. Renewable Energy developments in South Africa are highly desirable from a social, environmental and development perspectives, respectively. The solar resource in this area advocates for the use of Solar PV technology in order to generate energy.

Advancements in Solar PV technology presents a renewable and sustainable way for countries like South Africa to generate low cost energy from a natural resource.

The preliminary layout was based on an avoidance approach in which the development avoids the high sensitivity environments. While alternatives for the construction laydown area were identified and comparatively assessed by the specialists during the Scoping Phase, the detailed in-field investigations undertaken by the specialists identified additional high sensitivity environments and the layout was then updated and refined to incorporate the constraints identified by the various specialists. The layout has been designed to avoid sensitive areas as far as possible.

The no-go alternative will result in the current status quo being maintained as far as the avifauna, ecological and the aquatic systems are concerned. The no-go option would therefore eliminate any additional impact on the ecological integrity of the proposed development site. The no-go option would also mean that the social environment is not affected as the status quo remains. This also means that all the positive aspects associated with the project would not materialise. Consequently, there would be no job creation, no revenue streams into the local economy and municipal coffers, and a lost opportunity to enhance the National Grid with a renewable source of energy. The no-go alternative was not taken forward to the EIA phase for further assessment.

PUBLIC PARTICIPATION PROCESS TO BE UNDERTAKEN FOR THE EIA PHASE

The following was undertaken during the EIA Phase (as per the approved Final Scoping Report and Plan of Study):

- The dEIR underwent a 30-day comment and review period that ran from Tuesday 25 July 2023 to Thursday 24 August 2023 (excluding public holidays).
- The I&AP database was updated and includes all affected landowners, adjacent landowners, occupiers of affected and adjacent land, other I&APs, key stakeholders (such as OoS) and other surrounding project developers. The I&AP database is included in **Appendix 5**.
- Reminder notifications of the closing of the Draft EIA Report comment period were sent out on the 1st of August 2023, 15th of August 2023 and 24th of August 2023 to ensure that comments and/or concerns were received from the OoS and/or registered I&APs.
- All comments received from I&APs and the responses thereto have been included in this final EIA Report, which has been submitted to DFFE.
- A Comments and Response Report has been updated and included in the Final EIA Report, which records the date that issues were raised, a summary of each issue, and the response of the team to address the issue. The Final EIA Report with all comments included has been submitted to DFFE for review and approval.
- All I&APs will be notified via email, sms or fax after having received written notice from DFFE on the final decision on the application. These notifications will include the process required to lodge an appeal, as well as the prescribed timeframes in which documentation should be submitted.

POSITIVE AND NEGATIVE IMPACTS ASSOCIATED WITH THE PROPOSED LESAKA 1 SEF

Impact	Pre-mitigation	Post-mitigation
CONSTRUCTION		
Impacts to Biophysical Systems		
Aquatic / Freshwater		
Habitat, biota and ecological structure - Potential **direct impacts** caused by **construction**: • Trampling by construction personnel and equipment is likely to impact on the riparian and instream vegetation, leading to habitat degradation; • Net loss of habitat and ecological structure provided by the freshwater ecosystems; and • Source of sedimentation and smothering of freshwater ecosystem habitat.	Negative High	Negative Low
Habitat, biota and ecological structure - Potential **direct impacts** caused by **construction upgrades:** • Trampling by construction personnel and equipment is likely to impact on the riparian and instream vegetation, leading to habitat degradation; • Potential additional loss of habitat and ecological structure provided by the freshwater ecosystems; and • Potential changes to ecological and socio-cultural service provision.	Negative Medium	Negative Low
Habitat and biota and ecological structure - Potential **indirect impacts** caused by **construction:** • Disturbance to the buffer zone surrounding the freshwater ecosystem, making the freshwater ecosystems vulnerable to the invasion of alien and invasive vegetation species; and • Source of sedimentation and smothering of freshwater ecosystem habitat	Negative Low	Negative Low
Geomorphological processes - Potential **direct impacts** caused by **construction upgrades:** • Excavation and trenching leading to stockpiling of soil within close proximity to the active channel of the freshwater ecosystems; • Movement of construction equipment and personnel within the freshwater ecosystem leading to increased turbidity; • Disturbances of soils leading to potential impacts to the freshwater ecosystem vegetation, increased alien vegetation proliferation in the footprint areas, and in turn to altered freshwater ecosystem habitat; and • Altered runoff patterns, leading to increased erosion and sedimentation of the freshwater ecosystems and disturbance of geomorphological processes.	Negative Medium	Negative Low
Geomorphological processes - Potential **indirect impacts** caused by **construction:** • Reduction in the surface roughness surrounding the freshwater ecosystems leading to altered runoff patterns, leading to increased erosion and sedimentation of the freshwater ecosystems and disturbance of geomorphological processes.	Negative Low	Negative Low
Hydrological functioning and surface water quality - Potential **direct impacts** caused by **construction:** • Construction in the freshwater ecosystems may result in potential changes to the pattern, flow and timing of water entering the downstream portion of the freshwater ecosystem when surface water is present (during rainfall season); • Potential alterations to the runoff patterns, leading to increased erosion and sedimentation of the freshwater ecosystem; and • Constriction of flow leading to turbulent erosive flow of increased velocity or	Negative High	Negative Low

Impact	Pre-mitigation	Post-mitigation
possible loss of recharge to downstream areas, impacting on downstream biota.		
Hydrological functioning and surface water quality - Potential **direct impacts** caused by **construction upgrades:** • Construction in the freshwater ecosystems may result in potential changes to the pattern, flow and timing of water entering the downstream portion of the freshwater ecosystem when surface water is present (during rainfall season); • Potential alterations to the runoff patterns, leading to increased erosion and sedimentation of the freshwater ecosystem; and • Constriction of flow leading to turbulent erosive flow of increased velocity or possible loss of recharge to downstream areas, impacting on downstream biota.	Negative Medium	Negative Low
Hydrological functioning and surface water quality - Potential **indirect impacts** caused by **construction:** • Potential alteration to the surface water flow patterns leading to concentrated surface flow into the freshwater ecosystems; • Higher flood peaks into the freshwater ecosystems due to reduced surface roughness (sinuosity) of the areas surrounding the infrastructure.	Negative Low	Negative Low
Terrestrial Ecology		
Vegetation clearing for access roads, solar arrays and their service areas and other infrastructure will impact on vegetation.	Negative High	Negative Medium
Vegetation clearing for access roads, solar arrays and their service areas and other infrastructure will impact on SCC.	Negative High	Negative Medium
Disturbance could see an increase of alien invasive plant species at disturbed areas.	Negative High	Negative Low
Disturbance would leave the site vulnerable to wind and water erosion.	Negative Medium	Negative Low
An increase in noise and dust within the proposed site and surrounds could have negative impacts on faunal activity including breeding and feeding.	Negative Medium	Negative Low
Agricultural – none identified		
Avifaunal		
Significant habitat loss (including foraging and breeding) and fragmentation due to displacement (avoidance of disturbance) because of infrastructure installation (panels, powerlines, roads, fences and sub surface cables) and associated dust effects. Habitat loss has the tendency to not only destroy existing habitat but also displace bird species from large areas of natural habitat. This specifically has a greater impact on bird species restricted to a specific habitat and its requirements.	Negative Very High	Negative Medium
The destruction or disturbance of bird roosts during the construction phase.	Negative High	Negative Low
Disturbance (including of nesting SCC) due to noise such as, machinery movements and maintenance operations during the construction phase the proposed PV solar farm causing loss of offspring for a generation.	Negative Medium	Negative Low
Hydrological		
Impeding or diverting the flow of water in a watercourse.	Negative Medium	Negative Low
Altering the characteristics of catchment areas.	Negative Low	Negative Low
Erosion from disturbed open ground areas during construction (Disturbed and unconsolidated soil and stockpile).	Negative Medium	Negative Low
Contamination of the watercourses and down slope stream areas by spills of cement and other construction-related hazardous chemicals.	Negative Low	Negative Low
Contamination of the watercourses and down slope stream areas by spills of	Negative	Negative

Impact	Pre-mitigation	Post-mitigation
hydrocarbons from construction vehicles and workshop areas.	Low	Low
Disturbance to vegetation cover thus reducing the site's natural ability to biofilter the surface runoff and groundwater reaching downstream drainage lines.	Negative Low	Negative Low
An increase in impervious areas.	Negative Medium	Negative Low
Impeding flow.	Negative Low	Negative Low
Geotechnical		
Substation and BESS: Ground disturbance during access road construction, foundation earthworks, platform earthworks.	Negative Low	Negative Low
Substation and BESS: Increased erosion due to vegetation clearing, alteration of natural drainage.	Negative Low	Negative Low
SEF 1: Ground disturbance during access road construction, foundation earthworks, platform earthworks.	Negative Low	Negative Low
SEF 1: Increased erosion due to vegetation clearing, alteration of natural drainage.	Negative Low	Negative Low
Impacts to Socio-Economic Component		
Social		
Creation of employment and business opportunities during the construction phase.	Positive Low	Positive Medium
Potential impacts on family structures and social networks associated with the presence of construction workers.	Negative Medium	Negative Low
Potential risk to safety of farmers and farm workers, livestock and damage to farm infrastructure associated with the presence of construction workers on site.	Negative Medium	Negative Low
Potential loss of livestock, crops and houses, damage to farm infrastructure and threat to human life associated with increased incidence of grass fires.	Negative Medium	Negative Low
Potential noise, dust and safety impacts associated with construction related activities.	Negative Medium	Negative Low
Heritage		
Construction activities that take place near to archaeological resources may result in their destruction.	Negative High	Negative Low
Construction activities that take place near to palaeontological resources may result in their destruction.	Negative Low	Negative Low
Construction activities that take place near to cultural landscape elements may result in their destruction	Negative Medium	Negative Low
Visual		
Dust generated during construction will be visually unappealing and may detract from the visual quality (and sense of place) of the area. These impacts are typically limited to the immediate area surrounding the construction site, during the construction period.	Negative Medium	Negative Low
Transportation		

Impact	Pre-mitigation	Post-mitigation
Increase in traffic	Negative Medium	Negative Low
Increase of Incidents with pedestrians and livestock	Negative Medium	Negative Low
Increase in road maintenance	Negative Low	Negative Low
Additional abnormal loads	Negative Low	Negative Low
New / larger access points	Negative Low	Negative Low
OPERATIONAL		
Impacts to Biophysical Systems		
Aquatic / Freshwater		
Habitat and biota and ecological structure of the freshwater ecosystems - Potential **direct impacts** caused by the **operation**: • Continued use of road may result in the disturbance of vegetation and biota of the freshwater ecosystems; and • Proliferation of opportunistic alien and invasive species due to ongoing disturbances	Negative Medium	Negative Low
Habitat and biota and ecological structure of the freshwater ecosystems - Potential **indirect impacts** caused by the **operation:** • Disturbance to the buffer zone surrounding the freshwater ecosystem, making the freshwater ecosystems vulnerable to the invasion of alien and invasive vegetation species; and • Reduction in the surface roughness surrounding the freshwater ecosystems.	Negative Low	Negative Low
Geomorphology, hydrological functioning and surface water quality - Potential **direct impacts** caused by the **operation:** • Concentrated runoff from the road/surface infrastructure leading to erosion and subsequent sedimentation of the freshwater ecosystems (increase in the sediment load) and turbulent flows when surface water is present; and • Higher flood peaks into the freshwater ecosystems due to reduced surface roughness in the freshwater ecosystems and immediate vicinity of the surface infrastructure.	Negative Medium	Negative Low
Geomorphology, hydrological functioning and surface water quality - Potential **indirect impacts** caused by the **operation**: • Concentrated surface water entering the freshwater ecosystems leading to erosion and adding to the sediment load of the freshwater ecosystems; and • Contaminated surface water (from cleaning activities) may enter the freshwater ecosystems.	Negative Low	Negative Low
Terrestrial Ecology		
Displacement and/or disturbance of fauna communities.	Negative High	Negative Low
Re-establishment of secondary vegetation cover and establishment of alien species.	Negative High	Negative Low
Agricultural – none identified		
Avifaunal		
Disturbance (including of nesting SCC) due to noise such as, machinery movements and maintenance operations during the construction phase the proposed PV solar farm causing loss of offspring for a generation.	Negative Low	Negative Low
Bird mortalities during the operational phase due to vehicle collisions, collisions with	Negative	Negative

Impact	Pre-mitigation	Post-mitigation
infrastructure and/or combustion.	Very High	Medium
Loss of Bird Foraging Habitat	Negative High	Negative Low
Disruption of bird migratory pathways during the operational phase.	Negative Medium	Negative Low
The attraction of some novel bird species due to the development of a solar farm with associated infrastructure such as lake effect perches, nest and shade opportunities may cause both damage to the infrastructure through acidic defecation by certain species but also draw birds closer to infrastructure and cause significant direct mortality risks.	Negative High	Negative Medium
Chemicals being used to keep the PV panels clean from dust (suppressants) etc.	Negative High	Negative Low
Hydrological		
Impeding or diverting the flow of water in a watercourse.	Negative Low	Negative Low
Altering the characteristics of local catchment areas.	Negative Low	Negative Low
Natural vegetation disturbance/loss resulting in the emergence of invasive alien vegetation, placing further pressure on water resources.	Negative Low	Negative Low
Contamination of the watercourses and down slope stream areas by spills from chemicals used to clean or maintain the facility's assets.	Negative Low	Negative Low
Contamination of the watercourses and down slope stream areas by spills of hydrocarbons from maintenance or delivery vehicles.	Negative Low	Negative Low
Disturbance to the 'surface roughness' of baseline vegetation cover, thus reducing the site's natural ability to biofilter the runoff and groundwater reaching downstream drainage lines.	Negative Low	Negative Low
An increase in impervious areas, in the form of internal access roads and service infrastructure.	Negative Low	Negative Low
An increase in the kinetic energy and splash erosion potential resulting from the mass introduction of 'hard' surfaces, in the form of PV panels and their base infrastructure.	Negative Low	Negative Low
Impeding / diverting natural flows.	Negative Low	Negative Low
Geotechnical		
Substation and BESS: Increased erosion due to alteration of natural drainage.	Negative Low	Negative Low
SEF 1: Increased erosion due to alteration of natural drainage.	Negative Low	Negative Low
Impacts to Socio-Economic Component		
Social		

Impact	Pre-mitigation	Post-mitigation
Development of infrastructure to improve energy security and support renewable sector.	Positive Medium	Positive High
Creation of employment and business opportunities associated with the operational phase.	Positive Low	Positive Medium
The generation of additional income represents a significant benefit for the local affected farmer(s) and reduces the risks to their livelihoods posed by droughts and fluctuating market prices for sheep and farming inputs, such as feed etc.	Positive Low	Positive Medium
Benefits associated with support for local community's form SED contributions.	Positive Medium	Positive High
Visual impact associated with the proposed facility and associated infrastructure and the potential impact on the areas rural sense of place.	Negative Medium	Negative Medium
Potential impact of the SEF on property values	Negative Low	Negative Low
Potential impact of the SEF on local tourism	Negative Low	Negative Low
Heritage		
Operational activities that take place near to archaeological resources may result in their destruction.	Negative Medium	Negative Low
Operational activities that take place near to palaeontological resources may result in their destruction.	Negative Low	Negative Low
Operational activities that take place near to cultural landscape elements may result in their destruction.	Negative High	Negative Low
Visual		
The development of this PV array may be perceived as conflicting with the current undeveloped, inhospitable agricultural landscape. The proposed SEF is anticipated to interrupt and/or degrade views, affecting the sense of place and presenting as a visual intrusion across the landscape.	Negative Medium	Negative Medium
Associated infrastructure, particularly the BESS, is not congruent with the current landscape integrity, and will contribute to visual clutter: however, few receptors are expected to be exposed.	Negative Low	Negative Low
The glare analysis indicated that no glare will be experienced at the OPs modelled or along the routes modelled, viz. Gravel Road and the railway line. As no glare is expected, the impact associated with visual discomfort or impaired visibility is considered unlikely.	Negative Low	Negative Low
The installation of lighting on the site perimeter and / or around the BESS is anticipated to generate nightglow which currently does not emanate from the natural, undeveloped site. The introduction of lighting on the site will alter the sense of place and visual quality to surrounding receptors.	Negative Medium	Negative Low
Transportation		
Increase in Traffic	Negative Low	Negative Low
Increase of Incidents with pedestrians and livestock	Negative Low	Negative Low
Additional Abnormal Loads	Negative Low	Negative Low

Impact	Pre-mitigation	Post-mitigation
New / Larger Access points	Negative Low	Negative Low
DECOMMISSIONING		
Impacts to Biophysical Systems		
Aquatic / Freshwater		
Habitat and biota and ecological structure of the freshwater ecosystems - Potential direct and indirect impacts: • Clearing of habitat that has established in previous phases, resulting in a disturbed ecological structure; • Compaction and disturbance of soils due to decommissioning activities, making the impacted areas unfavourable for the establishment of vegetation and may allow for opportunistic alien and invasive species to establish in the freshwater ecosystems; • Movement of construction vehicles within the freshwater ecosystems, disturbing established biota in the freshwater ecosystems.	Negative Medium	Negative Low
Geomorphological processes, hydrological functioning and surface water - Potential direct and indirect impacts: • Site disturbance and trampling of vegetation resulting in increased runoff which leads to erosion and alteration of the geomorphology of the freshwater ecosystems; • Disturbance to the erodible soils, that may potentially result an increased risk of bank incision, sheet erosion and gully formation in the freshwater ecosystems and their surrounding area; • Increased movement of construction vehicles within the freshwater ecosystems (utilising freshwater ecosystem road crossings) resulting in soil compaction; • Potential runoff from stockpiles, earthwork activities and disposal of hazardous materials contributing to the freshwater ecosystem sediment load; and • Latent impacts from landscape scarring after decommissioning which creates a loss of ground cover that may potentially lead to erosion and sedimentation of freshwater ecosystems.	Negative Low	Negative Low
Terrestrial Ecology		
Dismantling and removal of infrastructure	Negative Medium	Negative Low
Waste generated	Negative High	Negative Medium
Agricultural – none identified		
Avifaunal		
Disruption of bird migratory pathways during the decommissioning phase.	Negative Medium	Negative Low
Destruction of habitats and scarring.	Negative High	Negative Medium
Hydrological		
Contamination of the watercourses and down slope stream areas by spills of hydrocarbons from an increase in decommissioning machinery or loading / transport vehicles.	Negative Low	Negative Low
Disturbance to the site's established vegetation cover, resulting in bare soil exposure, and thus increasing the risk of erosion and sediment reaching downstream drainage lines.	Negative Low	Negative Low
Geotechnical		

Impact	Pre-mitigation	Post-mitigation
Substation and BESS: Ground disturbance during access road construction, foundation earthworks, platform earthworks.	Negative Low	Negative Low
Substation and BESS: Increased erosion due to vegetation clearing, alteration of natural drainage.	Negative Low	Negative Low
SEF 1: Ground disturbance during access road construction, foundation earthworks, platform earthworks.	Negative Low	Negative Low
SEF 1: Increased erosion due to vegetation clearing, alteration of natural drainage.	Negative Low	Negative Low
Impacts to Socio-Economic Component		
Social		
Social impacts associated with retrenchment including loss of jobs, and source of income. Decommissioning will also create temporary employment opportunities, which would represent a positive temporary impact.	Negative Low	Negative Low
Heritage		
Decommissioning activities that take place near to archaeological resources may result in their destruction.	Negative High	Negative Low
Decommissioning activities that take place near to palaeontological resources may result in their destruction.	Negative Low	Negative Low
Decommissioning activities that take place near to cultural landscape elements may result in their destruction.	Negative Medium	Negative Low
Visual		
Dust generated during decommissioning activities will be visually unappealing and may detract from the visual quality (and sense of place) of the area. These impacts are typically limited to the immediate area surrounding the site, during the decommissioning period.	Negative Medium	Negative Low
Transportation		
Increase in Traffic	Negative Medium	Negative Low
Increase of Incidents with pedestrians and livestock	Negative Medium	Negative Low
Increase in road maintenance	Negative Low	Negative Low
Additional abnormal loads	Negative Low	Negative Low
New / Larger Access points	Negative Low	Negative Low
CUMULATIVE		
Impacts to Biophysical Systems		
Aquatic / Freshwater		
• Loss of freshwater ecosystem vegetation and subsequent habitat, due to freshwater ecosystem road crossings and potential infrastructure located in the freshwater ecosystems; and • Changes to flow, pattern and timing of surface water in the drainage system due to land use changes in the catchment, potentially resulting in changes to the hydrological regime of the larger downstream freshwater ecosystems.	Negative Medium	Negative Low
Terrestrial Ecology		
Cumulative Impact of various proposed renewable energy projects on the natural environment	Negative High	Negative Low
Cumulative Impact of numerous grid connection infrastructure in the surrounding area	Negative Medium	Negative Low

Impact	Pre-mitigation	Post-mitigation
Agricultural - none identified		
Avifaunal		
Regional Saturation of SEF facilities causing habitat loss.	Negative Very High	n/a
Increased roadkill due to higher traffic volumes	Negative High	Negative Low
Increased mortalities due to collisions with SEF infrastructure, especially powerlines and fences	Negative Very High	Negative Medium
Cumulative impact of numerous grid connection infrastructure in the surrounding area	Negative High	Negative Medium
Increased collision related mortalities due to increased powerlines	Negative Very High	Negative High
Hydrological		
A series (or high frequency) of localised hydrocarbon or hazardous material spills, leads to a 'larger-scale' impact on surrounding freshwater ecological systems, which may become irreversible.	Negative Medium	Negative Low
This photovoltaic project, together with any other proposed and existing projects and activities in the area would have a cumulative impact on the surface runoff regime, due to a 'broad-scale' increase in impervious areas, in the form of internal access roads and service infrastructure.	Negative Low	Negative Low
Geotechnical – none identified		
Impacts to Socio-Economic Component		
Social		
Cumulative visual impacts associated with the establishment of a number of SEFs and associated grid infrastructure and the potential impact on the area's rural sense of place and character of the landscape.	Negative Medium	Negative Medium
The establishment of a number of renewable energy facilities and associated projects, such as the proposed SEF, in the HM has the potential to place pressure on local services, specifically medical, education and accommodation.	Negative Medium	Negative Medium
The establishment of renewable energy facilities and associated projects, such as the SEF, in the HM will create employment, skills development and training opportunities, creation of downstream business opportunities.	Positive Medium	Positive High
Heritage		
Cumulative destruction of significant archaeological heritage.	Negative Medium	Negative Low
Cumulative destruction of significant palaeontological heritage.	Negative Medium	Negative Low
Cumulative impact to the cultural landscape.	Negative Medium	Negative Low
Visual		
The site and surrounds are rural in character, there is a high concentration of approved renewable energy projects and associated grid infrastructure located around the Helios MTS. Only two WEFs of the 12 facilities appear to be operational, while another SEF is under construction. As more of these facilities and infrastructure are constructed, the visual landscape is expected to be significantly transformed detracting from the visual quality of the region. As SEFs and WEFs proliferate, impacts will accumulate towards an unknowable threshold.	Negative Medium	Negative Low
Transportation		
Increase in traffic	Negative Medium	Negative Medium

Impact	Pre-mitigation	Post-mitigation
Increase of Incidents with pedestrians and livestock	Negative Medium	Negative Medium
Increase in road maintenance	Negative Low	Negative Low
Additional Abnormal Loads	Negative Medium	Negative Low
New / Larger Access points	Negative Low	Negative Low

SPECIALIST STUDIES

The following specialist studies have been undertaken for the project and their main findings and recommendations are included below:

Specialist Study	Findings	Recommendations
Aquatic	Only the episodic drainage lines and rivers with riparian vegetation can, from an ecological perspective, be classified as watercourses (freshwater ecosystems) due to the expression of a riparian response by vegetation and the presence of alluvial soil. Preferential flow paths (PFPs) are unlikely to have catchments which are large enough to generate a flood response and are not considered freshwater ecosystems from an ecological perspective. Episodic drainage lines without riparian vegetation may, on a system specific basis be considered freshwater ecosystems should they be subject to a 1:100 year floodline, as determined by a suitably qualified professional. PFPs and drainage lines, not defined as watercourses still function as waterways, through the episodic conveyance of water through the landscape. These systems are still considered important for the hydrological functioning of the larger episodic tributaries and rivers and	• Two episodic rivers with riparian vegetation will be crossed by newly proposed access roads; therefore additional precautionary measures should be taken in terms of erosion and sediment control and dissipation; • All construction works for the freshwater ecosystem road crossings must be supervised by a freshwater ecologist that must ensure that weather conditions are sufficiently dry enough such that no diversion of flow is necessary to proceed with construction – this is imperative to maintain a low impact significance; • Construction activities in the freshwater ecosystem will potentially result in bank destabilisation, and cause bank incision and sedimentation of the freshwater ecosystem, therefore, sediment control devices should be installed downgradient of the construction site in the freshwater ecosystem and all excess sediment is to be removed once construction activities have been completed; • For the solar arrays near episodic drainage lines, a 25 m setback to be allowed to ensure sufficient space for

Specialist Study	Findings	Recommendations
	must ideally be protected to manage the pattern, flow and timing of water in the landscape, implying that runoff from the project area must be carefully managed. The Impact Assessment identified that the Negative High and Medium Impacts in the construction, operation and decommissioning phases with mitigation can be lowered to a Negative Low Impact, on condition of strict adherence to general and project-specific suggested mitigation measures. Only the proposed access roads pose direct impacts to freshwater ecosystems, but the layout was proposed in a manner to, as far as possible, avoid and minimise crossings. All other infrastructure falls outside of the 32 m NEMA Zone of Regulation (ZoR).	erosion and sediment control and dissipation near these episodic features, as these areas are subjected to greater amounts of runoff compared to non-developed areas during high rainfall events; and • Existing roads and newly authorised freshwater ecosystem crossings should be utilised to gain access to the proposed construction area. No indiscriminate crossing of the freshwater ecosystems outside of the existing crossing points or driving in unmarked areas through the buffer zones of the freshwater ecosystems may be permitted; • Development footprint areas to remain as small as possible and vegetation clearing to be limited to what is essential; • New road crossings must intersect the freshwater ecosystem at a right angle (perpendicular) to minimise disturbance to the freshwater ecosystem; • Soil excavated as part of trenching must be stockpiled immediately upstream of the trench and backfilled as soon as possible with the removed material and suitably compacted to avoid any erosion and preferential flow paths from forming; • During excavation activities, the topsoil and vegetation that is removed should be stockpiled separately from other material outside of the 32 m NEMA ZoR; and • After construction of the surface infrastructure, the area surrounding the surface infrastructure must be revegetated with suitable indigenous vegetation (terrestrial vegetation) to prevent the establishment of alien vegetation species and their potential spread into the freshwater ecosystems.
Hydrological	The proposed solar project will alter the natural environmental state,	• It is recommended that the site is regularly inspected, with areas prone to

Specialist Study	Findings	Recommendations
	thereby affecting the generation of storm water and the associated potential for erosion. Volumes of storm water generated over disturbed areas are generally expected to increase because of the reduction in natural vegetation or the addition of areas of hardstanding resulting from the combination of PV infrastructure and associated pylons, Battery Energy Storage System, the temporary laydown area, the construction area as well as internal access roads. The quality of the storm water generated is also expected to be affected by the removal of vegetation and the excavation of soils. The movement of vehicles over the site will also potentially introduce possible hydrocarbons. A conceptual storm water management plan has been developed for the site aimed at ensuring the impact of water generated upstream or on site during extreme rainfall events can be better manged by routing storm water away from infrastructure thereby reducing any associated flood risk. A hydrological impact assessment was undertaken to determine the significance of each identified potential impact. Potential impacts considered in this assessment for the construction and operational phases were changes in catchment water resources, changes in catchment water quality, and changes in flood hydrology. Potential significance for the considered impacts ranged from medium in the pre-mitigation scenarios to low in the post mitigation scenarios.	erosion identified. Silt fences may be suitable for the control of erosion from areas disturbed or affected during construction, operation or decommissioning. • It is recommended that the proposed storm water management plan is implemented. This will ensure the attenuation of storm water runoff. It is also recommended that berms, channels, and sediment traps associated with the drainage lines are designed appropriately (in accordance with the best practice guidelines). • Natural vegetation should be re-established to represent the previously undisturbed environment as closely as possible • It is recommended that the grass beneath the panels be well maintained or that a buffer

Specialist Study	Findings	Recommendations
Terrestrial	The study area is located within the Hantam Karoo vegetation type, listed as Least Threatened, and intersects a CBA1, CBA2 and ESA according to the Northern Cape CBA Map. The CBA1 are the NFEPA Rivers, Klein-Rooiberg and Rooiberg, both considered largely natural which must be excluded from development. CBA2 are mainly due to the FEPA catchment, FEPA rivers and associated 500m buffer and the vegetation type being located within the Succulent Karoo biome. The ESA towards the western section is the Krom River and associated wetlands, while the smaller scattered ESAs towards the eastern boundary are koppies which are large high value climate resilience areas. Linear infrastructure such as roads and internal powerlines can cross the watercourses, but care should be taken in the planning of this. The majority of the SEF consist of Karoo shrubland with grassland patches on flat plains and gently sloping hills that are not considered sensitive. The watercourses and pans are considered sensitive and should be avoided during the construction period for placement of infrastructure, laydown areas and associated infrastructure. Roads and cables will cross watercourses, and the impacts can be mitigated by reducing it to acceptable levels since avoidance is not possible. The Koppie towards the north-east must be avoided from all development activities.	• Rehabilitation and monitoring plan required post-construction and post-operational phase of the project which addresses ecosystem functioning, fire management, alien invasive species management and effective methods of rehabilitating natural vegetation to functional systems (not just biomass replacement). • Roads and underground cabling must avoid sensitive areas as far as possible by considering various layout alternatives. The karoo shrubland habitat will not be transformed completely (only PV related – this is not the case for roads and temporary laydown areas), accordingly with appropriate mitigation and rehabilitation measures post-construction and post-operational, the impact of the PV panels is considered medium for karoo shrubland. • It is advised that an ecological specialist is appointed during the construction, operational and decommissioning phases to monitor impacts and related mitigation measures regarding natural and sensitive habitats and the faunal and floral assemblages occurring there. • Care should be taken not to unnecessarily clear or destroy natural vegetation. • Development and planned activities should therefore be planned in such a way that totally transformed areas are chosen for major developments and natural veld and especially any highly sensitive areas are avoided as far as possible. • Sensitive species 144 must be protected in situ and a 200m buffer is applicable where no construction activities may take place. • Provincially listed species which are affected by the proposed development

Specialist Study	Findings	Recommendations
		requires a permit application for their removal from the provincial authority prior to the commencement of construction activities.
Agricultural	The development will occupy land that is of very limited land capability, which is insufficient for crop production. There is not a scarcity of such agricultural land in South Africa and its conservation for agricultural production is not therefore a priority. The amount of agricultural land use by the development is within the allowable development limits prescribed by the agricultural protocol. These limits reflect the national need to conserve valuable agricultural land and therefore to steer, particularly renewable energy developments, onto land with low agricultural production potential. The PV panels will not necessarily totally exclude agricultural production. The area may still be used to graze sheep that will, in addition, be protected against stock theft within the security area of the facility. All renewable energy development in South Africa decreases the need for coal power and thereby contributes to reducing the large agricultural impact that open cast coal mining has on highly productive agricultural land throughout the coal mining areas of the country.	From an agricultural impact point of view, it is recommended that the development be approved. The conclusion of this assessment on the acceptability of the proposed development and the recommendation for its approval is not subject to any conditions, other than recommended mitigation.
Avifaunal	The study area is situated within the Hantam Karoo vegetation type. The study area is not anticipated to support breeding populations of several large terrestrial bird species such as cranes and large raptor species in sufficiently large densities	Formal post construction monitoring must be applied once the development has been activated, as per the most recent edition of the best practice guidelines. The exact scope and nature of the post-construction monitoring will be informed on an ongoing basis by the result of the monitoring through

Specialist Study	Findings	Recommendations
	or within breeding habitat that may be considered a fatal flaw. However, given the size of the area, the proximity to a very large areas of suitable habitat, the high-density presence of Red Lark, Ludwig's Bustard and Karoo Korhaan is deemed to be a significant concern. The CBAs of the Northern Cape designated that majority of the site falls within a CBA 1, CBA 2 and an ESA1. Avoidance mitigation could be applied wherever possible to project infrastructure design and limit the amount of habitat impacted. A total of twenty-two (22) priority species has the possibility of occurring within and around the study area. Some of the priority bird species are not habitat-bound to the area for nesting and/or foraging purposes and is therefore important to focus on the some of the most significant cumulative impacts for the proposed solar project. Overall and with these factors taken into consideration, the specialist deems that the project may proceed.	a process of an establishment of available new technology and adaptive management.
Geotechnical	The assessment area is underlain by rock units of Ecca Group of Karoo Supergroup and intrusive dolerite. Some geotechnical constraints have been identified, primarily shallow and outcropping bedrock which may cause excavation difficulties, localised steep slopes with thick talus and existing drainage channels with concentrated water flow. These conditions and associated constraints may be mitigated via standard engineering design and construction measures.	It is recommended that areas of steeper slope gradients and drainage channels are avoided when determining the final infrastructure layout. The proposed substation and BESS area falls within FACET I which is expected to provide good founding conditions and minimal earthworks before construction, therefore reducing the potential environmental impact. From a geotechnical and geological perspective, no fatal flaws or sensitivities have been identified within or close to the Lesaka 1 SEF assessment area and in the

Specialist Study	Findings	Recommendations
	The Lesaka 1 SEF area and substation areas may be divided into four (4No.) ZONEs (I, II, III and IV) where similar geotechnical conditions are anticipated. ZONE I is defined by shallow occurring bedrock covered by thin, loose transported material and varying degrees of cemented calcrete. ZONE II can be characterised by talus deposits on relatively steep slopes that is linked to ZONE III that defines the high lying outcropping bedrock of which is seemingly dolerite material. ZONE IV is confined to low lying areas that are underlain by relativity thicker alluvial deposits, identifiable by erosion paths, rills, and continuous drainage features. No fatal flaws or 'no-go' areas have been identified that would render any assessment areas unsuitable from a geological and geotechnical perspective. No geologically or geotechnically sensitive areas were identified within or near the assessment area.	proposed substation, and BESS. It is therefore recommended that the proposed activity be authorised.
Social	The findings of the SIA indicate that the proposed Lesaka 1 PV SEF and associated infrastructure will result in several social and socio-economic benefits, including creation of employment and business opportunities during both the construction and operational phase. The project will also contribute to local economic development though socio-economic development (SED) contributions. In addition, the development will improve energy security and reduce the carbon footprint associated with energy generation. The findings of the SIA	• Preparation and implementation of a Stakeholder Engagement Plan (SEP) prior to and during the construction phase. • Preparation and implementation of a Community Health, Safety and Security Plan (CHSSP) prior to and during the construction phase.

Specialist Study	Findings	Recommendations
	also indicate that the potential negative impacts associated with both the construction and operational phase are likely to be Low Negative with mitigation. The potential negative impacts can therefore be effectively mitigated if the recommended mitigation measures are implemented. The establishment of the proposed Lesaka 1 PV SEF is supported by the findings of the SIA.	
Heritage	The surveys conducted for impacts to heritage resources including archaeology and palaeontology proceeded with no significant constraints or limitations, and the project area was comprehensively surveyed for heritage resources. An area of higher archaeological sensitivity associated with the stream systems across the development area was identified and mapped. This area must be avoided in the final PV layout in order to ensure that no significant archaeological heritage resources are negatively impacted by the proposed development. Despite the high sensitivity for impacts to palaeontological heritage resources of sediments in the vicinity of the development, the areas proposed for the Lesaka 1 PV facility and its associated infrastructure consist of dolerite and quaternary sands and as such, the layout as proposed has low sensitivity for impacts to palaeontological sensitivity.	• The area of high archaeological sensitivity identified is avoided in the final configuration of the PV layout. The final layout provided complies with this recommendation. • If Palaeontological Heritage is uncovered during surface clearing and excavations ECO should be informed immediately. Fossil discoveries ought to be protected and the ECO/site manager must report to South African Heritage Resources Agency (SAHRA) so that mitigation (recording and collection) can be carried out. • Although all possible care has been taken to identify sites of cultural importance during the investigation of the study area, it is always possible that hidden or subsurface sites could be overlooked during the assessment. If any evidence of archaeological sites or remains (e.g. remnants of stone-made structures, indigenous ceramics, bones, stone artefacts, ostrich eggshell fragments, charcoal and ash concentrations), fossils, burials or other categories of heritage resources are found during the proposed development, work must cease in the vicinity of the find and SAHRA must be alerted immediately to determine an appropriate way forward.

Specialist Study	Findings	Recommendations
Transport	This Transportation Study assessed the anticipated traffic impact of the Lesaka 1 Solar Energy Facility. It was found that the highest traffic impact of the proposed development would occur during the construction phases, which was estimated to generate an additional ±14 peak hour vehicle trips. The existing site accesses are deemed sufficient for the proposed facility but may require some upgrades. No fatal flaws or preferences were identified for any of the proposed site alternatives for construction laydown areas and access points.	• An Abnormal Load Study should be undertaken once the (i) detail design, (ii) construction programme, and (iii) logistics plan are available. • Dry runs along abnormal load routes should be conducted prior to transporting abnormal loads • Internal access roads should be constructed according to TRH20 – Unsealed Roads: Design Construction and Maintenance • Traffic calming and speed reduction should be implemented at the approaches to the site access during construction • Proper and adequate construction road signage should be used on the approach roads which complies with the South African Road Traffic Signage Manual (SARTSM). • The condition and quality of the gravel roads used should be monitored closely during and after construction, and any required maintenance should be undertaken timeously under the auspices of the relevant transport department. • Farm fences and access cattle grids should be maintained regularly. • The implementation of the mitigation measures identified in the Impact Rating Table should be ensured and monitored.
Visual	The proposed project comprises the development of a SEF, further altering the visual landscape of the project area. This project is moderately congruent with and marginally affects the integrity of the landscape, as there are a number of approved renewable energy facilities around or near the proposed site, with two operational WEFs and a SEF under construction. A highly concentrated network of powerlines	• Limit vegetation clearance and the footprint of construction to what is absolutely essential. • Consolidate the footprint of the construction camp to a functional minimum. • Avoid excavation, handling and transport of materials which may generate dust under very windy conditions. • Keep stockpiled aggregate and sand covered to minimise dust generation.

Specialist Study	Findings	Recommendations
	exists within the project area and the wider region due to the nearby Helios MTS and approved renewable projects. Due to the open, flat and intact topography, the Visual Absorbtion Capacity of the project area is considered low. This project will alter visual quality during the construction and decommissioning phases, as well as alter sense of place, visual quality and result in visual intrusion during the operational phase. The impact of visual discomfort and impaired visibility is assessed to be low significance. These impacts are deemed to be acceptable on the assumption that the mitigation measures listed are implemented. Based on the assessment and the assumption that the mitigation measures will be implemented, the specialist is of the opinion that the visual impacts of the project are acceptable and there is no reason not to authorise the project.	• Keep construction site tidy • Fence the perimeter of the site with green or black fencing. • Install powerlines underground, where possible. • Fence the perimeter of the site with green or black fencing. • Ensure that the roof colour of the proposed buildings blends into the landscape. • Reduce the height of lighting masts to a workable minimum. • Direct lighting inwards and downwards to limit light pollution.
Risk	There are no fatal flaws associated with either battery technology type for the proposed Lesaka 1 battery installation. The current proposed location of the Lesaka 1 BESS is more than 100m from rivers and are therefore suitable.	• The overall design should be subject to a full Hazop prior to finalization of the design. • For the VRFB systems an end of life (and for possible periodic purging requirements) solution for the large quantities of hazardous electrolyte should be investigated, e.g., can it be returned to the supplier for re-conditioning. • Prior to bringing any solid-state battery containers into the country, the contractor should ensure that: ○ An Emergency Response Plan is in place that would be applicable for the full route from the ship to the site. This plan would include details of the most appropriate emergency

Specialist Study	Findings	Recommendations
		response to fires both while the units are in transit and once they are installed and operating. o An End-of-Life plan is in place for the handling, repurposing or disposal of dysfunctional, severely damaged batteries, modules and containers. • The site layout and spacing between lithium solid-state containers should be such that it mitigates the risk of a fire or explosion event spreading from one container to another. • Under certain weather conditions, the noxious smoke from a fire in a lithium battery container could travel some distance from the unit. The smoke will most likely be acrid and could cause irritation, coughing, distress etc. Close to the source of the smoke, the concentration of toxic gases may be highenough to cause irreversible harmful effects. Location of the facilities needs to ensure a suitable separation distance, i.e. 500m, from public facilities/residences etc. and should preferably not be located directly southwest of any occupied facilities • Where there is a choice of alternative locations for the BESS, those that are further from water courses would be preferred. VRFB hazards are mostly related to possible loss of containment of electrolyte and solid-state systems may experience fires that may result in loss of containment of liquids or the use of large amounts of fire water which could be contaminated. One would not want these run-offs to enter water courses directly. The buffer distance between water bodies and the facilities containing chemicals should be set in consultation with a water specialist, possibly 100m minimum separation. The current proposed location of both Lesaka 1 BESS are more than 100m

Specialist Study	Findings	Recommendations
		from rivers and are therefore suitable. • Finally, it is suggested once the technology has been chosen and more details of the actual design are available, the necessary updated Risk Assessments should be in place.

ENVIRONMENTAL IMPACT STATEMENT

Lesaka 1 Solar Energy Facility (Pty) Ltd is proposing to construct the Lesaka 1 Solar Energy Facility (SEF) and associated infrastructure approximately 35 km north of Loeriesfontein in the Hantam Local Municipality and the Namakwa District Municipality, in the Northern Cape Province. The overall objective of the proposed development is to supply suitable private off-taker initiatives (direct supply or wheeling agreements, as applicable), or be bid into the government coordinated Renewable Independent Power Producer Programme (REIPPP) or similar procurement program under the Integrated Resource Plan (IRP). The proposed development will have a maximum total generation capacity of up to 240 megawatt (MW).

Taking into consideration the findings of the EIA process for the proposed development and the fact that specialist recommendations have been used to inform the project design and layout of the facility, it is the opinion of the Environmental Assessment Practitioner (EAP) that the negative impacts associated with the implementation of the proposed project can be mitigated to acceptable levels. While there are potential negative environmental impacts associated with the proposed development, the extent of the positive benefits associated with the implementation of the project in terms of renewable energy supply and positive local and regional economic impact are considered to outweigh the negative impacts.

After consideration of the findings presented in the EIR and based on the preferred layout presented within this report, it is the reasoned opinion of the EAP that the proposed Lesaka 1 SEF is acceptable and Environmental Authorisation could be granted.

The Lesaka 1 SEF will assist by converting solar energy into electricity, thereby releasing no harmful by-products into the environment which will in turn reduce the dependency on fossil fuels.

The following specialist studies have been undertaken for the project:

- Aquatic/Freshwater Impact Assessment
- Terrestrial Biodiversity Impact Assessment
- Agriculture and Soils Impact Assessment
- Avifaunal Impact Assessment
- Hydrological Impact Assessment
- Desktop Geotechnical Investigation
- Social Impact Assessment
- Heritage Impact Assessment (including Palaeontology, Archaeology and Cultural)

- Transportation Impact Assessment
- Visual Impact Assessment
- Risk Assessment

The specialist assessments were conducted to address the potential impacts relating to the proposed development in order to ascertain the level of each identified impact, as well as mitigation measures which may be required.

The aquatic assessment (refer to **Appendix 6**) concluded that the negative high and medium impacts in the construction, operation and decommissioning phases can be lowered to a negative low impact after mitigation, on condition of strict adherence to general and project-specific suggested mitigation measures. Assuming that strict enforcement of cogent, well-developed mitigation measures takes place, the significance of impacts arising from the proposed SEF development can be adequately managed and the project considered for EA.

The hydrological impact assessment (**refer to Appendix 6**) concluded that No fatal flaws were identified during the hydrological investigations for the proposed Lesaka 1 Solar Energy Facility based on supplied information specific to the project and as such, it is the opinion of the authors that the proposed development can be authorised on condition that the recommendations and proposed mitigation measures be implemented in order to ensure any impact on receiving water resources can be limited as far as possible.

The terrestrial biodiversity assessment (refer to **Appendix 6**) concluded that the majority of the SEF consist of Karoo shrubland with grassland patches on flat plains and gently sloping hills that are not considered sensitive. The watercourses and pans are considered sensitive and should be avoided during the construction period for placement of infrastructure, laydown areas and associated infrastructure. Roads and cables will cross watercourses, and the impacts can be mitigated by reducing it to acceptable levels since avoidance is not possible. Large sections of the affected area are not considered highly sensitive and there are no specific features of the affected area which would indicate that it is of broad-scale significance for faunal movement or landscape connectivity. One individual of a sensitive species was recorded on site which should be protected in situ as it can be avoided by the proposed development.

The agricultural assessment (refer to **Appendix 6**) concluded that the site has low agricultural potential and no dryland cropping potential predominantly because of aridity constraints but also because of soil constraints. As a result of the constraints, agricultural production is limited to low density grazing. From an agricultural impact point of view, the specialist recommended that the development be approved.

The avifaunal assessment (refer to **Appendix 6**) concluded the study area is not anticipated to support breeding populations of several large terrestrial bird species such as cranes and large raptor species in sufficiently large densities or within breeding habitat that may be considered a fatal flaw. However, given the size of the area, the proximity to a very large areas of suitable habitat, the high-density presence of Red Lark, Ludwig's Bustard and Karoo Korhaan is deemed to be a significant concern. Formal post construction monitoring must be applied once the development have been activated. Overall and with these factors taken into consideration, the specialist deems that the project may proceed.

The geotechnical assessment (refer to **Appendix 6**) concluded that no fatal flaws or 'no-go' areas have been identified that would render any assessment areas unsuitable from a geological and geotechnical perspective. The specialist therefore recommended that the proposed activity be authorised.

The social assessment (refer to **Appendix 6**) concluded that the Lesaka 1 PV SEF and associated infrastructure will result in several social and socio-economic benefits, including creation of employment and business opportunities during both the construction and operational phase. The project will also contribute to local economic development though socio-economic development (SED) contributions. The potential negative impacts associated with both the construction and operational phase are likely to be low negative with mitigation. The potential negative impacts can therefore be effectively mitigated if the recommended mitigation measures are implemented. The establishment of the proposed Lesaka 1 SEF is supported by the findings of the SIA.

The heritage assessment (refer to **Appendix 6**) concluded that no significant constraints or limitations were identified, and that the project area was comprehensively surveyed for heritage resources. An area of higher archaeological sensitivity associated with the stream systems across the development area was identified and mapped and has been avoided by the proposed development. It is not anticipated that the proposed development will negatively impact on significant heritage resources.

The visual assessment (refer to **Appendix 6**) concluded that the project is moderately congruent with and marginally affects the integrity of the landscape, as there are a number of approved renewable energy facilities around or near the proposed site, with two operational WEFs and a SEF under construction. A highly concentrated network of powerlines exists within the project area and the wider region due to the nearby Helios MTS and approved renewable projects. Due to the open, flat and intact topography, the VAC of the project area is considered low. The project will alter visual quality during the construction and decommissioning phases, as well as alter sense of place, visual quality and result in visual intrusion during the operational phase. The impact of visual discomfort and impaired visibility is assessed to be low significance. These impacts are deemed to be acceptable on the assumption that the mitigation measures are implemented. Based on the assessment and the assumption that the mitigation measures will be implemented, the specialist is of the opinion that the visual impacts of the project are acceptable and there is no reason not to authorise the project.

The risk assessment (refer to **Appendix 6**) concluded that there are no fatal flaws associated with either battery technology type for the proposed Lesaka 1 battery installation and the current proposed location of the Lesaka 1 BESS is more than 100m from rivers and are therefore suitable.

No location alternatives are being considered for the Lesaka 1 SEF as these sites were selected prior to the commencement of the EIA Process. Layout alternatives for the construction laydown area were investigated in the Scoping phase. This layout was assessed by specialists to identify potential impacts that may arise from the development.

Based on the findings of the specialists, the potential impacts identified and the outcomes of the public participation process of the Scoping Phase, the layout was then updated to ensure avoidance of all environmental sensitivities identified by the specialists (except for a few roads and cabling) to produce a final layout. This final layout has been further assessed by all specialists (including cumulatively along with the proposed grid infrastructure) (refer to Impact Tables in **Section 14.3** and findings and recommendations in **Section 15**). No further layout alternatives have been considered as part of the EIA process. Impact assessments have been undertaken on the revised/preferred layout. No technology alternatives will be considered. The solar resource in this area advocates for the use of Solar PV technology in order to generate energy. The no-go alternative is not the preferred alternative and has not been assessed as part of the EIA phase.

LESAKA 1 SOLAR ENERGY FACILITY

FINAL ENVIRONMENTAL IMPACT ASSESSMENT REPORT

TABLE OF CONTENTS

APPENDICES

LIST OF FIGURES

LIST OF TABLES

LESAKA 1 SOLAR ENERGY FACILITY

FINAL ENVIRONMENTAL IMPACT ASSESSMENT REPORT

1. INTRODUCTION

Lesaka 1 Solar Energy Facility (Pty) Ltd is proposing to construct the Lesaka 1 Solar Energy Facility (SEF) and associated infrastructure approximately 35 km north of Loeriesfontein in the Hantam Local Municipality and the Namakwa District Municipality, in the Northern Cape Province (**Figure 1**) (**DFFE Reference Number: 14/12/16/3/3/2/2327**). The overall objective of the proposed development is to supply suitable private off-taker initiatives (direct supply or wheeling agreements, as applicable), or be bid into the government coordinated Renewable Independent Power Producer Programme (REIPPP) or similar procurement program under the Integrated Resource Plan (IRP). The proposed development will have a maximum total export capacity of up to 240 megawatt (MW).

SiVEST Environmental Division has subsequently been appointed as the independent Environmental Assessment Practitioner (EAP) to undertake the Environmental Impact Assessment (EIA) process for the proposed construction and operation of the Lesaka 1 SEF and associated infrastructure. The proposed development requires an Environmental Authorisation (EA) from the National Department Forestry, Fisheries and the Environment (DFFE). However, the provincial authority (i.e. the Northern Cape Department of Agriculture, Environmental Affairs, Rural Development and Land Reform) will also be consulted. The EIA for the proposed development will be conducted in terms of the EIA Regulations, 2014 (as amended) promulgated in terms of Chapter 5 of the NEMA. In terms of these regulations, a full EIA process is required for the proposed development. All relevant legislation and guidelines will be consulted during the EIA process and will be complied with at all times.

One additional SEF is currently being considered on the same property by way of a separate environmental impact assessment process contained in the 2014 Environmental Impact Assessment Regulations (GN No. R982, as amended) for listed activities contained Listing Notices 1, 2 and 3 (GN R983, R984 and R985, as amended). This project is known as Lesaka 2 Solar Energy Facility (**DFFE Reference Number: 14/12/16/3/3/2/2328**).

In order to evacuate the energy generated by the SEF's to supplement the national grid, the applicant is proposing a new 132/400kV Main Transmission Substation which will be constructed on site. This MTS will connect to the existing Helios Juno 1 400kV line crossing the site via a Loop-In-Loop-Out connection.

The grid connection will be assessed in a separate application once a preferred solution is identified. The proposed grid connection infrastructure has however been included and the infrastructure assessed cumulatively along with the proposed Lesaka SEF.

Although the SEF's will be assessed separately, a single public participation process was undertaken to consider both of the proposed projects.

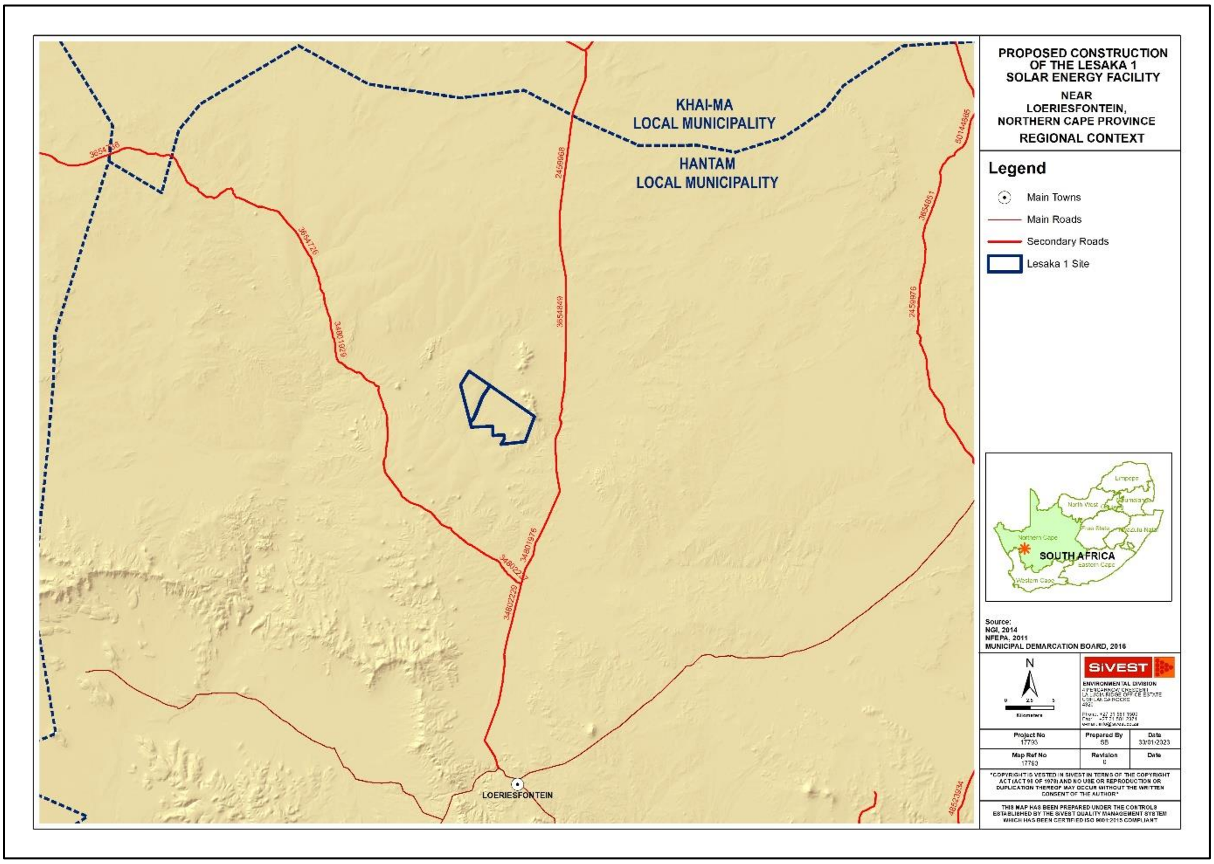


Figure 1: Lesaka 1 SEF Regional Context

1.1 Overview of the EIA Process

The National Environment Management Act, 1998 (Act No 107 of 1998) (NEMA) promotes the use of scoping and EIA in order to ensure integrated environmental management. The purpose of an EIA is to provide the Authority with sufficient information to make an informed decision on whether an activity should proceed or not, and to assist with selecting an option that will provide the most benefit and cause the least impact. The EIA process should identify activities which may have a detrimental effect on the environment, and which would therefore require Environmental Authorisation prior to commencement.

This project requires an Environmental Authorisation (EA) in terms of the National Environmental Management Act (NEMA) (Act No. 107 of 1998, as amended) and the 2014 EIA Regulations (as amended). The process triggered is a Scoping and Environmental Impact Assessment report (S&EIR). All the phases including the Environmental Management Programme report (EMPr) must be prepared in terms of the NEMA and GN R. 982, (as amended by GN R. 326) and the associated activities listed under GN R. 983, GN R. 984 and GN R. 985 (as amended by GN R 327, GN R 325, and GN R 324 respectively).

Objectives and Overview of the Environmental Impact Assessment (EIA) Phase

The EIA Phase is a comprehensive study that addresses all the issues raised in the Scoping Phase as well as provides further assessment of the sensitivities identified by the various specialist as well as the proposed impacts of the proposed development. The main objectives of the EIA phase is to assess the significance of the impacts that may occur from the proposed development, provide mitigation measures and management recommendations to reduce the significant impacts, compile an Environmental Management Programme for use during construction to ensure correct monitoring procedures are follows as well as to undertake further PPP.

The EAP therefore compiled a Draft Environmental Impact Assessment Report (DEIAr) and a draft Environmental Management Programme (EMPr) which was made available for public and stakeholder comment for a period of 30 days as part of the public participation process. All comments received in response to the DEIAr were considered and responded to, incorporated into the Final EIA Phase and submitted to the Department for decision.

Public Participation Process

Public and Stakeholder participation is a fundamental component of the EIA Process. The inclusion of the views of the affected and interested public aids in ensuring the EIA Process is open, transparent and robust, as well as that the decision-making process is equitable and fair. This in turn guides informed choice and better environmental outcomes. It further presents a valuable source of information on key impacts, potential mitigation measures and the identification and selection of feasible alternatives. This process allows the EAP to engage further with identified key stakeholders and Interested and Affected Parties (I&APs). The Draft EIA Report was made available to all I&APs as well as Organs of State for a period of 30 days from the 25th July 2023 until the 24th August 2023, following this, all comments were included in the Comments and Response Report which has been submitted to the Department for decision.

1.2 Content Requirements for an Environmental Impact Assessment Report

An Environmental Impact Assessment Report must contain the information that is necessary for the competent authority to consider and come to a decision on the application. The content requirements for an Environmental Impact Assessment Report (as provided in Appendix 3 of the EIA Regulations 2014, as amended), as well as details of which section of the report fulfils these requirements, are shown in **Table 1** below.

Table 1: Content requirements for an Environmental Impact Assessment Report

Content Requirements	Applicable Section
(a) details of- (i) the EAP who prepared the report; and (ii) the expertise of the EAP, including a curriculum vitae;	4
(b) the location of the activity, including- (i) the 21-digit Surveyor General code of each cadastral land parcel; (ii) where available, the physical address and farm name; (iii) where the required information in items (i) and (ii) is not available, the coordinates of the boundary of the property or properties;	5
(c) a plan which locates the proposed activity or activities applied for at an appropriate scale, or, if it is- (i) a linear activity, a description and coordinates of the corridor in which the proposed activity or activities is to be undertaken; or (ii) on land where the property has not been defined, the coordinates within which the activity is to be undertaken;	5
(d) a description of the scope of the proposed activity, including- (i) all listed and specified activities triggered; (ii) a description of the activities to be undertaken, including associated structures and infrastructure;	6.2

(e) a description of the policy and legislative context within which the development is located and an explanation of how the proposed development complies with and responds to the legislation and policy context;	10
(f) a motivation for the need and desirability for the proposed development, including the need and desirability of the activity in the context of the preferred development footprint within the approved site as contemplated in the accepted scoping report;	12
(g) a motivation for the preferred development footprint within the approved site as contemplated in the accepted scoping report;	13
(h) a full description of the process followed to reach the proposed development footprint within the approved site as contemplated in the accepted scoping report, including: (i) details of all the alternatives considered; (ii) details of the public participation process undertaken in terms of regulation 41 of the Regulations, including copies of the supporting documents and inputs; (iii) a summary of the issues raised by interested and affected parties, and an indication of the manner in which the issues were incorporated, or the reasons for not including them; (iv) the environmental attributes associated with the alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects; (v) the impacts and risks identified including the nature, significance, consequence, extent, duration and probability of the impacts, including the degree to which these impacts— (aa) can be reversed; (bb) may cause irreplaceable loss of resources; and (cc) can be avoided, managed or mitigated; (vi) the methodology used in determining and ranking the nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks; (vii) positive and negative impacts that the proposed activity and alternatives will have on the environment and on the community that may be affected focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects; (viii) the possible mitigation measures that could be applied and level of residual risk; (ix) if no alternatives, including alternative locations for the activity were investigated, the motivation for not considering such and (x) a concluding statement indicating the location of the preferred alternative development footprint within the approved site as contemplated in the accepted scoping report;	14
(i) a full description of the process undertaken to identify, assess and rank the impacts the activity and associated structures and infrastructure will impose on the preferred development footprint on the approved site as contemplated in the accepted scoping report through the life of the activity, including— (i) a description of all environmental issues and risks that were identified during the environmental impact assessment process; and (ii) an assessment of the significance of each issue and risk and an indication of the extent to which the issue and risk could be avoided or addressed by the adoption of mitigation measures;	14.3 Appendix 7
(j) an assessment of each identified potentially significant impact and risk, including— (i) cumulative impacts; (ii) the nature, significance and consequences of the impact and risk; (iii) the extent and duration of the impact and risk; (iv) the probability of the impact and risk occurring; (v) the degree to which the impact and risk can be reversed; (vi) the degree to which the impact and risk may cause irreplaceable loss of	14.3

resources; and (vii) the degree to which the impact and risk can be mitigated;	
(k) where applicable, a summary of the findings and recommendations of any specialist report complying with Appendix 6 to these Regulations and an indication as to how these findings and recommendations have been included in the final assessment report;	16
(l) an environmental impact statement which contains— (i) a summary of the key findings of the environmental impact assessment: (ii) a map at an appropriate scale which superimposes the proposed activity and its associated structures and infrastructure on the environmental sensitivities of the preferred development footprint on the approved site as contemplated in the accepted scoping report indicating any areas that should be avoided, including buffers; and (iii) a summary of the positive and negative impacts and risks of the proposed activity and identified alternatives;	17
(m) based on the assessment, and where applicable, recommendations from specialist reports, the recording of proposed impact management outcomes for the development for inclusion in the EMPr as well as for inclusion as conditions of authorisation;	18
(n) the final proposed alternatives which respond to the impact management measures, avoidance, and mitigation measures identified through the assessment;	19
(o) any aspects which were conditional to the findings of the assessment either by the EAP or specialist which are to be included as conditions of authorisation;	20
(p) a description of any assumptions, uncertainties and gaps in knowledge which relate to the assessment and mitigation measures proposed;	21
(q) a reasoned opinion as to whether the proposed activity should or should not be authorised, and if the opinion is that it should be authorised, any conditions that should be made in respect of that authorisation;	22
(r) where the proposed activity does not include operational aspects, the period for which the environmental authorisation is required and the date on which the activity will be concluded and the post construction monitoring requirements finalised;	22
(s) an undertaking under oath or affirmation by the EAP in relation to- (i) the correctness of the information provided in the report; (ii) the inclusion of comments and inputs from stakeholders and interested and affected parties; and (iii) the inclusion of inputs and recommendations from the specialist reports where relevant; and (iv) any information provided by the EAP to interested and affected parties and any responses by the EAP to comments or inputs made by interested or affected parties;	Appendix 1
(t) where applicable, details of any financial provision for the rehabilitation, closure, and ongoing post decommissioning management of negative environmental impacts;	n/a
(u) an indication of any deviation from the approved scoping report, including the plan of study, including— (i) any deviation from the methodology used in determining the significance of potential environmental impacts and risks; and (ii) a motivation for the deviation;	24
(v) any specific information required by the competent authority; and	25
(w) any other matter required in terms of section 24(4)(a) and (b) of the Act.	All requirements have been met in this report.
(2) Where a government notice gazetted by the Minister provides for any protocol or minimum information requirement to be applied to an environmental impact assessment report, the requirements as indicated in such notice will apply.	All requirements have been met in this report.

2. PROJECT TITLE

Proposed Development of the Lesaka 1 Solar Energy Facility (SEF) and Associated Infrastructure near Loeriesfontein in the Northern Cape Province.

