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VOLUME I

DRAFT ENVIRONMENTAL IMPACT ASSESSMENT REPORT

For the

PROPOSED LOXTON WIND ENERGY FACILITY 3, NEAR LOXTON IN THE NORTHERN CAPE PROVINCE

On behalf of

LOXTON WIND FACILITY 3 (PTY) LTD

DFFE REFERENCE: 14/12/16/3/3/2/2238

DRAFT FOR PUBLIC COMMENT

MAY 2023

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QUALITY MANAGEMENT SYSTEM

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Date	08 May 2023	10 May 2023	
Arcus Review and Approval	Ashlin Bodasing	Ashlin Bodasing	
Signature			
ERM Review and Approval	Dieter Rodewald	Dieter Rodewald	
Signature	-	-	

PROJECT DETAILS

DFFE Reference	14/12/16/3/3/2/2238		
Arcus Reference	Loxton WEF Cluster and Associated Infrastructure		
Project Title	Draft Environmental Impact Assessment Report for the Proposed Loxton Wind Energy Facility 3, near Loxton, Northern Cape Province.		
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		Riverine Rabbit	
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	Private	Wake Impact Study	Loxton WEF 3 (Pty) Ltd
Project Applicant	Loxton Wind Facility 3 (Pty) Ltd		
Report Status	EIA REPORT – DRAFT FOR PUBLIC COMMENT		

PUBLIC PARTICIPATION DETAILS

The Draft Environmental Impact Assessment (EIA) Report, with the required application form, has been submitted to the Department of Forestry, Fisheries and the Environment (DFFE), acting as the Competent Authority (CA).

Members of the public, local communities, and stakeholders are invited to comment on the Draft EIA Report available for public review and comment from the **11 May 2023 until the 09 June 2023 (both days inclusive)**, at the following locations.

Location	Physical Address
Hard Copy Location	
Loxton Public Library *Located within the Ubuntu Local Municipality Offices, Loxton*	Magrieta Prinsloo St, Loxton, 8405
CD copies will be made available upon request.	
Electronic Copy Locations	
Arcus Website	https://www.erm.com/
Electronic Transfer	I&APs can request for copies to be shared via a One Drive folder.
Comment Submission	
Company	Arcus Consultancy Services South Africa (Pty) Ltd
Via Email	LoxtonWEF@arcusconsulting.co.za
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ABBREVIATIONS, ACRONYMS AND UNITS

BAR	Basic Assessment Report
BESS	Battery Energy Storage System
CA	Competent Authority
CARA	Conservation of Agricultural Resources, 1983 (Act No. 43 of 1983)
CBA	Critical Biodiversity Area
dB	Decibel
DFFE	Department of Forestry, Fisheries and the Environment (National)
DHSWS	Department of Human Settlement, Water and Sanitation
DMRE	Department of Mineral Resources and Energy
DoE	Department of Energy
DSR	Draft Scoping Report
EAP	Environmental Assessment Practitioner
ECA	Environment Conservation Act, 1989 No. 73 of 1989)
EGI	Electricity Grid Infrastructure
EIA	Environmental Impact Assessment
EMPr	Environmental Management Programme
ESA	Ecological Support Area
ESA	Early Stone Age
ESKOM	Eskom Holdings SOC Limited
EWT	Endangered Wildlife Trust
FSR	Final Scoping Report
GNR	Government Notice Regulation
I&AP	Interested and Affected Party
IDP	Integrated Development Plan
IEM	Integrated Environmental Management
IPP	Independent Power Producer
IRP	Integrated Resource Plan
kV	Kilovolt
kWh	Kilowatt Hours
LSA	Late Stone Age
MSA	Middle Stone Age
MTS	Main Transmission Substation
MW	Megawatt
NCR	Noise Control Regulations
NDP	National Development Plan
NEMA	National Environmental Management Act, 1998 (Act No. 107 of 1998)
NEMBA	National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004)
NFEPA	National Freshwater Ecosystem Priority Area
NHRA	National Heritage Resources Act, 1999 (Act No. 25 of 1999)
NPAES	National Protected Area Expansion Strategy
NSD	Noise-sensitive Development
NWA	National Water Act, 1998 (Act No. 36 of 1998)
OES	Ostrich Eggshell
PES	Present Ecological State
PGDS	Provincial Growth and Development Strategy
PPA	Power Purchase Agreement
PPP	Public Participation Process
PSEIA	Plan of Study for EIA
REIPPPP	Renewable Energy Independent Power Producer Procurement Programme
SAHRA	South African Heritage Resources Agency
SAHRIS	South African Heritage Resources Information System
SANBI	South African National Biodiversity Institute
SANRAL	South African National Roads Agency Limited
SANS	South African National Standards
SAWS	South African Weather Service
SCADA	Supervisory Control and Data Acquisition
SDF	Spatial Development Framework
SEA	Strategic Environmental Assessment
SPV	Special Purpose Vehicle
WEF	Wind Energy Facility
WTG	Wind Turbine Generator
WULA	Water Use License Application

EXECUTIVE SUMMARY

Loxton Wind Facility 3 (Pty) Ltd ('the Project Applicant') is applying for environmental authorisation ('EA') to construct and operate the up to 240 MW Loxton Wind Energy Facility (WEF) 3 and its associated on-site substation and battery energy storage system ('the proposed development'). Arcus Consultancy Services South Africa (Pty) Ltd ('Arcus') has been appointed to act as the independent Environmental Assessment Practitioner (EAP) to undertake the Scoping and Environmental Impact Assessment (S&EIA) process for Environmental Authorisation under Chapter 5 of the National Environmental Management Act, 1998 (Act 107 of 1998 - NEMA) as amended.

The proposed development aims to generate and distribute electricity from a renewable wind energy resource into the national grid by connecting the proposed on-site substation with 132 kV power lines to the existing Eskom Gamma Main Transmission Substation (MTS). A separate basic assessment application process will be undertaken to obtain EA of the activities required for the grid connection between the Loxton WEF 3 switching station/ collector substation and the Eskom Gamma MTS (the grid connection is part of a separate application process).

Two additional WEF's, namely Loxton WEF 1 and Loxton WEF 2 are concurrently being considered on the surrounding properties and are assessed by way of separate impact assessment processes contained in the 2014 Environmental Impact Assessment (EIA) Regulations (GN No. R982, as amended) for listed activities contained in Listing Notices 1, 2 and 3 (GN R983, R984 and R985, as amended). These projects, including the Loxton WEF 3 is referred to as the Loxton WEF Cluster and all applications for EA are running concurrently.

Site Location and Proposed Development Description

The proposed development is located approximately 15 km east of the town of Loxton within the Ubuntu Local Municipality and the Pixley Ka Seme District Municipality in the Northern Cape Province.

The Loxton WEF 3 will comprise and accommodate the following infrastructure, which will enable the wind farm to supply a proposed capacity of up to 240 MW:

- Up to 39 wind turbines with a maximum hub height of up to 160 m and a rotor diameter of up to 200 m.
- A transformer at the base of each turbine.
- Concrete turbine foundations with a permanent footprint of approximately 6 ha.
- Each turbine will have a crane hardstand of 70 m x 45 m. The permanent footprint for turbine hardstands will be up to approximately 13 ha.
- Each turbine will have a temporary blade hardstand of 80 m x 45 m. The temporary footprint for blade hardstands will be up to approximately 14 ha.
- Temporary laydown areas (with a combined footprint of up to 25 ha) which will accommodate the boom erection, storage and assembly area.
- Battery Energy Storage System (with a footprint of up to approximately 5 ha).
- Medium voltage (33 kV) cables/powerlines running from wind turbines to the facility substations. The routing will follow existing/proposed access roads and will be buried where possible.
- One on-site substations up to 4 ha in extent to facilitate the connection between the wind farm and the electricity grid.
- Construction period laydown areas (temporary) up to 6 ha.
- Access roads to the site and between project components inclusive of stormwater infrastructure. A 15 m road corridor may be temporarily impacted upon during construction and rehabilitated to 8 m wide after construction. The WEF will have a total road network of up to 50 km.

- A temporary site camp establishment and concrete batching plants (with a combined footprint of up to 2ha).
- Operation and Maintenance buildings (with a combined footprint of up to 2 ha) including a gate house, security building, control centre, offices, warehouses, a workshop, parking bays and a storage area.
- Total permanent development footprint of up to 65 ha.

The project is expected to have a 25-year life span, but with possible refurbishment this could be extended if deemed feasible at the time.

Environmental Legislative Requirements

The EIA Regulations, 2014, published in Government Notice (GN) No. R. 982 as amended provide for the control of certain Listed Activities. These activities are listed in GN No. R. 983 (Listing Notice 1 - Basic Assessment), R. 984 (Listing Notice 2 - Scoping & EIA Process) and R. 985 (Listing Notice 3 - Basic Assessment) of 4 December and are prohibited to proceed until EA has been obtained from the competent authority, in this case, the Department of Forestry, Fisheries and the Environment (DFFE).

On 7 April 2017 in Government Gazette 40772 the Minister of Environmental Affairs, now the DFFE, published amendments in Government Notice (GN) Number R. 326 to the EIA Regulations of 2014 that provide for the control of certain Listed Activities. These activities are listed in Listing Notice 1 (GN R327), Listing Notice 2 (GN R325) and Listing Notice 3 (GN R324). Activities triggered within Listing Notice 1 and 3 require Basic Assessment; activities within Listing Notice 2 require a Scoping & EIA Process.

As the proposed Loxton WEF 3 and associated infrastructure triggers activities in Listing Notices 1, 2 and 3, and does not fall within a Renewable Energy Development Zone (REDZ), a full Scoping and EIA (S&EIA) process is being followed.

Listed Activities applicable to the proposed Loxton WEF 3 and associated infrastructure are summarised below. All potential impacts associated with these Listed Activities are being considered and assessed in this S&EIA process.

Summary of the applicable Listed Activities in terms of the NEMA, as amended

Listing Notice	Activities
LN 1 GN R327[1]	11(i); 12 (ii, a, c); 19 (i); 24 (ii); 28 (ii); 48 (a, c); and 56 (i)(ii).
LN 2 GN R325[2]	1; and 15.
LN 3 GN R324[3]	4 (g)(i)(bb)(ee); 12(g)(ii); 14(ii)(a, b, c)(g)(ii)(bb)(ff); 18(g)(ii) (bb)(ee); 23 (ii)(a, c)(g)(bb)(ee)

Depending on the final design of the Loxton WEF 3 and associated infrastructure, there may be a requirement for the following additional permits / authorisations. These permits will be applied for should the project be authorised and be selected as a preferred bidder.

- Biodiversity Permits in terms of the National Environmental Management: Biodiversity Act (Act No 10 of 2004) (NEMBA);
- Waste Management License/s as required by the NEMA, Waste Act, 2008 (Act No. 59 of 2008);
- Mining Permits as required by the Minerals and Petroleum Resources Development Act, 2002 (MPRDA) (Act No. 28 of 2002) (MPRDA);

[1] "Listing Notice 1 of the EIA Regulations, promulgated under Government Notice R983 of 4 December 2014, as amended by Government Notice R327 of 7 April 2017."
[2] "Listing Notice 2 of the EIA Regulations, promulgated under Government Notice R984 of 4 December 2014, as amended by Government Notice R325 of 7 April 2017."
[3] "Listing Notice 3 of the EIA Regulations, promulgated under Government Notice R985 of 4 December 2014, as amended by Government Notice R324 of 7 April 2017."

- Water Use Licenses as required by the National Water Act, 1998 (Act No. 36 of 1998) (NWA); and
- Heritage License in term of the National Heritage Resources Act 25 of 1999.

Environmental Impact Assessment Phase

The Final Scoping Report (FSR) (Arcus, January 2023) presented and assessed the initial proposed wind turbine layout and associated infrastructures of the Loxton WEF 3 and its associated infrastructure. In March 2023, the DFFE accepted the FSR. The results of the specialists' scoping assessments, DFFE comments on the FSR, and other technical and financial constraints for the proposed development site were taken into consideration and a revised 'preferred layout' was produced.

This EIA report presents and assesses the impacts associated with the preferred layout of the Loxton WEF 3.

Summary of Specialist Assessments Results

Each of the specialist assessments followed a systematic approach to the identification and assessment of impacts, with the principal steps being:

- Description of existing environment / baseline conditions;
- Prediction of likely potential impacts, including cumulative impacts (both positive and negative);
- Assessment of likely potential impacts (positive and negative);
- Identification of appropriate mitigation measures; and
- Assessment of residual (potential) environmental impacts.

The individual assessment methodologies and baseline descriptions are set out in this report. The approaches are in line with the legal requirements and industry best practice guidelines and makes use of the experience and expertise of the EAP and the specialists.

Studies have been completed to quantify possible impacts and magnitude of impacts related to but not limited to the soil, land, aquatic, biodiversity, landscape, heritage, noise, socio-economic and traffic and transportation and includes measures to mitigate and reduce the significance of impacts.

Soil, Land Use and Agriculture Potential

The purpose of the agricultural component in the EIA process is to preserve the agricultural production potential, particularly of scarce arable land, by ensuring that the development does not exclude existing or potential agricultural production from such land or impact it to the extent that its future production potential is reduced.

The proposed development site has a low capacity for grazing and is deemed unsuitable for crop production, which was assessed to be due to climate and soil constraints. Positive agricultural impacts identified were increased financial security for farming operations and heightened security against theft. Potential negative impacts identified in the study were the occupation of land and soil erosion/degradation. All negative potential impacts were assessed as having low significance as their impact would be very low on future agricultural production. In alignment with the agricultural protocols, it was assessed that agricultural land loss will be within the allowable development limits, ensuring appropriate conservation of production land. The development footprint is roughly eight times smaller than what the development limits allow. All the key findings substantiates that the assessment of the proposed development's potential negative impact on the agricultural production capability is deemed acceptable for the site, and the receiving environment was verified by the specialist as having overall low agricultural sensitivity. Therefore, from an agricultural point of view, it is **recommended that the development be approved**.

Freshwater and Wetlands

The assessment report was undertaken to meet the criteria to fulfil a Specialist Verification Assessment Report as the proposed site is located within an area rated as very high sensitivity by the DFFE Screening Tool.

The study area is situated predominantly within the Eastern Upper Karoo (NKu 4) vegetation unit, associated with the mainstem systems of the Brak / Soutpoort rivers, i.e., any of the proposed activities are located near watercourses that drain towards these systems only. The site thus forms part of the upper catchment of the Sak River and is characterised by low lying riverine areas separated by higher lying plateaus and / or inselbergs (koppies). These aquatic systems are largely untransformed, other than being used for grazing and the presence of previously cultivated areas near homesteads or minor track crossings.

The findings of the assessment were supported by baseline data collected over several site visits spanning a number of years (2012-2022), for other renewable and Eskom related projects within the region, coupled with a four-day site specific visit in February / March 2022. The initial findings were presented to the Applicant to develop the layout in the screening and then scoping phase of the project, and the preferred layout was assessed for the EIA phase.

Coupled to aquatic delineations, information was collected on potential species that could occur within the watercourses, especially any conservation worthy species (Listed or Protected). The sensitivity ratings of high (no-go) to low were determined through assessments of habitat sensitivity and related constraints. Structures such as WTGS, buildings, substations, and battery energy storage system (BESS), have been placed outside of the high sensitivity habitats while remaining structures (roads and transmission lines) could cross or span the moderate / low sensitivity areas. The preferred layout has thus taken cognisance of these, and where crossings are required over the high sensitivity area, areas with existing disturbance have been selected.

Most of the anticipated impacts would include disturbance during the construction phase. Changes to form and function of the site will be due to increased runoff roads or hard surfaces that would occur in the operational and maintenance (O&M) phase. This is largely based on the assumption that all sensitive habitats will be avoided, which then also includes any of the observed Critical Biodiversity Areas (CBAs). Disturbance of any Aquatic CBAs can be avoided using the existing tracks and roads shown in this assessment.

The significant impacts are associated with the access road crossings river systems. These systems are generally in a less modified state and still provide some habitat and important ecological functions. Mitigation should focus on these areas and include measures to halt erosion and rehabilitate habitat in the sections affected by the construction. Without the implementation of mitigation measures, the project has potential to cause a moderate cumulative impact upon aquatic biodiversity. However, with the adoption of mitigation, the proposed project will have a low impact upon aquatic biodiversity.

Considering the impacts that were assessed, there is **no objection to the authorisation of this project**.

Terrestrial Biodiversity

The Terrestrial Biodiversity Theme for parts of the development site included areas mapped as very high sensitivity according to the DFFE screening tool. This is due to the presence of areas of Critical Biodiversity Areas (CBA) 1 and 2, and National Protected Area Expansion Strategy (NPAES) focus areas. A full terrestrial biodiversity assessment was required and has been undertaken to assess the potential impacts of the development on terrestrial biodiversity.

In terms of the other features, there are no significant populations of threatened species observed in the affected area, and any natural wetlands present would be avoided by the development. As such, the overall impact of the development on CBAs and NAPES Focus Areas is considered acceptable.

There are no impacts associated with the development of the Loxton WEF 3 on terrestrial biodiversity that cannot be mitigated to an acceptable level. As such, should all the proposed mitigation be implemented, the Loxton WEF 3 development is **deemed acceptable from a terrestrial ecological impact perspective**. It is thus the reasoned opinion of the specialist that the **Loxton WEF 3 development should be authorised subject to the various mitigation and avoidance measures**.

Karoo Dwarf Tortoise

A herpetofaunal specialist was commissioned to produce a Terrestrial Animal Species Specialist Assessment (TASSA) and impact assessment components, specifically in the contexts of the potential occurrence of the Karoo Dwarf Tortoise (*Chersobius boulengeri*). The assessment was undertaken due to the DFFE screening tool listing this species as being of medium sensitivity within the Animal Species Theme. The current IUCN listing of this species is *Endangered*, and thus it is considered as a species of conservation concern (SCC).

During a four-day survey in October 2022, the appointed herpetologist encountered no live or dead Karoo Dwarf Tortoises. Farm owners and their workers were interviewed and shown photos of chelonians from the general region. These persons confirmed the occurrence of Leopard Tortoise (*Stigmochelys pardalis*), Southern Tent Tortoise (*Psammobates tentorius)* and South African Helmeted Terrapin (*Pelomedusa galeata*), but none of them recognised the Karoo Dwarf Tortoise or Greater Padloper (*Homopus femoralis*).

Based on the current evidence that Karoo Dwarf Tortoises are seemingly very rare within the study area, it can be argued that the Loxton WEF 3 population is not of particularly high conservation importance for this species. Although this may be true to some extent if viewed in the context of the species' global distribution (EOO = 144,000 km^2), it must be kept in mind that this is an *Endangered* species that is currently experiencing global decline. As such, all existing populations of this species should be regarded as being of conservation importance to some degree. Although the Loxton WEF 3 site does not appear to be a stronghold site for Karoo Dwarf Tortoises, it nevertheless contributes to the overall population viability of this species. This site contains units of habitat that are suited to the species' ecological needs, and these specific nodes should be regarded as being of HIGH conservation importance. However, due to the seemingly low population size of Karoo Dwarf Tortoises within the study area, the overall conservation importance of the Loxton WEF site is moderate at a global scale.

As a result, and with the application of the recommended mitigation and avoidance measures, the **impacts associated with the Loxton WEF 3 project are considered acceptable**. As such, **the proposed development is not opposed** based on the potential or probable occurrence of Karoo Dwarf Tortoises within the PAOI.

Riverine Rabbit

The Riverine Rabbit was detected at two localities near to the Loxton Wind Energy Facility 3 but not within the final wind farm project area which was adjusted to avoid these areas. The sightings are both within the typical riparian floodplain vegetation environment associated with this species, confirming the high fidelity for specific riparian communities associated with the larger drainage systems of the area. A minimum number of 2 individuals can be confirmed present within the area investigated, but based on published estimates of population density, the areas of confirmed habitat within the site could potentially hold between 30 and 95 individuals. Assuming a similar population density

across the range, within the published area of occupancy, the site is likely to hold less than 0.2% of the overall population of Riverine Rabbits.

Due to the presence of the Riverine Rabbit at the site and the condition and extent of habitat, the areas of habitat within the site are considered to have a High Site Ecological Importance (SEI). The area with confirmed sightings has been excluded from the wind farm project area and the remaining areas of identified suitable habitat within the site have been buffered from turbines by up to 500m depending on the landscape context and the potential for impact due to turbine noise and flicker. The areas where Riverine Rabbits occur are disjunct and it is assumed that Rabbits move between the areas of more extensive suitable habitat along the riparian corridors between these areas. These buffers and corridor linkages between the major habitat patches have been integrated into the turbine no-go layer and this explicitly informs the location of turbines at the site. Under the assessed layout there are no turbines within the areas of habitat or within the applied buffers. With the implementation of the above avoidance as well as the other recommended mitigation measures, the overall long-term impact of the development on Riverine Rabbits and their associated habitat is likely to be acceptable and would not be likely to compromise the local or regional population of this species.

Consequently, the development of the Loxton Wind Energy Facility 3 is considered acceptable with the implementation of the suggested avoidance and monitoring as indicated.

Biodiversity Offset

An Biodiversity Offset Needs Analysis study was undertaken to assess the need and desirability of applying an offset to the Loxton 3 WEF in order to account for residual impacts of the development, especially those related to impacts on CBAs and NPAES Focus Areas. The finding of the needs analysis is that no high or moderate residual impacts on irreplaceable biodiversity features have been identified, and thus, an offset is not required. The project does however occur in a NPAES focus area, and the Applicant is cognisant of the need to maintain ecological processses within and across the site. As a mitigation measure to promote the maintenance of connectivity through the affected area into the long term, the Applicant has commited to the implementation of a development-free corridor that would facilitate and enhance landscape connectivity. This study has identified the most suitable area within the site where such a corridor would have maximal effect and which should form the basis for the conservation set-aside to be implemented before construction commences on the Loxton WEF 3 site.

Plant

The DFFE Screening Tool indicated that the site has a low sensitivity for the Plant Species Theme. The vegetation within the footprint consists of low shrubland on open plains representative of the Eastern Upper Karoo, Upper Karoo Hardeveld and Southern Karoo Riviere vegetation types. The field assessment conducted by the specialist confirmed that there was no significant vegetation features or plants of special conservation concern within the development footprint. The site is therefore considered to be low sensitivity from a Plant Species Theme perspective.

The Plant Species Theme Compliance Statement therefore finds that the footprint of the Loxton Wind Energy Facility 1 is restricted to low sensitivity areas with no observed plant species of conservation concern present, and as such, there are no reasons to oppose the Loxton Wind Energy Facility 3.