3. DETAILS OF APPLICANT

3.1 Name and contact details of the Applicant

Table 2: Name and contact details of the applicant

Business Name of Applicant	Lesaka 1 Solar Energy Facility (Pty) Ltd
Physical Address	Suite 104, Albion Springs | 183 Main Road | Rondebosch | Cape Town
Postal Address	Suite 104, Albion Springs | 183 Main Road | Rondebosch | Cape Town
Postal Code	7700
Telephone	+27 (0) 21 207 2181
Email	Mercia.Grimbeek@enertrag.com Michael.Barnes@enertrag.com

4. DETAILS OF THE ENVIRONMENTAL ASSESSMENT PRACTIONER AND SPECIALISTS

4.1 Name and contact details of the Environmental Consultant

The table below provides the name and contact details of the Environmental Consultants who prepared this report:

Table 3: Name and contact details of the Environmental Consultant who prepared the report

Business Name of EAP	SiVEST SA (PTY) Ltd
Physical Address	4 Pencarrow Crescent, La Lucia Ridge Office Estate
Postal Address	PO Box 1899, Umhlanga Rocks
Postal Code	4320
Telephone	031 581 1500
Fax	031 566 2371
Email	michelleg@sivest.com

4.2 Names and expertise of the Environmental Assessment Practitioner (EAP)

The table below provides the names of the EAP's who prepared this report:

Table 4: Names and details of the expertise of the EAP's involved in the preparation of this report

Name of representative of the EAP	Educational Qualifications	Professional Affiliations	Experience (years)
Michelle Nevette *(Cert.Sci.Nat.)*	MEnvMgt. (Environmental Management)	SACNASP Registration No. 120356 EAPASA Registration No. 2019/1560 IAIA	19
Michelle Guy *(Pr.Sci.Nat)*	MSc Environmental Science	SACNASP Registration No. 126338 EAPASA Registration No. 2019/868 IAIA	10

CV's of SiVEST personnel and the EAP declaration are attached in **Appendix 1.**

4.3 Names and expertise of the specialists

The table below provides the names of the specialists involved in the project:

Table 5: Names of specialists involved in the project

Company	Name of representative of the specialist	Specialist	Educational Qualifications	Experience (years)
SRK Consulting	Kelly Armstrong	Visual Impact Assessment	BSocSc (Hons)	4
	Chris Dalgliesh		BBusSci (Hons) M Phil (Env) EAPASA	35
CTS Heritage	Jenna Lavin	Heritage Impact Assessment	MSc. Archaeology (UCT), CPD in Conservation of the Built Environment (UCT)	12
	Elize Butler	Palaeontology Impact Assessment	MSc Zoology	28
Johann Lanz Consulting	Johann Lanz	Agriculture and Soils Impact Assessment (desktop)	M.Sc. (Environmental Geochemistry)	24
Tony Barbour	Tony Barbour	Socio-economic Impact Assessment (desktop)	BSc (Geology and Economics) Rhodes (1984); B Economics (Honours) Rhodes (1985); MSc (Environmental Science), University of Cape Town (1992)	28
Enviro Insight	Corné Niemandt	Terrestrial Biodiversity Assessment	MSc Plant Science Pr. Sci. Nat.	8
Enviro Insight	Sam Laurence	Avifaunal Impact Assessment	BSc, BSC Hons, M.Sc. candidate.	15

Company	Name of representative of the specialist	Specialist	Educational Qualifications	Experience (years)
			Pr. Sci. Nat. Zoological Science	
FEN Consulting	Cole Grainger	Surface Water Impact Assessment	MSc Conservation Ecology Cand.Sci.Nat	6
	Stephen van Staden		MSc Environmental Management Pr. Sci. Nat	20
GaGE Consulting (Pty) Ltd	Duan Swart	Desktop Geotechnical Impact Assessment	MSc Engineering Geology Pr.Sci.Nat 137543	4
SiVEST SA	Ntuthuko Hlanguza	Transportation Study	Pr. Eng	7
iSHEcon	Debra Mitchell	Quantitative Risk Assessment	MSc (Chem Eng) and Pr.Eng	25
Highlands Hydrology	Luke Wiles	Hydrological Impact Assessment	MSc Hydrology Pr.Sci.Nat 400123/10	16

5. LOCATION OF THE ACTIVITY

5.1 21 Digit Surveyor General Codes and Farm names of the sites

Table 6: 21 Digit Surveyor General Code

SG CODE	DESCRIPTION
C01500000000026400000	PORTION 0 OF THE FARM KLUITJES KRAAL NO. 264

5.2 Coordinates of the site

The centre point coordinates for the sites are as follows:

- Latitude: 30° 36' 51.54" S
- Longitude: 19° 28' 7.65" E

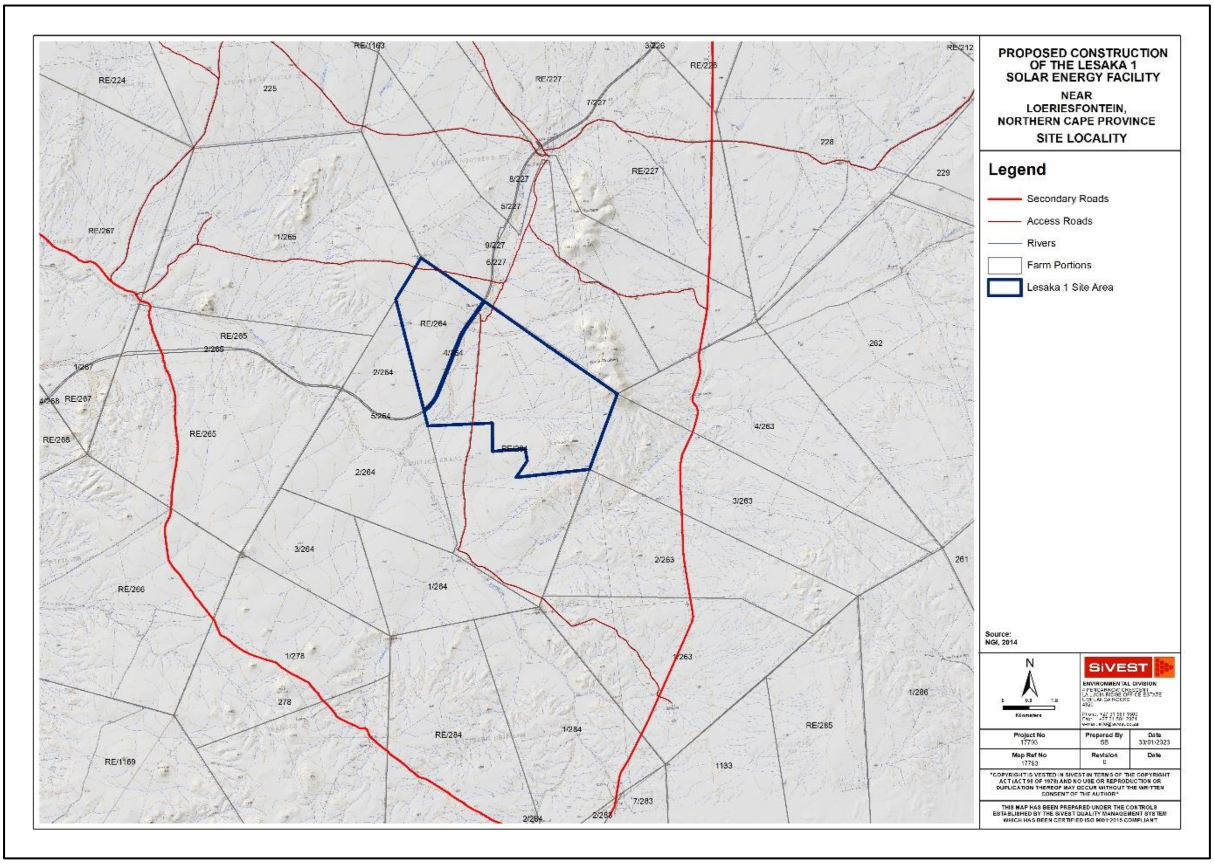


Figure 2: Site locality

The bend point coordinates of the site have been included below:

Table 7: Bend point coordinates for the Lesaka 1 SEF site boundary

LESAKA 1 SEF: APPLICATION SITE		
COORDINATES AT CORNER POINTS (DD MM SS.sss)		
POINT	**SOUTH**	**EAST**
1	30°34'18.06"S	19°26'38.26"E
2	30°37'12.02"S	19°30'31.88"E
3	30°38'32.50"S	19°29'46.16"E
4	30°38'32.97"S	19°28'11.14"E
5	30°38'15.94"S	19°28'27.34"E
6	30°38'2.07"S	19°28'26.28"E
7	30°38'1.32"S	19°27'44.13"E
8	30°37'29.89"S	19°27'47.76"E
9	30°37'25.49"S	19°26'24.34"E
10	30°35'1.18"S	19°26'0.30"E
COORDINATES AT CENTRE POINT (DD MM SS.sss)		
POINT	**SOUTH**	**EAST**
11	30°36'51.54"S	19°28'7.65"E

Table 8: Corner point coordinates for Onsite Substation, O&M Building and BESS

LESAKA 1 SEF: ONSITE SUBSTATION, O&M BUILDING AND BESS (6.5ha)

COORDINATES AT CORNER POINTS (DD MM SS.sss)		
POINT	SOUTH	EAST
1	30°37'32.23"S	19°27'47.65"E
2	30°37'32.90"S	19°27'55.68"E
3	30°37'42.60"S	19°27'54.57"E
4	30°37'41.91"S	19°27'46.54"E
COORDINATES AT CENTRE POINT (DD MM SS.sss)		
POINT	SOUTH	EAST
5	30°37'37.44"S	19°27'51.00"E

Table 9: Corner point coordinates for Temporary Laydown Area

LESAKA 1 SEF: TEMPORARY LAYDOWN AREA (6.5ha)		
COORDINATES AT CORNER POINTS (DD MM SS.sss)		
POINT	SOUTH	EAST
1	30°36'10.57"S	19°27'35.24"E
2	30°36'12.08"S	19°27'43.12"E
3	30°36'21.58"S	19°27'40.70"E
4	30°36'20.08"S	19°27'32.81"E
COORDINATES AT CENTRE POINT (DD MM SS.sss)		
POINT	SOUTH	EAST
5	30°36'15.96"S	19°27'38.16"E

Table 10: Coordinates for Solar Field Buildable Area Prospect 1

LESAKA 1 SEF: SOLAR FIELD BUILDABLE AREA PROSPECT 1 (235 ha)		
COORDINATES AT CORNER POINTS (DD MM SS.sss)		
POINT	SOUTH	EAST
1	30°35'57.95"S	19°27'54.57"E
2	30°35'57.98"S	19°28'0.08"E
3	30°35'59.40"S	19°28'5.47"E
4	30°35'59.56"S	19°28'24.83"E
5	30°35'58.81"S	19°28'31.03"E
6	30°35'55.97"S	19°28'40.71"E
7	30°35'54.64"S	19°28'43.28"E
8	30°35'53.89"S	19°28'46.36"E
9	30°36'3.67"S	19°28'58.88"E
10	30°37'0.36"S	19°27'18.35"E
11	30°36'50.66"S	19°27'19.51"E
12	30°36'43.29"S	19°27'19.62"E
13	30°36'41.91"S	19°27'22.09"E
14	30°36'39.57"S	19°27'23.71"E
15	30°36'33.94"S	19°27'23.77"E
16	30°36'20.16"S	19°27'32.43"E
17	30°36'21.56"S	19°27'40.73"E
18	30°36'11.40"S	19°27'43.22"E
19	30°36'10.19"S	19°27'43.19"E

LESAKA 1 SEF: SOLAR FIELD BUILDABLE AREA PROSPECT 1 (235 ha)		
COORDINATES AT CORNER POINTS (DD MM SS.sss)		
POINT	SOUTH	EAST
20	30°36'9.76"S	19°27'45.21"E
21	30°36'8.44"S	19°27'48.01"E
22	30°36'6.13"S	19°27'49.50"E
23	30°36'5.16"S	19°27'53.37"E
24	30°36'2.28"S	19°27'54.58"E
COORDINATES AT CENTRE POINT (DD MM SS.sss)		
POINT	SOUTH	EAST
25	30°36'17.02"S	19°28'2.32"E

Table 11: Coordinates for Solar Field Buildable Area Prospect 2

LESAKA 1 SEF: SOLAR FIELD BUILDABLE AREA PROSPECT 2 (139 ha)		
COORDINATES AT CORNER POINTS (DD MM SS.sss)		
POINT	SOUTH	EAST
1	30°36'45.91"S	19°28'20.05"E
2	30°36'45.12"S	19°28'22.52"E
3	30°36'45.13"S	19°28'35.69"E
4	30°36'45.76"S	19°28'38.68"E
5	30°36'45.75"S	19°28'53.30"E
6	30°36'46.15"S	19°28'54.60"E
7	30°36'48.88"S	19°28'58.49"E
8	30°36'52.59"S	19°28'54.62"E
9	30°36'57.94"S	19°28'53.09"E
10	30°37'1.78"S	19°28'48.53"E
11	30°37'8.96"S	19°28'41.40"E
12	30°37'8.83"S	19°28'38.65"E
13	30°37'12.43"S	19°28'34.44"E
14	30°37'17.73"S	19°28'34.42"E
15	30°37'21.98"S	19°28'25.96"E
16	30°37'21.83"S	19°27'59.09"E
17	30°37'19.76"S	19°27'56.33"E
18	30°37'17.33"S	19°27'55.38"E
19	30°37'11.74"S	19°27'49.38"E
20	30°37'9.99"S	19°27'56.24"E
21	30°37'8.20"S	19°28'7.17"E
22	30°37'5.19"S	19°28'17.52"E
23	30°37'3.19"S	19°28'20.79"E
24	30°36'57.35"S	19°28'20.72"E
25	30°36'56.16"S	19°28'21.71"E
26	30°36'52.23"S	19°28'21.85"E
27	30°36'51.17"S	19°28'20.06"E
COORDINATES AT CENTRE POINT (DD MM SS.sss)		
POINT	SOUTH	EAST

LESAKA 1 SEF: SOLAR FIELD BUILDABLE AREA PROSPECT 2 (139 ha)		
COORDINATES AT CORNER POINTS (DD MM SS.sss)		
POINT	SOUTH	EAST
28	30°37'3.23"S	19°28'31.88"E

Table 12: Coordinates for Solar Field Buildable Area Prospect 3

LESAKA 1 SEF: SOLAR FIELD BUILDABLE AREA PROSPECT 3 (185 ha)		
COORDINATES AT CORNER POINTS (DD MM SS.sss)		
POINT	SOUTH	EAST
1	30°37'34.60"S	19°27'55.49"E
2	30°37'34.58"S	19°28'5.13"E
3	30°37'35.60"S	19°28'13.30"E
4	30°37'34.66"S	19°28'27.79"E
5	30°37'34.87"S	19°28'39.02"E
6	30°37'37.27"S	19°28'40.52"E
7	30°37'42.80"S	19°28'50.72"E
8	30°37'46.18"S	19°28'51.62"E
9	30°37'53.05"S	19°28'51.11"E
10	30°38'16.32"S	19°28'40.80"E
11	30°38'18.64"S	19°28'34.90"E
12	30°38'19.94"S	19°28'33.06"E
13	30°38'24.85"S	19°28'30.12"E
14	30°38'27.44"S	19°28'28.22"E
15	30°38'29.84"S	19°28'23.97"E
16	30°38'29.85"S	19°28'16.74"E
17	30°38'18.46"S	19°28'27.49"E
18	30°38'2.32"S	19°28'29.28"E
19	30°38'1.45"S	19°27'43.81"E
20	30°37'41.86"S	19°27'46.04"E
21	30°37'42.62"S	19°27'54.57"E
COORDINATES AT CENTRE POINT (DD MM SS.sss)		
POINT	SOUTH	EAST
22	30°37'50.66"S	19°28'27.70"E

Table 13: Coordinates for Solar Field Buildable Area Prospect 4

LESAKA 1 SEF: SOLAR FIELD BUILDABLE AREA PROSPECT 4 (37 ha)		
COORDINATES AT CORNER POINTS (DD MM SS.sss)		
POINT	SOUTH	EAST
1	30°35'41.58"S	19°28'3.48"E
2	30°35'41.76"S	19°28'14.10"E
3	30°35'41.48"S	19°28'15.37"E
4	30°35'40.17"S	19°28'16.79"E
5	30°35'39.00"S	19°28'17.56"E
6	30°35'39.03"S	19°28'24.47"E
7	30°35'39.38"S	19°28'25.96"E

8	30°35'40.37"S	19°28'27.68"E
9	30°35'40.76"S	19°28'29.28"E
10	30°35'41.85"S	19°28'30.66"E
11	30°35'47.82"S	19°28'30.59"E
12	30°35'48.38"S	19°28'28.20"E
13	30°35'48.05"S	19°27'59.18"E
14	30°35'46.72"S	19°27'55.44"E
COORDINATES AT CENTRE POINT (DD MM SS.sss)		
POINT	**SOUTH**	**EAST**
15	30°35'44.95"S	19°28'16.51"E

6. ACTIVITY INFORMATION

6.1 Project Description

6.1.1 SEF and Associated Infrastructure

The full application site assessed is approximately 4 894.93 hectares (ha) in extent.

In summary, the proposed Lesaka 1 SEF development will include the following components:

- Buildable area for PV approximately 596 ha.
- Export capacity of up to 240MW.
- Solar Module Technology – Monocrystalline or Polycrystalline cell type (Monofacial and/or Bifacial Photovoltaic (PV) Modules) with fixed, single or dual axis tracking mounting structures.
- Low and medium voltage cabling will link the PV facility to the facility substation / grid connection infrastructure. These cables will be either overhead or laid underground wherever technically feasible (up to 33kV).
- Access road/s to the site and internal roads between project components of up to 5m and 6m, this can increase to 8m on bends. The roads to be placed with a corridor of up to 20m width to accommodate cable trenches, stormwater channels (as required), and turning circle/bypass areas of up to 20m in some sections. Existing roads will be upgraded wherever needed, and new roads will be constructed where necessary.
- Operation and maintenance (O&M) building to be located near the IPP substation and/or BESS (including septic/conservancy tanks with portable toilets). Typical areas include: Operations building (20m x 10m = 200m$^{2)}$, Workshop (15m x 10m = 150m^2), and Stores (5m x 10m = 150m^2).
- Construction camp laydown area approximately 0.5 ha in size.
- Temporary laydown/staging area during construction phase approximately 2.2 ha in size.
- Battery Energy Storage System (BESS) will be up to 120MW / 480MWh with up to four hours of storage. It is proposed that Lithium Battery Technologies, such as Lithium Iron Phosphate, Lithium Nickel Manganese Cobalt oxides or Vanadium Redox flow technologies will be considered as the preferred battery technology however the specific technology will only be determined following Engineering, Procurement, and Construction (EPC) procurement. The main components of the BESS include the batteries, power conversion system, and transformer which will all be stored in various rows of containers. The BESS components will arrive on site pre-assembled. The approximate footprint for the BESS is 4 ha.

- Associated infrastructure such as: fencing and lighting, lightning protection system (LPS), telecommunication infrastructure, batching plant (if required), security infrastructure, access and internal roads, stormwater infrastructure, water pipelines (as needed).
- Fences will run adjacent to the solar buildable areas and outside all no-go areas.
- One new 33/132kV on-site IPP substation (facility substation) utilised for collection and connection of the internal LV and MV reticulation of the Solar PV Facility. The 132kV Switching Station may be adjacent to the respective onsite IPP Substation. The onsite IPP Substation and Switching Station combined footprint will be approximately 1 ha.
- Substation infrastructure includes: office area, operation and control room, workshop, and storage area, oil dam, including standard substation electrical equipment (feeder bays, transformers, busbars, stringer strain beams, insulators, isolators, conductors, circuit breakers, lightning arrestors, relays, capacitor banks, batteries, wave/line trappers, switchyard, metering and indication instruments, equipment for carrier current, surge protection and outgoing feeders, as may be needed).

6.1.2 Main components of a Solar PV Facility

It is anticipated that the proposed Solar PV energy facility will include PV fields (arrays) comprising multiple PV panels. Solar PV panels are usually arranged in rows consisting of a number of PV modules.

Please refer to **Figure 3** below for the typical components of a solar panel.

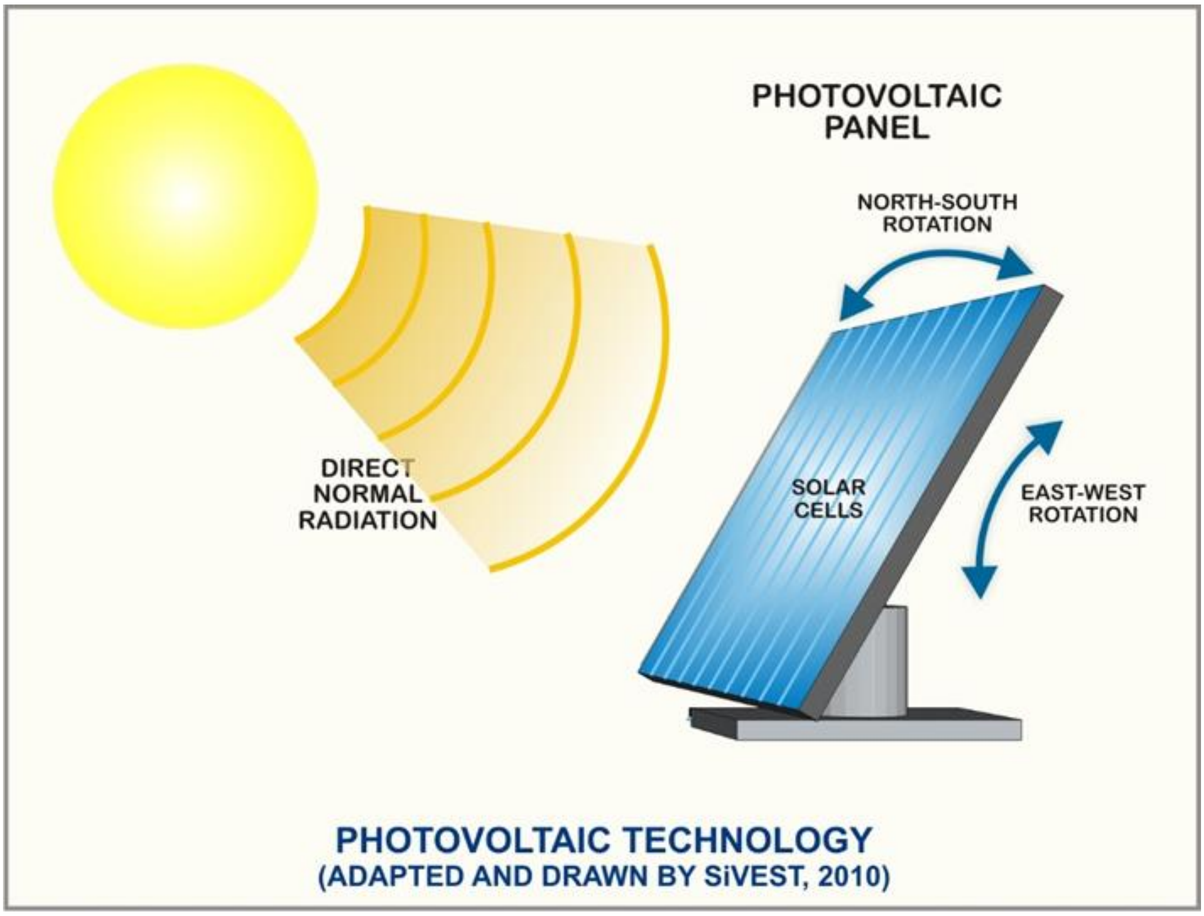


Figure 3: Typical components of a solar PV panel

The solar arrays are usually connected in strings, which are in turn connected to inverters. DC power from the panels will be converted into AC power in the inverters and the voltage will be typically stepped up to a medium voltage in the transformers. As mentioned, medium voltage cabling will link the solar PV energy facility to the grid connection infrastructure (132kV overhead power line and 33/132kV on-site substation). The medium voltage cables will be run underground (wherever technically feasible) in the facility before being fed to the on-site and/or collector substation, where the voltage will typically be stepped up.

The solar PV electricity generation process is illustrated in **Figure 4** below.

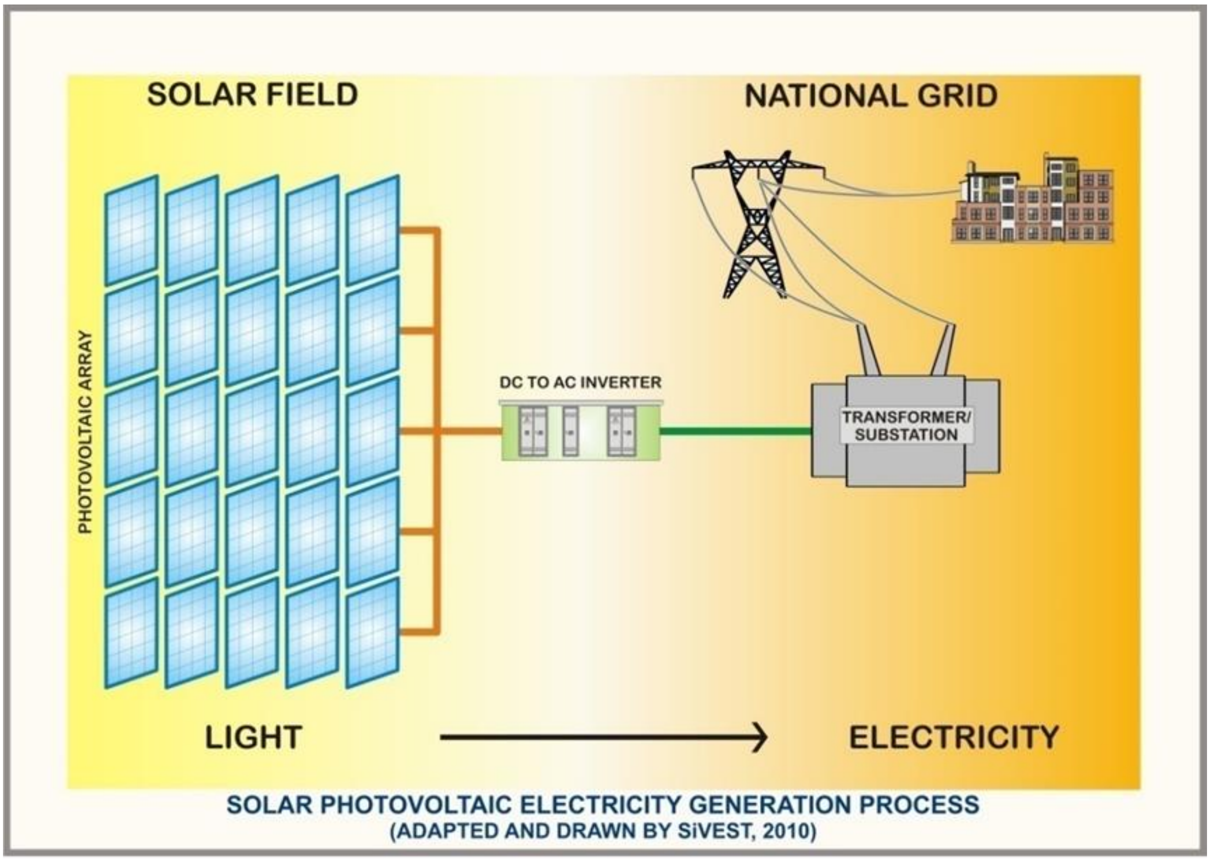


Figure 4: Solar PV electricity generation process

6.1.3 Roads

There are two site access roads to the Project site. The first access road is via the R355, which is approximately 34km south from the proposed development area; and the second access road is on the north of the proposed development area, namely, the Grannaatboskolk Road. Internal access roads will then be required to access the solar PV panels. The site and internal roads will have a width of between 5m and 6m, which can increase to 8m on bends. The roads will be placed within a corridor of up to 20m width to accommodate cable trenches, stormwater channels (as requried) and turning/bypass areas of up to 20m in some sections. Existing roads will be upgraded wherever needed, and new roads will be constructed where necessary.

6.1.4 Battery Energy Storage System (BESS)

The associated BESS storage capacity will be up to 120MW / 480MWh with up to four hours of storage. It is proposed that Lithium Battery Technologies, such as Lithium Iron Phosphate, Lithium Nickel Manganese Cobalt oxides or Vanadium Redox flow technologies will be considered as the preferred battery technology however the specific technology will only be determined following Engineering, Procurement, and Construction (EPC) procurement. The main components of the BESS include the batteries, power conversion system, and transformer which will all be stored in various rows of containers. The BESS components will arrive on site pre-assembled. The approximate footprint for the BESS is 4 ha.

In terms of BESS and the NEMA EIA Regulations, activities relating to storage of dangerous goods, such as Activity 14 of Listing Notice 1 and Activity 10 of Listing Notice 3, will not be triggered by the proposed battery storage facility installation, due to the following:

- A battery is not deemed to be a container; and
- Electrolytes that are used within battery storage facilities: their function is deemed to be like transformers within substations: converting high voltage electricity to lower voltage electricity for further distribution. The function of the battery is not for “storage” or “storage and handling” of a dangerous good. For flow batteries that need to be recharged, the truck will come in, recharge and leave immediately, and so there will be no temporary storage on site.

Battery storage does not trigger any listed activities relating to the generation of electricity as the technology does not ‘generate’ electricity, it simply stores electricity generated by the renewable energy facility (the Lesaka SEF in this instance) and discharges the stored electricity as and when required by the grid.

The preferred technology is Lithium-ion solid state battery, however, due to the ever changing preferences and improvements to battery technology, the final selection of the type of battery technology to be used will only take place during the detailed design process and after the appointment of the battery supplier.

A high level risk assessment for the BESS has been inlcuded in **Appendix 6**. The risk assessment identified that with suitable preventative and mitigative measures in place, none of the identified potential risks of either battery technology type are excessively high, i.e., from a SHE perspective no fatal flaws were found with the proposed BESS installations at the Lesaka 1 SEF near Loeriesfontein. The current proposed location of the Lesaka 1 BESS are more than 100m from rivers and more than 50m from boreholes and are suitable.

6.1.5 Final Proposed Layout and Technical Detail Summary

The Final Proposed Layout is reflected in **Figure 5** below and attached in **Appendix 3**. Photographs of the site are included in **Appendix 4**.

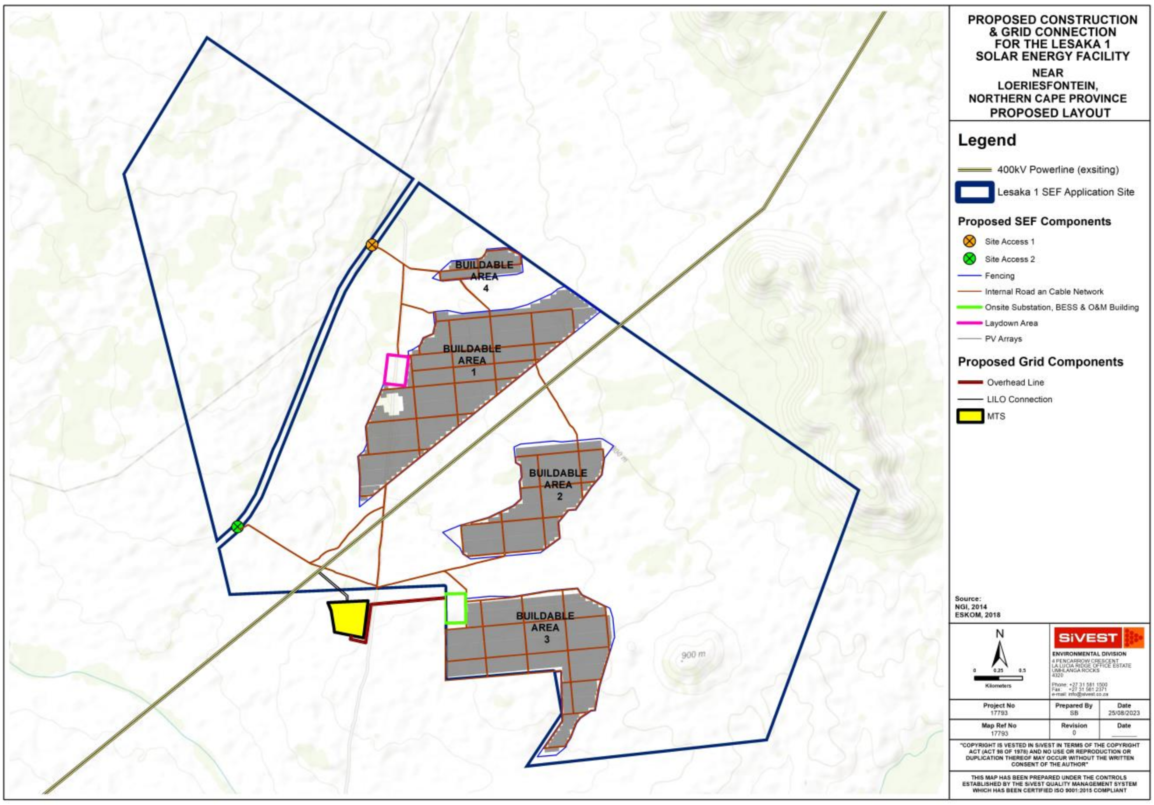


Figure 5: Final layout showing proposed location of solar PV panels and associated infrastructure (including grid infrastructure which is subject to a separate application)

The solar panels and all other project infrastructure have been placed strategically within the development area based on environmental constraints and sensitivity findings.

A summary of the project technical details is provided in **Table 14** below.

Table 14: Technical Detail Summary

Component	Description / Dimensions
Location of site (centre point)	30°36'51.54"S 19°28'7.65"E
Application site area	4 894.93 ha (overall farm area)
PV development area	Approximately 596 ha
SG codes	C01500000000026400000
Export capacity	Up to 240 MW
Proposed technology	Solar Module Technology – Monocrystalline or Polycrystalline cell type. Monofacial and/or Bifacial Photovoltaic (PV) Modules. Mounting System Technology – Single-axis tracking, Dual-axis tracking, or Fixed axis tracking. Overhead or underground LV and MV cabling. Centralised inverter stations or string inverters. Power Transformers.
Max panel height from the ground	5 m

Component	Description / Dimensions
Substation area	6.5 ha
Battery Energy Storage Area (BESS)	The associated BESS storage capacity will be up to 120MW / 480MWh with up to four hours of storage. It is proposed that Lithium Battery Technologies, such as Lithium Iron Phosphate, Lithium Nickel Manganese Cobalt oxides or Vanadium Redox flow technologies will be considered as the preferred battery technology however the specific technology will only be determined following Engineering, Procurement, and Construction (EPC) procurement. The main components of the BESS include the batteries, power conversion system, and transformer which will all be stored in various rows of containers. The approximate footprint for the BESS is 4 ha.
Capacity of on-site and collector substation	33/132kV
O&M building area	Located near the onsite IPP SS and/or BESS. Septic/Conservancy tanks with portable toilets Typical areas include: - Operations building – 20m x 10m = 200m² - Workshop – 15m x 10m = 150m² - Stores – 5m x 10m = 150m²
Construction Camp Laydown area	Typical area 100m x 50m = 5 000m² (0.5 ha)
Temporary laydown or staging area	Typical area 220m x 100m = 22 000m² (2.2 ha)
Internal roads	Access road/s to the site and internal roads between project components of up to 5m and 6m, this can increase to 8m on bends. The roads to be placed with a corridor of up to 20m width to accommodate cable trenches, stormwater channels (as required), and turning circle/bypass areas of up to 20m in some sections. Existing roads will be upgraded wherever needed, and new roads will be constructed where necessary.
Site Access	Access to the development area can be obtained via the AP2972, which is approximately 7 km east of the proposed development area.
Proximity to grid connection	On site via a Loop-In-Loop-Out connection to the existing 400kV line.
Associated Infrastructure	- Fencing and lighting (fences will run adjacent to the solar buildable areas and outside all no-go areas) - Lightning Protection System (LPS). - Telecommunication infrastructure. - Batching plant (if required). - Security infrastructure. - Access and internal roads. - Stormwater infrastructure (as needed). - Water pipelines (as needed).

6.2 NEMA Listed Activities

The amended EIA Regulations promulgated under Section 24(5) of the National Environmental Management Act, Act 107 of 1998 and published in Government Notice No. R. 326 list activities which may not commence without environmental authorization from the Competent Authority. The proposed activity is identified in terms of Government Notice No. R. 327, 325 and 324 for activities which must follow a full Environmental Impact Assessment Process. The project will trigger the following listed activities:

Table 15: Listed activities in terms of NEMA: EIA Regulations 2014 (as amended in 2017), applicable to the proposed project

Activity No(s):	**Relevant activities as set out in Listing Notices 1, 2 and 3 of the EIA Regulations, 2014 as amended**	**Describe the portion of the proposed project to which the applicable listed activity relates.**
Relevant Basic Assessment Activities as set out in Listing Notice 1		
11 (i)	**GN R. 327 (as amended) Item 11:** The development of facilities or infrastructure for the transmission and distribution of electricity— (i) outside urban areas or industrial complexes with a capacity of more than 33 but less than 275 kilovolts.	New on-site substations/collector switching stations will be constructed as part of the proposed development. The proposed substation / collector switching stations will be located outside urban areas and will have capacities of 33/132kV respectively. The substations will be connected via underground/overhead powerlines.
12 (ii) (a) (c)	**GN R. 327 (as amended) Item 12:** The development of: ii) infrastructure or structures with a physical footprint of 100 square metres or more; where such development occurs- (a) within a watercourse; (c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse.	Drainage lines and watercourses are located across the proposed site. One or more roads and/or powerlines and/or services will cross these watercourses or drainage lines or be within 32m thereof. The proposed developments will therefore entail the construction of infrastructure with physical footprints of approximately 100m^2 or more within a surface water feature / watercourse or within 32m of a surface water feature / watercourse.
14	**GN R. 327 (as amended) Item 14**: The development of facilities or infrastructure, for the storage, or for the storage and handling, of a dangerous good, where such storage occurs in containers with a combined capacity of 80 cubic metres or more but not exceeding 500 cubic metres.	"Dangerous goods" that are likely to be associated with the project include fuel stored during the construction phase and/or hazardous chemical substances at the substation during the operational phase. Threshold of 80 m^3 expected to be exceeded. The Facility will require storage and handling of dangerous goods, including fuel, cement and chemical storage onsite, that will be greater than 80m^3 but not exceeding 500m^3. The following estimated maximum capacities of dangerous good will be stored on site:

Activity No(s):	Relevant activities as set out in Listing Notices 1, 2 and 3 of the EIA Regulations, 2014 as amended	Describe the portion of the proposed project to which the applicable listed activity relates.
		• Concrete Batching: ~125 m^3 • Fuel stores (Petrol and/or Diesel): ~250m^3 • Paint, grease, transformer oils, construction chemicals, lubricants: ~100m^3
19	**GN R. 327 (as amended) Item 19**: The infilling or depositing of any material of more than 10 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 10 cubic metres from a watercourse;	The proposed development will involve the excavation, removal, infilling or depositing of any material of more than 10m^3 into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 10m^3 from some of the identified surface water features / watercourses. Although the layout of the proposed developments will be designed to avoid the identified surface water features / watercourses as far as possible, some of the internal and/or access roads/project related infrastructure may need to traverse the identified surface water features / watercourses. In addition, during construction, soil will need to be removed from some of the identified surface water features / watercourses.
24 (ii)	**GN R. 327 (as amended) Item 24:** The development of a road - ii) with a reserve wider than 13,5 meters, or where no reserve exists where the road is wider than 8 metres.	Internal access roads will be required to access the PV panels and substations. The roads to be placed within a corridor of up to 20m width to accommodate cable tranches, stormwater channels (as required), and turning circle/bypass areas of up to 20m in some sections. Existing roads will be used wherever possible, although new roads will be constructed where necessary.
28 (ii)	**GN R. 327 (as amended) Item 28:** Residential, mixed, retail, commercial, industrial or institutional developments where such land was used for agriculture, game farming, equestrian purposes or afforestation on or after 01 April 1998 and where such development: (ii) will occur outside an urban area, where the total land to be developed is bigger than 1 hectare;	The total area to be developed for the proposed renewable energy facilities is greater than 1ha and occurs outside an urban area in an area currently zoned as agricultural land.
48 (i) (a) (c)	**GN R. 327 (as amended) Item 48:** The expansion of-	The proposed development will entail the expansion (upgrading) of roads and other infrastructure by

Activity No(s):	Relevant activities as set out in Listing Notices 1, 2 and 3 of the EIA Regulations, 2014 as amended	Describe the portion of the proposed project to which the applicable listed activity relates.
	(i) infrastructure or structures where the physical footprint is expanded by 100 square metres or more; where such expansion occurs— (a) within a watercourse; or (c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse;	$100m^2$ or more within a surface water feature / watercourse or within 32m from the edge of a surface water feature / watercourse. Although the layouts of the proposed developments will be designed to avoid the identified surface water features / watercourses as far as possible, some of the internal and access roads and project related infrastructure to be upgraded will need to traverse the identified surface water features / watercourses and construction will occur within some of the surface water features / watercourses and/or be within 32m of some of the surface water features / watercourses.
56 (ii)	**GN R. 327 Item 56:** The widening of a road by more than 6 metres, or the lengthening of a road by more than 1 kilometre - (i) where the existing reserve is wider than 13,5 metres; or (ii) where no reserve exists, where the existing road is wider than 8 metres –	Internal access roads will be required to access the PV panels and the substation. Existing roads will be used wherever possible, although new roads will be constructed where necessary. The existing access roads will need to be upgraded by widening them more than 6m, or by lengthening them by more than 1km.
Relevant Scoping and EIA Activities as set out in Listing Notice 2 of the EIA Regulations, 2014 as amended		
1	**GN R. 325 (as amended) Item 1:** The development of facilities or infrastructure for the generation of electricity from a renewable resource where the electricity output is 20 megawatts or more.	The proposed development will entail the construction of a SEF where the respective electricity output will be up to 240 MW. In addition, the proposed SEF development will be located outside urban areas.
15	**GN R. 325 (as amended) Item 15:** The clearance of an area of 20 hectares or more of indigenous vegetation.	The proposed SEF development will involve the clearance of more than 20 ha of indigenous vegetation. Clearance will also be required for the proposed substations, internal access roads and other associated infrastructure.
Relevant Basic Assessment Activities as set out in Listing Notice 3 of the EIA Regulations, 2014 as amended		
4 (g)(ii)(ee)	**GN R. 324 (as amended) Item 4:** The development of a road wider than 4m with a reserve less than 13.5 metres. **g. Northern Cape** ii. Outside Urban Areas: (ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by	The development of the SEF facility and associated infrastructure will require the development of roads wider than 4 m with a reserve of less than 13.5 m within a CBA 1 and CBA 2 area. These roads will occur within the

Activity No(s):	Relevant activities as set out in Listing Notices 1, 2 and 3 of the EIA Regulations, 2014 as amended	Describe the portion of the proposed project to which the applicable listed activity relates.
	the competent authority or in bioregional plans.	Northern Cape Province, outside urban areas.
12 (g)(ii)	**GN R. 324 (as amended) Item 12:** The clearance of an area of 300 square metres or more of indigenous vegetation except where such clearance of indigenous vegetation is required for maintenance purposes undertaken in accordance with a maintenance management plan. **g. Northern Cape** (ii) Within critical biodiversity areas identified in bioregional plans.	The proposed development will entail the construction of infrastructure with physical footprints of approximately 300 m^2 or more within areas identified as CBA 1 and CBA 2 area. As such, approximately 300 m^2 or more of indigenous vegetation will likely be cleared as part of the respective proposed developments.
14 (ii)(a)(c)(g)(ii)(ff)	**GN R. 324 (as amended) Item 14:** The development of— (ii) infrastructure or structures with a physical footprint of 10 square metres or more; where such development occurs— (a) within a watercourse; or (c) if no development setback has been adopted, within 32 metres of a watercourse, measured from the edge of a watercourse; excluding the development of infrastructure or structures within existing ports or harbours that will not increase the development footprint of the port or harbour. **g. Northern Cape** ii. Outside urban areas: (ff) Critical biodiversity areas or ecosystem service areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans;	The proposed development will entail the development of infrastructure with physical footprints of 10m^2 or more within a watercourse / surface water feature or within 32 m from the edge of a watercourse / surface water feature. The construction of the infrastructure for the development will occur within CBA Areas 1 and 2 and Ecosystem Support Areas.
18 (g)(ii)(ee)(ii)	**GN R. 324 (as amended) Item 18:** The widening of a road by more than 4 meters, or the lengthening of a road by more than 1 kilometer- **g. Northern Cape** ii. Outside urban areas: (ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans; (ii) Areas within a watercourse or wetland; or within 100m from the edge of a watercourse or wetland.	Internal access roads will be required to access the solar panels as well as the substation. Existing roads will be used wherever possible. Internal access roads will thus be widened by more than 4 m or lengthened by more than 1 km. These roads will occur within the Northern Cape Province, outside urban areas. The widening of the roads will occur within a CBA 1 and 2 area as well as a watercourse or wetland or within 100 m from the edge of a watercourse or wetland.
23 (ii)(a)(c)	**GN R. 3245 (as amended) Item 23**: The	The proposed development will

Activity No(s):	Relevant activities as set out in Listing Notices 1, 2 and 3 of the EIA Regulations, 2014 as amended	Describe the portion of the proposed project to which the applicable listed activity relates.
(g)(ii)(ee)	expansion of— (ii) infrastructure or structures where the physical footprint is expanded by 10 square metres or more; where such expansion occurs— (a) within a watercourse; (c) if no development setback has been adopted, within 32 metres of a watercourse, measured from the edge of a watercourse; excluding the expansion of infrastructure or structures within existing ports or harbours that will not increase the development footprint of the port or harbour. **g. Northern Cape** ii. Outside urban areas: (ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans;	entail the development and expansion of roads and other infrastructure by 10m^2 or more within a watercourse or within 32m from the edge of a watercourse. The expansion of the infrastructure will occur within the Northern Cape Province, outside urban areas, within a CBA 1 and 2 area. Although the layout of the proposed development will be designed to avoid the identified surface water features as far as possible, some of the existing internal and access roads will need to traverse some of the identified surface water features.

7. NATIONAL WEB-BASED ENVIRONMENTAL SCREENING TOOL

The National Web based Environmental Screening Tool is a geographically based web-enabled application which allows a proponent intending to submit an application for environmental authorisation in terms of the Environmental Impact Assessment (EIA) Regulations 2014, as amended to screen their proposed site for any environmental sensitivity.

According to the DFFE Screening Tool Report (attached in **Appendix 8**), the following themes described in **Table 16** below are applicable to the proposed development:

Table 16: DFFE Screening Tool Environmental Sensitivity

Theme	DFFE Sensitivity	Specialist Verified Sensitivity	Comment
Agriculture Theme	Low	Low	The Agricultural Compliance Statement is included in **Appendix 6** of the Final EIA Report. The low agricultural sensitivity of the site, as identified by the screening tool, is confirmed. The motivation for confirming the sensitivity is predominantly that the climate data (very low rainfall

Theme	DFFE Sensitivity	Specialist Verified Sensitivity	Comment
			of approximately 175 mm per annum and high evaporation of approximately 1,560 mm per annum) proves the area to be arid and therefore of limited land capability. Moisture availability is completely insufficient for viable rain-fed crop production. In addition, the land type data shows a high proportion of shallow soils on underlying rock and hardpan carbonate. A low agricultural sensitivity is entirely appropriate for the site.
Animal Species Theme	High	Low for all animal taxa groups High for avifaunal	The Terrestrial Ecological Report is included **Appendix 6** of the Final EIA Report. Site verification was undertaken on 2 July 2022 by a SACNASP registered ecologist. The findings of the site verification confirmed Low Sensitivity for all another animal taxa groups, **except for avifaunal.** For the Avifaunal Theme, the relative animal species theme is indicated as high sensitivity, due to confirmed presence of two Red List species, *Neotis ludwigii* and *Calendulauda burra*.
Aquatic Biodiversity Theme	Very High	Very High	The Surface Water Report is included in **Appendix 6** of the Final EIA Report. The DFFE National Web-Based Environmental Screening Tool designated the majority of the investigation area as having a very high aquatic biodiversity sensitivity due to the presence of FEPA catchments, rivers, wetlands and estuaries. No wetlands and estuaries occur within the investigation area but the presence of FEPA catchments and rivers retain the

Theme	DFFE Sensitivity	Specialist Verified Sensitivity	Comment
			very high aquatic biodiversity sensitivity within the investigation area. However, the DWAF (1999) EIS tool for riparian watercourses determined an overall moderate EIS for the various freshwater HGM types, with the EDLs in the upland areas being more sensitive than the ephemeral rivers to alien invasive vegetation invasion. The proponent has however made suitable provision for the protection of no -go areas and areas of high and moderate sensitivity in accordance with the derived PES of these freshwater HGM types.
Archaeological and Cultural Heritage Theme	Low	Medium	The Heritage Report is included in **Appendix 6** of the Final EIA Report. The results of the assessment in terms of site sensitivity are summarised below: The cultural value of the broader area has some significance in terms of its sense of place and scenic qualities (Moderate). Some significant archaeological resources were identified within the broader area (Moderate). As per the findings of this assessment, and its supporting documentation, the outcome of the sensitivity verification disputes the results of the DFFE Screening Tool for Cultural Heritage and Archaeology.
Avian Theme	Low	High	The Avifaunal Report is included in **Appendix 6** of the Final EIA Report. The relative animal species theme is indicated as high

Theme	DFFE Sensitivity	Specialist Verified Sensitivity	Comment
			sensitivity, due to confirmed presence of two Red List species, *Neotis ludwigii* and *Calendulauda burra*.
Civil Aviation (Solar PV) Theme	Low	Low	The closest airport is the Upington Airport, located approximately 347 km from the site. As a result of the low sensitivity, no additional assessments are required.
Defence Theme	Low	Low	The entire site has a low sensitivity in terms of the defence theme. As a result of the low sensitivity, no additional assessments are required
Landscape (Solar) Theme	Very High	Medium	The Visual Assessment is included in **Appendix 6** of the Final EIA Report. The site sensitivity verification finds the site to be of moderate landscape sensitivity rather than very high as suggested by the Screening Tool.
Palaeontology Theme	Very High	Low	The Heritage Report is included in **Appendix 6** of the Final EIA Report. No highly significant palaeontological resources were identified within the development area and the sediments underlying the development area have zero palaeontological sensitivity (Low). As per the findings of this assessment, and its supporting documentation, the outcome of the sensitivity verification disputes the results of the DFFE Screening Tool for Palaeontology.
Plant Species Theme	Medium	High	The Terrestrial Ecological Report is included **Appendix 6** of the Final EIA Report. The plant species theme

Theme	DFFE Sensitivity	Specialist Verified Sensitivity	Comment
			confirmed the presence of sensitive species 144 on site, accordingly a full assessment must be done, and the theme is regarded as high sensitivity.
RFI Theme	Very high	Low	Correspondence from SARAO has been received. The SARAO office conducted a high-level impact assessment. Their internal findings determined that the project represents a low risk of interference to the nearest SKA radio telescope with a compliance surplus of 32.12 dBm/Hz. As such, SARAO do not object to the proposed Lesaka SEF development.
Terrestrial Biodiversity Theme	Very High	Very High	The Terrestrial Ecological Report is included **Appendix 6** of the Final EIA Report. Site verification was undertaken on 2 July 2022 by a SACNASP registered ecologist. The findings of the site verification confirmed the Very High environmental sensitivity of the Terrestrial Biodiversity theme.

8. DESCRIPTION OF THE PHYSICAL ENVIRONMENT

8.1 Geographical

The proposed SEF is located approximately 35 km North of Loeriesfontein in the Namakwa District, in the Northern Cape Province. The regional context of the proposed application site is shown in **Figure 6** below.

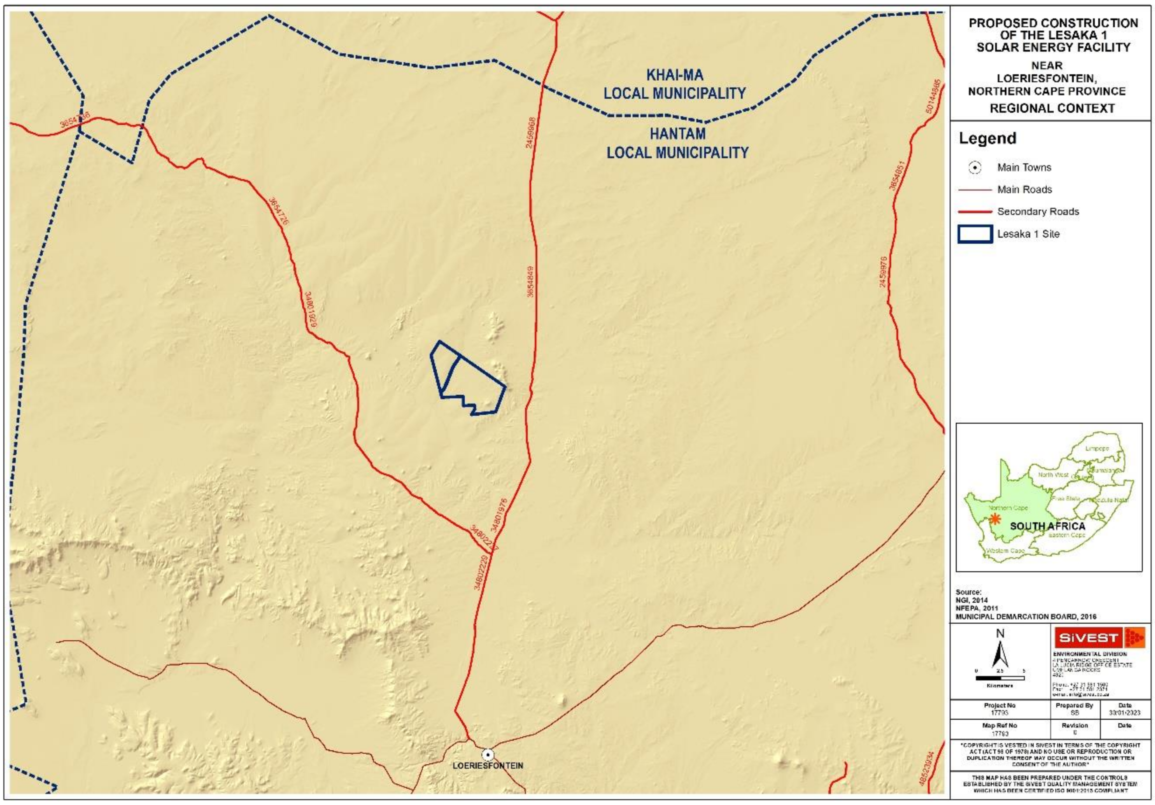


Figure 6: Regional context

8.2 Land Use

The area around the SEF property is predominantly characterised by grazing lands (natural vegetation), with supporting infrastructure (roads, powerlines and a railway line). A road (AP 2972) extends northwards from Loeriesfontein and to the east of the SEF property. The Sishen-Saldanha railway line is routed adjacent to the Klein-Rooiberg River bisecting the northern portion of the SEF property. Existing large-scale powerlines are also present around the SEF property and powerline corridor, increasing in concentration nearer the existing Helios MTS. There are approximately 12 renewable energy projects within ~35 km of the SEF property.

The visual character of the project area is provided by the topography, vegetation and land use of the area which is a rural environment characterised by the sparsely vegetated prominences and ridgelines separated by often, wide flat expanses interspersed with farmstead and some infrastructure. The project area can therefore be defined as a natural transition landscape as it is mostly rural with few isolated farmsteads and some powerlines, roads and railway line visible in the landscape. Refer **Figure 7** below for a broad land cover classification.

Pictures of the typical site area are included in **Figures 7-11** below and an image of the existing large-scale powerlines present in the area surrounding the SEF property is included in **Figure 12**.

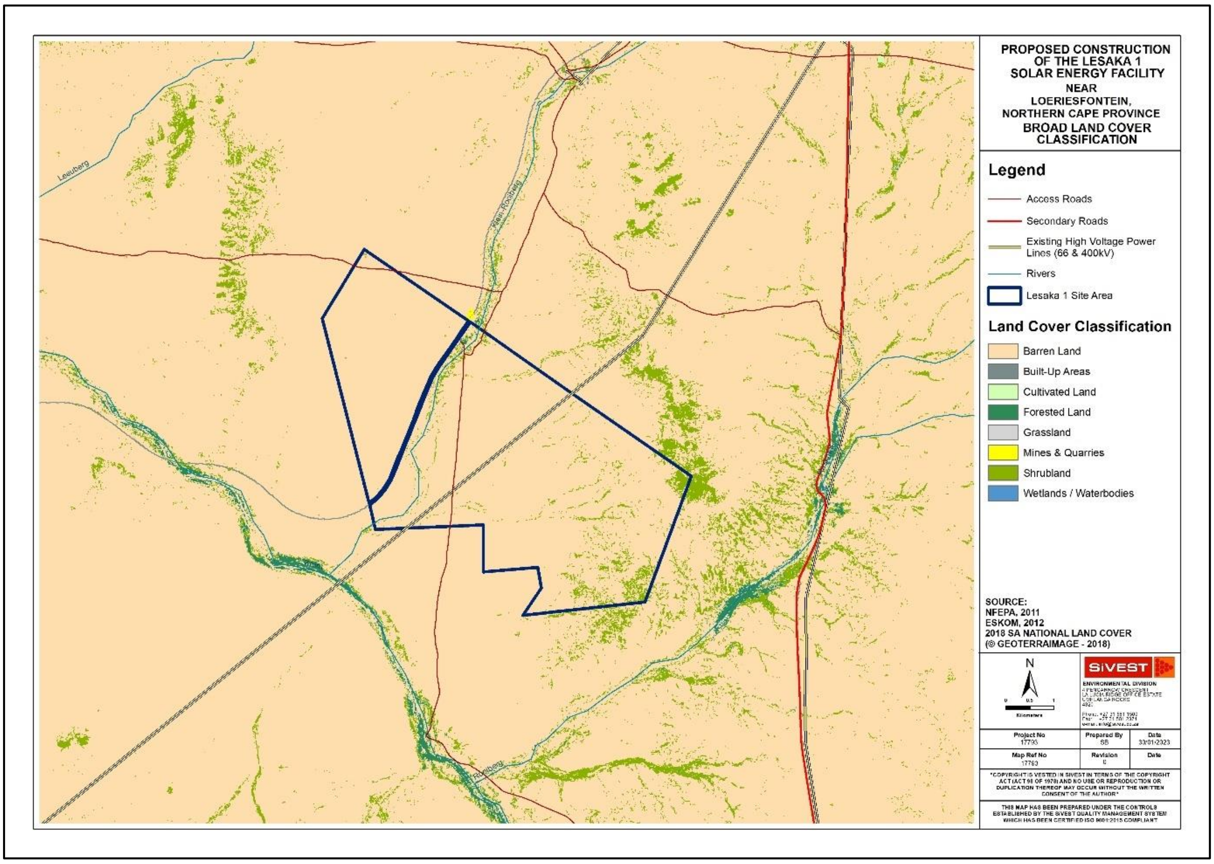


Figure 7: Land Cover Classification

Figure 8: Typical site area

Figure 9: Typical site area

Figure 10: Typical site area **Figure 11: Typical site area**

Figure 12: Existing network of powerlines converging at the Helios MTS

8.3 Climate

The area surrounding Loeriesfontein is considered to have a desert climate with little rainfall all year long. The area can be classified as hot desert climate (BWk) according to the Köppen-Geiger climate classification. The average annual rainfall is 224 mm with the average maximum and minimum temperatures of 22.8°C and 9.9°C, respectively.

8.4 Topography

The SEF is generally flat with slightly undulating ground topography due to the various rills and gullies formed from erosion. The north-eastern portion of the site has flat to convex plateaus and isolated ridge lines. Isolated koppies and higher lying plateaus exist on the site. These have formed due to the presence of weather resistance geological units such as dolerite capping seemingly less durable shale and mudrock. The presence of the geological units results in very steep slopes adjacent to isolated koppies. The very steep sections occur in the midslope and are angled at greater than 20° (>35%). Foot slopes and plateau area are shallower and exist between 10° (1:5; 20%) to 15° (1:4; 25%) . The majority of the site area is sloped between <2° (1:20; 4%) to occasionally 5° (1:10; 10%).

There is one large non-perennial streams passing through the site, namely the Klein Rooiberg River, flowing in a westerly to south westerly direction. The site drainage is expected to occur as sheetwash into the rills and gullies, becoming concentrated flow into the various small nonperennial streams before flowing into the two large streams. The drained water will then flow into the Krom River to the west of site. The elevation of the site is between 750 m to 800 m above mean sea level (AMSL).

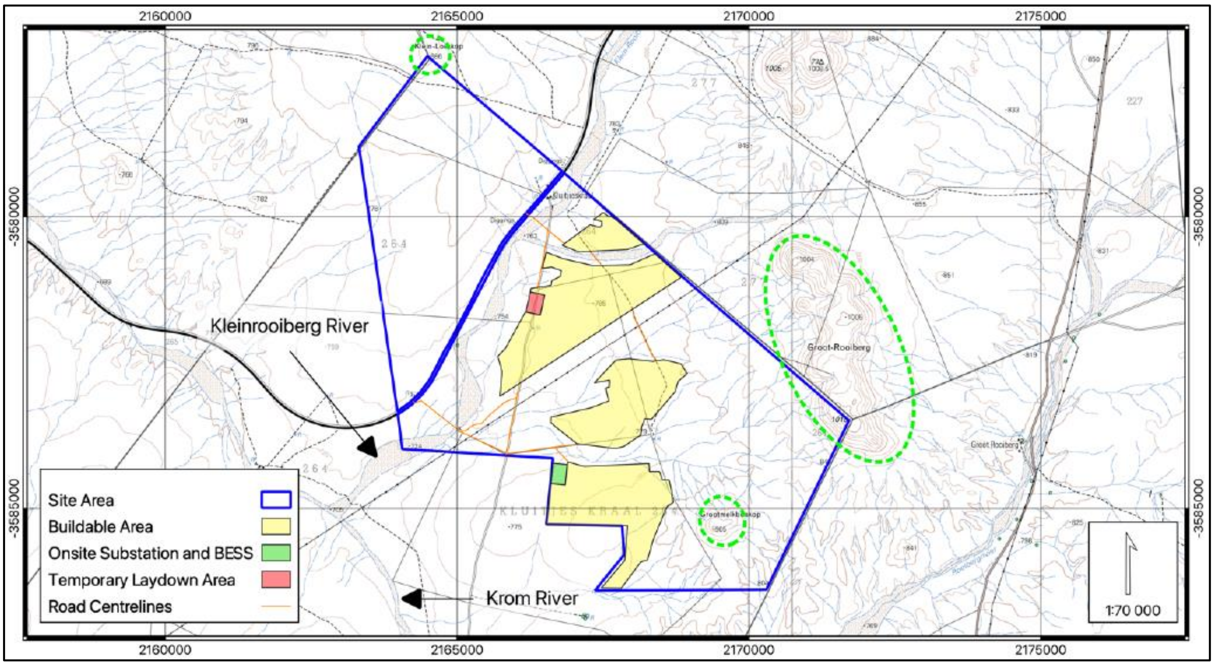


Figure 13: Topography

8.5 Desktop Geotechnical Assessment

A desktop geotechnical assessment was undertaken by Gage Consulting (report dated September 2023).

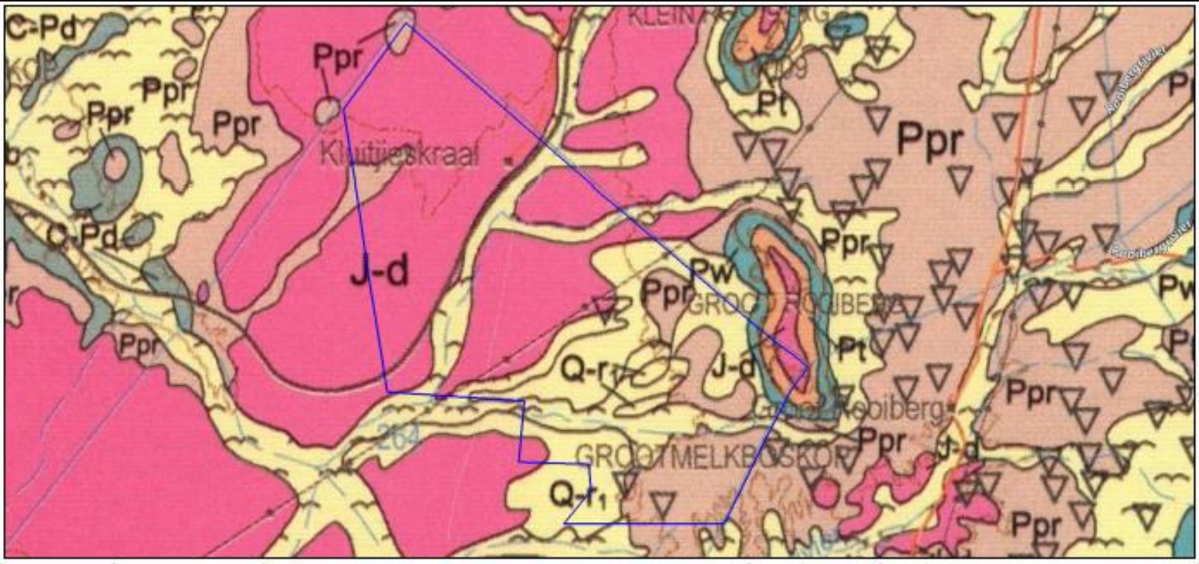
8.5.1 Description of Receiving Environment

The assessment area is underlain by rock units of Ecca Group of Karoo Supergroup and intrusive dolerite.

According to the 1:250 000 scale geological map 3018 Loeriesfontein (2011), the bedrock geology comprises horizontally orientated Formations of the upper Ecca Group. The eastern portion of the site is underlain by Prince Albert Formation (designated Ppr; shaded brown) that comprises dark grey to black carbonaceous shale and medium to fine- to medium-grained feldspathic arenite and wacke. The extreme eastern portion of the site comprises black to light grey weathering, dark grey carbonaceous, pyrite bearing, shale of the Whitehill Formation (designated Pw; shaded green). This exists beneath the well-laminated, dark, brown and grey shale of the Tierberg Formation (designated Pt; shaded orange). Intrusive dolerite in the form of a large sill intruded into the abovementioned sedimentary rock units during the Jurassic age (designated Jd; shaded red). The dolerite sill forms a weather resisting capping layer which results in a high-lying plateau at the eastern corner of the site. Most of the western section of the site is underlain by a large dolerite sill.

The bedrock, when not outcropping, is overlain by extensive deposits of Quaternary-aged sandy soil (designated Qr1) and alluvium material. The area shown to be underlain by dolerite is assumed to comprises dolerite gravels formed from physical weathering of the dolerite bedrock. The isolated koppies across the site has seemingly formed from the presence of breccia pipes associated with the intrusion of the dolerite.

The regional geology of the site is illustrated in **Figure 14** below.



Symbol	Age	Sedimentary and Volcanic Rocks			Intrusive Rocks	Geological Unit Type
		Supergroup	Group	Formation		
	Quaternary	N/A				Sandy Soil
Q-r_1						Alluvium
Jd	Jurassic	-	-	-	Dykes / Sills	Dolerite (Δ breccia pipes)
Pt	Permian	Karoo	Ecca	Tierberg	-	Brown to grey shale
Pw				Whitehill	-	Carbonaceous shale; cherty siltstone
Ppr				Prince Albert	-	Carbonaceous shale

Figure 14: The regional geology of the site

Based on the desktop study, the entire assessment area may be divided into four (4 No.) ZONEs: I, II, III, and IV. Intrusive investigation may reveal additional facets once variations in the subsoil profile become apparent.

The assessment area is considered suitable for the development of the proposed Lesaka 1 SEF, including the substation and BESS, from a geotechnical viewpoint, provided that standard engineering design and construction measures are implemented to mitigate the identified geotechnical constraints. The proposed substation and BESS area falls within FACET I which is expected to provide good founding conditions and minimal earthworks before construction, therefore reducing the potential environmental impact. The anticipated geotechnical constraints and mitigation measures are summarized in the table below.

Table 17: Summary of geotechnical conditions/constraints

ZONE	Shallow Geology	Geotechnical Conditions / Constraints	Impacts on Engineering Design and Construction
I	Shallow bedrock covered by thin transported and calcrete material	• Shallow bedrock • Thin soil cover • Intermediate to hard excavation conditions with depth • Overlain by alluvial soils of variable thickness in some areas (in gullies and rills)	• Generally good founding conditions for structures at shallow depths • Minor earth works required at founding level • Conventional shallow foundations suitable • Conventional subgrade preparation for roads • Variable excavation conditions • Intermediate to hard excavation conditions for pole planting / trenching / earthworks
II	Talus in steep slopes	• Mass earthworks on gradients greater than 1:10 • Potentially unstable talus slopes	• Terracing and slope stabilisation required
III	Outcropping bedrock	• Hard excavation conditions	• Heavy plant machinery / pneumatic methods / required for excavations (pole planting earthworks / trenching / foundations) • Good founding conditions for structures • Overbreak is anticipated during trenching
IV	Alluvium	• Loose sandy soils • Potentially collapsible soils • Moderate soil cover • Moderate bedrock depth • Increased erosion potential • Deep erosion gullies and rills	• Deeper spread footings (found below alluvial sands) • Soft excavation conditions becoming intermediate with depth • Unstable trench sidewalls – shoring/battering required • Erodible soils • Surface drainage measures required to minimise risk of flooding and erosion

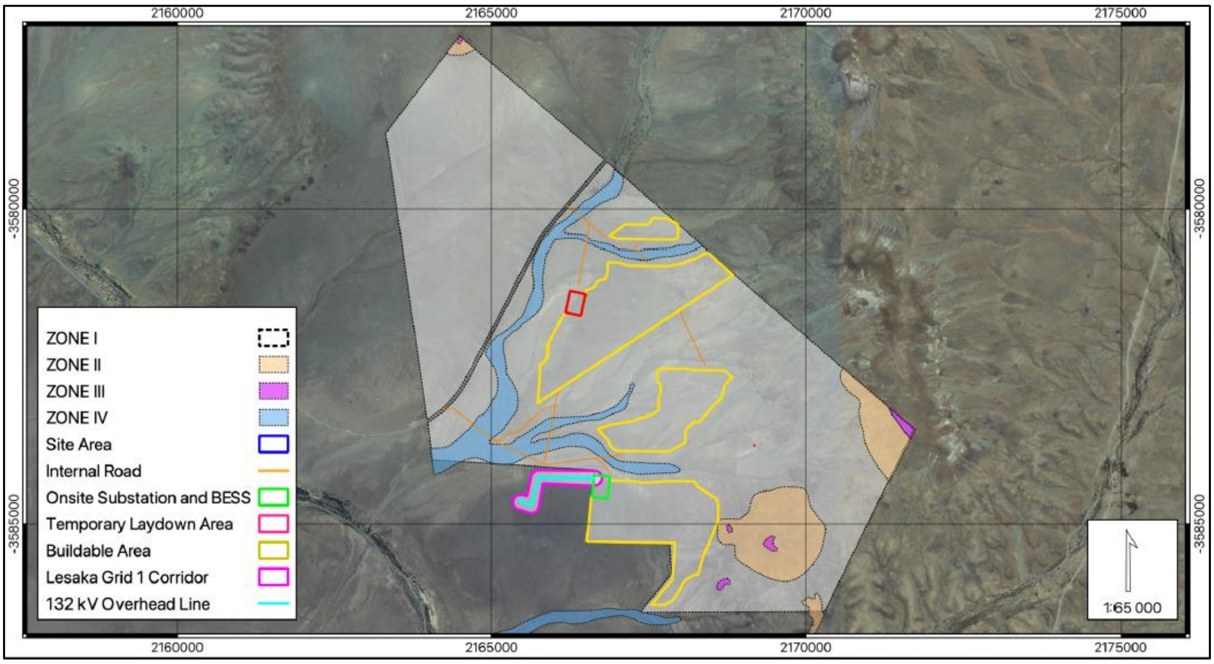


Figure 15: Geotechnical desktop zonation for Lesaka 1 SEF area

8.5.2 Impact on geological environment

The main impact of the proposed development from a geological perspective is the displacement and removal of soil and rock materials. These activities will predominantly take place during the construction phase. The degree of disturbance is largely dependent on the topography and location of the project site and the nature of the proposed infrastructure. Steep slopes are unfavourable as these require bulk earthworks to create working platforms and access roads. Earthworks on steep slopes increases the risk of soil movements or slope failure. Construction within drainage channels is also unfavourable due to the erosion potential of the loose, sandy soils.

The risk of soil erosion is also increased during construction activities, by the removal of vegetation and by possible disturbance to the natural surface drainage environment. These activities may prevent infiltration of rainwater, increase surface runoff and cause concentration of surface water flow. Erosion will increase the disturbance and displacement of soils and the impact may extend beyond the infrastructure footprint/s over time.

The project (including SEF, substation and powerlines) been assigned a “Negative Low impact” rating provided that the recommended mitigation measures are implemented.

The topography of the site is generally flat with localised areas of steep slopes. The flat areas will require minor earthworks depending on the final layout design. Access routes should be carefully planned to avoid the steep areas and drainage channels. The crest of the ridges is expected to be characterised by outcropping or very shallow bedrock. This will provide good founding for the PV modules.

The majority of soils (when not in large drainage channels) do not render the site particularly susceptible to soil erosion, though mitigation measures need to be implemented, particularly within the steeper sections of the site and lower lying sections of the site where concentrated surface flow is anticipated after heavy rainfall events. Appropriate engineering design of access roads, particularly drainage and erosion control measures, are critical to limit the impact of the development on the geological and geotechnical environment. Detailed geotechnical materials investigations should be undertaken to assess the suitability of the in-situ materials and the need for processing (e.g. crushing, stabilisation).

8.5.3 Conclusions

No fatal flaws or ‘no-go’ areas have been identified that would render any assessment areas unsuitable from a geological and geotechnical perspective. The proposed substation and BESS area falls within FACET I which is expected to provide good founding conditions and minimal earthworks before construction, therefore reducing the potential environmental impact.

The proposed developments are assessed to have a “Negative Low impact - the anticipated impact will have negligible negative effects” provided that the recommended mitigation measures are implemented. The remaining mitigation measures provided minimise the impacts related to the appropriate engineering design of earthworks and site drainage, erosion control, and topsoil and spoil material management. These do not exceed civil engineering and construction best practices.

From a geotechnical and geological perspective, no fatal flaws or sensitivities have been identified within or close to the Lesaka 1 SEF assessment area and in the proposed substation, BESS and powerline areas. It is therefore recommended that the proposed activity be authorised.

8.6 Aquatic/Freshwater Assessment

A Freshwater Ecological Assessment was undertaken by Fen Consulting (report dated August 2023).

8.6.1 Description of Receiving Environment

FEPA – The study area is mostly located (> 60%) in a sub-quaternary catchment classified as a Freshwater Ecosystem Priority Area. The remainder of the study area is designated as an area on no freshwater ecosystem priority importance. River FEPAs achieves biodiversity targets for river ecosystems and threatened fish species and were identified in rivers that are currently in a good condition (A or B ecological category). Their FEPA status indicates that they should remain in a good condition in order to contribute to national biodiversity goals and support sustainable use of water resources.

NFEPA Wetlands: No wetlands were identified by the 2011 NFEPA database within the investigation area.

Wetland Vegetation Type: The study area falls within the Trans-Escaprment Succulent Karoo (Skt) Wetland Vegetation type which is considered to be least threatened as per Mbona et al. (2015).

NFEPA Rivers - According to the NFEPA database (2011), the Klein Rooiberg, Rooiberg and Krom Rivers drain through the study area. The Klein Rooiberg River and the Rooiberg River drain in a south westerly direction and confluence with the Krom River, are considered to be in a Largely Natural ecological condition (PES Class = B) and Largely Natural to Natural Ecological condition (PES Class = A/B) according to the PES 1999 and NFEPA 2011 databases respectively. The Krom River drains in a north westerly direction and is considered to be in a Largely Natural ecological condition (PES Class = B) according to the PES 1999 and NFEPA 2011 databases.

South African Inventory of Inland Aquatic Ecosystems: According to the National Biodiversity Assessment River spatial layer, the Klein Rooiberg, Rooiberg and Krom Rivers drain through the study area. These rivers are considered to be in a largely natural (PES Class – B) ecological condition. According to the Ecosystem Threat Status (ETS 2018) the Klein Rooiberg and Rooiberg Rivers are considered to be least threatened and the Krom River is considered to be endangered. According to the Ecosystem Protection Level (EPL 2018), these rivers are considered as not protected. These rivers are also displayed in the National Biodiversity Assessment wetland spatial layer.

8.6.2 Field Verification and Delineation

The desktop and field-based delineations did not identify any wetlands but revealed that the study area accommodates a network of episodic drainage lines which confluence into larger episodic tributaries that drain into the episodic rivers of the Klein Rooiberg, Rooiberg and Krom Rivers. The north westerly draining Krom River receives the south westerly flowing Klein Rooiberg and Rooiberg Rivers and is the largest freshwater HGM type within the study area (**Figure 16**). This network of episodic drainage lines were differentiated into the following freshwater HGM categories:

- Preferential Flow Path (PFP)
- Episodic Drainage Lines without Riparian Vegetation
- Episodic Drainage Lines with Riparian Vegetation
- Episodic Rivers with Riparian Vegetation

Only the episodic drainage lines and rivers with riparian vegetation can, from an ecological perspective, be classified as watercourses (freshwater ecosystems) due to the expression of a riparian response by vegetation and the presence of alluvial soil. Preferential flow paths (PFPs) are unlikely to have catchments which are large enough to generate a flood response and are not considered freshwater ecosystems from an ecological perspective. Episodic drainage lines without riparian vegetation may, on a system specific basis be considered freshwater ecosystems should they be subject to a 1:100- year floodline, as determined by a suitably qualified professional. Nevertheless, PFPs and drainage lines, not defined as watercourses still function as waterways, through the episodic conveyance of water through the landscape. These systems are still considered important for the hydrological functioning of the larger episodic tributaries and rivers and must ideally be protected to manage the pattern, flow and timing of water in the landscape, implying that runoff from the project area must be carefully managed.

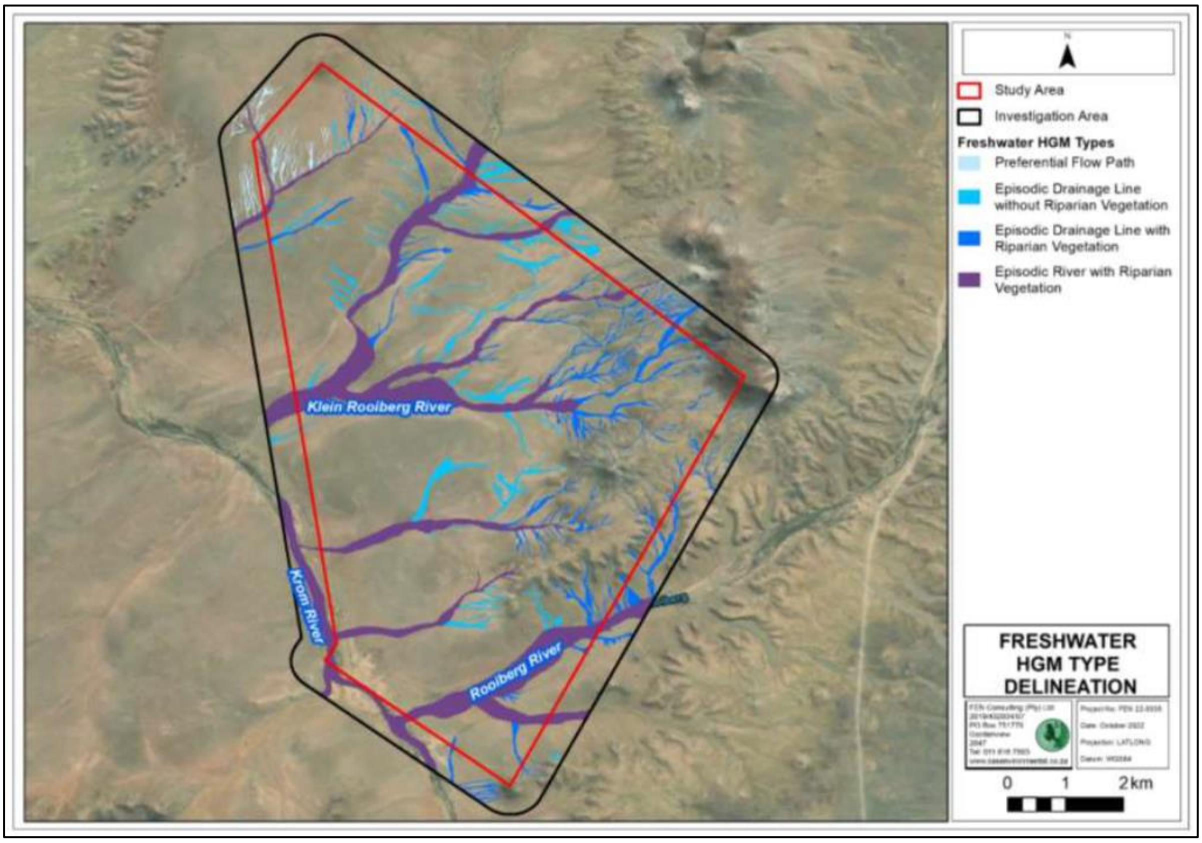


Figure 16: Overall delineated extent of the freshwater HGM types associated with the proposed SEF relative to the study and investigation area

8.6.3 Freshwater Ecosystem Classification

The ecological assessment results of the freshwater HGM types are tabulated below:

Table 18: Species and habitat sensitivity rating definitions

Freshwater HGM Type	Present Ecological State (PES)		Ecoservices (supply importance)	Ecological Importance and Sensitivity (EIS)
Episodic drainage lines without riparian vegetation	Considered to be in a largely natural condition (PEC Class B) based on field observations of the ecological drivers (hydrology, geomorphology, biota and water quality.)		o Sediment trapping o Erosion control o Biodiversity maintenance	Moderate
Episodic drainage lines with riparian vegetation	**Instream IHI** B/C (Largely natural to moderately modified)	**Riparian IHI** D (Largely Modified)	o Sediment trapping o Erosion control o Biodiversity maintenance	Moderate
Episodic rivers with riparian vegetation	**Instream IHI** C (Moderately modified)	**Riparian IHI** E (Seriously Modified)	o Sediment trapping o Erosion control o Harvestable resources	Moderate

8.6.4 Sensitivity Mapping

The episodic rivers with riparian vegetation and their main tributaries, including their smaller contributing
episodic drainage lines with riparian vegetation were assigned the following Zones of Regulation (ZoR),
and development setbacks, as determined using Macfarlane et. al. (2015):

- A 32 m (ZoR) in accordance with the National Environmental Management Act, 1998 (Act No. 107 1998) as amended (NEMA);
- In the absence of defined 1 in 100-year flood lines, a 100 m ZoR in accordance with Government Notice 509 as published in the Government Gazette 40229 of 2016 as it relates to the NWA;
- A 15 m setback (no go area) using the Macfarlane et al. (2014) buffer tool for the episodic drainage lines with riparian vegetation, with appropriate mitigation for all non-linear infrastructure, except the solar arrays (see bullet 5);
- A 25 m setback (no go area) using the Macfarlane et al. (2014) buffer tool for the episodic rivers and their larger tributaries with riparian vegetation, which are considered more sensitive for all non-linear infrastructure, including the solar arrays;
- For the solar arrays near episodic drainage lines, a 25 m setback to be allowed to ensure sufficient space for erosion and sediment control and dissipation near these episodic features, as these areas are subjected to greater amounts of runoff compared to non-developed areas during high rainfall events; and
- All linear infrastructure should avoid drainage lines as far as possible and cross them at acute, rather than obtuse angles to minimise the extent of disturbance within these systems.

The development setbacks are illustrated in **Figures 17 – 21** below.

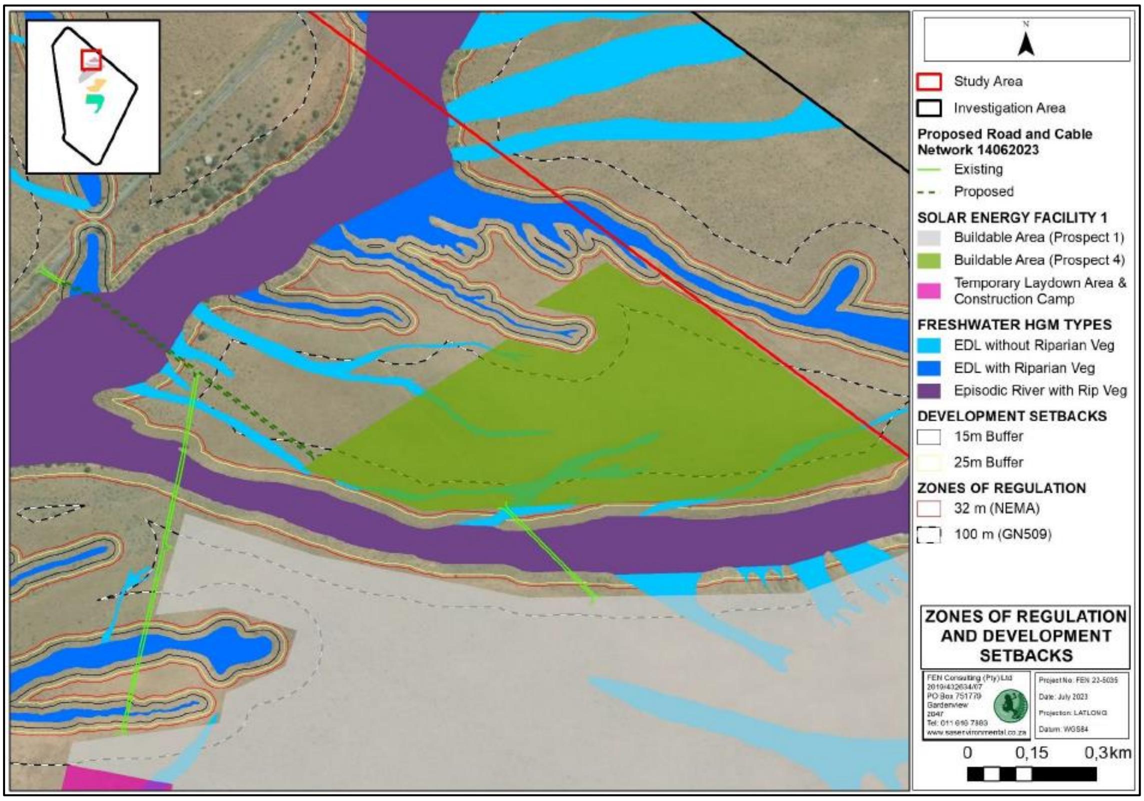


Figure 17: Zones of regulation and development setbacks in the northern portion of the study area.

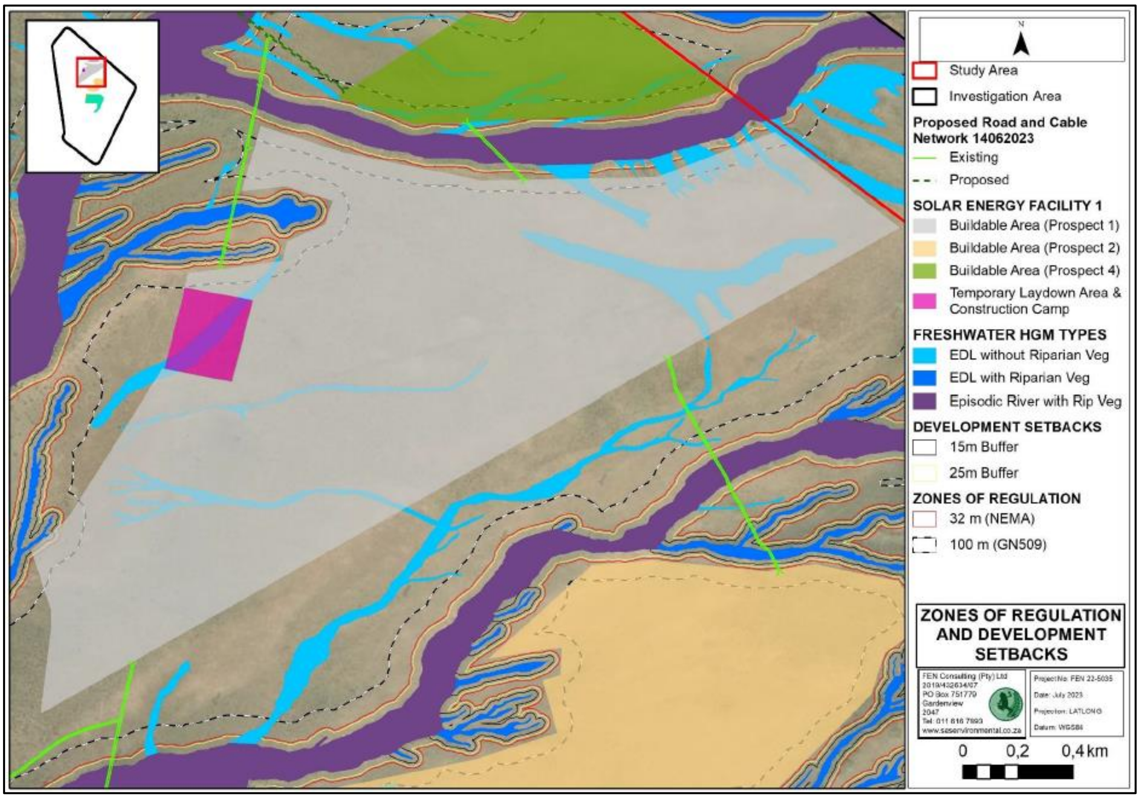


Figure 18: Zones of regulation and development setbacks in the northern portion of the study area.

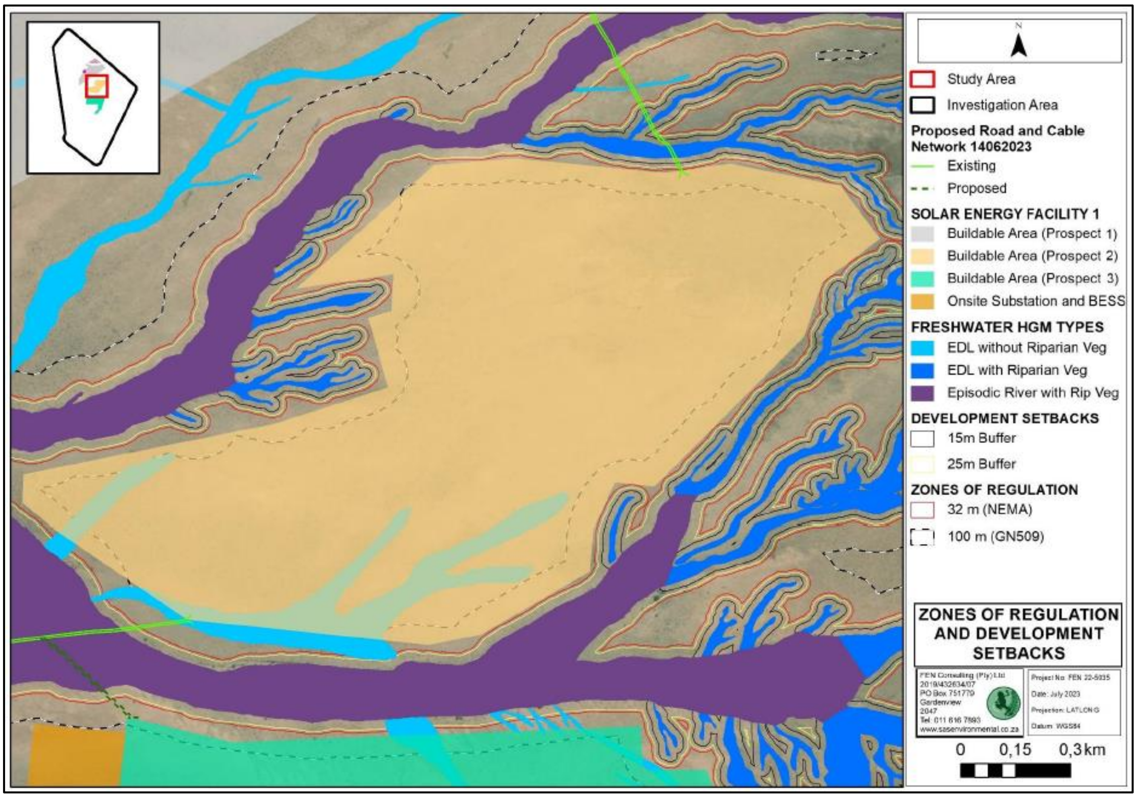


Figure 19 : Zones of regulation and development setbacks in the middle central portion of the study area

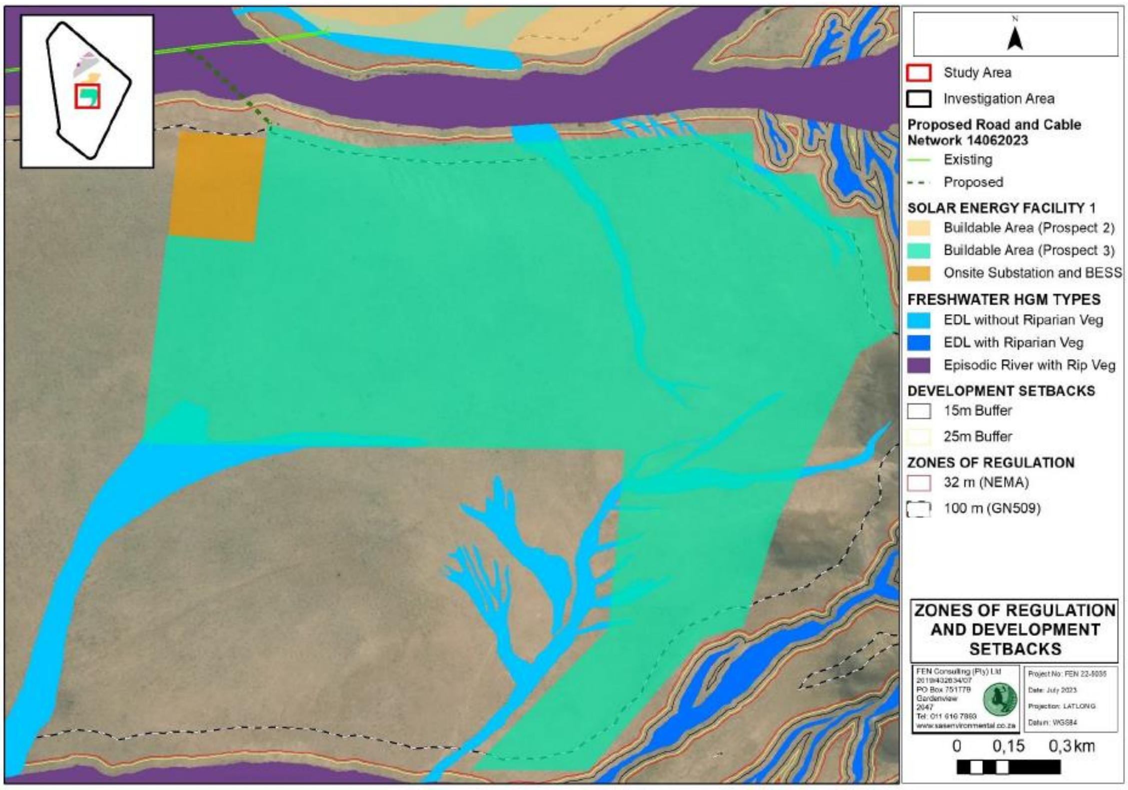


Figure 20 : Zones of regulation and development setbacks in the southern portion of the study area

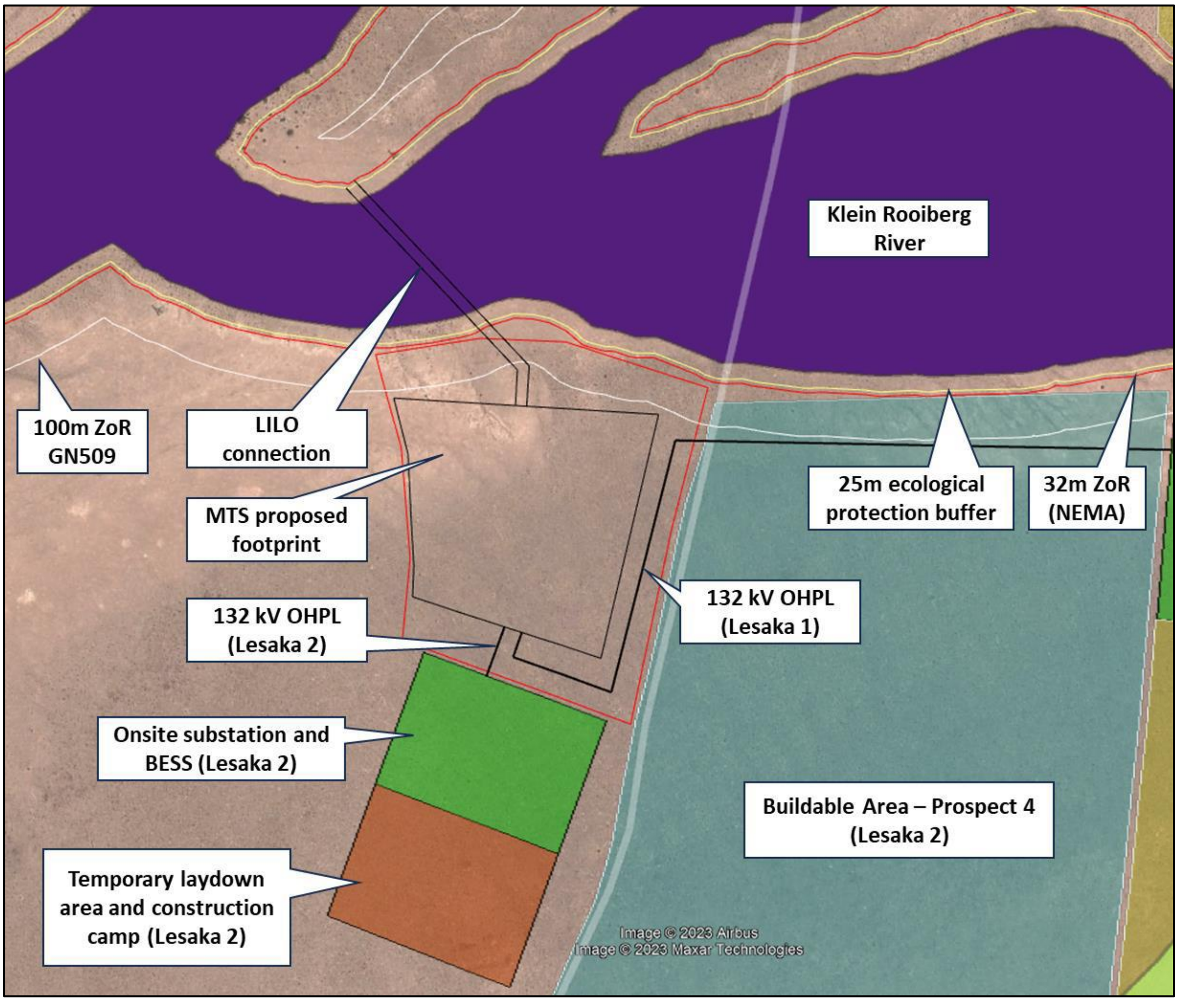


Figure 21: Location of proposed grid infrastructure (subject to separate application) with respect to other SEF infrastructure, freshwater ecosystems, Zones of Regulation and development setbacks.

The area in which the MTS footprint is proposed does not comprise of any freshwater ecosystems and the MTS footprint, together with the Lesaka 1 OHPL are outside of the 100 m zone of regulation as defined in GN509 of 2016. The proposed LILO connection between the onsite substation and the existing 400 kV OHPL that feeds to the Helios MTS would be required to span the Klein Rooiberg River for an approximate distance of 250 m. The proposed support towers would however be placed outside of the 25 m development setback (ecological protection buffer) of this river, and provided that the mitigation measures, are followed, no significant cumulative impacts to the environment due to the above proposed grid infrastructure are envisaged.

Areas of sensitivity were developed following the on-site delineation of the freshwater HGM types, and after determining their applicable regulated areas and development setback areas. Based on these delineations and the assignment of ZoRs and development setbacks, the following was concluded:

- **No-go Area**: includes the extent of the delineated boundaries of the episodic rivers and drainage lines with riparian vegetation, and development setback buffers (as determined by the buffer tool) of 15 m for the episodic drainage lines with riparian vegetation (for all non-linear infrastructure) and 25 m for episodic rivers with riparian vegetation (for all infrastructure). Roads and associated river crossings should only be planned within these areas if it is absolutely. unavoidable to circumnavigate these freshwater ecosystems.

- **High Sensitivity Area**: the 32 m regulated area of a freshwater ecosystem as stipulated by NEMA applicable to the freshwater ecosystems. No surface infrastructure components (solar PV arrays, substation, BESS and construction camp) should be placed in these areas.
- **Moderate Sensitivity Area**: includes the 100 m GN 509 regulated area of the freshwater ecosystems. Development within these areas could take place but should be avoided, if possible, to avoid triggering Section 21 (c) and (i) water uses as it relates to the NWA; and
- **Low Sensitivity Area**: all other areas remaining in the study area, comprising terrestrial areas, PFPs and episodic drainage lines without riparian vegetation that are not subjected to a 1:100. year floodline. These areas are considered the least sensitive from a freshwater ecosystem. conservation and water resource management point of view.

Only the proposed access roads pose direct impacts to freshwater ecosystems, but the layout was proposed in a manner to, as far as possible, avoid and minimise crossings. All other infrastructure falls outside of the 32 m NEMA ZoR.

8.6.5 Impacts of SEF on Surface Water features

The location (footprint) of the components of the solar power plant would have an important bearing on whether surface water features on the development site would be impacted or not. Under a worst-case scenario, the footprint of the SEF could intercept one or more of the surface water drainage features on the site (the expected footprint of the solar array modules is approximately 582 ha). Under this scenario entire freshwater ecosystems, or certain reaches of freshwater ecosystems could be transformed, with resultant loss of riparian habitat. This could exert a localised, but important cumulative impact on surface water features on the site, and hydrological and ecological functionality (ecosystem goods and services) associated with the affected freshwater ecosystem would be lost or severely impaired.

The potential for this type of impact occurring is believed to be low and can be fully mitigated through appropriate cogent layout planning. Most importantly, large parts of the development site have been identified to have no surface water drainage, thus the SEF components could be easily developed on parts of the site in which no surface water features (freshwater ecosystems) are present, thus resulting in far less risk form a freshwater ecological perspective.

8.6.6 Impacts related to access roads

Access roads could potentially also exert an impact on surface water features, as they would have a physical footprint within the surface water feature crossed. The primary potential impacts related to access roads is the physical disturbance of substrate and vegetation, and the creation of a physical barrier across a drainage feature that could potentially affect the hydrological and ecological functionality of the surface water feature. Roads can have the potential to have significant impact on surface water features, as depending on the design of the road crossing, the surface water feature may be physically affected, as the footprint of the road will affect the hydrology and habitat of the surface water feature to varying degrees.

The degree of impact depends to a large degree on the type of the road crossing. It is not considered feasible to avoid the crossing of freshwater ecosystems, but it must be noted that the proposal of new access roads was done in a manner to, as far as possible, avoid and minimise crossings, with existing access roads being commissioned for this development as far as possible.

8.6.7 Conclusion

The NEMA Impact Assessment was applied to the proposed SEF layout in the determination to apply for EA, which was informed by the footprints of the freshwater HGM types, their ZoR and determined development setback buffers as per Macfarlane et al. (2014), ultimately for the classification of environmental sensitivities against which the Impact Assessment can be rated.

The Impact Assessment identified that the Negative High and Medium Impacts in the construction, operation and decommissioning phases after mitigation can be lowered to a Negative Low Impact, on condition of strict adherence to general and project-specific suggested mitigation measures.

Only the proposed access roads pose direct impacts to freshwater ecosystems, but the layout was proposed in a manner to, as far as possible, avoid and minimise crossings. All other infrastructure falls outside of the 32 m NEMA ZoR.

Assuming that strict enforcement of cogent, well-developed mitigation measures takes place (and the implementation of general construction management and good housekeeping practices, the significance of impacts arising from the proposed SEF development can be adequately managed and the project considered for EA.

8.7 Hydrological Impact Assessment

A Hydrological assessment was undertaken by Highlands Hydrology (Pty) Ltd (report dated August 2023).

8.7.1 Baseline Information

Baseline information including monthly rainfall, monthly evaporation, design event rainfall, soils, vegetation and land cover, as well as site topography and regional and local catchment hydrology were considered for the proposed Lesaka 1 PV Facility located near Loeriesfontein in the Northern Cape Province of South Africa. This baseline confirmed that potential evaporation greatly exceeds rainfall (2673mm versus 199mm respectively). Ground elevations on the site approximate 780mAMSL. Site slopes are mild, with slopes typically below 10%. The site lies within quaternary catchment E31C. The site is drained via a network of non-perennial water courses, expected to flow for short durations following significant rainfall events into the Klein-Rooiberg River, which ultimately contribute to the Berg-Olifants Water Management Area in South Africa. Refer to **Figure 22** below for an illustration of the hydrological setting of the site.

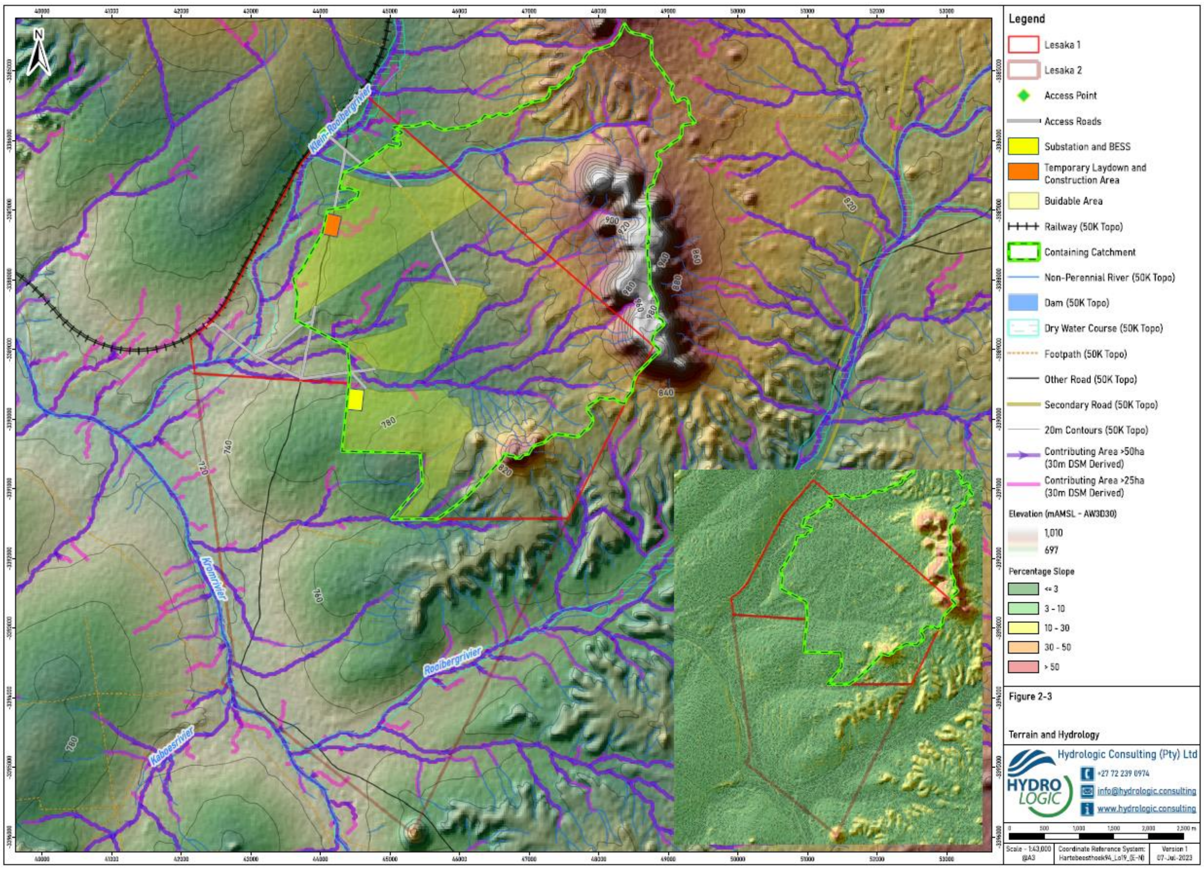


Figure 22: Terrain and Hydrology

8.7.2 Stormwater Management

The proposed solar project will alter the natural environmental state, thereby affecting the generation of storm water and the associated potential for erosion. Volumes of storm water generated over disturbed areas are generally expected to increase because of the reduction in natural vegetation or the addition of areas of hardstanding. The quality of the storm water generated is also expected to be affected by the removal of vegetation and excavation of soils (i.e. potential erosion will increase). The movement of vehicles over the site will also introduce possible hydrocarbons, however, this section does not deal with possible chemical pollutants (focusing instead on potentially increased sediment loads with regards to water quality).

In considering the site, some hardstanding areas are proposed in the form of the substation/BESS, temporary laydown area/construction camp and solar panel pylons (specifically their foundations). The solar panels themselves do not qualify as hardstanding since they do not limit infiltration beneath them. Some compaction of soils on site is expected, particularly with regards to areas of travel, such as the internal access roads and laydown area. Site access roads are also proposed although these are expected to be gravel and while compaction may occur, they will not be fully impervious.

The development of the solar farm will likely be associated with a limited change to the natural land-cover when the full site is considered, assuming disturbed land-cover (i.e. soils and vegetation) is rehabilitated. The implication of this rehabilitation (of the areas between panel foundations), is that most of the site can retain a naturalised hydrological response where both the quantity and quality of storm water is similar to the natural baseline environment. This does not consider solar panel washing or other maintenance that may introduce pollutants such as hydrocarbons.

Soils on and surrounding the site are expected to have moderately low to moderately high runoff potential. Combined with the flat terrain and low rainfall of the region, runoff is only expected to occur during storms. The dominant occurrence of sparse vegetation in a desert climate means that areas of poor vegetation coverage are possible (i.e. bare areas). These areas would increase the potential for runoff due to the absence of vegetation that may otherwise slow down runoff (and promote infiltration).

The conceptual stormwater management plan is reflected in **Figure 23** below. Storm water management infrastructure has been conceptually designed using the 1:50 year, 24-hour RI event except for sediment control areas that have utilised the 1:10 year RI event.

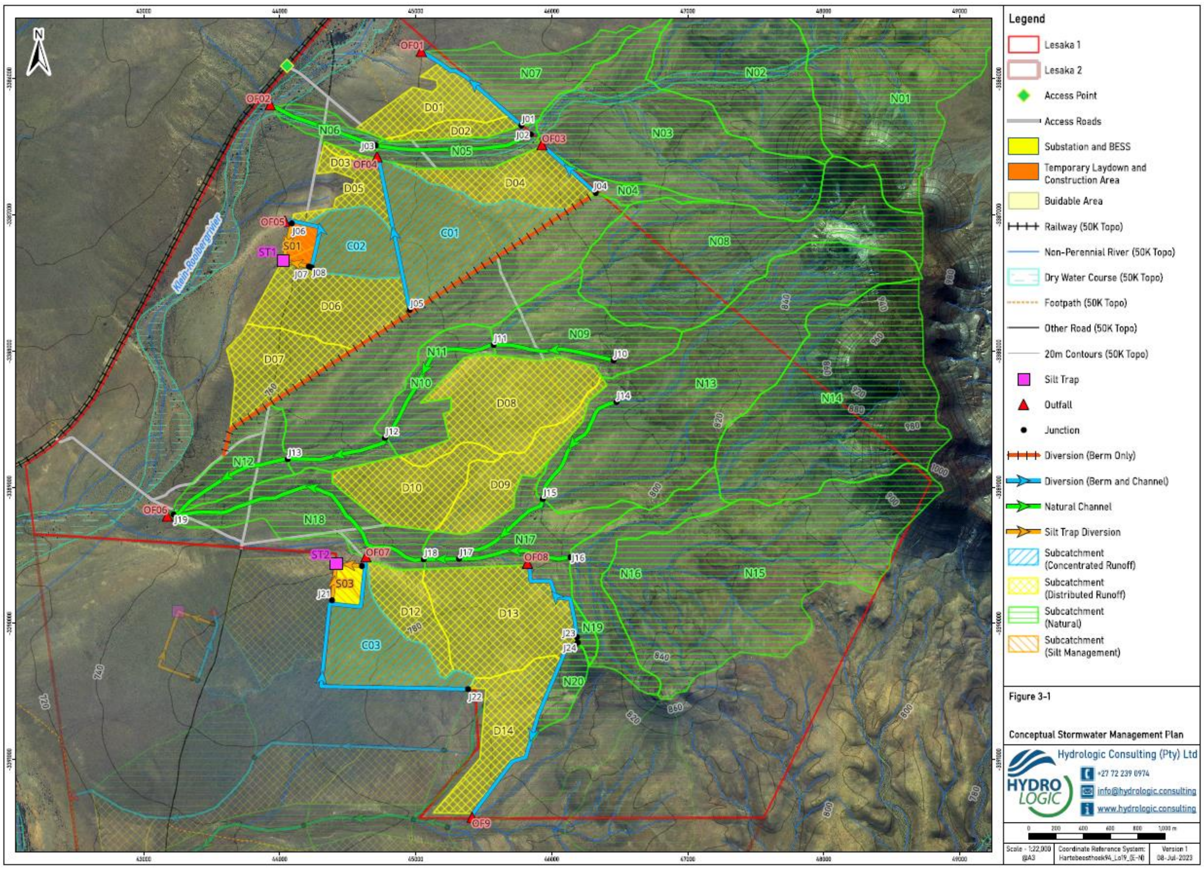


Figure 23: Conceptual Stormwater Management Plan

Erosion control has partly been considered with regards to storm water management and the routing of the runoff along trapezoidal channels (runoff that may otherwise be prone to the exacerbation or development of erosion if left unmanaged). Retention or rehabilitation of the natural land-cover and drainage of the site (post construction or decommissioning) will also serve to limit potential increases in erosion.

Management of erosion potential through regular inspection and maintenance is also of greater importance given the possible absence of gravel strips beneath panels (such that rainfall erosivity may be a problem).

It is recommended that the site is regularly inspected, with areas prone to erosion identified. Silt fences may be suitable for the control of erosion from areas disturbed or affected during construction, operation or decommissioning.

8.7.3 Conclusion

A hydrological impact assessment was undertaken to determine the significance of each identified potential impact according to impact probability, frequency, extent, duration and intensity. Potential impacts considered in this assessment for the construction and operational phases were changes in catchment water resources, changes in catchment water quality, and changes in flood hydrology. The assessment further considered appropriate mitigation techniques which should be adopted in order to reduce impact significance. Potential significance for the considered impacts ranged from medium in the pre-mitigation scenarios to low in the post mitigation scenarios. It is recommended that a surface water monitoring plan be developed for the proposed development. This should be developed prior to development to ensure any impacts on receiving water resources resulting from both the construction and subsequent operation of the proposed development are addressed. These monitoring points should be located both upstream and downstream of the proposed development site to ensure any impacts can be identified with appropriate responsive mitigation measures implemented.

No fatal flaws were identified during the hydrological investigations for the proposed Lesaka 1 Solar Energy Facility based on supplied information specific to the project (inclusive of solar panel arrangements and grid infrastructure). As such, it is the opinion of the authors that the proposed development can be authorised on condition that the recommendations and proposed mitigation measures be implemented in order to ensure any impact on receiving water resources can be limited as far as possible.

8.8 Terrestrial Ecological Assessment

A Terrestrial Biodiversity Study was undertaken by Enviro-Insight (report dated August 2023).

8.8.1 Vegetation type

The entire study area is located in the Hantam Karoo vegetation type (part of the Succulent Karoo Biome) as described by Mucina and Rutherford (2006, as amended). The distribution is mainly within the Northern Cape Province and to a smaller extent also Western Cape. It forms the greater part of the Onder-Bokkeveld and Hantam region between Nieuwoudtville and Calvinia.

The Biome comprises of dwarf Karoo shrubland with nearly equal proportions of succulents (Aloe, Antimima, Euphorbia, Ruschia) and low karroid shrubs, particularly of the daisy family Asteraceae (Eriocephalus, Pentzia, Pteronia). The area has rich displays of spring annuals and geophytes. Hantam Karoo is an arid area with a mean annual rainfall of 190 mm (compared with 350 mm around Nieuwoudtville), with a clear peak from June to July and hardly any rain in December and January, characters typical of a winter-rainfall regime. The mean annual temperature is around 16-17ºC and frost incidence is high.

The Hantam Karoo vegetation type is listed as Least threatened with a target of 18%. Only a small patch is statutorily conserved in Akkerendam Nature Reserve near Calvinia. Transformation rate is low and invasions of alien plants have not been identified as a problem yet. Erosion is moderate (73%) and high (18%).

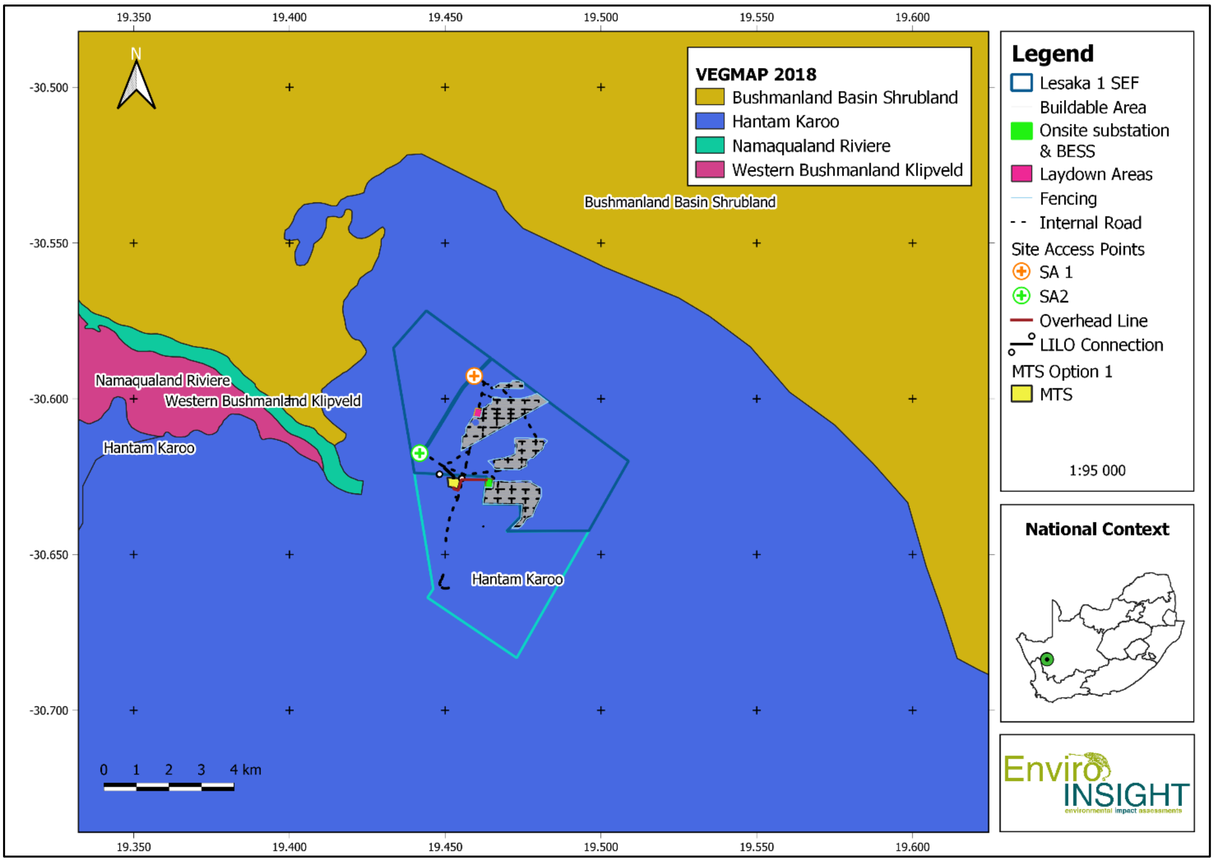


Figure 24: Regional Vegetation types in relation to the site

8.8.2 Northern Cape Critical Biodiversity Area

According to the Northern Cape CBA Map (2016), the study area is mainly located in CBA2, with sections of CBA1, ESA and "Other Natural Areas" (**Figure 25**). CBA2 are mainly due to the FEPA catchment, FEPA rivers and 500m buffer and the vegetation type. The CBA1 are the NFEPA Rivers, Klein-Rooiberg and Rooiberg, both considered largely natural. The ESA towards the western section is the Krom River and associated wetlands, while the smaller scattered ESAs towards the eastern boundary are koppies which are large high value climate resilience areas.

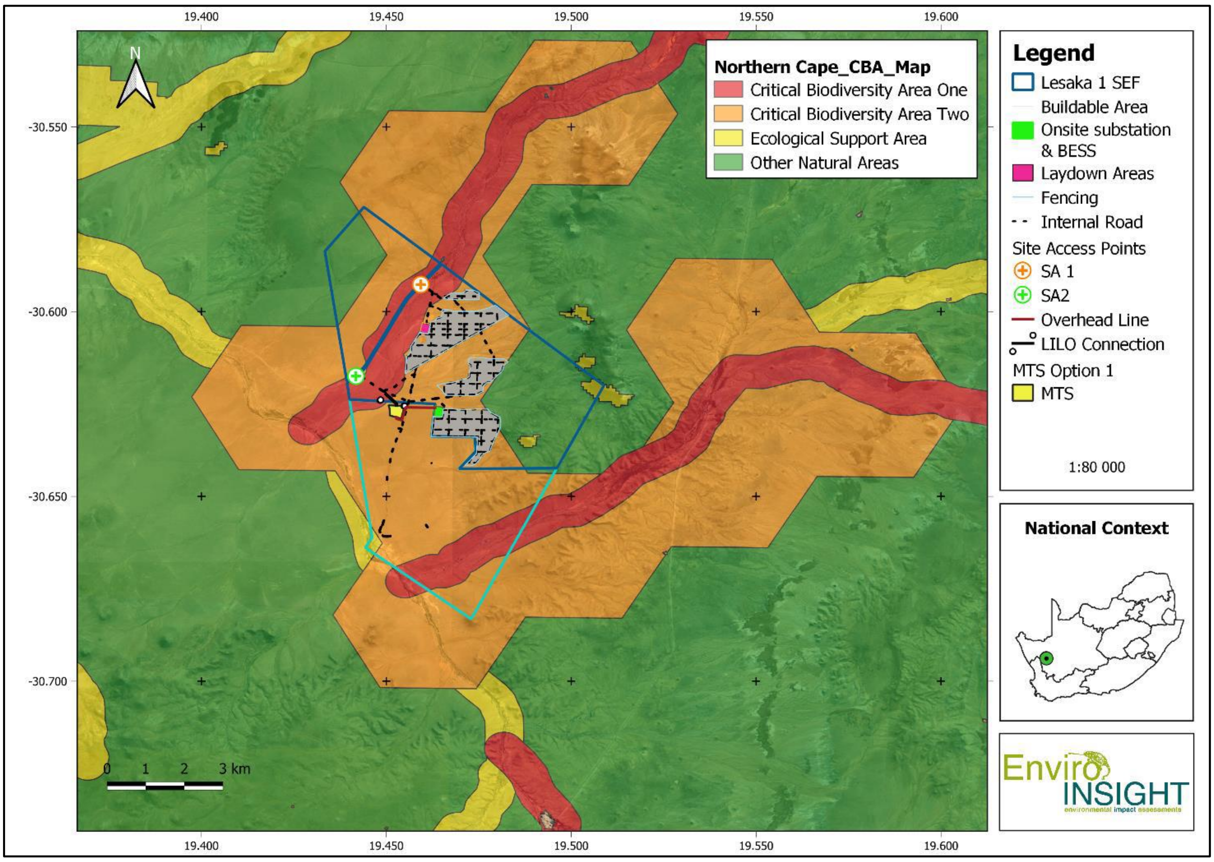


Figure 25: Study area in relation to Northern Cape CBA

8.8.3 Field Verification and Specialist Findings

Plant diversity is generally moderate with diversity increasing on hilly plains and the ridges. Four main habitats were identified based on species composition and structure for the Lesaka Cluster, but for the development footprint only one habitat is impacted on directly, namely the Hantam karoo shrubland (**Figure 26**). The main driver of vegetation pattern in the area is substrate.

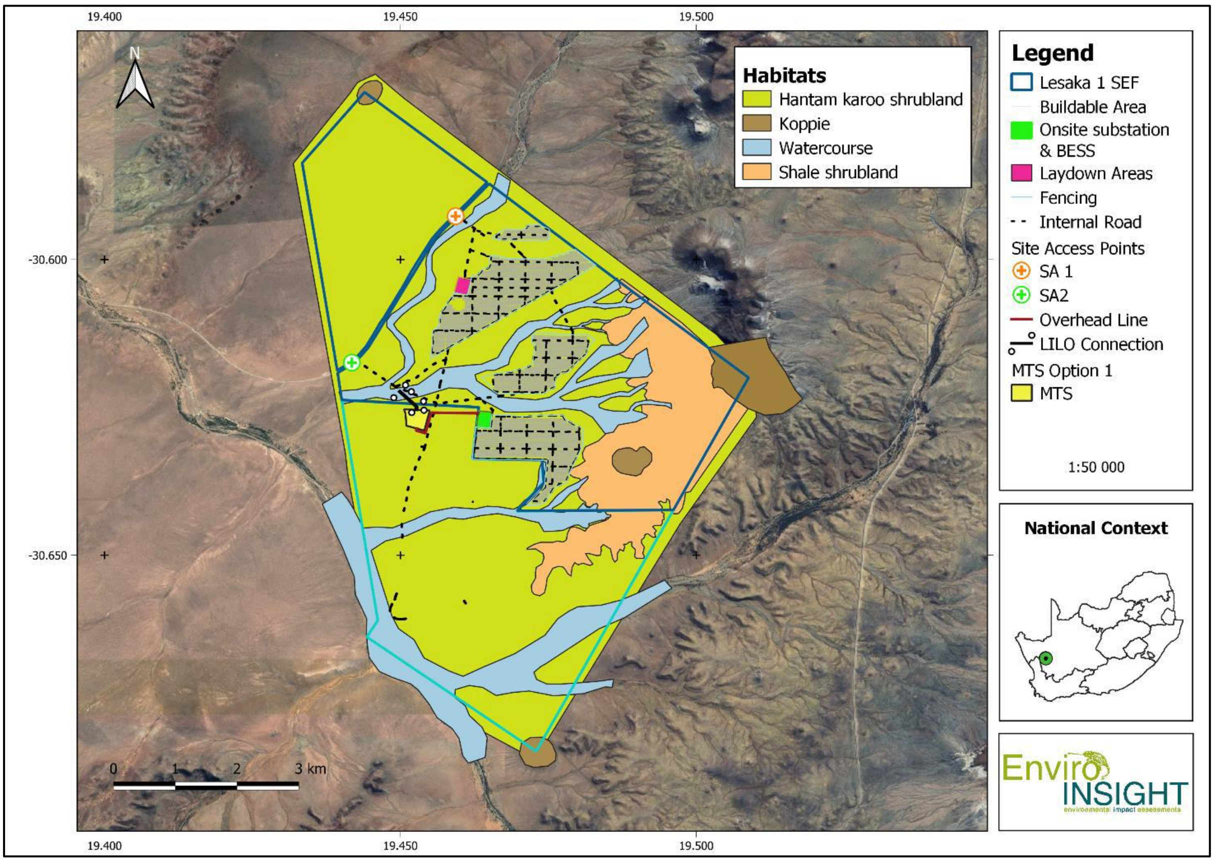


Figure 26: Habitat identified for the study area

A description of the habitats is provided below:

Karoo Shrubland - This represents the Hantam Karoo vegetation type. There are rich displays of geophytes and spring annuals, with dominant dwarf shrubs and microphyllous karroid shrubs. The following species were recorded:

- Shrubs: *Lycium cinereum, Salsola aphylla, Pentzia incana, Pteronia incana, Aptosimum spinescens, Felicia macrorrhiza, Monsonia salmoniflora, Blepharis sp., Galenia fruticose, Eriocephalus sp., Zygophyllum microphyllum*
- Succulent shrubs*: Drosanthemum sp., Ruschia cf. grisea, Augea capensis, Euphorbia sp., Mesembryanthemum brevicarpum*
- Grasses: *Ehrharta calycina*, *Stipagrostis obtusa, S. ciliata, Tribolium tenellum, Aristida sp.*
- Geophytic herbs: *Albuca secunda*, *Lachenalia sp., Daubenya sp., Oxalis sp., Lachenalia cf. aurioliae, Lachenalia xerophila, Ledebouria apertiflora, Haemanthus sp., Oxalis foveolata*
- Succulent herbs: *Aloe sp., Hoodia gordonii, Gonialoe variegata,*
- Herbs: *Amellus tridactylus, Gazania lichtensteinii, Senecio arenarius, Lotononis sp., Hermannia cf. multiflora, Psilocaulon junceum*

One individual of sensitive species 144 was recorded in this habitat. It should be protected in situ with a buffer of 200m (**Figure 28**).

Figure 27: Vegetation and landscape features of the Karoo shrubland

Figure 28: Sensitive species 144

Shale Shrubland - This was distinguished from the Karoo shrubland habitat mainly due to geological features and species composition. Although there might be some overlap, some of the species recorded only occur within this habitat. Species recorded include:

- Shrubs: *Felicia macrorrhiza, Salsola aphylla, Pentzia incana, Pteronia incana, Eriocephalus sp.*
- Succulent Shrubs: *Drosanthemum sp., Ruschia cf. grisea, Ruschia spinosa, Euphorbia cf. mauritanica., Euphorbia rhombifolia, Gonialoe variegata, Mesembryanthemum tetragonum*
- Succulent Herbs: *Aloe sp., Hoodia gordonii, Lampranthus otzenianus*, *Anacampseros namaquensis,*
- Herbs*: Hyobanche glabrata, Gazania lichtensteinii, Albuca longipes, Helichrysum herniarioides, Tritonia karooica*
- Geophytic herbs: *Albuca leucantha, Albuca longipes, Albuca spiralis, Bulbine sp., Gethyllis linearis, Oxalis purpurea., Lachenalia cf. aurioliae, Tritonia karooica, Moraea sp.*
- Woody climbers: *Microloma sagittatum, Asparagus fasciculatus*

Figure 29: Vegetation and landscape features of the Shale shrubland habitat

Ridge / Koppies - Several small koppies and Klein Rooiberg is located on the study area.

- Shrubs: *Asparagus capensis*, *Eriocephalus sp.*
- Geophytic herbs: *Oxalis pes-caprae, Oxalis sp., Lachenalia cf. aurioliae, Moraea cf. miniata.*
- Succulent herbs: *Aloe sp., Hoodia gordonii, Mesembryanthemum tetragonum, Lampranthus otzenianus, Phyllobolus sp.*
- Herb*: Amellus tridactylus, Sutherlandia frutescens, Psilocaulon junceum*

Figure 30: Vegetation and landscape features of the Ridge / Koppies habitat

Watercourses - There are three main watercourses on site, two flowing into one on the south-western boundary. Species composition is limited but the ecosystem services of water supply to the landscape remains vital. Species recorded include *Stipagrostis namaquensis, Senecio niveus, Nenax namaquensis, Salvia disermas, Foveolina dichotoma, Trichodesma africanum, Prosopis sp., Sutherlandia frutescens.*

Figure 31: Vegetation and landscape features of Watercourse habitat

8.8.4 Plant Species Theme Results

National sensitive species

As per the screening report, three sensitive species are likely to occur in the study area.

Table 19: Expected and observed list of sensitive plant species for the Lesaka SEF

Species	National Status	Provincially Protected	Endemic to (1) South Africa or (2) Northern Cape	Observed or likely to occur within the study area
Sensitive species 144	**Vulnerable A3ce**	**Yes**	**No**	**One individual observed within the study area, two individuals observed on neighbouring properties to the east.**
Sensitive species 951	Vulnerable D2	Yes	1 and 2	Moderate probability – was recorded approximately 30km from the study area
Dregeochloa calviniensis Conert	Rare	Yes	1 and 2	Moderate probability – was recorded approximately 52km SE of the study area
***Hoodia gordonii* (Masson) Sweet ex Decne.**	**Data Deficient - Insufficient Information**	**Yes**	**No**	**Observed within the study area and on neighbouring properties.**
Wahlenbergia divergens A.DC.	Data Deficient - Taxonomically Problematic		1 and 2	Moderate – currently there is not enough information available for this species. Based on historical records, this species was recorded approximately 12km south of the study area.

Only one individual of Sensitive species 144 was recorded within the area of influence (**Figure 28**). The species need be protected in situ as per the Provincial gazette No 968 of 1 April 2005 in terms of the Nature and Environmental Conservation Ordinance, 1974 (Ordinance No. 19 of 1974) which prohibits the harvesting of this species.

While other sensitive species are found within the area and on neighbouring sites, the only other species found on site was *Hoodia gordonii* (Masson) Sweet ex Decne. Within the study area, the species is more abundant on the koppies / ridge. Where the proposed development requires the removal or destruction of the species, the necessary permit from the Provincial Department for its relocation is required.