Avifauna

As part of the feasibility investigations towards the suitability for the development of a wind farm, an avifaunal screening assessment and nest survey for the site was conducted and

the developable area was refined on the basis of identified avifaunal constraints. This included running the Verreaux's Eagle Risk Assessment (VERA) model, to identify high and medium risk areas around known Verreaux's Eagle nests. Following the initial feasibility assessment, the specialist conducted the necessary 12 months' pre-construction bird monitoring which was initiated on site in July 2021 and completed in May 2022.

Based on the results of the pre-construction monitoring, should the project proceed, three bird species were classified as high risk, namely Ludwig's Bustard (Endangered), Verreaux's Eagle (Vulnerable) and Jackal Buzzard (endemic, not Red Listed), with two species Martial Eagle (Endangered) and Black Harrier (Endangered) at medium risk.

Since the turbine model has not been finalised, bird fatalities were estimated using a 'typical rotor envelope' of 30 to 230 m above ground. Before mitigation, is it estimated that approximately 3,41 bird fatalities could be recorded per year across the 20 target bird species recorded flying on-site turbine rotor swept area of 30 – 230 m. The fatality estimates could be reduced significantly with an increase in minimum blade height above ground as most bird flights was recorded closer to the ground than 60 m. It is strongly recommended that any opportunity to raise the lower blade tip as much as possible should be taken into account, as this could significantly reduce the bird collision risk.

Avifaunal impacts have been assessed and have been mostly determined to be of low or moderate negative significance post-mitigation, with the exception of habitat destruction and the impact of fatalities as a direct result of turbine and power line collisions, which remain at moderate negative post mitigation. Cumulative impacts will be of high negative significance pre-mitigation, and moderate negative significance post mitigation.

According to available information consulted during this study to date, **there are no fatal flaws from an avifaunal sensitivity perspective which should prevent the wind farm from proceeding**.

Bats

The report assessed impacts to bats that could occur because of the construction, operation and decommission of the Loxton WEF 3. The assessment was based on 12 months of baseline data on bat activity recorded at the project. Based on these data, the key issue for the WEF will be managing collision impacts to high-flying free-tailed bats; specifically Egyptian free-tailed bat, but also possibly Roberts's flat-headed bat. The magnitude of Egyptian free-tailed bat activity was, including at 50 m and 100 m, based on median bat activity with reference to MacEwan et al. (2020). While this was restricted to certain nightly time periods and seasons, this high risk needs to be addressed and the mitigation options for high-flying species are relatively limited. This is because these bats are active across most of the rotor swept zone and hence are likely to encounter wind turbine blades should they be foraging or commuting in the vicinity of these structures. Additionally, bats may also be attracted to wind turbines (Guest et al. 2022, Leroux et al. 2022).

Mitigation measures to minimise residual impacts include curtailment and acoustic deterrents. These measures are effective, and it is possible they may need to be implemented because the fatality thresholds are relatively low. The residual impacts must be monitored using post-construction fatality monitoring for a minimum of two years (Aronson et al. 2020). Curtailment and/or acoustic deterrents must be used if this monitoring indicates that species fatality thresholds have been exceeded (MacEwan et al. 2018) to maintain the impacts to bats within acceptable limits of change and prevent declines in the impacted bat populations.

Considering that the overall impact to bats was assessed as moderate after the application of the mitigation measures proposed to avoid and minimise impacts to bats, the **proposed project can be approved for environmental authorisation**.

Noise

A full environmental impact assessment was conducted because the project area was rated as having a potentially high sensitivity to noise. The surroundings of the project focus area are sparsely populated with a few noise-sensitive developments. The area is considered wilderness with the presence of cattle, game and guest farms. The surrounding activities identified did not influence ambient sound levels in the receiving area.

The closest potential noise-sensitive receptors were residential areas. These noise receptors were identified using aerial imagery as well as a physical site visit. Methodology used by the specialist aimed to measure ambient sound levels. Ambient levels were measured over a period of two nights in June 2022 at six different locations within the study area. The findings of the study reported that across 1,000 10-minute measurements collected, the highest fast-weighted sound level measured for daytime activities was 72 decibels A (dBA) and the lowest level was less than 20 dBA. Measurements collected at night-time periods reported the highest fast-weighted sound level of 44 dBA and the lowest sound level was less than 20 dBA. Average sound levels for daytime fast-weighted sound levels are 35.9 dBA and night-time fast-weighted sound levels are 25.2 dBA.

Acceptable noise limits for daytime is 45 dBA with a maximum noise limit of 52 dBA. Night-time rating levels is reported as 35 dBA with a noise limit of 42 dBA. These limits are typical of a rural noise district.

From an acoustic perspective the turbine layout is considered acceptable should the applicant select to use a turbine model with a sound pressure level (SPL) less than 109.2 dBA (re 1 pico Watt (pW)) and it is **recommended that the Loxton WEF 3 be authorised**.

Heritage and Archaeology

The site is comprised of long, low sandstone hills with intervening river valleys. Occasional dolerite outcrops occur and vegetation tends to be sparse and very low. Ground visibility was thus excellent. Farmsteads occur in places and the only infrastructure on the site is related to farming (e.g., tracks, fences, dams, wind pumps).

Archaeological resources were found to be very rare in the areas targeted for development. Rare artefact scatters from the MSA (Middle Stone Age) and LSA (Later Stone Age) were seen, while historical resources included ruins of houses, kraals and other features along with some artefactual debris. The farmsteads and surrounding arable lands are pockets of cultural landscape, while the broader landscape also has cultural significance. Impacts on most heritage resources are likely to be minimal as most sites occur in the valleys. The landscape will be impacted and, due to the size of the turbines, little can be done to reduce impacts. However, these impacts can be reversed with rehabilitation and the project will result in socio-economic benefits which makes the landscape impacts acceptable.

It is recommended that the **Loxton WEF 3 be approved**, subject to the recommended mitigation measures.

Palaeontology

Historical palaeontological site mapping for the region between Loxton and Victoria West revealed a paucity of recorded vertebrate fossil sites within the Loxton WEF Cluster project area. This was supported by recent palaeontological field surveying, within the Loxton WEF 3 and neighbouring WEF project areas, which showed that:

- Levels of Beaufort Group bedrock exposure are very limited here due to pervasive cover by Late Caenozoic superficial sediments;
- Intensive intrusion by dolerite sills and dykes has compromised fossil preservation over large areas; and

- The Beaufort Group bedrocks represented within the study area span the catastrophic end-Middle Permian Extinction Event which is associated with an unusually low abundance of well-preserved fossil remains.

Over the course of eight days during a field visit, only a handful of fossil sites were recorded within the entire Loxton WEF Cluster project area, the majority of which were poorly preserved and of limited scientific or conservation significance. Even occasional small areas showing excellent, fresh mudrock exposure ideal for palaeontological recording yielded hardly any fossils. Almost no fossil sites were recorded within the Late Caenozoic superficial deposits. Very few of the handful (~20) of new fossil sites recorded within the Loxton WEF 3 project area are of significant scientific or conservation value and no mitigation is recommended here with regard to these known sites. No known significant or unique palaeontological heritage sites are threatened by the proposed WEF development.

While additional, unrecorded fossil sites of high palaeontological and conservation value are likely to occur at and beneath the land surface within the Loxton WEF 3 area, they are probably very sparse and sporadic in distribution and can be effectively handled in the Construction Phase through a Chance Fossil Finds Protocol. All the recorded sites can, if necessary, be effectively mitigated in the preconstruction phase.

Given the inferred low overall site sensitivity and anticipated impact significance, formal palaeontological heritage impact assessment was not considered necessary. However, a combined desktop and field-based palaeontological heritage study outlining and mapping the recorded fossil sites, their scientific / conservation value and their geological context was provided as part of the Heritage Assessment process for the proposed Loxton 1 WEF development.

It is concluded that the palaeo-sensitivity of the Loxton WEF 3 project area is, in practice, low. There are therefore **no objections on palaeontological heritage grounds to authorisation of the proposed development**.

Visual / Landscape

The layout of the WEF has been subject to an iterative planning process, based on the various specialist findings, including the mapping of scenic resources and sensitive receptors. The current proposed layout largely succeeds in avoiding visually sensitive areas.

It is the opinion of the specialist that while the proposed WEF could generally have a 'high' visual impact significance, the current layout has largely avoided the scenic resources and sensitive visual receptors of the area and the development has an overall medium visual impact significance.

Provided the recommended mitigation measures are implemented, the **project would not present a potential fatal flaw in visual terms and could be authorised from a visual perspective**.

Socio-Economic

The findings of the social impact assessment (SIA) study indicate that the proposed Loxton WEF 3 and associated infrastructure will create a number of social and socio-economic benefits, including creation of employment and business opportunities during both the construction and operational phase. The project will also create economic development opportunities for the local community. The enhancement measures listed in the report should be implemented in order to maximise the potential benefits. The significance of this impact is rated as high positive. The proposed development also represents an investment in clean, renewable energy infrastructure, which, given the negative environmental and socio-economic impacts associated a coal-based energy economy and the challenges created by climate change, represents a significant positive social benefit for society as a whole. The Renewable Energy Independent Power Producers Procurement Programme

(REIPPPP) has resulted in significant socio-economic benefits, both at a national level and at a local, community level. These benefits are linked to foreign Direct Investment, local employment and procurement and investment in local community initiatives.

The findings 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 Loxton WEF 3 and associated infrastructure is therefore **supported by the findings of the SIA**.

Traffic and Transportation

The Traffic Impact Assessment (TIA) compiled for the Loxton WEF 3 assesses the impacts on the existing road network within the study area during the construction, operation and decommissioning phases. The assessment follows appropriate guidelines and protocols for technical appraisal.

A site visit was conducted in February 2023 after provisionally finalizing the WTG which dedicated the layout of the access roads and points onto the public road network. The public road network is well established in the study area and majority are surfaced roads. Minor and private access roads to the proposed Loxton WEF 3 from the main roads are mostly gravel roads.

The location of the proposed development allows for more than one route to transport materials and equipment to the facility from various origins. Generated traffic estimates in the assessment were based on similar projects and traffic volume calculated for a single activity is applied to all possible routes, resulting in the worst-case scenario.

The activity within the study area, with the most significant traffic volume hourly increase, is the transportation of material and equipment to and from the proposed development. Maximum projected cumulative hourly increase in traffic volume is 62 vehicles per hour, which surpasses threshold limits of 50 vehicles per hour. Hence, the requirement for a TIA. There will be a notable increase of traffic on the public road network in the study area during the construction phase. It is recommended the Project Developer contributes towards the ongoing maintenance of the road network as governmental budgetary constraints only allow for minor maintenance on the public roads. Maintenance is especially needed during rainy seasons where degradation of roads are catalysed.

Access points from the development onto the public road network will be addressed during the design phase of the project and needs to be in accordance with standard geometric requirements. Traffic delivering materials, including abnormal loads, shall be from the TR 01606 via access point A. Mitigation measures mainly focus on reducing community disruptions and the risk of traffic incidents. It is also recommended that a separate impact assessment be undertaken during the decommissioning project phase.

From a traffic and transportation perspective, there are no constraints or notables impacts that would jeopardise the implementation of the Loxton WEF 3. **The project can be considered for environmental authorisation**.

Stormwater Management

The objective of the stormwater management plan was to determine the impacts of Loxton WEF 3 on the immediate and greater area concerning stormwater. No significant risks are foreseen provided the recommendations suggested by the specialist are enforced before and during the construction phase of the project. The developments construction phase will generate the highest surface run-off when coinciding with the wet season. The impacts will be temporary, and mitigation can increase recoverability. Post-development

stormwater flow during the operation phase will have minimal impacts if adequate stormwater designs are implemented to maintain existing drainage patterns and flows in the catchment.

From a stormwater perspective, the proposed development will have a nominal impact on existing stormwater catchments, provided the recommendations and mitigation measures are implemented. The project is **deemed acceptable and can be considered for environmental authorisation**.

Geotechnical

Geotechnical assessments help determine the feasibility of proposed developments and ongoing geotechnical investigations should be carried out as the proposed development moves forward. Based on the geological and geotechnical information obtained for Loxton WEF 3, **there appears to be no reason for the project not to proceed beyond the pre-feasibility geotechnical assessment stage**. The specialist has found no fatal flaws in terms of the project's progress and the project can proceed to detailed design-level geotechnical investigations.

Wake Impact

An Energy Resource Assessment was prepared to determine the wake effects which the Loxton WEF 3 would have on the surrounding authorised Hoogland WEF's and the proposed North, Taaibos North and Soutrivier WEF's, currently in the EA application phase. The wake losses from the proposed Loxton WEF 3 were deemed to be insignificant on the Hoogeland North WEF's, due to the prevailing wind direction and the fact that the distance between the Loxton turbines and the Hoogland North boundary is 13km.

The wake losses on the Taaibos North, Soutrivier North Wind Farms were considered negligible, as the assessment was based on a worst-case theoretical analysis and was analysed to have little to none wake impact influence. The external wake losses are displayed in the table below.

Loxton WF affection over Taaibos North WF	
External wake efficiency	Energy loss (%)
0,984	1,6%
Loxton WF affection over reduced Taaibos North WF	
External wake efficiency	Energy loss (%)
0,990	1,0%
Loxton WF affection over Soutrivier North WF	
External wake efficiency	Energy loss (%)
0,996	0,4%
Loxton WF affection over Hoogeland North WF	
External wake efficiency	Energy loss (%)
1,000	0,0%

SPECIALIST IMPACT TABLE SUMMARY

Construction Phase Impacts

Construction Phase		Extent	Duration	Reversibility	Status	Significance	Probability	Magnitude
Freshwater & Wetlands (Aquatics)								
Spread of Alien Vegetation	Without Mitigation	Local	Long term	Irreversible	Negative	**Moderate**	Probable	Moderate
	With Mitigation	*Site*	*Short term*	*Partly reversible*	*Negative*	***Low***	*Possible*	*Low*
Loss of habitat/ vegetation	Without Mitigation	Local	Long term	Irreversible	Negative	**Moderate**	Probable	Medium
	With Mitigation	*Site*	*Short term*	*Partly Reversible*	*Negative*	***Low***	*Possible*	*Low*
Loss of Critical Biodiversity Areas (CBAs)	Without Mitigation	Local	Long term	Irreversible	Negative	**Moderate**	Probable	Medium
	With Mitigation	*Site*	*Short term*	*Partly Reversible*	*Negative*	***Low***	*Possible*	*Low*
Loss of riparian habitat	Without Mitigation	Local	Long term	Irreversible	Negative	**Moderate**	Probable	Medium
	With Mitigation	*Site*	*Short term*	*Partly Reversible*	*Negative*	***Low***	*Possible*	*Low*
Changes to the hydrological regime and increase potential for erosion	Without Mitigation	Local	Long term	Irreversible	Negative	**Moderate**	Probable	Medium
	With Mitigation	*Site*	*Short term*	*Partly Reversible*	*Negative*	***Low***	*Possible*	*Low*
Changes to surface water quality	Without Mitigation	Local	Long term	Irreversible	Negative	**Moderate**	Probable	Medium
	With Mitigation	*Site*	*Short term*	*Partly Reversible*	*Negative*	***Low***	*Possible*	*Low*
Bats								

Construction Phase		Extent	Duration	Reversibility	Status	Significance	Probability	Magnitude
Modification & disturbance of Habitats	Without Mitigation	Site	Short term	Recoverable	Negative	**Low**	Probable	Moderate
	With Mitigation	*Site*	*Short term*	*Recoverable*	*Negative*	***Low***	*Low Probability*	*Low*
Avifauna								
Destruction of habitat	Without Mitigation	Site	Long term	Recoverable	Negative	**Moderate**	Highly Probable	Moderate
	With Mitigation	*Site*	*Long term*	*Recoverable*	*Negative*	***Moderate***	*Highly Probable*	*Moderate*
Disturbance of birds	Without Mitigation	Local	Short term	Reversible	Negative	**Low**	Probable	Low
	With Mitigation	*Local*	*Short term*	*Reversible*	*Negative*	***Low***	*Probable*	*Low*
Terrestrial Biodiversity								
Disturbance to CBAs	Without Mitigation	Local	Long term	Recoverable	Negative	**Moderate**	Probable	Moderate
	With Mitigation	*Local*	*Long term*	*Recoverable*	*Negative*	***Low***	*Low Probability*	*Low*
Impacts to the value of affected NPAES Focus Areas	Without Mitigation	Local	Long term	Recoverable	Negative	**Moderate**	Probable	Moderate
	With Mitigation	*Local*	*Long term*	*Recoverable*	*Negative*	***Low***	*Low Probability*	*Low*
Karoo Dwarf Tortoise								
Habitat loss and degradation	Without Mitigation	Local	Short-term	Recoverable	Negative	**High**	Probable	High
	With Mitigation	*Local*	*Short-term*	*Recoverable*	*Negative*	***Low***	*Conceivable*	*Moderate*
Tortoise mortalities due to earthworks and roadkill	Without Mitigation	Local	Long term	Irreversible	Negative	**Moderate**	Probable	Moderate
	With Mitigation	*Local*	*Long term*	*Irreversible*	*Negative*	***Low***	*Conceivable*	*Moderate*

Construction Phase		Extent	Duration	Reversibility	Status	Significance	Probability	Magnitude
Riverine Rabbit								
Vehicle collisions, disturbance and habitat loss	Without Mitigation	Local	Short term	Reversible	Negative	**Moderate**	Highly Probable	Moderate
	With Mitigation	*Local*	*Short term*	*Reversible*	*Negative*	***Low***	*Low Probability*	*Low*
Noise								
Construction of Access Roads	Without Mitigation	Local	Temporary	High	Negative	**Low**	Possible	Very High
	With Mitigation	*Local*	*Temporary*	*High*	*Negative*	***Low***	*Possible*	*Very High*
Traffic Noises	Without Mitigation	Local	Short-term	High	Negative	**Low**	Improbable	Very High
	With Mitigation	*Local*	*Short-term*	*High*	*Negative*	***Low***	*Improbable*	*Very High*
Daytime WTG construction	Without Mitigation	Local	Short-term	High	Negative	**Low**	Improbable	Very High
	With Mitigation	*Local*	*Short-term*	*High*	*Negative*	***Low***	*Improbable*	*Very High*
Night-time WTG construction	Without Mitigation	Regional	Short-term	High	Negative	**High**	Likely	Very High
	With Mitigation	*Regional*	*Short-term*	*High*	*Negative*	***Low***	*Improbable*	*Very High*
Heritage, Archaeology & Palaeontology								
Visual intrusion to the cultural landscape	Without Mitigation	Regional	Short term	Recoverable	Negative	**Moderate**	Definite	High
	With Mitigation	*Regional*	*Short term*	*Recoverable*	*Negative*	***Moderate***	*Definite*	*Moderate*
Damage or destruction of archaeological resources	Without Mitigation	Site	Permanent	Irreversible	Negative	**Low**	Definite	Low
	With Mitigation	*Site*	*Permanent*	*Irreversible*	*Negative*	***Low***	*Low Probability*	*Very Low*

Construction Phase		Extent	Duration	Reversibility	Status	Significance	Probability	Magnitude
Visual								
Visual effects of construction activities on scenic resources	Without Mitigation	Local	Short term	Recoverable	Negative	**Moderate**	Definite	Moderate
	With Mitigation	*Local*	*Short term*	*Recoverable*	*Negative*	***Moderate***	*Highly probable*	*Moderate*
Traffic								
Increased Road incidents	Without Mitigation	Regional	Short term	Irreversible	Negative	**Moderate**	Highly probable	High
	With Mitigation	*Regional*	*Short term*	*Irreversible*	*Negative*	***Moderate***	*Probable*	*High*
Road Degradation	Without Mitigation	Regional	Short term	Recoverable	Negative	**Moderate**	Highly probable	Moderate
	With Mitigation	*Regional*	*Short term*	*Recoverable*	*Negative*	***Moderate***	*Probable*	*Moderate*
Dust	Without Mitigation	Regional	Short term	Reversible	Negative	**Moderate**	Probable	Moderate
	With Mitigation	*Regional*	*Short term*	*Reversible*	*Negative*	***Low***	*Probable*	*Moderate*
Intersection Safety	Without Mitigation	Regional	Short term	Irreversible	Negative	**Moderate**	Highly probable	High
	With Mitigation	*Regional*	*Short term*	*Irreversible*	*Negative*	***Moderate***	*Probable*	*High*
Social								
Creation of employment and business opportunities	Without Mitigation	Local	Short term	N/A	**Positive**	**Low**	Probable	Moderate
	With Mitigation	*Local*	*Short term*	*N/A*	***Positive***	***Moderate***	*Highly probable*	*Moderate*
Presence of construction workers and potential	Without Mitigation	Local	Short term	Recoverable	Negative	**Moderate**	Probable	Moderate
	With Mitigation	*Local*	*Short term*	*Recoverable*	*Negative*	***Low***	*Probable*	*Low*

Construction Phase		Extent	Duration	Reversibility	Status	Significance	Probability	Magnitude
impacts on family structures and social networks								
Influx of job seekers	Without Mitigation	Local	Short term	Recoverable	Negative	**Low**	Probable	Low
	With Mitigation	*Local*	*Short term*	*Recoverable*	*Negative*	***Low***	*Probable*	*Low*
Safety risk, stock theft and damage to farm infrastructure associated with presence of construction workers	Without Mitigation	Local	Short term	Reversible	Negative	**Moderate**	Probable	Moderate
	With Mitigation	*Local*	*Short term*	*Reversible*	*Negative*	***Low***	*Probable*	*Low*
Increased risk of grass fires	Without Mitigation	Local	Short term	Reversible	Negative	**Moderate**	Probable	Moderate
	With Mitigation	*Local*	*Short term*	*Reversible*	*Negative*	***Low***	*Low Probability*	*Low*
Impact of heavy vehicles and construction activities	Without Mitigation	Local	Short term	Reversible	Negative	**Low**	Probable	Low
	With Mitigation	*Local*	*Short term*	*Reversible*	*Negative*	***Low***	*Low Probability*	*Low*
Loss of farmland	Without Mitigation	Local	Short term	Reversible	Negative	**Moderate**	Highly probable	Moderate
	With Mitigation	*Local*	*Short term*	*Reversible*	*Negative*	***Low***	*Probable*	*Low*