Figure 32: *Hoodia gordonii* recorded in the area of influence

<u>Provincially protected species</u>

In addition to the above species, there are several provincially protected species under the Northern Cape Nature Conservation Act, 2009 (Act No. 9 of 2009) that occur on the study area which require permits for their removal from the Provincial Department. Prior to construction activities, all individuals of these species that will be directly impacted on by the proposed development, needs to be enumerated and marked with a GPS. A permit application for their relocation needs to be submitted to the Northern Cape Department Agriculture, Environmental Affairs, Rural Development and Land Reform and the necessary species needs to be removed or relocated prior to the commencement of construction activities.

Provincially protected species include:

Schedule 1 species:

- Hoodia gordonii
- Sensitive species 144
- Sutherlandia spp.
- Pelargonium spp.

Schedule 2 species:

- All species within the *Aizoaceae* family, which includes *Ruschia sp*, *Mesembryanthemum sp, Drosanthemum spp*.,
- All species within the Anacampserotaceae family, including *Anacampseros* spp., *Avonia* spp.
- All species within the Oxalidaceae family, including *Oxalis* spp.
- All species within the Apocynaceae family, including *Microloma sagittatum*

- All species within the Asphodelaceae family, including all *Aloe* spp. (except those listed in Schedule 1), *Gonialoe variegata*.

8.8.5 Sensitivity Mapping

A sensitivity map was generated for the study area, where low sensitivity is considered ideal for development and highly sensitive areas must be avoided (no-go areas). The watercourse and koppies habitats are considered highly sensitive and must be excluded from the layout. For Lesaka 1 SEF, these sensitive features have been avoided from the layout. Sensitive species 144 requires a 200m buffer area around it, where no development should take place as the species should ideally be protected *in situ*. The PV arrays can be designed around this individual.

The sensitivity map is included in **Figure 33** below. All infrastructure except for linear activities have been excluded from both high and moderate sensitivity areas.

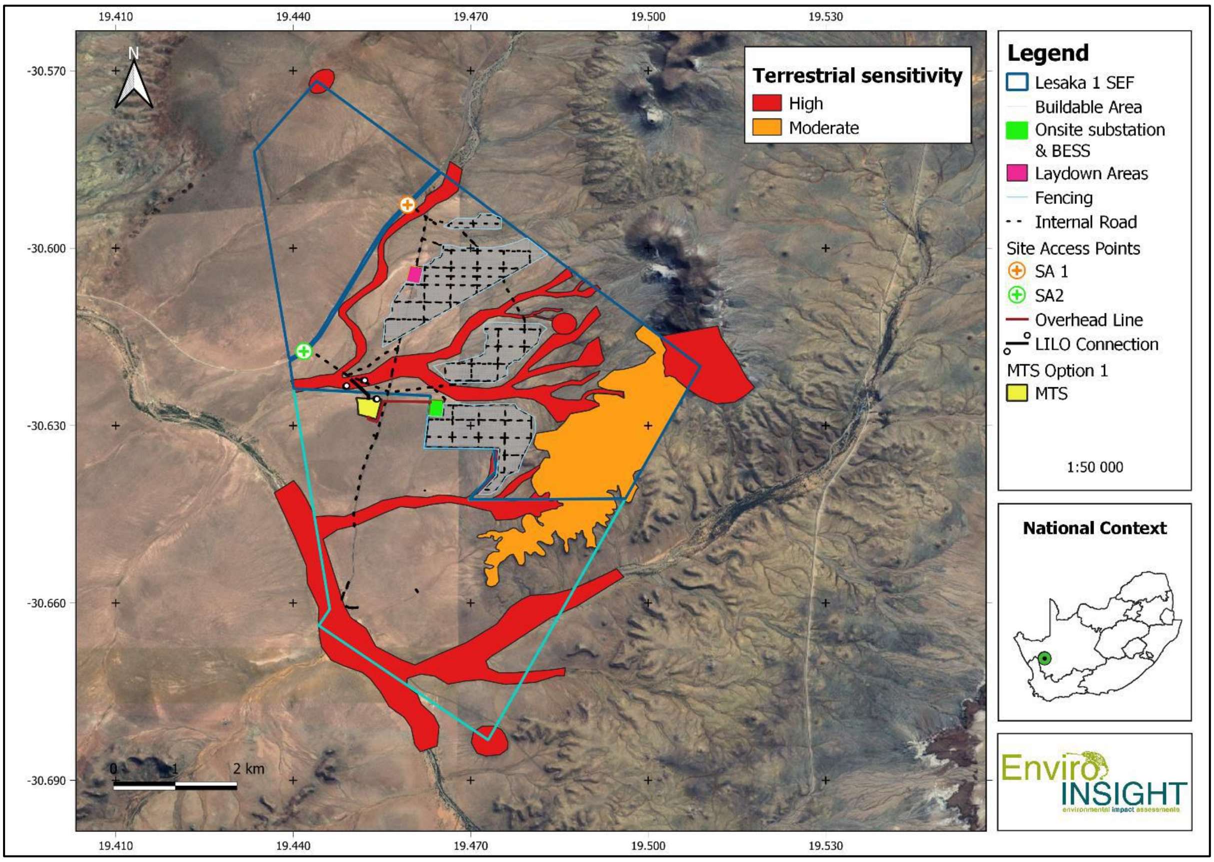


Figure 33: Habitat sensitivity of the study area

8.8.6 Impact Assessment

<u>Construction Phase</u>

Habitat loss and fragmentation - The proposed Lesaka SEF is not located in a threatened ecosystem. It is located in the Hantam Karoo vegetation type which has a status of least concern but is within the endemic Succulent Karoo biome which is a biodiversity hotspot. There is a CBA1 located on the property which should be excluded from development, where possible. This will not be possible for all linear activities (roads and grid connections), but the PV arrays placement, laydown areas and other permanent structures must avoid these areas.

Loss of Species of conservation concern - Apart from the direct loss of vegetation within the development footprint, plant SCC could be impacted on. The nationally protected sensitive species 144 was recorded on site, as well as several provincially protected species. The development must avoid sensitive species 144 and where infrastructure will impact on provincially protected species the necessary permits for their removal or relocation is required from the relevant provincial department prior to the commencement of construction activities.

Alien and invasive plant species - The disturbance associated with the construction phase of the project could see an increase of alien invasive plant species at disturbed areas. Some alien plant invasion is inevitable and regular alien plant clearing activities would be required to limit the extent of this problem. Once the natural vegetation has returned to the disturbed areas through rehabilitation efforts post-construction, the site will be less susceptible to alien plant invasion. *Prosopis sp*. is the only dominant alien invasive plant in the study area which is located mainly in watercourses (a few individuals may occur in the larger study area). The removal of these individuals will have a positive outcome by improving the indigenous biodiversity as there will be less competition and more favourable habitat for indigenous fauna.

Increased risk of erosion and flash floods - Disturbance created during construction would leave the site vulnerable to wind and water erosion. Soil disturbance associated with the development such as earth works, laying foundations, and expansion of roads, will render the impacted areas vulnerable to soil erosion, especially when crossing watercourses. Appropriate measures to limit erosion will need to be implemented. This impact is mainly limited to the construction phase and could persist into the operational phase.

Disturbance or displacement impacts on fauna - The construction of the proposed Lesaka SEF and associated infrastructure will result in an increase in noise and dust within the proposed site and surrounds. Roads are known to alter the physical characteristics of the environment and it is possible that numerous species within the proposed site will be affected by the increase in noise and dust to some extent.

<u>Operational Phase</u>

Direct faunal impacts due to operational activities - The most negative and significant impacts will likely be the displacement and/or disturbance of fauna communities. Fences around the proposed SEFs, if not fauna-friendly, may limit fauna movement and dispersal. Importantly, mitigation measures should be put in place to assure that ecological flow and genetic exchange is not interrupted or fragmented by the infrastructure.

Alien and invasive plant species - The clearance of vegetation associated with the proposed solar developments and associated infrastructure will create suitable conditions which are likely to be colonised by pioneer plant species. While this is partly a natural revegetation/regeneration process, which would ultimately lead to the re-establishment of secondary vegetation cover, it also favours the establishment of alien species. Care should be taken to limit the spread of alien invasive species.

8.8.7 Conclusions and Recommendations

The study area is located within the Hantam Karoo vegetation type, listed as Least Threatened, and intersects a CBA1, CBA2 and ESA according to the Northern Cape CBA Map. The CBA1 are the NFEPA Rivers, Klein-Rooiberg and Rooiberg, both considered largely natural which must be excluded from development. CBA2 are mainly due to the FEPA catchment, FEPA rivers and associated 500m buffer and the vegetation type being located within the Succulent Karoo biome. The ESA towards the western section is the Krom River and associated wetlands, while the smaller scattered ESAs towards the eastern boundary are koppies which are large high value climate resilience areas. Linear infrastructure such as roads and internal powerlines can cross the watercourses, but care should be taken in the planning of this.

The majority of the SEF consist of Karoo shrubland with grassland patches on flat plains and gently sloping hills that are not considered sensitive. The watercourses and pans are considered sensitive and should be avoided during the construction period for placement of infrastructure, laydown areas and associated infrastructure. Roads and cables will cross watercourses, and the impacts can be mitigated by reducing it to acceptable levels since avoidance is not possible. The Koppie towards the north-east must be avoided from all development activities.

Large sections of the affected area are not considered highly sensitive and there are no specific features of the affected area which would indicate that it is of broad-scale significance for faunal movement or landscape connectivity. One individual of a sensitive species was recorded on site which should be protected in situ as it can be avoided by the proposed development. A 200m buffer has been placed around its location. For other provincially listed species which are affected by the proposed development, a permit application for their removal must be applied for with the provincial authority prior to the commencement of construction activities.

The following EA recommendations must be included:

- Rehabilitation and monitoring plan required post-construction and post-operational phase of the project which addresses ecosystem functioning, fire management, alien invasive species management and effective methods of rehabilitating natural vegetation to functional systems (not just biomass replacement).
- Roads and underground cabling must avoid sensitive areas as far as possible by considering various layout alternatives. The karoo shrubland habitat will not be transformed completely (only PV related – this is not the case for roads and temporary laydown areas), accordingly with appropriate mitigation and rehabilitation measures post-construction and post-operational, the impact of the PV panels is considered medium for karoo shrubland.
- It is advised that an ecological specialist is appointed during the construction, operational and decommissioning phases to monitor impacts and related mitigation measures regarding natural and sensitive habitats and the faunal and floral assemblages occurring there.
- Care should be taken not to unnecessarily clear or destroy natural vegetation.
- Development and planned activities should therefore be planned in such a way that totally transformed areas are chosen for major developments and natural veld and especially any highly sensitive areas are avoided as far as possible.
- Sensitive species 144 must be protected in situ and a 200m buffer is applicable where no construction activities may take place.
- Provincially listed species which are affected by the proposed development requires a permit application for their removal from the provincial authority prior to the commencement of construction activities.

8.9 Agricultural

An agricultural compliance statement and site sensitivity verification was undertaken by Johann Lanz (report dated September 2023).

The site has low agricultural potential and no dryland cropping potential predominantly because of aridity constraints but also because of soil constraints. As a result of the constraints, agricultural production is limited to low density grazing. The land across the site is verified in this assessment as being of low agricultural sensitivity.

Two potential mechanisms of negative agricultural impact were identified, occupation of agricultural land and soil degradation. Two potential mechanisms of positive agricultural impact were identified as increased financial security for farming operations and improved security against stock theft and other crime.

All mechanisms are likely to lead to low impact on the agricultural production potential and the agricultural impact is therefore assessed as having low significance. The impact of the power line is assessed as negligible.

The associated grid connection will result in negligible loss of future agricultural production potential and its agricultural impact is therefore assessed as being of very low significance and acceptable. The entire project, including the gird connection, is therefore acceptable.

The conclusion of this assessment is that the agricultural impact of the proposed development is acceptable because:

- The development will occupy land that is of very limited land capability, which is insufficient for crop production. There is not a scarcity of such agricultural land in South Africa and its conservation for agricultural production is not therefore a priority.
- The amount of agricultural land use by the development is within the allowable development limits prescribed by the agricultural protocol. These limits reflect the national need to conserve valuable agricultural land and therefore to steer, particularly renewable energy developments, onto land with low agricultural production potential.
- The PV panels will not necessarily totally exclude agricultural production. The area may still be used to graze sheep that will, in addition, be protected against stock theft within the security area of the facility.
- All renewable energy development in South Africa decreases the need for coal power and thereby contributes to reducing the large agricultural impact that open cast coal mining has on highly productive agricultural land throughout the coal mining areas of the country.

From an agricultural impact point of view, it is recommended that the development be approved.

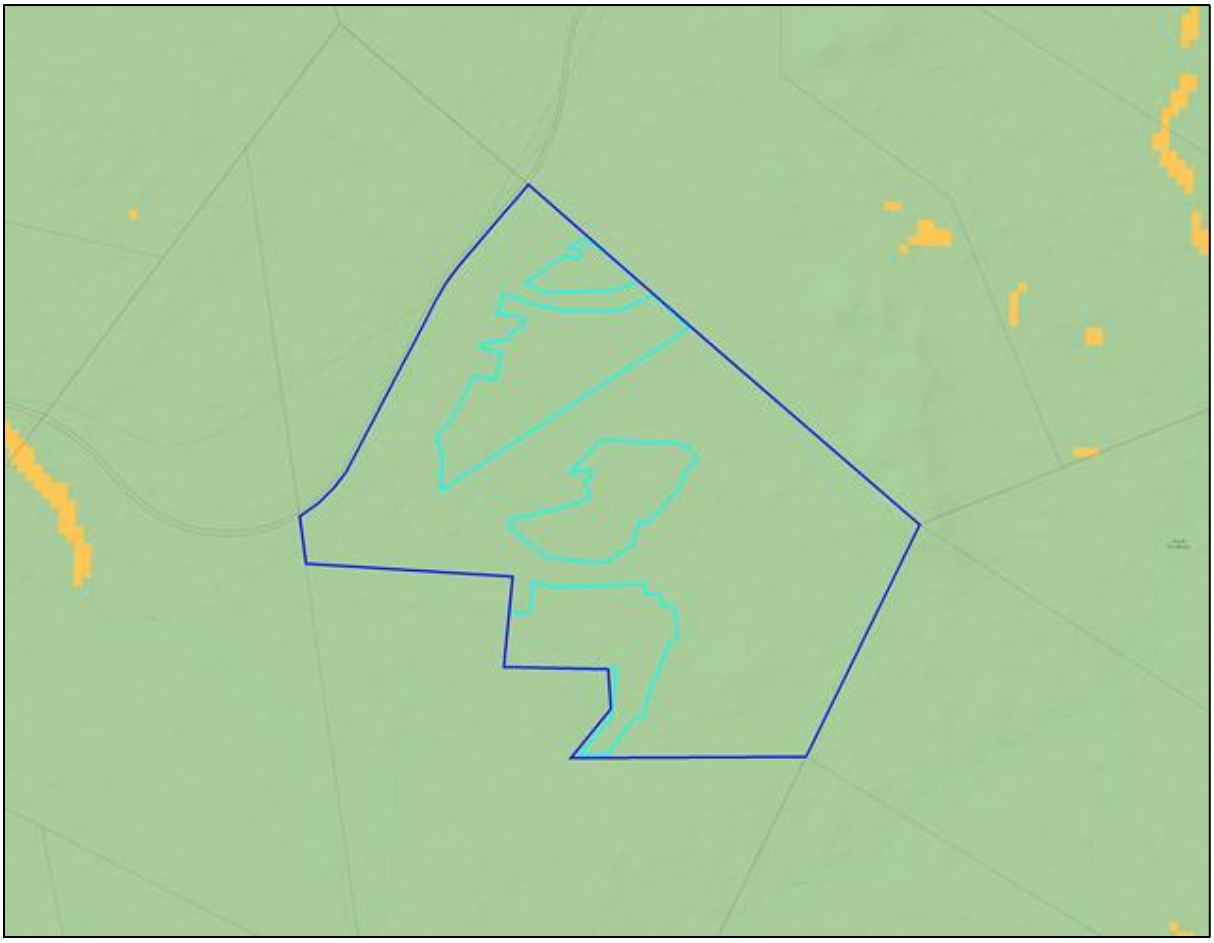


Figure 34: The proposed PV site (dark blue outline) and buildable area (light blue outline) overlaid on agricultural sensitivity, as given by the screening tool (green = low; yellow = medium; red = high; dark red = very high).

8.10 Avifauna

An Avifaunal Assessment was undertaken by Enviro Insight (report dated July 2023).

The proposed study area is classified as a Regime 2 based on the size of the study area, high avifaunal sensitivity and type of technology that will be used for the proposed project. The avifaunal sensitivity was also determined based on the number of priority species occurring, or potentially present, within or around the study area, the regional or globally threat status of these species, avifaunal habitat found in the area, population of priority species, bird movement corridor and Important Bird and Biodiversity Areas.

The first site visit was a site reconnaissance and dry-season verification survey conducted to identify site characteristic found within the study area such as habitats, important bird species and site sensitivities including sensitive habitats with their associated sensitive bird species and observation of nests of sensitive bird species. The second site visit was conducted in October 2022 (Spring). The final site visit was conducted during the December season (Summer).

8.10.1 Critical Biodiversity Area (CBAs)

According to the Northern Cape CBA Map (2016) (**Figure 35**), the study area is mainly located in CBA2, with sections of CBA1, ESA and "Other Natural Areas". CBA2 are mainly due to the FEPA catchment, FEPA rivers and 500m buffer and the vegetation type. The CBA1 are the NFEPA Rivers, Klein-Rooiberg and Rooiberg, both considered largely natural. The ESA towards the western section is the Krom River and associated wetlands, while the smaller scattered ESAs towards the eastern boundary are koppies which are large high value climate resilience areas.

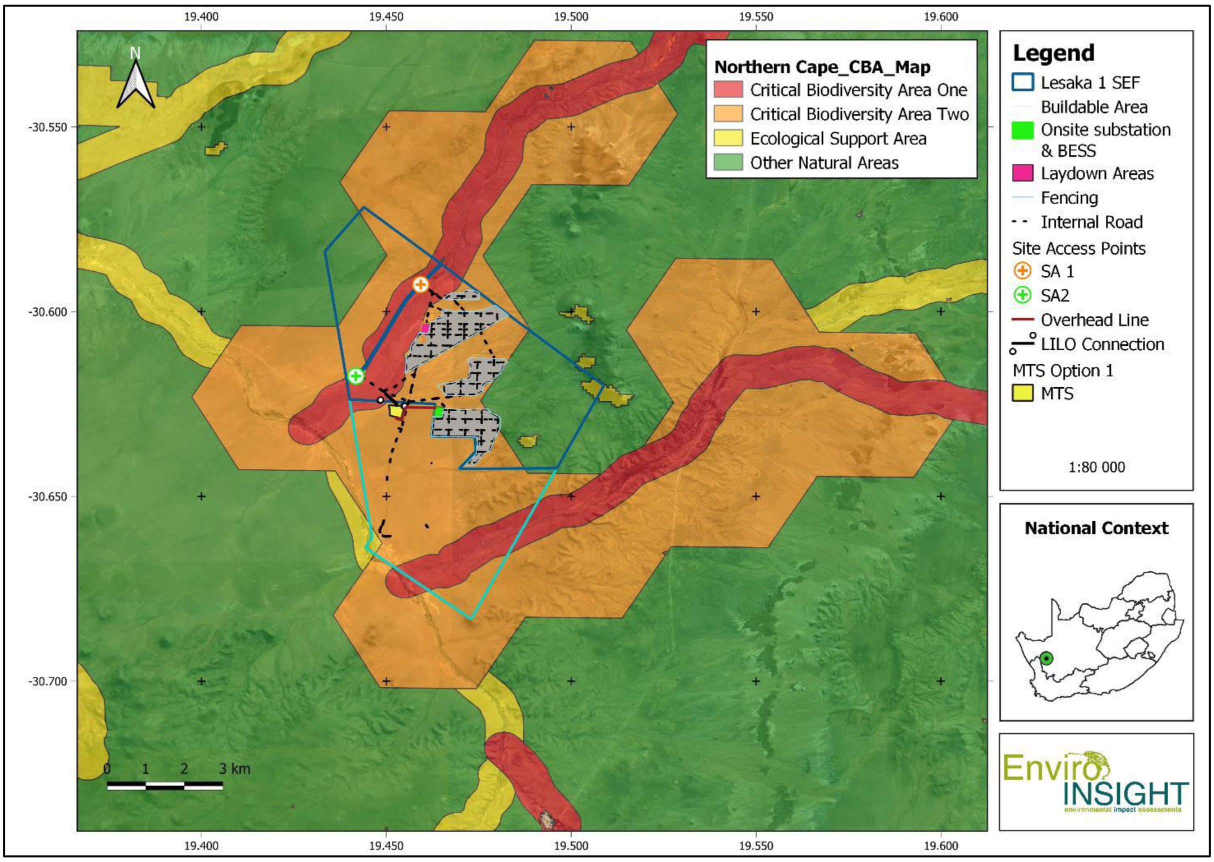


Figure 35: The study area in relation to the Northern Cape Critical Biodiversity Areas (2016).

8.10.2 Description of major bird habitats

The overall habitat delineation as expressed below is more complex than the habitats described below. However, for the purposes of avifaunal monitoring, the monitoring can be confined to the below-described habitat types which will encompass all delineated habitats below.

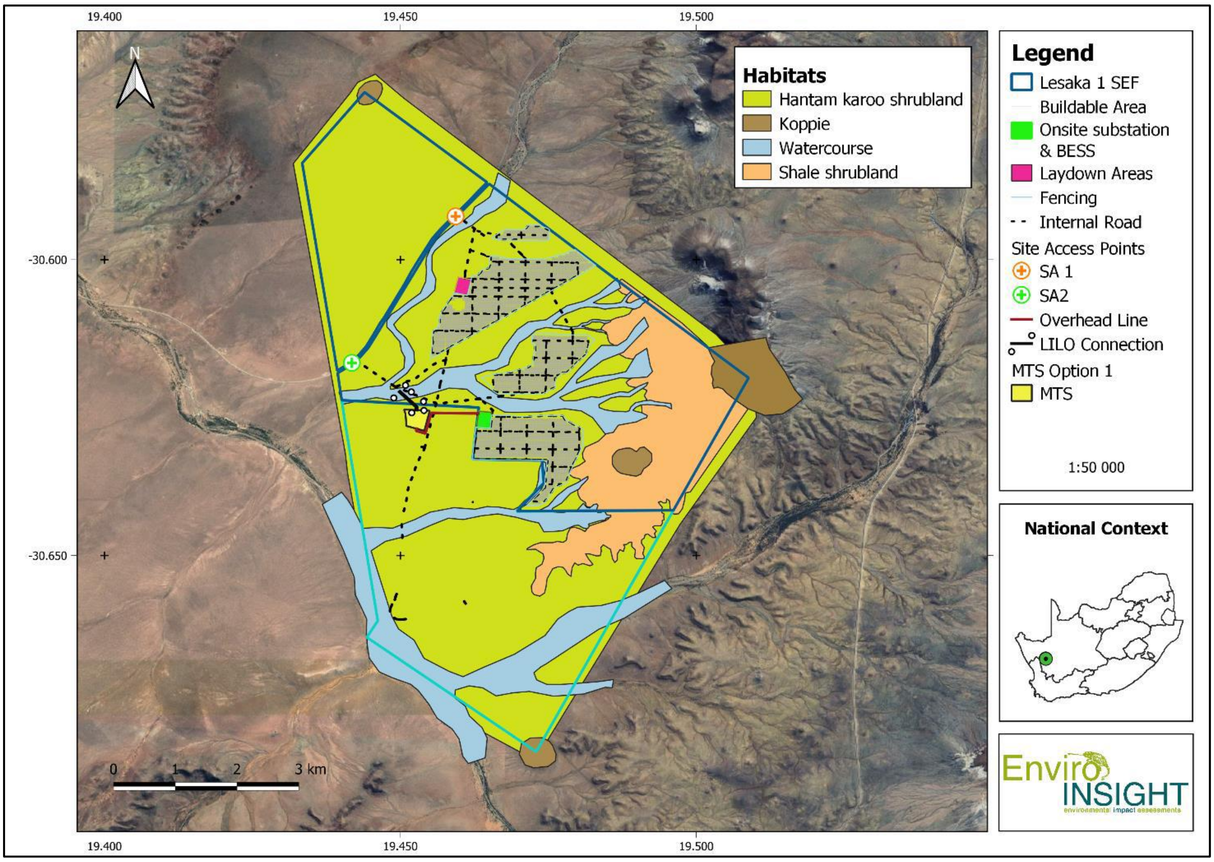


Figure 36: Delineated habitat types within the Lesaka 1 SEF cluster

<u>Open Sandy Grassland/ Hantam Karoo Shrubland</u>

The sandy grassland habitats show a reduced structural complexity and vegetation which provides for a more generic species diversity albeit often at high densities of individuals. The habitat contains features that provide suitable foraging habitat for Red Lark (*Calendulauda burra*), Ludwig's Bustard (*Neotis ludwigii*), Kori Bustard (*Ardeotis kori*) and medium raptors. Specifically, the habitat is characterised by a much-reduced rocky substrate and a higher prevalence of grassed red sand infusions which provides highly localized portions of optimal habitat for Red Larks.

Figure 37: Open Sandy Grassland

<u>Open Karoo Shale</u>

This habitat is largely concentrated in the north-east section of the SEF. There is a localised high population density of small mammals/ground birds such as rodents, springhares, hares and korhaans within the project area of influence as well as the regional linkage to the drainage line habitats. The absence of these animals in high densities reduces the ecological importance of this habitat for avifauna. The shrubland habitats do not provide structural complexity allowing for a higher species diversity and often showed lower densities of avifauna due to the lack of specific prey species that are found within. However, the habitat vegetation provides suitable foraging habitat for the Ludwig's Bustard (*Neotis ludwigii*), Kori Bustard (*Ardeotis kori*) and medium sized raptors and thus maintains a medium sensitivity.

Figure 38: Open Karoo Shale

<u>Isolated Rocky Ridge "Koppies"</u>

Isolated rocky ridges, or "koppies", are situated in the south-eastern and north-eastern areas of the SEF. The rocky ridge found in the project footprint are linked to isolated inselbergs and connected ridges and hills which differ in size and height and can (regionally) form extensive ridge systems. The localised high population densities of small mammals such as rodents, springhares and hares within the project area of influence as well as the local linkage to the drainage line habitats, elevates the overall ecological importance of this habitat for avifauna. The rocky habitats provide structural complexity which often showed higher diversity and densities of avifauna due to the abundance of prey species that are found in this habitat. The habitat vegetation provides suitable foraging, roosting and breeding habitat for the Ludwig's Bustard (*Neotis ludwigii*), Karoo Korhaan, Kori and large, medium and small raptors.

<u>Drainage lines</u>

Drainage lines border the south-western and southern extremes of the SEF and enter the south-eastern and central areas. Avifaunal assemblages differed depending on the classification of the drainage line system as well as the season. Most of the drainage line systems are seasonally ephemeral or dry. Thus, most of the bird associations are linked to the prevailing vegetation and soil types within the delineated drainage line habitats. In summary, drainage lines with taller shrub and tree layers showed a much higher diversity of passerine species as well as sand-associates and ground-dwelling birds such as coursers and thick-knees. Species of conservation concern such as Red Lark and coursers were observed in varying densities.

The seasonal drainage lines and accompanying riparian trees are linear dispersal corridors for terrestrial bird species. Much higher species diversity (as well as a unique composition) was observed in this habitat and therefore, these systems are classified to be of high avifaunal importance. The drainage lines act as important flight corridors for passerines and raptors between foraging and roosting sites.

8.10.3 Protected Areas and Important Bird Areas (IBA)

The Lesaka 1 SEF is not located in or directly adjacent to an Important Bird Area (IBA) or protected area. The closest IBA to the SEF is Bitterputs Conservation Area which is approximately 60 km north-west of the study area.

8.10.4 Expected and Observed Avifauna

A relatively moderate diversity of 93 bird species for the area have been recorded within the 16 SABAP pentads in which the study area is situated. A total of 58 bird species were recorded in the greater area (9 pentads).

A list of expected and observed priority species in the project area is provided in **Table 20**. A total of 20 priority species are expected to occur on and surrounding the study area, of which 14 have been recorded either within or adjacent to the project area footprint.

It is clear from **Table 20** that numerous priority avifauna species occur within the project area of influence and can be expected to interact with the proposed Lesaka 1 SEF. Indeed, Van Rooyen (2020) suggests that displacement effects of the renewable energy developments are more significant than direct mortality which can greatly affect habitat specific species such as Red Lark and Ludwig's Bustard. Consequently, all applicable data of priority species observed within the monitoring seasons of field surveys allowed for careful evaluation of potential impacts and application of suitable mitigation measures to reduce these impacts where possible.

Table 20: Priority avifauna species list (both expected and recorded) for the study area

Common name	Scientific name	Global Status	Regional Status	South African Endemic	Current pre-construction monitoring
Bustard, Kori	*Ardeotis kori*	NT	NT		
Bustard, Ludwig's	*Neotis ludwigii*	EN	EN		X
Buzzard, Jackal	*Buteo rufofuscus*	LC	LC	X	
Courser, Burchell's	*Cursorius rufus*	LC	VU	X	X
Courser, Double-banded	*Rhinoptilus africanus*	LC	NT		X
Eagle, Booted	*Aquila pennatus*	LC	LC		X
Eagle, Martial (nest only)	*Polemaetus bellicosus*	EN	EN		X
Eagle, Verreaux's	*Aquila verreauxii*	LC	VU		
Eagle-owl, Cape	*Bubo capensis*	LC	LC		
Eagle-owl, Spotted	*Bubo africanus*	LC	LC		X
Falcon, Lanner	*Falco biarmicus*	LC	VU		X
Goshawk, Southern Pale Chanting	*Melierax canorus*	LC	LC	X	X
Kestrel, Greater	*Falco rupicoloides*	LC	LC		X
Kestrel, lesser	*Falco naumanni*	LC	LC		X
Kite, Black-winged	*Elanus caeruleus*	LC	LC		X
Korhaan, Karoo	*Eupodotis vigorsii*	LC	NT	X	X
Korhaan, Northern Black	*Afrotis afraoides*	LC	LC		
Lark, Red	*Calendulauda burra*	VU	VU		X

Common name	Scientific name	Global Status	Regional Status	South African Endemic	Current pre-construction monitoring
Lark, Sclater's	*Spizocorys sclateri*	NT	NT		
Secretarybird	*Sagittarius serpentarius*	EN	VU		
Snake- Eagle, Black-chested	*Circaetus pectoralis*	LC	LC		X

According to the literature, 15 Species of Conservation Concern (SCC) are known to occur in the region with six (6) species confirmed during the complete surveys, representing a moderate success rate. Of the expected SCC, two of the species are Endangered, five of the species are Vulnerable and four are Near-Threatened. All SCC recorded and expected are described below:

Table 21: SCC avifauna species list recorded (per season)

		Season			
English IOC Name	**Scientific Name**	**Spring**	**Summer**	**Winter**	**Total**
Double-banded Courser	*Rhinoptilus africanus*	1	6	3	10
Karoo Korhaan	*Eupodotis vigorsii*	1	14	17	32
Lanner Falcon	*Falco biarmicus*		3		3
Ludwig's Bustard	*Neotis ludwigii*	7	6	21	34
Martial Eagle	*Polemaetus bellicosus*	NEST SITES ONLY			
Red Lark	*Calendulauda burra*	8	14	10	32
Grand Total	**4**	**16**	**37**	**48**	**111**

A buffer of 1 km is recommended as an exclusion area around the two Martial Eagle nests, which were confirmed after the completion of the pre-construction monitoring. There is currently no species-specific guideline for the Martial Eagle, and buffer areas around nest sites remains a scientifically contentious topic of discussion in the industry without rigorous scientific studies providing necessary guidance. The only published recommended buffer to implement around raptor nests in South Africa is for the Verreauxs' Eagle (Ralston-Paton, 2017), which dictates that a precautionary buffer of 3 km is recommended and may be reduced or increased based on the results of rigorous avifaunal surveys. It must be stated that this is for Wind Energy Facilities and the current recommended buffering of 1km for the currently inactive martial eagle nests is considered adequate, subject to monitoring.

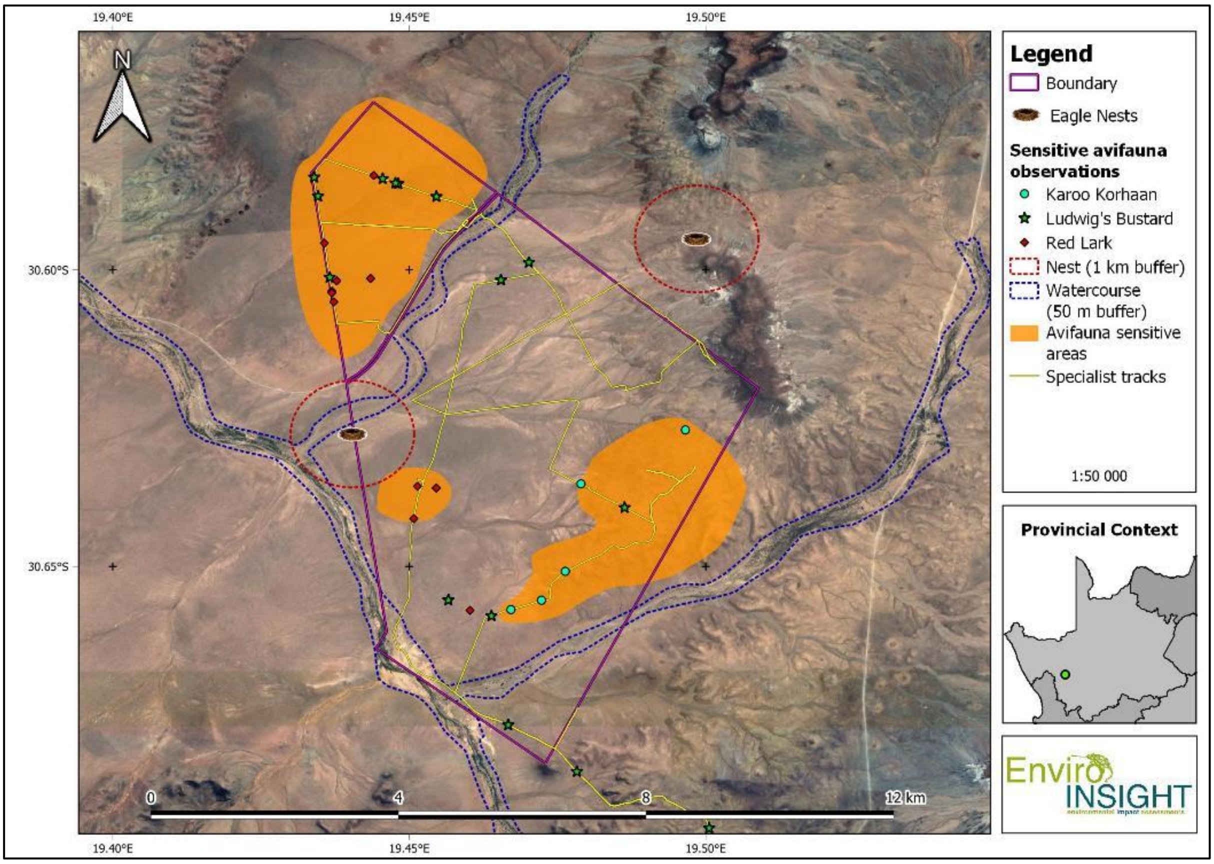


Figure 39: Avifaunal site recorded and delineations of sensitive habitats

8.10.5 Sensitivity

The study area mostly consists of Open Grassland and Karoo Shale habitats with some drainage line and koppies found in parts of the project footprint. The Sandy Grassland and Koppie vegetation provides potential nesting habitat for bird species such as Ludwig's Bustard, Raptors, Red Larks, Cisticola's and Karoo Korhaan, and possibly includes hunting/foraging habitat for species such as Lanner Falcon, Secretarybird and other larger raptors.

The site visit in July 2022 took place during the winter season, which means the habitat conditions were at their least optimal. When conditions are sub-optimal, avifaunal assemblages will carry out small scale migrations to more ecologically productive habitats (such as permanent water courses) and return after the commencement of the warmer months. The Spring and Summer surveys yielded more significant results due to the warmer temperatures and post rain ecological productivity.

The associated powerlines within the study area footprint showed significant signs of priority bird species nests and could lead to possible recolonisation in the future for species such as Martial Eagle. Accordingly, final sensitivities have been shown in **Figure 40.** The figure indicates that the entire north-western area, as well as smaller pockets to the south and east, are "high sensitivity" areas, while the nest buffers towards the south-west and beyond the north-east border are "no-go" areas. The drainage line running across the site has also been marked as a "no-go".

A buffer of 1 km is recommended as an exclusion zone of ALL project activities, in addition to stipulated mitigation measures. This applies to the two (seemingly) abandoned Martial Eagle nests.

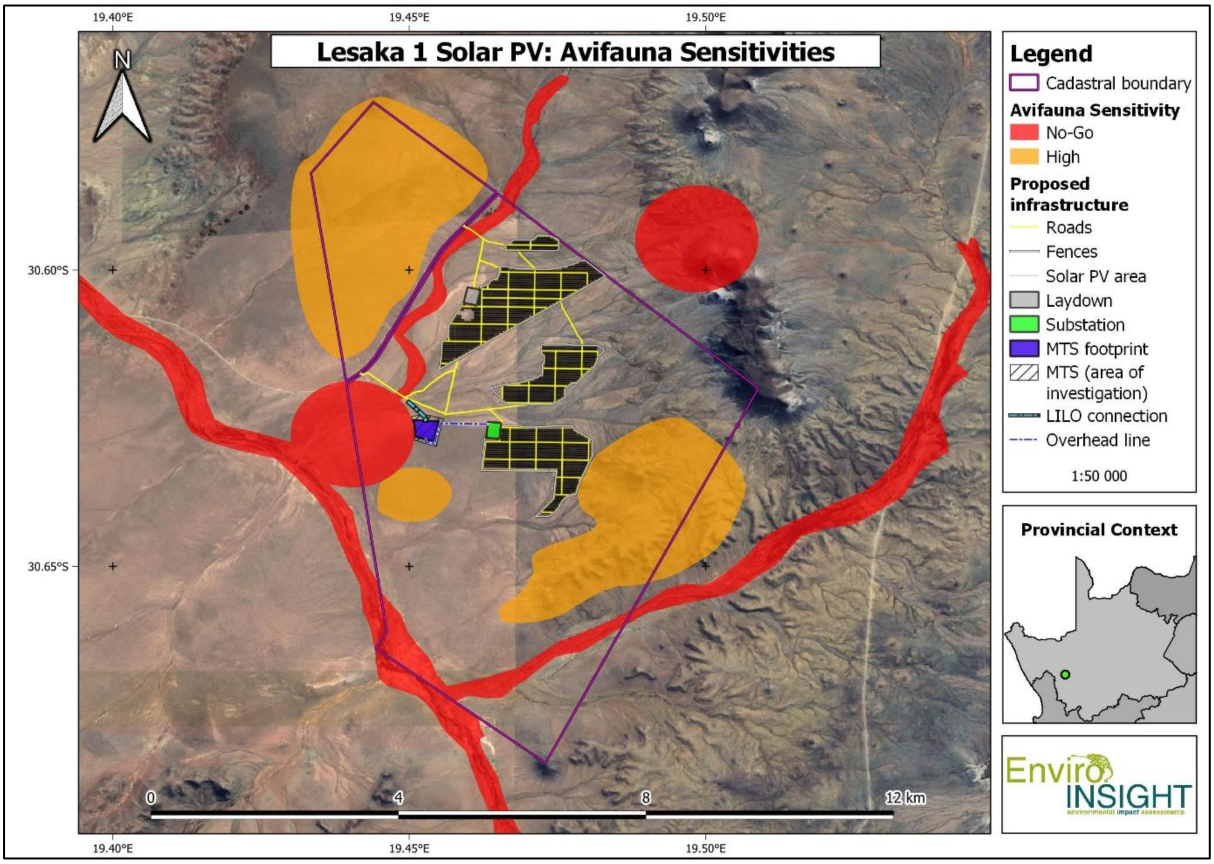


Figure 40: Final avifauna sensitivity map for the Lesaka 1 SEF (including the grid infrastructure to be fully assessed in separate application)

8.10.6 Conclusions

The study area is situated within the Hantam Karoo vegetation type. The study area is not anticipated to support breeding populations of several large terrestrial bird species such as cranes and large raptor species in sufficiently large densities or within breeding habitat that may be considered a fatal flaw. However, given the size of the area, the proximity to a very large areas of suitable habitat, the high-density presence of Red Lark, Ludwig's Bustard and Karoo Korhaan is deemed to be a significant concern. The CBAs of the Northern Cape designated that majority of the site falls within a CBA 1, CBA 2 and an ESA1. Avoidance mitigation could be applied wherever possible to project infrastructure design and limit the amount of habitat impacted.

The study area is classified as a Regime 2 assessment. Even though it is not within a REDZ and will require a full S&EIA, the methods will follow the appropriate sampling method, which consists of 3 surveys of 3 days each (minimum) over a 6-month period. Sampling methods to be used included walking and driving transects, bird species abundance at waterbodies and monitoring of new and previously observed nests on existing and constructed pylons. A total of twenty-two (22) priority species has the possibility of occurring within and around the study area.

Some of the priority bird species are not habitat-bound to the area for nesting and/or foraging purposes and is therefore important to focus on the some of the most significant cumulative impacts for the proposed solar project. Possible primary impacts of the proposed study area on avifauna include:

- Potential habitat loss through the establishment of solar panel infrastructure.

- The inclusion of livestock agriculture that might attract more avifauna species to the area.
- Collision with solar panel infrastructure is possible albeit less likely than secondary collision risk.
- Secondary collision risks are represented by supporting powerline infrastructure which are connected to solar panel infrastructure.

The study area is surrounded with existing renewable energy developments, both wind and solar developments, although a number are proposed which could manifest as significant cumulative impacts at the proposed site. Consequently, every effort has been taken to finalise within an EIA Framework, all aspects of priority species observed within the field survey to allow for careful evaluation of potential impacts and application of suitable mitigation measures to reduce these impacts where possible.

Overall and with these factors taken into consideration, the specialist deems that the project may proceed.

9. DESCRIPTION OF THE SOCIO- ECONOMIC ENVIRONMENT

9.1 Socio economic characteristics

A Socio-economic Impact Assessment was undertaken by Tony Barbour (report dated August 2023).

The Northern Cape is the largest province in South Africa, taking up nearly a third of the country's land area. It covers an area of 372 889km² and has a population of 1 193 780, the least populous of South Africa's provinces. The capital city is Kimberley. The Northern Cape is divided into five district municipalities and the SEF facility will be located in the Namakwa District Municipality (DM).

9.1.1 Namakwa District Municipality

The Namakwa District Municipality is bordered by the republic of Namibia in the north, ZF Mgcawu Local Municipality in the north-east, Cape Winelands District Municipality in the south, West Coast District Municipality in the south-west, Pixley Ka Seme District Municipality in the east, Central Karoo District Municipality in the south-east, and the Atlantic Ocean in the west. The Namakwa District is the largest district in the province, making up over a third of its geographical area and consist of six local municipalities. These include:

- Nama Khoi Local Municipality;
- Hantam Local Municipality;
- Khai-Ma Local Municipality; and
- Kamiesberg Local Municipality.
- Karoo Hoogland Local Municipality
- Richtersveld Local Municipality

9.1.2 Hantam Local Municipality

The SEF facility will be located in the Hantam Local Municipality. The Hantam LM is the largest municipality of six in the district, making up a third of its geographical area. The town of Clavinia is the administrative seat of the HM. The Lesaka 1 PV SEF is located in Ward 5 of the HM. The closest settlement to the PV SEF is Loriesfontein located ~ 35km to the north of the site.

Population

The population in the HM in 2016 was 21 541. The number of households was 6 893, with an average household size of 3.1. The IDP (2021/22) indicates the population growth rate in HM municipality for the 2015—2020 period was a negative -0.4% with a marginal increase (0.16%) in the number of households over the same period.

Household income

Based on the data from the 2011 Census, 6.9% of the population of the HM had no formal income, 2.6 % earned under R 4 800, 4.8% earned between R 5 000 and R 10 000 per annum, 21.1% between R 10 000 and 20 000 per annum and 24.7% between R 20 000 and R 40 000 per annum (Census 2011). The figures for Ward 5 were 8.8%, 2.6%, 5.9%, 24.3% and 24.8% respectively.

Employment

The official unemployment rate in the HM in 2016 was 6%, with 45.6% falling within the not economically active group and 3.2% being classified as discouraged work seekers. The figures for Ward 5 (2011) were 3.5%, with 48.3% falling within the not economically active group and 1.3% being classified as discouraged work seekers. The unemployment rate was lower than the district (11.1%) and provincial (14.5%) rate. However, the current (2022) unemployment rates are likely to be higher due to the impact of the COVID-19 pandemic.

Economic Overview

The HM IDP indicates that the HM has a relatively small economy, making up about 12% of 2020 Gross Value Added (GVA) of the NDM, down from 13% in 2016. The primary sector contributed about 22% or R352 million in 2020 and the secondary sector 7.3% or R117 million in 2020. Of relevance the IDP notes that between 2015 and 2020 the electricity, gas and water subsector had the highest percentage growth rate of 76% due to the establishment of renewable energy generation facilities in the municipal area.

In summary, the economy in the HM is characterised by the following:

- It is a small-town sub-region with low levels of development despite the strategic location in terms of road and rail transport corridors.
- High rate of unemployment, poverty, and social grant dependence.
- Prone to significant environmental changes/shifts owing to long-term structural changes such as **climate change** — less rainfall, more droughts and an increase in extreme weather events — energy crises and other shifts.
- Geographic similarity in economic sectors, growth factors and settlement patterns.
- Economies of scale not easily achieved owing to the size of towns.
- A diverse road network with trunk, main and divisional roads of varying quality.
- **Potential in renewable energy generation.**
- Largely a tertiary-sector based economy with agriculture as the only other notable subsector activity.

9.1.3 Assessment of Social Issues

Policy and Planning Fit

The findings of the SIA indicate that investment in renewable energy and the associated energy infrastructure is strongly supported at a national, provincial, and local level. The development of and investment in renewable energy and associated energy distribution infrastructure is supported by the

National Development Plan (NDP), New Growth Path Framework and National Infrastructure Plan, which all highlight the importance of energy security and investment in energy infrastructure.

The development of the proposed SEF and associated infrastructure is therefore supported by key policy and planning documents.

Construction Phase Social Impacts

Potential positive impacts will be identified in the construction phase with regards to the creation of employment and business opportunities. Given the high local unemployment levels and limited job opportunities in the area, this will represent a significant, if localised, social benefit. In terms of business opportunities for local companies, expenditure during the construction phase will create business opportunities for the regional and local economy. Opportunities may exist for local contractors and engineering companies based in the HM.

The sector of the local economy that is most likely to benefit from the proposed development is the local service industry. The potential opportunities for the local service sector would be linked to accommodation, catering, cleaning, transport, and security, etc. associated with the construction workers on the site. The hospitality industry in the area is also likely to benefit from the provision of accommodation and meals for professionals (engineers, quantity surveyors, project managers, product representatives etc.) and other (non-construction) personnel involved on the project.

Potential negative impacts are as follows:

- Impacts associated with the presence of construction workers on local communities - can pose a potential risk to family structures and social networks. This risk is linked to the potential risky behavior, mainly of male construction workers, such as increase in alcohol and drug use, increase in crime, loss of girlfriends/wives to construction workers etc.
- Safety and security risks to local farmers and farming operations - The presence on and movement of construction workers on and off the site will pose a limited risk to local famers and farm workers in the vicinity of the site. This is due to the small number of affected farmsteads and low intensity of the farming activities in the area due to the low carrying capacity of the veld. The potential risks including stock theft and safety can be effectively mitigated by careful planning and managing the movement of construction workers on the site during the construction phase
- Potential risk of grass fires - The presence of construction workers and construction-related activities on the site poses an increased risk of grass fires that could, in turn pose, a threat to livestock, crops, wildlife and farm infrastructure. Although the area is not prone of grass fires, the loss of grazing due to a grass fire would impact significantly on low famers is the area.
- Nuisance impacts such as noise, dust and safety impacts associated with construction related activities and vehicles - Construction related activities, including the movement of heavy construction vehicles of and on the site, has the potential to create dust, noise and safety impacts and damage roads. The impacts will be largely local and can be effectively mitigated. The number of potentially sensitive social receptors, such as farmsteads, will also be low due to the sparse settlement patterns and small number of farmsteads in the area. Some of the key issues raised by farmers in the local areas included:
    - The maintenance of the roads that the construction vehicles will be using as previous projects have left the gravel road damaged.
    - Ensuring that the main roads are kept clear so that the neighbouring farmers can travel into town and transport their livestock when necessary.
    - The excess dust that caused by construction activities, especially around the farm dwellings.

Operational Phase Social Impacts

The potential positive impacts during the operational phase include:

- The establishment of infrastructure to improve energy security and support renewable sector - The primary goal of the proposed project is to improve energy security in South Africa by generating additional energy. The proposed SEF also reduces the carbon footprint associated with energy generation. The project should therefore be viewed within the context of the South Africa's current reliance on coal powered energy to meet the majority of its energy needs, and secondly, within the context of the success of the REIPPPP.
- Creation of employment opportunities - The proposed development will create in the region of 15 full time employment opportunities during the operational phase. The annual operating budget will be in the region of R 20 million (2022 Rand values), including wages. A percentage of the annual operating budget will be spent in the local economy which will benefit local businesses.
- Benefits to the affected landowners - The proponent will enter into rental agreements with the affected landowners for the use of the land for the establishment of the proposed SEF. The additional income will reduce the risk to his livelihoods posed by droughts and fluctuating market prices for sheep and farming inputs, such as fuel, feed etc. Given the low carrying capacity of the veld the additional income represents a significant benefit for the affected landowners.
- Benefits associated with the socio-economic contributions to community development - The REIPPPP has been designed not only to procure energy but has also been structured to contribute to the broader national development objectives of job creation, social upliftment and broadening of economic ownership

The potential negative impacts during the operational phase include:

- Visual impacts and associated impacts on sense of place - The proposed SEF has the potential to impact on the areas existing rural sense of place. Due to the location of the proposed SEF and the nature of SEFs it will not be possible to effectively mitigate the impact on the areas sense of place
- Impact on property values - Based on the findings of the literature review the potential impact of WEFs on rural property values is likely to be low. This finding is also likely to apply to the proposed SEFs, specifically given the low carrying capacity of the veld in the area and limited farming opportunities.
- Impact on tourism - Based on the location of the proposed SEF the potential impact on tourism at a local and regional level will be negligible

Cumulative Impact

The establishment of the proposed SEF and other renewable energy projects in the area does have the potential to place pressure on the local towns in the area, specifically Loeriesfontein. The impact will depend on the timing of the construction phase for the different projects. However, the potential impact should also be viewed within the context of the potential positive cumulative impacts for the local economy associated with the establishment of the proposed facility and associated renewable energy projects in the district.

9.1.4 Key Findings and Recommendations

The findings of the SIA indicate that the proposed Lesaka 1 PV SEF and associated infrastructure will result in several social and socio-economic benefits, including creation of employment and business opportunities during both the construction and operational phase. The project will also contribute to local economic development though socio-economic development (SED) contributions. In addition, the development will improve energy security and reduce the carbon footprint associated with energy generation. The findings of the SIA also indicate that the potential negative impacts associated with both the construction and operational phase are likely to be Low Negative with mitigation. The potential negative impacts can therefore be effectively mitigated if the recommended mitigation measures are implemented.

The establishment of the proposed Lesaka 1 PV SEF and associated infrastructure is supported by the findings of the SIA.

9.2 Cultural/Historical Environment

A Heritage Impact Assessment was undertaken by CTS Heritage (report dated August 2023).

This application is for the proposed development of PV facilities located approximately 40km north of the town of Loeriesfontein in the Northern Cape. The town grew around a general store established in 1894 by a travelling Bible salesman and became a municipality in 1958. The town of Loeriesfontein is within a basin surrounded by mountains and the broader area around the town forms part of Namaqualand, famous for its flower season. This area is recognised as one of the highest yield areas for renewable energy in South Africa, however this area falls outside of a REDZ area. Due to these high yields, there are existing, approved renewable energy facilities located immediately adjacent to the area proposed for development.

9.2.1 Cultural Environment

According to an impact assessment completed for the neighbouring Loeriesfontein PV Facility (Webley and Halkett, 2012), an adjacent farm is named “Klein Rooiberg” because the northern border of the study area is dominated by outcropping regions (“koppies”) which are reddish in colour. The southern area also exhibits these koppies that are elevated above the plains. The assessment goes on to note that “The site is covered by low lying vegetation of the Succulent Karoo Biome. A number of drainage lines were identified crossing the study area”.

The drainage systems are associated with the Volstruisnesholte River catchment. The study area is considered to be fairly natural succulent Karoo shrubland with low intensity sheep grazing on the site. There is a small concrete farm dam located on the property next to a windmill. Farm fences have been erected. There are two transmission lines near the site, including a 66kV transmission line that runs along the district road towards the substation and a 400kV transmission line that runs to the west of the site in the direction of Klein Rooiberg. There is a district road which runs through the project site. The predominant context of this area is wilderness landscape dominated by topographic features such as koppies and rivers, as well as existing renewable energy facilities. In his assessment of the Kokerboom WEF located 10 kilometres north of this development area, Orton (2021) notes that “The landscape is also considered to be a heritage resource but its cultural component is very limited and a new layer of electrical infrastructure is starting to dominate the landscape.”

The area proposed for development is scattered with farm werfs and connecting roads. According to Webley and Halkett (2012), “from approximately 1850 onwards, Dutch Trekboers started making seasonal use of the summer grazing around the large pans in the area. Many contemporary farmers in Namaqualand still own two farms, one in the Bushmanland and the other in Namaqualand. The livestock is transported between their farms by truck” Orton (2021) notes that “It is unlikely that many earlier farmsteads (than the earlier 20th Century) would be present because this harsh landscape was only permanently settled in relatively recent times.”

Prior to colonial settlement, this region was occupied by San hunter-gatherers and remained here living around the salt pans until they were "forced off the land as the farms were surveyed and made available to European farmers. Some of these "Basters", of mixed descent, travelled north and settled in the southern Richtersveld. Many of the farms were only allocated after the introduction of the wind pump to South Africa in the 1870s made the more arid lands accessible and suitable for grazing." The salt pans of this area therefore have associated cultural landscape value however no saltpans are evident within the area proposed for development.

9.2.2 Archaeology

As a result of the renewable energy facilities proposed in this area, a number of Heritage Impact Assessments have been completed, and a number of significant archaeological resources identified in the area.

For Lesaka 1 SEF, 58 observations were made during the survey which added to the growing database of recorded heritage resources in the area that have been conducted during various impact assessments. No significant built environment heritage was found on Kluitjes Kraal but extensive remains of Stone Age material was found. These date both to the Middle Stone Age generally spread across the entire study area as well as Later Stone Age (LSA) and terminal LSA/historical period where ceramics, metal and glass items appear in the assemblages.

The riverine floodplain systems contain the bulk of the sites located and much of Middle Stone Age (MSA) is likely buried in the terraces overlooking the three non-perennial streams crisscrossing the farm. More significant LSA material similar to those observed by Halkett and Webley to the north east of Kluitjes Kraal (on the eastern side of Groot Rooiberg) was found with the local white opaline CCS/chert, hornfels and quartzite assemblages. These sites lie within a band of more sensitive ground buffering the stream systems and can easily be avoided by placing the solar PV infrastructure outside of a minimum distance from these streams.

The more sensitive archaeological areas surrounding the streams have been identified in **Table 22** and mapped in **Figure 41 and 42** below. It is recommended that the PV layout avoid the identified sensitive archaeological area to prevent negative impacts to significant archaeological heritage. Should the final amended layout adhere to the recommendations, no negative impact to significant archaeological resources are anticipated from the development of the proposed PV facility.

Table 22: Artefacts identified during the field assessment

Site No.	Description	Type	Period	Density	Co ords		Grade	Mitigatio n
001	Groot Rooiberg werf, late Victorian/Edwardian building with hipped corrugated iron roof. Stone walling kraals and additional ruins closer to Rooiberg River	Structure	Historic	n/a	-30.62246805	19.53500846	IIIB	NA - Outside of developm ent area
003	Opaline CCS cores, flakes, hornfels flakes	Artefacts	LSA, MSA	30+	-30.58809	19.46048	IIIB	Avoid - sensitive area
004	Quartz and CCS flakes, some hornfels and a few dolerite flakes	Artefacts	LSA	30+	-30.5878	19.45835	IIIC	Avoid - sensitive area
006	Siltstone triangular flake with edge retouched; CCS and quartz cores and flakes	Artefacts	LSA	30+	-30.58582	19.45324	IIIC	Avoid - sensitive area
007	Siltstone flakes, quartz flakes and cores	Artefacts	LSA, MSA	10 to 30	-30.58416	19.44767	IIIC	Avoid - sensitive area
022	Quartz, CCS and siltstone flakes, cores	Artefacts	LSA	10 to 30	-30.6069649	19.44838371	IIIC	Avoid - sensitive area
031	Hornfels blade production, debitage, flakes, core	Artefacts	MSA	10 to 30	-30.64979	19.49039	IIIC	Avoid - sensitive area

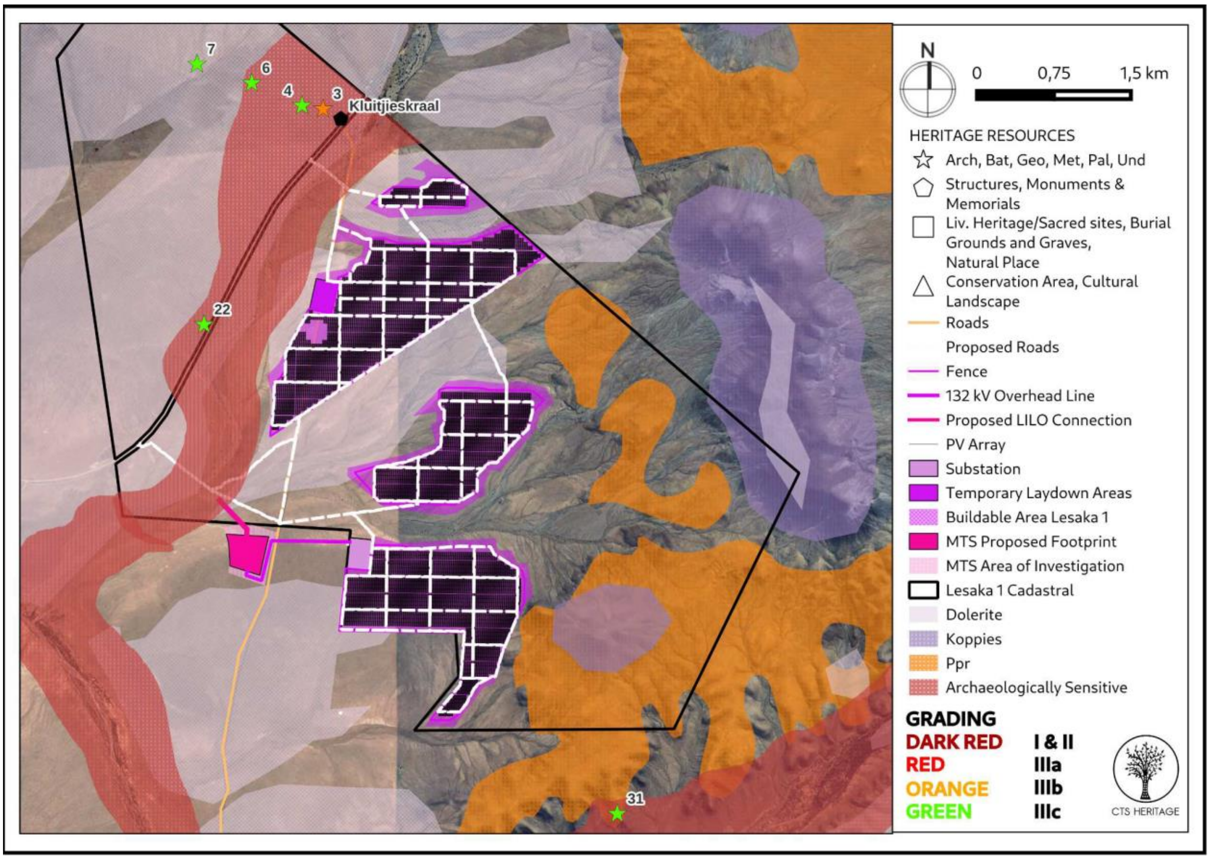


Figure 41: Heritage resources identified within the development area relative to final layout

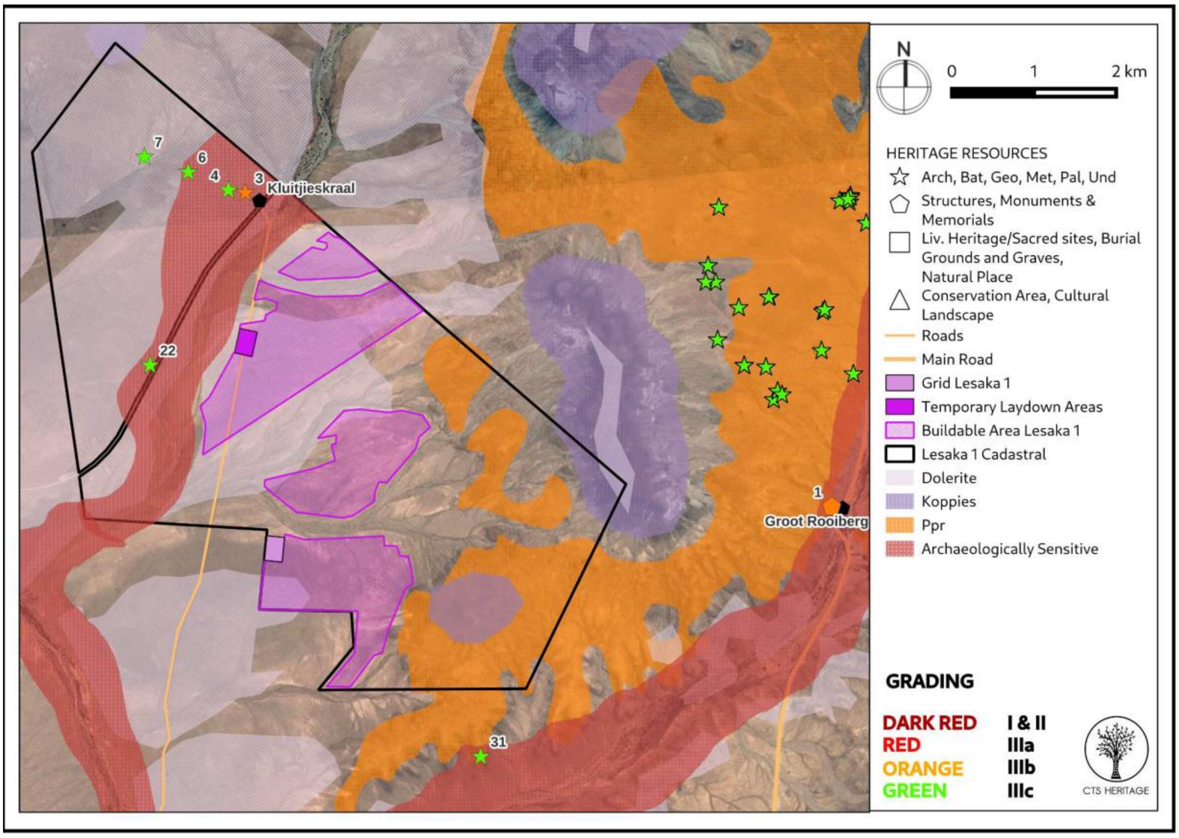


Figure 42: Heritage sensitivity within the development area

9.2.3 Palaeontology

No fossiliferous outcrop was detected in the proposed Lesaka Solar Energy Facility development area. A LOW Palaeontological significance has been allocated to the development. It is therefore considered that the proposed development will not lead to damaging impacts on the palaeontological resources of the area. The construction of the development may thus be permitted in its whole extent, as the development footprint is not considered sensitive in terms of palaeontological resources.

9.2.4 Conclusions and Recommendations

The surveys conducted for impacts to heritage resources including archaeology and palaeontology proceeded with no significant constraints or limitations, and the project area was comprehensively surveyed for heritage resources. An area of higher archaeological sensitivity associated with the stream systems across the development area was identified and mapped. This area must be avoided in the Final PV layout in order to ensure that no significant archaeological heritage resources are negatively impacted by the proposed development.

Despite the high sensitivity for impacts to palaeontological heritage resources of sediments in the vicinity of the development, the areas proposed for the Lesaka 1 PV facility and its associated infrastructure consist of dolerite and quaternary sands and as such, the layout as proposed has low sensitivity for impacts to palaeontological sensitivity.

Based on the outcomes of this report, it is not anticipated that the proposed development of the solar energy facility will negatively impact on significant archaeological heritage on condition that:

- The area of high archaeological sensitivity identified is avoided in the final configuration of the PV layout. The final layout complies with this recommendation.
- If Palaeontological Heritage is uncovered during surface clearing and excavations ECO should be informed immediately. Fossil discoveries ought to be protected and the ECO/site manager must report to South African Heritage Resources Agency (SAHRA) so that mitigation (recording and collection) can be carried out.
- Although all possible care has been taken to identify sites of cultural importance during the investigation of the study area, it is always possible that hidden or subsurface sites could be overlooked during the assessment. If any evidence of archaeological sites or remains (e.g. remnants of stone-made structures, indigenous ceramics, bones, stone artefacts, ostrich eggshell fragments, charcoal and ash concentrations), fossils, burials or other categories of heritage resources are found during the proposed development, work must cease in the vicinity of the find and SAHRA must be alerted immediately to determine an appropriate way forward.

9.3 Transportation

A Transportation Impact Assessment was undertaken by SiVEST SA (Pty) Ltd (September 2023).