Operation Phase Impacts

Operational Phase		Extent	Duration	Reversibility	Status	Significance	Probability	Magnitude
Freshwater & Wetlands (Aquatics)								
Spread of Alien Vegetation	Without Mitigation	Local	Long term	Irreversible	Negative	**Moderate**	Probable	Moderate
	With Mitigation	*Site*	*Short term*	*Partly reversible*	*Negative*	***Low***	*Possible*	*Low*
Bats								
Bat Fatality	Without Mitigation	Local	Long term	Recoverable	Negative	**Moderate**	Highly probable	High
	With Mitigation	*Local*	*Long term*	*Recoverable*	*Negative*	***Moderate***	*Probable*	*Moderate*
Light Pollution	Without Mitigation	Local	Long term	Recoverable	Negative	**Moderate**	Probable	Moderate
	With Mitigation	*Local*	*Long term*	*Recoverable*	*Negative*	***Low***	*Low Probability*	*Moderate*
Avifauna								
Disturbance to birds	Without Mitigation	Local	Long term	Reversible	Negative	**Low**	Probable	Low
	With Mitigation	*Local*	*Long term*	*Reversible*	*Negative*	***Low***	*Probable*	*Low*
Displacement of birds	Without Mitigation	Local	Long term	Reversible	Negative	**Low**	Probable	Low
	With Mitigation	*Local*	*Long term*	*Reversible*	*Negative*	***Low***	*Probable*	*Low*
Bird collision with turbine blades	Without Mitigation	National	Long term	Irreversible	Negative	**High**	Highly Probable	High
	With Mitigation	*National*	*Long term*	*Irreversible*	*Negative*	***Moderate***	*Probable*	*Moderate*
	Without Mitigation	National	Long term	Irreversible	Negative	**High**	Highly Probable	High

Operational Phase		Extent	Duration	Reversibility	Status	Significance	Probability	Magnitude
Bird collision with overhead power lines	*With Mitigation*	*National*	*Long term*	*Irreversible*	*Negative*	***Moderate***	*Probable*	*Moderate*
Bird electrocution on overhead lines	Without Mitigation	National	Long term	Irreversible	Negative	**High**	Highly Probable	High
	With Mitigation	*National*	*Long term*	*Irreversible*	*Negative*	***Low***	*Improbable*	*Moderate*
Terrestrial Biodiversity								
Disturbance, specifically wind turbine noise, to CBAs	Without Mitigation	Local	Long term	Reversible	Negative	**Moderate**	Probable	Low
	With Mitigation	*Local*	*Long term*	*Reversible*	*Negative*	***Low***	*Low Probability*	*Low*
Connectivity, dispersal and affected movements of fauna about the landscape	Without Mitigation	Local	Long term	Recoverable	Negative	**Moderate**	Probable	Moderate
	With Mitigation	*Local*	*Long term*	*Reversible*	*Negative*	***Low***	*Low Probability*	*Low*
Karoo Dwarf Tortoise								
Tortoise mortalities due to traffic on new roads	Without Mitigation	Local	Long term	Irreversible	Negative	**High**	Probable	High
	With Mitigation	*Local*	*Long term*	*Irreversible*	*Negative*	***Low***	*Conceivable*	*Moderate*
Riverine Rabbit								
Turbine noise, disturbance and vehicle collision	Without Mitigation	Local	Long term	Reversible	Negative	**Low**	Probable	Moderate
	With Mitigation	*Local*	*Long term*	*Reversible*	*Negative*	***Low***	*Low Probability*	*Low*
Heritage, Archaeology & Palaeontology								
	Without Mitigation	Regional	Long Term	Recoverable	Negative	**High**	Definite	Moderate

Operational Phase		Extent	Duration	Reversibility	Status	Significance	Probability	Magnitude
Impacts to the cultural landscape	*With Mitigation*	*Regional*	*Long Term*	*Recoverable*	*Negative*	***Moderate***	*Definite*	*Moderate*
Visual								
Visual effect of wind turbines on the rural landscape	Without Mitigation	Regional	Long Term	Recoverable	Negative	**High**	Definite	High
	With Mitigation	*Regional*	*Long Term*	*Recoverable*	*Negative*	***High***	*Definite*	*High*
Visual effect of substation and BESS on the rural landscape	Without Mitigation	Local	Long Term	Recoverable	Negative	**Moderate**	Definite	Moderate
	With Mitigation	*Local*	*Long Term*	*Recoverable*	*Negative*	***Moderate***	*Highly Probable*	*Moderate*
Visual effect of access roads on the rural landscape	Without Mitigation	Local	Long Term	Recoverable	Negative	**Moderate**	Probable	Low
	With Mitigation	*Local*	*Long Term*	*Recoverable*	*Negative*	***Low***	*Low Probability*	*Low*
Visual intrusion of lighting at night	Without Mitigation	Local	Long Term	Recoverable	Negative	**Moderate**	Definite	Moderate
	With Mitigation	*Local*	*Long Term*	*Recoverable*	*Negative*	***Moderate***	*Highly Probable*	*Moderate*
Traffic								
Intersection Safety	Without Mitigation	Regional	Short term	Irreversible	Negative	**Moderate**	Probable	Low
	With Mitigation	*Regional*	*Short term*	*Irreversible*	*Negative*	***Moderate***	*Probable*	*Low*
Noise								
Daytime operation of WTG (worst-case SPL)	Without Mitigation	Local	Long-term	High	Negative	**Low**	Improbable	Low
	With Mitigation	*Local*	*Long-term*	*High*	*Negative*	***Low***	*Improbable*	*Low*

Operational Phase		Extent	Duration	Reversibility	Status	Significance	Probability	Magnitude
Night-time operation of WTG (worst-case SPL)	Without Mitigation	Regional	Long-term	High	Negative	**Low**	Possible	Low
	With Mitigation	*Regional*	*Long-term*	*High*	*Negative*	***Low***	*Possible*	*Low*
Social								
Establish infrastructure to generate renewable energy	Without Mitigation	National	Long term	N/A	Negative	**Moderate**	Highly Probable	High
	With Mitigation	*National*	*Long term*	*N/A*	***Positive***	***High***	*Definite*	*High*
Creation of employment and business opportunities during maintenance	Without Mitigation	Regional	Long term	N/A	**Positive**	**Low**	Low Probability	Low
	With Mitigation	*Regional*	*Long term*	*N/A*	***Positive***	***Moderate***	*Highly Probable*	*Moderate*
Benefits associated with the local economic development initiatives	Without Mitigation	Regional	Long term	N/A	**Positive**	**Moderate**	Highly Probable	Moderate
	With Mitigation	*Regional*	*Long term*	*N/A*	***Positive***	***Moderate***	*Definite*	*Moderate*
Benefits for landowners	Without Mitigation	Regional	Long term	N/A	**Positive**	**Low**	Probable	Low
	With Mitigation	*Regional*	*Long term*	*N/A*	***Positive***	***Moderate***	*Definite*	*Moderate*
Visual impact and impact on sense of place	Without Mitigation	Regional	Long term	Reversible	Negative	**Moderate**	Highly Probable	Moderate
	With Mitigation	*Regional*	*Long term*	*Reversible*	*Negative*	***Moderate***	*Highly Probable*	*Moderate*
Impact on property values	Without Mitigation	Local	Long term	N/A	Negative	**Low**	Low Probability	Low
	With Mitigation	*Local*	*Long term*	*N/A*	*Negative*	***Low***	*Low Probability*	*Low*

Operational Phase		Extent	Duration	Reversibility	Status	Significance	Probability	Magnitude
Impact on tourism	Without Mitigation	Local	Long term	N/A	Negative	**Low**	Low Probability	Low
	With Mitigation	*Local*	*Long term*	*N/A*	*Negative*	***Low***	*Low Probability*	*Low*

Decommissioning Phase Impacts

Decommissioning Phase		Extent	Duration	Reversibility	Status	Significance	Probability	Magnitude
Freshwater & Wetlands (Aquatics)								
Loss of habitat/vegetation	Without Mitigation	Local	Long term	Irreversible	Negative	**Moderate**	Probable	Medium
	With Mitigation	*Site*	*Short term*	*Partly Reversible*	*Negative*	***Low***	*Possible*	*Low*
Loss of Critical Biodiversity Areas (CBAs)	Without Mitigation	Local	Long term	Irreversible	Negative	**Moderate**	Probable	Medium
	With Mitigation	*Site*	*Short term*	*Partly Reversible*	*Negative*	***Low***	*Possible*	*Low*
Loss of riparian habitat	Without Mitigation	Local	Long term	Irreversible	Negative	**Moderate**	Probable	Medium
	With Mitigation	*Site*	*Short term*	*Partly Reversible*	*Negative*	***Low***	*Possible*	*Low*
Changes to the hydrological regime and increase potential for erosion	Without Mitigation	Local	Long term	Irreversible	Negative	**Moderate**	Probable	Medium
	With Mitigation	*Site*	*Short term*	*Partly Reversible*	*Negative*	***Low***	*Possible*	*Low*
Changes to surface water quality	Without Mitigation	Local	Long term	Irreversible	Negative	**Moderate**	Probable	Medium

Decommissioning Phase		Extent	Duration	Reversibility	Status	Significance	Probability	Magnitude
	With Mitigation	*Site*	*Short term*	*Partly Reversible*	*Negative*	***Low***	*Possible*	*Low*
Bats								
Disturbance of Bats	Without Mitigation	Site	Short term	Recoverable	Negative	**Low**	Probable	Moderate
	With Mitigation	*Site*	*Short term*	*Recoverable*	*Negative*	***Low***	*Low Probability*	*Low*
Avifauna								
Disturbance of Birds	Without Mitigation	Local	Short term	Reversible	Negative	**Low**	Probable	Low
	With Mitigation	*Local*	*Short term*	*Reversible*	*Negative*	***Low***	*Probable*	*Low*
Riverine Rabbit								
Disturbance and vehicle collisions	Without Mitigation	Local	Short term	Reversible	Negative	**Medium**	Highly Probable	Moderate
	With Mitigation	*Local*	*Short term*	*Reversible*	*Negative*	***Low***	*Low Probability*	*Low*
Heritage, Archaeology & Palaeontology								
Impacts to the cultural landscape	Without Mitigation	Regional	Short term	Recoverable	Negative	**Moderate**	Definite	High
	With Mitigation	*Regional*	*Short term*	*Recoverable*	*Negative*	***Moderate***	*Definite*	*Low*
Visual								
Visual intrusion of activities to remove infrastructure	Without Mitigation	Local	Short term	Recoverable	Negative	**Moderate**	Definite	Moderate
	With Mitigation	*Local*	*Short term*	*Recoverable*	*Negative*	***Moderate***	*Highly Probable*	*Moderate*

Decommissioning Phase		Extent	Duration	Reversibility	Status	Significance	Probability	Magnitude
Social								
Loss of jobs and associated income	Without Mitigation	Local	Short term	Recoverable	Negative	**Low**	Probable	Low
	With Mitigation	*Local*	*Short term*	*Recoverable*	*Negative*	***Low***	*Probable*	*Moderate*

Cumulative Phase Impacts

Cumulative Phase		Extent	Duration	Reversibility	Status	Significance	Probability	Magnitude
Freshwater & Wetlands (Aquatics)								
Combined impact of the remaining and other renewable projects within a 35km radius	Without Mitigation	Local	Long term	Irreversible	Negative	Medium	Probable	Moderate
	With Mitigation	*Site*	*Short term*	*Partly Reversible*	*Negative*	***Low***	*Possible*	*Low*
Bats								
Total impacts from combined effects of the project when added to other existing, planned or anticipated future projects	Without Enhancement	National	Long term	Recoverable	Negative	High	Highly Probable	High
	With Enhancement	*Local*	*Long term*	*Recoverable*	*Negative*	***Medium***	*Probable*	*Moderate*
Avifauna								
Cumulative impacts on	Without Enhancement	National	Long term	Recoverable	Negative	**High**	Highly Probable	High

Cumulative Phase		Extent	Duration	Reversibility	Status	Significance	Probability	Magnitude
birds during construction and operation	*With Enhancement*	*Regional*	*Long term*	*Recoverable*	*Negative*	***Medium***	*Probable*	*Moderate*
Terrestrial Biodiversity								
Impacts on broad-scale ecological processes such as connectivity, dispersal and movement of fauna about the landscape.	Without Mitigation	Local	Long term	Recoverable	Negative	Medium	Probable	Moderate
	With Mitigation	*Local*	*Long term*	*Reversible*	*Negative*	***Low***	*Low Possible*	*Low*
Riverine Rabbit								
Due to decommissioning	Without Mitigation	Local	Short term	Reversible	Negative	**Medium**	Highly Probable	Moderate
	With Mitigation	*Local*	*Short term*	*Reversible*	*Negative*	***Low***	*Low Probability*	*Low*
Karoo Dwarf Tortoise								
Cumulative impacts of habitat loss and degradation on the Karoo Dwarf Tortoise during construction	Without Mitigation	Local	Short term	Recoverable	Negative	Medium	Probable	Moderate
	With Mitigation	*Local*	*Short term*	*Recoverable*	*Negative*	***Low***	*Conceivable*	*Moderate*
Cumulative impacts on Mortalities due	Without Mitigation	Local	Short term	Irreversible	Negative	Medium	Probable	Moderate
	With Mitigation	*Local*	*Short term*	*Irreversible*	*Negative*	***Low***	*Conceivable*	*Moderate*

Cumulative Phase		Extent	Duration	Reversibility	Status	Significance	Probability	Magnitude
to earthworks and roadkill								
Heritage, Archaeology & Palaeontology								
Impacts to archaeology, graves, buildings and cultural landscape through destruction and/or visual intrusion	Without Enhancement	Regional	Long term	Recoverable	Negative	High	Definite	High
	With Enhancement	*Regional*	*Long term*	*Recoverable*	*Negative*	***Medium***	*Probable*	*Low*
Visual								
Combined visual effect of existing and proposed WEFs on scenic resources and sensitive receptors	Without Enhancement	Regional	Long term	Recoverable	Negative	Medium	Highly Probable	Moderate
	With Enhancement	*Regional*	*Long term*	*Recoverable*	*Negative*	***Medium***	*Highly Probable*	*Moderate*
Social								
Area's sense of place and character of the landscape	Without Enhancement	Regional	Long term	Reversible	Negative	Medium	Highly Probable	Moderate
	With Enhancement	*Regional*	*Long term*	*Reversible*	*Negative*	***Medium***	*Highly Probable*	*Moderate*
Impacts on local services	Without Enhancement	Local	Short term	N/A	Negative	Low	Low Probability	Low
	With Enhancement	*Local*	*Medium Term*	*N/A*	*Negative*	***Low***	*Low Probability*	*Low*

Cumulative Phase		Extent	Duration	Reversibility	Status	Significance	Probability	Magnitude
Impacts on the local economy	Without Enhancement	Regional	Long term	N/A	**Positive**	Low	Highly Probable	Moderate
	With Enhancement	*Regional*	*Long term*	*N/A*	***Positive***	***Low***	*Definite*	*Moderate*
Noise								
Potential Cumulative Noise Impacts	Without Enhancement	Regional	Long-term	High	Negative	Low	Possible	Low
	With Enhancement	*Regional*	*Long-term*	*High*	*Negative*	***Low***	*Possible*	*Low*

DFFE: INFORMATION REQUIREMENTS FOR WEF APPLICATIONS

The DFFE's requirements for information for all Wind Energy Facilities (WEFs) applications are included in this section of the report. Where the information is not provided in the tables below, the location of where it can be found in the report is indicated.

Table 0-1: Details of the Affected Farm Properties and SG 21 Codes

Portion Number	Farm Name	Farm No.	SG 21 Code
Remaining Extent	Farm Yzervarkspoort	139	C08000000000013900000
Potion 1	Farm Yzervarkspoort	139	C08000000000013900001
Remaining Extent	Farm 273	Farm 273	C08000000000027300000
Remaining Extent	Farm 262	Farm 262	C08000000000026900000
Remaining Extent of Portion 0	Erasmuskraal	269	C08000000000026900000

Table 0-2: General Site Information

General Site Components	Description / Dimensions
Copies of deeds of all affected farm portions	Submitted with the Application Form to the DFFE.
Location of the site	Approximately 15 km east of Loxton within the Ubuntu Local Municipality and the Pixley Ka Seme District Municipality.
Facility Area	Approximately 65 hectares. This is the permanent development footprint.
Photos of areas that give a visual perspective of all parts of the site	Included in the Visual Impact Assessment Report (Volume II)
Photographs from sensitive visual receptors (tourism routes, tourism facilities, etc.)	Included in the Visual Impact Assessment Report (Volume II)

Table 0-3: WEF and Associated Infrastructure Technical Details

WEF Technical Details Components	Description / Dimensions
Maximum Generation Capacity	Up to 240 MW
Type of technology	Onshore Wind
Number of Turbines	Up to 39
WTG Hub Height from ground level	Up to 160 m
Blade Length	Up to 100 m
Rotor Diameter	Up to 200 m
Structure height (Tip Height)	Maximum of 300 m tip height
Structure orientation	Vertical towers with 3 blades attached

WEF Technical Details Components	Description / Dimensions
Area occupied by both permanent and construction laydown areas	• Concrete turbine foundations with a permanent footprint of up to 5.5 ha; • Each turbine will have a crane hardstand of 70 m x 45 m. The permanent footprint for turbine hardstands will be up to 13 ha. • Each turbine will have a temporary blade hardstand of 80 m x 45 m. The temporary footprint for blade hardstands will be up to 14 ha. • Temporary laydown areas (with a combined footprint of up to 25 ha) which will accommodate the boom erection, storage and assembly area; • Temporary construction laydown areas of up to 6 ha; and • A temporary site camp establishment and concrete batching plants (with a combined footprint of up to 2 ha).
Operations and maintenance buildings (O&M building) with parking area	Up to 2 ha including a gate house, security building, control centre, offices, warehouses, a workshop, parking bays and a storage area.
Site Access	Access roads to the site and between project components inclusive of stormwater infrastructure. A 15 m road corridor may be temporarily impacted upon during construction and rehabilitated to 8 m wide after construction. The WEF will have a total road network of up to 50 km.
Area occupied by inverter transformer stations/substations	One on-site substations up to 4 ha in extent to facilitate the connection between the wind farm and the electricity grid
Capacity of on-site substation	33 / 132 kV
Battery Energy Storage System footprint	Footprint of up to 5 ha
Length of internal roads	Up to 50 km
Width of internal roads	Up to 15 m including road reserve, during construction and rehabilitated to up to 8 m after construction.
Proximity to grid connection	100 km, depending on the preferred alternative route (separate application process is being followed for the grid connection).
Internal Cabling	Up to 33 kV medium voltage electrical cabling between the turbines, to be laid underground where practical.
Height of fencing	Up to 5 m
Type of fencing	Palisade fencing or similar

Table 0-4: Site Maps and GIS Information

Site Maps and GIS Information	Report Reference
All maps/information layers are provided in ESRI Shapefile format.	
All affected farm portions must be indicated.	Figure 2: Site Locality
The exact site of the application must be indicated (the areas that will be occupied by the application).	Figure 2: Site Locality
A *status quo* map/layer must be provided that includes the following: Current use of land on the site including:	
Buildings and other structures	Figure 9: Buildings and Other Structures
Agricultural fields	Figure 5: Land Use and Land Cover
Grazing areas	Figure 5: Land Use and Land Cover
Natural vegetation areas (natural veld not cultivated for the preceding 10 years) with an indication of the vegetation quality as well as fine scale mapping in respect of Critical Biodiversity Areas and Ecological Support Areas	Figure 6: Important Ecological Areas
Critically endangered and endangered vegetation areas that occur on the site	Figure 6: Important Ecological Areas
Bare areas which may be susceptible to soil erosion	Figure 6: Important Ecological Areas
Cultural historical sites and elements	Figure 7: Environmental Sensitivity
Rivers, streams and water courses	Figure 6: Important Ecological Areas
Ridgelines and 20 m continuous contours with height references in the GIS database	Figure 5: Land Use and Land Cover
Fountains, boreholes, dams (in-stream as well as off-stream) and reservoirs	Figure 6: Important Ecological Areas
High potential agricultural areas as defined by the Department of Agriculture, Forestry and Fisheries	Figure 5: Land Use and Land Cover
Buffer zones (also where it is dictated by elements outside the site): **500 m from any irrigated agricultural land** **1 km from residential areas**	Figure 7: Environmental Sensitivity
Indicate isolated residential, tourism facilities on or within 1 km of the site	Figure 7: Environmental Sensitivity

Site Maps and GIS Information	Report Reference
A slope analysis map/layer that include the following slope ranges: **Less than 8% slope (preferred areas for turbines and infrastructure)** **Between 8% and 12% slope (potentially sensitive to turbines and infrastructure) Between 12%and 14% slope (highly sensitive to turbines and infrastructure)** **Steeper than 18% slope (unsuitable for turbines and infrastructure)**	Figure 5: Land Use and Land Cover
A map/layer that indicate locations of birds and bats including roosting and foraging areas	Figure 7: Environmental Sensitivity
A site development proposal map(s)/layer(s) that indicate: **Turbine positions** **Foundation footprint** **Permanent laydown area footprint** **Construction period laydown footprint** **Internal roads indicating width (construction period width and operation period width) and with numbered sections between the other site elements which they serve (to make commenting on sections possible).**	Figure 3: Site Development Plan
River, stream and water crossing of roads and cables indicating the type of bridging structures that will be used.	Figure 10: SDP overlain on Environmental Sensitivity
Substation(s) and/or transformer(s) sites including their entire footprint.	Figure 3: Site Development Plan
Cable routes and trench dimensions (where they are not along internal roads) Connection routes to the distribution/transmission network (the connection must form part of the EIA even if the construction and maintenance thereof will be done by another entity such as ESKOM).	Only internal MV cabling is presented in Figure 3: Site Development Plan. Cabling to the distribution network is not presented in this EIA figures as the Grid Connection from the WEF to the Eskom Gamma MTS is being assessed as part of a separate application process.
Cut and fill areas at turbine sites along roads and at substation/transformer sites indicating the expected volume of each cut and fill	Figure 3 indicated the Site Development Plan Cut and fill areas at the turbine sites long roads, etc, will be provided in the final design approval of the development layout.
Borrow pits	No borrow pits on site. Licensed borrow pits will be used to source material.

Site Maps and GIS Information	Report Reference
Spoil heaps (temporary for topsoil and subsoil and permanently for excess material) Buildings including accommodation	Temporary and permanent spoil heaps will be kept within demarcated construction areas, and monitored by the ECO during the construction phase.

Table 0-5: Development Area Geographic Coordinates - Loxton WEF 3

Proposed Loxton WEF 3 Site Boundary			
Reference Point	**Aspect**	**Latitude**	**Longitude**
03	North West Corner	31° 25'54.62" S	022° 27'44.40" E
05	South West Corner	31° 30'45.17" S	022° 26'11.79" E
09	South East Corner	31° 29'36.20" S	022° 34'32.29" E
12	North East Corner	31° 25'29.94" S	022° 33'45.83" E

TABLE OF CONTENTS

1 INTRODUCTION

1.1 Project Overview

Loxton Wind Facility 3 (Pty) Ltd ('the Project Applicant') is applying for environmental authorisation to construct and operate the up to 240 MW Loxton Wind Energy Facility (WEF) 3 and its associated on-site substation and battery energy storage system. Hereafter the proposed Loxton WEF 3 and its associated infrastructure will be referred to as the 'proposed development'.