The proposed facility can be approached using public gravel roads R355 and AP2972, private roads PR1 and PR2, and Transnet service road (TR1). The condition and suitability of these roads is discussed below and summarised in the table below.

Table 23: Existing Road Network

Road	RCAM Class	Surface	Average Width	Road Reserve	Authority	Condition
R357	R3	Asphalt	8 m	30	SANRAL	Excellent
R355	R3	Gravel	6.6 m	20	SANRAL	Good
AP2972	R3	Gravel	8 m	30	NCDTSL	Excellent
TR1	R5	Gravel	6.6 m	10	Transnet	Good
PR1	N/A	Gravel	6 m	10	Pvt	Good
PR2	N/A	Gravel	4 m	N/A	Pvt	Poor


Figure 43: R355 and R 357 intersection


Figure 44: Typical condition of R 355

According to the transport report, the construction phase will generate the highest number of trips for the proposed facility. Based on calculations and experience from previous solar energy facilities, an 18-month construction period has been estimated and is expected to generate a daily maximum of ±33 additional vehicle trips on the surrounding road network.

Of the total maximum daily vehicle trips, ±14 will be transporting staff and labour and will typically occur in the morning between 07:00 – 08:00 and in the afternoon between 16:00 – 17:00. These trips will therefore coincide with the morning and afternoon peak periods. Given the remote locality of the proposed development, it is anticipated that a fair amount of labour will travel to and from site in group transportation. The remaining ±19 vehicle trips are expected to occur over the 6-hr period between the morning and afternoon peaks for the delivery of construction plant, material and equipment; and include both normal and abnormal loads. These equate to ±4 vehicle trips / hour.

Based on similar existing facilities, the operation and maintenance of the proposed facility will be undertaken by a staff compliment of approximately 5-15 people. The traffic impact during this phase will result from employees commuting to and from the development, the occasional repair vehicle, and the occasional delivery of replacement components. The development is estimated to add 10 vehicle trips per hour onto the surrounding road network during the morning and afternoon peaks over the lifespan of the facility, while the occasional maintenance-related trips are deemed negligible. The overall traffic impact for this phase is therefore seen as nominal.

9.3.1 Recommendations and conclusions

Following the extensive study of the transportation and traffic related aspects of the proposed development and their impacts on the immediate and broader transportation system, the following are recommended:

- An Abnormal Load Study should be undertaken once the (i) detail design, (ii) construction programme, and (iii) logistics plan are available.
- Dry runs along abnormal load routes should be conducted prior to transporting abnormal loads
- Internal access roads should be constructed according to TRH20 – Unsealed Roads: Design Construction and Maintenance
- Traffic calming and speed reduction should be implemented at the approaches to the site access during construction
- Proper and adequate construction road signage should be used on the approach roads which complies with the South African Road Traffic Signage Manual (SARTSM).
- The condition and quality of the gravel roads used should be monitored closely during and after construction, and any required maintenance should be undertaken timeously under the auspices of the relevant transport department.
- Farm fences and access cattle grids should be maintained regularly.
- The implementation of the mitigation measures identified in the Impact Rating Table should be ensured and monitored.

The existing site accesses are deemed sufficient for the proposed facility but may require some upgrades.

No fatal flaws or preferences were identified for any of the proposed site alternatives for construction laydown areas and access points. The project is deemed acceptable from a transport perspective, provided the recommendations and mitigations measures in this report are implemented, and hence the Environmental Authorisation (EA) should be granted for the EIA application.

9.4 Visual

A Visual Impact Assessment was undertaken by SRK Consulting (report dated August 2023).

The Lesaka SEF lies at an elevation of ~750 m amsl and is mostly flat. Elevation increases towards the northern and southern boundaries of the property and a fairly prominent ridge is located on the eastern boundary of the property. Regionally, elevation ranges more significantly, particularly to the south-west and south-east. Isolated koppies, ridgelines and escarpments are a feature of the surrounding landscape.

9.4.1 Description of the receiving environment

Landscape Character

The area surrounding the SEF property is predominantly characterised by grazing lands (natural vegetation), with supporting infrastructure (roads, powerlines and a railway line). Livestock farming, is the predominant land use surrounding the site, with farmsteads interspersed throughout the area. A road (AP 2972) extends northwards from Loeriesfontein and to the east of the SEF property. The Sishen-Saldanha railway line is routed adjacent to the Klein-Rooiberg River bisecting the northern portion of the SEF property. Existing large-scale powerlines are also present in the area surrounding the SEF property increasing in concentration nearer the existing Helios MTS (**Figure 45**).

Figure 45: Existing network of powerlines converging at Helios MTS

Visual Character

The basis for the visual character is provided by the topography, vegetation and land use of the area, which is a rural environment characterised by the sparsely vegetated prominences and ridgelines separated by often, wide flat expanses interspersed with farmsteads and some infrastructure (i.e. the road routed to the east of the site and the Sishen-Saldanha railway line bisecting the northern portion of the SEF property). The expanse of vegetated landscape surrounding the property evokes a rural, undeveloped and fairly inhospitable environment, representative of the Karoo. The project area can therefore be defined as a natural transition landscape as it is mostly rural with few isolated farmsteads and some powerlines, roads and a railway line visible in the landscape.

Figure 46: Landscape of the areas surrounding the project site

Visual Quality

The visual quality of the area can be experienced through long closed views across plains of low, vegetation and prominences, escarpments and ridgelines defining the horizon. The arid, sparsely populated and vegetated region which can be experienced visually as a somewhat sterile environment. Though there are limited anthropogenic features (road, fences, powerlines and railway line), they impact significantly on the visual quality of the area as they interrupt views and are discordant with the natural landscape. Though not always visible, the very long, noisy trains using the railway line bisecting the property, detract significantly from visual quality. The ephemeral rivers and the rugged topography comprising open plains interrupted by koppies, ridges or mountains add to visual quality.

Visual Receptors

Visual receptors have been identified based on surrounding land uses, including the isolated farmsteads and motorists. The visual receptors are briefly described below:

- Farmstead Residents - Isolated farmsteads are interspersed throughout the area surrounding the SEF
- Railway personnel - The Shishen-Saldanha railway is routed to the north-west of the property; and
- Motorists and tourists - A gravel road, AP 2972, is routed to the east of the property.

A number of viewpoints were selected to indicate locations from where receptors may (or may not) view the project. The viewpoints are listed in **Table 24** below and shown in **Figure 47**.

The visibility of the project can be summarised as follows:

- Receptors will have limited visibility of the Lesaka 1 SEF in general, with no viewpoints to the north of the site (VP 5,6,7 and 8) having a view of the proposed SEF; and
- Motorists travelling on the AP 2972 may have a limited view of the SEF in the background along sections of the road (VP 3).

Overall, the proposed SEF is marginally visible in the background to receptors and is considered to be low.

Table 24: Visibility of viewpoints

Viewpoint #	Location	Co-ordinates	Direction of view	Potential Receptors	Visibility
VP 1	Krom River and Farmstead	30° 44' 35.87" S 19° 29' 32.89" E	Looking north	Residents of farmstead and motorists travelling on AP 2972.	**Lesaka 1 SEF: Not visible** The SEF is not visible due to distance and screening by intervening topography.
VP 2	AP 2972 Road 1	30° 42' 59.06" S 19° 30' 40.57" E	Looking north-west	Motorists travelling on AP 2972.	**Lesaka 1 SEF: Not Visible** The SEF is not visible due to distance and screening by intervening topography.
VP 3	AP 2972 Road 2	30° 41' 13.24" S 19° 31' 38.75" E	Looking west	Motorists travelling on AP 2972.	**Lesaka 1 SEF: Marginally Visible** The SEF will be marginally visible due to distance and screening by intervening topography.
VP 4	AP 2972 Road 3	30° 39' 19.18" S 19° 31' 40.20" E	Looking west	Motorists travelling on AP 2972.	**Lesaka 1 SEF: Marginally Visible** The SEF will be marginally visible due to distance and screening by intervening topography.
VP 5	Farmsteads	30° 37' 20.06" S 19° 32' 11.83" E	Looking west	Residents of farmstead and motorist travelling on the AP 2972.	**Lesaka 1 SEF: Not Visible** The SEF will not be visible due to screening by intervening topography.
VP 6	Helios MTS	30° 30' 15.66" S 19° 33' 24.01" E	Looking south	Motorists travelling on the AP 2972.	**Lesaka 1 SEF: Not Visible** The SEF will not be visible due to distance and screening by intervening topography.
VP 7	Khobab WEF	30° 28' 11.84" S 19° 33' 19.87" E	Looking south.	Motorists travelling on the AP 2972.	**Lesaka 1 SEF: Not Visible** The SEF will not be visible due to distance and screening by intervening topography.
VP 8	Klein Rooiberg River Road	30° 34' 2.01" S 19° 32' 29.55" E	Looking south	Motorists travelling on the Klein Rooiberg River Road.	**Lesaka 1 SEF: Not Visible** The SEF will not be visible due to distance and screening by intervening topography.

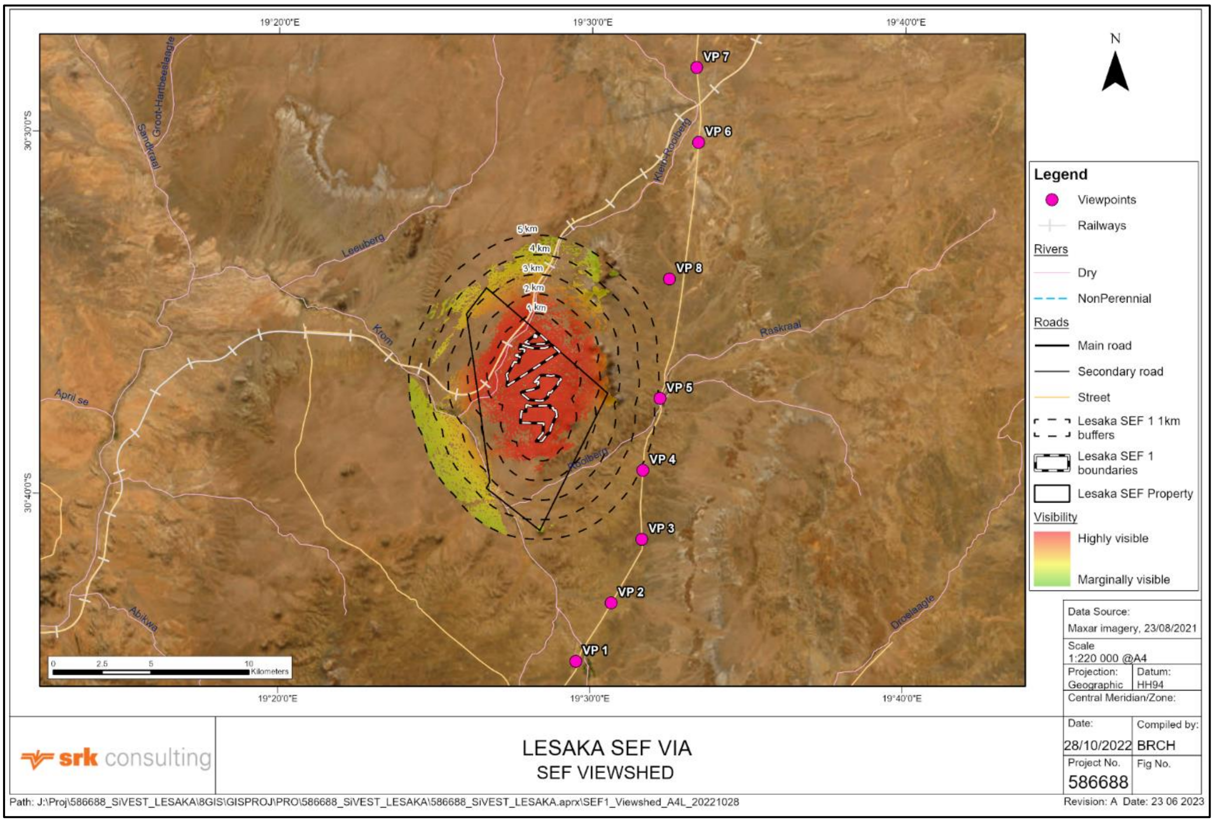


Figure 47: Viewshed of SEF

Sense of Place

The region has scenic value in terms of the rugged natural landscape and large portions of agricultural land. The sense of place of the surrounding area is strongly influenced by the surrounding land use, which can generally be described as a natural agricultural area, on natural grazing land, i.e. not managed (irrigated) pastures.

9.4.2 Analysis of magnitude of the visual impact

Various factors were considered in the assessment, including:

- Visual exposure;
- Visual absorption capacity (VAC) – potential for area to conceal and assimilate a project;
- Sensitivity of visual receptors;
- Visibility and viewing distance; and
- Integrity with existing landscape / townscape.
- Solar reflection

The analysis of the magnitude or intensity of the visual impact is summarized and integrated in the table below and forms the basis for the assessment and rating of the impact.

The overall magnitude of the visual impact that is expected to result from the project is rated as moderate. The moderate visual exposure and landscape integrity and low VAC are moderated by the low viewer sensitivity, visibility and exposure to solar reflection.

Table 25: Magnitude of overall visual impact

Criteria	Rating	Comments
Visual Exposure (Viewshed)	Moderate	The viewshed indicates that beyond the SEF property the SEF cluster is moderately visible in the background to the north and west. The SEF cluster will also be visible to railway passengers to the north, and from the western bank of the Krom River, although there are no / few receptors located to the west.
Visual Absorption Capacity	Low	The low VAC of the surrounding area is reduced by the wide flat, undeveloped, expanse between isolated ridges for both the powerline and SEF for the powerline. The vegetation of the surrounding area is not expected to screen the SEF or powerline and pylons from receptors.
Viewer Sensitivity (Receptors)	Low	The limited number of highly sensitive visual receptors is further moderated by the large number of transient motorists, as well as receptors' familiarity with and acceptance of views of renewable energy projects and powerlines in the surrounding landscape.
Viewing Distance and Visibility	Low	The proposed SEF is marginally visible in the background to receptors.
Landscape Integrity	Moderate	Although a number of renewable energy facilities are proposed around the SEF property, they do not currently exist within the landscape. The proposed project is incongruent with the size, scale and form of the currently landscape.
Solar Reflection	Low	The glare analysis indicates that glare caused by the project will not be experienced by receptors. Glint is not modelled; but may be experienced by moving receptors that have line of sight of the PV panels.

9.4.3 Solar Reflection

The suite of visual receptors that may be impacted by glint and glare caused by any new development may include:

- Residents;
- Motorists;
- Train drivers; and
- Pilots and air traffic controllers.

Glare modelling was conducted for the proposed layout of the PV array using ForgeSolar's GlareGauge. Eighteen observation points representative of the residential dwellings located around the site were modelled to ascertain whether glare would be experienced by receptors at these points. Two routes were modelled in both directions. While the viewshed demonstrates that the SEF will be highly visible within 1.5km of the site, there are very few receptors in the area.

Based on the input parameters the glare analysis demonstrated that no glare from the project will be experienced by the visual receptors despite their close proximity to the array. The exposure to glare is considered to be low.

9.4.4 Discussion and identification of Impacts

Construction

Construction activities associated with the SEF will generate visual impacts related to earthworks and construction infrastructure, plant and materials on site. These activities are visually intrusive and will have a greater impact within the foreground (<200 m); however, very few farmsteads were identified around the site, and none were identified in the foreground. The impact is assessed to be of medium significance and with the implementation of mitigation is reduced to low.

Operation

The development of this PV array may be perceived as conflicting with the current undeveloped, inhospitable agricultural landscape. Although a number of renewable energy projects are proposed in the area directly adjacent to the site, many of them do not currently exist. Therefore, within the current landscape the proposed project is considered incongruent in scale, size and form.

Furthermore, although modelling shows that no glare is experienced by receptors, glint/glare will emanate from the PV arrays, possibly being seen and experienced as an unobtrusive twinkle in the distance (>5 km away) across the landscape. The glare, though not affecting permanent receptors in a significant manner, will be generated and therefore contributes to the altered sense of place.

Across the landscape there is evidence of anthropogenic influence such as the Sishen-Saldanha railway line, fence lines, AP 2972, operational WEFs and construction of a SEF. Nevertheless, the proposed PV array is expected to degrade views, and negatively impact the sense of place and present as a visual intrusion across the landscape.

Due to their distance from the property, receptors are not expected to experience the PV array as a significant transformation in the landscape.

Motorists on the AP 2972 may also be exposed to the project, however due to their fleeting views and transient exposure to the area, motorists are not considered sensitive receptors. An exception is the seasonal tourists (to renowned springtime Namaqualand floral displays/landscapes) who may be affected. The impact is assessed to be of medium significance with and without the implementation of mitigation.

Other infrastructure, such as the BESS and IPP substation are not congruent with the current landscape and will contribute to visual clutter, however few receptors are expected to be exposed. The impact is assessed to be of low significance, as is the impact of glint/glare.

The installation of lighting on the site perimeter and / or around the BESS will generate nightglow that currently does not emanate from the natural, undeveloped property or surrounds. As such, the introduction of lighting on the site alters the sense of place and visual quality to surrounding receptors.

Lighting is not easily screened by vegetation or topography, and the proposed lighting will contribute any existing nightglow from the surrounding areas and significantly alter visual quality of the surrounding area. The impact is assessed to be of medium significance and with the implementation of mitigation is reduced to low.

9.4.5 Conclusion

The proposed project comprises the development of a SEF, further altering the visual landscape of the project area. This project is moderately congruent with and marginally affects the integrity of the landscape, as there are a number of approved renewable energy facilities around or near the proposed site, with two operational WEFs and a SEF under construction. A highly concentrated network of powerlines exists within the project area and the wider region due to the nearby Helios MTS and approved renewable projects. Due to the open, flat and intact topography, the visual absorption capacity of the project area is considered low.

This project will alter visual quality during the construction and decommissioning phases, as well as alter sense of place, visual quality and result in visual intrusion during the operational phase. The impact of visual discomfort and impaired visibility is assessed to be low significance. The cumulative impact, assessing the proposed project as well as the proposed associated infrastructure (including powerlines and MTS) is assessed to be of low significance after mitigation. These impacts are deemed to be acceptable on the assumption that the mitigation measures are implemented.

Based on the assessment and the assumption that the mitigation measures will be implemented, the specialist is of the opinion that the visual impacts of the project are acceptable and there is no reason not to authorise the project.

10. POLICY AND LEGISLATIVE CONTEXT

The relationship between the project and certain key pieces of environmental legislation is discussed in the subsections to follow.

10.1 The Constitution

The Constitution of the Republic of South Africa, Act 108 of 1996 sets the legal context in which environmental law in South Africa occurs and was formulated. All environmental aspects should be interpreted within the context of the Constitution, National Environmental Management Act 107 of 1998 and the Environment Conservation Act 73 of 1989.

The Constitution has enhanced the status of the environment by virtue of the fact that an environmental right has been established (Section 24) and because other rights created in the Bill of Rights may impact on environmental management through, for example, access to health care, food and water and social security (Section 27). An objective of local government is to provide a safe and healthy environment (Section 152) and public administration must be accountable, transparent and encourage participation (Section 195(1) (e) to (g)).

Section 24 of the Constitution states that:

"Everyone has the right –

- *To an environment that is not harmful to their health or well-being; and*

- To *have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that:*

  - Prevent pollution and ecological degradation;
  - Promote conservation and
  - Secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development."

The Constitution is the overarching legislation for South Africa. Although it provides for certain rights and obligations, the NEMA has been promulgated in order to manage the various spheres of both the social and natural environment.

10.2 National Environmental Management Act (107 of 1998)

The National Environmental Management Act (Act No. 107 of 1998) was promulgated in 1998 but has since been amended on several occasions from this date. The act intends to provide for:

- co-operative environmental governance by establishing principles for decision-making on matters affecting the environment;
- institutions that will promote co-operative governance and procedures for coordinating environmental functions exercised by organs of state;
- to provide for the prohibition, restriction or control of activities which are likely to have a detrimental effect on the environment; and
- to provide for matters connected therewith.

NEMA is the overarching legislation which governs the EIA process and environmental management in South Africa. Sections 24 and 44 of NEMA make provision for the promulgation of regulations that identify activities which may not commence without an EA. Activities that may significantly affect the environment must be considered, investigated and assessed prior to implementation.

According to Section 2(3) of the National Environmental Management Act (NEMA) (Act No. 107 of 1998), "development must be socially, environmentally and economically sustainable", which means the integration of these three factors into planning, implementation and decision-making so as to ensure that development serves present and future generations.

The EIA Regulations, 2014 (as amended) identify lists of activities which have the potential to result in detrimental environmental impacts and thus require EA, subject to either "Basic Assessment" or "Scoping and Environmental Impact Assessment". The Regulations prescribe the procedural and substantive requirements for the undertaking of EIAs and the issue of EA's.

The proposed project triggers listed activities under Listing Notice 1, 2 and 3 (as detailed in Section 6 above), and thus requires an EA subject to an Environmental Impact Assessment (EIA) Process.

10.3 Environmental Impact Assessment (EIA) Guideline for Renewable Energy Projects, DFFE Notice 989 of 2015

The purpose of this document is primarily to provide guidance on the environmental management legal framework applicable to renewable energy operations and all the role players in the sector. The guideline is principally intended for use by the following stakeholder groups:

- Public Sector Authorities (as regulator and/or competent authority);

- Joint public sector authorities and project funders (e.g., Eskom, IDC, etc.);
- Private Sector Entities (as project funder / developer / consultant); and
- Other interested and affected parties (as determined by the project location and/or scope).

This guideline seeks to identify activities requiring authorisation prior to commencement of that activity and provide an interface between national EIA Regulations and other legislative requirements of various authorities.

The guidelines are applicable for the construction, installation and/or development of the following renewable energy projects:

- Concentrating Solar Power (CSP) Plant;
- Wind Energy Facility (WEF);
- Hydropower Station; and
- Photovoltaic (PV) Power Plant.

10.4 National Water Act (Act 36 of 1998)

The National Water Act (NWA) No 36 of 1998 was promulgated on the 20th of August 1998. This Act is important in that it provides a framework to protect water resources against over exploitation and to ensure that there is water for socio-economic and economic development, human needs and to meet the needs of the aquatic environment. The Act also recognises that water belongs to the whole nation for the benefit of all people.

Water resources as defined include a watercourse, surface water, estuary or aquifer. Specifically, a watercourse is defined as (inter alia):

- A river or spring;
- A natural channel in which water flows regularly or intermittently; and
- A wetland, lake or dam into which, or from which water flows.

Due to the possible encroachment into the wetland areas, the following Section 21 water uses in terms of the NWA may be triggered and require licensing:

- (c) impeding or diverting the flow of water in a watercourse; and
- (i) altering the bed, banks, course or characteristics of a watercourse.

In light of the above, there are a number of stipulations within the NWA that are relevant to the potential impacts on rivers, streams and wetlands that may be associated with the proposed development. An Aquatic / Freshwater Impact Assessment (**Appendix 6**) has been conducted to explore how the proposed development may impact on identified water resources as protected by the Act. Should the proposed development require a General Authorisation (GA) or Water Use Licence (WUL), it will be determined and applied for separately prior to construction**.**

10.5 The National Heritage Resources Act 1999 (25 of 1999)

The National Heritage Resources Act promotes good management of the heritage resources of South Africa which are deemed to have cultural significance and to enable and encourage communities to ensure that these resources are maintained for future generations.

The aim of the Act is to introduce an integrated, three-tier system for the identification, assessment and management of national heritage resources (operating at a national, provincial and local level). This legislation makes provision for a grading system for the evaluation of heritage resources on three levels which broadly coincide with their national, provincial and local significance.

This Act requires investigation to determine the impact of heritage resources when developments exceed the thresholds list in section 38 (1) of the act:

a) the construction of a road, wall, powerline, pipeline, canal or other similar form of linear development or barrier exceeding 300 m in length;
b) the construction of a bridge or similar structure exceeding 50 m in length;
c) any development or other activity which will change the character of a site—
   (i) exceeding 5 000 m^2 in extent; or
   (ii) involving three or more existing erven or subdivisions thereof; or
   (iii) involving three or more erven or divisions thereof which have been consolidated within the past five years; or
   (iv) the costs of which will exceed a sum set in terms of regulations by SAHRA or a provincial heritage resources authority;
d) the re-zoning of a site exceeding 10 000 m2 in extent; or
e) any other category of development provided for in regulations by SAHRA or a provincial heritage resources authority,

The proposed development would involve; (c) the development of a SEF and associated infrastructure that will change the character of more than 0.5ha, and (d), the rezoning of a site that will exceed 1ha.

Under the legislation the South African Heritage Resources Agency (SAHRA), was established, which replaced the National Monuments Council. SAHRA is responsible for the preservation of heritage resources with exceptional qualities of special national significance (Grade I sites). A Provincial Heritage Resources Authority, established in each province, will protect Grade II heritage resources which are significance within the context of a province or region. Buildings and sites of local interest (Grade III sites) is the responsibility of local authorities as part of their planning functions. In this case, the South African Heritage Resource Agency (SAHRA) will need to be consulted with extensively throughout the process.

Within the scope of this project, Section 38 of the NHRA (25 of 1999), states that, as described above, an assessment of potential heritage resources in the development area needs to be done. A Heritage Impact Assessment (HIA), Archaeological Impact Assessment (AIA), and Paleontological Impact Assessment (PIA) (**Appendix 6**) has therefore been commissioned to explore how the proposed development may impact on heritage resources and potential cultural artefacts as protected by the Act.

10.6 National Environmental Management: Biodiversity Act (NEM:BA) (Act No. 10 of 2004, as amended)

As the principal national act regulating biodiversity protection, the National Environmental Management: Biodiversity Act (NEM:BA) (Act No. 10 of 2004), which is administered by the DFFE, is concerned with the management and conservation of biological diversity, as well as the use of indigenous biological resources in a sustainable manner.

The overarching aim of the NEM:BA, within the framework of the NEMA, is to provide for:

- The management and conservation of biological diversity within South Africa, and of the components of such biological diversity;
- The use of indigenous biological resources in a sustainable manner; and
- The fair and equitable sharing among stakeholders of benefits arising from bio-prospecting involving indigenous biological resources.

In terms of this Act, the developer has a responsibility to:

- Conserve endangered ecosystems and restriction of activities according to the categorisation of the area (not just by listed activity as specified in the EIA regulations);
- Promote the application of appropriate environmental management tools in order to ensure integrated environmental management of activities thereby ensuring that all development within the area are in line with ecological sustainable development and protection of biodiversity; and
- Limit further loss of biodiversity and conserve endangered ecosystems.

The South African National Biodiversity Institute (SANBI) was established in terms of the NEM:BA, its purpose being (inter alia) to report on the status of the country's biodiversity and the conservation status of all listed threatened or protected species and ecosystems.

The NEM:BA provides for a range of measures to protect ecosystems and for the protection of species that are threatened or in need of protection to ensure their survival in the wild, including a prohibition on carrying out a 'restricted activity' involving a specimen of a listed threatened or protected species without a permit issued in terms of Chapter 7 of the Act. According to Section 57 of the Act, 'Restricted activities involving listed threatened or protected species':

A Terrestrial Biodiversity Assessment (**Appendix 6**) has been conducted to explore how the proposed development may impact on biodiversity as protected by the Act.

In addition, all relevant conservation departments (such as the SANBI and NCDENC) will be invited to provide comments with regards to the proposed development.

10.7 National Environmental Management: Protected Areas Act, 2003 (Act No.57 of 2003 as amended)

The overarching aim of the National Environmental Management: Protected Areas Act (NEMPAA) Act No. 57 of 2003, within the framework of NEMA, is to provide for:

- the declaration and management of protected areas;
- co-operative governance in the declaration and management of protected areas;
- effect a national system of protected areas in South Africa as part of a strategy to manage and conserve its biodiversity;
- a representative network of protected areas on state land, private land and communal land;
- promote sustainable utilisation of protected areas for the benefit of people, in a manner that would preserve the ecological character of such areas;
- promote participation of local communities in the management of protected areas, where appropriate; and
- the continued existence of South African National Parks.

The proposed project is not located in any protected area.

10.8 National Forests Act (NFA) (Act No. 84 of 1998)

The National Forest Act (NFA) (Act No. 24 of 1998) was enacted to:

- Provide for the protection, management and utilisation of forests;
- The protection of certain plant and animal life;
- The regulation of trade in forest produce; and
- The control and management of a national hiking way system and National Botanic Gardens.

The NFA enforces the necessity for a license to be obtained prior to destroying any indigenous tree in a natural forest and, subject to certain exemptions, cutting, disturbing, damaging, destroying or removing any protected tree. The list of protected trees is currently contained in GN 908 of 21 November 2014. Licenses are issued by the Minister and are subject to periods and conditions as may be stipulated.

<u>Protected trees</u>
According to this act, the Minister may declare a tree, group of trees, woodland or a species of trees as protected. The prohibitions provide that 'no person may cut, damage, disturb, destroy or remove any protected tree, or collect, remove, transport, export, purchase, sell, donate or in any other manner acquire or dispose of any protected tree, except under a licence granted by the Minister'.

<u>Forests</u>
Prohibits the destruction of indigenous trees in any natural forest without a licence.

The NFA is relevant to the proposed development as the removal and/or disturbance and/or clearance of indigenous vegetation will be required and a license in terms of the NFA may be required for this to be done.

A Terrestrial Biodiversity Assessment (**Appendix 6**) has been conducted to explore how the proposed development may impact on vegetation as protected by the Act.

In addition, all relevant conservation departments (such as the SANBI and NCDENC) will be invited to provide comments with regards to the proposed development.

10.9 National Veld and Forest Fire Act (Act No. 101 of 1998)

Provides requirements for veldfire prevention through firebreaks and required measures for firefighting. Chapter 4 of the Act places a duty on landowners to prepare and maintain firebreaks. Chapter 5 of the Act places a duty on all landowners to acquire equipment and have available personnel to fight fires.

10.10 Conservation of Agricultural Resources Act (CARA) (Act No. 43 of 1983)

The Conservation of Agricultural Resources Act (CARA) (Act No. 43 of 1983) controls the utilisation of natural agricultural resources in South Africa. The Act promotes the conservation of soil, water sources and vegetation as well as the combating weeds and invader plants. The Act requires the protection of land against soil erosion and the prevention of water logging and salinization of soils by means of suitable soil conservation works to be constructed and maintained. The utilisation of marshes, water sponges and watercourses are also addressed.

The primary objective of the Act is to conserve natural agricultural resources by:

- maintaining the production potential of land;
- combating and preventing erosion and weakening or destruction of the water resources;
- protecting vegetation; and
- combating weeds and invaders plants.

In terms of this Act, no degradation of natural land is permitted. Rehabilitation after disturbance to agricultural land is also managed by this Act. The CARA is relevant to the proposed development as the construction of a SEF as well as other components (such as the on-site switching substation and permanent guard house) may impact on agricultural resources and vegetation on the site. The Act prohibits the spreading of weeds and prescribes control measures that need to be complied with in order to achieve this. As such, measures will need to be taken to protect agricultural resources and prevent weeds and exotic plants from invading the site as a result of the proposed development.

Declared Weeds and Invaders in South Africa are categorised according to one (1) of the following categories:

- Category 1 plants: are prohibited and must be controlled.
- Category 2 plants: (commercially used plants) may be grown in demarcated areas providing that there is a permit and that steps are taken to prevent their spread.
- Category 3 plants: (ornamentally used plants) may no longer be planted; existing plants may remain, as long as all reasonable steps are taken to prevent the spreading thereof, except within the flood line of watercourses and wetlands.

An Agricultural and Soils Site Verification (**Appendix 6**) has been conducted to explore how the proposed development may impact on the agricultural production potential of the proposed site.

10.11 National Road Traffic Act (NRTA) (Act No. 93 of 1996, as amended)

The National Road Traffic Act (NRTA) (Act No. 93 of 1996, as amended) provides for all road traffic matters and is applied uniformly throughout South Africa. The Act enforces the necessity of registering and licensing motor vehicles. It also stipulates requirements regarding fitness of drivers and vehicles as well as making provision for the transportation of dangerous goods.

All the requirements stipulated in the NRTA will need to be complied with during the construction and operational phases of the proposed development. A Transportation Assessment (**Appendix 6**) has been conducted to explore how the proposed development may impact on the area.

10.12 Civil Aviation Act (CAA) (Act No. 13 of 2009)

The Civil Aviation Act (CAA) (Act No. 13 of 2009) controls and regulates aviation within South Africa. It provides for the establishment of a South African Civil Aviation Authority (SACAA) and independent Aviation Safety Investigation Board in compliance with Annexure 13 of the Chicago Convention. It gives effect to various conventions related to aircraft offences, civil aviation safety and security, and provides for additional measures directed at more effective control of the safety and security of aircrafts, airports and matters connected thereto.

Although the Act is not directly relevant to the proposed development, it should be considered as the establishment of electricity distribution infrastructure (such as a substation and powerlines) may impact on aviation and air traffic safety, if located directly within aircraft flight paths.

The Air Traffic and Navigation Services Company Limited (ATNS) and the SACAA will be consulted throughout the EIA process and the required approvals will be obtained, where necessary. It is not however anticipated that any approvals will be required.

10.13 Astronomy Geographic Advantage Act (Act No. 21 of 2007)

The Astronomy Geographic Advantage Act (Act No. 21 of 2007) provides for:

- The preservation and protection of areas that are uniquely suited for optical and radio astronomy; and
- Intergovernmental cooperation and public consultation on matters concerning nationally significant astronomy advantage areas and matters connected therewith.

Under Section 22(1) of the Act, the Minister has the authority to protect the radio frequency spectrum for astronomy observations within a core or central astronomy advantage area. As such, the Minister may under section 23(1) of the Act, declare that no person may undertake certain activities within a core or central Astronomy Advantage Area (AAA). These activities include the construction, expansion or operation; of any fixed radio frequency interference source, facilities for the generation, transmission or distribution of electricity, or any activity capable of causing radio frequency interference or which may detrimentally influence the astronomy and scientific endeavours.

In terms of section 7(1) and 7(2) of this Act, national government established the following AAAs:

- Karoo Central AAA (GN 198 of 2014) – proposed development falls outside this AAA
- Sutherland Central AAA – proposed development falls outside this AAA
- Northern Cape AAA (GN 115 of 2010) – proposed development falls outside of this AAA

The proposed site falls within the Square Kilometre Array (SKA) Karoo Central Radio Astronomy Advantage Area (KCAAA) 1 buffer (refer **Figure 48** below). The main impacts of renewable energy developments on the SKA is RFI. RFI is a part of the Electromagnetic Compatibility (EMC) discipline that includes Electromagnetic emissions and Electromagnetic immunity. The location of the proposed project could pose an EMI or RFI risk to the SKA, as the proposed project is located within the KCAA 1 buffer. The South African Radio Astronomy Observatory (SARAO) was contacted for comment to determine their requirements in this regard.

The SARAO office conducted a high-level impact assessment. Their internal findings determined that the project represents a low risk of interference to the nearest SKA radio telescope with a compliance surplus of 32.12 dBm/Hz. As such, SARAO do not object to the proposed Lesaka SEF development. Confirmation/consent from SARAO is included in **Appendix 5**.

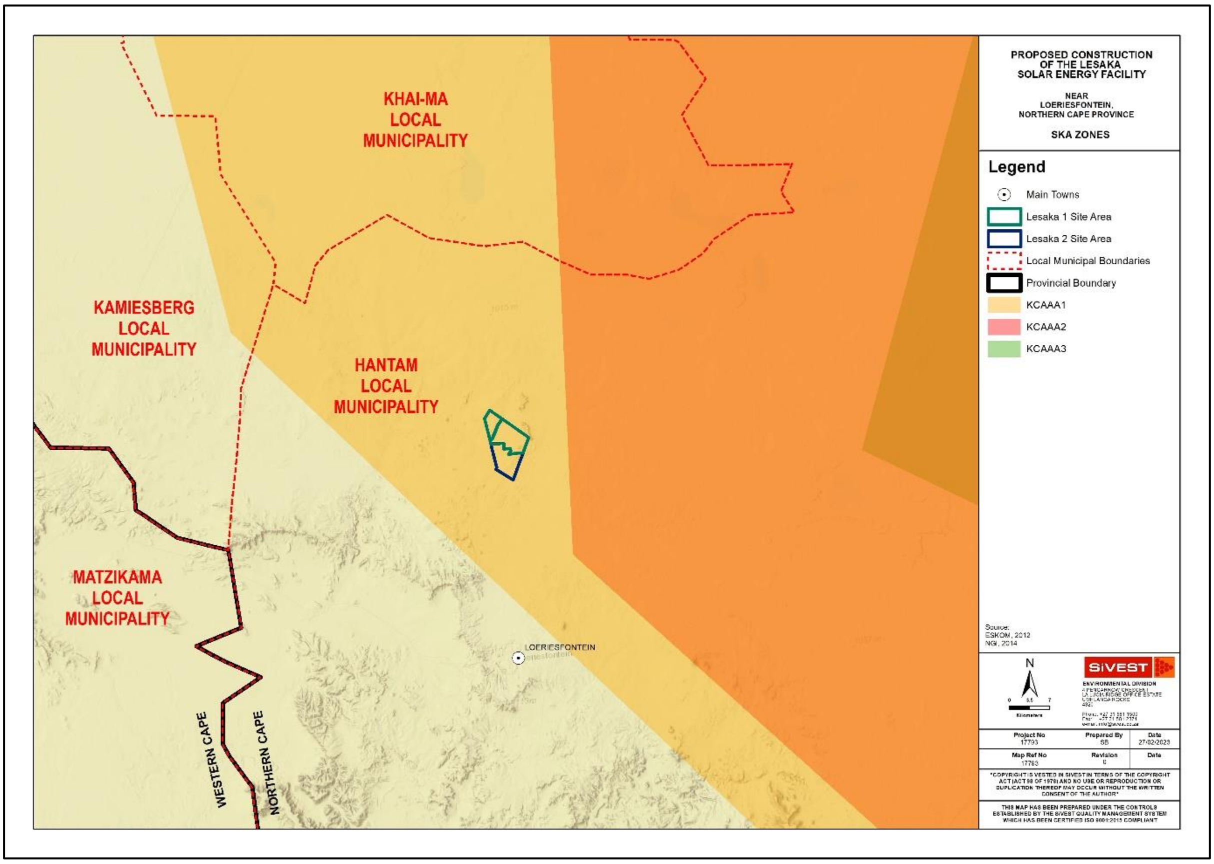


Figure 48: Proposed project location within the SKA

10.14 National Energy Act (Act No. 34 of 2008)

South Africa has two (2) acts that direct the planning and development of the country's electricity sector, namely:

i. The National Energy Act of 2008 (Act No. 34 of 2008); and
ii. The Electricity Regulation Act (ERA) of 2006 (Act No. 4 of 2006).

The National Energy Act (Act No. 34 of 2008), promulgated in 2008, has, as one (1) of its key objectives, the promotion of diversity of supply of energy and its sources. From this standpoint, the Act directly references the importance of the renewable energy (RE) sector, with a mention of the solar energy sector included. The aim is to ensure that the South African economy is able to grow and develop, fast-tracking poverty alleviation, through the availability of a sustainable, diverse energy mix. Moreover, the goal is to provide for the increased generation and consumption of RE (Republic of South Africa, 2008).

10.15 Electricity Regulation Act (Act No. 4 of 2006)

In 2011, the electricity regulation on new generation capacity was published under Section 35(4) of the Electricity Regulation Act (ERA) (Act No. 4 of 2006). These regulations apply to the procurement of new generation capacity by organs of state.

The objectives of the regulations include:

- To facilitate planning for the establishment of new generation capacity;
- The regulation of entry by a buyer and a generator into a Power Purchase Agreement (PPA);
- To set minimum standards or requirements for PPAs;
- The facilitation of the full recovery by the buyer of all costs efficiently incurred by it under, or in connection with, a PPA including a reasonable return based on the risks assumed by the buyer thereunder and to ensure transparency and cost reflectivity in the determination of electricity tariffs; and
- The provision of a framework for implementation of an Independent Power Producer (IPP) procurement programme and the relevant agreements concluded.

The Act establishes a National Energy Regulator as the custodian and enforcer of the National Electricity Regulatory Framework. The Act also provides for licenses and registration as the manner in which generation, transmission, distribution, trading and the import and export of electricity are regulated.

10.16 Protection of Public Information Act (Act No. 4 of 2013)

The Protection of Public Information Act (Act No. 4 of 2013) (POPIA) recognises the Constitutional requirement that everyone has a right to privacy.

Ultimately the Act promotes "the protection of personal information processed by public and private bodies; to introduce certain conditions so as to establish minimum requirements for the processing of personal information; to provide for the establishment of an Information Regulator to exercise certain powers and to perform certain duties and functions in terms of this Act and the Promotion of Access to Information Act, 2000 (PAIA); to provide for the issuing of codes of conduct; to provide for the rights of persons regarding unsolicited electronic communications and automated decision making; to regulate the flow of personal information across the borders of the Republic; and to provide for matters connected therewith".

Due to the requirements around the Public Participation Process, SIVEST will process and capture information aligned to the POPIA and always obtain consent for I&APs information to be gathered, stored and distributed for the purpose of this project.

10.17 Renewable Energy Development Zones (REDZs) and Strategic Transmission Corridors

The Strategic Environmental Assessment (SEA) for Wind and Solar PV Energy in South Africa (CSIR, 2015) originally identified eight (8) formally gazetted Renewable Energy Development Zones (REDZs) that are of strategic importance for large-scale wind and solar PV development in terms of Strategic Integrated Project 8: Green Energy in Support of the South African Economy, as well as associated strategic transmission corridors, including the rollout of its supporting transmission and distribution infrastructure, in terms of Strategic Integrated Project 10: Electricity Transmission and Distribution.

- REDZs for large-scale wind and solar photovoltaic development;
- associated Strategic Transmission Corridors which support areas where long-term electricity grid will be developed;
- process of basic assessment to be followed and reduced decision-making timeframe for processing of applications for environmental authorisation in terms of the NEMA; and
- acceptance of routes which have been pre-negotiated with all landowners as part of applications for environmental authorisations for power lines and substations.

In addition to the eight (8) formally gazetted REDZs mentioned above, the Phase 2 SEA for Wind and Solar Photovoltaic Energy in South Africa (2019) identified three (3) additional REDZs (namely REDZ 9, REDZ 10 and REDZ 11) that are of strategic importance for large scale wind and solar photovoltaic energy development. These REDZs were published under Government Notice No. 786, Government Gazette No. 43528 of 17 July of 2020, and were officially gazetted under Government Notice No. 144, Government Gazette No. 44191 of 26 February 2021.

Table 26: The SEA for Wind and Solar PV Energy in South Africa (Phase 1 and Phase 2) (CSIR, 2015; CSIR, 2019) identified the following eleven (11) geographic areas for REDZs

REDZ Number	Name	Applicability of REDZ
REDZ 1	Overberg	Large-scale wind and solar photovoltaic energy facilities
REDZ 2	Komsberg	Large-scale wind and solar photovoltaic energy facilities
REDZ 3	Cookhouse	Large-scale wind and solar photovoltaic energy facilities
REDZ 4	Stormberg	Large-scale wind and solar photovoltaic energy facilities
REDZ 5	Kimberley	Large-scale solar photovoltaic energy facilities
REDZ 6	Vryburg	Large-scale solar photovoltaic energy facilities
REDZ 7	Upington	Large-scale solar photovoltaic energy facilities
REDZ 8	Springbok	Large-scale wind and solar photovoltaic energy facilities
REDZ 9	Emalahieni	Large scale solar photovoltaic energy facilities
REDZ 10	Klerksdorp	Large scale solar photovoltaic energy facilities
REDZ 11	Beaufort West	Large scale wind and solar photovoltaic energy facilities

It should be noted that the proposed project is not located within a REDZ (however is within a strategic transmission corridor) and will be subject to a full EIA process in terms of the NEMA, as amended, and the EIA Regulations, 2014 (as amended).

10.18 Additional Relevant Legislation

- White Paper on the Energy Policy of the Republic of South Africa (1998)
- Occupational Health and Safety Act (Act No. 85 of 1993) [OHSA];
- Environment Conservation Act (Act 73 of 1989) [ECA]
- Road Safety Act (Act No. 93 of 1996) [RSA];
- National Environmental Management: Air Quality Act (Act No. 39 of 2004) [NEM:AQA];
- National Environmental Management: Waste Act (Act No. 59 of 2008, as amended) [NEM;WA];
- Development Facilitation Act (Act No. 67 of 1995) [DFA];
- Promotion of Access to Information Act, (Act No. 2 of 2000); [PAIA]
- The Hazardous Substances Act (Act No. 15 of 1973) [HSA];
- Water Services Act (Act No. 108 of 1998) [WSA];
- Municipal Systems Act (Act No. 32 of 2000) [MSA];
- Subdivision of Agricultural Land Act, 70 of 1970, and
- Mineral and Petroleum Resource Development Act (Act No. 28 of 2002, as amended) [MPRDA].

11. KEY DEVELOPMENT STRATEGIES AND GUIDELINES

In his 2023 State of the Nation Address, President Cyril Ramaphosa announced government are taking the following measures to rapidly and significantly increase generation capacity outside of Eskom:

- *We are introducing a clear action plan to address the energy crisis and address the electricity shortfall of 4000 to 6000 megatatts (MW).*
- *The five key interventions include:*
  - *First, fix Eskom's coal-fired power stations and improve the availability of existing supply.*
  - *Second, enable and accelerate private investment in generation capacity.*
  - *Three, accelerate procurement of new capacity from renewables, gas and battery storage.*
  - *Four, unleash businesses and households to invest in rooftop solar.*
  - *Five, fundamentally transform the electricity sector to achieve long-term energy security.*
- *Improve the performance of Eskom's existing power stations so that the coal-fired power stations that provide 80% of our electricity produce the amount of electricity for which they were designed. One of the priority investment areas is to rapidly expand energy generation capacity.*
- *Eskom has launched a programme to buy excess power from private generators and has already secured 300 MW from our neighbouring countries*
- *One of the potent reforms we have embarked upon is to allow private developers to generate electricity. There are now more than 100 projects, which are expected to provide over 9 000 MW of new capacity over time.*
- *A number of companies that have participated in the renewable energy programme will soon enter construction and deliver a total of 2 800 MW of new capacity.*
- *Eskom will procure emergency power that can be deployed within six months to close the immediate gap.*
- *We are investing in new transmission lines and substations, especially in areas such as the Eastern Cape, Northern Cape and Western Cape.*
- *All of these measures will result in a massive increase in power to the grid over the next 12 to 18 months, and beyond.*
- *This power will be in line with our diverse mix of energy sources, including our current coal-fired power stations, solar, wind, gas, nuclear, hydro and battery storage.*
- *To fully implement this plan, we need strong central coordination and decisive action.*
- *The president has declared a national state of disaster to respond to the electricity crisis.*
- *And it will enable us to accelerate energy projects and limit regulatory requirements while maintaining rigorous environmental protections, procurement principles and technical standards.*
- *Focusing our attention on the energy crisis*
- *Through the Just Energy Transition Investment Plan, R1.5 trillion will be invested in our economy over the next five years in new frontiers such as renewable energy, green hydrogen and electric vehicles.*
- *Several new sectors are emerging in the economy, such as major green hydrogen, electric vehicles and fuel cells.*
- *The Northern Cape has already attracted well over R100 billion in investments in renewable energy projects.*
- *These and other massive investments in renewable energy will create jobs and stimulate local economies not only in the Northern Cape, but also in the Eastern Cape, Western Cape and Mpumalanga, turning even the most arid desert into a giant energy source.*
- *Above all, our just transition will prioritise workers and communities in vulnerable industries to ensure that no one is left behind.*

Policy decisions taken in the next decade will largely determine the dimension of the impact of climate change. Local government is in the front line of implementation and service delivery, and thus needs to pursue adequate mitigation and adaptation strategies which should include participation from the public sector, the private sector and NGOs.

The DoE gazetted its White Paper on Renewable Energy in 2003 and introduced it as a 'policy that envisages a range of measures to bring about integration of renewable energies into the mainstream energy economy.' At that time, the national target was fixed at 10 000 GWh (0.8 Mtoe) renewable energy contribution to final energy consumption by 2013. The White Paper proposed that this would be produced mainly from biomass, wind, solar and small-scale hydropower. It went on to recommend that this renewable energy should be utilised for power generation and non-electric technologies such as solar water heating and biofuels. Since the White Paper was gazetted, South Africa's primary and secondary energy requirements have remained heavily fossil-fuel dependent, both in terms of indigenous coal production and use, as well as the use of imported oil resources. Alongside this, the projected electricity demand of the country has led the National utility Eskom, to embark upon an intensive build programme to secure South Africa's longer-term energy needs, together with an adequate reserve margin.

The National Development Plan (NDP), 2011 – 2030, aims to address parts of the South African triple development challenges of poverty and inequality by 2030. In order to achieve this, numerous enabling milestones and critical actions have been formulated. One (1) of the critical actions is the formulation and implementation of interventions that aim to ensure environmental sustainability and resilience to future shocks.

The emphasis is on South African investment and assistance in the exploitation of various opportunities for low-carbon energy in the clean energy sources of Southern Africa (National Planning Commission, 2011).

A more efficient and competitive infrastructure is envisaged, particularly infrastructure that facilitates economic activity and is conducive to growth and job creation. The plan identifies key services that need strengthening; namely commercial transport, energy, telecommunications and water, while ensuring their long-term affordability and sustainability. The National Planning Commission maintains that South Africa has missed a generation of capital investment in many infrastructure opportunities including electricity. Therefore, one (1) infrastructure investment priority is in the procurement of at least 20,000 MW of renewable energy-efficiency (National Planning Commission, 2011).

The proposed project is thus well aligned with the aims of the NDP which is further detailed in the following national and provincial plans:

- National Integrated Resource Plan for Electricity (2010-2030);
- Integrated Resource Plan (IRP 2019)
- National Infrastructure Plan 2012, as amended;
- Constitution of the Republic of South Africa, 1996
- National Environmental Management Act (No. 107 of 1998) (NEMA)
- White Paper on the Energy Policy of the Republic of South Africa (1998)
- National Energy Act (No. 34 of 2008)
- Integrated Energy Plan (IEP) (2015)
- National Development Plan (NDP) 2030 (2012)
- Strategic Infrastructures (SIPs).
- Northern Cape Provincial Growth and Development Strategy (NCGDS) (2005)
- Northern Cape Spatial Development Framework (NCSDF) (2012)
- Integrated Development Plan (IDP) of the Namakwa District Municipality 2019-2020
- Climate Change Response Strategy (2017-2022)
- Namakwa District Climate Change Response Plan

The proposed project is also well aligned with the Namakwa District Municipality IDP 2019/2020 and the Hantam Local Municipality IDP 2017/2022 (discussed further below).

11.1 Provincial Policies

Table 27: Relevant Provincial Policies for the Lesaka 1 Solar PV Facility

Relevant policy	Relevance to the proposed project
Northern Cape Provincial Growth and Development Strategy (NCPGDS) (2005)	The NCPGDS identifies poverty reduction as the most significant challenge facing the government and its partners. All other societal challenges that the province faces emanate predominantly from the effects of poverty. The NCPGDS notes that the only effective way to reduce poverty is through long-term sustainable economic growth and development. Of specific relevance to the Socio-Economic Assessment the NCPGDS make reference to the need to ensure the availability of inexpensive energy. The section notes that in order to promote economic growth in the Northern Cape the availability of electricity to key industrial users at critical localities at rates that enhance the competitiveness of their industries must be ensured. At the same time, the development of new sources of energy through the promotion of the adoption of energy applications that display a synergy with the province's natural resource endowments must be encouraged. In this regard the NCPGDS notes "the development of energy sources such as solar energy, the natural gas fields, biofuels, etc., could be some of the means by which new economic opportunity and activity is generated in the Northern Cape". The NCPGDS also highlights the importance of close co-operation between the public and private sectors in order for the economic development potential of the Northern Cape to be realised. The development of the energy and infrastructure development supports the overall objective of economic development and infrastructure investment towards growth and social development, by contributing to the energy mix, supply and infrastructure of the province. The development of the facility will also contribute to the alleviation of poverty through the creation of direct and indirect employment opportunities.
Northern Cape Spatial Development Framework (NCSDF)	Under Section B 14.4, Energy Sector, the NCSDF (2012), notes the total area of high radiation in South Africa amounts to approximately 194 000 km2 of which the majority falls within the Northern Cape. It is estimated that, if the electricity production per km2 of mirror surface in a solar thermal power station were 30.2 MW and only 1% of the area of high radiation were available for solar power generation, then generation potential would equate to approximately 64 GW. A mere 1.25% of the area of high radiation could thus meet projected South African electricity demand in 2025 (80 GW) (NCPSDF, 2012). However, the SDF does indicate that this would require large investments in transmission lines from the areas of high radiation to the main electricity consumer centres. Section C8.2.3, Energy Objectives, sets out the energy objectives for the Northern Cape Province. The section makes specific reference to renewable energy. The objectives are listed below: • Promote the development of renewable energy supply schemes. Large-

Relevant policy	Relevance to the proposed project
	scale renewable energy supply schemes are strategically important for increasing the diversity of domestic energy supplies and avoiding energy imports while minimizing detrimental environmental impacts. • Develop and institute innovative new energy technologies to improve access to reliable, sustainable, and affordable energy services with the objective to realize sustainable economic growth and development. The goals of securing supply, providing energy services, tackling climate change, avoiding air pollution, and reaching sustainable development in the province offer both opportunities and synergies which require joint planning between local and provincial government as well as the private sector. • Development and institute energy supply schemes with the aim to contribute to the achievement of the targets set by the White Paper on Renewable Energy (2003). This target relates to the delivery of 10 000 GWh of energy from renewable energy sources (mainly biomass, wind, solar, and small-scale hydro) by 2013. The proposed RE facility will contribute to energy objectives of the Northern Cape SDF, through the generation of clean energy and creation of jobs and business opportunities.

11.2 District and Local Municipalities

The strategic policies at a district and local levels have similar objectives for the respective areas, namely, to accelerate economic growth, create jobs, and uplift communities. The proposed Lesaka 1 SEF is considered to align with the aims of these policies. A brief review of the most relevant district and local municipal policies is provided in the table below.

Table 28: Relevant District and Local Municipal Policies for the Lesaka 1 Solar PV Facility

Name	Relevance to the proposed project
Integrated Development Plan (IDP) of the Namakwa District Municipality 2019-2020	The Namakwa District Municipality IDP (2019/2020) notes that the vision of the Namakwa DM is: ‘Namakwa District, the centre of excellence’. Key developmental priorities identified for the DM include: • Economic diversification, specifically the development of local agricultural and mining manufacturing sectors. • New mining and renewable energy projects should be supported. The IDP notes support for the commitments made in terms of the Paris Accord on Climate Change. The IDP notes that the DM is located in an arid region, prone to droughts, and therefore very vulnerable to global warming.

Name	Relevance to the proposed project
	The proposed RE facility will contribute to the key development priorities by developing new renewable energy projects.
Climate Change Response Plan of the Namakwa District Municipality (2017-2022)	The Namakwa District Climate Change Response Plan (2017-2022) was developed through the Local Government Climate Change Support program. It includes a climate change vulnerability assessment and associated climate change responses which address these vulnerabilities. The vulnerability assessment identified 17 of the DM's socio-economic indicators which are both very exposed and highly sensitive to climate change but have very low capacity to adapt. These included the agricultural sector, tourism, water-dependent municipal services and the coastal and marine environment. Priority responses are identified for the key sectors, including agriculture, biodiversity and habitat conservation, human health, and human settlements. These include mainstreaming climate change preparedness into all future IDPs, and implementation of a Namakwa Renewable Energy Strategy which supports the development and use of non-fossil sources of energy. The proposed RE facility will contribute to the Climate Change Response Plan by the use of non-fossil sources of energy.
Integrated Development Plan (IDP) of the Hantam Municipality 2017-2022	The Vision for the HM is "Hantam, a place of service excellence and equal opportunities, creating a better life for all". The Mission Statement associated with the vision is "To create an inclusive, people centred municipality through social cohesion, good governance and sustainable development where all can reach their full potential". In terms of describing the municipal area, the IDP notes that the HM is a small-town sub-region with a mix of sparsely populated towns and low levels of development despite the strategic location of some towns in terms of road and rail transport corridors. Calvinia serves as the main agricultural service centre with the associated transport infrastructure shaping the (original) spatial structure of the town. Of relevance the IDP notes that Loeriesfontein has in recent years

Name	Relevance to the proposed project
	experienced phenomenal investment in infrastructure and services with associated employment opportunities due to the social responsibility programmes by Independent Power Producers. In this regard almost a quarter of all land development applications submitted to the Municipality between 2011 and 2015 were for large-scale renewable energy generation projects. The proposed RE facility will contribute to the vision of the Hantam Local Municipality.

The review of relevant legislation, policies and documentation pertaining to the proposed development indicates that the establishment of the solar farm and associated infrastructure is supported at a national, provincial, and local levels, and that the proposed project will contribute positively towards several targets and policy aims.

12. NEED AND DESIRABILITY

12.1 National Renewable Energy Requirement

In 2010, South Africa had 44,157 MW of power generation capacity installed. Current forecasts indicate that by 2025, the expected growth in demand will require the current installed power generation capacity to be almost doubled to approximately 74,000 MW (SAWEA, 2010).

This growing demand, fuelled by increasing economic growth and social development within Southern Africa, is placing increasing pressure on South Africa's existing power generation capacity. Coupled with this, is the growing awareness of environmental impact, climate change and the need for sustainable development. Despite the worldwide concern regarding Greenhouse Gas (GHG) emissions and climate change, South Africa continues to rely heavily on coal as its primary source of energy, while most of the countries renewable energy resources remain largely untapped (DME, 2003). There is therefore an increasing need to establish a new source of generating power in SA within the next decade.

The use of renewable energy technologies, as one (1) of a mix of technologies needed to meet future energy consumption requirements is being investigated as part of Eskom's long-term strategic planning and research process. It must be remembered that solar energy is plentiful, renewable, widely distributed, clean and reduces GHG emissions when it displaces fossil-fuel derived from electricity. In this light, renewable solar energy can be seen as desirable.

The REIPPP programme and the competitive nature of the bidding process has resulted in significant lowering of solar and wind tariff prices since 2011. Further projects will increase the competitive nature of the REIPPP program and further result in cost savings to South African consumers.

12.2 National Renewable Energy Commitment

In support of the need to find solutions for the current electricity shortages, the increasing demand for energy, as well as the need to find more sustainable and environmentally friendly energy resources, South Africa has embarked on an infrastructure growth programme supported by various government initiatives. These include the National Development Plan (NDP), the Presidential Infrastructure Coordinating Commission (PICC), the DoE's IRP, the National Strategy for Sustainable Development, the National Climate Change Response White Paper, the Presidency of the Republic of South Africa's Medium-Term Framework, and the National Treasury's Carbon Tax Policy Paper.

The Government's commitment to growing the renewable energy industry in South Africa is also supported by the White Paper on Renewable Energy (2003) which sets out the Government's principals, goals and objectives for promoting and implementing renewable energy in South Africa. In order to achieve the long-term goal of achieving a sustainable renewable energy industry, the DoE has set a target of contributing 17,8GW of renewable energy to the final energy consumption by 2030. This target is to be produced mainly through, wind and solar; but also through biomass and small scale hydro (DME, 2003; IRP, 2010). Further renewable energy targets have been proposed within the latest IRP, which was gazetted in 2019.

The 2019 Integrated Resource Plan (2019) (IRP2019) was released on 18 October 2019 and includes the following capacity allocation:

- 1 500 MW of new coal power (noting that there will be decommissioning of coal capacity over the period);
- 2 50 0MW of hydro power;
- 6 000 MW solar;
- 14 400 MW wind;
- 2 000 MW of storage;
- 3 000 MW from gas.

12.3 Site Suitability

Based on the extensive in-house prefeasibility study done in the province, the Lesaka SEF project location has been selected based on a site selection criteria including; Meteorological resources availability, Land availability, Eskom Main Transmission Substation ("MTS") proximity, Grid connection suitability, Environmental constraints, Topography, Site access, and Existing Independent Power Producer ("IPP") competition. The listed criteria items are further discussed below.

12.3.1 Meteorological Resource Availability

The availability of solar resources is the main driver of project viability. The Project site was identified by ENERTRAG South Africa ("ESA") through a desktop pre-feasibility analysis based on the estimation of the solar energy resource. Northern Cape is generally known to have an exceptional pocket of solar resource. Although some parts of the province have appeared to have minimal solar resource, the Project site was considered suitable for renewable energy development, due to the sufficient availability of the solar resource in this region of the province. The average annual Global Horizontal Irradiance ("GHI") ranges between 2100 kWh/m2 to 2250 kWh/m2 which is a sufficient resource to ensure the economic viability of a SEF. This viable resource ensures the best Return on Investment for the economy of South Africa.

According to the Photovoltaic Power Potential map (*2020 The World Bank, Source: Global Solar Atlas 2.0, Solar resource data: Solargis*) in **Figure 49** below, the Northern Cape has a very high solar potential when compared to other provinces. The project site is thus suitable for the establishment of the proposed solar PV energy facility.

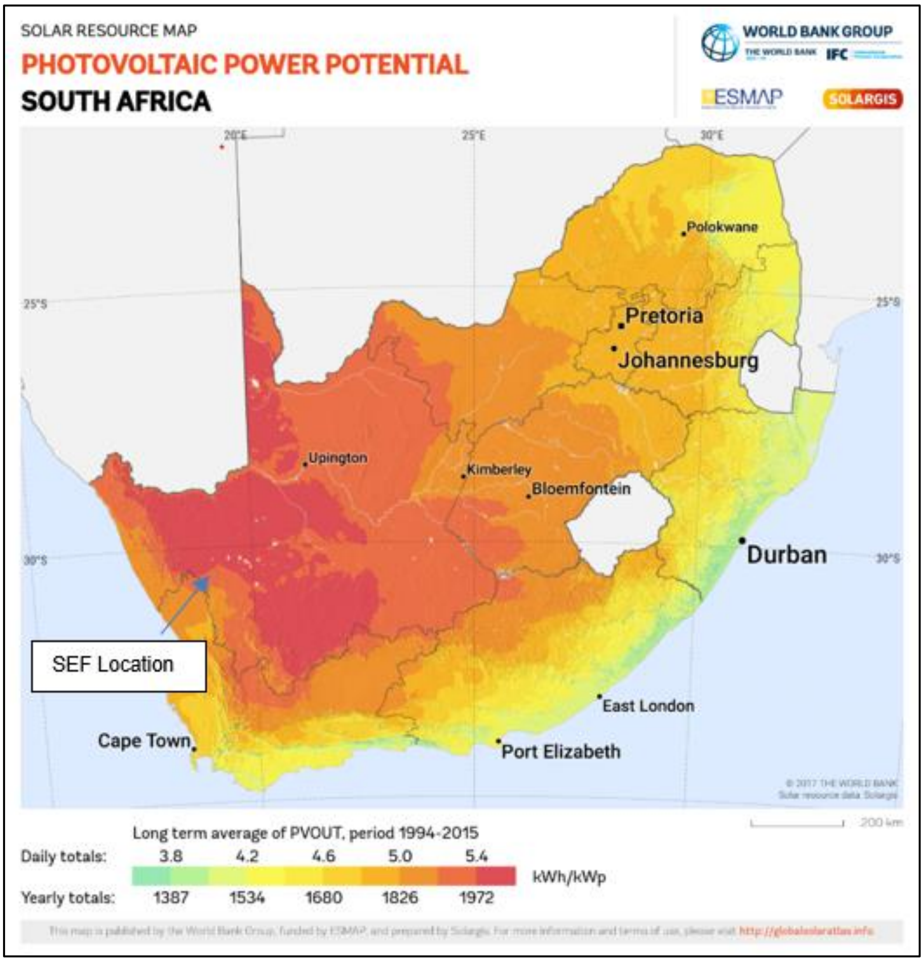


Figure 49: Photovoltaic Power Potential in South Africa

12.3.2 Topography, Site Access and IPP Competition

The surrounding topography is a combination of flat and complex terrains, with the flat terrain is suitable for the development of a solar project. The Project site itself is located on a flat terrain that has the optimal exposure to solar radiation within the immediate area.

The Project site can be accessed from the R355 which is approximately 34km south of the site. Thereafter access to the development area can be obtained via the AP2972, which is approximately 7 km east of the proposed development area. There is an existing road that runs to the east of the site, this has a turnoff that leads directly to the development area.

There is a fair amount of other IPP competition in the area, regarding renewable energy facilities; thus, the Project will further aid in the socio-economic development of the area.

12.3.3 Environmental

All the environmental constraints were considered in the area at the time of undertaking the prefeasibility analysis. Key environmental specialists were consulted with to identify any potential impacts/environmental constraints which may be associated with a proposed SEF at the onset of the project. A terrestrial ecologist was appointed to undertake a detailed pre-feasibility assessment before the applicant decided to proceed with the project. These sensitivities were taken into account from project onset and used to determine the preliminary layout. The National Department of Environmental Affairs (DEA) screening tool was also utilized to generate a site sensitivity report for the proposed project to guide the level of specialist input that would be required.

12.3.4 Land Availability

While the proposed project site is not located in an identified REDZs (however is in strategic transmission corridor), the development of the proposed solar PV energy facility is still considered to be important for South Africa as it will reduce the country's overall environmental footprint from power generation (including externality costs), and thereby steer the country on a pathway towards sustainability. There is very limited land available for the development of renewable energy facilities. ESA, has, however, through speaking with local landowners identified parcels of land available which are suitable for development. After intensive studies around the Northern Cape province, through analyzing the other criteria it was determined that this site has the most ideal conditions for the Project.

The affected landowner has given their consent for the undertaking of the Scoping and EIA Process and the subsequent development of the proposed Lesaka 1 Solar PV project.

In terms of the agricultural assessment, the site has low agricultural potential and no dryland cropping potential predominantly because of aridity constraints. As such, it is not envisioned that farming activities will be negatively impacted by the proposed development.

12.3.5 Access to Grid

Grid connection suitability is the next fundamental element which drives the project location. The project will connect to a new 132/400kV Main Transmission Substation which will be constructed on site. This MTS will connect to the existing Helios Juno 1 400kV crossing the site via a Loop-In-Loop-Out connection.

The grid connection will be assessed in a separate application once a preferred solution is identified.

The site is considered suitable for the reasons provided above. There is therefore no Site Alternative for the proposed Lesaka 1 SEF.

12.4 Realization of Global and Local Commitments

The Project will greatly contribute to the countries' efforts to reduce their carbon emissions and play their role as part of the Paris Climate Accord. The Paris Agreement is a legally binding international treaty signed by 196 countries at the COP 21 in Paris, on the 12th of December 2015 to combat climate change. The goal of the Paris Accord is to limit global warming to well below 2 degrees Celsius, compared to industrial levels to avoid catastrophic natural disasters which are driven by the global temperature increase. Therefore, to achieve this long-term temperature goal, countries aim to reach the global peaking of greenhouse gas emissions swiftly to achieve a climate neutral world by 2050.

The authorization of the Project will further align with South Africa's National Climate Response White Paper which outlines the countries' efforts to manage the impacts of climate change and to contribute to the global efforts to stabilize the Greenhouse gases concentrations in the atmosphere.

12.5 Just Energy Transition

The Just Transition is described as the transition towards a low-carbon and climate-resilient economy that maximizes the benefits of climate action while simultaneously improving the welfare of the workers and their communities. The Project will pave the way for the Just Energy Transition in South Africa and promote the transition from a fossil fuel-based economy to a low carbon economy. South Africa is the seventh largest coal consumer in the world and the leading African carbon emitter, with 471.6 million metric tons of carbon emitted in 2019. South Africa heavily relies on coal to fire up 30 000MW of electricity, which serves an estimated 80% of the country's energy needs.

The Northern Cape is a commodity-rich province, and its economic development is largely dependent on mining. 75% of the worlds' manganese is extracted from the Northern Cape. These mines require energy to operate, thus allowing the further development of renewables in the province will allow for mines to have access to green energy and in turn reduce their carbon footprint. Thus, driving South African mines towards adopting green practices. This will not only aid in reducing the country's overall carbon footprint but also aid in the provision of more green jobs and positively contribute to achieving a Just Transition. It is important to note that to ensure the success of the Just Energy Transition is not only to focus on the transition from fossil fuels to renewable energy resources but to simultaneously ensure the Just Transition of jobs and skills.

The transition towards renewable energy will improve the socio-economic conditions of the Hantam Local Municipality. The Hantam Local Municipality recorded an unemployment rate of 10.6% in 2016, with the majority of its employed in government services and the mining sector. The Project will aid in solving two of the leading challenges faced by most municipalities in the country, namely the cost of electricity and the lack of adequate employment opportunities. The developer foresees this project as being an essential project to realizing a true Just Energy Transition in South Africa.

12.6 Stimulate the economy

A significant portion of the capital expenditure envisaged for the project will be spent on procurement of goods and services within South Africa and specifically within the Northern Cape Province. If goods and services are procured locally (i.e. within South Africa), it increases the production of the respective industries. This has a positive impact on the national economy and economies of the municipalities where inputs are procured.

The proposed development has the potential to stimulate the demand for other industries, among others construction services, engineering service, transport services, steel structures, cement and other aggregates, and electrical equipment. At the local level, increase in demand for accommodation, personal services, perishable and non-perishable goods is expected, which will stimulate the local economies of the towns and settlements, where labour will be procured from or where migrant workers will be temporarily located.

Some of the local businesses could benefit from sub-contracting opportunities, if the construction companies appointed by the developer implement a local community procurement policy, and consumer expenditure of the construction crew. Furthermore, the demand for hospitality services (including accommodation and catering in the town of Loeriesfontein and other nearby towns) is expected to increase and provide for much-needed stimulus for the local economy.

According to the Social Impact Assessment, the development of this project will create employment and business opportunities which will have a positive economic benefit within the region. Job opportunities will be available and many of the low and semi-skilled employment opportunities will be available to residents in the area. Many of the beneficiaries are likely to be historically disadvantaged members of the community and the project will provide opportunities to develop skills for the local people.

The construction phase for the Lesaka 1 SEF will extend over a period of ~18 months. The total wage bill for the construction phase is estimated to be ± R 40 million, where the capital expenditure estimate for the construction phase is ± R 1.5 billion. The construction phase will create approximately 250 employment opportunities. The number of employment opportunities in terms of low skilled, semi-skilled and skilled are as follows: Low skilled: ± 150 (± 60%); Semi-skilled: ± 63 (± 25%); Skilled: ± 37 (± 15%).

The typical lifespan of renewable energy projects is 20 to 25 years, during the operational phase there will be a significant decrease in employment opportunities, hence the potential socio-economic benefits will be limited. The total number of people employed in the operational phase is ± 15. Low and semi-skilled employment opportunities will likely be available for local communities of De Aar, Loeriesfontein and Calvinia, which will benefit to these communities due to the low availability of employment opportunities in these areas.

12.7 Power Generation

The Project will also aid in assisting in overcoming the power shortages that are currently faced in the country. In 2020, South Africa witnessed its longest recorded hours of load shedding, with the power being off for 859 hours of the year. The South African Government has taken strides to try to reduce these power cuts through the implementation of bid Windows in REIPPPP and lifting the independent power generation threshold to 100 MW, but it is still expected that the country will undergo more load shedding. Over the years the construction and management of solar energy facilities has become cheaper, and less time-consuming.

Thus, acting as a faster and more efficient method of meeting the ever-growing demand for electricity in the country. Furthermore, after the COP26, South Africa signed an international partnership that will facilitate the funding of USD 8.5 billion from Germany, France, the USA, the UK, and the European Union over the next three to five years to aid in the country's transition towards a low-carbon economy. This opens an opportunity for Renewable Energy IPPs to aid in the country's quest to reduce its GHG emissions, and also help resolve the ongoing electricity crisis in the country.

The Council for Scientific and Industrial Research (CSIR) reported that renewable energy assisted in relieving pressure on the constrained South African power system during load shedding in the first quarter of 2019. This indicates that renewable energy is a key factor in ensuring that the country does not face further load shedding in the future.

Moreover, Eskom plans to decommission approximately 5 400MW of power generated from coal power stations by the year 2022, 10 500MW by the year 2030, and up to 35 000MW by the year 2050. Subsequently, Eskom has considered options for repurposing these power stations with the core aims of reusing existing power transmission infrastructure, developing new generation capacity, proving ancillary services, and mitigating socio-economic impact. Thus, the Project will assist Eskom achieve its diversification goal as well as contribute positively to meeting the evergrowing demand for electricity in the country.

12.8 Job opportunities and household livelihoods

Solar energy projects create both temporary and permanent job opportunities in South Africa for both skilled and unskilled workers. According to the Social Impact Assessment, the erection of solar PV in the area will create employment opportunities for both skilled and unskilled workers during the construction stage. If recruitment processes are efficiently managed, work opportunities can be localised as much as possible, with a trend visible in the industry that local people will be most ready to take up unskilled jobs, while employment requiring specialised skills tends to attract specialists from across the country. Business opportunities associated with the construction phase may also be open for local enterprises, especially in the supply of goods and services, such as food and other essential supplies.

In addition to those benefitting from direct employment created at the project, various multiplier effects will assist in temporarily supporting existing jobs in the businesses offering services and goods that will be procured during construction activities. The increased temporary income earned by these businesses will, in turn, stimulate consumer spending, creating another round of multiplier effect, positively impacting on the employment situation in the area. There will be opportunities for skills development (refer below) and training.

12.9 Skills development

In addition to the job creation, there is valuable opportunities for skills enhancement/development/training and knowledge transfer as quite often input from experts are required in this field. Therefore, opportunities for guiding and training of local workers is created. A variation of skill sets is required ranging from semi-skilled construction workers to highly skilled engineers. The skill set of the majority of the municipality's residents comprises of low-skills, which means that with proper planning and recruitment strategies, many of the local unemployed residents could be hired as temporary construction workers on site provided they satisfy any other recruitment criteria.

Those employed will either develop new skills or enhance current skills. This insinuates that inexperienced workers will have the opportunity to attain and develop new skills, while experienced workers will further improve their existing skills. Albeit the employment is temporary, the skills attained will be of long-term benefit to employees. However, as any skills set it will need to be supported and practised on a regular basis to maintain its currency.

13. MOTIVATION FOR THE PREFERRED DEVELOPMENT FOOTPRINT WITHIN THE APPROVED SITE AS CONTEMPLATED IN THE SCOPING REPORT

The layout that was included in the Scoping Phase reporting has been refined based on specialist input and a final proposed layout has been compiled for approval (refer to **Figure 51** and **52** below). The proposed layout / preferred development footprint that is being put forward is the most feasible layout configuration. The layout has been refined based on information from the pre-screening phase through to the impact assessment phase which has resulted in a layout where all buildable areas/panels and supporting infrastructure (except for certain roads and caballing) avoids all the sensitivities identified by the specialists. In addition to this, existing road crossings have been used as far as possible.

The SEF facility was identified to be located within areas defined as Critical Biodiversity Area 1 (CBA1), Critical Biodiversity Area 2 (CBA2), Ecological Support Areas (ESA) and Other Natural Areas (ONA) (**Figure 50**). As a result of this, and to ensure that due process was followed, the specialists were consulted with to determine if development within CBA 2 would be considered acceptable from an ecological perspective and specialist opinions letters were thereafter compiled. In consultation with the specialists, the layout was amended to avoid all CBA1 areas, however, it is still located within CBA2 and ONAs. The specialist opinion letters regarding the development within these areas is included in the respective specialist folders in **Appendix 6**.

In this regard, the Aquatic specialist confirmed the following:

"No wetlands were identified within the study area, and thus the criteria for the designated CBA 2 areas within this study area is based solely on the presence of the FEPA catchment of the Rooiberg and Klein Rooiberg river catchments.

Given that the PVSEF1 proposed development footprint almost exclusively fall outside of the development setbacks of the delineated freshwater ecosystems…no change in the Present Ecological State (PES) Category of these freshwater ecosystems is deemed likely. This is provided that the mitigation measures as listed in the freshwater specialist report are strictly applied, with routine monitoring of freshwater ecosystems during the operational phase. For this reason, development of the SEF within a CBA catchment is not deemed an unacceptable land use and can be considered for authorisation from a freshwater resource management point of view".

The terrestrial specialist has confirmed that the CBAs are based on aquatic features and not terrestrial features. <u>The opinion of the terrestrial and avifaunal specialist concluded the following:</u>

"The vegetation unit is not considered threatened or highly sensitive and there are limited sensitive features or important landscape features that, if disturbed or transformed, will result in a catastrophic collapse of the system. The proposed Lesaka SEF does not represent a significant impact on the ecosystem processes and services, except for the main river courses and wetland pans as well as Koppies located on the study area which needs to be excluded from construction activities.

Large sections of the affected area are not considered highly sensitive and there are no specific features of the affected area which would indicate that it is of broad-scale significance for faunal movement or landscape connectivity. The CBA are mainly aquatic related, and as indicated the Hantam Karoo is not a threatened system or highly sensitive, accordingly the CBA is not justified for this, unless certain elements or endemism, rarity or important ecosystem processes have been identified, which this assessment has not.

There is accordingly no reason based on the collected data to indicate that the CBA1 and CBA2 are from a Terrestrial Biodiversity perspective. Should the sensitive areas, specifically the no-go areas with indicated buffers be avoided by the proposed development, and the indicated mitigation measures in the reports be implemented, the proposed Lesaka 1 SEF can proceed".

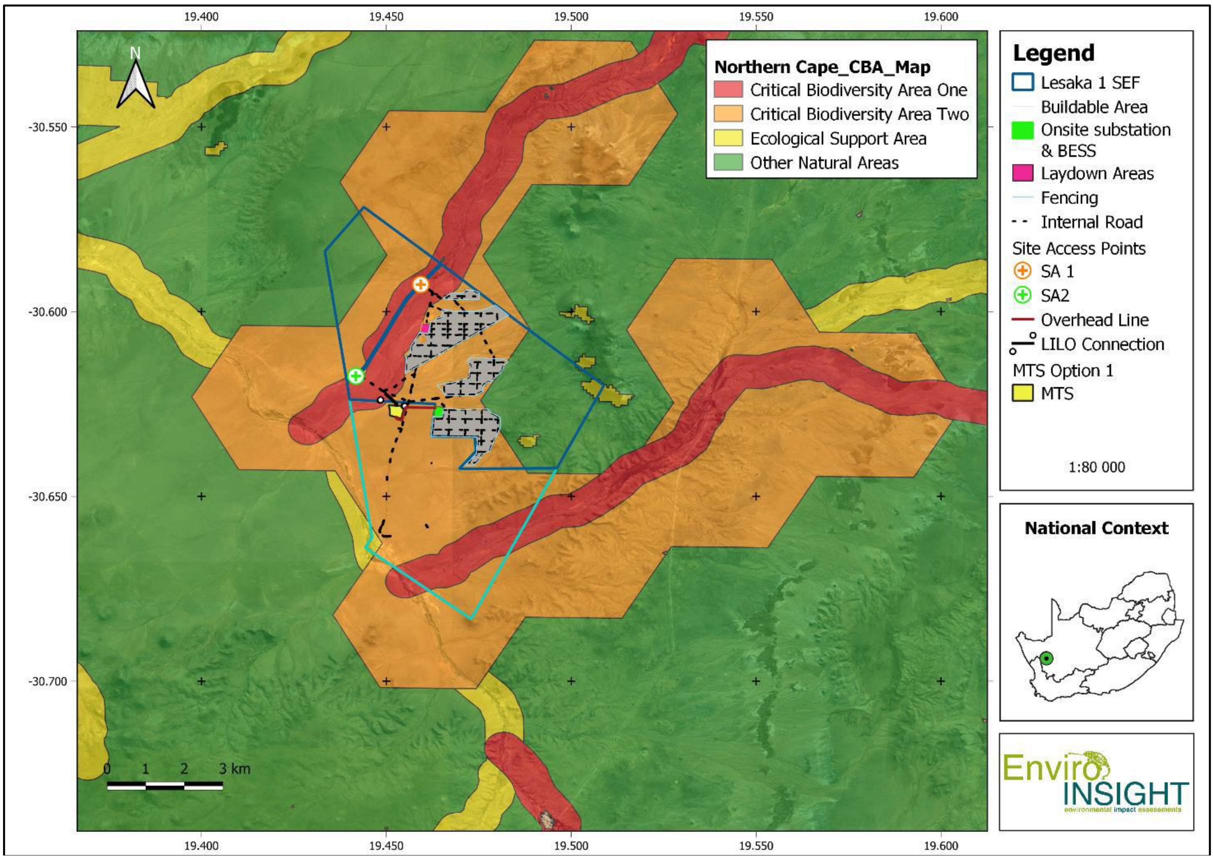


Figure 50: Location of the SEF in relation to the CBA on site

As indicated earlier, the layout was adjusted to ensure that all buildable areas and associated infrastructure falls outside of all development setbacks of the freshwater ecosystems, as well as high sensitivity terrestrial areas and CBA1. Provided all mitigation measures are strictly adhered to, the aquatic specialist has confirmed that no change in the PES of the freshwater systems is likely to take place and the development of the SEF within the landscape is acceptable. The terrestrial specialist confirmed that there is no reason based on the collected data to indicate that the CBA1 and CBA2 are from a terrestrial biodiversity perspective and, provided the no-go areas are adhered to, and the mitigation measures are implemented, the project can proceed.

All constraints identified to date as indicated in the sensitivity mapping below have been taken into account and the buildable areas/panels and supporting infrastructure shifted where necessary to inform the proposed layout for the Lesaka 1 SEF. All buildable areas/panels and associated infrastructure (including the substation, BESS and O&M Building) are placed outside of the no-go areas (which are inclusive of the associated buffers) identified by specialists.

The mitigation hierarchy has been followed in that the avoidance of all high sensitivity areas has been implemented from project onset. The layout was designed as an iterative process in conjunction with a specialist team to avoid impacts as far as possible. All residual impacts will be minimized as far as possible in accordance with a well-designed layout as well as an Environmental Management Programme.

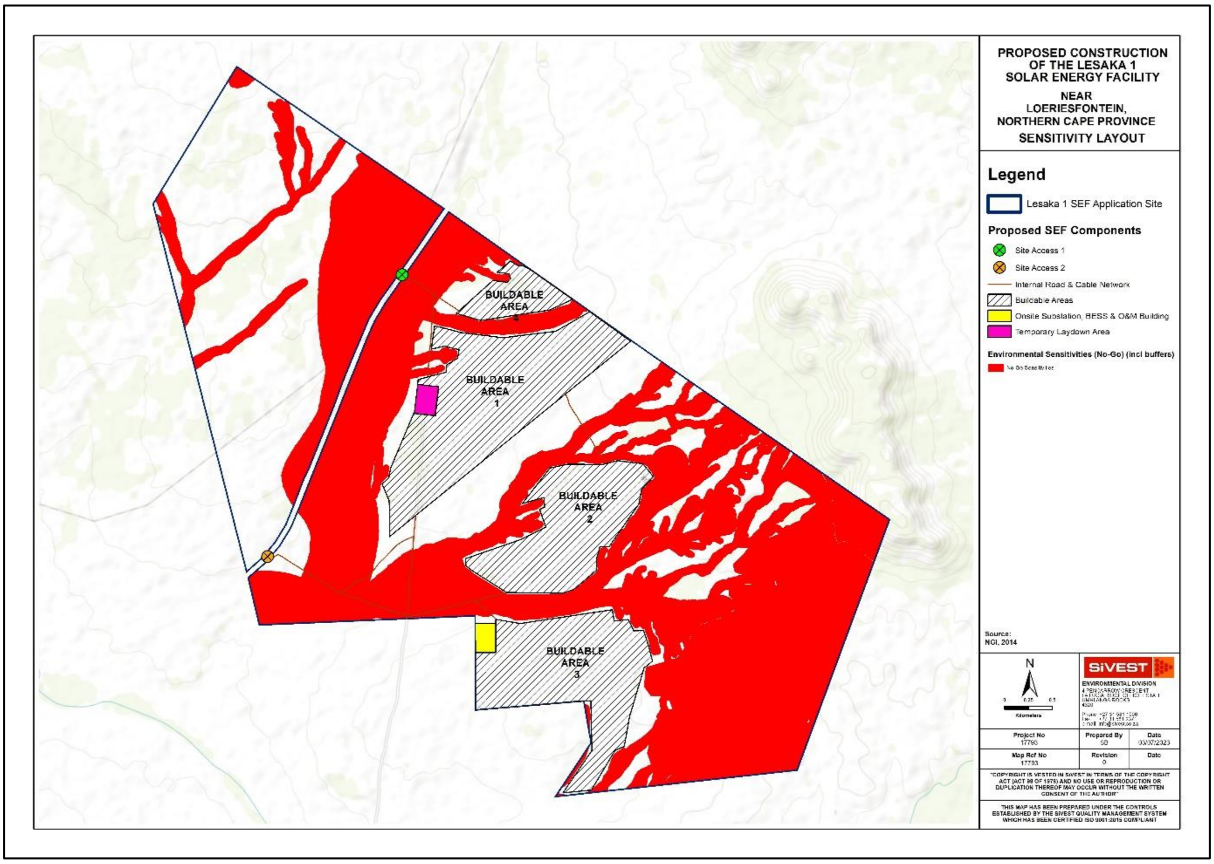


Figure 51: SEF and supporting infrastructure no-go sensitivity layout

The layout provided (revised by scoping phase inputs) has, to a large degree, avoided any sensitive aquatic features and associated buffer areas, significantly reducing the potential overall impact and risk to aquatic resources on the study site. The aquatic specialist has stated that the only exception to development within the no-go areas is road crossings and caballing provided they adhere to the recommendations as contained in the EMPr and are suitably mitigated. The specialist has confirmed that the road layout has been proposed in a manner to, as far as possible, avoid and minimise crossings.

No fatal flaws have been identified by any of the specialists and all impacts can be mitigated to acceptable levels. During the construction phase, almost all of the post-mitigation scores are low, with the exception of the terrestrial ecological as well as avifaunal impact of vegetation clearing/habitat loss which scored a negative medium impact post mitigation. In terms of terms of job creation and economic opportunities, a positive medium rating was identified from a social perspective during the construction phase.

During the operation phase, almost all of the post-mitigation scores were identified as low, however a medium negative impact was identified by the avifaunal specialist for bird mortalities. A medium negative rating was also identified by the visual specialist with regards to the altered sense of place and visual intrusion caused by the PV array and BESS/substation. While it is acknowledged that infrastructure will have an impact on the sense of place within the landscape, the heritage specialist has acknowledged that from a cultural perspective, the naturally undulating landscape is already intermittently interrupted by powerlines and railway lines which detract from the visual quality of the surrounding area. No fatal flaws were identified. Positive medium and high impacts were identified by the social specialist for creation of employment and business opportunities, development of infrastructure to improve energy security as well as benefits for the local community.

For the decommissioning phase, all negative impacts were identified as low, except for the impact of destruction of habitats and scarring as well as waste generated by the decommissioning activities which were identified as medium negative impacts. Where possible, all recyclable materials must be repurposed in an environmentally friendly way.

Cumulatively, negative medium impacts were identified from a social and visual perspective for the areas altered sense of place and change in character of the landscape. There may also be pressure created on local services which could impact the area negatively. The avifaunal specialist identified a very high negative impact as a result of regional saturation of SEF facilities causing habitat loss which is not able to be mitigated quantitatively. The specialist did state however that the necessary buffers for roost sites must be adhered to and all underground cables bisecting sensitive habitats must be placed below the subsurface flow of the ephemeral wetlands with the linear construction pits subjected to full rehabilitation in order to maintain normal subsurface flow. On a positive note however, the establishment of renewable energy facilities and associated projects, such as the SEF, in the Hantam Municipality will create employment, skills development and training opportunities, creation of downstream business opportunities.

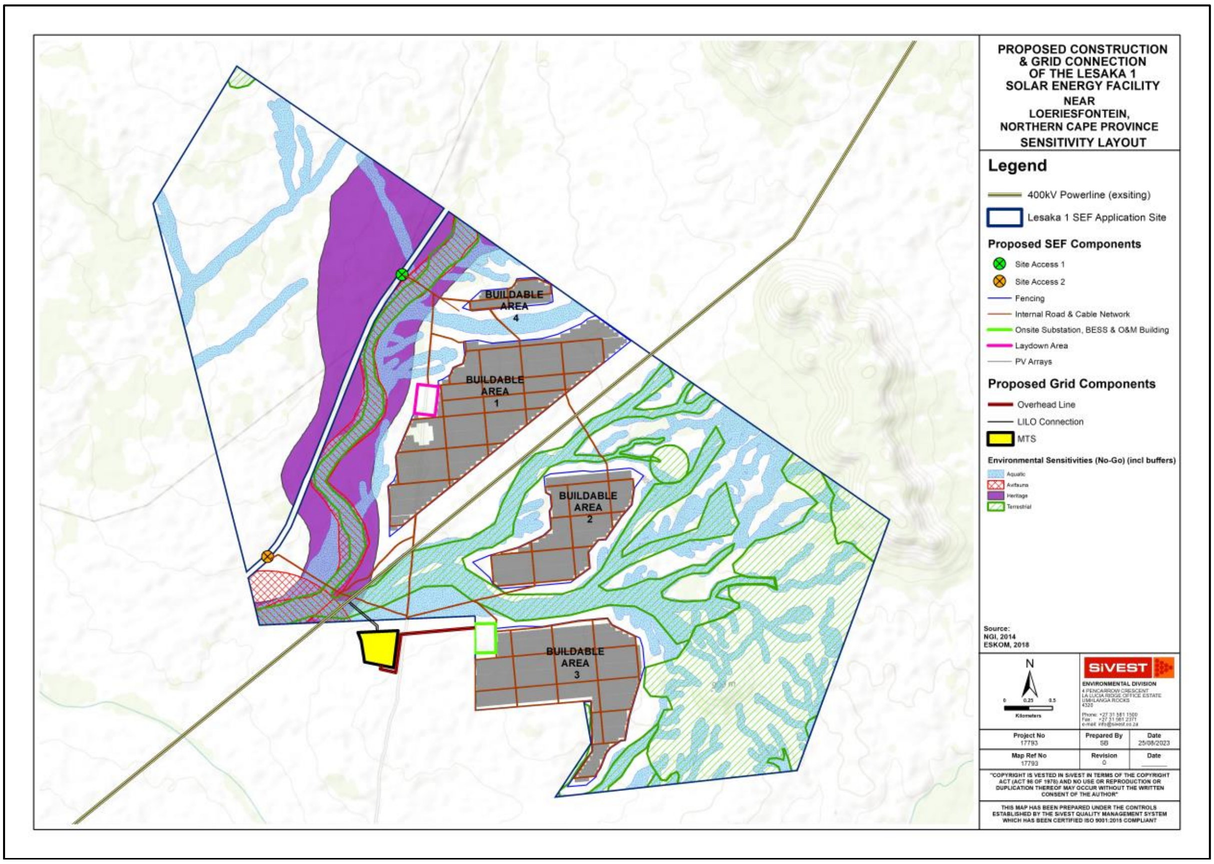


Figure 52: Final proposed layout / development footprint with site sensitivities (grid infrastructure and MTS subject to a separate application

The following updates have been made to the layout:

- All buildable areas/panels are located outside of the no-go areas identified by specialists (all no-go areas of inclusive of the buffers imposed by the various specialists).
- All buildable areas/panels are located outside of all CBA 1 areas.

- The substation, BESS, O&M Building and construction laydown areas have been placed in areas deemed acceptable by the specialists.
- Some associated roads and cables do cross drainage lines in some instances, however existing crossings have been used as far as possible. Specialist recommendations and mitigations will be applied in areas where crossing of drainage lines / watercourses is required.
- The grid infrastructure has been included in the final proposed layout and assessed cumulatively. The grid infrastructure will however be approved in a separate application.

The proposed final layout has therefore considered the sensitivities identified throughout the process and has informed the final proposed development footprint and layout put forward for authorisation.

14. DETAILS OF PROCESS FOLLOWED TO REACH THE PREFERRED OPTION

14.1 Details of alternatives

As per Chapter 1 of the EIA regulations (2014), as amended, feasible and reasonable alternatives are required to be considered during the EIA process. Alternatives are defined as "*different means of meeting the general purpose and requirements of the activity*". These alternatives may include:

(a) The property on which or location where it is proposed to undertake the activity;
(b) The type of activity to be undertaken;
(c) The design or layout of the activity;
(d) The technology to be used in the activity;
(e) The operational aspects of the activity; and
(f) The option of not implementing the activity.

Each of these alternatives are discussed in relation to the proposed development in the sections below. The EIA Regulations, 2010 guideline document stipulates that the environmental investigation needs to consider feasible alternatives for the proposed development. The developer should be encouraged to consider alternatives that would meet the objective of the original proposal and which could have an acceptable impact on the environment. The role of alternatives in the EIA process is therefore to find the most effective way of meeting the need and purpose of the proposal, either through enhancing the environmental benefits of the proposed activity, and/or through reducing or avoiding potentially significant negative impacts.

14.1.1 Location/Site alternatives

As discussed above, the selection of a potential solar farm site includes several key aspects including solar resource, grid connection suitability/infrastructure as well as environmental and social constraints, topography and access. This proposed project site was selected based on the above criteria ahead of other regional properties / sites due to the cumulative assessment of all criteria. This internal process takes several weeks to complete and ensures that the least environmentally sensitive property / site is selected in the specific region of development.

Based on the reasons above no site alternatives have been considered during the EIA process for this proposed development. The placement of solar energy facilities is dependent on the factors discussed above, all of which are favourable at the proposed site location. The proposed project site has topography which is suitable for the development of a SEF and is in close proximity to a grid connection that has been identified to have sufficient capacity to evacuate the generation. In addition, the proposed site is easily accessible off the public gravel roads R355 and AP2972. The site is therefore considered highly suitable for the proposed development of a SEF and no other locations have been considered.

14.1.2 The type of activity to be undertaken

No other activity alternatives have been considered. Renewable Energy developments in South Africa are highly desirable from a social, environmental and development perspectives respectively. The importance of renewable energy has been outlined in **Section 10** and **11** above highlighting national, district and local support. The solar resource in this area along with the rapid advancements in solar energy technology efficiency serves as further motivations for the proposed development.

South Africa is under immense pressure to provide clean sources of electricity generating capacity in order to reduce the current electricity demand from aging and polluting coal-fired power stations. With the global focus on climate change, the government is under severe pressure to explore alternative energy sources in addition to coal-fired power stations. Although solar energy is not the only solution to solving the energy crisis in South Africa, it is a suitable sustainable solution to the energy crisis and this project could contribute to addressing the problem. This project will thus aid in achieving South Africa’s goals in terms of sustainability, energy security, mitigating energy cost risks, local economic development and national job creation.

14.1.3 The technology to be used in the activity

The importance of renewable energy has been outlined in **Section 10** and **11** above highlighting national, district and local support. The solar resource in this area advocates for the use of Solar PV technology in order to generate energy. Advancements in Solar PV technology presents a renewable and sustainable way for countries like South Africa to generate low cost energy from a natural resource.

14.1.4 Design or layout of the activity

The preliminary layout was based on an avoidance approach in which the development avoids the high sensitivity environments. While alternatives for the construction laydown area were identified and comparatively assessed by the specialists during the Scoping Phase, the detailed in-field investigations undertaken by the specialists identified additional high sensitivity environments and the layout was then updated and refined to incorporate the constraints identified by the various specialists. The layout has been designed to avoid sensitive areas as far as possible.

14.1.5 No – go option

The option of not implementing the activity, or the “no-go” alternative, has been considered in the EIA process. South Africa is under immense pressure to provide clean sources of electricity generating capacity in order to reduce the current electricity demand from aging and polluting coal-fired power stations. With the global focus on climate change, the government is under severe pressure to explore alternative energy sources in addition to coal-fired power stations. Although solar energy is not the only solution to solving the energy crisis in South Africa, not establishing the proposed SEF and associated infrastructure would be detrimental to the mandate that the government has set to promote the implementation of renewable energy. It is a suitable sustainable solution to the energy crisis and this project could contribute to addressing the problem. This project will thus aid in achieving South Africa’s goals in terms of sustainability, energy security, mitigating energy cost risks, local economic development and national job creation.

The no-go alternative assumes that the proposed project will not go ahead i.e., it is the option of not developing the proposed Lesaka 1 SEF. This alternative would result in no environmental, social or economic impacts (positive or negative) from the proposed project on the site or surrounding local area.

The following implications will occur if the no-go alternative is implemented (i.e., the proposed project does not proceed):

- No benefits will be realised from the implementation of an additional land-use being energy generation;
- No additional power will be generated or supplied through means of renewable energy solar resources at this project at this location;
- There will be lost opportunity for skills transfer and education / training of local communities;
- The positive socio-economic impacts likely to result from the project such as increased local spending and the creation of local employment opportunities will not be realized;
- There will be a loss of job creation opportunities from the construction and operation phases, where job creation is identified as a key priority;
- Not contributing to future demand for additional power generation in a most economic and rapid manner.
- Loss of economic benefit to participating landowners due to the revenue that will be gained from leasing the land to the developer.
- No contribution to assist the government in addressing climate change, energy security and economic development.

No fatal flaws have been identified by the specialists and all have indicated that project should proceed with the proposed mitigation measures taken into account.

14.2 Details of Public Participation Process undertaken

Public participation is the cornerstone of any EIA. The principles of the National Environmental Management Act (NEMA) as well as the EIA Regulations (as amended 2017) govern the EIA process, including public participation. These include provision of sufficient and transparent information on an ongoing basis to stakeholders to allow them to comment, and ensuring the participation of previously disadvantaged people, women and the youth. All documents relating to the PP process have been included in **Appendix 5**.

14.2.1 Public Participation Process completed for the Scoping Phase

The aim of the Scoping phase was to collect the issues, concerns and queries of interested and affected parties (I&APs) and determine the scope of the following phase of the EIA. The main objective of the Scoping phase was to:

- Inform the stakeholders about the proposed project and the environmental assessment process to be followed;
- Provide opportunity to all parties to exchange information and express their views and concerns;
- Obtain contributions from stakeholders (including the client, consultants, relevant authorities and the public) and ensure that all issues, concerns and queries raised are fully documented;
- Evaluate the issues raised and identify the significant issues; and
- Provide comment on how these issues are to be assessed as part of the Environmental Impact Assessment Process.

The comment periods during the scoping phase were implemented according to the EIA Regulations, 2014 (as amended). The comment periods which have been implemented during the Scoping phase (as set out by the EIA Regulations, 2014) were as follows:

Comment and review period for the Draft Scoping Report (DSR)

- The DSR underwent a 30-day comment and review period that ran from the **10th of March 2023 until 12th of April 2023** (excluding public holidays).
- An I&AP database was compiled which includes all affected landowners, adjacent landowners, occupiers of affected and adjacent land, other I&APs, key stakeholders (such as OoS) and other surrounding project developers. The I&AP database is included in **Appendix 5**.
- Issuing of the notifications and initial landowner consultation were circulated to all I&APs on the 9th of March 2023 as part of the Draft Scoping Report (proof included in **Appendix 5**).
- Placement of site notices in English and Afrikaans (as per regulations) were placed along the entrance road to the application site and around the site itself as well as in the town of Loeriesfontein on the 7th and 8th of March 2023 (proof included in **Appendix 5**).
- Public notification of the EIA Process was advertised in a local newspaper (namely the Noordwester Uitgewers) on the 10th March 2023, as required according to Regulation 41(2)(c) of the EIA Regulations (2014), as amended. Proof is included in **Appendix 5**.
- Reminder notifications of the closing of the DSR comment period were sent out on the 4th and 12th of April 2023 in order to ensure that comments and/or concerns were received from OoS and/or registered I&APs.

Availability of report for review:

- The Draft Scoping Report was made available on SiVEST's website for download.
- Electronic copies were made available to parties upon request for the documentation.
- CDs / Flash drive to be posted to stakeholders, onl.y if requested.
- The Draft Scoping Report was available for review at the following locations:
    - Hantam Local Municipality, 13 Long St, Loeriesfontein, 8185.

Summary of issues raised

Issues, comments and concerns raised during the Scoping phase public participation process have been captured in the Comments and Response Report (C&RR). The C&RR provides a summary of the comments received and issues raised by I&APs and key stakeholders, as well as the responses provided. This information has been used to feed into the evaluation of environmental and social impacts and has also been taken into consideration when compiling this report. All comments received to date have been included in the C&RR and attached in **Appendix 5**.

The Final Scoping Report was accepted by DFFE on the 25th of May 2023.

14.2.2 Public Participation Process undertaken for the EIA Phase

Public participation forms a critical component of the EIA process, as it provides all interested and affected parties with an opportunity to learn about a project, but more importantly to understand how a project will impact on them. The following will be undertaken during the EIA Phase (as per the approved Final Scoping Report and Plan of Study):

- The Draft EIA Report underwent a 30-day comment and review period that ran from Tuesday 25th of July 2023 until Thursday the 24th of August 2023 (excluding public holidays).
- The I&AP database was updated and includes all affected landowners, adjacent landowners, occupiers of affected and adjacent land, other I&APs, key stakeholders (such as OoS) and other surrounding project developers. The I&AP database is included in **Appendix 5**.
- Issuing of the notifications was circulated to all registered I&APs on the 25th of July 2023 as part of the Draft EIA Report (proof included in **Appendix 5**).
- Reminder notifications of the closing of the Draft EIA Report comment period were sent out on the 1st of August 2023, 15th of August 2023 and 24th of August 2023 to ensure that comments and/or concerns were received from the OoS and/or registered I&APs.
- All comments received from I&APs and the responses thereto were included in this final EIA Report, which has been submitted to DFFE.
- A copy of the Draft EIA Report was made available at the Hantam Local Municipality, 13 Long St, Loeriesfontein.
- The Comments and Response Report was updated and is included in the Final EIA Report, which records the date that issues were raised, a summary of each issue, and the response of the team to address the issue. The Final EIA Report with all comments included has been submitted to DFFE for review and approval.
- All I&APs will be notified via email, sms or fax after having received written notice from DFFE on the final decision on the application. These notifications will include the process required to lodge an appeal, as well as the prescribed timeframes in which documentation should be submitted.

14.3 Impact Assessment

The potential impacts for the identified environmental aspects have been assessed and mitigation measures identified below (refer **Appendix 6**).

14.3.1 Planning

None identified.

14.3.2 Construction Phase

ENVIRONMENTAL PARAMETER	ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION									RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION								
		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S
Aquatic / Freshwater																				
Habitat and biota (inclusive of the vegetation component) and ecological structure of the freshwater ecosystems identified in the study area.	Potential **direct impacts** caused by **construction** of the following proposed infrastructure components that directly traverse freshwater ecosystems: Within delineated freshwater ecosystem – No-Go area: • Access Roads • Cable laying alongside access roads. These direct impacts may result in: • Trampling by construction personnel and equipment is likely to impact on the riparian and instream vegetation, leading to habitat degradation; • Net loss of habitat and ecological structure provided by the freshwater ecosystems; and • Source of sedimentation and smothering of freshwater ecosystem habitat.	2	4	3	3	3	3	45	-	High	**GENERAL MITIGATION MEASURES:** • All development footprint areas to remain as small as possible and vegetation clearing to be limited to what is essential; • Retain as much indigenous freshwater vegetation as possible; • All vegetation removed as part of the site clearing activities (specifically where large areas need to be cleared) must be stockpiled in designated areas (outside the 32 m NEMA ZoR) or disposed of at a registered waste disposal facility; and • Regular spraying of water alone or in conjunction with chemical dust suppressants must be implemented where possible to reduce dust and to ensure that no smothering of vegetation within the freshwater ecosystems occurs from excessive dust settling during construction activities associated with surface infrastructure – within close proximity to a freshwater ecosystem (required at road crossings and for infrastructure located within the 32 m NEMA ZoR). **MITIGATION MEASURES PERTAINING TO THE NEW ROAD AND CABLE CROSSINGS AND THE UPGRADING OF EXISTING ROADS:** Due to the nature of this proposed development, it is acknowledged that the road freshwater ecosystem crossings cannot be avoided, thus a direct negative impact is expected to occur on the freshwater ecosystems. Nevertheless, the following mitigation measures are applicable for the construction of new freshwater ecosystem crossings and the upgrading of existing freshwater ecosystem crossings:	1	2	2	2	2	2	18	-	Low

ENVIRONMENTAL PARAMETER	ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION									RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION								
		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S
											• The design of the new road crossings should ensure that no concentration of flow occurs thus reducing the risk of erosion and incision,. As such, vegetation must be established in the construction footprint immediately after the construction of the road/ installation of cables is complete and as directed by the ECO; • New road crossings must, as far as possible, intersect the freshwater ecosystem at a right angle (perpendicular) to minimise disturbance to the freshwater ecosystem; • During the construction of roads, upgrading of internal roads and associated cable installation that may potentially traverse freshwater ecosystems, a construction corridor of no more than 5 m on either side of the proposed road reserve through the freshwater ecosystems may be impacted. This area must be cordoned off, and no vehicles or personnel are permitted outside of the authorised construction area; • Soils excavated from the cable trench must be stockpiled immediately upgradient of the trench. Once the cable is installed the trench must be backfilled with the removed material and suitably compacted to avoid any erosion and preferential flow paths from forming; and • Any remaining soils following the completion of backfilling of the trenches are to be spread out thinly in an area within the freshwater ecosystems to aid in the natural reclamation process.									
Habitat and biota (inclusive of the vegetation component) and ecological structure of the freshwater ecosystems identified in the study area.	Potential **direct impacts** caused by **construction upgrades** of the following proposed infrastructure components that directly traverse freshwater ecosystems: Within delineated freshwater ecosystem – No-Go area: • Upgrading of existing sections of Access Roads in the study area which traverses several freshwater ecosystems. These direct impacts may result in: • Trampling by construction personnel and equipment is likely to impact on the riparian and instream vegetation, leading to habitat	2	4	3	2	3	3	42	-	Medium	**GENERAL MITIGATION MEASURES:** • All development footprint areas to remain as small as possible and vegetation clearing to be limited to what is essential; • Retain as much indigenous freshwater vegetation as possible; • All vegetation removed as part of the site clearing activities (specifically where large areas need to be cleared) must be stockpiled in designated areas (outside the 32 m NEMA ZoR) or disposed of at a registered waste disposal facility; and • Regular spraying of water alone or in conjunction with chemical dust suppressants must be implemented where possible to reduce dust and to ensure that no smothering of vegetation within the freshwater ecosystems occurs from excessive dust settling during construction activities	1	2	2	2	2	2	18	-	Low

ENVIRONMENTAL PARAMETER	ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION									RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION								
		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S
	degradation; • Potential additional loss of habitat and ecological structure provided by the freshwater ecosystems; and • Potential changes to ecological and socio-cultural service provision.										associated with surface infrastructure – within close proximity to a freshwater ecosystem (required at road crossings and for infrastructure located within the 32 m NEMA ZoR). **MITIGATION MEASURES PERTAINING TO THE NEW ROAD AND CABLE CROSSINGS AND THE UPGRADING OF EXISTING ROADS:** Due to the nature of this proposed development, it is acknowledged that the road freshwater ecosystem crossings cannot be avoided, thus a direct negative impact is expected to occur on the freshwater ecosystems. Nevertheless, the following mitigation measures are applicable for the construction of new freshwater ecosystem crossings and the upgrading of existing freshwater ecosystem crossings: • The design of the new road crossings should ensure that no concentration of flow occurs thus reducing the risk of erosion and incision,. As such, vegetation must be established in the construction footprint immediately after the construction of the road/ installation of cables is complete and as directed by the ECO; • New road crossings must, as far as possible, intersect the freshwater ecosystem at a right angle (perpendicular) to minimise disturbance to the freshwater ecosystem; • During the construction of roads, upgrading of internal roads and associated cable installation that may potentially traverse freshwater ecosystems, a construction corridor of no more than 5 m on either side of the proposed road reserve through the freshwater ecosystems may be impacted. This area must be cordoned off, and no vehicles or personnel are permitted outside of the authorised construction area; • Soils excavated from the cable trench must be stockpiled immediately upgradient of the trench. Once the cable is installed the trench must be backfilled with the removed material and suitably compacted to avoid any erosion and preferential flow paths from forming; and • Any remaining soils following the completion of backfilling of the trenches are to be spread out thinly in an area within the freshwater ecosystems to aid in the natural reclamation process.									

ENVIRONMENTAL PARAMETER	ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION									RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION								
		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S
Habitat and biota (inclusive of the vegetation component) and ecological structure of the freshwater ecosystems identified in the study area.	Potential **indirect impacts** caused by **construction** of the following proposed infrastructure components not directly traversing freshwater ecosystems: Within 100m (GN509) – medium sensitivity area • Solar array buildable areas 1 – 4 Outside 100m ZoR (GN509 – low sensitivity area • Onsite substation and BESS • Temporary laydown area and construction camp These indirect impacts may result in: • Disturbance to the buffer zone surrounding the freshwater ecosystem, making the freshwater ecosystems vulnerable to the invasion of alien and invasive vegetation species; and • Source of sedimentation and smothering of freshwater ecosystem habitat	1	2	2	2	2	2	18	-	Low	• It should be feasible to utilise existing roads to gain access to the proposed construction area. Use must be made of existing and newly authorised freshwater ecosystem crossings and no indiscriminate crossing of the freshwater ecosystems outside of the existing crossing points or driving indiscriminately in the veld within the buffer zones of the freshwater ecosystems may be permitted. This will avoid any disturbance to the terrestrial vegetation; • No other terrestrial vegetation areas may be disturbed by the proposed construction activities for the surface infrastructure, other than the approved proposed footprint areas; • During excavation activities, the topsoil and vegetation that is removed should be stockpiled separately from other material outside of the 32 m NEMA ZoR; • Excavated materials should not be contaminated, and it should be ensured that the minimum surface area is taken up, so as to not impact on any vegetation (freshwater ecosystem or terrestrial). The mixture of the lower and upper layers of the excavated soil should be kept to a minimum, so as for later use as backfill material after construction has commenced; • All exposed soils must be protected for the duration of the construction phase to prevent potential erosion, sedimentation and smothering (through dust and potential run-off) of the vegetation in the surrounding area; and • After construction of the surface infrastructure, the area surrounding the surface infrastructure must be revegetated with suitable indigenous vegetation (terrestrial vegetation) to prevent the establishment of alien vegetation species and their potential spread into the freshwater ecosystems.	1	1	1	1	1	1	5	-	Low
Geomorphological processes (including sediment balance and erosion control) of the freshwater ecosystems identified in the study area.	Potential **direct impacts** caused by **construction upgrades** of the following proposed infrastructure components that directly traverse freshwater ecosystems: Within delineated freshwater ecosystem – No-Go area: • Upgrading of existing sections of Access Roads in the study area which traverses several freshwater ecosystems. These direct impacts may result in:	2	4	3	2	3	3	42	-	Medium	• The design of the new road crossings should ensure that no concentration of flow occurs thus reducing the risk of erosion and incision,. As such, vegetation must be established in the construction footprint immediately after the construction of the road/ installation of cables is complete and as directed by the ECO; • New road crossings must, as far as possible, intersect the freshwater ecosystem at a right angle (perpendicular) to minimise disturbance to the freshwater ecosystem; • During the construction of roads, upgrading of internal roads and associated cable installation that may potentially traverse freshwater ecosystems, a construction corridor of no more than 5 m on either side of the proposed road reserve through the freshwater ecosystems may be	1	2	2	2	2	2	18	-	Low

ENVIRONMENTAL PARAMETER	ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION									RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION								
		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S
	• Excavation and trenching leading to stockpiling of soil within close proximity to the active channel of the freshwater ecosystems; • Movement of construction equipment and personnel within the freshwater ecosystem leading to increased turbidity; • Disturbances of soils leading to potential impacts to the freshwater ecosystem vegetation, increased alien vegetation proliferation in the footprint areas, and in turn to altered freshwater ecosystem habitat; and • Altered runoff patterns, leading to increased erosion and sedimentation of the freshwater ecosystems and disturbance of geomorphological processes.										impacted. This area must be cordoned off, and no vehicles or personnel are permitted outside of the authorised construction area; • Soil excavated from the cable trench must be stockpiled immediately upgradient of the trench. Once the cable is installed the trench must be backfilled with the removed material and suitably compacted to avoid any erosion and preferential flow paths from forming; • Any remaining soil following the completion of backfilling of the trenches are to be spread out thinly in an area within the freshwater ecosystems to aid in the natural reclamation process; and • Construction of the proposed surface infrastructure may result in disturbance to the natural buffer zone surrounding the freshwater ecosystems which may result in the reduction of surface roughness. This can be mitigated by ensuring that no concentrated runoff from the surface infrastructure construction area enters the freshwater ecosystems.									
Geomorphological processes (including sediment balance and erosion control) of the freshwater ecosystems identified in the study area.	Potential **indirect impacts** caused by **construction** of the following proposed infrastructure components not directly traversing freshwater ecosystems: Within 100m (GN509) – medium sensitivity area • Solar array buildable areas 1 – 4 Outside 100m ZoR (GN509) – low sensitivity area • Onsite substation and BESS • Temporary laydown area and construction camp These indirect impacts may result in: • Reduction in the surface roughness surrounding the freshwater ecosystems leading to altered runoff patterns, leading to increased erosion and sedimentation of the freshwater ecosystems and disturbance of geomorphological processes.	1	2	2	2	2	2	18	-	Low	• It should be feasible to utilise existing roads to gain access to the proposed construction area. Use must be made of existing and newly authorised freshwater ecosystem crossings and no indiscriminate crossing of the freshwater ecosystems outside of the existing crossing points or driving in unmarked areas through the buffer zones of the freshwater ecosystems may be permitted. This will avoid any disturbance to the terrestrial vegetation. This will avoid any disturbance to the soils surrounding the freshwater ecosystems and any sediment laden runoff; and • Concentrated flow from the construction footprint areas can be mitigated by ensuring that no concentrated runoff from the surface infrastructure construction area enters the freshwater ecosystems.	1	1	1	1	1	1	5	-	Low

ENVIRONMENTAL PARAMETER	ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION									RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION								
		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S
Hydrological functioning and surface water quality (if present) within the freshwater ecosystems identified in the study area.	Potential **direct impacts** caused by **construction** of the following proposed infrastructure components directly traversing freshwater ecosystems: Within delineated freshwater ecosystem (No-Go area) • Access Roads • Cable laying alongside access roads These direct impacts may result in: • Construction in the freshwater ecosystems may result in potential changes to the pattern, flow and timing of water entering the downstream portion of the freshwater ecosystem when surface water is present (during rainfall season); • Potential alterations to the runoff patterns, leading to increased erosion and sedimentation of the freshwater ecosystem; and • Constriction of flow leading to turbulent erosive flow of increased velocity or possible loss of recharge to downstream areas, impacting on downstream biota.	2	4	3	3	3	3	45	-	High	• It is considered imperative that all works be undertaken during the dry period to limit surface water contamination and the need for any surface water diversion during the construction works (diverting the flow of water through a pipe or an excavated channel was not included as part of this risk assessment). In so doing, the severity of impact to the hydrological functioning will be significantly reduced as would the frequency of an impact; • The design of the road and cable crossings should ensure adequate flow connectivity between the upstream and downstream portions of the freshwater ecosystems. Thus, the gravel road and cable trenches must be level with the freshwater ecosystem bed to allow water to flow over the road surface (avoid constriction of flow and alteration of flow pattern) and no drop may form downgradient of the road crossing which may result in concentrated flow and subsequent erosion; • Road crossings must be broad enough to allow for surface water (when present) connectivity over the entire width of the active channel of the freshwater ecosystem. This can be achieved by ensuring that the embankments of the freshwater ecosystem are adequately sloped (3:1 ratio recommended) to allow free flowing of surface water. • All excavated trenches must be compacted to natural soil compaction levels to prevent the formation of preferential surface flow paths and subsequent erosion/incision.	1	2	2	2	2	2	18	-	Low
Hydrological functioning and surface water quality (if present) within the freshwater ecosystems identified in the study area.	Potential **direct impacts** caused by **construction upgrades** of the following proposed infrastructure components that directly traverse freshwater ecosystems: Within delineated freshwater ecosystem (No-Go area) • Upgrading of existing sections of Access Roads which traverse several freshwater ecosystems. These direct impacts may result in: • Construction in the freshwater ecosystems may result in potential changes to the pattern, flow and timing of water entering the downstream portion of the freshwater	2	4	3	2	3	3	42	-	Medium	• Construction of the proposed surface infrastructure may result in disturbance to the natural buffer zone surrounding the freshwater ecosystems which may result in the reduction of surface roughness and cause concentrated surface runoff into the freshwater ecosystems.	1	2	2	2	2	2	18	-	Low

ENVIRONMENTAL PARAMETER	ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION									RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION								
		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S
	ecosystem when surface water is present (during rainfall season); • Potential alterations to the runoff patterns, leading to increased erosion and sedimentation of the freshwater ecosystem; and • Constriction of flow leading to turbulent erosive flow of increased velocity or possible loss of recharge to downstream areas, impacting on downstream biota.																			
Hydrological functioning and surface water quality (if present) within the freshwater ecosystems identified in the study area.	Potential **indirect impacts** caused by **construction** of the following proposed infrastructure components not directly traversing freshwater ecosystems: Within 100m (GN509) – medium sensitivity area • Solar array buildable areas 1 – 4 Outside 100m ZoR (GN509 – low sensitivity area • Onsite substation and BESS • Temporary laydown area and construction camp These indirect impacts may result in: • Potential alteration to the surface water flow patterns leading to concentrated surface flow into the freshwater ecosystems; • Higher flood peaks into the freshwater ecosystems due to reduced surface roughness (sinuosity) of the areas surrounding the infrastructure.	1	2	2	2	2	2	18	-	Low	• It should be feasible to utilise existing roads to gain access to the proposed construction area. Use must be made of existing and newly authorised freshwater ecosystem crossings and no indiscriminate crossing of the freshwater ecosystems outside of the existing crossing points or driving in unmarked areas through the buffer zones of the freshwater ecosystems may be permitted. This will avoid/minimise any additional disturbance to the hydrological regime of the freshwater ecosystems. • High flood peaks from the construction footprint areas can be mitigated by ensuring that no concentrated runoff from the surface infrastructure construction area enters the freshwater ecosystems. The velocity of surface water flow from these areas must be reduced by ensuring that the vegetation in the buffer area surrounding the freshwater ecosystems are intact or by the strategic placement of silt traps consisting of haybales as a means to obstruct flow but still allow flow to percolate at a reduced velocity and encourages a diffuse flow pattern. • Concrete may be utilised as part of the surface infrastructure activities. The following mitigation measures are applicable to prevent any impacts to the hydrological functioning of the freshwater ecosystems: ○ No mixed concrete may be deposited outside of the designated construction footprint; ○ As far as possible, concrete mixing should be restricted to the contractor laydown area. Additionally, batter / dagga board mixing trays and impermeable sumps should be provided, onto which any mixed concrete can be deposited while it awaits placing; and ○ Concrete spilled outside of the demarcated area must be promptly removed and taken to a suitably licensed waste disposal site.	1	1	1	1	1	1	5	-	Low
Terrestrial Ecology																				

ENVIRONMENTAL PARAMETER	ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION									RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION								
		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S
Habitat Loss and Fragmentation	Vegetation clearing for access roads, solar arrays and their service areas and other infrastructure will impact on vegetation.	2	4	3	3	3	4	60	-	High	• Placement of infrastructure within High Sensitivity areas must be avoided. • Ensure that lay-down and other temporary infrastructure is within low sensitivity areas, preferably previously transformed areas where possible. • Minimise the development footprint as far as possible. • Rehabilitate disturbed areas that are no longer required by the operational phase of the development. Inadequate rehabilitation could result in limited revegetation and/or an invasion of alien vegetation which will result in long term ecological degradation and damage. • A Rehabilitation Management Plan must be developed and implemented during the construction phase as construction is complete at each site. • The number of roads should be reduced to the minimum possible and routes should also be adjusted to avoid areas of high sensitivity as far as possible. Where possible, existing roads must be used to avoid additional habitat loss and fragmentation. • Demarcate all areas to be cleared with construction tape or other appropriate and effective means. However, caution should be exercised to avoid using material that might entangle fauna. • An Environmental Control Officer (ECO) must be employed to monitor the clearing of vegetation for the construction of roads and hardstands.	1	3	2	3	3	3	36	-	Medium
Loss of species of conservation concern (SCC), including national and provincial protected species and protected trees	Vegetation clearing for access roads, solar arrays and their service areas and other infrastructure will impact on SCC.	1	4	3	3	4	4	60	-	High	• A comprehensive Plant Search and Rescue must be undertaken by a suitably qualified botanical specialist prior to vegetation clearance during the construction phase. • All relevant plant permits must be obtained from the provincial authority prior to the removal or relocation of SCC, including provincially protected species. • Demarcate sensitive species with the appropriate buffers which must be excluded from development activities. A 200m buffer is applied to sensitive species 144. • Plant SCC (excluding sensitive species 144 which must be protected in situ) found within the proposed site must either be housed in an onsite nursery for use during rehabilitation or be relocated to suitable areas where vegetation clearance will not occur.	1	2	2	2	2	3	27	-	Medium
Alien and invasive plant species	Disturbance could see an increase of alien invasive plant species at disturbed areas.	2	3	2	2	3	4	48	-	High	• A site-specific Alien Invasive Species (AIS) Management Plan must be implemented during the construction phase and continued monitoring and eradication needs to take place throughout the life of the project. • Alien vegetation, within the development footprints, should	1	2	2	2	2	2	18	-	Low

ENVIRONMENTAL PARAMETER	ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION									RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION								
		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S
											be removed from the site and disposed of at a registered waste disposal site. • The development footprints and immediate surroundings should be monitored for the growth/regrowth of alien vegetation throughout the construction and operation phases of the project.									
Increased risk of erosion and flash floods	Disturbance would leave the site vulnerable to wind and water erosion.	2	3	2	3	3	3	39	-	Medium	• Soil Erosion and Rehabilitation Plan to be part of the EMPr. • The clearance of vegetation, at any given time, must be kept to a minimum to reduce the possibility of soil erosion. • Rehabilitation of eroded areas on a regular basis during the construction period. • All roads and other hardened surfaces should have runoff control features which redirect water flow and dissipate any energy in the water which may pose an erosion risk. • Regular monitoring for erosion after construction to ensure that no erosion problems have developed as result of the disturbance.	2	2	2	2	2	2	20	-	Low
Disturbances or displacement impacts on fauna including traffic, noise and dust	Could result in an increase in noise and dust within the proposed site and surrounds which could have negative impacts on faunal activity including breeding and feeding.	2	3	2	3	3	3	39	-	Medium	• Ground clearing and the digging of trenches should ideally take place at the end of the dry season, prior to the first rains in order to minimise the impacts of dust. • Newly cleared and exposed areas must be managed for dust and landscaped with indigenous vegetation to avoid soil erosion. Where necessary, temporary stabilisation measures must be used until vegetation establishes. • Speed restrictions (40 km per hour is recommended) should be in place to reduce the amount of dust caused by vehicle movement along the roads, and to reduce possible fauna fatalities with vehicle collisions. • Driving around in the area as well as noise levels at night should be limited, as should the use of harsh lights which could cause light pollution for nocturnal species. • Where appropriate, sound dampeners must be used. • Avoid the presence of people and vehicles in highly sensitive areas as far as possible. • Fences should be constructed in such a way so that burrowing animals can still gain access. • Strict measures should be put into place to prevent workers from poaching and hunting naturally occurring fauna.	1	2	2	2	2	2	18	-	Low
Agricultural - none identified																				
Avifauna																				

ENVIRONMENTAL PARAMETER	ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION									RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION								
		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S
Habitat destruction	Significant habitat loss (including foraging and breeding) and fragmentation due to displacement (avoidance of disturbance) because of infrastructure installation (panels, powerlines, roads, fences and sub surface cables) and associated dust effects. Habitat loss has the tendency to not only destroy existing habitat but also displace bird species from large areas of natural habitat. This specifically has a greater impact on bird species restricted to a specific habitat and its requirements.	3	4	4	4	4	3	66	-	Very High	• Impacts associated with the loss of bird foraging habitat due to construction activity cannot be mitigated in relation to the majority of the habitats but can be mitigated by avoiding avifaunal specific highly sensitive areas and their associated buffers, such as the local drainage lines, impoundments, smaller watercourses, high value sandy dunes, pans and rocky koppies. • The overall severity of the impact can be reduced to being insignificant if avoidance mitigation is applied related to the positioning of the panels and supporting infrastructure and minimisation mitigation is applied. • Finally, and for all panel infrastructure, commencement of construction should be, if possible, limited to the months of December, January, February, March, April, May, September, October, November (latest) to minimise dust effects and subsequent destruction of the avifaunal habitats, especially during foraging and breeding season. **SPECIFIC MITIGATIONS FOR WETLAND AND WATERBODY CROSSINGS** The Site Development Plan (SDP) provided clearly shows potential interaction between infrastructure and designated High Sensitivity avifaunal features. Methods used for constructing linear infrastructure (such as buried powerlines, pipelines, raised powerlines, roads) across wetlands or drainage lines will vary, depending on the nature of wetland hydrology and soils. Thus, the following specific prescribed mitigations as well as guiding principles and "best practice" are described below. • An ECO should be appointed in order to consult with the engineers regarding the technical requirements of the following mitigations. Changes may be allowed as per the ECOs discretion. • Horizontal directional drilling is preferred for the crossing of wetlands, • If as is more typical, an open trench is dug, mitigations should be implemented to reduce impacts to wetland hydrology and soil structure. • All pipeline corridors (affected areas) should be implemented to a maximum 10 metres wide through wetlands during construction. • During construction, laydown areas must be located in uplands a minimum of 35 metres from the wetland edge. • Construction equipment used while working in wetlands is	2	2	2	2	4	2	24	-	Medium

ENVIRONMENTAL PARAMETER	ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION									RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION								
		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S
											limited to only those pieces that are essential and non-essential equipment is allowed to travel through wetlands only once during deployment and once during extraction. • During vegetation clearing, sediment barriers such as silt fences must be installed and maintained adjacent to wetlands. • The method of pipeline construction used in wetlands depends on the stability of the soils. Overall, topsoil is first removed and stored separately from the subsoil. Where wetland soils are saturated, segregating topsoil is not possible. Large timber mats placed ahead of the construction equipment can provide a stable working platform and protect wetland soils by spreading the weight of the construction equipment over a broad area. • Generally, the preferred method for crossing an actively flowing waterbody with a pipeline is horizontal directional drilling as compared to open-cut trenching. With this method, a hole is dug below the stream crossing and pulling a prefabricated section of pipe through the hole. The goal is for zero interruption to flow. • Open-cut crossings involve cutting a trench across the waterbody while water flows through the trenching area. Where the water is shallow enough, it may be diverted by flumes and pumps. A flume pipe may be placed to divert the water around the trenching area. Pumps in combination with dams may also be used to divert the water during open-cut trenching. **Wetland Road Design and Construction Practices** • All road construction should preferably take place in the dry season. • A temporary road in a wetland needs to provide adequate crossroad drainage at all natural drainageways. Temporary drainage structures include culverts, bridges, and porous material. • Prior to construction, areas of infrastructure placement must be graded flat so as not to cause vegetation root mat loss or restriction to sub surface flow. Topsoil storage must be enacted. Construction of roads must occur at natural ground level (not below) to minimize to restricting water flow. • Limit or restrict the construction of fill roads. All fill roads must use a permeable fill material (such as gravel or crushed rock) for at least the first layer of fill in order to									

ENVIRONMENTAL PARAMETER	ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION									RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION								
		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S
											maintain the natural flow regimes of subsurface water. • It is preferable to eliminate fill roads and utilise raised bridges and culverts with adequate sizing and spacing of water crossing structures, proper choice of the type of crossing structure, and installation of drainage structures at a depth adequate to pass subsurface flow.									
Disturbance of bird roosts and breeding sites	The destruction or disturbance of bird roosts during the construction phase.	3	4	3	4	2	3	48	-	High	As with other impacts, this impact can be mitigated by preferably timing construction to May, June, July and August in order to avoid breeding periods of species within the sensitive drainage lines, wetlands and the general region. If construction takes place outside of May, June, July and August, all noise generated by machinery and maintenance operations must be kept to a minimum.	2	3	2	2	2	2	22	-	Low
Disturbance due to noise such as, machinery movements and maintenance operations	Disturbance (including of nesting SCC) due to noise such as, machinery movements and maintenance operations during the construction phase the proposed PV solar farm causing loss of offspring for a generation.	3	3	1	2	3	3	36	-	Medium	As with other impacts, this impact can be mitigated by preferably timing construction to May, June, July and August in order to avoid breeding periods of species within the sensitive drainage lines, wetlands and the general region. If construction takes place outside of May, June, July and August, all noise generated by machinery and maintenance operations must be kept to a minimum.	3	2	1	2	3	2	22	-	Low
Hydrological																				
Changes in Catchment Water Resources due to:	Impeding or diverting the flow of water in a watercourse.	1	4	2	2	3	2	24	-	Medium	Storm water management infrastructure development such as diversion berms channels and silt management though silt traps and silt fences	1	2	1	2	1	1	7	-	Low
Changes in Catchment Water Resources due to:	Altering the characteristics of catchment areas.	1	1	2	2	1	1	7	-	Low	The proposed development is associated with the conversion of natural areas to developed areas. This is likely to alter the hydrological characteristics of the immediate areas associated with development. This impact is largely limited to the project site and is therefore associated with a low significance level. Natural vegetation should be re-established to represent the previously undisturbed environment as closely as possible.	1	1	1	1	1	1	5	-	Low
Reduction in Catchment Water Quality due to:	Erosion from disturbed open ground areas during construction (Disturbed and unconsolidated soil and stockpile).	2	4	2	2	2	2	24	-	Medium	Any rainfall falling onto open ground during the construction phase may result in erosion and sediment being transported into the nearby streams. Clearing of vegetation and associated excavation areas should be kept to a minimum, particularly in areas where soils are unstable. Mitigation measures include the implantation of flow control measures upstream of a construction site (through berms) and limiting sediment from being eroded from a construction site (through silt fences).	1	2	1	1	1	1	6	-	Low
Reduction in Catchment Water Quality due to:	Contamination of the watercourses and down slope stream areas by spills of cement and other construction-related hazardous chemicals.	1	2	1	1	1	2	12	-	Low	The storage/handling of fuel, lubricants and chemicals will require special attention due to their hazardous nature as is the case with the laydown areas. These areas are required to be managed on impermeable floors with appropriate bunding,	1	1	1	1	1	1	5	-	Low

ENVIRONMENTAL PARAMETER	ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION									RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION								
		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S
										Low	sumps and roofing.									
Reduction in Catchment Water Quality due to:	Contamination of the watercourses and down slope stream areas by spills of hydrocarbons from construction vehicles and workshop areas.	2	3	2	2	2	2	22	-	Low	There is an inherent risk of spillage from machinery and hydrocarbon stores, particularly during the construction phase.	1	1	1	1	1	1	5	-	Low
Reduction in Catchment Water Quality due to:	Disturbance to vegetation cover thus reducing the site's natural ability to biofilter the surface runoff and groundwater reaching downstream drainage lines.	1	4	2	2	2	2	22	-	Low	Clearing of vegetation on site will result in change of biodiversity, degradation of the topsoil due to erosion and presence of suspended solids in surface runoff. Retention or rehabilitation of the natural land-cover and drainage of the site (post construction or decommissioning) will also serve to limit potential increases in erosion.	1	3	2	2	1	1	9	-	Low
Changes in Flood Hydrology due to:	An increase in impervious areas.	2	4	2	2	2	2	24	-	Medium	Due to the conversion of permeable surfaces to impermeable surfaces (i.e. internal roads, construction camps, laydown areas, storage areas, and PV panel infrastructure), the peak discharge rate of local streams will be increased. The impact of this is associated with a medium significance rating.	1	4	2	1	2	2	20	-	Low
Changes in Flood Hydrology due to:	Impeding flow.	1	4	2	1	3	2	22	-	Low	Stream diversions are proposed near the buildable area, the construction camp/laydown area, and the substation area, which is likely to impede the natural flow of water across the site.	1	3	2	1	2	2	18	-	Low
Geotechnical																				
Substation and BESS: Disturbance/ displacement/ removal of soil and rock	Ground disturbance during access road construction, foundation earthworks, platform earthworks.	1	4	2	2	2	1	11	-	Low	• Design access roads, foundations and post locations to minimise earthworks and levelling based on high resolution ground contour information. • Correct topsoil and spoil management.	1	4	2	1	2	1	10	-	Low
Substation and BESS: Soil Erosion.	Increased erosion due to vegetation clearing, alteration of natural drainage.	1	3	2	2	2	1	10	-	Low	• Avoid development in preferential drainage paths. • Appropriate engineering design of road drainage and watercourse crossings. • Temporary berms and drainage channels to divert surface runoff where needed. • Landscape and rehabilitate disturbed areas timeously (e.g. regressing). • Use designated access and laydown areas only to minimise disturbance to surrounding areas.	1	2	1	1	2	1	7	-	Low
SEF 1: Disturbance/ displacement/ removal of soil and rock	Ground disturbance during access road construction, foundation earthworks, platform earthworks.	1	4	2	2	3	1	12	-	Low	• Design access roads and post locations to minimise earthworks and levelling based on high resolution ground contour information. • Correct topsoil and spoil management.	1	4	2	1	2	1	10	-	Low

ENVIRONMENTAL PARAMETER	ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION									RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION								
		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S
SEF 1: Soil Erosion	Increased erosion due to vegetation clearing, alteration of natural drainage.	1	3	2	2	3	1	11	-	Low	• Avoid development in preferential drainage paths. • Appropriate engineering design of road drainage and watercourse crossings. • Temporary berms and drainage channels to divert surface runoff where needed. • Landscape and rehabilitate disturbed areas timeously (e.g., regressing). • Use designated access and laydown areas only to minimise disturbance to surrounding areas.	1	2	1	1	2	1	7	-	Low
Social																				
Impact assessment of employment and business creation opportunities during the construction phase.	Creation of employment and business opportunities during the construction phase.	2	2	2	1	1	2	16	+	Low	**Employment** • Preparation and implementation of a Stakeholder Engagement Plan (SEP) prior to and during the construction phase. • Where reasonable and practical, the proponent should appoint local contractors and implement a 'locals first' policy, especially for semi and low-skilled job categories. However, due to the low skills levels in the area, the majority of skilled posts are likely to be filled by people from outside the area. • Where feasible, efforts should be made to employ local contactors that are compliant with Broad Based Black Economic Empowerment (BBBEE) criteria. • Before the construction phase commences the proponent should meet with representatives from the HM to establish the existence of a skills database for the area. If such as database exists, it should be made available to the contractors appointed for the construction phase. • The local authorities, community representatives, and organisations on the interested and affected party database should be informed of the final decision regarding the project and the potential job opportunities for locals and the employment procedures that the proponent intends following for the construction phase of the project. • Where feasible, training and skills development programmes for locals should be initiated prior to the initiation of the construction phase. • The recruitment selection process should seek to promote gender equality and the employment of women wherever possible. **Business**	2	3	3	2	1	3	27	+	Medium

ENVIRONMENTAL PARAMETER	ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION									RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION								
		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S
											• The proponent should liaise with the HM with regards the establishment of a database of local companies, specifically BBBEE companies, which qualify as potential service providers (e.g. construction companies, catering companies, waste collection companies, security companies etc.) prior to the commencement of the tender process for construction contractors. These companies should be notified of the tender process and invited to bid for project-related work. • Where possible, the proponent should assist local BBBEE companies to complete and submit the required tender forms and associated information. • The HM, in conjunction with the local business sector and representatives from the local hospitality industry, should identify strategies aimed at maximising the potential benefits associated with the project. Note that while preference to local employees and companies is recommended, it is recognised that a competitive tender process may not guarantee the employment of local labour for the construction phase.									
Assessment of impact of the presence of construction workers in the area on local communities	Potential impacts on family structures and social networks associated with the presence of construction workers.	2	3	2	2	1	3	30	-	Medium	• Preparation and implementation of a Stakeholder Engagement Plan (SEP) prior to and during the construction phase. • Preparation and implementation of a Community Health, Safety and Security Plan (CHSSP) prior to and during the construction phase. • The SEP and CHSSP should include a Grievance Mechanism that enables stakeholders to report resolve incidents. • Where possible, the proponent should make it a requirement for contractors to implement a 'locals first' policy for construction jobs, specifically for semi and low-skilled job categories. • The proponent should consider the option of establishing a Monitoring Forum (MF) in order to monitor the construction phase and the implementation of the recommended mitigation measures. The MF should be established before the construction phase commences, and should include key stakeholders, including representatives from local communities, local councillor, farmers and the contractor(s). The MF should also be briefed on the potential risks to the local community associated with construction workers.	2	2	1	1	1	2	14	-	Low

<table>
<tr><th rowspan="2">ENVIRONMENTAL PARAMETER</th><th rowspan="2">ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE</th><th colspan="9">ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION</th><th rowspan="2">RECOMMENDED MITIGATION MEASURES</th><th colspan="9">ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION</th></tr>
<tr><th>E</th><th>P</th><th>R</th><th>L</th><th>D</th><th>I / M</th><th>TOTAL</th><th>STATUS (+ OR -)</th><th>S</th><th>E</th><th>P</th><th>R</th><th>L</th><th>D</th><th>I / M</th><th>TOTAL</th><th>STATUS (+ OR -)</th><th>S</th></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>• The proponent and the contractor(s) should, in consultation with representatives from the MF, develop a code of conduct for the construction phase. The code should identify which types of behaviour and activities are not acceptable. Construction workers in breach of the code should be dismissed. All dismissals must comply with the South African labour legislation.
• The proponent and the contractor should implement an HIV/AIDS and COVID-19 awareness programme for all construction workers at the outset of the construction phase.
• The construction area should be fenced off before construction commences and no workers should be permitted to leave the fenced off area.
• The contractor should provide transport for workers to and from the site on a daily basis. This will enable the contactor to effectively manage and monitor the movement of construction workers on and off the site.
• Where necessary, the contractors should make the necessary arrangements to enable low and semi-skilled workers from outside the area to return home over weekends and/ or on a regular basis. This would reduce the risk posed to local family structures and social networks.
• The contractor must ensure that all construction workers from outside the area are transported back to their place of residence within 2 days for their contract coming to an end.
• It is recommended that no construction workers, with the exception of security personnel, should be permitted to stay over-night on the site.</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>Risk to safety, livestock, and farm infrastructure</td><td>Potential risk to safety of farmers and farm workers, livestock and damage to farm infrastructure associated with the presence of construction workers on site.</td><td>2</td><td>3</td><td>2</td><td>2</td><td>1</td><td>3</td><td>30</td><td>-</td><td>Medium</td><td>• Preparation and implementation of a Stakeholder Engagement Plan (SEP) prior to and during the construction phase.
• Preparation and implementation of a Community Health, Safety and Security Plan (CHSSP) prior to and during the construction phase.
• The construction area should be fenced off prior to the commencement of the construction phase. The movement of construction workers on the site should be confined to the fenced off area.
• The proponent should enter into an agreement with the local farmers in the area whereby damages to farm property etc. during the construction phase will be compensated for. The agreement should be signed before the construction phase commences.</td><td>2</td><td>2</td><td>1</td><td>1</td><td>1</td><td>2</td><td>14</td><td>-</td><td>Low</td></tr>
</table>

ENVIRONMENTAL PARAMETER	ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION									RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION								
		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S
											• Traffic and activities should be strictly contained within designated areas. • Strict traffic speed limits must be enforced on the farm. • All farm gates must be closed after passing through. • Contractors appointed by the proponent should provide daily transport for low and semi-skilled workers to and from the site. This would reduce the potential risk of trespassing on the remainder of the farm and adjacent properties. • The proponent should consider the option of establishing a MF (see above) that includes local farmers and develop a Code of Conduct for construction workers. This committee should be established prior to commencement of the construction phase. The Code of Conduct should be signed by the proponent and the contractors before the contractors move onto site. • The proponent should hold contractors liable for compensating farmers and communities in full for any stock losses and/or damage to farm infrastructure that can be linked to construction workers. This should be contained in the Code of Conduct to be signed between the proponent, the contractors', and neighbouring landowners. The agreement should also cover loses and costs associated with fires caused by construction workers or construction related activities (see below). • The Environmental Management Plan (EMP) must outline procedures for managing and storing waste on site, specifically plastic waste that poses a threat to livestock if ingested. • Contractors appointed by the proponent must ensure that all workers are informed at the outset of the construction phase of the conditions contained on the Code of Conduct, specifically consequences of stock theft and trespassing on adjacent farms. • Contractors appointed by the proponent must ensure that construction workers who are found guilty of stealing livestock and/or damaging farm infrastructure are dismissed and charged. This should be contained in the Code of Conduct. All dismissals must be in accordance with South African labour legislation. • It is recommended that no construction workers, with the exception of security personnel, should be permitted to stay over-night on the site.									