The proposed development is located approximately 15 km east of the town of Loxton within the Ubuntu Local Municipality and the Pixley Ka Seme District Municipality in the Northern Cape Province (Figure 1 – Site Locality Map).

In terms of Chapter 5 of the National Environmental Management Act, 1998 (Act 107 of 1998 – NEMA), and the EIA Regulations, 2014 (as amended), the Project Applicant appointed Arcus Consultancy Services South Africa (Pty) Ltd (Arcus), to act as the project manager and appoint and EAP to undertake the S&EIA process for Environmental Authorisation.

1.2 Purpose and Aim of the Environmental Impact Assessment Report

The National Environment Management Act, 1998 (Act No 107 of 1998) (NEMA) promotes the use of scoping and EIA in order to ensure the integrated environmental management of activities.

Section 24(1) of NEMA states:

"*In order to give effect to the general objectives of integrated environmental management laid down in this Chapter, the potential impact on the environment of listed activities must be considered, investigated, assessed and reported to the competent authority charged by this Act with granting the relevant environmental authorisation*."

EIA is ultimately a decision-making process with the specific aim of 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 EA prior to commencement.

1.3 DFFE Comments on the Final Scoping Report

Table 1.1 below summarises the comments received from the DFFE on the FSR. This table further indicates where in this report the comments have been addressed.

Table 1-1: Comments received from the DFFE on the Final Scoping Report

No.	Comment from DFFE	EAP Response	Section in Report
DFFE Reference: 14/12/16/3/3/2/2238 Enquiries: Ms Bathandwa Ncube **COMMENTS ON THE SCOPING REPORT FOR THE FOR THE PROPOSED LOXTON WIND ENERGY FACILITY 3, NEAR LOXTON, WITHIN THE UBUNTU LOCAL MUNICIPALITY, NORTHERN CAPE PROVINCE**			
The final Scoping Report (SR) and the Plan of Study for Environmental Impact Assessment dated January 2023 and received by the Department on 14 January 2023, refers. This letter serves to inform you, that the following amendments and additional information are required for the EIAr:			
(a)	**Application form**		
1.	It is noted that the proposed wind energy facility (WEF) does not fall within any strategic corridors or development zones, therefore the application will be considered as a normal EIA Application.	The EAP confirms that the Development does not fall within any strategic corridors or development zones. The application is following a full Scoping and EIA process in accordance with the NEMA EIA Regulations, 2014 as amended.	Volume I: Section 3
2.	If the EIAr contains listed activities and/or other information that differs from the application form, the application form must be amended accordingly and submitted to the Department with the EIAr.	The listed activities in the Application form and in the EIAr is the same. A revised Application Form has been submitted with the EIAr considering the updated Development specifications following the scoping phase.	n/a
(b)	**Alternatives**		
3.	Please note that you are required to provide a full description of the process followed to reach the proposed preferred alternative within the site, in terms of Appendix 1(3)(1)(h) of the EIA Regulations 2014, as amended.	The EIAr includes a full description of the process followed to reach the proposed preferred alternative within the site, which includes the activity alternatives, site alternatives, location alternatives and the "No Development" alternative.	Volume I: Section 8
4.	Design/Layout alternatives, as illustrated in the preliminary site development plan of the final SR, must be included in the Alternatives Assessment section of the EIAr. This includes discussing the 2 laydown area alternatives and the 3 substation alternatives.	The design evolution of the WEF is included in the EIAr. The WEF layout change was based on the further studies for the EIA phase of the development and	Volume I: Section 8

No.	Comment from DFFE	EAP Response	Section in Report
		includes the preferred location of alternatives, including the laydown and substation locations.	
5.	Where applicable, each specialist study must indicate a preferred laydown and substation alternative.	The layout assessed during the scoping phase has been adjusted based on the initial scoping assessment and specialists' findings. Due to the design evolution of the Loxton WEF 3 turbine positions, the placements of the laydown area and on-site substation have both been revisited and is considered the preferred alternative in the EIAr.	Volume I: Section 8
6.	BESS technologies must be included in the Technology Alternatives section of the EIAr, explaining how lithium-ion batteries were chosen as the preferred alternative.	An explanation of the preferred and alternative battery technologies has been included in the alternative section of the EIAr.	Volume I: Section 8
(c)	**Public Participation**		
7.	Comments on the draft EIAR must be obtained from this Department's Biodiversity Conservation Directorate. Further to that, these comments must be addressed and incorporated in the final EIAR. Please ensure that comments from all relevant stakeholders are submitted to the Department with the EIAr.	The Department's Biodiversity Conservation Directorate will be requested to review and submit comment on the EIAr. This comment will be addressed and incorporated into the Final EIAr. The Department's Biodiversity Conservation Directorate provided comment during the PPP for the scoping phase and addressed in the comment and response report.	Volume III: PP Report
8.	Please ensure that comments from all relevant stakeholders are submitted to the Department with the EIAr.	Comments from all relevant stakeholders which were received and addressed prior to submission the draft EIAr will be submitted to the Department. The PP report (volume III) will be updated following the PP period of the draft EIAr and submitted to the Department with the final EIAr	Volume III: PP Report
9.	All issues raised and comments received must be incorporated into the Comments and Response Report (CRR). This includes comments received	The comments and response report included in the PP report (Volume III) includes all issues raised and	Volume III: PP Report

No.	Comment from DFFE	EAP Response	Section in Report
	from the distribution of the draft SR, which have not been incorporated into the CRR in the FSR.	comments received prior to submission the draft EIAr will be submitted to the Department. The PP report (volume III) will be updated following the PP period of the draft EIAr and submitted to the Department with the final EIAr	
10.	Proof of correspondence with the various stakeholders must be included in the EIAr. Should you be unable to obtain comments, proof should be submitted to the Department of the attempts that were made to obtain comments.	This has been provided for in the PP Report (Volume III) of the EIAr. Any correspondence with relevant organs of state and stakeholders has been included in the comments and response table. Where no correspondence has been received, the proof of attempts to retrieve a comment has been provided.	Volume III: PP Report
11.	Comments from I&APs must not be split and arranged into categories. Comments from each submission must be responded to individually.	The comments and response report has been collated by thread and have not been split.	Volume III: PP Report
12.	Please refrain from summarising comments made by I&APs. All comments from I&APs must be copied verbatim and responded to clearly. Please note that a response such as "noted" is not regarded as an adequate response to an I&AP's comments.	The comments and response report includes verbatim 'copy and paste' of comments received. Responses provided are adequate and addresses comments raised.	Volume III: PP Report
(d)	**Layout & Sensitivity Maps**		
13.	The Critical Biodiversity Areas map in the FSR shows that the construction of all 41 turbines associated with Loxton WEF 3, is proposed within a CBA 1 and CBA 2. Please provide motivation for locating this WEF in a highly sensitive ecological area. Take note that any development within highly sensitive areas, which will result in significant negative impacts prior to mitigation measures, is prohibited.	There are three turbines located within the areas of CBA 1, which would have a footprint of less than 5 ha within the CBA 1. The turbines within the CBA 1 are largely associated with areas of Upper Karoo Hardeveld or higher-lying ground associated with the dominant ridges of the site. The remainder of the development footprint is located within the area of CBA 2. Since the actual biodiversity features present in this area have been mapped at a fine scale and avoided by the layout, the impact would be within low sensitivity areas of the CBA 2. As a result, the presence of turbines in this area is not likely to significantly impact the underlying biodiversity features of the affected CBA 2 to a significant degree. The representation of the	Volume I and Volume II.

No.	Comment from DFFE	EAP Response	Section in Report
		Eastern Upper Karoo vegetation type within the CBA 2 would not be a significant issue as this is an extensive vegetation type that has been little impacted by transformation. As a result, the areas within the CBA 2 are not considered of especially high value and would have low irreplaceability. As such, the overall impact of the development on CBAs is considered acceptable.	
14.	Please provide a Layout Map which indicates the following: a. Wind turbine positions (numbered) and its associated infrastructure; b. Permanent laydown area footprint; c. Internal roads indicating width (construction period width and operation period width) and with numbered sections between the other site elements which they serve (to make commenting on sections possible); d. The location of any sensitive environmental features on site e.g. CBAs, heritage sites, wetlands, drainage lines etc. that will be affected by the facility and its associated infrastructure; e. Substation(s) and/or transformer(s) sites, including their entire footprint; f. Connection routes (including pylon positions) to the distribution/transmission network; g. Buildings, including accommodation if any; h. Buildings proposed within the substation footprint if any; and i. Buffer areas; j. All "no-go" areas.	Figure 3 of the EIAr report includes a layout map which indicates the preferred location of the Loxton WEF 3 development.	Volume I: Figure 3
15.	An environmental sensitivity map indicating environmental sensitive areas and features identified during the assessment process must be submitted in the EIAr.	Figure 7 of the EIAr report includes an environmental sensitivity map indicating environmental sensitive areas and features identified during the assessment process.	Volume I: Figure 7
16.	A map combining the layout map superimposed (overlain) on the environmental sensitivity map must be submitted in the EIAr.	Figure 10 of the EIAr report includes a map combining the layout map superimposed (overlain) on the environmental sensitivity map.	Volume I: Figure 10

No.	Comment from DFFE	EAP Response	Section in Report
(e)	**Specialist assessments**		
17.	In addition to the preliminary specialist studies contained in the final SR, it is noted that a desktop Wake Impact Analysis and desktop Geotechnical Impact Assessment will be included in the EIAr, as per Section 12.5 of the final SR.	The desktop Wake Impact Analysis and desktop Geotechnical Impact Assessment is included in the EIAr.	Volume I; Volume II.
18.	Comments from the Northern Cape's Namaqualand District Ecologist dated 13 December 2022, state that the cumulative impacts of the 3 proposed Loxton WEFs on CBAs, is significant and an offset needs analysis is required to assess whether the cumulative impact is acceptable. Please include a Biodiversity Offset Assessment in the Specialist Plan of Study, which must be conducted in terms of the National Draft Biodiversity Offset Guideline. Should the assessment not be included in the EIAR, a detailed motivation must be provided for its exclusion. The list of required specialist studies proposed on page 5 of the comments letter must be addressed in the CRR.	The footprint of the Loxton 3 WEF within CBAs are high and ~65. Following a meeting with the Provincial Department of Agriculture, Environmental Affairs, Rural Development and Land Reform (DAERL), undertaking a further biodiversity study was required for the Loxton WEF 3 (see Volume III: PP Report for minutes of the meeting). A Plant Compliance Statement, Riverine Rabbit Species Assessment, Karoo Dwarf Tortoise Species Assessment and Terrestrial Biodiversity Assessment was undertaken for the EIA phase and is discussed and included in this EIAr.	Volume I; Volume II.
19.	A Risk Assessment study is not required for the Battery Energy Storage System (BESS), however, impacts associated with the risks must be identified, considered, and assessed as part of the EIAr.	Where impacts have been identified by specialists regarding the operation of the BESS, this has been included in the EIAr. The EMPr includes a risk assessment of the BESS.	Volume I; Appendix B: EMPr.
20.	The Heritage Impact Assessment and Palaeontological Heritage Compliance Statement, which will be included in the EIAR, must address the interim comments from the South African Heritage Resources Agency (SAHRA) dated 20 January 2023.	The Heritage Impact Assessment and Palaeontological Heritage Compliance Statement, included in the EIAr addresses the interim comments from the SAHRA. Final comment from the SAHRA will be requested during the EIA PPP.	Volume II: Specialist Reports Volume III: PP Report
21.	Specialist assessments must be conducted in accordance with the Government Notice No. 320 of 20 March 2020 (i.e. "the Protocols"), and Government Notice No. 1150 of 30 October 2020 (i.e. protocols for terrestrial plant and animal species).	Specialist assessments identified by the screening report generated for the proposed development was used as the basis for each specialist study. If an assessment was not conducted according to the said procedures, reason for this has been provided.	Volume I: Section 4

No.	Comment from DFFE	EAP Response	Section in Report
22.	Please note that the Department considers a 'no-go' area, as an area where no development of any infrastructure is allowed; therefore, no development of associated infrastructure including access roads is allowed in the 'no-go' areas.	The EAP acknowledges that the departments definition of a 'no-go' area is for any infrastructure, including the associated infrastructure such as access roads. The proposed development, including the associated infrastructure is not proposed within no-go areas.	Volume I: Figure 10
23.	Should the specialist definition of 'no-go' area differ from the Departments definition; this must be clearly indicated. The specialist must also indicate the 'no-go' area's buffer if applicable.	Except for avifauna and bats the specialist definition of 'no-go' is the same as that of the department. Buffers for any 'no-go' area provided by the specialist is indicated. The avifauna and bat specialist has identified areas of no-go for turbines, and permits associated infrastructure such as access roads and the development of associated infrastructure and underground cabling within these buffers. These areas are clearly defined and marked in the maps.	Volume I: Figure 10
24.	All specialist studies must be final and provide detailed/practical mitigation measures for the preferred alternative and recommendations and must not recommend further studies to be completed post environmental authorisation.	All specialist studies are final and provide detailed / practical mitigation measures. Further studies are only provided for post construction of the proposed development.	Volume II: Specialist Reports
25.	Should the specialist studies provide more detail regarding any of the project activity thresholds, please ensure that the project activity descriptions are amended accordingly in the application form and EIAr.	Project activity descriptions and thresholds are the same in all documents related to the application and assessment of the Loxton WEF 3.	Application Form and Volume I – Volume II
26.	Should a specialist recommend specific mitigation measures, these must be clearly indicated.	Specific mitigation measures as recommended by specialists are clearly indicated the EIAr and EMPr.	Volume I; Appendix B: EMPr
27.	Should the appointed specialists specify contradicting recommendations, the EAP must clearly indicate the most reasonable recommendation and substantiate this with defendable reasons; and were necessary, include further expertise advice.	No contradicting recommendations were provided by specialists. Specialists' recommendations have been considered and included Section 13 of the EIAr to be included in EA and / or in the EMPr for implementation.	Volume I: Section 13; Appendix B: EMPr

No.	Comment from DFFE	EAP Response	Section in Report
28.	You are requested to submit copies of signed Specialist Declaration of Interest forms (witnessed and signed by a commissioner of oaths) for each specialist study conducted.	Each specialist study undertaken includes a copy of a specialist declaration of interest forms (witnessed and signed by a commissioner of oaths).	Volume II: Specialist Reports.
(f)	**Cumulative Assessments**		
29.	Regarding the identified similar projects within a 30km radius of the proposed development site, the cumulative impact assessment for all identified and assessed impacts must indicate the following: a. Identified cumulative impacts must be clearly defined, and where possible the size of the identified impact must be quantified and indicated, i.e., hectares of cumulatively transformed land. b. Identified cumulative impacts associated with the proposed development must be rated with the significance rating methodology used in the process. c. Detailed process flow and proof must be provided, to indicate how the specialist's recommendations, mitigation measures and conclusions from the various similar developments in the area were taken into consideration in the assessment of cumulative impacts and when the conclusion and mitigation measures were drafted for this project. d. The cumulative impacts significance rating must also inform the need and desirability of the proposed development. e. A cumulative impact environmental statement on whether the proposed development must proceed.	An assessment of cumulative impacts, including significance ratings, has been included in Section 4.3.3 and Section 11 of the EIAr. The actual development footprint of the nearby Renewable Energy developments could not be easily quantified or accessed spatially. For example, the National Renewable Energy EIA Application Database contains the land parcels, and not the footprint. Nonetheless, it is believed that the assessment of cumulative impacts has been adequately captured in this EIAr. Detailed process flow and proof of the assessments have been included in the individual independent specialist reports. The need and desirability of the proposed project takes into account the cumulative impacts of surrounding developments of the area. A statement of the cumulative impacts of the proposed development has been included in the report.	An assessment of cumulative impacts, including significance ratings, has been included in Section 4.3.3 and Section 11 of the EIAr. The actual development footprint of the nearby Renewable Energy developments could not be easily quantified or accessed spatially. For example, the National Renewable Energy EIA Application Database contains the land parcels, and not the footprint. Nonetheless, it is believed that the assessment of cumulative impacts has been adequately captured in this EIAr. Detailed process flow and proof of the assessments have been included in the individual independent specialist reports. The need and desirability of the proposed project takes into account the cumulative impacts of

No.	Comment from DFFE	EAP Response	Section in Report
			surrounding developments of the area. A statement of the cumulative impacts of the proposed development has been included in the report.
(g)	**WEF Environmental Management Programme (EMPr)**		
30.	A construction and operational phase EMPr for the WEF, which includes mitigation and monitoring measures must be submitted with the EIAr.	A construction and operational phase EMPr for the WEF, which includes mitigation and monitoring measures has been drafted and will be submitted with the EIAr.	Volume I: Appendix B: EMPr
31.	The EMPr must be developed in terms of Appendix 4 of the EIA Regulations, 2014 as amended and must include (but not limited to) the following plans and measures: a. Re-vegetation and habitat rehabilitation plan; b. Weed and invader plant management plan; c. Traffic management plan; d. Emergency response plan; e. Fire management plan; f. Stormwater management plan; g. Noise management; h. Erosion management; i. Dust management; j. Waste management; k. All recommendations and mitigation measures, plans and procedures recorded in the EIAr and the specialist studies conducted. l. An effective monitoring system to detect any leakage or spillage of all hazardous substances during their transportation, handling, use and storage. This must include precautionary measures to limit the	The content of the EMPr produced for the proposed development is in compliance in terms of Appendix 4 of the Environmental Impact Assessment Regulations, 2014, as amended, and includes, where relevant the plans and measures recommended by the Department.	Volume I: Appendix B: EMPr

No.	Comment from DFFE	EAP Response	Section in Report
	possibility of oil and other toxic liquids from entering the soil or storm water systems. m. An Open space management plan, to be implemented during the construction and operation of the facility; n. A Transportation plan for the transport of components, main assembly cranes and other large pieces of equipment;		
32.	The decommissioning phase section of the EMPr for the facility must contain information relating to the handling, repurposing or disposal of dysfunctional, severely damaged batteries, module and containers.	The decommissioning phase section of the EMPr contains information relating to the handling, repurposing or disposal of dysfunctional, severely damaged batteries, module and containers.	Volume I: Appendix B: EMPr
33.	The EMPr must distinguish between impact management actions and impact management outcomes.	The EMPr impact management outcomes and impact management actions are separated in the respective tables the EMPr.	Volume I: Appendix B: EMPr
34.	The EMPr must include all recommendations and mitigation measures recorded in the EIAr and specialist studies conducted.	Specific recommendations and mitigation measures identified in the EIAr, specialist reports and based on comments received are incorporated into the EMPr.	Volume I: Appendix B: EMPr
35.	The EMPr must not contain any ambiguity. Where applicable, statements containing the word "should" or "may" are to be amended to "must".	The EMPr has been drafted to include management actions which 'must' take place. Should changes be required, the EMPr will be amended and submitted for approval as it is seen as a live and dynamic document.	Volume I: Appendix B: EMPr
(h)	**Generic Environmental Management Programme (EMPr)**		
36.	The proposed development triggers Activity 11 of Listing Notice 1 as amended for an on-site substation. The following generic EMPr must be included in the EIAr, over and above the EMPr for the WEF: *a. Generic EMPr for the development and expansion of substation infrastructure for the transmission and distribution of electricity.*	The generic EMPr for the development of a substation has been appended to the EMPr submitted with the EIAr.	Volume I: Appendix B: EMPr
37.	Part B: Section 2 of the generic EMPrs must be completed, and a copy of the signed EMPr must be submitted with the EIAr. Please note that Point 7.1.1 in Part B: Section 2 needs to match the details of the applicant as contained in	The generic EMPr for the development of a substation will include Applicant details and project information as	Volume I: Appendix B: EMPr

No.	Comment from DFFE	EAP Response	Section in Report
	the application form. The generic EMPr must be signed by the applicant and submitted with the EIAR. An unsigned Generic EMPr is regarded as incomplete.	it is included in the Application Form and EIAr and will be signed prior to submission.	
38.	If any specific environmental sensitivities/attributes are present on the site which require more specific impact management outcomes and impact management actions, not included in the pre-approved generic EMPr template, to manage impacts, those impact management outcomes and actions must be included in Part C of the generic EMPr.	Specific environmental sensitivities/attributes applicable to the development of the substation which require more specific impact management outcomes and impact management actions, not included in the pre-approved generic EMPr template, to manage impacts, those impact management outcomes and actions is included in Part C of the generic EMPr.	Volume I: Appendix B: EMPr
(i)	**General**		
39.	The EAP must provide detailed motivation if any of the above requirements is not required by the proposed development and will not be included in the EMPr.	All requirements in the Department comment have been considered for in the respective EMPr(s). No motivation for exclusion in the EMPr is required.	n/a

2 TERMS OF REFERENCE

The primary objective of the S&EIA process is to present sufficient information to the CA and I&APs on predicted potential impacts and associated mitigation measures required to avoid or mitigate potential negative impacts, as well as to improve or maximise the potential benefits of the development.

In terms of legal requirements, the NEMA EIA Regulations 2014, as amended, regulate and prescribe the content of the EIA Report and specify the type of supporting information that must accompany the submission of the report to the authorities. Table 2.1 shows how and where the legal requirements are addressed in this EIA Report. Section 9 of this EIAr provides a summary of the Public Participation Process (PPP) and Volume III of this EIAr includes all Public Participation undertaken to date. As comments were received these have been collated and included in this EIAr.

As per the EIA Regulations 2014, as amended, '*the objective of the environmental impact assessment process is to, through a consultative process* -

(a) determine the policy and legislative context within which the activity is located and document how the proposed activity complies with and responds to the policy and legislative context;

(b) describe the need and desirability of the proposed activity, including the need and desirability of the activity in the context of the development footprint on the approved site as contemplated in the accepted scoping report;

(c) identify the location of the development footprint within the approved site as contemplated in the accepted scoping report based on an impact and risk assessment process inclusive of cumulative impacts and a ranking process of all the identified development footprint alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects of the environment;

(d) determine the:

(i) nature, significance, consequence, extent, duration and probability of the impacts occurring to inform identified preferred alternatives; and

(ii) degree to which these impacts –

(aa) can be reversed;

(bb) may cause irreplaceable loss of resources, and

(cc) can be avoided, managed or mitigated;

(e) identify the most ideal location for the activity within the development footprint of the approved site as contemplated in the accepted scoping report based on the lowest level of environmental sensitivity identified during the assessment;

(f) identify, assess, and rank the impacts the activity will impose on the development footprint on the approved site as contemplated in the accepted scoping report through the life of the activity;

(g) identify suitable measures to avoid, manage or mitigate identified impacts; and

(h) identify residual risks that need to be managed and monitored.'

The above activities are completed through consultation with:

- The lead authority involved in the decision-making for the application (in this case, the DFFE);
- I&APs, provincial and local governments, and other relevant organisations to ensure that local issues are well understood; and

- The specialist team to ensure that technical issues are identified.

Table 2-1: Legislative Requirements for Scope of Assessment and Content of Environmental Impact Assessment Reports

Appendix 3 Requirements NEMA, 1998 (Act No. 107 of 1998)		Location in EIA
3 (1)	*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, and must include-*	
(a)	*details of-* *the EAP who prepared the report; and* *the expertise of the EAP, including a curriculum vitae;*	Section 2 Appendix A
(b)	*the location of the development footprint of the activity on the approved site as contemplated in the accepted scoping report, including-* *the 21 digit Surveyor General code of each cadastral land parcel;* *where available, the physical address and farm name;* *where the required information in items (i) and (ii) is not available, the co-ordinates of the boundary of the property or properties;*	Executive Summary Figure 1 and 2
(c)	*a plan which locates the proposed activity or activities applied for as well as the associated structures and infrastructure at an appropriate scale, or, if it is-* *a linear activity, a description and coordinates of the corridor in which the proposed activity or activities is to be undertaken; or* *on land where the property has not been defined, the coordinates within which the activity is to be undertaken;*	Figure 3
(d)	*a description of the scope of the proposed activity, including-* *all listed and specified activities triggered and being applied for; and* *a description of the associated structures and infrastructure related to the development;*	Section 3.1
(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;*	Section 3 and 5
(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;*	Section 5
(g)	*a motivation for the preferred development footprint within the approved site as contemplated in the accepted scoping report;*	Section 9
(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:*	
	details of the development footprint alternatives considered;	Section 7
	details of the public participation process undertaken in terms of regulation 41 of the Regulations, including copies of the supporting documents and inputs;	Section 10 Volume 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;	Section 10
	the environmental attributes associated with the development footprint alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects;	Section 6

Appendix 3 Requirements NEMA, 1998 (Act No. 107 of 1998)		Location in EIA
	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;*	Section 11 and 12
	the methodology used in determining and ranking the nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks;	Section 4 Volume II
	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;	Section 11 and 12
	the possible mitigation measures that could be applied and level of residual risk;	Section 11 and 12
	if no alternative development footprints were investigated, the motivation for not considering such; and	Section 8
	a concluding statement indicating the location of the preferred alternative development footprint within the approved site as contemplated in the accepted scoping report;	Section 9
(i)	*a full description of the process undertaken to identify, assess and rank the impacts the activity will impose on the preferred development footprint within the approved site as contemplated in the accepted scoping report through the life of the activity, including -*	
	a description of all environmental issues and risks that were identified during the environmental impact assessment process; and	Section 11
	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;	Section 11
(j)	*an assessment of each identified potentially significant impact and risk, including-* *cumulative impacts;* *the nature, significance and consequences of the impact and risk;* *the extent and duration of the impact and risk;* *the probability of the impact and risk occurring;* *the degree to which the impact and risk can be reversed;* *the degree to which the impact and risk may cause irreplaceable loss of resources; and* *the degree to which the impact and risk can be mitigated;*	Section 12
(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 report;*	Section 13
(l)	*an environmental impact statement which contains-* *a summary of the key findings of the environmental impact assessment;* *a map at an appropriate scale which superimposes the proposed activity and its associated structures and infrastructure on the environmental sensitivities of the development footprint on the approved site as contemplated in the accepted scoping report indicating any areas that should be avoided, including buffers; and*	Section 13 and 14 Figure 7

Appendix 3 Requirements NEMA, 1998 (Act No. 107 of 1998)		Location in EIA
	a summary of the positive and negative impacts and risks of the proposed activity and identified alternatives;	
(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;*	Section 13 and 14 Appendix B
(n)	*the final proposed alternatives which respond to the impact management measures, avoidance, and mitigation measures identified through the assessment;*	Section 9
(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;*	Section 14
(p)	*a description of any assumptions, uncertainties and gaps in knowledge which relate to the assessment and mitigation measures proposed;*	Section 2 Volume II
(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;*	Section 14
(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;*	The proposed activity includes operational aspects.
(s)	*an undertaking under oath or affirmation by the EAP in relation to-* *the correctness of the information provided in the reports;* *the inclusion of comments and inputs from stakeholders and I&APs;* *the inclusion of inputs and recommendations from the specialist reports where relevant; and* *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; and*	Appendix A
(t)	*where applicable, details of any financial provision for the rehabilitation, closure, and ongoing post decommissioning management of negative environmental impacts;*	Appendix B
(u)	*An indication of any deviation from the approved scoping report, including the plan of study, including-* *any deviation from the methodology used in determining the significance of potential environmental impacts and risks; and* *a motivation for the deviation;*	n/a Specialist following the same methodology and protocols in the EIA phase and followed during the scoping phase. There are no deviations from the approved Plan of Study
(v)	*any specific information that may be required by the competent authority; and*	Section 14
(w)	*any other matters required in terms of section 24(4)(a) and (b) of the Act.*	n/a
3 (2)	*Where a government notice gazetted by the Minister provides for any protocol or minimum information requirement to be applied to*	Volume 4 Volume II

Appendix 3 Requirements NEMA, 1998 (Act No. 107 of 1998)		Location in EIA
	an environmental impact assessment report the requirements as indicated in such notice will apply.	

2.1 Structure of the EIA Report

The EIA report is set out in three volumes:

Volume I: EIA Report;

Volume III: Specialist Reports; and

Volume III: Public Participation Report (including Comments and Responses table).

2.2 Deviations from Plan of Study

There are no deviations from the approved PSEIA.

2.3 The Applicant

The Applicant, Loxton Wind Facility 3 (Pty) Ltd, appointed Arcus, with the lead EAP being Ashlin Bodasing to co-ordinate and manage the S&EIA application process.

Table 2-2: Details of the Applicant

Name of the Applicant	Loxton Wind Facility 3 (Pty) Ltd		
Name of contact person for applicant (if other)	Unai Urtasun		
Company Registration Number	2022/294641/07		
BBBEE status	n/a		
Physical address	Unit 1501, 15th Floor, Portside Building 4 Bree Street, Cape Town, Western Cape		
Postal address	PO Box 1730, Welgemoed, Cape Town, Western Cape		
Postal code	8001	Cell:	
Telephone	-	Fax:	-
E-mail	unai.bravo.urtasun@acciona.com		

2.4 Details of the EAP

The co-ordination and management of this environmental application process is being conducted by Arcus Consultancy Services South Africa (Pty) Ltd ('Arcus') with the lead EAP being Ashlin Bodasing (Table 2.3). Refer to Appendix A for the EAP's Declaration of Interest and *Curriculum Vitae*.

Table 2-3: Details of the Environmental Assessment Practitioner

Name of the EAP organisation	Arcus Consultancy Services South Africa (Pty) Ltd
Details of the organisation	Arcus is a specialist environmental consultancy providing environmental services to the renewable energy market. Arcus has advised on over 250 renewable energy projects, including in the United Kingdom and South Africa, with environmental management and in-house specialist services. Since 2020, Arcus has been acquired and part of the Environmental Resource Management (ERM) group of companies. Being part of the ERM group has been a benefit to both organisations in sharing expertise and providing effective advisory and consultancy services.

Environmental Assessment Practitioner	Ashlin Bodasing		
Consultant	Aneesah Alwie		
Postal address	240 Main Road, Great Westerford Building, 1st Floor, Rondebosch, Cape Town		
Telephone	+27105963502	Postal Code:	7700
Cellular	+27 (0)76 340 8914	Fax:	(-) -
E-mail	Ashlin.Bodasing@arcusconsulting.co.za / LoxtonWEF@arcusconsulting.co.za		
EAP Qualifications	Bachelor of Social Science: Geography and Environmental Management Registered EAP (EAPASA 2020/780)		
Details of EAP Expertise	Ashlin Bodasing is the Technical Director at Arcus, located in Cape Town. Having obtained her Bachelor of Social Science Degree from the University of Kwa-Zulu Natal; she has over 18 years' experience in the environmental consulting industry in southern Africa. She has gained extensive experience in the field of Integrated Environmental Management, environmental impact assessments and public participation. She has also been actively involved in a number of industrial and infrastructural projects, including electricity power lines and substations; road and water infrastructure upgrades and the installation of telecommunication equipment and as well green field coal mines, as well as renewable energy facilities, both wind and solar. Ashlin has major project experience in the development of Environmental Impact Assessments, Basic Assessments, Environmental Management Plans and the monitoring of construction activities. Her areas of expertise include project management, environmental scoping and impact assessments, environmental management plans, environmental compliance monitoring and environmental feasibility studies. Experience also includes International Finance Corporation Performance Standards and World Bank Environmental Guidelines environmental reviews. She has worked in Mozambique, Botswana, Lesotho and Zimbabwe.		
Details of Consultant Qualifications	Bachelor of Science (Environmental and Water Science)		
Details of Consultant Expertise	Aneesah Alwie is an Environmental Consultant at Arcus. Having obtained her Bachelor of Science Degree (Environment and Water Science) from the University of the Western Cape; she has 5 years' experience as an environmental professional. She has also attended certified training courses in Environmental Law and Compliance. Aneesah manages the EIA processes for projects across South Africa and works alongside the registered EAP assisting in report writing and public participation processes. She has a proven track record in producing work of quality standards, within timeframes and budgets. Her excellent organisational and project management skills enable a smooth flow of the assigned project duties and client relations. Starting off as administrator at Arcus over five years ago she still provides on-going administrative and technical support.		

2.4.1 The Specialists

The Applicant in consultation with the EAP, assembled a team of technical specialists to undertake studies for the proposed Loxton WEF 3 and associated infrastructure.

The specialists' fields of investigation are listed in Table 2.4 below. The areas of investigation were identified as relevant to the proposed development as per the results of the DFFE screening report generated, experience of the EAP, and consultation with the listed specialists who were selected based on their experience in the field of renewable energy projects, and the locality of the proposed development.

The same team of specialist undertook the scoping of the proposed development and have implemented the plan of study for EIA in their impact assessment reports (Volume II).

Table 2-4: List of Specialist Investigations

Specialist	Specialist Study	Organisation
Johann Lanz	Soil, Land Use and Agricultural Potential	Independent Consultant
Dr Brian Colloty	Freshwater and Wetlands	EnviroSci. Pty Ltd
Simon Todd	Terrestrial Biodiversity	3 Foxes Biodiversity Solutions
	Biodiversity Offset Needs Analysis Report	
	Riverine Rabbit	
	Plant	
Maruis Buger	Karoo Dwarf Tortoise	Sungazer Faunal Services
Jon Smallie	Avifauna	WildSkies Ecological Services
Jonathan Aronson	Bats	Camissa Sustainability Consulting
Quinton Lawson and Bernard Oberholzer	Visual / Landscape	Qarc and BOLA
Jayson Orton	Heritage and Archaeology	ASHA Consulting
Dr John Almond	Palaeontology	Natura Viva
Morné de Jager	Noise	Enviro Acoustic Research
Tony Barbour	Socio-Economic	Independent Consultant
Athol Swartz	Traffic and Transportation	Independent Consultant
Merchandt Le Maitre	Stormwater Managament	Skerp Consulting Engineers
Charles Warren-Codrington	Geotechnical	SMEC South Africa (Pty) Ltd
Private	Wake Impact Study	Loxton Wind Facility 3 Pty Ltd

2.5 Assumptions and Limitations

The assumption is made that the information on which this report is based (baseline studies and project information, as well as existing information) is accurate and correct. The following assumptions and limitations are noted for the EIA report and the specialist studies conducted (Volume II) as part of the proposed developments' EIA process.

2.5.1 Soil, Land Use and Agriculture Potential

There were no specific assumptions, uncertainties or gaps in knowledge or data that affected the findings of the study.

2.5.2 Freshwater and Wetlands

Obtaining comprehensive understanding of the dynamics of both the flora and fauna of communities within study sites, as well as the status of endemic, rare or threatened species in any study area, assessments should consider investigations at different time scales and through replication. Due to time constraints, long-term studies are not feasible, and assessments are mostly based on instantaneous sampling. This limitation is common to many impact assessment type studies, but the findings are deemed adequate for the purposes of decision-making, unless otherwise stated.

Due to the scope of the work for the assessment of the proposed development, a long-term investigation of the proposed study site was not possible and not perceived as part of the Terms of Reference (ToR) and considering the Protocols. A concerted effort was made to assess as much of the potential site, as well as make use of available supporting literature, species distribution data and aerial photography.

Information presented by the specialist and including in this EIA report only has reference to the study area as indicated on the accompanying maps and cannot be applied to any other area without detailed investigation.

2.5.3 Terrestrial Biodiversity

Conditions at the time of the two initial field assessment dates (May 2021 and June 2022) were relatively poor, as these took place during an extended drought experienced in the area and wider Karoo. However, by July 2022 rains had begun and by October 2022 the area was exceptionally wet. As a result, the conditions during the extended field assessment were considered favourable as the abundance of annual plants and geophytes were relatively high, with many species growing or in flower by the end of 2022.

Given the favourable conditions and specialists knowledge of the area during the remaining four site visits, there are few limitations and assumptions required with regards to the vegetation of the site and the presence of plants with SCC within the wind farm development footprint.

Although not all areas could be sampled in detail (the wind farm area is large), represented habitats in the project footprint are considered to have been well-covered and it is highly unlikely that there are any significant vegetation features present that would not have been observed during the study.

The above being said, a number of limitations and assumptions are inherent in the study regarding the fauna of the site including the following:

- Camera trapping for fauna was conducted across the greater Loxton cluster site with 40 camera traps for a period of 12 weeks. This confirmed the presence of the Riverine Rabbit within the greater Loxton Cluster and within the Loxton WEF 3 site.
    - Although there were no camera trap observations of Riverine Rabbit from within the final boundaries of Loxton WEF 3 site, there were potential habitat present within the site and was assumed that the Riverine Rabbit is potentially present.
    - It is assumed that there are no Riverine Rabbits resident in areas outside of the riparian habitat, which is typically associated with this species in the Upper Karoo. This is considered to be a reasonable assumption, as this species is strongly associated with riparian vegetation within the study area. It is only in the southern population that Riverine Rabbits can usually be found outside of riparian areas.
- It is assumed that since no other mammalian fauna of concern were camera trapped at the site, that there are indeed no such other species using the site on a regular basis.

- There is potentially suitable habitat for the Karoo Dwarf Tortoise within the site and the possible presence and impact on this species was dealt with in a separate impact assessment report (Volume II).

2.5.4 Riverine Rabbit

A number of limitations and assumptions are inherent in camera trapping studies generally and with the assessment of rare fauna. These include the following:

- It is not possible to confirm the absence of a species and in this case the Riverine Rabbit with 100% certainty. As such, presence is considered more significant than absence. However, where Riverine Rabbits were observed at a camera trapping location, they tended to be captured relatively shortly after camera deployment and were abundant at such sites relative to other fauna. This suggests that they are relatively common and active within areas of suitable habitat and it is unlikely that they were present at sites where they were not picked up.
- It is possible that not all patches of suitable habitat were occupied at the time of the assessment. Hence the assessment relies on both the presence of suitable habitat as well as confirmed presence of the Riverine Rabbit.
- Although the Riverine Rabbit has a clear habitat preference within the site, it is likely that they disperse between such patches of suitable habitat along the riparian corridors. Hence the areas between such patches are considered to have some significance for this species even if there is no habitat present that might support rabbits.
- It is assumed that if a Riverine Rabbit is picked up within a certain part of a habitat patch, that they are present throughout that patch.

2.5.5 Karoo Dwarf Tortoise

The assumption is made that the timing (early summer) of the site visit was appropriate for the surveying of Karoo Dwarf Tortoises, as per the Species Environmental Assessment Guideline (SANBI 2020). In addition to the field surveying efforts of the project herpetologist, the faunal specialist (Simon Todd of 3FBS) has spent 14 days exploring the Loxton WEF sites (Todd 2022). This visit included assessment of Karoo Dwarf Tortoises in the general region.

A limitation of the assessment is based on the extent of the surveys. Surveys of the Karoo Dwarf Tortoise is hampered by the fact that the species has low detectability in the field, and it is thus difficult to determine its occurrence or actual absence at a particular site. To selectively quote from Loehr and Keswick (2022): "*Inconspicuous, secretive, or sparsely distributed species receive relatively little research attention, potentially leading to uncertainty about their status and lack of efforts to conserve them. Karoo dwarf tortoises spend most of the time in retreats at remote arid locations, and are seldom seen*."

2.5.6 Plant

At the time the two initial surveys took place, site conditions were poor as the wider Karoo experienced an extended drought. However, by October 2022 the drought conditions cleared up as a result from rains that started in July the same year. Field assessments conducted after October 2022 saw relatively high abundances of annuals and geophytes, with many species flowering by the end of 2022. Despite the large project area, the specialists are confident that the project footprint was well-covered across the surveys undertaken. The chances of significant vegetation types being missed by the specialists would be unlikely. Given the favourable conditions at the time of the site visits, there are few limitations and assumptions required with regards to the vegetation of the site and the presence of plant SCC within the wind farm development footprint.

2.5.7 Avifauna

Biases and challenges are inherent in the methods that have been employed to collect data in the monitoring programme. Key limitations to be acknowledged include:

- The presence of observers on site affects the presence and/or visibility of birds. This is particularly the case in Walked transects as certain bird species are easily flushed. Their detection and identification may be a challenge.
- In Vantage point surveys, observers sitting in position for four hours at a time will affect bird flight activity. Estimating the height at which birds are flying is another challenging aspect of fieldwork and is a subjective task. Over time, with multiple survey data, biases in data can be addressed.
- In 2019 - 2021, drought conditions were persistent in most parts of the country. There is a risk the data collected may not be typical of conditions in the area. It is expected the abundance of certain species will decrease in drought conditions, therefore, reported bird abundances should be considered to a minimum.
- No fatality thresholds for priority species have been established in South Africa to date. Impact assessments make subjective judgements on the acceptability of predicted fatalities for each species.

2.5.8 Bats

Findings and recommendations of the study are influenced by several limitations due to the methodology used, Acoustic Monitoring and Roost surveys.

Acoustic monitoring is a useful technique in the context of wind farms; however, acoustic monitoring cannot provide indications of bat abundance or population size present at the proposed site. Population demographics (age, sex) cannot be determined from bat echolocation calls. Due to the volume of data collection by bat detectors, it is time-consuming to inspect each file for echolocation calls. It is recommended that specialist statistical software is used to reference bat calls and automate the bat identification process. The specialist's study made use of Wildlife Acoustics library "Bats of South Africa Version 5.4.2" which excludes reference calls for most South African species, thus there may be species overlooked. Given the duration of the monitoring and spatial coverage of detectors, the acoustic data provides a reasonable inventory of the species present. Lastly, bat activity is variable in response to a number of factors such as land use change, climactic variability, variations in prey abundance and meteorological conditions which can vary over different time scales. Since this study is limited to 12 months, the baseline conditions presented here may not be representative of activity over longer time frames meaning risk may be misinterpreted.

The major limitation with roost surveys is finding roosting bats. Surveying preferred roosting features at a site can help target roost searches but evidence of the presence of bats may not always be apparent. Subsequently, the absence of bat evidence does not equate to evidence of bat absence. The study thus uses a precautionary approach by applying buffers to roosts (buildings and crevices) even if bats were not located.

It is challenging to assess the risk to bats during the operation of the proposed WEF based on pre-construction acoustic data collected. Pre-construction bat activity is not a significant collision of risk (Hein et al. 2013). The predications the report makes about the potential risk to bats carry a degree of uncertainty and must be verified by post-construction surveys to ensure predictions are accurate.

2.5.9 Noise

Ambient sound levels are cumulative effects of innumerable sounds generated at various instances both far and near. A high measurement does not equate to an area that is

constantly noisy. Low sound levels do not mean an area is always quiet. Sound levels are variable across seasons, time of day, dependent on faunal characteristics, vegetation present, and meteorological conditions. The ENIA (Volume II) provides a full list of assumptions and limitations related to the assessment of noise impacts.

2.5.10 Heritage and Archaeology

Field studies were carried out at surface level only and therefore any completely buried archaeological sites would not be readily located. It is not always possible to determine the depth of archaeological material visible at the surface. Because a preliminary layout was available for assessment, the survey focused on the areas in which turbines would be placed. In this way the survey was most likely to cover the areas being targeted for development. After the survey, the layout was altered slightly to avoid sensitivities identified by the specialists. No road layout was provided for assessment in either the preliminary or final scoping layouts. This meant that potentially sensitive areas where roads might cross river valleys could not be checked. However, the majority of the access roads included in the EIA layout were covered during the initial fieldwork surveys. Google Earth was used to identify obvious sites that were not visited, and these have been included in the report.

Cumulative impacts are difficult to assess due to the variable site conditions that would have been experienced in different areas and in different seasons. Survey quality is thus likely to be variable. Some assumptions need to be made in terms of what and how much heritage might be impacted by other developments in the broader area.

2.5.11 Palaeontology

There were no specific assumptions, uncertainties or gaps in knowledge or data that affected the findings of the study.

2.5.12 Visual / Landscape

Assumptions have been made regarding the footprint and height of the proposed substation (including the associated BESS facility) and operation and management (O&M) buildings, relating to the proposed project as detailed design of these would only become available at a later stage.

2.5.13 Socio-Economic

It is assumed that the development site represents a technically suitable site for the establishment of the proposed WEF and associated infrastructure. The strategic importance of promoting renewable and other forms of energy is supported by the national and provincial energy policies.

Legislation and policies reflect societal norms and values. The legislative and policy context therefore plays an important role in identifying and assessing the potential social impacts associated with a proposed development. In this regard, a key component of the SIA process was to assess the proposed development in terms of its fit with key planning and policy documents. As such, if the findings of the study indicate that the proposed development in its current format does not conform to the spatial principles and guidelines contained in the relevant legislation and planning documents, and there are no significant or unique opportunities created by the development, the development cannot be supported.

In terms of limitations, some of the provincial documents do not contain data from the 2011 Census and or 2016 Household Community Survey. However, where required the relevant 2011 and 2016 data has been provided.