ENVIRONMENTAL PARAMETER	ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION									RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION								
		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S
Increased risk of grass fires.	Potential loss of livestock, crops and houses, damage to farm infrastructure and threat to human life associated with increased incidence of grass fires.	2	3	2	2	1	3	30	-	Medium	• The proponent should prepare a Community Health, Safety and Security Plan (CHSSP) prior to commencement of the construction phase. • The proponent should enter into an agreement with the local farmers in the area whereby damages to farm property etc., during the construction phase will be compensated for. The agreement should be signed before the construction phase commences. • The option of establishing a firebreak around the perimeter of the site prior to the commencement of the construction phase should be investigated. • Contractor should ensure that open fires on the site for cooking or heating are not allowed except in designated areas. • Smoking on site should be confined to designated areas. • Contractor to ensure that construction related activities that pose a potential fire risk, such as welding, are effectively managed and are confined to areas where the risk of fires has been reduced. Measures to reduce the risk of fires include avoiding working in high wind conditions when the risk of fires is greater. In this regard special care should be taken during the high-risk dry, windy summer months. • Contractor should provide adequate fire-fighting equipment on-site, including a fire fighting vehicle. • Contractor to provide fire-fighting training to selected construction staff. No construction staff, with the exception of security staff, to be accommodated on site overnight. • As per the conditions of the Code of Conduct, in the advent of a fire being caused by construction workers and or construction activities, the appointed contractors must compensate farmers for any damage caused to their farms. The contractor should also compensate the fire-fighting costs borne by farmers and local authorities.	2	2	1	1	1	2	14	-	Low
Nuisance impacts associated with construction related activities.	Potential noise, dust and safety impacts associated with construction related activities.	1	3	2	2	1	3	27	-	Medium	• The proponent should prepare a Community Health, Safety and Security Plan (CHSSP) prior to commencement of the construction phase. • The movement of construction vehicles on the site should be confined to agreed access road/s. • Establishment of a Grievance Mechanism that provides local farmers and other road users with an effective and efficient mechanism to address issues related to construction related impacts, including damage to local gravel farm roads. • The movement of heavy vehicles associated with the construction phase should be timed to avoid times days of	1	2	1	1	1	2	12	-	Low

ENVIRONMENTAL PARAMETER	ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION									RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION								
		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S
											the week, such as weekends, when the volume of traffic travelling along the access roads may be higher. • Dust suppression measures should be implemented, such as wetting on a regular basis and ensuring that vehicles used to transport sand and building materials are fitted with tarpaulins or covers. • All vehicles must be road worthy, and drivers must be qualified and made aware of the potential road safety issues and need for strict speed limits.									
Heritage																				
Impacts to archaeological heritage resources	Construction activities that take place near to archaeological resources may result in their destruction.	1	3	4	4	4	3	48	-	High	• No development activities within the high archaeological sensitivity area identified. • Should any previously unknown archaeological resource be impacted during construction, work must cease in the vicinity of the find and the relevant heritage authority must be contacted.	1	1	4	4	4	1	14	-	Low
Impacts to palaeontological resources	Construction activities that take place near to palaeontological resources may result in their destruction.	1	2	4	4	4	1	15	-	Low	• Implementation of the Chance Fossil Finds Protocol.	1	2	4	4	4	1	15	-	Low
Impacts to the cultural landscape	Construction activities that take place near to cultural landscape elements may result in their destruction	1	2	1	3	1	3	24	-	Medium	• Implementation of the recommendations included in the VIA.	1	1	4	1	4	1	11	-	Low
Visual																				
Altered Sense of Place and Visual Intrusion caused by Construction Activities	Dust generated during construction will be visually unappealing and may detract from the visual quality (and sense of place) of the area. These impacts are typically limited to the immediate area surrounding the construction site, during the construction period.	2	4	1	2	1	3	30	-	Medium	• Limit vegetation clearance and the footprint of construction to what is absolutely essential. • Consolidate the footprint of the construction camp to a functional minimum. • Avoid excavation, handling and transport of materials which may generate dust under very windy conditions. • Keep stockpiled aggregate and sand covered to minimise dust generation. • Keep construction site tidy.	2	3	1	2	1	2	18	-	Low
Transportation																				
Additional Traffic Generation	Increase in traffic	2	4	1	2	1	3	30	-	Medium	• Group transportation of staff. • Stagger material, component and abnormal loads deliveries. • Schedule deliveries for off-peak times. • Adequate enforcement of traffic laws. • Construct on-site concrete batching plant to reduce trips.	2	4	1	2	1	2	20	-	Low

ENVIRONMENTAL PARAMETER	ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION									RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION								
		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S
Additional Traffic Generation	Increase of Incidents with pedestrians and livestock	2	4	2	4	1	2	26	-	Medium	• Upgrade of existing / new access points. • Reduce and control speed of vehicles. • Safe accommodation of pedestrians. • Implement pedestrian safety initiatives. • Regularly maintain farm fences & access cattle grids.	2	3	2	4	1	1	12	-	Low
Additional Traffic Generation	Increase in road maintenance	2	3	2	2	2	2	22	-	Low	• Avoid deliveries in wet weather. • Implement a road maintenance program under the auspices of the respective transport department.	2	3	2	2	1	2	20	-	Low
Abnormal Loads	Additional abnormal loads	3	2	1	2	1	1	9	-	Low	• Stagger abnormal load deliveries. • Schedule abnormal load deliveries for off-peak times. • Ensure compliance with permits. • Adequate enforcement of the law.	3	2	1	2	1	1	9	-	Low
Abnormal Loads	New / larger access points	1	4	1	2	1	1	9	-	Low	• Adequate road signage according to the SARTSM. • Approval from the respective roads department.	1	4	1	2	1	1	9	-	Low

14.3.3 Operational Phase

ENVIRONMENTAL PARAMETER	ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION									RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION								
		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S
Aquatic / Freshwater																				
Habitat and biota (inclusive of the vegetation component) and ecological structure of the freshwater ecosystems identified in the study area.	Potential **direct impacts** caused by the **operation** of the following proposed infrastructure components that directly traverse freshwater ecosystems: • Access Roads These direct impacts may result in: • Continued use of road may result in the disturbance of vegetation and biota of the freshwater ecosystems; and	1	3	2	2	4	3	36	-	Medium	• No indiscriminate driving through the freshwater ecosystems may be permitted. Use must be made of the existing freshwater ecosystem crossings only; • Unnecessary disturbances surrounding the perimeter of the surface infrastructure must be avoided; • Vehicles used in the development site must be regularly washed (within a non-permeable area or off-site) to avoid the dispersal of seeds on any alien or invasive species into the freshwater ecosystems; • Ensure that routine inspections and monitoring of any instream infrastructure are undertaken to manage the establishment of indigenous vegetation and reduce the	1	2	2	1	3	2	18	-	Low

ENVIRONMENTAL PARAMETER	ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION									RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION								
		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S
	• Proliferation of opportunistic alien and invasive species due to ongoing disturbances										presence of any alien or invasive plant species; and • Monitoring for the establishment for alien and invasive vegetation species must be undertaken, specifically at the road crossings and surface infrastructure areas. Should alien and invasive plant species be identified, they must be removed and disposed of as per an alien and invasive species control plan and the area must be revegetated with suitable indigenous vegetation.									
Habitat and biota (inclusive of the vegetation component) and ecological structure of the freshwater ecosystems identified in the study area.	Potential **indirect impacts** caused by the **operation** of the following proposed infrastructure components not directly traversing freshwater ecosystems: Within 100 m (GN509) – medium sensitivity area • Solar array buildable areas 1– 4 Outside 100m ZoR (GN509 – low sensitivity area • Onsite substation and BESS These indirect impacts may result in: • Disturbance to the buffer zone surrounding the freshwater ecosystem, making the freshwater ecosystems vulnerable to the invasion of alien and invasive vegetation species; and • Reduction in the surface roughness surrounding the freshwater ecosystems.	1	1	2	1	2	2	14	-	Low	• No indiscriminate movement of construction equipment in the buffer zones surrounding the freshwater ecosystems may be permitted. Use must be made of the existing roads only; • Vehicles used in the development site must be regularly washed (within a non-permeable area or off-site) to avoid the dispersal of seeds on any alien or invasive species into the surrounding terrestrial environment and the subsequent dispersal thereof into the freshwater ecosystems; and • Ensure that routine inspections and monitoring of surface infrastructure are undertaken to manage the establishment of indigenous vegetation and the presence of any alien or invasive plant species, so as to reduce the spread of such species into the freshwater ecosystems.	1	1	1	1	1	1	5	-	Low
Geomorphology, hydrological functioning and surface water quality (if present) of the freshwater ecosystems identified in the study area.	Potential **direct impacts** caused by the **operation** of the proposed infrastructure components that directly traverse freshwater ecosystems: Within delineated freshwater ecosystem – No-Go area • Access roads These direct impacts may result in: • Concentrated runoff from the road/surface infrastructure leading to erosion and subsequent sedimentation of the freshwater ecosystems (increase in the sediment load) and turbulent flows when surface water is present; and	1	4	2	2	4	3	39	-	Medium	• Routine maintenance of the roads must be undertaken to ensure that no concentration of flow and subsequent erosion occurs due to the road crossings/instream infrastructure. Such maintenance activities must specifically be undertaken after high rainfall events; • Stormwater runoff from the road crossings should be monitored (by the Operation and Maintenance (O&M) Manager), to ensure that no erosion of the freshwater ecosystems occurs. Stormwater should be allowed to diffusely spread across the landscape, by ensuring adequate surface roughness in the freshwater ecosystem (through vegetation and rocky areas); • Maintenance vehicles must make use of dedicated access roads and no indiscriminate movement in the freshwater ecosystems may be permitted; • During periodic maintenance activities of the roads/surface infrastructure, monitoring for erosion should be undertaken;	1	2	2	1	3	2	18	-	Low

ENVIRONMENTAL PARAMETER	ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION									RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION								
		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S
	• Higher flood peaks into the freshwater ecosystems due to reduced surface roughness in the freshwater ecosystems and immediate vicinity of the surface infrastructure.										and • Should erosion be observed, caused by the road crossings/instream infrastructure, the area must be rehabilitated by infilling the erosion gully and revegetation thereof with suitable indigenous vegetation. Use can also be made of rocks collected from the surrounding area to infill any area prone to erosion, as a natural dispersal mechanism.									
Geomorphology, hydrological functioning and surface water quality (if present) of the freshwater ecosystems identified in the study area.	Potential **indirect impacts** caused by the **operation** of the following proposed infrastructure components that do not directly traverse freshwater ecosystems: Within 100m (GN509) – medium sensitivity area • Solar array buildable areas 1 – 4 Outside 100m ZoR (GN509 – low sensitivity area • Onsite substation and BESS These indirect impacts may result in: • Concentrated surface water entering the freshwater ecosystems leading to erosion and adding to the sediment load of the freshwater ecosystems; and • Contaminated surface water (from cleaning activities) may enter the freshwater ecosystems.	1	1	2	1	2	2	14	-	Low	• No water used as part of the SEF cleaning activities may enter the freshwater ecosystems. It should be ensured that the water is collected in stormwater management systems within the development area. This must be included in the Stormwater Management Plan for the proposed SEF development; and • No concentrated surface water flow from the surface infrastructure areas may enter the freshwater ecosystems. Flow must be spread in a diffuse manner over the landscape to eventually enter the freshwater ecosystems. This can be achieved by ensuring a high surface roughness of the buffer area surrounding the freshwater ecosystems and by the strategic placement of either permanent or temporary energy dissipation structures.	1	1	1	1	1	1	5	-	Low
Terrestrial Ecology																				
Direct faunal impacts	Displacement and/or disturbance of fauna communities.	2	4	3	3	3	3	45	-	High	• Reduce the presence of human activity on the project area as far as possible by only focusing on the areas where operational tasks are required, • Avoid the presence of people and vehicles in highly sensitive areas as far as possible, • No unauthorised persons should be allowed onto the site, • Any potentially dangerous fauna such snakes or fauna threatened by the maintenance and operational activities must be removed to a safe location. A specialist or trained animal handler (especially when working with dangerous animals) must be contacted, • Lower the levels of noise whenever possible and avoid the destruction or disturbance of identified important features,	1	3	2	2	2	2	20	-	Low

ENVIRONMENTAL PARAMETER	ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION									RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION								
		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S
											• The illegal collection, hunting or harvesting of any plants or animals at the site should be strictly forbidden by anyone except by individuals with the appropriate permits obtained from the relevant competent authorities, • All hazardous materials should be stored in the appropriate manner to prevent contamination of the site. Any accidental chemical, fuel and oil spills that occur at the site should be cleaned up in the appropriate manner as related to the nature of the spill, • Fences should be constructed in such a way so that burrowing animals can still gain access, which will allow other animals to also utilise the holes dug under fences to increase connectivity in the area.									
Alien and invasive plant species	Re-establishment of secondary vegetation cover and establishment of alien species.	2	4	3	3	3	3	45	-	High	• The site-specific AIS Management Plan must be implemented for the first year of the operational phase. Thereafter, alien vegetation must continue to be monitored and eradicated annually throughout the life of the project. • Due to the disturbance at the site as well as the increased runoff generated by the hard infrastructure, alien plant species are likely to be a long-term problem at the site and a long-term control plan will need to be implemented. Problem woody species such as Prosopis are already present in the area and are likely to increase rapidly if not controlled. • Regular alien clearing should be conducted using the best-practice methods for the species concerned. The use of herbicides should be avoided as far as possible. • Alien vegetation, within the development footprints, should be removed from the site and disposed of at a registered waste disposal site.	1	2	2	2	2	2	18	-	Low
Agricultural- none identified																				
Avifauna																				
Disturbance due to noise such as, machinery movements and maintenance operations	Disturbance (including of nesting SCC) due to noise such as, machinery movements and maintenance operations during the construction phase the proposed PV solar farm causing loss of offspring for a generation.	3	3	1	2	1	2	20	-	Low	No Mitigation Required	3	3	1	2	1	2	20	-	Low
Bird mortalities	Bird mortalities during the operational phase due to vehicle collisions, collisions with infrastructure and/or combustion.	3	3	3	3	4	4	64	-	Very High	• Impacts due to bird mortalities during the operational phase are practically unavoidable for any large facility, but with the appropriate mitigation measures these impacts can be minimised. • It is likely that most of the avifaunal populations will be	2	2	2	2	4	3	36	-	Medium

ENVIRONMENTAL PARAMETER	ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION									RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION								
		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S
											largely displaced from the majority of the project infrastructure, although significant risks are associated with the likelihood of project vehicles flushing birds into fencing infrastructure as well as collisions of large bodied species with powerlines. • Although the current overall bird activity qualifies the proposed solar development boundary as a high-density area, there are certain times of the year (and day) when it appears that large flocks of birds (such as bustards and large birds of prey) are far more prevalent. • All powerline infrastructure must be fitted with approved bird diverters in order to provide visibility for large-bodied birds. In all areas where service road intersects with semi natural or natural habitat, all fences that are constructed (if any) must be set back at least (strictly) 75 metres from the edge of every service road in order to allow for vulnerable species such as coursers, cranes and korhaans to obtain adequate height after being flushed by vehicle traffic. • An Alternative mitigation measure and where a 75 metre buffer is not possible, new fences must be set back no more than 2 metres (directly adjacent) from the edge of service roads. • Through the essential elimination of habitat, this will limit any chance of vulnerable species foraging on verge side vegetation and causing subsequent fence collisions. • Finally, reflective diverters should be attached to new fencing alongside regular maintenance roads every 50 metres.									
Loss of Bird Foraging Habitat	Loss of Bird Foraging Habitat	3	3	3	3	3	3	45	-	High	• Impacts associated with the loss of bird foraging habitat due to operations can be mitigated by avoiding avifaunal specific sensitive areas and their associated buffers, such as the local drainage lines, impoundments, smaller watercourses, sandy dunes, pans and koppies. • A green buffer should be maintained around all habitats designated as High Sensitivity or above.	3	2	2	2	2	2	22	-	Low
Disruption of bird migratory pathways	Disruption of bird migratory pathways during the operational phase.	3	3	2	2	4	2	28	-	Medium	• Migratory pathways of birds cannot be changed and the resulting impacts are unavoidable. • However, severity of the impacts can be reduced with appropriate mitigation measures. • Some significant discernible migratory flight pathways were able to be established which could be explained by large areas of generic habitats punctuated by some distinguishing geographic features in the landscape, such as large ridges, large impoundments, wetlands and drainage lines.	3	2	2	2	2	2	22	-	Low

ENVIRONMENTAL PARAMETER	ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION									RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION								
		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S
											• The linear Drainage line habitats must be buffered by a minimum of 50 metres from the edge of the demarcated wetland.									
The attraction of some novel bird species due to the development of a solar farm with associated infrastructure such as lake effect, perches, nest and shade opportunities	The attraction of some novel bird species due to the development of a solar farm with associated infrastructure such as lake effect perches, nest and shade opportunities may cause both damage to the infrastructure through acidic defecation by certain species but also draw birds closer to infrastructure and cause significant direct mortality risks.	3	3	3	3	3	3	45	-	High	• Essentially, all habitat attractants should be eliminated so that avifaunal populations will not embedded themselves within the infrastructure over time. • This includes bird diverters, perch deterrents and the application of non-polarising white tape can be used around and/or across panels to minimise reflection which can attract aquatic birds and insects (food) as panels mimic reflective surfaces of waterbodies. An ECO can advise on the mitigations during operations.	3	2	2	2	3	2	24	-	Medium
Chemical pollution spills	Chemicals being used to keep the PV panels clean from dust (suppressants) etc.	3	3	2	2	4	3	42	-	High	• Application of strict chemical control procedures as per the EMPr. • Zero spills should be targeted and full clean up kits available in the event of any chemical spill. Soil testing subject to EMPr.	1	2	2	2	3	2	20	-	Low
Hydrological																				
Changes in Catchment Water Resources due to:	Impeding or diverting the flow of water in a watercourse.	2	3	2	2	3	1	12	-	Low	Mitigation measures required through implementation of Storm water management plan, and proposed diversion berms / channels. Changes in catchment water resources and ecosystem functionality are expected to be minimal as a result of the proposed development.	1	2	1	1	3	1	8	-	Low
Changes in Catchment Water Resources due to:	Altering the characteristics of local catchment areas.	2	2	2	2	3	1	11	-	Low	Impacts on the local hydrology are unavoidable. These impacts are, however, limited to the local hydrology and are therefore associated with a low significance rating.	1	1	2	1	2	1	7	-	Low
Changes in Catchment Water Resources due to:	Natural vegetation disturbance/loss resulting in the emergence of invasive alien vegetation, placing further pressure on water resources.	2	1	1	2	2	2	16	-	Low	Rehabilitation design should initially include those pioneer species for fast coverage and establishment. With the aim of later include a mix of locally indigenous shrubbery for biodiversity re-establishment and reinstatement to baseline site conditions. This will minimize the opportunity for invasives to establish on disturbed soils.	1	1	1	2	2	1	7	-	Low
Reduction in Catchment Water Quality due to:	Contamination of the watercourses and down slope stream areas by spills from chemicals used to clean or maintain the facility's assets.	1	1	1	1	2	2	12	-	Low	The storage/handling of fuel, lubricants and chemicals will require special attention due to their hazardous nature as is the case with the laydown areas. These areas are required to be managed on impermeable floors with appropriate bunding, sumps and roofing.	1	1	1	1	2	1	6	-	Low
Reduction in Catchment Water Quality due to:	Contamination of the watercourses and down slope stream areas by spills of hydrocarbons from maintenance or delivery vehicles.	1	1	1	1	2	2	12	-	Low	The movement of vehicles over the site will also introduce possible hydrocarbons. These constitute storage, leaks and accidental spills of fuels and lubricants.	1	1	1	1	2	1	6	-	Low

ENVIRONMENTAL PARAMETER	ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION									RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION								
		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S
Reduction in Catchment Water Quality due to:	Disturbance to the 'surface roughness' of baseline vegetation cover, thus reducing the site's natural ability to biofilter the runoff and groundwater reaching downstream drainage lines.	1	3	2	2	2	2	20	-	Low	Timeous and effective post-construction rehabilitation / re-vegetation adds protection to those disturbed topsoil layers and reduces the suspended solids in surface runoff. Rehabilitation design should aim to increase the 'surface roughness' provided by natural vegetation, thus reducing sheet flow and runoff velocities.	1	2	1	1	2	2	14	-	Low
Changes in Flood Hydrology due to:	An increase in impervious areas, in the form of internal access roads and service infrastructure.	1	2	2	1	3	1	9	-	Low	Solar panels do not have a significant effect on existing runoff rates, runoff volumes or time to peak of runoff. The presence of gravel or bare ground under the panels could, however, significantly increase the amount of runoff generated.	1	2	1	1	2	1	7	-	Low
Changes in Flood Hydrology due to:	An increase in the kinetic energy and splash erosion potential resulting from the mass introduction of 'hard' surfaces, in the form of PV panels and their base infrastructure.	1	3	3	1	3	1	11	-	Low	The kinetic energy of runoff falling from panels is a possible cause of erosion (at the base of panels). It is recommended that the grass beneath the panels be well maintained or that a buffer strip be placed after the most downgradient row of panels. Gravel strips are consequently only recommended below panels where grass cannot be cultivated (to limit possible increased erosivity of runoff falling from panels).	1	3	3	1	3	1	11	-	Low
Changes in Flood Hydrology due to:	Impeding / diverting natural flows	2	3	2	2	2	2	22	-	Low	In order to mitigate against discharge rates impacting the proposed development areas, it is recommended that the proposed storm water management plan is implemented. This will ensure the attenuation of storm water runoff. It is also recommended that berms, channels, and sediment traps associated with the drainage lines are designed appropriately (in accordance with the best practice guidelines).	1	3	2	1	2	2	18	-	Low
Geotechnical																				
Substation and BESS: Soil Erosion	Increased erosion due to alteration of natural drainage.	1	2	1	1	2	1	7	-	Low	• Maintain access roads including drainage features. • Monitor for erosion and remediate and rehabilitate timeously.	1	1	1	1	2	1	6	-	Low
SEF 1: Soil Erosion	Increased erosion due to alteration of natural drainage.	1	2	1	1	2	1	7	-	Low	• Maintain access roads including drainage features. • Monitor for erosion and remediate and rehabilitate timeously.	1	1	1	1	2	1	6	-	Low
Social																				
Improve energy security and support renewable sector	Development of infrastructure to improve energy security and support renewable sector.	4	2	2	2	3	2	26	+	Medium	• Implement a skills development and training programme aimed at maximizing the number of employment opportunities for local community members. • Maximise opportunities for local content, procurement, and community shareholding.	4	5	3	3	3	3	54	+	High
Assessment of employment and business creation opportunities	Creation of employment and business opportunities associated with the operational phase.	2	2	2	1	3	1	10	+	Low	**Employment** • Where reasonable and practical, the proponent should appoint local contractors and implement a 'locals first'	2	3	3	2	3	2	26	+	Medium

ENVIRONMENTAL PARAMETER	ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION									RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION								
		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S
											policy, especially for semi and low-skilled job categories. • Where feasible, efforts should be made to employ local contactors that are compliant with Broad Based Black Economic Empowerment (BBBEE) criteria. • Before the operational phase commences the proponent should meet with representatives from the HM to establish the existence of a skills database for the area. • The local authorities, community representatives, and organisations on the interested and affected party database should be informed of the final decision regarding the project and the potential job opportunities for locals and the employment procedures that the proponent intends following for the operational phase of the project. • Where feasible, training and skills development programmes for locals should be initiated prior to the initiation of the operational phase. • The recruitment selection process should seek to promote gender equality and the employment of women wherever possible. **Business** • The proponent should liaise with the HM with regards the establishment of a database of local companies, specifically BBBEE companies, which qualify as potential service providers prior to the commencement of the operational. These companies should be notified of the tender process and invited to bid for project-related work. • Where possible, the proponent should assist local BBBEE companies to complete and submit the required tender forms and associated information.									
Assessment of benefits associated with income generated for the affected farmer(s).	The generation of additional income represents a significant benefit for the local affected farmer(s) and reduces the risks to their livelihoods posed by droughts and fluctuating market prices for sheep and farming inputs, such as feed etc.	1	2	2	2	3	2	22	+	Low	• Implement agreements with affected landowner.	1	3	3	3	3	3	39	+	Medium
Assessment of benefits associated with socio-economic development contributions	Benefits associated with support for local community's form SED contributions.	2	3	2	2	3	2	24	+	Medium	• The proponents should liaise with the HM to identify projects that can be supported by SED contributions. • Clear criteria for identifying and funding community projects and initiatives in the area should be identified. The criteria should be aimed at maximising the benefits for the community as a whole and not individuals within the community. • Strict financial management controls, including annual audits, should be instituted to manage the SED	2	4	3	3	3	3	45	+	High

ENVIRONMENTAL PARAMETER	ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION									RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION								
		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S
											contributions.									
Visual impact and impact on sense of place	Visual impact associated with the proposed facility and associated infrastructure and the potential impact on the areas rural sense of place.	2	3	2	2	3	2	24	-	Medium	• The recommendations contained in the VIA should be implemented.	2	3	2	2	3	2	24	-	Medium
Assessment of potential impact on property values and operations	Potential impact of the SEF on property values	2	2	2	2	3	2	22	-	Low	• The recommendations contained in the VIA should be implemented.	2	2	1	2	3	2	20	-	Low
Impact on tourism in the region	Potential impact of the SEF on local tourism	2	2	2	2	3	1	11	-	Low	• The recommendations contained in the VIA should be implemented.	2	2	1	2	3	1	10	-	Low
Heritage																				
Impacts to archaeological heritage resources	Operational activities that take place near to archaeological resources may result in their destruction.	1	1	4	2	4	3	36	-	Medium	• No development activities within the high archaeological sensitivity area identified. • Should any previously unknown archaeological resources be impacted during construction, work must cease in the vicinity of the find and the relevant heritage authority must be contacted.	1	1	4	1	4	1	11	-	Low
Impacts to palaeontological resources	Operational activities that take place near to palaeontological resources may result in their destruction.	1	1	4	1	4	3	33	-	Low	• Implementation of the Chance Fossil Finds Protocol.	1	1	4	1	4	1	11	-	Low
Impacts to the cultural landscape	Operational activities that take place near to cultural landscape elements may result in their destruction.	2	3	4	3	3	3	45	-	High	• Implementation of the recommendations included in the VIA.	1	1	4	1	4	1	11	-	Low
Visual																				
Altered Sense of Place and Visual Intrusion caused by the PV Array	The development of this PV array may be perceived as conflicting with the current undeveloped, inhospitable agricultural landscape. The proposed SEF is anticipated to interrupt and/or degrade views, affecting the sense of place and presenting as a visual intrusion across the landscape.	2	4	2	3	3	3	26	-	Medium	• Fence the perimeter of the site with green or black fencing.	2	4	2	3	3	3	26	-	Medium
Altered Sense of Place and Visual Intrusion caused by the BESS,	Associated infrastructure, particularly the BESS, is not congruent with the current landscape integrity, and will contribute to visual clutter: however, few receptors are expected to be exposed.	2	4	1	1	3	2	22	-	Low	• Install powerlines underground, where possible. • Fence the perimeter of the site with green or black fencing. • Ensure that the roof colour of the proposed buildings blends into the landscape.	2	3	1	1	3	2	20	-	Low

ENVIRONMENTAL PARAMETER	ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION									RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION								
		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S
Substation and Internal Grid Infrastructure																				
Visual Discomfort and Impaired Visibility caused by Glint and Glare	The glare analysis indicated that no glare will be experienced at the OPs modelled or along the routes modelled, viz. Gravel Road and the railway line. As no glare is expected, the impact associated with visual discomfort or impaired visibility is considered unlikely.	2	1	1	1	3	1	8	-	Low	• None	2	1	1	1	3	1	8	-	Low
Altered Visual Quality caused by Light Pollution at Night	The installation of lighting on the site perimeter and / or around the BESS is anticipated to generate nightglow which currently does not emanate from the natural, undeveloped site. The introduction of lighting on the site will alter the sense of place and visual quality to surrounding receptors.	2	4	1	1	3	3	33	-	Medium	• Reduce the height of lighting masts to a workable minimum. • Direct lighting inwards and downwards to limit light pollution.	2	3	1	1	3	2	20	-	Low
Transportation																				
Additional Traffic Generation	Increase in Traffic	2	1	1	2	3	1	9	-	Low	• Group transportation of staff.	2	1	1	2	3	1	9	-	Low
Additional Traffic Generation	Increase of Incidents with pedestrians and livestock	2	1	1	2	3	1	9	-	Low	• Safe accommodation of pedestrians. • Reduce vehicle speed. • Regularly maintain farm fences & access cattle grids.	2	1	1	2	3	1	9	-	Low
Abnormal Loads	Additional Abnormal Loads	3	1	1	2	3	1	10	-	Low	• Schedule abnormal load deliveries for off-peak times.	3	1	1	2	3	1	10	-	Low
Access and Internal Roads	New / Larger Access points	1	1	1	2	3	1	8	-	Low	• Adequate road signage according to the SARTSM.	1	1	1	2	3	1	8	-	Low

14.3.4 Decommissioning

ENVIRONMENTAL PARAMETER	ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION	RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION

		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S
Aquatic / Freshwater																				
Habitat and biota (inclusive of the vegetation component) and ecological structure of the freshwater ecosystems identified in the study area.	Potential direct and indirect impacts that may potentially result due to the decommissioning activities: • Clearing of habitat that has established in previous phases, resulting in a disturbed ecological structure; • Compaction and disturbance of soils due to decommissioning activities, making the impacted areas unfavourable for the establishment of vegetation and may allow for opportunistic alien and invasive species to establish in the freshwater ecosystems; • Movement of construction vehicles within the freshwater ecosystems, disturbing established biota in the freshwater ecosystems.	2	4	3	2	2	3	39	-	Medium	• No indiscriminate movement of construction equipment in the freshwater ecosystems and buffer zones surrounding the freshwater ecosystems may be permitted. Use must be made of the existing roads during the decommissioning phase; • All surface infrastructure within the freshwater ecosystems and that within its 100 m ZoR must be decommissioned. All materials must be removed from the freshwater ecosystems (where appliable) and may temporarily be stockpiled outside the 32 m NEMA ZoR, where after is must be removed from site and disposed of at a registered disposal facility; • Should road crossings be decommissioned, road footprint areas within the freshwater ecosystem must be levelled to the same level and shape as that of the upstream and downstream reaches. This will ensure a continuous bed level and prevent any concentration of surface flow from occurring; • Freshwater ecosystem embankments must be suitably rehabilitated (shaped and revegetated) to prevent any erosion from occurring; • All bare areas in the study area, specifically where vegetation was initially cleared for surface infrastructure components) must be ripped and be revegetated within suitable indigenous vegetation species; • All areas revegetated must be monitored until suitable basal cover has been re-established. Follow up revegetation should take place in areas where initial revegetation is not successful; • It is recommended that a Freshwater ecosystem Rehabilitation and Management Plan be compiled and implemented once the layout plan has been finalised. Implementation must be overseen by a suitably qualified Environmental Control Officer (ECO) and must sign off the rehabilitation before the relevant contractors leave site; and • Post-closure monitoring of the freshwater ecosystems (for a period of 3 years), with specific mention of the invasion of alien vegetation species) is recommended.	1	2	2	2	2	2	18	-	Low
Geomorphological processes, hydrological functioning and surface water quality (if present) within the freshwater ecosystems	Potential direct and indirect impacts that may potentially result due to the decommissioning activities: • Site disturbance and trampling of vegetation resulting in increased runoff which leads to erosion and alteration of the geomorphology of the freshwater ecosystems; • Disturbance to the erodible soils, that may	1	2	2	1	2	2	16	-	Low	• No indiscriminate movement of construction equipment through the freshwater ecosystems outside of the existing crossing point or driving in unmarked areas through the buffer zones of the freshwater ecosystems may be permitted. This will avoid any disturbance to the freshwater ecosystem. • High flood peaks from the decommissioning footprint areas can be mitigated by ensuring that no concentrated runoff from the surface infrastructure area and subsequent	1	1	1	1	1	1	5	-	Low

ENVIRONMENTAL PARAMETER	ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION									RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION								
		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S
identified in the study area.	potentially result an increased risk of bank incision, sheet erosion and gully formation in the freshwater ecosystems and their surrounding area; • Increased movement of construction vehicles within the freshwater ecosystems (utilising freshwater ecosystem road crossings) resulting in soil compaction; • Potential runoff from stockpiles, earthwork activities and disposal of hazardous materials contributing to the freshwater ecosystem sediment load; and • Latent impacts from landscape scarring after decommission which creates a loss of ground cover that may potentially lead to erosion and sedimentation of freshwater ecosystems.										cleared area enters the freshwater ecosystems. The velocity of surface water flow from these areas must be reduced by ensuring that the vegetation in the buffer area surrounding the freshwater ecosystems are intact or by the strategic placement of silt traps of haybales as a means to obstruct flow but still allow flow to percolate at a reduced velocity and encourages a diffuse flow pattern; • Areas where surface infrastructure have been decommissioned and removed must be suitably compacted and revegetated to ensure that no erosion occurs which may contribute to the sediment load of the freshwater ecosystems; and • Should erosion gullies be noted, these areas must be rehabilitated by infilling them with suitable soil and ensuring the area is vegetated. The increased surface roughness will discourage concentrated flow paths to develop and ensure diffuse flow patterns.									
Terrestrial																				
Vegetation loss and disturbance of fauna communities	Dismantling and removal of infrastructure	1	3	2	3	2	3	33	-	Medium	• When the solar farms reach the end of their lifespan, all machinery and related installations must be dismantled and removed, and the site should, as far as is reasonably possible, be restored to its original condition. • Where possible, all recyclable materials must be repurposed in an environmentally friendly way. • Rehabilitate disturbed areas that are no longer required by the operational phase of the development. Inadequate rehabilitation could result in limited revegetation and/or an invasion of alien vegetation which will result in long term ecological degradation and damage.	1	2	2	2	2	2	18	-	Low
Waste generated	Waste generated	2	3	3	3	3	4	56	-	High	• Repurpose all recyclable materials	2	3	2	2	2	3	33	-	Medium
Agriculture – None identified																				
Avifauna																				
Disruption of bird migratory pathways	Disruption of bird migratory pathways during the decommissioning phase.	3	3	2	2	4	2	28	-	Medium	• Decommissioning of panels must not commence during the peak wet season months on November, December and January.	3	2	2	2	2	2	22		Low

ENVIRONMENTAL PARAMETER	ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION									RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION								
		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S
Habitat destruction post decommissioning	Destruction of habitats and scarring.	3	3	2	2	4	3	42	-	High	• A rehabilitation plan must be commissioned before construction commences. • All topsoil harvesting must take place in the dry season (late dry season). • Returning the wetlands to their original grade must take place as minor differences in the final surface elevation can produce significant impacts on the type of vegetation that re-establishes itself (alien invasive species). • When topsoil is salvaged and returned, it is anticipated without reseeding that dense vegetative communities of native species can regenerate within two growing seasons. • As emergent wetlands will recover more quickly than others, artificial seeding is not advised as it creates competition for reestablishment of native facultative and obligate wetland vegetation.	3	2	2	2	3	2	24	-	Medium
Hydrological																				
Reduction in Catchment Water Quality due to:	Contamination of the watercourses and down slope stream areas by spills of hydrocarbons from an increase in decommissioning machinery or loading / transport vehicles.	2	3	2	2	2	2	22	-	Low	• There is an inherent risk of spillage from machinery and hydrocarbon stores, particularly when there is an increase in vehicular traffic during the decommissioning phase.	1	1	1	1	1	1	5	-	Low
Reduction in Catchment Water Quality due to:	Disturbance to the site's established vegetation cover, resulting in bare soil exposure, and thus increasing the risk of erosion and sediment reaching downstream drainage lines.	1	4	2	2	2	2	22		Low	• Clearing of vegetation on site will result in change of biodiversity, degradation of the topsoil due to erosion and presence of suspended solids in surface runoff. • Retention or rehabilitation of the natural landcover and drainage of the site (post-decommissioning) will serve to limit potential increases in erosion.	1	2	1	1	2	2	14	-	Low
Geotechnical																				
Substation and BESS: Disturbance/ displacement/ removal of soil and rock	Ground disturbance during access road construction, foundation earthworks, platform earthworks.	1	4	2	2	2	1	11	-	Low	• Restore natural site topography. • Landscape and rehabilitate access roads and disturbed areas timeously (e.g., regressing).	1	4	2	1	2	1	10	-	Low
Substation and BESS: Soil Erosion	Increased erosion due to vegetation clearing, alteration of natural drainage.	1	2	2	2	2	1	9	-	Low	• Temporary berms and drainage channels to divert surface runoff where needed. • Restore natural site topography. • Use designated access and laydown areas only to minimise disturbance to surrounding areas.	1	1	1	1	2	1	6	-	Low
SEF 1: Disturbance/displacement/removal of soil and rock	Ground disturbance during access road construction, foundation earthworks, platform earthworks.	1	4	2	2	2	1	11	-	Low	• Restore natural site topography. • Landscape and rehabilitate access roads and disturbed areas timeously (e.g. regressing).	1	4	2	1	2	1	10	-	Low

ENVIRONMENTAL PARAMETER	ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION									RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION								
		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S
SEF 1: Soil Erosion	Increased erosion due to vegetation clearing, alteration of natural drainage.	1	2	2	2	2	1	9	-	Low	• Temporary berms and drainage channels to divert surface runoff where needed. • Restore natural site topography. • Use designated access and laydown areas only to minimise disturbance to surrounding areas.	1	1	1	1	2	1	6	-	Low
Social																				
Social impacts associated with decommissioning	Social impacts associated with retrenchment including loss of jobs, and source of income. Decommissioning will also create temporary employment opportunities, which would represent a positive temporary impact.	2	2	2	2	3	2	22	-	Low	• The proponent should ensure that retrenchment packages are provided for all staff retrenched when the plant is decommissioned. • All structures and infrastructure associated with the proposed facility should be dismantled and transported off-site on decommissioning.	2	2	1	2	3	1	10	-	Low
Heritage																				
Impacts to archaeological heritage resources	Decommissioning activities that take place near to archaeological resources may result in their destruction.	1	3	4	4	4	3	48	-	High	• No development activities within the high archaeological sensitivity area identified. • Should any previously unknown archaeological resources be impacted during construction, work must cease in the vicinity of the find and the relevant heritage authority must be contacted.	1	1	4	4	4	1	14	-	Low
Impacts to palaeontological resources	Decommissioning activities that take place near to palaeontological resources may result in their destruction.	1	2	4	4	4	1	15	-	Low	• Implementation of the Chance Fossil Finds Protocol.	1	2	4	4	4	1	15	-	Low
Impacts to the cultural landscape	Decommissioning activities that take place near to cultural landscape elements may result in their destruction.	1	2	1	3	1	3	24	-	Medium	• Implementation of the recommendations included in the VIA.	1	1	4	1	4	1	11	-	Low
Visual																				
Altered Sense of Place caused by the decommissioning activities	Dust generated during decommissioning activities will be visually unappealing and may detract from the visual quality (and sense of place) of the area. These impacts are typically limited to the immediate area surrounding the site, during the decommissioning period.	2	4	1	2	1	3	30	-	Medium	• Limit vegetation clearance and the footprint of decommissioning to what is absolutely essential. • Avoid excavation, handling and transport of materials which may generate dust under very windy conditions. • Keep stockpiled aggregate and sand covered to minimise dust generation. • Keep site tidy.	2	3	1	2	1	2	18	-	Low
Transportation																				
Additional Traffic Generation	Increase in Traffic	2	4	1	2	1	3	30	-	Medium	• Group transportation of staff. • Stagger carting of material, components and plant. • Schedule carting for off-peak times. • Adequate enforcement of the law.	2	4	1	2	1	2	20	-	Low

ENVIRONMENTAL PARAMETER	ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION									RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION								
		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S
Additional Traffic Generation	Increase of Incidents with pedestrians and livestock	2	4	2	4	1	2	26	-	Medium	• Reduce and control speed of vehicles. • Safe accommodation of pedestrians. • Regularly maintain farm fences & access cattle grids.	2	3	2	4	1	1	12	-	Low
Additional Traffic Generation	Increase in road maintenance	2	3	2	2	2	2	22	-	Low	• Avoid carting in wet weather. • Implement a road maintenance program under the auspices of the respective transport department.	2	3	2	2	1	2	20	-	Low
Abnormal Loads	Additional abnormal loads	3	2	1	2	1	1	9	-	Low	• Stagger carting of abnormal loads. • Schedule carting of abnormal loads for off-peak times. • Ensure compliance with permits. • Adequate enforcement of the law.	3	2	1	2	1	1	9	-	Low
Access and Internal Roads	New / Larger Access points	1	4	1	2	1	1	9	-	Low	• Adequate road signage according to the SARTSM.	1	4	1	2	1	1	9	-	Low

14.3.5 Cumulative

Twelve (12) renewable energy facilities are located within 35 km of Lesaka 1 Solar PV site. The information that could be obtained for the surrounding planned renewable energy developments was taken into account as part of the cumulative impact assessment. The SEFs that were considered are indicated in **Figure 53** and **Table 29** below. Please note that the Lesaka Grid Infrastructure has been included in the cumulative impact assessment and assessed by all specialists.

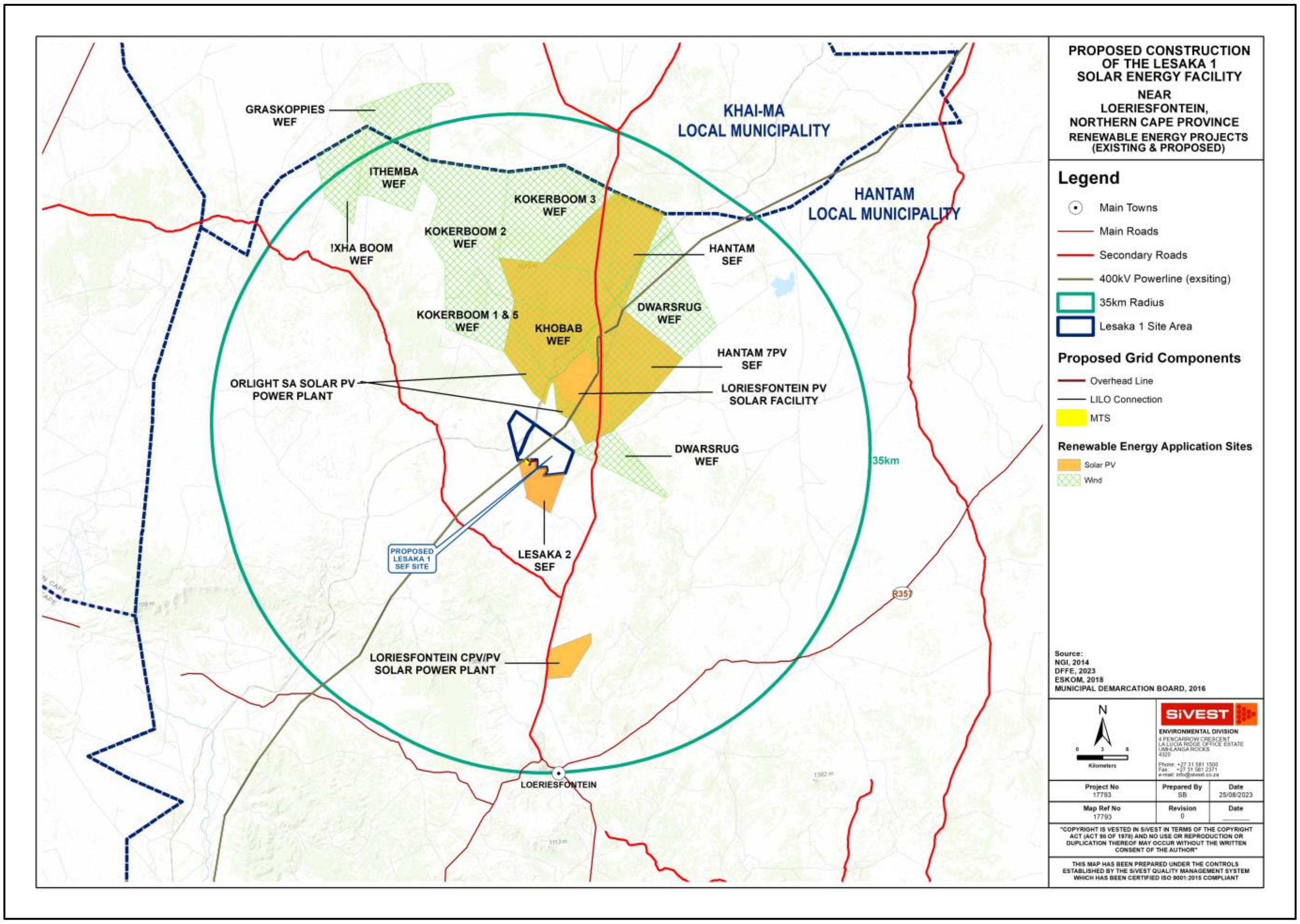


Figure 53: Renewable Energy Projects within 35km of the Lesaka 1 SEF

Table 29: Renewable Energy Projects within 35km of the Lesaka 1 SEF

	Facility Name / Description	Status	MW
1	Orlight SA SEF	Approved	22 MW
2	Mainstream SEF	Approved	50 MW
3	Solar Capital Orange 80 MW SEF	Approved and in construction phase	75 MW
4	Loeriesfontein 3 SEF	Approved	100 MW
5	Kokerboom 2 WEF	Approved	240 MW

	Facility Name / Description	Status	MW
6	Kokerboom 3 WEF	Approved	240 MW
7	Kokerboom 5 WEF	Approved	256 MW
8	Graskoppies WEF	Approved	235 MW
9	!XHA Boom WEF	Approved	235 MW
10	Dwarsrug WEF	Approved	140 MW
11	Loeriesfontein 2 WEF	Approved and in operational phase	140 MW
12	Khobab WEF	Approved and in operational phase	140 MW
			1 873 MW

Cumulative Impacts

ENVIRONMENTAL PARAMETER	ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION									RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION								
		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S
Aquatic / Freshwater																				
Drainage system habitat integrity and hydrological functioning	• Loss of freshwater ecosystem vegetation and subsequent habitat, due to freshwater ecosystem road crossings and potential infrastructure located in the freshwater ecosystems; and • Changes to flow, pattern and timing of surface water in the drainage system due to land use changes in the catchment, potentially resulting in changes to the hydrological regime of the larger downstream freshwater ecosystems.	2	3	3	2	3	3	39	-	Medium	• The mitigation measures pertaining to the construction of new road infrastructure must be adhered to, specifically to avoid erosion and only allow new road crossings where authorised; • Continuous and more frequent use of the roads and movement within the freshwater ecosystems and surrounding buffer areas during the life of the proposed SEF development may compromise the integrity of the freshwater ecosystems. As such it is highly recommended that a Freshwater ecosystem Maintenance and Management Plan (WMMP) be implemented, to avoid any unnecessary impacts and to ensure adequate mitigation of activities that may directly impact on the freshwater ecosystems, in order to avoid extensive cumulative impacts from occurring. This WMMP must detail: ○ Alien and invasive plant species control; ○ Sediment and erosion control; and ○ Hydrological connectivity.	2	2	2	2	2	2	20	-	Low
Terrestrial																				
Cumulative Impact of various proposed renewable energy projects on the natural environment	The cumulative assessment considers the various proposed renewable projects that occur within a 30km radius of this site.	2	4	3	3	3	3	45	-	High	• The premise of all the reviewed or assessed projects has been the avoidance of impacts on the Very High and High Sensitivity Environments including appropriate buffers, which have been achieved by the various proposed layouts. • Majority of projects are not located in CBA or ESA (mainly in ONA). • Necessary relocation permits for provincially protected species are required prior to construction phase. • No threatened ecosystems or vegetation types intersect any of the developments.	2	3	2	2	2	2	22	-	Low
Cumulative Impact of numerous grid connection infrastructure in the surrounding area	Additional removal of vegetation and potential loss of SCC	2	3	2	3	3	3	39	-	Medium	• The premise of all the reviewed or assessed projects has been the avoidance of impacts on the Very High and High Sensitivity Environments including appropriate buffers, which have been achieved by the various proposed layouts. • For grid connections specifically, pylons must be placed strategically to avoid very high and high sensitivity areas as far as possible. • Necessary relocation permits for provincially protected species are required prior to construction phase.	1	2	2	2	2	2	18	-	Low

ENVIRONMENTAL PARAMETER	ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION									RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION								
		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S
											• No threatened ecosystems or vegetation types intersect any of the developments.									
Agriculture – none-identified																				
Avifauna																				
Construction and Operational Phases: Habitat loss	Regional Saturation of SEF facilities causing habitat loss.	3	4	3	3	4	4	68	-	Very High	• Not able to be mitigated quantitatively. Mitigation measures are similar to SEF facility. • Where possible, apply necessary buffers for roost sites and other sensitive bird habitat features, avoiding the construction of panels and access roads in these areas. • Roads must utilise or upgrade existing farm roads as far as possible. • All underground cables bisecting sensitive habitats must be placed below the subsurface flow of the ephemeral wetlands with the linear construction pits subjected to full rehabilitation in order to maintain normal subsurface slow. • All roads and crossings must be engineered not to impede surface or subsurface flow in any way.									
Construction and Operational Phases: Collison mortality (vehicle)	Increased roadkill due to higher traffic volumes	3	3	3	3	4	3	48	-	High	• Strict enforcement of speed limits in the PAOI as well saturation of fence infrastructure with reflective diverters and maintaining fence set aside distances (75/ 5 metres).	3	2	1	1	2	2	18	-	Low
Construction and Operational Phases: Collison mortality (infrastructure)	Increased mortalities due to collisions with SEF infrastructure, especially powerlines and fences	3	4	3	3	4	4	64	-	Very High	• Impacts due to bird mortalities during the operational phase are practically unavoidable for any large facility, but with the appropriate mitigation measures these impacts can be minimised. • All powerline infrastructure must be fitted with approved bird diverters in order to provide visibility for large-bodied birds. • Positive Cumulative Mitigation will be the retrofitting of existing powerline infrastructure (in consultation with Eskom) which currently does not have diverter infrastructure in place.	3	2	3	3	2	3	33	-	Medium
Cumulative Impact of numerous grid connection infrastructure in the surrounding area	Increased mortalities due to collisions with SEF infrastructure, especially powerlines and fences	3	3	3	3	4	3	48	-	High	• All powerline infrastructure must be fitted with approved bird diverters in order to provide visibility for large-bodied birds. Positive Cumulative Mitigation will be the retrofitting of existing powerline infrastructure (in consultation with Eskom) which currently does not have diverter infrastructure in place.	3	2	3	3	2	3	33	-	Med
Decommissioning Phase: Collison mortality (powerlines)	Increased collision related mortalities due to increased powerlines	3	4	3	3	3	4	64	-	Very High	• Saturation of powerline infrastructure with approved bird diverters	3	2	2	2	3	4	48	-	High

ENVIRONMENTAL PARAMETER	ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION									RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION								
		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S
Hydrological																				
Reduction in Catchment Water Quality due to:	A series (or high frequency) of localised hydrocarbon or hazardous material spills, leads to a 'larger-scale' impact on surrounding freshwater ecological systems, which may become irreversible.	2	1	2	3	3	3	33	-	Medium	• Although the probability of this occurring on a frequent basis is low, the cumulative impacts of these events would be severely negative for downstream systems over the long term.	1	1	2	2	2	2	16	-	Low
Changes in Flood Hydrology due to:	This photovoltaic project, together with any other proposed and existing projects and activities in the area would have a cumulative impact on the surface runoff regime, due to a 'broad-scale' increase in impervious areas, in the form of internal access roads and service infrastructure.	2	2	2	1	2	2	18	-	Low	• With respect to soils, permeability, and from a surface run-off perspective, multiple projects would result in a large disturbance footprint, collectively causing a series of cumulative impacts.	2	1	1	1	2	2	14	-	Low
Geotechnical – none identified																				
Social																				
Cumulative impacts on sense of place and the landscape	Cumulative visual impacts associated with the establishment of a number of SEFs and associated grid infrastructure and the potential impact on the area's rural sense of place and character of the landscape.	2	3	2	2	3	2	24	-	Medium	• Recommendations of VIA should be implemented.	2	4	2	2	3	2	26	-	Medium
Cumulative impacts on local services	The establishment of a number of renewable energy facilities and associated projects, such as the proposed SEF, in the HM has the potential to place pressure on local services, specifically medical, education and accommodation.	2	3	2	2	3	2	24	-	Medium	• The proponent should liaise with the HM to address potential impacts on local services and accommodation and ensure challenges are addressed as part of the IDP process.	2	3	2	2	3	2	24	-	Medium
Cumulative impacts on local economy	The establishment of renewable energy facilities and associated infrastructure, such as the SEF, in the HM will create employment, skills development and training opportunities, creation of downstream business opportunities.	2	3	2	2	3	2	24	+	Medium	• The proponent should liaise with the HM to identify potential opportunities associated with the development of renewable energy projects and how best to enhance these opportunities and incorporate them into the IDP process.	2	4	3	3	3	3	45	+	High
Heritage																				
Impacts to archaeological heritage resources	Cumulative destruction of significant archaeological heritage.	1	2	4	3	4	3	42	-	Medium	• No development activities within the high archaeological sensitivity area identified. • Should any previously unknown archaeological resources be impacted during construction, work must cease in the vicinity of the find and the relevant heritage authority must be contacted.	1	1	4	1	4	1	11	-	Low
Impacts to palaeontological resources	Cumulative destruction of significant palaeontological heritage.	1	2	4	3	4	3	42	-	Medium	• Implementation of the Chance Fossil Finds Protocol.	1	1	4	1	4	1	11	-	Low

ENVIRONMENTAL PARAMETER	ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION									RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION								
		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S
Impacts to the cultural landscape	Cumulative impact to the cultural landscape.	1	2	4	3	4	3	42	-	Medium	• Implementation of the recommendations included in the VIA.	1	1	4	1	4	1	11	-	Low
Visual																				
Altered sense of place caused by the SEF	The site and surrounds are rural in character, there is a high concentration of approved renewable energy projects and associated grid infrastructure located around the Helios MTS. Only two WEFs of the 12 facilities appear to be operational, while another SEF is under construction. As more of these facilities and infrastructure are constructed, the visual landscape is expected to be significantly transformed detracting from the visual quality of the region. As SEFs and WEFs proliferate, impacts will accumulate towards an unknowable threshold.	2	4	1	3	3	2	26	-	Medium	• Encourage other project owners to implement measures to mitigate the impact of these projects on visual intrusion and altered sense of place, such as screening (vegetation and/or berms) and limit the light pollution generated by these facilities.	2	3	1	2	3	2	22	-	Low
Transportation																				
Additional Traffic Generation	Increase in traffic	2	4	1	2	1	4	40	-	Medium	• Shared group transportation of staff/labour between developments. • Adequate enforcement of the law. • Construct local concrete batching plant for use by various developments. • Coordination of transportation between all developments.	2	4	1	2	1	3	30	-	Medium
Additional Traffic Generation	Increase of Incidents with pedestrians and livestock	2	4	2	4	1	3	39	-	Medium	• Reduce and control speed of vehicles. • Safe accommodation of pedestrians. • Shared implementation of pedestrian safety initiatives. • Regularly maintain farm fences & access cattle grids. • Coordination of construction traffic accommodation among all developments.	2	3	2	4	1	2	24	-	Medium
Additional Traffic Generation	Increase in road maintenance	2	3	2	2	2	2	22	-	Low	• Avoid transporting in wet weather. • Implement a road maintenance program under the auspices of the respective transport department. • Coordination of road maintenance between all developments.	2	3	2	2	2	2	22	-	Low
Abnormal Loads	Additional Abnormal Loads	3	2	1	2	1	4	36	-	Medium	• Stagger abnormal load deliveries. • Schedule abnormal load deliveries for off-peak times. • Ensure compliance with permits. • Adequate enforcement of the law. • Coordination of abnormal load delivery schedules among all developments.	3	2	1	2	1	2	18	-	Low

ENVIRONMENTAL PARAMETER	ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION									RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION								
		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S
Access and Internal Roads	New / Larger Access points	1	4	1	2	1	2	18	-	Low	• Adequate road signage according to the SARTSM. • Approval from the respective roads department.	1	4	1	2	1	1	9	-	Low

14.3.6 Comparative Assessment of Alternatives

Alternatives for the temporary laydown area for the SEF were identified and a preliminary comparative assessment of the alternatives was undertaken by the specialists during the Scoping Phase. The layout was however revised following the Scoping phase and all supporting infrastructure (e.g. substation, BESS, laydown area and O&M Building) moved outside of all no-go areas.