2.5.14 Traffic and Transportation

The compiling of the TIA report was based on the following assumptions with regard to the Project:

- An active construction phase of 18 months was assumed providing six months for site establishment and final commissioning of the proposed development.
- The tower section is assumed to be comprised of steel elements.
- During peak construction, the manpower complement will not exceed 260 individuals.
- Expected manpower complement for Gamma Grid connection is 60 individuals.
- Expected manpower complement for the expansion work at the Gamma Substation is 40 individuals.
- A combined manpower complement for the operational phase is 120 individuals.
- No on-site accommodation will be provided.
- Access from the public road network to the proposed development is from the DR 02324 via Access Point C.
- Delivery routes of equipment and materials to the proposed developments from various commercial centres within South Africa will follow well-established road networks.
- Although the tower section of the WTG components could be manufactured in South Africa, for the purpose of the report it is assumed that all the WTG components are imported into South Africa via one of two terminals, either at Ngqura (close to Gqeberha) or Saldanha Terminals. Both routes are addressed in the report.
- Final route selection is subject to the limitations specified in the transport permits and the available vehicles to be used by the appointed logistics company.
- For analysis purposes the shortest route to the proposed developments will be adopted.
- Construction equipment and will be transported from the various commercial centres within South Africa.
- The supply of raw materials for the manufacture of concrete and road construction, as a worst-case scenario, will be sourced from commercial sources outside the proposed development.
- The maximum payload of general-purpose vehicles used to transport equipment and material to the site is assumed to be in the order of 20 000 kg.
- The transportation of personnel shall be provided by either double cab bakkie (4 Pax), minibuses (16 Pax), or Buses (35, 45 and 55 Pax), all vehicles shall be retained on-site during the day.
- Concrete for the foundations of the wind towers is envisaged to be mixed at an on-site batching plant.
- A single batching plant will be provided on-site.

The TIA report excludes the following, it should be noted that none of these exclusions is expected to affect the findings of this assessment:

- Traffic Management Plan for the development, as this will depend on the construction process adopted by the contractor.
- Site Development Plan of the infrastructure, including roads, stormwater drainage, amenities, batching plant, etc. within the site boundary that does not affect the public road network.
- The geometric details of intersections and entrances onto the site from the public road network, as this will be finalised during the detailed design phase, which will require approval from the relevant roads authorities.
- Assessment of risks and impacts associated with loading or off-loading of the vehicles at the site or associated facilities are not addressed since these will be addressed in the Standard Operating Procedures developed by the Engineering, Procurement, Construction and Management (EPCM) contractor for the construction and decommissioning of the development.

- The suitability of the minor roads for the delivery and transportation and commuting of personnel will need to be assessed at the time of implementation, as the road conditions could have changed. It must be noted that not all the roads included in this report were evaluated during the site visit.
- The transportation route from the Port Terminals or Commercial Centres to the proposed development is the responsibility of the logistics company that will be appointed.

2.5.15 Stormwater Management

The following assumptions and limitations are to be noted:

- The analysis is based on the information provided at the time by Loxton Wind Facility 3 and its representatives.
- Digital Terrain Model: 25m DEM from NGI (2014) & 2m DEM from GeoSmart (2016: 3122AB, 3122BA, 3122AD, 3122AC).
- Figures included in the report are indicative as many of the components are still at the design stage and will only be confirmed closer to the construction time.

2.5.16 Geotechnical

The Geotechnical study was based on data from a limited number of sources including geological records, topographic maps, aerial imagery, and geotechnical and geological literature available for the greater Loxton region.

The nature of geotechnical engineering is such that variations in soil and rock conditions may occur even where sites seem consistent. Variations in what is reported will become evident during the later project phases of site investigation and construction.

On a conceptual basis, the current project phase may be considered a Category 1 geotechnical project (SANS 10160-5, 2010), requiring desktop study equivalent information to determine the project feasibility.

However, once the project progresses to the preliminary and detailed design stages, it will require more detailed geotechnical input. Thus, to lower the probability of failure of the final designed structures and avoid over-design, a detailed geotechnical investigation of each turbine structure - and supporting infrastructure thereof - must be considered mandatory as the project approaches detailed design status. Thus, this report will culminate with recommendations for further geotechnical investigations that will provide the engineer with the necessary parameters for further design stages. It must be noted that any founding recommendation(s) provided in this report is conceptual and that this report does not present a design for the proposed foundation support solution(s). Referral to a design solution is conceptual, and the design process, as per the latest version of SANS 10160 in general and specifically SANS 10160-5, must be undertaken under a separate appointment.

3 ENVIRONMENTAL LEGAL FRAMEWORK

The proposed development requires EA prior to being constructed and operated. This section of the report highlights the important environmental legal considerations taken while undertaking this S&EIA process.

3.1 The National Environment Management Act, 1998 (Act No 107 of 1998)

Section 2 of the National Environment Management Act, 1998 (NEMA) as amended, lists environmental principles that are to be applied by all organs of state regarding developments that may significantly affect the environment. Included amongst the key principles is the principle that all developments must be socially, economically and environmentally sustainable, and environmental management must place people and their

needs at the forefront of its concern, to serve their physical, psychological, developmental, cultural and social interests equitably.

NEMA, as amended, also provides for the participation of potential and registered I&APs and it stipulates that decisions must take the interests, needs and values of all I&APs into account.

Chapter 5 of NEMA, as amended, outlines the general objectives and implementation of Integrated Environmental Management (IEM), the latter providing a framework for the integration of environmental issues into the planning, design, decision-making and implementation of plans and development proposals. Section 24 provides a framework for the granting of environmental authorisations.

To give effect to the general objectives of IEM, the potential impacts on the environment of listed activities must be considered, investigated, assessed and reported to the competent authority. Section 24(4) outlines the minimum requirements for procedures for the investigation, assessment and communication of the potential impact of activities.

3.2 Environmental Impact Assessment (EIA) Regulations, 2014 as amended

The EIA Regulations 2014 as amended by GNR 326 of 2017 provide for the control of certain Listed Activities. These activities are listed in Government Notice No. R327 (Listing Notice 1 – Basic Assessment), R325 (Listing Notice 2 – Scoping & EIA Process) and R324 (Listing Notice 3 – Basic Assessment) of 7 April 2017, and are prohibited to commence until EA has been obtained from the competent authority, in this case, the Department of Forestry and Fisheries (DFFE).

The DFFE is the competent authority for all renewable energy proposals which will be bid into the Renewable Energy Independent Power Producer Procurement Programme (REIPPPP), as NEMA, as amended, states that:

"24C. (2) The Minister must be identified as the competent authority in terms of subsection (1) if the activity- (a) has implications for international environmental commitments or Relations"

It is the intention of the Project Applicant to bid the Loxton WEF 3 in the seventh bidding window of the REIPPPP with the aim of evacuating the generated power from the WEF into the National Eskom Grid.

EA, which may be granted subject to conditions, will only be considered upon compliance with GNR982, as amended by GNR326 of 7 April 2017.

Any EA obtained from the DFFE or any other competent authority only applies to those specific listed activities for which the application was made. The applicable Listed Activities are presented in Table 3.1 below. All potential impacts associated with these Listed Activities will be considered and adequately assessed in this authorisation process.

Table 3-1: NEMA Listed Activities in relation to the Proposed Development

Listing Notices 1, 2 and 3 **07 April 2017**	**Listed Activity**	**Description of project activity that triggers listed activity**
Listing Notice 1 **GN R 327** Activity 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.*	The proposed Loxton WEF 3 will entail the construction of one onsite substation with a footprint of up to 4 ha and a 33/132 kV / overhead transmission powerline to facilitate the connection between the wind farm and the grid connection.

Listing Notices 1, 2 and 3 **07 April 2017**	**Listed Activity**	**Description of project activity that triggers listed activity**
		The proposed Loxton WEF 3 will be constructed across various farm portions located approximately 15 km east of Loxton within the Ubuntu Local Municipality and the Pixley Ka Seme District Municipality in the Northern Cape Province.
Listing Notice 1 **GN R 327** Activity 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 m of a watercourse, measured from the edge of a watercourse.*	The proposed Loxton WEF 3 will entail the construction of built infrastructure and structures (such as wind turbines, hardstands, offices, Operations and Maintenance (O&M) buildings, ablution facilities, onsite substations, laydown areas and security enclosures etc.). The infrastructure and structures are expected to exceed a footprint of 100 m^2 and could occur within small drainage features and 32 m of the watercourses.
Listing Notice 1 **GN R 327** Activity 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 (i) a watercourse;*	The proposed Loxton WEF 3 will entail the excavation, removal and moving of more than 10 m^3 of soil, sand, pebbles, or rock from nearby watercourses on site, mainly for the purpose of constructing access roads. As a result, the proposed Loxton WEF 3 could potentially entail the infilling of more than 10 m^3 of material into the nearby watercourses. Details of the infilling of and excavations from the affected watercourses/drainage features will be confirmed during the detailed engineering design phase.
Listing Notice 1 **GN R 327** Activity 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 meters*	A temporary road corridor of up to 15 m will be impacted during the construction phase. This will be rehabilitated after the completion of construction activities to allow for a permanent 8 m wide road surface, with side drains on one or both sides where necessary.
Listing Notice 1 **GN R 327** Activity 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 proposed Loxton WEF 3 will take place outside of an urban area and across several adjoining farm portions, and is considered as a commercial / industrial development, which will have an estimated total development footprint of more than 20 ha. The proposed Loxton WEF 3 will also entail the construction of an onsite substation, as well as a battery energy storage system, and various associated structures and infrastructure of more than 1 ha.

Listing Notices 1, 2 and 3 **07 April 2017**	**Listed Activity**	**Description of project activity that triggers listed activity**
Listing Notice 1 **GN R 327** Activity 48	*The expansion of-* *Infrastructure or structures where the physical footprint is expanded by 100 square metres or more; where such expansion occurs-* *(a) within a watercourse;* *(c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse.*	The proposed Loxton WEF 3 will require the upgrading of existing roads within the development area, as well as watercourse crossing upgrades, where such upgrades may take place within watercourses and within 32 m from the edge of these watercourses. The total footprint of the upgrades to be undertaken on the existing roads would be in excess of 100 m^2 within a watercourse, or within 32 m of a watercourse.
Listing Notice 1 **GN R 327** Activity 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 meters; or (ii) where no reserve exists, where the existing road is wider than 8 metres; excluding where widening or lengthening occur inside urban areas.*	Existing roads will be widened by more than 6 metres and will require lengthening by more than 1 km, to accommodate the movement of heavy vehicles and cable trenching activities associated with the WEF.
Listing Notice 2 **GN R 325** Activity 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 Loxton WEF 3 will comprise a maximum generation capacity of up to 240 MW (i.e., facility for the generation of electricity from a renewable resource).
Listing Notice 2 **GN R 325** Activity 15	*The clearance of an area of 20 hectares or more of indigenous vegetation, excluding where such clearance of indigenous vegetation is required for-* *(i) the undertaking of a linear activity*	The construction of the proposed development will require clearance of more than 20 hectares of indigenous vegetation. The total project development footprint is up to 65 ha.
Listing Notice 3 **GN R 324** Activity 4	*The development of a road wider than 4 metres with a reserve less than 13,5 metres* *(g) Northern Cape* *(i) Outside urban areas:* *(bb) National Protected Area Expansion Strategy Focus areas;* *(ee) Critical Biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans;*	A 15 m road corridor will be temporarily impacted upon during construction and rehabilitated to 8 m wide after construction. The Loxton WEF 3 will have a total road network of up to 50 km. The site falls outside of an urban area and parts of the site fall within a NPAESF area and Critical Biodiversity Area (CBA) 1 and CBA 2 in the Northern Cape.
Listing Notice 3 **GN R 324** Activity 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.*	The proposed development will require the clearance of natural vegetation in excess of 300 m^2 in areas of natural vegetation. The entire project area of Loxton 3 falls within CBAs. Under the layout provided for the current assessment, there are three

Listing Notices 1, 2 and 3 **07 April 2017**	**Listed Activity**	**Description of project activity that triggers listed activity**
	(g) Northern Cape *(ii) Within critical biodiversity areas identified in bioregional plans;*	turbines located marginally within CBA 1s and the remaining 38 turbines are located within the CBA 2. Since the layout takes account of the fine-scale mapping of biodiversity features, the impact of the Loxton WEF 3 on biodiversity features would be relatively low and while there would be some residual impact on the affected CBAs, it is unlikely that the development would compromise the overall ecological functioning of the area and the affected CBAs.
Listing Notice 3 **GN R 324** Activity 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;* *(b) in front of a development setback;* *(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:* *(bb) National Protected Area Expansion Strategy Focus 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 32m from the edge of a watercourse / surface water feature. Although the layout of the proposed development will be designed to avoid the identified surface water features / watercourse as far as possible, some of the infrastructure / structures will likely need to traverse the identified surface water features / watercourses. The construction of the infrastructure for the development will occur within Critical Biodiversity Areas (CBAs) located outside of urban areas. The whole of the Loxton WEF 3 site falls within a NPAES Focus Area. While the loss of 65 ha of habitat within the NPAES FA is not considered to represent a highly significant impact in its own right, the presence of wind turbines within the NPAES FA should be interpreted more broadly. in terms of the impacts on NPAES Focus Areas, these are considered to be low when considered simply in terms of the extent of habitat loss and the direct impact on the affected NPAES Focus Areas. Based on the current analysis of impacts associated with the Loxton 3 WEF, cumulative impacts and the broader landscape and conservation planning context, it is clear the primary concern regarding the development would be its' potential impact on broad-scale biodiversity processes.
Listing Notice 3 **GN R 324** Activity 18	*The widening of a road by more than 4 metres, or the lengthening of a road by more than 1 kilometre.*	Internal access roads will be required to access the wind turbines as well as the respective substation. Existing roads

Listing Notices 1, 2 and 3 **07 April 2017**	**Listed Activity**	**Description of project activity that triggers listed activity**
	(g) Northern Cape *(ii) Outside urban areas* *(bb) National Protected Area Expansion Strategy Focus areas;* *(ee) Critical biodiversity areas or ecosystem service areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans;*	will be used wherever possible. Internal access roads will thus likely be widened by more than 8 m or lengthened by more than 1 km. These roads will occur within the Northern Cape Province, outside urban areas. The respective proposed development sites contain indigenous vegetation. In addition, the widening of the roads will occur within CBAs and or within 100 m from the edge of a watercourse or wetland.
Listing Notice 3 **GN R 324** **Activity 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;* *(g) Northern Cape* *(bb) National Protected Area Expansion Strategy Focus areas;* *(ee) Critical biodiversity areas or ecosystem service areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans;*	The respective proposed development will entail the development and expansion of roads by 10m^2 or more within a surface water feature / watercourse or within 32m from the edge of a surface water feature / watercourse. Although the layout of the proposed development will be designed to avoid the identified surface water features / watercourses as far as possible, some of the existing internal and access roads may likely need to traverse some of the identified surface water features / watercourses. The proposed developments occur within CBAs and are located outside urban areas. The whole of the Loxton WEF 3 site falls within a NPAES Focus Area. While the loss of 65 ha of habitat within the NPAES FA is not considered to represent a highly significant impact in its own right, the presence of wind turbines within the NPAES FA should be interpreted more broadly. in terms of the impacts on NPAES Focus Areas, these are considered to be low when considered simply in terms of the extent of habitat loss and the direct impact on the affected NPAES Focus Areas. Based on the current analysis of impacts associated with the Loxton 3 WEF, cumulative impacts and the broader landscape and conservation planning context, it is clear the primary concern regarding the development would be its' potential impact on broad-scale biodiversity processes.

3.3 The National Heritage Resources Act, 1999 (Act No 25 of 1999 - NHRA)

Section 38 (1) of the National Heritage Resources Act, 1999 (NHRA) lists development activities that would require authorisation by the responsible heritage resources authority. Activities considered applicable to the proposed project include the following:

"*(a) The construction of a road, wall, powerline, pipeline, canal or other similar form of linear development or barrier exceeding 300 m in length;*
(c) any development or other activity which will change the character of a site; and
(i) exceeding 5000 m² in extent."

The NHRA, 1999, requires that a person intending to undertake such an activity must notify the relevant national and provincial heritage authorities at the earliest stages of initiating such a development. The relevant heritage authority would then in turn, notify the person whether a Heritage Impact Assessment Report should be submitted. According to Section 38(8) of the NHRA, 1999, a separate report would not be necessary if an evaluation of the impact of such development on heritage resources is required in terms of the Environment Conservation Act, 1989 (No. 73 of 1989) (ECA) (now replaced by NEMA, Act 107 of 1998) or any other applicable legislation. The decision-making authority must ensure that the heritage evaluation fulfils the requirements of the NHRA, 1999, and take into account any comments and recommendations made by the relevant heritage resources authority.

The Heritage Assessment, including Archaeology and Palaeontology, which formed part of this Scoping process was submitted to the Northern Cape South African Heritage Resources Authority (SAHRA) for comment. Comment from the SAHRA was taken into consideration and final comment will be requested from the SAHRA for the EIA phase (refer to Volume III: PP Report).

In South Africa, the law is directed towards the protection of human-made heritage, although places and objects of scientific importance are covered. The NHRA, 1999, also protects intangible heritage such as traditional activities, oral histories and places where significant events happened. While not specifically mentioned in the NHRA, scenic routes are recognised as a category of heritage resources which requires grading as the Act protects area of aesthetic significance.

3.4 National Department of Agriculture, Land Reform and Rural Development (DALRRD)

A renewable energy facility requires approval from the National Department of Agriculture, Land Reform and Rural Development (DALRRD) if the facility is on agriculturally zoned land. A *No Objection Letter* for the change in land use is required. This letter is one of the requirements for receiving municipal rezoning. This application requires a motivation backed by good evidence that the development is acceptable in terms of its impact on the agricultural production potential of the development site. This process is separate to the S&EIA process and should not affect the EA decision.

3.4.1 Subdivision of Agricultural Land Act, 1970 (Act No. 70 of 1970 - SALA)

In terms of the Subdivision of Agricultural Land Act, 1970, any application for change of land use must be approved by the Minister of Agriculture. This is a consent for long-term lease in terms of the SALA. If DALRRD approval for the development has already been obtained in the form of the No Objection letter, then SALA approval should not present any difficulties. Note that SALA approval is not required if the lease is over the entire farm portion. SALA approval (if required) can only be applied for once the Municipal Rezoning Certificate and Environmental Authorisation has been obtained.

3.5 Conservation of Agricultural Resources, 1983 (Act No. 43 of 1983)

The Conservation of Agricultural Resources Act (CARA), 1983 states that no degradation of natural land is permitted. 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.

Rehabilitation after disturbance to agricultural land is managed by the CARA. A consent in terms of CARA is required for the cultivation of virgin land. Cultivation is defined in CARA as "any act by means of which the topsoil is disturbed mechanically". The purpose of this consent for the cultivation of virgin land is to ensure that only land that is suitable as arable land is cultivated. Therefore, despite the above definition of cultivation, disturbance to the topsoil that results from the construction of a renewable energy facility and its associated infrastructure does not constitute cultivation as it is understood in CARA. This has been corroborated by Anneliza Collett (Acting Scientific Manager: Natural Resources Inventories and Assessments in the Directorate: Land and Soil Management of the Department of Agriculture, Land Reform and Rural Development (DALRRD)). The construction and operation of the facility will therefore not require consent from the Department of Agriculture, Land Reform and Rural Development in terms of this provision of CARA.

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

The purpose of the National Veld and Forest Fire Act, as amended by the National Fire Laws Amendment Act (Act 12 of 2001), is to prevent and combat veld, forest and mountain fires throughout South Africa. The Act applies to the open countryside beyond the urban limit and puts in place a range of requirements. It also specifies the responsibilities of land owners. The term 'owners' includes lessees, people in control of land, the executive body of a community, the manager of State land, and the chief executive officer of any local authority. The requirements include, but are not limited to, the maintenance of firebreaks and availability of firefighting equipment to reasonably prevent the spread of fires to neighbouring properties.

3.7 The Environment Conservation Act, 1989 (Act No.73 of 1989), the National Noise Control Regulations: GN R154 of 1992

The Environment Conservation Act, 1989 (ECA) allows the Minister of Environmental Affairs and Tourism (now the "Minister of Forestry, Fisheries and the Environment") to make regulations regarding noise, amongst other concerns. The Minister has made noise control regulations under the ECA.

In terms of section 25 of the ECA, the national noise-control regulations (NCR) were promulgated (GN R154 in *Government Gazette* No. 13717 dated 10 January 1992). The NCRs were revised under Government Notice Number R. 55 of 14 January 1994 to make it obligatory for all authorities to apply the regulations.

Subsequently, in terms of Schedule 5 of the Constitution of South Africa of 1996 legislative responsibility for administering the NCR was devolved to provincial and local authorities.

These regulations define "**disturbing noise**" as:

"*Noise level which exceeds the zone sound level or, if no zone sound level has been designated, a noise level which exceeds the ambient sound level at the same measuring point by 7 dBA or more*".

These Regulations prohibits anyone from causing a disturbing noise.

3.8 National Environmental Management: Air Quality Act, 2004 (Act No. 39 of 2004)

Section 34 of the Air Quality Act, 2004 (AQA) makes provision for:

(1) The Minister to prescribe essential national noise standards –
   a. For the control of noise, either in general or by specified machinery or activities or in specified places or areas; or
   b. For determining –
      i. a definition of noise; and
      ii. the maximum levels of noise.

(2) When controlling noise, the provincial and local spheres of government are bound by any prescribed national standards.

This section of the Act is in force, but no such standards have yet been promulgated.

An atmospheric emission license issued in terms of Section 22 may contain conditions in respect of noise. This however will not be relevant to this proposed development.

3.8.1 National Dust Control Regulations, 2013

The National Environmental Management: Air Quality Act, 2004 (Act 39 of 2004), makes provision for national dust control regulations. These regulations prescribe dust fall standards for residential and non-residential areas. These Regulations also provide for dust monitoring, control and reporting.

The acceptable dust fall out rates are:

Restriction Area	Dust Fall (D) (mg/m^2/day, 30 day average)	Permitted Frequency of exceedance
Residential	D<600	Two within a year, not sequential months
Non- Residential	600 <D< 1200	Two within a year, not sequential months

3.9 National Water Act, 1998 (Act No. 36 of 1998 - NWA)

The National Water Act, 1998 (NWA) provides for constitutional requirements including pollution prevention, ecological and resource conservation and sustainable utilisation. In terms of this Act, all water resources are the property of the State.

A water resource includes any watercourse, surface water, estuary or aquifer, and, where relevant, its bed and banks. A watercourse is interpreted as a river or spring; a natural channel in which water flows regularly or intermittently; a wetland lake or dam into which or from which water flows; and any collection of water that the Minister may declare to be a watercourse.

Relevant water uses for the proposed construction of the WEF, which will require access roads over watercourses and drainage channels and boreholes for construction water, in terms of Section 21 of the Act include but are not limited to the following:

Section 21 (a): Abstraction of water from boreholes and rivers or dams;
Section 21 (b): Storage of water (dams or reservoirs);
Section 21 (c): Impeding or diverting the flow of water in a watercourse;
Section 21 (i): Altering the bed, banks, course or characteristics of a watercourse; and
Section 21 (g): Storage of domestic waste in conservancy tanks.
GN 1199 of 18 December 2009 grants general authorisation (GA) for the above water uses based on certain conditions. It is also stipulates that these water uses must be registered with the responsible authority.

Pollution of river water is a contravention of the NWA. Chapter 3, Part 4 of the NWA deals with pollution prevention and in particular the situation where pollution of a water resource occurs or might occur as a result of activities on land. The person who owns, controls, occupies or uses the land in question is responsible for taking measures to prevent pollution of water resources.

Chapter 3, Part 5 of the NWA deals with pollution of water resources following an emergency incident, such as an accident involving the spilling of a harmful substance that finds or may find its way into a water resource. The responsibility for remedying the situation rests with the person responsible for the incident or the substance involved.

3.9.1 Permit Requirements

A Water Use License Application (WULA) or a General Application (GA) may be required. This will be determined by the Department of Human Settlement, Water and Sanitation (DHSWS) during the WULA pre-application process.

This process will run separate to this EA application process.

3.10 National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004 - NEMBA)

3.10.1 Threatened or Protected Species List, 2015

Amendments to the Threatened or Protected Species (TOPS) list were published on 31 March 2015 in Government Gazette No. 38600 and Notice 256 of 2015. Certain flora and fauna that occur on the site may be threatened or protected.

TOPS permits for the carrying out of restricted activities in terms of the NEMBA, Act 2004 may be required. TOPS permits are submitted to either the national minister or the provincial minister. In terms of the legislation, the relevant issuing authority for the current project would be the office of the MEC of the province.

3.10.2 Alien and Invasive Species Regulations, 2016

The Act and Regulations set out various degrees of Invasive Species (Plants, Insects, Birds, Animals, Fish and Water Plants) and requires that certain of those invasive species are documented and, in some cases, removed from properties in South Africa.

The Regulations list 4 categories of invasive species that must be managed, controlled or eradicated from areas where they may cause harm to the environment, or that are prohibited to be brought into South Africa.

3.11 The Nature and Environmental Conservation Ordinance No. 19 of 1974; and Northern Cape Nature Conservation Act, 2009 (Act No. 9 of 2009)

These were developed to protect both animal and plant species within the various provinces of the country which warrant protection. These may be species which are under threat or which are already considered to be endangered and species are listed in the relevant documents. The provincial environmental authorities are responsible for the issuing of permits in terms of this legislation.

A protected flora clearing permit from provincial authority would be required. This permit must list the number and location of all individuals of protected plants as listed in the provincial ordinance, as well as those plants listed as being of conservation concern by the Red List of South African Plants (http://redlist.sanbi.org/index.php). This permit requires a full walk-through of the final approved wind farm development footprint, following which the number of individuals of protected species that would be affected by the development can be quantified and used to populate the permit application. Depending on the identity

of the species concerned, some would be destroyed, while other species would need to be translocated within the site to a safe site outside the development footprint, based on the recommendations of the walk-through study.

3.12 National Noise Control Regulations (GN R154 of 1992)

The Noise Control Regulations (NCR) were promulgated in terms of section 25 of the ECA. The NCRs were revised under Government Notice Number R. 55 of 14 January 1994 to make it obligatory for all authorities to apply the regulations.

Subsequently, in terms of Schedule 5 of the Constitution of South Africa of 1996 legislative responsibility for administering the noise control regulations was devolved to provincial and local authorities. Provincial noise control regulations exist in the Free State, Gauteng and Western Cape provinces, but not in the Northern Cape Province (the National Noise Control Regulations will be in effect).

In terms of national permits, a protected tree clearing permit is potentially required. The notice of the List of Protected Tree Species under the National Forests Act, 1998 (Act No 84 of 1998) can be obtained from https://www.gov.za/documents/national-forests-act-list-protected-tree-species-7. This list has not been changed since it was last published in 2014. No protected tree species were observed present within the site and as such, no tree clearing permit would be required.

3.12.1 Noise Standards

There are a few South African scientific standards (SABS) relevant to noise from developments, industry and roads. They are:

- SANS 10103:2008. 'The measurement and rating of environmental noise with respect to annoyance and to speech communication'.
- SANS 10210:2004. 'Calculating and predicting road traffic noise'.
- SANS 10328:2008. 'Methods for environmental noise impact assessments'.
- SANS 10357:2004. 'The calculation of sound propagation by the Concave method'.
- SANS 10181:2003. 'The Measurement of Noise Emitted by Road Vehicles when Stationary'.

3.13 National Forests Act, 1998 (Act No. 84 of 1998 - NFA)

This act lists protected tree species and prohibits certain activities. 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".*

3.14 Astronomy Geographic Advantage Act, 2007 (Act. 21 of 2007)

The Act provides for the preservation and protection of areas within the Republic that are uniquely suited for optical and radio astronomy. The Square Kilometer Array radio telescope is located in the declared Karoo Central Advantage Array and as such it is protected against harmful interference from wireless communication and electromagnetic emissions from electrical equipment.

3.15 National Road Traffic Act, 1996 (Act No. 93 of 1996) (NRTA)

The technical recommendations for highways (TRH 11): *"Draft Guidelines for Granting of Exemption Permits for the Conveyance of Abnormal Loads and for other Events on Public Roads"* outline the rules and conditions which apply to the transport of abnormal loads and vehicles on public roads and the detailed procedures to be followed in applying for exemption permits are described and discussed.

Legal axle load limits and the restrictions imposed on abnormally heavy loads are discussed in relation to the damaging effect on road pavements, bridges, and culverts.

The general conditions, limitations, and escort requirements for abnormally dimensioned loads and vehicles are also discussed and reference is made to speed restrictions, power/mass ratio, mass distribution, and general operating conditions for abnormal loads and vehicles. Provision is also made for the granting of permits for all other exemptions from the requirements of the National Road Traffic Act and the relevant Regulations.

The South African National Roads Authority (SANRAL) and the Provincial Department of Transport would act as a Competent/Commenting Authority.

3.16 Civil Aviation Act, 2009 (Act No. 13 of 2009) (CAA)

The Civil Aviation Act, 2009 (Act No. 13 of 2009) (CAA), governs civil aviation in the Republic. The Act provides for the establishment of a stand-alone authority mandated with the controlling, promoting, regulating, supporting, developing, enforcing and continuously improving levels of safety and security throughout the civil aviation industry. This mandate is fulfilled by the South African Civil Aviation Authority (SACAA), an agency of the Department of Transport (DoT).

The SACAA achieves the objectives of the Act by complying with the Standard and Recommended Practices (SARPs) of the International Civil Aviation Organisation (ICAO), while considering the local context when issuing the South African Civil Aviation Regulations (SA CARs). All proposed developments or activities in South Africa that potentially could affect civil aviation must be assessed by SACCAA in terms of the CARs and the South African Civil Aviation Technical Standards (SA CATs), in order to ensure civil aviation safety.

The SACAA and Air Traffic Navigation Services (ATNS) is included as a stakeholder and will be provided further opportunity to comment during the public participation period, as no comment were received from these authorities during the scoping phase.

3.17 Promotion of Access to Information Act, 2000 (Act No. 2 of 2002) (PAIA)

The PAIA gives effect to the constitutional right of access to any information held by the state and any information that is held by another person and that is required for the exercise or protection of any rights; and to provide for matters connected therewith.

3.18 National Environmental Management Act: National Appeals Regulations, 2014

The purpose of these regulations is to regulate the procedure contemplated in section 43(4) of the National Environmental Management Act relating to the submission, processing and consideration of a decision on an appeal. This Act is used to help guide and understand the appeal process and the procedures may follow.

3.19 Additional Relevant Legislation

The applicant must also comply with the provisions of other relevant national legislation. Additional relevant legislation that has informed the scope and content of this S&EIA Report includes the following:

- *Constitution of the Republic of South Africa, 1996 (Act No. 108, 1996);*
- *Aviation Act, 1962 (Act No. 74, 1962);*
- *National Environmental Management: Waste Act, 2008 (Act No. 59, 2008);*
- *National Environmental Management: Protected Areas Act, 2003 (Act No. 57, 2003);*
- *National Roads Act, 1998 (Act No. 7, 1998)*
- *Occupational Health and Safety Act, 1993 (Act No. 85 of 1993);*
- *National Veld and Forest Fire Bill of 10 July 1998;*

- *Fertiliser, Farm Feeds, Agricultural Remedies and Stock Remedies Act, 1947 (Act No. 36 of 1947;*
- *Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002); and*
- *Independent Communications Authority of South Africa Act, 2000 (Act No. 13 of 2000; as amended); and*
- *Screening Report referred to in Regulation 16(1)(v) of the Environmental Impact Assessment Regulations 2014, as amended.*

3.20 Conventions and Treaties

3.20.1 The Paris Agreement (2016)

South Africa is one of 195 countries that are signatory to The Paris Agreement. The Paris Agreement is a legally binding instrument within the United Nations Framework Convention on Climate Change (UNFCCC) that provides guidance for action on climate change, focusing on sustainable development and poverty eradication. It sets the goal of preventing increase in global average temperature to below 2 degrees Celsius and pursuing efforts to limit global temperature increase to 1.5 degrees Celsius. Previous Minister of the DFFE, Ms Edna Molewa, signed the Paris Agreement on Climate Change on behalf of South Africa on 22 April 2016.[4]

The proposed WEF fits the emission reduction targets of the Paris Agreement and its aim of sustainable development.

3.20.2 The Convention on Biological Diversity (CBD) (1993)

This is a multilateral treaty for the international conservation of biodiversity, the sustainable use of its components and fair and equitable sharing of benefits arising from natural resources. Signatories have the sovereign right to exploit their own resources pursuant to their own environmental policies, and the responsibility to ensure that activities within their jurisdiction or control do not cause damage to the environment of other States or of areas beyond the limits of national jurisdiction. South Africa became a signatory to the CBD in 1993, which was ratified in 1995.

The convention prescribes that signatories identify components of biological diversity important for conservation and monitor these components in light of any activities that have been identified which are likely to have adverse impacts on biodiversity. The CBD is based on the precautionary principle which states that where there is a threat of significant reduction or loss of biological diversity, lack of full scientific certainty should not be used as a reason for postponing measures to avoid or minimise such a threat and that in the absence of scientific consensus the burden of proof that the action or policy is not harmful falls on those proposing or taking the action.

3.20.3 The Ramsar Convention (1971)

The Convention on Wetlands, called the Ramsar Convention, as it was adopted in the Iranian city of Ramsar in 1971 and came into force in 1975, is an intergovernmental treaty that provides the framework for the conservation and wise use of wetlands and their resources. Under the three pillars of the convention the Contracting Parties commit to work towards the wise use of all their wetlands through national plans, policies and legislation, management actions and public education; designate suitable wetlands for their list of Wetlands of International Importance (the "Ramsar List") and ensure their effective management; and Cooperate internationally on transboundary wetlands, shared wetland systems, shared species, and development projects that may affect wetlands.

[4] https://www.environment.gov.za/mediarelease/southafrica_ratifies_parisagreement (accessed on 24 January 2019).

3.20.4 The Convention on the Conservation of Migratory Species of Wild Animals (CMS or Bonn Convention) (1983)

An intergovernmental treaty, concluded under the sponsorship of the United Nations Environment Programme, concerned with the conservation of wildlife and habitats on a global scale. The fundamental principles listed in Article II of this treaty state that signatories acknowledge the importance of migratory species being conserved and agree to take action to this end "*whenever possible and appropriate*", "*paying special attention to migratory species the conservation status of which is unfavourable and taking individually or in cooperation appropriate and necessary steps to conserve such species and their habitat*".

3.20.5 The Agreement on the Conservation of African-Eurasian Migratory Waterbirds (AEWA) (1999)

An intergovernmental treaty developed under the framework of the Convention on Migratory Species (CMS), concerned with the coordinated conservation and management of migratory waterbirds throughout their entire migratory range. Signatories of the Agreement have expressed their commitment to work towards the conservation and sustainable management of migratory waterbirds, paying special attention to endangered species as well as to those with an unfavourable conservation status. The assessment of the ecology and identification of sites and habitats for migratory waterbirds is required to coordinate efforts that ensure that networks of suitable habitats are maintained and investigate problems likely posed by human activities.

3.21 Policies and Guidelines

3.21.1 Environmental Impact Assessment Guidelines

Relevant guidelines and policies as applicable to the management of the S&EIA process and to this application have also been taken into account, as indicated below:

- *IEM Guideline Series (Series 3): Stakeholder engagement (2002);*
- *IEM Guideline Series (Series 4): Specialist studies (2002);*
- *IEM Guideline Series (Series 5): Impact Significance (2002);*
- *IEM Guideline Series (Guideline 5): Companion to the EIA Regulations 2010 (October 2012);*
- *IEM Guideline Series (Series 7): Cumulative Effects Assessment (2002);*
- *IEM Guideline Series (Guideline 7): Public Participation in the EIA process (October 2012);*
- *IEM Guideline Series (Series 7): Alternatives in the EIA process (2002);*
- *IEM Guideline Series (Guideline 9): Draft guideline on need and desirability in terms of the EIA Regulations 2010 (October 2012);*
- *DEA (2017) Guideline on Need and Desirability, Department of Environmental Affairs (DEA) Pretoria, South Africa (2017);*
- *IEM Guideline Series (Series 12): Environmental Management Plans (EMP) (2002); and*
- *IEM Guideline Series (Series 15): Environmental impact reporting (2002).*

3.21.2 The Equator Principles (EPs) IIII, 2020

The principles applicable to the project are likely to include:

- *Principle 2: Environmental and Social Assessment;*
- *Principle 3: Applicable Environmental and Social Standards;*
- *Principle 4: Environmental and Social Management System and Equator Principles Action Plan;*
- *Principle 5: Stakeholder Engagement;*

- *Principle 6: Grievance Mechanism;*
- *Principle 7: Independent Review;*
- *Principle 8: Covenants;*
- *Principle 9: Independent Monitoring and Reporting; and*
- *Principle 10: Reporting and Transparency.*

These principles, among various requirements, include a requirement for an assessment process and an Environmental and Social Management Plan (ESMP) to be prepared by the client to address issues raised in the assessment process and incorporate actions required to comply with the applicable standards, and the appointment of an independent environmental expert to verify monitoring information. This document, including the appended EMPr, provides the assessment and proposed measures to minimise, mitigate and, where residual impacts remain, remediate risks and impacts the development will have on the receiving environment and includes the requirement to establish an effective grievance mechanism for affected communities and workers in which it is proposed.

3.21.3 South African Wind Energy Facility Guidelines

The following guidelines are relevant to the proposed WEF and the potential impacts they may have on bats/avifauna and habitat that support bats/avifauna:

- South African Best Practice Guidelines for Pre-Construction Monitoring of Bats at Wind Energy Facilities. 5th Edition. 2020;
- South African Best Practice Guidelines for Operational Monitoring of Bats at Wind Energy Facilities. 5th Edition. 2020;
- South African Bat Fatality Threshold Guidelines. Edition 2. 2018;
- The Species Environmental Assessment Guideline (SANBI, 2020);
- Best-Practice Guidelines for assessing and monitoring the impact of wind-energy facilities on birds in southern Africa. Third Edition, 2015;
- Best Practice Guidelines for Verreaux's Eagle and Wind Energy (BirdLife South Africa, 2017), and the more recent draft update of these: Verreaux's Eagles and Wind Farms (BirdLife South Africa, 2021);
- The Southern African Bird Atlas Project 2 data, available at the pentad level (http://sabap2.adu.org.za/v1/index.php) (accessed at www.mybirdpatch.adu.org.za);
- IUCN 2021. The IUCN List of Threatened Species. 2021 - 3. http://www.iucnredlist.org/;
- Wind Energy Impacts on Birds in South Africa: A Preliminary review of the results of operational monitoring at the first wind farms of the Renewable Energy Independent Power Producer Procurement Programme in South Africa. BLSA. Occasional Report Series: 2;
- On a collision course: the large diversity of birds killed by wind farms in South Africa (Perold *et al.* 2020);
- Birds & Renewable Energy. Update for 2019. BirdLife South Africa. Birds and Renewable Energy Forum, 10 October 2019; and
- Avian Wind Farm Sensitivity Map. Birdlife South Africa. http://www.birdlife.org.za/conservation/birds-and-wind-energy/windmap.

3.21.4 International Finance Corporation (IFC) Performance Standards

The IFC's Performance Standards on Social and Environmental Sustainability (Referred to as Performance Standards hereinafter) is an environmental and social risk management tool provided by the IFC for its investment and financing clients, and is also one of the major applicable standards of the Equator Principles. As the global influence of the Equator Principles has continued to rise, more and more Equator Principles Financial Institutions (EPFI) have been applying the Performance Standards in their assessments of

environmental and social impacts. Under this backdrop, the Performance Standards have become the world's leading system and tool for environmental and social risk management.

The IFC Performance Standards encompass eight topics as described in Table 3-2 below. Given that South Africa has a complex and well-balance environmental regulatory system, the IFC Performance Standards are wholly addressed in the NEMA, 1998, as amended, framework.

For reference purposes the Project Applicant, will be referred to as the 'Borrower' in Table 3-2.

The project will not have adverse impacts on PS5: Land Acquisition and Involuntary Resettlement and PS7: Indigenous Peoples as there is no displacement or resettlement, and none such indigenous people are found in the proposed development area of influence.

Table 3-2: Description of the IFC Performance Standards

PS Description	Project Applicability
Performance Standard 1: Assessment and Management of Environmental and Social (E&S) Risks and Impacts **Objective:** Underscores the importance of identifying E&S risks and impacts and managing E&S performance throughout the life of a project.	
Borrowers are required to manage the environmental and social performance of their business activity, which should also involve communication between the Borrower/Investee, its workers and the local communities directly affected by the business activity. This requires the development of a good management system, appropriate to the size and nature of the business activity, to promote sound and sustainable environmental and social performance as well as lead to improved financial outcomes.	Section 2 of Chapter 1 of the NEMA, as amended, provides details of the environmental management principles that should be adhered to during the entire project life. Chapter 6 of the NEMA EIA Regulations, 2014 (as amended) outlines the requirements for Public Participation in respect of a project. This document represents the S&EIA process (equitable to an ESIA) undertaken for the proposed development, and comprehensively assesses the key environmental and social impacts and complies with the requirements of the NEMA EIA Regulations, 2014 (as amended). The proposed development will be managed in terms of environmental and social impacts through an approved Environmental Management Programme (EMPr) which is drafted as part of the EIA process. The following have been included as part of this Assessment: • Description of relevant Policy; • Identification of Risks and Impacts; • EMPr (included in the EIA phase); • Requirements for Monitoring and Review; • Stakeholder Engagement as part of PPP; • External Communication and Grievance Mechanism; and • Recommendation for ongoing Reporting to Affected Communities.
Performance Standard 2: Labour and Working Conditions **Objective:** Recognizes that the pursuit of economic growth through employment creation and income generation should be balanced with protection of basic rights for workers.	
For any business, its workforce is a valuable asset and a sound worker-management relationship is a key component of the overall success of the enterprise. By protecting the basic rights of workers, treating workers fairly and providing them with safe and healthy working conditions, Borrowers can enhance the efficiency and productivity of their operations and	Whilst PS 2 is applicable to the proposed development, it will not be addressed in detail in this report as Labour and Working conditions are typically addressed prior to construction, once EA has been awarded. Recommendations are provided concerning development of a detailed Human Resources (HR) and Occupational Health and Safety (OHS) system by the Applicant. In terms of the proposed development, construction will require the appointment of an EPC contractor (and others) for completion.

PS Description	Project Applicability
strengthen worker commitment and retention.	Appointment of contactors and employees will be 'fair and equal', and workers will be provided with a safe, healthy and inclusive work environment. The EMPr will incorporate the requirements for compliance with local and international Labour and Working legislation and good practice on the part of the contractors.
Performance Standard 3: Resource Efficiency and Pollution Prevention **Objective:** Recognizes that increased industrial activity and urbanization often generate higher levels of air, water and land pollution, and that there are efficiency opportunities.	
Increased industrial activity and urbanization often generate increased levels of pollution to air, water and land that may threaten people and the environment at the local, regional and global level. Borrowers are required to integrate pollution prevention and control technologies and practices (as technically and financially feasible as well as cost-effective) into their business activities.	The Project is not likely to have many large-scale and long-term impacts related to pollution. Measures to address air, water and land pollution are contained in the EMPr. There are no material resource efficiency issues associated with the proposed development and the EMPr includes general resource efficiency measures. The project is not greenhouse gas (GHG) emissions intensive and the detailed assessment and reporting of emissions is not required. This project, however, seeks to facilitate resource efficiency and pollution prevention by contributing to the South African green economy. The project will not release industrial effluents and waste generation will be managed according to the EMPr. Hazardous materials are not a key issue; small quantities of construction materials (oil, grease, diesel fuel etc.) are the only wastes expected to be associated with the project. Land contamination of the site from previous land use is not a concern as the project area is mostly an agricultural area where low intensity agriculture / grazing is practiced.
Performance Standard 4: Community Health, Safety, and Security **Objective:** Recognizes that projects can bring benefits to communities but can also increase potential exposure to risks and impacts from incidents, structural failures, and hazardous materials.	
Business activities can increase the potential for community exposure to risks and impacts arising from equipment accidents, structural failures and releases of hazardous materials as well as impacts on a community's natural resources, exposure to diseases and the use of security personnel. Borrowers are responsible for avoiding or minimizing the risks and impacts to community health, safety and security that may arise from their business activities.	The requirements for PS 4 have been addressed in this report and will be managed in accordance with the EMPr. It is understood that the project infrastructure and equipment will be designed to good industry standards to minimise risks to communities, however a community health and safety plan should be compiled by the Applicant prior to construction to meet the requirements of IFC Performance Standard 4 (Community Health, Safety and Security). To ensure compliance with PS 4, Applicant will need to evaluate the risks and impacts to the health and safety of the affected community during the design, construction and operation of the proposed development and establish preventive measures to address them in a manner commensurate with the identified risks and impacts as contained in this report. Such measures need to adhere to the precautionary principle for the prevention or avoidance of risks and impacts over minimization and reduction.
Performance Standard 5: Land Acquisition and Involuntary Resettlement **Objective:** Applies to physical or economic displacement resulting from land transactions such as expropriation or negotiated settlements.	
Land acquisition due to the business activities of a Borrowers may result in the physical displacement (relocation or loss of shelter) and economic	Not Applicable

PS Description	Project Applicability
displacement (loss of access to resources necessary for income generation or as means of livelihood) of individuals or communities. Involuntary resettlement occurs when affected individuals or communities do not have the right to refuse land acquisition and are displaced, which may result in long-term hardship and impoverishment as well as environmental damage and social stress. Borrowers are required to avoid physical or economic displacement or minimize impacts on displaced individuals or communities through appropriate measures such as fair compensation and improving livelihoods and living conditions.	
Performance Standard 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources **Objective**: Promotes the protection of biodiversity and the sustainable management and use of natural resources.	
Protecting and conserving biodiversity (including genetic, species and ecosystem diversity) and its ability to change and evolve, is fundamental to sustainable development. Borrowers are required to avoid or mitigate threats to biodiversity arising from their business activities and to promote the use of renewable natural resources in their operations.	In terms of protecting and conserving biodiversity, specialists have assessed the impacts of the proposed development within the area of influence and will recommend further measures to prevent/avoid/mitigate these potential impacts during the EIA phase. Specialist methods include a combination of literature review, stakeholder engagement and consultation, and in-field surveys. This substantively complies with the PS 6 general requirements for S&EIA and baseline assessment for determination of biodiversity and ecosystem services issues. The determination of habitat sensitivity was undertaken within the legal and best practice reference framework for South Africa.
Performance Standard 7: Indigenous Peoples **Objective:** Aims to ensure that the development process fosters full respect for Indigenous Peoples.	
Indigenous Peoples are recognized as social groups with identities that are distinct from other groups in national societies and are often among the marginalized and vulnerable. Their economic, social and legal status may limit their capacity to defend their interests and rights to lands and natural and cultural resources. Borrowers are required to ensure that their business activities respect the identity, culture and natural resource-based livelihoods of Indigenous Peoples and reduce exposure to impoverishment and disease.	Not Applicable. As per the international instruments under the United Nations (UN) Human Rights Conventions, no indigenous peoples are present within the study area. The Project does not involve displacement.
Performance Standard 8: Cultural Heritage **Objective:** Aims to protect cultural heritage from adverse impacts of project activities and support its preservation.	