Full site layout alternatives were not comparatively assessed, but rather a single layout was refined as additional information became available throughout the EIA process (e.g. specialist input, additional site surveys, and ongoing stakeholder engagement) and was based on an avoidance approach. As a result, the layout provided in the Scoping Phase has been updated and all SEF infrastructure and supporting infrastructure (i.e. substation, BESS, laydown area and O&M Building) are situated outside of any and all sensitive areas and buffers.

The development area presented in the Final Environmental Impact Assessment Report has been selected as a practicable option for the Lesaka 1 SEF considering technical preference and constraints, as well as initial No-Go layers informed by the relevant specialist during their specialist studies.

14.4 Concluding statement

No activity alternatives are being considered. Renewable Energy development in South Africa is highly desirable from a social, environmental and development point of view. Solar energy installations are more suitable for the site because of the good solar resource. The choice of technology selected for the Lesaka 1 SEF was based on environmental constraints as well as technical and economic considerations.

The development avoids all CBA 1 areas, and while development is being pursued within a CBA 2 area, the aquatic specialist has confirmed that no wetlands were identified within the study area, and thus the criteria for the designated CBA 2 areas within this study area is based solely on the presence of the FEPA catchment of the Rooiberg and Klein Rooiberg river catchments. Given that the proposed development falls outside of the delineated freshwater ecosystems (with the exception of some road infrastructure) the specialist has confirmed that no change in the Present Ecological State category is deemed likely. They have confirmed that development within the CBA catchment is not deemed an unacceptable land use.

The terrestrial specialist further confirmed they CBAs are based on aquatic features and not terrestrial features.

As a result of the above, the residual impact is not deemed significant, and an offset is not warranted based on the following:

- All CBA 1 areas have been avoided by the PV's
- There are no wetlands on site and thus the criteria for the designated CBA 2 areas within this study area is based solely on the presence of the FEPA catchment of the Rooiberg and Klein Rooiberg river catchments.
- The development falls outside of all freshwater ecosystems (with the exception of some road infrastructure)
- No change in the Present Ecological State category is deemed likely given the fact there are no wetlands and the Present Ecological State category is deemed likely.

Site layout alternatives have not been comparatively assessed, but rather a single layout has been refined as additional information become available throughout the EIA process. The layout has therefore been refined throughout the process which has resulted in a layout where all SEF infrastructure and supporting infrastructure (with the exception of roads) avoids the no-go areas identified by the various specialists. The proposed layout has been assessed by the specialists in their respective specialist studies. All constraints identified to date (which are inclusive of the buffer areas) as indicated in the sensitivity mapping have been taken into account and the SEF and supporting infrastructure shifted where necessary to inform the proposed layout for the Lesaka 1 SEF (**Figure 54** below). No fatal flaws have been identified and all impacts as identified by the specialists can be mitigated to acceptable levels. This is the layout being put forward for environmental authorisation.

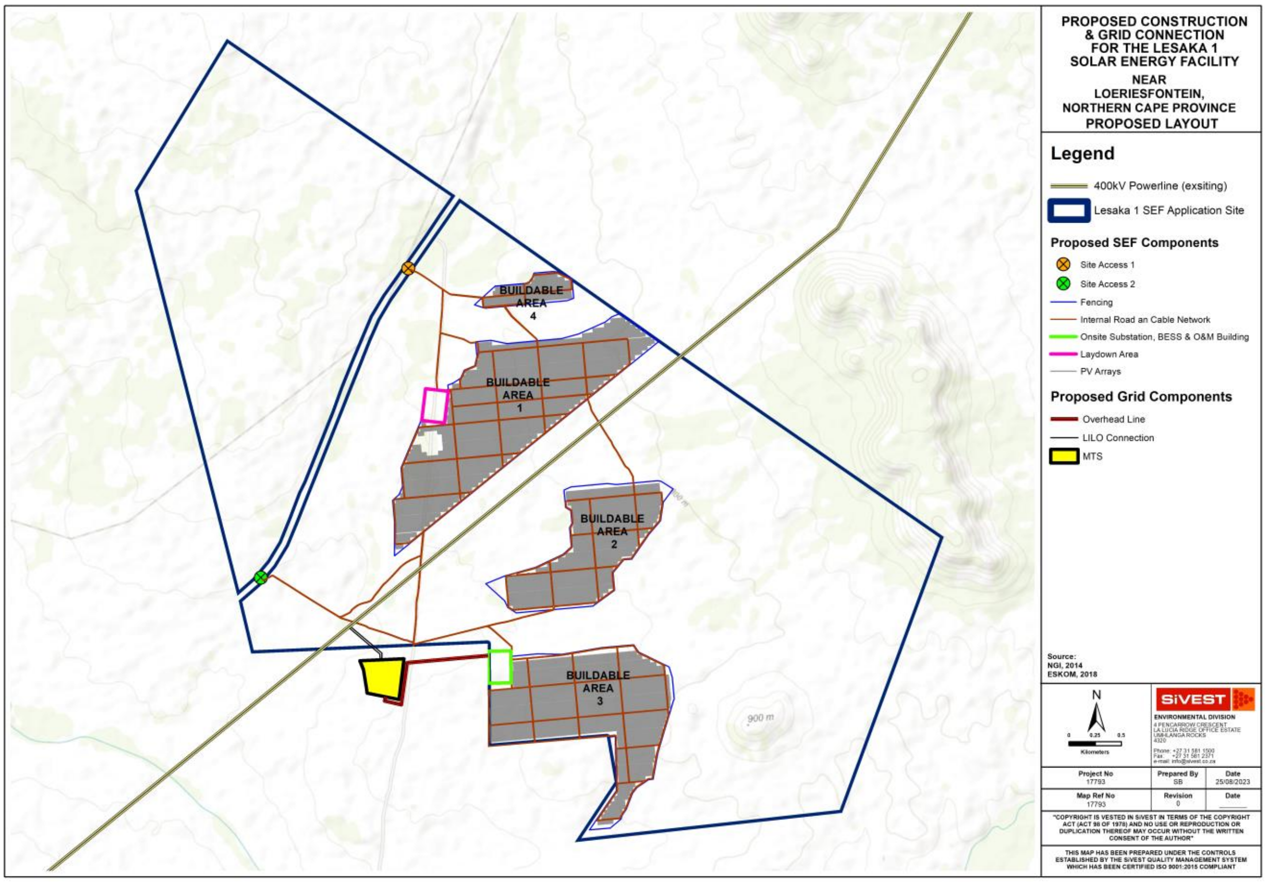


Figure 54: Proposed layout put forward for authorisation (proposed grid components to be included in a separate application)

15. POSITIVE AND NEGATIVE IMPACTS OF THE PROJECT

A summary of the impacts pre-mitigation and post-mitigation are provided below:

Table 30: Pre and post mitigation impact ratings

Impact	Pre-mitigation	Post-mitigation
CONSTRUCTION		
Impacts to Biophysical Systems		
Aquatic / Freshwater		
Habitat, biota and ecological structure - Potential **direct impacts** caused by **construction**: • Trampling by construction personnel and equipment is likely to impact on the riparian and instream vegetation, leading to habitat degradation; • Net loss of habitat and ecological structure provided by the freshwater ecosystems; and • Source of sedimentation and smothering of freshwater ecosystem habitat.	Negative High	Negative Low
Habitat, biota and ecological structure - Potential **direct impacts** caused by **construction upgrades:** • Trampling by construction personnel and equipment is likely to impact on the riparian and instream vegetation, leading to habitat degradation; • Potential additional loss of habitat and ecological structure provided by the freshwater ecosystems; and • Potential changes to ecological and socio-cultural service provision.	Negative Medium	Negative Low
Habitat and biota and ecological structure - Potential **indirect impacts** caused by **construction:** • Disturbance to the buffer zone surrounding the freshwater ecosystem, making the freshwater ecosystems vulnerable to the invasion of alien and invasive vegetation species; and • Source of sedimentation and smothering of freshwater ecosystem habitat	Negative Low	Negative Low
Geomorphological processes - Potential **direct impacts** caused by **construction upgrades:** • Excavation and trenching leading to stockpiling of soil within close proximity to the active channel of the freshwater ecosystems; • Movement of construction equipment and personnel within the freshwater ecosystem leading to increased turbidity; • Disturbances of soils leading to potential impacts to the freshwater ecosystem vegetation, increased alien vegetation proliferation in the footprint areas, and in turn to altered freshwater ecosystem habitat; and • Altered runoff patterns, leading to increased erosion and sedimentation of the freshwater ecosystems and disturbance of geomorphological processes.	Negative Medium	Negative Low
Geomorphological processes - Potential **indirect impacts** caused by **construction:** • Reduction in the surface roughness surrounding the freshwater ecosystems leading to altered runoff patterns, leading to increased erosion and sedimentation of the freshwater ecosystems and disturbance of geomorphological processes.	Negative Low	Negative Low
Hydrological functioning and surface water quality - Potential **direct impacts** caused by **construction:** • Construction in the freshwater ecosystems may result in potential changes to the pattern, flow and timing of water entering the downstream portion of the freshwater ecosystem when surface water is present (during rainfall season); • Potential alterations to the runoff patterns, leading to increased erosion and sedimentation of the freshwater ecosystem; and • Constriction of flow leading to turbulent erosive flow of increased velocity or possible loss	Negative High	Negative Low

Impact	Pre-mitigation	Post-mitigation
of recharge to downstream areas, impacting on downstream biota.		
Hydrological functioning and surface water quality - Potential **direct impacts** caused by **construction upgrades:** • Construction in the freshwater ecosystems may result in potential changes to the pattern, flow and timing of water entering the downstream portion of the freshwater ecosystem when surface water is present (during rainfall season); • Potential alterations to the runoff patterns, leading to increased erosion and sedimentation of the freshwater ecosystem; and • Constriction of flow leading to turbulent erosive flow of increased velocity or possible loss of recharge to downstream areas, impacting on downstream biota.	Negative Medium	Negative Low
Hydrological functioning and surface water quality - Potential **indirect impacts** caused by **construction:** • Potential alteration to the surface water flow patterns leading to concentrated surface flow into the freshwater ecosystems; • Higher flood peaks into the freshwater ecosystems due to reduced surface roughness (sinuosity) of the areas surrounding the infrastructure.	Negative Low	Negative Low
Terrestrial Ecology		
Vegetation clearing for access roads, solar arrays and their service areas and other infrastructure will impact on vegetation.	Negative High	Negative Medium
Vegetation clearing for access roads, solar arrays and their service areas and other infrastructure will impact on SCC.	Negative High	Negative Medium
Disturbance could see an increase of alien invasive plant species at disturbed areas.	Negative High	Negative Low
Disturbance would leave the site vulnerable to wind and water erosion.	Negative Medium	Negative Low
An increase in noise and dust within the proposed site and surrounds could have negative impacts on faunal activity including breeding and feeding.	Negative Medium	Negative Low
Agricultural – none identified		
Avifaunal		
Significant habitat loss (including foraging and breeding) and fragmentation due to displacement (avoidance of disturbance) because of infrastructure installation (panels, powerlines, roads, fences and sub surface cables) and associated dust effects. Habitat loss has the tendency to not only destroy existing habitat but also displace bird species from large areas of natural habitat. This specifically has a greater impact on bird species restricted to a specific habitat and its requirements.	Negative Very High	Negative Medium
The destruction or disturbance of bird roosts during the construction phase.	Negative High	Negative Low
Disturbance (including of nesting SCC) due to noise such as, machinery movements and maintenance operations during the construction phase the proposed PV solar farm causing loss of offspring for a generation.	Negative Medium	Negative Low
Hydrological		
Impeding or diverting the flow of water in a watercourse.	Negative Medium	Negative Low
Altering the characteristics of catchment areas.	Negative Low	Negative Low
Erosion from disturbed open ground areas during construction (Disturbed and unconsolidated soil and stockpile).	Negative Medium	Negative Low
Contamination of the watercourses and down slope stream areas by spills of cement and other construction-related hazardous chemicals.	Negative Low	Negative Low

Impact	Pre-mitigation	Post-mitigation
Contamination of the watercourses and down slope stream areas by spills of hydrocarbons from construction vehicles and workshop areas.	Negative Low	Negative Low
Disturbance to vegetation cover thus reducing the site's natural ability to biofilter the surface runoff and groundwater reaching downstream drainage lines.	Negative Low	Negative Low
An increase in impervious areas.	Negative Medium	Negative Low
Impeding flow.	Negative Low	Negative Low
Geotechnical		
Substation and BESS: Ground disturbance during access road construction, foundation earthworks, platform earthworks.	Negative Low	Negative Low
Substation and BESS: Increased erosion due to vegetation clearing, alteration of natural drainage.	Negative Low	Negative Low
SEF 1: Ground disturbance during access road construction, foundation earthworks, platform earthworks.	Negative Low	Negative Low
SEF 1: Increased erosion due to vegetation clearing, alteration of natural drainage.	Negative Low	Negative Low
Impacts to Socio-Economic Component		
Social		
Creation of employment and business opportunities during the construction phase.	Positive Low	Positive Medium
Potential impacts on family structures and social networks associated with the presence of construction workers.	Negative Medium	Negative Low
Potential risk to safety of farmers and farm workers, livestock and damage to farm infrastructure associated with the presence of construction workers on site.	Negative Medium	Negative Low
Potential loss of livestock, crops and houses, damage to farm infrastructure and threat to human life associated with increased incidence of grass fires.	Negative Medium	Negative Low
Potential noise, dust and safety impacts associated with construction related activities.	Negative Medium	Negative Low
Heritage		
Construction activities that take place near to archaeological resources may result in their destruction.	Negative High	Negative Low
Construction activities that take place near to palaeontological resources may result in their destruction.	Negative Low	Negative Low
Construction activities that take place near to cultural landscape elements may result in their destruction	Negative Medium	Negative Low
Visual		
Dust generated during construction will be visually unappealing and may detract from the visual quality (and sense of place) of the area. These impacts are typically limited to the immediate area surrounding the construction site, during the construction period.	Negative Medium	Negative Low
Transportation		

Impact	Pre-mitigation	Post-mitigation
Increase in traffic	Negative Medium	Negative Low
Increase of Incidents with pedestrians and livestock	Negative Medium	Negative Low
Increase in road maintenance	Negative Low	Negative Low
Additional abnormal loads	Negative Low	Negative Low
New / larger access points	Negative Low	Negative Low
OPERATIONAL		
Impacts to Biophysical Systems		
Aquatic / Freshwater		
Habitat and biota and ecological structure of the freshwater ecosystems - Potential **direct impacts** caused by the **operation**: • Continued use of road may result in the disturbance of vegetation and biota of the freshwater ecosystems; and • Proliferation of opportunistic alien and invasive species due to ongoing disturbances	Negative Medium	Negative Low
Habitat and biota and ecological structure of the freshwater ecosystems - Potential **indirect impacts** caused by the **operation:** • Disturbance to the buffer zone surrounding the freshwater ecosystem, making the freshwater ecosystems vulnerable to the invasion of alien and invasive vegetation species; and • Reduction in the surface roughness surrounding the freshwater ecosystems.	Negative Low	Negative Low
Geomorphology, hydrological functioning and surface water quality - Potential **direct impacts** caused by the **operation:** • Concentrated runoff from the road/surface infrastructure leading to erosion and subsequent sedimentation of the freshwater ecosystems (increase in the sediment load) and turbulent flows when surface water is present; and • Higher flood peaks into the freshwater ecosystems due to reduced surface roughness in the freshwater ecosystems and immediate vicinity of the surface infrastructure.	Negative Medium	Negative Low
Geomorphology, hydrological functioning and surface water quality - Potential **indirect impacts** caused by the **operation**: • Concentrated surface water entering the freshwater ecosystems leading to erosion and adding to the sediment load of the freshwater ecosystems; and • Contaminated surface water (from cleaning activities) may enter the freshwater ecosystems.	Negative Low	Negative Low
Terrestrial Ecology		
Displacement and/or disturbance of fauna communities.	Negative High	Negative Low
Re-establishment of secondary vegetation cover and establishment of alien species.	Negative High	Negative Low
Agricultural – none identified		
Avifaunal		
Disturbance (including of nesting SCC) due to noise such as, machinery movements and maintenance operations during the construction phase the proposed PV solar farm causing loss of offspring for a generation.	Negative Low	Negative Low
Bird mortalities during the operational phase due to vehicle collisions, collisions with infrastructure and/or combustion.	Negative Very High	Negative Medium

Impact	Pre-mitigation	Post-mitigation
Loss of Bird Foraging Habitat	Negative High	Negative Low
Disruption of bird migratory pathways during the operational phase.	Negative Medium	Negative Low
The attraction of some novel bird species due to the development of a solar farm with associated infrastructure such as lake effect perches, nest and shade opportunities may cause both damage to the infrastructure through acidic defecation by certain species but also draw birds closer to infrastructure and cause significant direct mortality risks.	Negative High	Negative Medium
Chemicals being used to keep the PV panels clean from dust (suppressants) etc.	Negative High	Negative Low
Hydrological		
Impeding or diverting the flow of water in a watercourse.	Negative Low	Negative Low
Altering the characteristics of local catchment areas.	Negative Low	Negative Low
Natural vegetation disturbance/loss resulting in the emergence of invasive alien vegetation, placing further pressure on water resources.	Negative Low	Negative Low
Contamination of the watercourses and down slope stream areas by spills from chemicals used to clean or maintain the facility's assets.	Negative Low	Negative Low
Contamination of the watercourses and down slope stream areas by spills of hydrocarbons from maintenance or delivery vehicles.	Negative Low	Negative Low
Disturbance to the 'surface roughness' of baseline vegetation cover, thus reducing the site's natural ability to biofilter the runoff and groundwater reaching downstream drainage lines.	Negative Low	Negative Low
An increase in impervious areas, in the form of internal access roads and service infrastructure.	Negative Low	Negative Low
An increase in the kinetic energy and splash erosion potential resulting from the mass introduction of 'hard' surfaces, in the form of PV panels and their base infrastructure.	Negative Low	Negative Low
Impeding / diverting natural flows.	Negative Low	Negative Low
Geotechnical		
Substation and BESS: Increased erosion due to alteration of natural drainage.	Negative Low	Negative Low
SEF 1: Increased erosion due to alteration of natural drainage.	Negative Low	Negative Low
Impacts to Socio-Economic Component		
Social		

Impact	Pre-mitigation	Post-mitigation
Development of infrastructure to improve energy security and support renewable sector.	Positive Medium	Positive High
Creation of employment and business opportunities associated with the operational phase.	Positive Low	Positive Medium
The generation of additional income represents a significant benefit for the local affected farmer(s) and reduces the risks to their livelihoods posed by droughts and fluctuating market prices for sheep and farming inputs, such as feed etc.	Positive Low	Positive Medium
Benefits associated with support for local community's form SED contributions.	Positive Medium	Positive High
Visual impact associated with the proposed facility and associated infrastructure and the potential impact on the areas rural sense of place.	Negative Medium	Negative Medium
Potential impact of the SEF on property values	Negative Low	Negative Low
Potential impact of the SEF on local tourism	Negative Low	Negative Low
Heritage		
Operational activities that take place near to archaeological resources may result in their destruction.	Negative Medium	Negative Low
Operational activities that take place near to palaeontological resources may result in their destruction.	Negative Low	Negative Low
Operational activities that take place near to cultural landscape elements may result in their destruction.	Negative High	Negative Low
Visual		
The development of this PV array may be perceived as conflicting with the current undeveloped, inhospitable agricultural landscape. The proposed SEF is anticipated to interrupt and/or degrade views, affecting the sense of place and presenting as a visual intrusion across the landscape.	Negative Medium	Negative Medium
Associated infrastructure, particularly the BESS, is not congruent with the current landscape integrity, and will contribute to visual clutter: however, few receptors are expected to be exposed.	Negative Low	Negative Low
The glare analysis indicated that no glare will be experienced at the OPs modelled or along the routes modelled, viz. Gravel Road and the railway line. As no glare is expected, the impact associated with visual discomfort or impaired visibility is considered unlikely.	Negative Low	Negative Low
The installation of lighting on the site perimeter and / or around the BESS is anticipated to generate nightglow which currently does not emanate from the natural, undeveloped site. The introduction of lighting on the site will alter the sense of place and visual quality to surrounding receptors.	Negative Medium	Negative Low
Transportation		
Increase in Traffic	Negative Low	Negative Low
Increase of Incidents with pedestrians and livestock	Negative Low	Negative Low
Additional Abnormal Loads	Negative Low	Negative Low

Impact	Pre-mitigation	Post-mitigation
New / Larger Access points	Negative Low	Negative Low
DECOMMISSIONING		
Impacts to Biophysical Systems		
Aquatic / Freshwater		
Habitat and biota and ecological structure of the freshwater ecosystems - Potential direct and indirect impacts: • Clearing of habitat that has established in previous phases, resulting in a disturbed ecological structure; • Compaction and disturbance of soils due to decommissioning activities, making the impacted areas unfavourable for the establishment of vegetation and may allow for opportunistic alien and invasive species to establish in the freshwater ecosystems; • Movement of construction vehicles within the freshwater ecosystems, disturbing established biota in the freshwater ecosystems.	Negative Medium	Negative Low
Geomorphological processes, hydrological functioning and surface water - Potential direct and indirect impacts: • Site disturbance and trampling of vegetation resulting in increased runoff which leads to erosion and alteration of the geomorphology of the freshwater ecosystems; • Disturbance to the erodible soils, that may potentially result an increased risk of bank incision, sheet erosion and gully formation in the freshwater ecosystems and their surrounding area; • Increased movement of construction vehicles within the freshwater ecosystems (utilising freshwater ecosystem road crossings) resulting in soil compaction; • Potential runoff from stockpiles, earthwork activities and disposal of hazardous materials contributing to the freshwater ecosystem sediment load; and • Latent impacts from landscape scarring after decommission which creates a loss of ground cover that may potentially lead to erosion and sedimentation of freshwater ecosystems.	Negative Low	Negative Low
Terrestrial Ecology		
Dismantling and removal of infrastructure	Negative Medium	Negative Low
Waste generated	Negative High	Negative Medium
Agricultural – none identified		
Avifaunal		
Disruption of bird migratory pathways during the decommissioning phase.	Negative Medium	Negative Low
Destruction of habitats and scarring.	Negative High	Negative Medium
Hydrological		
Contamination of the watercourses and down slope stream areas by spills of hydrocarbons from an increase in decommissioning machinery or loading / transport vehicles.	Negative Low	Negative Low
Disturbance to the site's established vegetation cover, resulting in bare soil exposure, and thus increasing the risk of erosion and sediment reaching downstream drainage lines.	Negative Low	Negative Low
Geotechnical		

Impact	Pre-mitigation	Post-mitigation
Substation and BESS: Ground disturbance during access road construction, foundation earthworks, platform earthworks.	Negative Low	Negative Low
Substation and BESS: Increased erosion due to vegetation clearing, alteration of natural drainage.	Negative Low	Negative Low
SEF 1: Ground disturbance during access road construction, foundation earthworks, platform earthworks.	Negative Low	Negative Low
SEF 1: Increased erosion due to vegetation clearing, alteration of natural drainage.	Negative Low	Negative Low
Impacts to Socio-Economic Component		
Social		
Social impacts associated with retrenchment including loss of jobs, and source of income. Decommissioning will also create temporary employment opportunities, which would represent a positive temporary impact.	Negative Low	Negative Low
Heritage		
Decommissioning activities that take place near to archaeological resources may result in their destruction.	Negative High	Negative Low
Decommissioning activities that take place near to palaeontological resources may result in their destruction.	Negative Low	Negative Low
Decommissioning activities that take place near to cultural landscape elements may result in their destruction.	Negative Medium	Negative Low
Visual		
Dust generated during decommissioning activities will be visually unappealing and may detract from the visual quality (and sense of place) of the area. These impacts are typically limited to the immediate area surrounding the site, during the decommissioning period.	Negative Medium	Negative Low
Transportation		
Increase in Traffic	Negative Medium	Negative Low
Increase of Incidents with pedestrians and livestock	Negative Medium	Negative Low
Increase in road maintenance	Negative Low	Negative Low
Additional abnormal loads	Negative Low	Negative Low
New / Larger Access points	Negative Low	Negative Low
CUMULATIVE		
Impacts to Biophysical Systems		
Aquatic / Freshwater		
• Loss of freshwater ecosystem vegetation and subsequent habitat, due to freshwater ecosystem road crossings and potential infrastructure located in the freshwater ecosystems; and • Changes to flow, pattern and timing of surface water in the drainage system due to land use changes in the catchment, potentially resulting in changes to the hydrological regime of the larger downstream freshwater ecosystems.	Negative Medium	Negative Low
Terrestrial Ecology		
Cumulative Impact of various proposed renewable energy projects on the natural environment	Negative High	Negative Low
Cumulative Impact of numerous grid connection infrastructure in the surrounding area	Negative Medium	Negative Low

Impact	Pre-mitigation	Post-mitigation
Agricultural - none identified		
Avifaunal		
Regional Saturation of SEF facilities causing habitat loss.	Negative Very High	n/a
Increased roadkill due to higher traffic volumes	Negative High	Negative Low
Increased mortalities due to collisions with SEF infrastructure, especially powerlines and fences	Negative Very High	Negative Medium
Cumulative impact of numerous grid connection infrastructure in the surrounding area	Negative High	Negative Medium
Increased collision related mortalities due to increased powerlines	Negative Very High	Negative High
Hydrological		
A series (or high frequency) of localised hydrocarbon or hazardous material spills, leads to a 'larger-scale' impact on surrounding freshwater ecological systems, which may become irreversible.	Negative Medium	Negative Low
This photovoltaic project, together with any other proposed and existing projects and activities in the area would have a cumulative impact on the surface runoff regime, due to a 'broad-scale' increase in impervious areas, in the form of internal access roads and service infrastructure.	Negative Low	Negative Low
Geotechnical – none identified		
Impacts to Socio-Economic Component		
Social		
Cumulative visual impacts associated with the establishment of a number of SEFs and associated grid infrastructure and the potential impact on the area's rural sense of place and character of the landscape.	Negative Medium	Negative Medium
The establishment of a number of renewable energy facilities and associated projects, such as the proposed SEF, in the HM has the potential to place pressure on local services, specifically medical, education and accommodation.	Negative Medium	Negative Medium
The establishment of renewable energy facilities and associated projects, such as the SEF, in the HM will create employment, skills development and training opportunities, creation of downstream business opportunities.	Positive Medium	Positive High
Heritage		
Cumulative destruction of significant archaeological heritage.	Negative Medium	Negative Low
Cumulative destruction of significant palaeontological heritage.	Negative Medium	Negative Low
Cumulative impact to the cultural landscape.	Negative Medium	Negative Low
Visual		
The site and surrounds are rural in character, there is a high concentration of approved renewable energy projects and associated grid infrastructure located around the Helios MTS. Only two WEFs of the 12 facilities appear to be operational, while another SEF is under construction. As more of these facilities and infrastructure are constructed, the visual landscape is expected to be significantly transformed detracting from the visual quality of the region. As SEFs and WEFs proliferate, impacts will accumulate towards an unknowable threshold.	Negative Medium	Negative Low
Transportation		

Impact	Pre-mitigation	Post-mitigation
Increase in traffic	Negative Medium	Negative Medium
Increase of Incidents with pedestrians and livestock	Negative Medium	Negative Medium
Increase in road maintenance	Negative Low	Negative Low
Additional Abnormal Loads	Negative Medium	Negative Low
New / Larger Access points	Negative Low	Negative Low

16. SUMMARY OF SPECIALIST FINDINGS AND RECOMMENDATIONS

Table 31: Summary of specialist findings and recommendations

Specialist Study	Findings	Recommendations
Aquatic / Freshwater	Only the episodic drainage lines and rivers with riparian vegetation can, from an ecological perspective, be classified as watercourses (freshwater ecosystems) due to the expression of a riparian response by vegetation and the presence of alluvial soil. Preferential flow paths (PFPs) are unlikely to have catchments which are large enough to generate a flood response and are not considered freshwater ecosystems from an ecological perspective. Episodic drainage lines without riparian vegetation may, on a system specific basis be considered freshwater ecosystems should they be subject to a 1:100 year floodline, as determined by a suitably qualified professional. PFPs and drainage lines, not defined as watercourses still function as waterways, through the episodic conveyance of water through the landscape. These systems are still considered important for the hydrological functioning of the larger episodic tributaries and rivers and must	• Two episodic rivers with riparian vegetation will be crossed by newly proposed access roads; therefore additional precautionary measures should be taken in terms of erosion and sediment control and dissipation; • All construction works for the freshwater ecosystem road crossings must be supervised by a freshwater ecologist that must ensure that weather conditions are sufficiently dry enough such that no diversion of flow is necessary to proceed with construction – this is imperative to maintain a low impact significance; • Construction activities in the freshwater ecosystem will potentially result in bank destabilisation, and cause bank incision and sedimentation of the freshwater ecosystem, therefore, sediment control devices should be installed downgradient of the construction site in the freshwater ecosystem and all excess sediment is to be removed once construction activities have been completed; • For the solar arrays near episodic drainage lines, a 25 m setback to be allowed to ensure sufficient space for erosion and sediment control and dissipation near these

Specialist Study	Findings	Recommendations
	ideally be protected to manage the pattern, flow and timing of water in the landscape, implying that runoff from the project area must be carefully managed. The Impact Assessment identified that the Negative High and Medium Impacts in the construction, operation and decommissioning phases with mitigation can be lowered to a Negative Low Impact, on condition of strict adherence to general and project-specific suggested mitigation measures. Only the proposed access roads pose direct impacts to freshwater ecosystems, but the layout was proposed in a manner to, as far as possible, avoid and minimise crossings. All other infrastructure falls outside of the 32 m NEMA Zone of Regulation (ZoR).	episodic features, as these areas are subjected to greater amounts of runoff compared to non-developed areas during high rainfall events; and • Existing roads and newly authorised freshwater ecosystem crossings should be utilised to gain access to the proposed construction area. No indiscriminate crossing of the freshwater ecosystems outside of the existing crossing points or driving in unmarked areas through the buffer zones of the freshwater ecosystems may be permitted; • Development footprint areas to remain as small as possible and vegetation clearing to be limited to what is essential; • New road crossings must intersect the freshwater ecosystem at a right angle (perpendicular) to minimise disturbance to the freshwater ecosystem; • Soil excavated as part of trenching must be stockpiled immediately upstream of the trench and backfilled as soon as possible with the removed material and suitably compacted to avoid any erosion and preferential flow paths from forming; • During excavation activities, the topsoil and vegetation that is removed should be stockpiled separately from other material outside of the 32 m NEMA ZoR; and • After construction of the surface infrastructure, the area surrounding the surface infrastructure must be revegetated with suitable indigenous vegetation (terrestrial vegetation) to prevent the establishment of alien vegetation species and their potential spread into the freshwater ecosystems.
Hydrological	The proposed solar project will alter the natural environmental state, thereby affecting the generation of storm water and the associated potential for erosion. Volumes of storm water generated over disturbed areas are generally expected	• It is recommended that the site is regularly inspected, with areas prone to erosion identified. Silt fences may be suitable for the control of erosion from areas disturbed or affected during construction, operation or decommissioning.

Specialist Study	Findings	Recommendations
	to increase because of the reduction in natural vegetation or the addition of areas of hardstanding resulting from the combination of PV infrastructure and associated pylons, Battery Energy Storage System, the temporary laydown area, the construction area as well as internal access roads. The quality of the storm water generated is also expected to be affected by the removal of vegetation and the excavation of soils. The movement of vehicles over the site will also potentially introduce possible hydrocarbons. A conceptual storm water management plan has been developed for the site aimed at ensuring the impact of water generated upstream or on site during extreme rainfall events can be better manged by routing storm water away from infrastructure thereby reducing any associated flood risk. A hydrological impact assessment was undertaken to determine the significance of each identified potential impact. Potential impacts considered in this assessment for the construction and operational phases were changes in catchment water resources, changes in catchment water quality, and changes in flood hydrology. Potential significance for the considered impacts ranged from medium in the pre-mitigation scenarios to low in the post mitigation scenarios.	• It is recommended that the proposed storm water management plan is implemented. This will ensure the attenuation of storm water runoff. It is also recommended that berms, channels, and sediment traps associated with the drainage lines are designed appropriately (in accordance with the best practice guidelines). • Natural vegetation should be re-established to represent the previously undisturbed environment as closely as possible • It is recommended that the grass beneath the panels be well maintained or that a buffer
Terrestrial	The study area is located within the Hantam Karoo vegetation type, listed as Least Threatened, and intersects a CBA1, CBA2 and ESA according to the Northern Cape CBA Map. The CBA1 are the NFEPA Rivers, Klein-Rooiberg and Rooiberg, both considered largely natural which must be excluded from development. CBA2 are mainly due to	• Rehabilitation and monitoring plan required post-construction and post-operational phase of the project which addresses ecosystem functioning, fire management, alien invasive species management and effective methods of rehabilitating natural vegetation to functional systems (not just biomass replacement). • Roads and underground cabling must avoid

Specialist Study	Findings	Recommendations
	the FEPA catchment, FEPA rivers and associated 500m buffer and the vegetation type being located within the Succulent Karoo biome. The ESA towards the western section is the Krom River and associated wetlands, while the smaller scattered ESAs towards the eastern boundary are koppies which are large high value climate resilience areas. Linear infrastructure such as roads and internal powerlines can cross the watercourses, but care should be taken in the planning of this. The majority of the SEF consist of Karoo shrubland with grassland patches on flat plains and gently sloping hills that are not considered sensitive. The watercourses and pans are considered sensitive and should be avoided during the construction period for placement of infrastructure, laydown areas and associated infrastructure. Roads and cables will cross watercourses, and the impacts can be mitigated by reducing it to acceptable levels since avoidance is not possible. The Koppie towards the north-east must be avoided from all development activities.	sensitive areas as far as possible by considering various layout alternatives. The karoo shrubland habitat will not be transformed completely (only PV related – this is not the case for roads and temporary laydown areas), accordingly with appropriate mitigation and rehabilitation measures post-construction and post-operational, the impact of the PV panels is considered medium for karoo shrubland. • It is advised that an ecological specialist is appointed during the construction, operational and decommissioning phases to monitor impacts and related mitigation measures regarding natural and sensitive habitats and the faunal and floral assemblages occurring there. • Care should be taken not to unnecessarily clear or destroy natural vegetation. • Development and planned activities should therefore be planned in such a way that totally transformed areas are chosen for major developments and natural veld and especially any highly sensitive areas are avoided as far as possible. • Sensitive species 144 must be protected in situ and a 200m buffer is applicable where no construction activities may take place. • Provincially listed species which are affected by the proposed development requires a permit application for their removal from the provincial authority prior to the commencement of construction activities.
Agricultural	The development will occupy land that is of very limited land capability, which is insufficient for crop production. There is not a scarcity of such agricultural land in South Africa and its conservation for agricultural production is not therefore a priority. The amount of agricultural land use by the development is within the allowable	From an agricultural impact point of view, it is recommended that the development be approved. The conclusion of this assessment on the acceptability of the proposed development and the recommendation for its approval is not subject to any conditions, other than recommended mitigation.

Specialist Study	Findings	Recommendations
	development limits prescribed by the agricultural protocol. These limits reflect the national need to conserve valuable agricultural land and therefore to steer, particularly renewable energy developments, onto land with low agricultural production potential. The PV panels will not necessarily totally exclude agricultural production. The area may still be used to graze sheep that will, in addition, be protected against stock theft within the security area of the facility. All renewable energy development in South Africa decreases the need for coal power and thereby contributes to reducing the large agricultural impact that open cast coal mining has on highly productive agricultural land throughout the coal mining areas of the country.	
Avifaunal	The study area is situated within the Hantam Karoo vegetation type. The study area is not anticipated to support breeding populations of several large terrestrial bird species such as cranes and large raptor species in sufficiently large densities or within breeding habitat that may be considered a fatal flaw. However, given the size of the area, the proximity to a very large areas of suitable habitat, the high-density presence of Red Lark, Ludwig's Bustard and Karoo Korhaan is deemed to be a significant concern. The CBAs of the Northern Cape designated that majority of the site falls within a CBA 1, CBA 2 and an ESA1. Avoidance mitigation could be applied wherever possible to project infrastructure design and limit the amount of habitat impacted. A total of twenty-two (22) priority species has the possibility of occurring within	Formal post construction monitoring must be applied once the development has been activated, as per the most recent edition of the best practice guidelines. The exact scope and nature of the post-construction monitoring will be informed on an ongoing basis by the result of the monitoring through a process of an establishment of available new technology and adaptive management.

Specialist Study	Findings	Recommendations
	and around the study area. Some of the priority bird species are not habitat-bound to the area for nesting and/or foraging purposes and is therefore important to focus on the some of the most significant cumulative impacts for the proposed solar project. Overall and with these factors taken into consideration, the specialist deems that the project may proceed.	
Geotechnical	The assessment area is underlain by rock units of Ecca Group of Karoo Supergroup and intrusive dolerite. Some geotechnical constraints have been identified, primarily shallow and outcropping bedrock which may cause excavation difficulties, localised steep slopes with thick talus and existing drainage channels with concentrated water flow. These conditions and associated constraints may be mitigated via standard engineering design and construction measures. The Lesaka 1 SEF area and substation areas may be divided into four (4No.) ZONEs (I, II, III and IV) where similar geotechnical conditions are anticipated. ZONE I is defined by shallow occurring bedrock covered by thin, loose transported material and varying degrees of cemented calcrete. ZONE II can be characterised by talus deposits on relatively steep slopes that is linked to ZONE III that defines the high lying outcropping bedrock of which is seemingly dolerite material. ZONE IV is confined to low lying areas that are underlain by relativity thicker alluvial deposits, identifiable by erosion paths, rills, and continuous drainage features. No fatal flaws or 'no-go' areas have	It is recommended that areas of steeper slope gradients and drainage channels are avoided when determining the final infrastructure layout. The proposed substation and BESS area falls within FACET I which is expected to provide good founding conditions and minimal earthworks before construction, therefore reducing the potential environmental impact. From a geotechnical and geological perspective, no fatal flaws or sensitivities have been identified within or close to the Lesaka 1 SEF assessment area and in the proposed substation, and BESS. It is therefore recommended that the proposed activity be authorised.

Specialist Study	Findings	Recommendations
	been identified that would render any assessment areas unsuitable from a geological and geotechnical perspective. No geologically or geotechnically sensitive areas were identified within or near the assessment area.	
Social	The findings of the SIA indicate that the proposed Lesaka 1 PV SEF and associated infrastructure will result in several social and socio-economic benefits, including creation of employment and business opportunities during both the construction and operational phase. The project will also contribute to local economic development though socio-economic development (SED) contributions. In addition, the development will improve energy security and reduce the carbon footprint associated with energy generation. The findings of the SIA also indicate that the potential negative impacts associated with both the construction and operational phase are likely to be Low Negative with mitigation. The potential negative impacts can therefore be effectively mitigated if the recommended mitigation measures are implemented. The establishment of the proposed Lesaka 1 PV SEF is supported by the findings of the SIA.	• Preparation and implementation of a Stakeholder Engagement Plan (SEP) prior to and during the construction phase. • Preparation and implementation of a Community Health, Safety and Security Plan (CHSSP) prior to and during the construction phase.
Heritage	The surveys conducted for impacts to heritage resources including archaeology and palaeontology proceeded with no significant constraints or limitations, and the project area was comprehensively surveyed for heritage resources. An area of higher archaeological sensitivity associated with the stream systems across the development area was identified and mapped. This area must be avoided in	• The area of high archaeological sensitivity identified is avoided in the final configuration of the PV layout. The final layout provided complies with this recommendation. • If Palaeontological Heritage is uncovered during surface clearing and excavations ECO should be informed immediately. Fossil discoveries ought to be protected and the ECO/site manager must report to South African Heritage Resources Agency (SAHRA) so that mitigation (recording and

Specialist Study	Findings	Recommendations
	the final PV layout in order to ensure that no significant archaeological heritage resources are negatively impacted by the proposed development. Despite the high sensitivity for impacts to palaeontological heritage resources of sediments in the vicinity of the development, the areas proposed for the Lesaka 1 PV facility and its associated infrastructure consist of dolerite and quaternary sands and as such, the layout as proposed has low sensitivity for impacts to palaeontological sensitivity.	collection) can be carried out. • Although all possible care has been taken to identify sites of cultural importance during the investigation of the study area, it is always possible that hidden or subsurface sites could be overlooked during the assessment. If any evidence of archaeological sites or remains (e.g. remnants of stone-made structures, indigenous ceramics, bones, stone artefacts, ostrich eggshell fragments, charcoal and ash concentrations), fossils, burials or other categories of heritage resources are found during the proposed development, work must cease in the vicinity of the find and SAHRA must be alerted immediately to determine an appropriate way forward.
Transport	This Transportation Study assessed the anticipated traffic impact of the Lesaka 1 Solar Energy Facility. It was found that the highest traffic impact of the proposed development would occur during the construction phases, which was estimated to generate an additional ±14 peak hour vehicle trips. The existing site accesses are deemed sufficient for the proposed facility but may require some upgrades. No fatal flaws or preferences were identified for any of the proposed site alternatives for construction laydown areas and access points.	• An Abnormal Load Study should be undertaken once the (i) detail design, (ii) construction programme, and (iii) logistics plan are available. • Dry runs along abnormal load routes should be conducted prior to transporting abnormal loads • Internal access roads should be constructed according to TRH20 – Unsealed Roads: Design Construction and Maintenance • Traffic calming and speed reduction should be implemented at the approaches to the site access during construction • Proper and adequate construction road signage should be used on the approach roads which complies with the South African Road Traffic Signage Manual (SARTSM). • The condition and quality of the gravel roads used should be monitored closely during and after construction, and any required maintenance should be undertaken timeously under the auspices of the relevant transport department. • Farm fences and access cattle grids should be maintained regularly. • The implementation of the mitigation

Specialist Study	Findings	Recommendations
		measures identified in the Impact Rating Table should be ensured and monitored.
Visual	The proposed project comprises the development of a SEF, further altering the visual landscape of the project area. This project is moderately congruent with and marginally affects the integrity of the landscape, as there are a number of approved renewable energy facilities around or near the proposed site, with two operational WEFs and a SEF under construction. A highly concentrated network of powerlines exists within the project area and the wider region due to the nearby Helios MTS and approved renewable projects. Due to the open, flat and intact topography, the Visual Absorbtion Capacity of the project area is considered low. This project will alter visual quality during the construction and decommissioning phases, as well as alter sense of place, visual quality and result in visual intrusion during the operational phase. The impact of visual discomfort and impaired visibility is assessed to be low significance. These impacts are deemed to be acceptable on the assumption that the mitigation measures listed are implemented. Based on the assessment and the assumption that the mitigation measures will be implemented, the specialist is of the opinion that the visual impacts of the project are acceptable and there is no reason not to authorise the project.	• Limit vegetation clearance and the footprint of construction to what is absolutely essential. • Consolidate the footprint of the construction camp to a functional minimum. • Avoid excavation, handling and transport of materials which may generate dust under very windy conditions. • Keep stockpiled aggregate and sand covered to minimise dust generation. • Keep construction site tidy • Fence the perimeter of the site with green or black fencing. • Install powerlines underground, where possible. • Fence the perimeter of the site with green or black fencing. • Ensure that the roof colour of the proposed buildings blends into the landscape. • Reduce the height of lighting masts to a workable minimum. • Direct lighting inwards and downwards to limit light pollution.
Risk	There are no fatal flaws associated with either battery technology type for the proposed Lesaka 1 battery installation. The current proposed location of the Lesaka 1 BESS is more than 100m from rivers and are therefore suitable.	• The overall design should be subject to a full Hazop prior to finalization of the design. • For the VRFB systems an end of life (and for possible periodic purging requirements) solution for the large quantities of hazardous electrolyte should be investigated, e.g., can it be returned to the

Specialist Study	Findings	Recommendations

		supplier for re-conditioning.
		• Prior to bringing any solid-state battery containers into the country, the contractor should ensure that:
		  ○ An Emergency Response Plan is in place that would be applicable for the full route from the ship to the site. This plan would include details of the most appropriate emergency response to fires both while the units are in transit and once they are installed and operating.
		  ○ An End-of-Life plan is in place for the handling, repurposing or disposal of dysfunctional, severely damaged batteries, modules and containers.
		• The site layout and spacing between lithium solid-state containers should be such that it mitigates the risk of a fire or explosion event spreading from one container to another.
		• Under certain weather conditions, the noxious smoke from a fire in a lithium battery container could travel some distance from the unit. The smoke will most likely be acrid and could cause irritation, coughing, distress etc. Close to the source of the smoke, the concentration of toxic gases may be highenough to cause irreversible harmful effects. Location of the facilities needs to ensure a suitable separation distance, i.e. 500m, from public facilities/residences etc. and should preferably not be located directly southwest of any occupied facilities
		• Where there is a choice of alternative locations for the BESS, those that are further from water courses would be preferred. VRFB hazards are mostly related to possible loss of containment of electrolyte and solid-state systems may experience fires that may result in loss of containment of liquids or the use of large amounts of fire water which could be contaminated. One would not want these run-offs to enter water courses directly. The buffer distance

Specialist Study	Findings	Recommendations
		between water bodies and the facilities containing chemicals should be set in consultation with a water specialist, possibly 100m minimum separation. The current proposed location of both Lesaka 1 BESS are more than 100m from rivers and are therefore suitable. • Finally, it is suggested once the technology has been chosen and more details of the actual design are available, the necessary updated Risk Assessments should be in place.

17. ENVIRONMENTAL IMPACT STATEMENT

Lesaka 1 Solar Energy Facility (Pty) Ltd is proposing to construct the Lesaka 1 Solar Energy Facility (SEF) and associated infrastructure approximately 35 km north of Loeriesfontein in the Hantam Local Municipality and the Namakwa District Municipality, in the Northern Cape Province. The overall objective of the proposed development is to supply suitable private off-taker initiatives (direct supply or wheeling agreements, as applicable), or be bid into the government coordinated Renewable Independent Power Producer Programme (REIPPP) or similar procurement program under the Integrated Resource Plan (IRP). The proposed development will have a maximum total generation capacity of up to 240 megawatt (MW).

Taking into consideration the findings of the EIA process for the proposed development and the fact that specialist recommendations have been used to inform the project design and layout of the facility, it is the opinion of the Environmental Assessment Practitioner (EAP) that the negative impacts associated with the implementation of the proposed project can be mitigated to acceptable levels. While there are potential negative environmental impacts associated with the proposed development, the extent of the positive benefits associated with the implementation of the project in terms of renewable energy supply and positive local and regional economic impact are considered to outweigh the negative impacts.

After consideration of the findings presented in the EIR and based on the preferred layout presented within this report, it is the reasoned opinion of the EAP that the proposed Lesaka 1 SEF is acceptable and Environmental Authorisation could be granted.

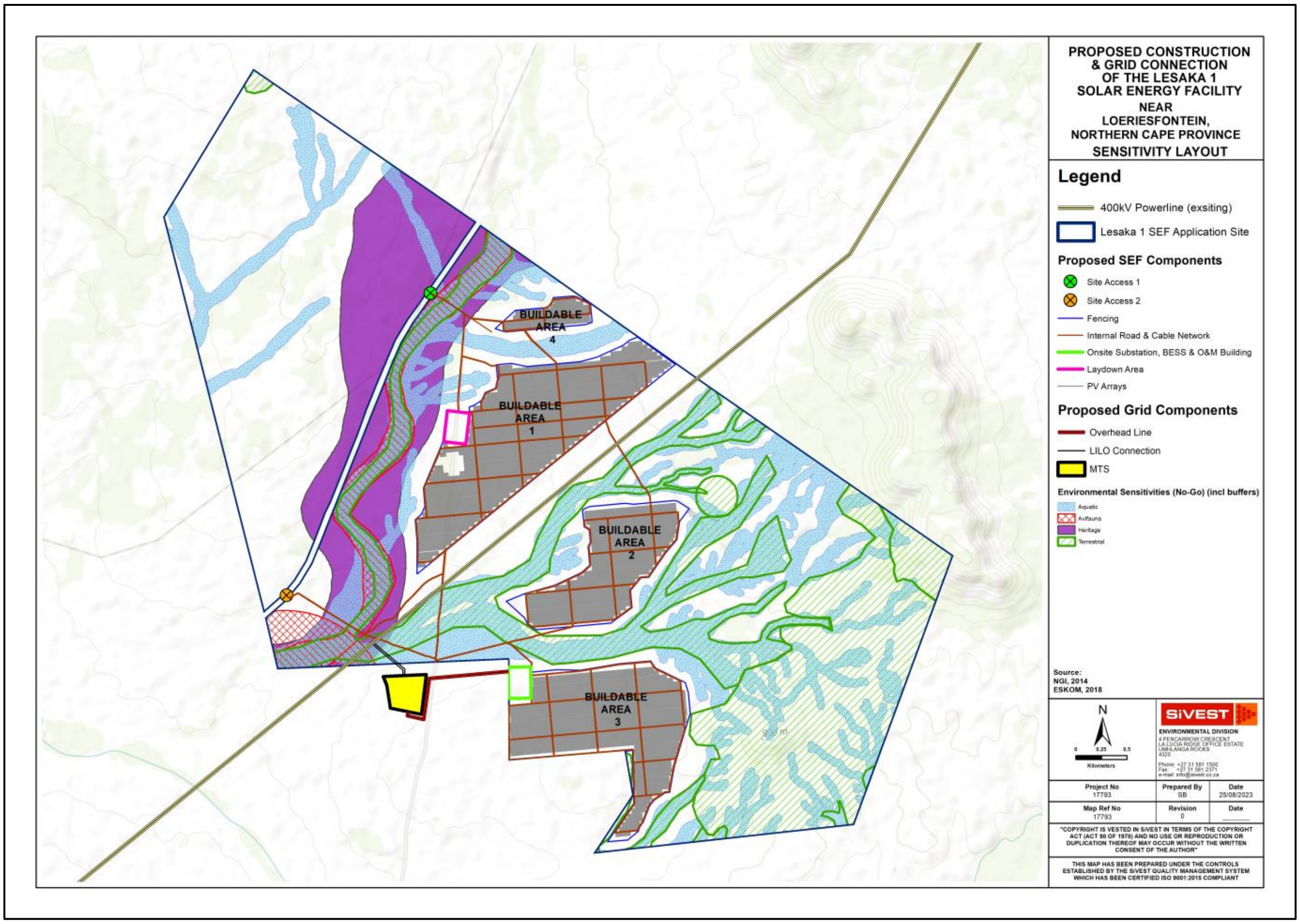


Figure 55: Final proposed layout with site sensitivities (proposed grid components and MTS to be included in a separate application)

The Lesaka 1 SEF will assist by converting solar energy into electricity, thereby releasing no harmful by-products into the environment which will in turn reduce the dependency on fossil fuels.

The following specialist studies have been undertaken for the project:

- Aquatic/Freshwater Impact Assessment
- Terrestrial Biodiversity Impact Assessment
- Agriculture and Soils Impact Assessment
- Avifaunal Impact Assessment
- Hydrological Impact Assessment
- Desktop Geotechnical Investigation
- Social Impact Assessment
- Heritage Impact Assessment (including Palaeontology, Archaeology and Cultural)
- Transportation Impact Assessment
- Visual Impact Assessment
- Risk Assessment

The specialist assessments were conducted to address the potential impacts relating to the proposed development in order to ascertain the level of each identified impact, as well as mitigation measures which may be required. A summary of the main findings of the specialists are included in **Section 16** above.

The aquatic assessment (refer to **Appendix 6**) concluded that the negative high and medium impacts in the construction, operation and decommissioning phases can be lowered to a negative low impact after mitigation, on condition of strict adherence to general and project-specific suggested mitigation measures. Assuming that strict enforcement of cogent, well-developed mitigation measures takes place, the significance of impacts arising from the proposed SEF development can be adequately managed and the project considered for EA.

The hydrological impact assessment (**refer to Appendix 6**) concluded that No fatal flaws were identified during the hydrological investigations for the proposed Lesaka 1 Solar Energy Facility based on supplied information specific to the project and as such, it is the opinion of the authors that the proposed development can be authorised on condition that the recommendations and proposed mitigation measures be implemented in order to ensure any impact on receiving water resources can be limited as far as possible.

The terrestrial biodiversity assessment (refer to **Appendix 6**) concluded that the majority of the SEF consist of Karoo shrubland with grassland patches on flat plains and gently sloping hills that are not considered sensitive. The watercourses and pans are considered sensitive and should be avoided during the construction period for placement of infrastructure, laydown areas and associated infrastructure. Roads and cables will cross watercourses, and the impacts can be mitigated by reducing it to acceptable levels since avoidance is not possible. Large sections of the affected area are not considered highly sensitive and there are no specific features of the affected area which would indicate that it is of broad-scale significance for faunal movement or landscape connectivity. One individual of a sensitive species was recorded on site which should be protected in situ as it can be avoided by the proposed development.

The agricultural assessment (refer to **Appendix 6**) concluded that the site has low agricultural potential and no dryland cropping potential predominantly because of aridity constraints but also because of soil constraints. As a result of the constraints, agricultural production is limited to low density grazing. From an agricultural impact point of view, the specialist recommended that the development be approved.

The avifaunal assessment (refer to **Appendix 6**) concluded the study area is not anticipated to support breeding populations of several large terrestrial bird species such as cranes and large raptor species in sufficiently large densities or within breeding habitat that may be considered a fatal flaw. However, given the size of the area, the proximity to a very large areas of suitable habitat, the high-density presence of Red Lark, Ludwig's Bustard and Karoo Korhaan is deemed to be a significant concern. Formal post construction monitoring must be applied once the development have been activated. Overall and with these factors taken into consideration, the specialist deems that the project may proceed.

The geotechnical assessment (refer to **Appendix 6**) concluded that no fatal flaws or 'no-go' areas have been identified that would render any assessment areas unsuitable from a geological and geotechnical perspective. The specialist therefore recommended that the proposed activity be authorised.

The social assessment (refer to **Appendix 6**) concluded that the Lesaka 1 PV SEF and associated infrastructure will result in several social and socio-economic benefits, including creation of employment and business opportunities during both the construction and operational phase. The project will also contribute to local economic development though socio-economic development (SED) contributions. The potential negative impacts associated with both the construction and operational phase are likely to be low negative with mitigation. The potential negative impacts can therefore be effectively mitigated if the recommended mitigation measures are implemented. The establishment of the proposed Lesaka 1 PV SEF is supported by the findings of the SIA.

The heritage assessment (refer to **Appendix 6**) concluded that no significant constraints or limitations were identified, and that the project area was comprehensively surveyed for heritage resources. An area of higher archaeological sensitivity associated with the stream systems across the development area was identified and mapped and has been avoided by the proposed development. It is not anticipated that the proposed development will negatively impact on significant heritage resources.

The visual assessment (refer to **Appendix 6**) concluded that the project is moderately congruent with and marginally affects the integrity of the landscape, as there are a number of approved renewable energy facilities around or near the proposed site, with two operational WEFs and a SEF under construction. A highly concentrated network of powerlines exists within the project area and the wider region due to the nearby Helios MTS and approved renewable projects. Due to the open, flat and intact topography, the VAC of the project area is considered low. The project will alter visual quality during the construction and decommissioning phases, as well as alter sense of place, visual quality and result in visual intrusion during the operational phase. The impact of visual discomfort and impaired visibility is assessed to be low significance. These impacts are deemed to be acceptable on the assumption that the mitigation measures are implemented. Based on the assessment and the assumption that the mitigation measures will be implemented, the specialist is of the opinion that the visual impacts of the project are acceptable and there is no reason not to authorise the project.

The risk assessment (refer to **Appendix 6**) concluded that there are no fatal flaws associated with either battery technology type for the proposed Lesaka 1 battery installation and the current proposed location of the Lesaka 1 BESS is more than 100m from rivers and are therefore suitable.

No location alternatives are being considered for the Lesaka 1 SEF as these sites were selected prior to the commencement of the EIA Process. Layout alternatives for the construction laydown area were investigated in the Scoping phase. This layout was assessed by specialists to identify potential impacts that may arise from the development.

Based on the findings of the specialists, the potential impacts identified and the outcomes of the public participation process of the Scoping Phase, the layout was then updated to ensure avoidance of all environmental sensitivities identified by the specialists (except for a few roads and cabling) to produce a final layout. This final layout has been further assessed by all specialists (including cumulatively along with the proposed grid infrastructure) (refer to Impact Tables in **Section 14.3** and findings and recommendations in **Section 16**). No further layout alternatives have been considered as part of the EIA process. Impact assessments have been undertaken on the revised/preferred layout. No technology alternatives will be considered. The solar resource in this area advocates for the use of Solar PV technology in order to generate energy. The no-go alternative is not the preferred alternative and has not been assessed as part of the EIA phase.

Section 15 provides a summary of the positive and negative impacts associated with the proposed project.

18. ENVIRONMENTAL MANAGEMENT PROGRAMME (EMPR) AND CONDITIONS TO BE INCLUDED IN THE ENVIRONMENTAL AUTHORISATION

In accordance with Appendix 4 of the EIA Regulations, 2014 (as amended), an EMPr has been included within the EIA. The EMPr includes the impact management measures formulated by the various specialists and the recording of the proposed impact management outcomes for the development have also been included in the EMPr (**Appendix 9**).

The EMPr provides suitable measures to avoid, reverse, mitigate or manage identified impacts and to determine the extent of the residual risks that need to be managed and monitored. The relevant management plans have also been incorporated into the EMPr (where required), which will assist in this regard. Taking into account the potential negative and significant positive impacts that the proposed development could have on the biophysical and social environment, it is the opinion of the EAP that the proposed development should be authorised subject to the following conditions of authorisation:

- All of the mitigation measures identified in this EIA Report (**Section 14.3**) must be made conditions of the authorisation.
- It is important that all of the listed mitigation measures are costed for in the construction phase financial planning and budget so that the contractor and/or developer cannot give financial budget constraints as reasons for non-compliance.
- All feasible and practical mitigation measures recommended by the various specialists must be incorporated into the Final Environmental Management Programme (EMPr) and implemented, where applicable;
- The specialist recommendations included in Section 16 must be made conditions of the authorisation.
- Where applicable, monitoring should be undertaken to evaluate the success of the mitigation measures recommended by the various specialists.
- The activity-specific construction EMPr must be adhered to.
- An independent Environmental Control Officer (ECO) must be appointed by the applicant to monitor the implementation of the construction EMP. The ECO should undertake regular site inspections and compile an environmental audit report.

The following EA recommendations have been identified by the Terrestrial Specialist and must be included:

- Rehabilitation and monitoring plan required post-construction and post-operational phase of the project which addresses ecosystem functioning, fire management, alien invasive species management and effective methods of rehabilitating natural vegetation to functional systems (not just biomass replacement).
- Roads and underground cabling must avoid sensitive areas as far as possible by considering various layout alternatives. The karoo shrubland habitat will not be transformed completely (only PV related – this is not the case for roads and temporary laydown areas), accordingly with appropriate mitigation and rehabilitation measures post-construction and post-operational, the impact of the PV panels is considered medium for karoo shrubland.
- It is advised that an ecological specialist is appointed during the construction, operational and decommissioning phases to monitor impacts and related mitigation measures regarding natural and sensitive habitats and the faunal and floral assemblages occurring there.
- Care should be taken not to unnecessarily clear or destroy natural vegetation.

- Development and planned activities should therefore be planned in such a way that totally transformed areas are chosen for major developments and natural veld and especially any highly sensitive areas are avoided as far as possible.
- Sensitive species 144 must be protected in situ and a 200m buffer is applicable where no construction activities may take place.
- Provincially listed species which are affected by the proposed development requires a permit application for their removal from the provincial authority prior to the commencement of construction activities.

19. FINAL PROPOSED ALTERNATIVE WHICH RESPONDS TO THE IMPACT MANAGEMENT MEASURES, AVOIDANCE, AND MITIGATION MEASURES IDENTIFIED THROUGH THE ASSESSMENT

The final proposed alternative is the layout that has been assessed in this report.

20. ASPECTS WHICH WERE CONDITIONAL TO THE FINDINGS OF THE ASSESEMENT EITHER BY THE EAP OR SPECIALIST WHICH ARE TO BE INCLUDED AS CONDITIONS OF AUTHORISATION

None identified.

21. UNCERTAINTIES, ASSUMPTIONS AND GAPS IN KNOWLEDGE

The assessment has been based by SiVEST on information sourced and provided by the Applicant, site visits conducted, specialist findings and the application of the SiVEST assessment criteria. The EAP is of the opinion that the assessment method applied is acceptable. SiVEST assumes that:

- All the information provided by the Applicant is accurate and unbiased.
- The available data, including Topocadastral maps, Orthophotographs, geological maps and Google Earth images, are reasonably accurate.
- All information contained in the specialist studies provided is accurate and unbiased.
- Refer specialist studies (**Appendix 6**) for their specific assumptions and limitations.
- It is not always possible to involve all Interested and/or Affected Parties (I&APs) individually, however, every effort has/will be made to involve as many interested parties as possible. It is also assumed that individuals representing various associations or parties convey the necessary information to these associations / parties.
- It is not possible to determine the actual degree of the impact that the development will have on the immediate environment without some level of uncertainties. Actual impacts can only be determined following construction and/or operation commences.

22. AUTHORISATION OF THE PROPOSED LESAKA 1 SEF PROJECT

The final layout for the Lesaka 1 SEF has been designed to avoid no-go features on site that have been identified through the various specialist studies that have been undertaken. No fatal flaws were identified by the specialists who have undertaken their respective assessment for the project. Whilst it is acknowledged that the project will result in negative impacts, these can be mitigated to acceptable levels.

Based on the findings of the specialist studies and this assessment, the EAP has no reason to recommend that the project not be authorised, provided that the mitigation measures are adhered to. The conditions to be included in the Environmental Authorisation for the construction phase are listed in **Section 18** above.

The environmental authorization should be valid for a period of 10 years. Construction is expected to start in March 2026.

23. EAP DECLARATION

The EAP declarations, CV's and qualifications for the EAP's responsible for the preparation of this report have been attached in **Appendix 1**.

24. DEVIATIONS FROM THE APPROVED SCOPING REPORT

No significant changes have been made to the EIA. However, based on comment from DFFE on the DEIAr, the cumulative impact assessment of the proposed grids has been included in the impact ratings and assessed by all specialists. The specialists have confirmed that the addition of the MTS and grid infrastructure will not alter the cumulative impact assessment significantly. The MTS and grid infrastructure to the existing Eskom 400kV line (to be finalized once discussions with Eskom have been concluded) is fully contained within the boundary of the site already assessed (as it is a loop-in-loop-out (LILO) to an existing 400kV Eskom line crossing the site) and is located outside of all sensitivities identified by the specialists, besides from the LILO connection to the existing powerline which crosses a watercourse.

The Freshwater Assessment confirmed that the area in which the MTS footprint is proposed does not comprise of any freshwater ecosystems and the MTS footprint, together with the Lesaka 1 OHPL are outside of the 100 m zone of regulation. The proposed LILO connection between the onsite substation and the existing 400 kV Eskom line that feeds to the Helios MTS would be required to span the Klein Rooiberg River for an approximate distance of 250 m. The proposed support towers would however be placed outside of the 25 m development setback (ecological protection buffer) of this river, and provided that the mitigation measures, are followed, no significant cumulative impacts to the environment due to the above proposed grid infrastructure are envisaged.

As requested by DFFE, the MTS and grid infrastructure has been included in the final layout put forward for approval.

25. INFORMATION REQUIRED BY CA (IF APPLICABLE)

Currently n/a.

26. CONCLUSION

This Report has covered activities and findings related to the scoping and EIA process for the proposed Lesaka 1 SEF Project. Professional experience, specialist knowledge, relevant literature and local knowledge of the area have all been used to identify the potential issues associated with the proposed project. No fatal flaws have been identified by the respective specialists during the EIA Phase reporting. In conclusion, SiVEST, as the independent EAP, is therefore of the view that:

- The site location and project description can be authorised based on the findings of the suite of specialist assessments;
- During the construction phase, almost all of the post-mitigation scores are low, with the exception of the terrestrial ecological as well as avifaunal impact of vegetation clearing/habitat loss which scored a negative medium impact post mitigation. The area will experience an altered sense of place and visual intrusion caused by the SEF which will have a medium impact during the operational phase and an increase in bird mortalities which was also identified as a medium negative impact. Cumulatively, negative medium impacts were identified from a social and visual perspective for the areas altered sense of place and change in character of the landscape. There may also be pressure created on local services which could impact the area negatively. The avifaunal specialist identified a very high negative impact as a result of regional saturation of SEF facilities and associated grid infrastrucure causing habitat loss which is not able to be mitigated quantitatively. The specialist did state however that the necessary buffers for roost sites must be adhered to and all underground cables bisecting sensitive habitats must be placed below the subsurface flow of the ephemeral wetlands with the linear construction pits subjected to full rehabilitation in order to maintain normal subsurface flow. On a positive note, however, the establishment of renewable energy facilities and associated projects, such as the SEF, in the HM will create employment, skills development and training opportunities, creation of downstream business opportunities.
- Through the implementation of mitigation measures, together with adequate compliance monitoring, auditing and enforcement thereof by the appointed Environmental Control Officer (ECO) as well as the competent authority, the potential detrimental negative impacts associated with the proposed development can be mitigated to acceptable levels.

SiVEST Environmental Division
4 Pencarrow Crescent,
La Lucia Ridge Office Estate,
Umhlanga Rocks, 4320
PO Box 1899, Umhlanga Rocks, 4320
KwaZulu-Natal, South Africa

Tel +27 31 581 1579
Email info@sivest.com
www.sivest.com

Contact Person: Michelle Guy
Email: michelleg@sivest.com