PS Description	Project Applicability
Aims to protect cultural heritage from adverse impacts of project activities and support its preservation.	A cultural heritage impact assessment and paleontological impact assessment has been undertaken for the proposed development. Consultation has been undertaken with the SAHRA and will continue during the EIA phase.

4 METHODOLOGY

The EIA process formally commenced with notifying the CA, in this case the DFFE, of the proposed development through the submission of an application form. The EAP, along with the team of technical specialists, commenced the scoping phase to make informed decisions of the appropriate "scope" of the EIA process. The existing environmental baseline of the site proposed for development is established during this phase through a desktop assessment and site visits. The type of development is considered and its anticipated impacts on the existing environment informs the specialists' studies to be undertaken. The methodology of how these impacts should be assessed within the EIA phase is also determined. The EIA Phase must be undertaken in line with the approved PSEIA. The environmental impacts, mitigation and closure outcomes as well as the residual risks of the proposed activity must be set out in the EIA report.

A Draft Scoping Report (DSR) (Arcus, November 2022) for the proposed development was made available for public and stakeholder comment for a prescribed 30-day consultation period. All comments received in response to the DSR were considered and as appropriate, incorporated into the FSR and Plan of Study for EIA (PSEIA). The FSR and PSEIA (Arcus, January 2023) were then submitted to the DFFE for approval. Interested and Affected Parties (I&APs) were able to review FSR and PSEIA as submitted to the DFFE.

The FSR presented and assessed the initial proposed wind turbine layout and associated infrastructures of the Loxton WEF 3 and its associated infrastructure. In March 2023, the DFFE accepted the FSR. The results of the specialists' scoping assessments, DFFE comments on the FSR, and other technical and financial constraints for the proposed development site were taken into consideration and a revised preferred layout was produced.

This EIA report presents and assesses a revised mitigated layout for the proposed development and will be made available for a prescribed 30-day consultation period. Any comments received will be considered and incorporated as applicable into a Final EIA report. Once a Final EIA report has been submitted, the DFFE will make a decision within 107 days on whether to grant or refuse EA. I&APs will be notified of the availability of the Final EIA report for their review as per the FSR.

4.1 DFFE Environmental Screening Tool

In terms of GN R960 (promulgated on 5 July 2019) and Regulation 16 (1)(b)(v) of the EIA Regulations, 2014 (as amended), the submission of a Screening Report generated from the national web based environmental screening tool is compulsory for the submission of BA and EIA applications in terms of Regulation 19 and 21 of EIA Regulations, 2014 (as amended). The Screening Report generated for the proposed development is included in Volume II of this Report.

The screening report was generated based on the selected classification, i.e., Utilities Infrastructure / Electricity / Generation / Renewable / Wind. The screening report generated did not identify any Wind or Solar PV / CSP Developments which received environmental authorisation within a 30 km radius of the wind farm[5], furthermore, no

[5] The EAP / specialists assessed in full the cumulative impacts on the developments identified within a 30 km radius of the development during the EIA Phase.

intersections with Environmental Management Frameworks (EMF) or with any development zones were found.

Based on the selected classification to produce the screening tool report, and the environmental sensitivities of the development footprint, the screening report generates a list of specialist assessments identified for inclusion in the assessment report. It is the responsibility of the EAP to confirm this list and to motivate in the assessment report, the reason for not including any of the identified specialist study.

Table 4.1 provides a summary of the specialist assessments identified by the screening tool reports, and the response to each assessment in terms of the proposed development, based specialist site sensitivity verifications. Specialist assessments undertaken (Volume II) have considered the results of the DFFE Screening Tool in their terms of reference.

Table 4-1: Specialist assessments identified in terms of the national web-based screening tool for the proposed Loxton WEF 3

Identified Specialist Assessment	Assessment Protocol	Identified Sensitivity	
		By DFFE Screening Report	By Specialist / EAP
Agriculture Theme	Protocol for the Specialist Assessment and Minimum Report Content Requirements of Environmental Impacts on Agricultural Resources by Onshore Wind and/or Solar Photovoltaic Energy Generation Facilities where the Electricity Output is 20 MW or more, gazetted on 20 March 2020. This protocol replaces the requirements of Appendix 6 of the Environmental Impact Assessment Regulations.	**High Sensitivity**	**Low Sensitivity**
	Comment: The agricultural sensitivity of the site, as identified by the screening tool, varies from low to very high across different parts of the site. The criteria for agricultural sensitivity in the screening tool are straightforward and are clearly defined in terms of cultivation status and land capability. The classified land capability of the site is predominantly 5, but ranges from 2 to 6. The confirmed high sensitivity agricultural areas are highly likely to be avoided by the proposed facility infrastructure, regardless of agricultural impact, because they are low-lying and near watercourses and farmsteads. The specialist assessment **disputes** the high sensitivity as given by the screening tool. The motivation for confirming the sensitivity is predominantly that the climate data (low rainfall of approximately 199 to 221 mm per annum and high evaporation of approximately 1,371 to 1,412 mm per annum) (Schulze, 2009) proves the area to be arid, and therefore of limited land capability. Moisture availability is totally insufficient for crop production without irrigation. In addition, the land type data shows the dominant soils to be shallow soils on underlying rock. **A low agricultural sensitivity** is entirely appropriate for this land, which is totally unsuitable for crop production. A site investigation was not considered necessary for this assessment, including for the site sensitivity verification as the land capability limitation is predominantly a function of climate, which cannot be usefully informed by a site assessment. Based on the specialists' verification of the site as 'less than high' sensitivity, the level of agricultural assessment followed by the specialist was an Agricultural Compliance Statement.		
Landscape / Visual Impact Assessment	Site Sensitivity Verification Requirements where a Specialist Assessment is required but no specific assessment protocol has been prescribed, gazetted on 20 March 2020.	**Very High Sensitivity**	**Medium Sensitivity**
	Comment: The sensitivity mapping on which the screening tool is based is regional in scale and is therefore **disputed** based on the more detailed visual sensitivity mapping prepared by the visual specialists at the local project scale.		
Archaeological and Cultural Heritage Impact Assessment	Site Sensitivity Verification Requirements where a Specialist Assessment is required but no specific assessment protocol has been prescribed, gazetted on 20 March 2020.	**Low Sensitivity**	**Medium Sensitivity**
	Comment:		

Identified Specialist Assessment	Assessment Protocol	Identified Sensitivity	
		By DFFE Screening Report	By Specialist / EAP
	The screening tool report shows the archaeological and heritage sensitivity to be low throughout the study area. The site visit confirms that in fact the majority of the site is of low sensitivity with only small pockets (where heritage resources occur) considered to be of higher sensitivity. The main concerns are the farm complexes (inhabited and abandoned) since these have high densities of heritage resources and are considered locally significant cultural landscapes. These tend to be in river valleys, while the ridges targeted for development have almost no traces of heritage. A photographic record and description of the relevant heritage resource is contained within the impact assessment report. The heritage specialist thus **disputes** the uniform low sensitivity, noting that several pockets of medium to high sensitivity are also present in the area.		
Palaeontology Impact Assessment	Site Sensitivity Verification Requirements where a Specialist Assessment is required but no specific assessment protocol has been prescribed, gazetted on 20 March 2020.	**Very High Sensitivity**	**Low Sensitivity**
	Comment: It is concluded that the palaeo sensitivity of the project area is, in practice, low. The provisional palaeo sensitivity mapping by the DFFE Screening Tool is accordingly **disputed** by the specialist. A palaeontological compliance statement was prepared for the development.		
Terrestrial Biodiversity Impact Assessment	Protocol for the Specialist Assessment and minimum report content requirements for Environmental Impacts on Terrestrial Biodiversity, gazetted on 20 March 2020.	**Very High Sensitivity**	**High Sensitivity**
	Comment: The facility falls almost entirely within areas classified as Vey High sensitivity under the Terrestrial Biodiversity Theme due to the presence of CBAs, and NPAES Focus Areas. The specialist **disputes** the very high sensitivity, the areas mapped as Very High sensitivity are considered no-go areas for wind turbines but may be traversed by overhead cables or turbine access roads where required, subject to review. The areas mapped as High sensitivity represent other sensitive features such as minor drainage lines or slopes deemed to be sub-optimal as Karoo Dwarf Tortoise habitat. These areas should also be avoided by turbines as much as possible, but some habitat loss in these areas is considered acceptable. Under the layout provided for the assessment, there are no turbines in areas mapped as Very High or in the High sensitivity areas. As a result, the development of the Loxton WEF 3 would avoid significant impact on the major ecological features of the site.		
Aquatic Biodiversity Impact Assessment	Protocol for the Specialist Assessment and minimum report content requirements for Environmental Impacts on Aquatic Biodiversity, gazetted on 20 March 2020.	**Very High Sensitivity**	**Very High Sensitivity**
	Comment: The aquatic sensitivity of the site, as identified by the screening tool, varies from very high to high and a small portion is low across different parts of the site. The specialist assessment **confirms** the sensitivity as given by the screening tool due to the presence of National Freshwater Priority Ecosystem Areas (NFEPAs), rivers as well as several CBAs.		

Identified Specialist Assessment	Assessment Protocol	Identified Sensitivity	
		By DFFE Screening Report	**By Specialist / EAP**
	Although there is some overlap with the findings on site and the Screening Tool's outcome, the development footprint will be developed with cognisance of the sensitivities. Structures such as WTGS, buildings, substations, and Battery Energy Storage System (BESS), have been placed outside of the High Sensitivity habitats, while remaining structures (roads and transmission lines) could cross or span the Moderate / Low Sensitivity areas. Noting that Low Sensitivity can also = Moderate areas but with existing impacts e.g., current roads, farm tracks of previously disturbed areas. With the adoption of mitigation, the proposed project will have a Low impact upon aquatic biodiversity. Any activities within the watercourses and pans, the buffers, or 500 m from the wetland boundary will require a Water Use license under Section 21 c and i of the National Water Act (Act 36 of 1998).		
Avian Impact Assessment	Protocol for the specialist assessment and minimum report content requirements for Environmental Impacts on Avifaunal Species by Onshore Wind Energy Generation Facilities where the electricity output is 20 MW or more, gazetted 20 March 2020.	**Low Sensitivity**	**High Sensitivity**
	Comment: The Avian Wind Farm Sensitivity map for South Africa (Retief et al. 2011) and the Important Bird and Biodiversity Areas programme data (IBA - Marnewick et al. 2015) were consulted to determine the sensitivity of the project in national terms. The site falls mostly within the lowest two categories of sensitivities in terms of avifauna, is not located in or close to any IBAs (Marnewick et al. 2015), nor does it fall in a Renewable Energy Development Zone (REDZ/2). Overall, it is the specialist opinion that the proposed site falls in an area of Low sensitivity on a national scale. This statement serves to provide holistic context on the suitability of the location of the development on the basis of these consulted databases and does not consider individual species. Additionally, the specialist **disputes** the Screening Tool finding for the Avian Theme which designates the site as Low sensitivity and concur with the High sensitivity assessment of the Animal Species Theme for both highlighted avian species (Ludwig's Bustard and Verreaux's Eagle). The specialist also included Black Harrier and Martial Eagle in a category of at least Medium sensitivity. The habitat is transformed, but the combination of irrigated and dryland pastures, grassland with shrub, dams and wetlands which have replaced the original Fynbos vegetation is highly suitable for a number of wind farm sensitive priority species, including some Red Listed species.		
Civil Aviation Assessment	Protocol for the specialist assessment and minimum report content requirements for Environmental Impacts on Civil Aviation Installations, gazetted on 20 March 2020.	**Low Sensitivity**	**Low Sensitivity**
	Comment: Site verification **confirms** the low sensitivity. During the public consultation, the South African Civil Aviation Authority (SACAA) were consulted by the EAP / Project Applicant to confirm that there will be no impact to the airspace of the development area and immediate surrounds, however no comment was received. A site sensitivity verification report has been produced by the EAP for inclusion as part of the EIA process.		

Identified Specialist Assessment	Assessment Protocol	Identified Sensitivity	
		By DFFE Screening Report	By Specialist / EAP
Defence Assessment	Protocol for the specialist assessment and minimum report content requirements for Environmental Impacts on Defence Installations, gazetted on 20 March 2020.	**Low Sensitivity**	**Low Sensitivity**
	Comment: Site verification **confirms** the low sensitivity. During the public consultation, the South African National Defence Force (SANDF) were consulted by the EAP / Project Applicant to confirm that there will be no impact on the defence installation of the development area and immediate surrounds, however no comment was received. A site sensitivity verification report has been produced by the EAP for inclusion as part of the EIA process.		
RFI Assessment	Site Sensitivity Verification Requirements where a Specialist Assessment is required but no specific assessment protocol has been prescribed, gazetted on 20 March 2020.	**Very High Sensitivity**	**N/A**
	Comment: The screening tool described the study area as very high Radio Frequency Interference Theme (RFI) sensitivity due to the cluster falling within the Square Kilometre Array (SKA) Karoo Central Radio Astronomy Advantage Area 1 buffer. SARAO undertook a high-level impact assessment and based on the information provided, it was determined that the project represents a low risk to medium risk of interference to the SKA radio telescope and as such, there is no objection to the development. Mitigation measures provided in comment (see Volume II) will be considered by the Developer during the various phases of the development. SARAO will be included as a registered I&AP as part of the EIA process.		
Noise Impact Assessment	Protocol for specialist assessment and minimum report content requirements for Noise Impacts, gazetted on 20 March 2020.	**Very High Sensitivity**	**Medium Sensitivity**
	Comment: The output from the Screening tool indicates a number of areas within, and up to 2,000 m from the project boundary is considered to be of a "very high" sensitivity to noise. The site sensitivity by the specialist was confirmed using available aerial images (Google Earth®) and assuming that these structures are residential as the statuses of the structures are unknown at this stage. The assessment highlighted that **there are no noise-sensitive receptors located in areas identified to have a "very high" sensitivity to noise** by the online screening tool. Due to the number of potential noise-sensitive locations in the area, it is recommended that the potential significance of the noise impact be assessed on the verified receptors in a noise specialist study. Based on the site sensitivity verification by the specialist, the site was determined to be of medium sensitivity and **disputes** the Very High Sensitivity rated of the screening tool.		
Flicker Assessment	Site Sensitivity Verification requirements where a specialist assessment is required but no Specific Assessment Protocol has been prescribed, gazetted 20 March 2020.	**Very High Sensitivity**	**Not Determined**
	Comment:		

Identified Specialist Assessment	Assessment Protocol	Identified Sensitivity	
		By DFFE Screening Report	By Specialist / EAP
	Although noise and flicker are two separate themes within the DFFE Screening Tool, the sensitive features (dwellings / receptors) are the same for both themes. In Arcus' experience, the noise sensitivities and buffers also provide sufficient setback to ensure shadow flicker effects will not be significant. Shadow flicker constraints are thus catered for to some degree by the noise related spatial constraints and buffers. Receptors falling within the shadow flicker envelope could potentially be affected by shadow flicker from the rotating wind turbine blades when the sun is low in the sky. However, the blades would need to be orientated toward the receptor, they would need to be rotating and the weather would need to be clear with bright sunlight to cast shadows. The orientation of buildings, as well as topography and trees would all determine the potential flicker effect. Only two farmsteads within 2 km of the proposed WEFs could potentially be affected, although these are both within the project boundary. Incidences of flicker are therefore expected to be minimal.		
Traffic Assessment	Site Sensitivity Verification Requirements where a Specialist Assessment is required but no specific assessment protocol has been prescribed, gazetted on 20 March 2020.	**Not Determined**	**Low Sensitivity**
	Comment: Traffic assessment was identified as a required specialist assessment but no environmental sensitivity was determined by the screening report. A full traffic impact assessment, including a site assessment, was undertaken for the EIA phase to confirm the identified low sensitivity of the development.		
Geotechnical Assessment	Site Sensitivity Verification Requirements where a Specialist Assessment is required but no specific assessment protocol has been prescribed, gazetted on 20 March 2020.	**Not Determined**	**Not Determined**
	Comment: Geotechnical assessment was identified as a required specialist assessment but no environmental sensitivity was determined by the screening report. An in-depth desktop study was undertaken for the EIA phase which included review of available geological records, maps, site topography via the Digital Elevation Model (DEM)-sourced elevation data, and an evaluation of the specialists' geotechnical database of projects conducted near the project area and within similar geotechnical and geological zonation / sequences.		
Socio-Economic Assessment	Site Sensitivity Verification Requirements where a Specialist Assessment is required but no specific assessment protocol has been prescribed, gazetted on 20 March 2020.	**Not Determined**	**Low Sensitivity**
	Comment: Socio-economic assessment was identified as a required specialist assessment but no environmental sensitivity was determined by the screening report. Following the scoping assessment and verification, the socio-economic theme is deemed low by the specialist. A full impact assessment was undertaken by the specialist for the EIA phase of the development.		

Identified Specialist Assessment	Assessment Protocol	Identified Sensitivity	
		By DFFE Screening Report	By Specialist / EAP
Plant Species Assessment	Protocol for specialist assessment and minimum report content requirements for Environmental Impacts on Terrestrial Plant Species, gazetted on 20 March 2020.	**Low Sensitivity**	**Low Sensitivity**
	Comment: There are no known species of conservation concern that are likely to occur in the area. This **confirms** the results of the site verification which found no plant SCC within the site. The broader area does not appear to have many plant species of concern present and no such species have been identified on any of the other five wind energy facilities that the consultant has worked on in the area. As such, the low sensitivity rating of the site was confirmed. A Plant Species Compliance Statement was completed to present findings of the specialist.		
Animal Species Assessment	Protocol for specialist assessment and minimum report content requirements for Environmental Impacts on Terrestrial Animal Species, gazetted on 20 March 2020.	**High Sensitivity**	**High Sensitivity**
	Comment: The Avian Wind Farm Sensitivity map for South Africa (Retief et al. 2011) and the Important Bird and Biodiversity Areas programme data (IBA - Marnewick et al. 2015) were consulted to determine the sensitivity of the project in national terms. The site falls mostly within the lowest two categories of sensitivities in terms of avifauna, is not located in or close to any IBAs (Marnewick et al. 2015), nor does it fall in a Renewable Energy Development Zone (REDZ/2). Overall, it is the specialist opinion that the proposed site falls in an area of Low sensitivity on a national scale. This statement serves to provide holistic context on the suitability of the location of the development on the basis of these consulted databases and does not consider individual species. Additionally, the avian specialist **confirms** the High sensitivity assessment of the site as per the Screening Tool for Verreaux's Eagle and Ludwig's Bustard and includes Black Harrier and Martial Eagle in a category of at least Medium sensitivity. Extensive camera trapping was conducted across the Loxton WEF 3 site as well as adjacent areas to check for the presence of mammalian fauna of concern. Although there are some areas present within the Loxton WEF 3 area that are considered potentially suitable for the Riverine Rabbit, the camera trapping was not able to confirm the presence of this species within the site itself, but **confirmed** captures were obtained at two sites west of the project area. Given that this habitat extends into the site, the possible presence of the Riverine Rabbit within the site could not be excluded and a **full assessment for the Riverine Rabbit was conducted**. The field verification **confirmed** that the site includes areas of suitable habitat for the Karoo Dwarf Tortoise associated with the dolerite hills of the site. While no specimens of this species were observed within the site despite searching, the presence of historical records from the area and the presence of suitable habitat are considered sufficient to confirm the potential presence of this species within the site. As such **a full assessment for the Karoo Dwarf Tortoise was conducted**. In terms of fauna of concern that may be present on the site, but which are not listed under the DFFE Screening Tool, several different species are potentially present on the site including Mountain Reedbuck *Redunca fulvorufula* (EN), Grey Rhebok **Pelea capreolus** (NT) and Brown Hyena *Hyaena brunnea* (NT). The extensive camera trapping conducted across the site did not pick up any of these species or any other animal SCC.		

Identified Specialist Assessment	Assessment Protocol	Identified Sensitivity	
		By DFFE Screening Report	By Specialist / EAP
Bats (Wind) Assessment	**Not Determined.**	**High Sensitivity**	**Medium Sensitivity**
	Comment: Based on current taxonomic information and field data, no threatened species were recorded or expected to occur on site. The acoustic monitoring results show that the median number of bat passes/hour per night at height (50 m and 100 m) would classify the study area as high sensitivity for Egyptian free-tailed bat (except during winter) and moderate to low sensitivity for Cape serotine and Roberts's flat-headed bat depending on season. The outcome of the SSV is that the overall sensitivity of the site varies by bat species and season, linked to their relative activity levels. However, the two sensitivities are based on different data types. The Screening Tool is based on broad scale habitat data whereas the SSV is based on bat collision risk with wind turbines derived from activity data collected within the project boundary and is therefore a better approximation of the project sensitivity because collision is the primary impact. As such the SSV **disputes** the current environmental sensitivity of the proposed project area, arguing that the sensitivity should be reduced to low for Cape serotine, low-medium for Roberts's flat-headed bat and high for Egyptian free-tailed bat.		

4.2 Specialist Methodology

In order to evaluate the potential environmental impacts, information relating to the existing environmental conditions were collected through field and desktop research; this is known as the baseline. Climate change is expected to affect the proposed development site over the lifetime of the proposed development; however, the nature, scale and severity of climate change effects are uncertain. Given this uncertainty, the existing environment is assumed to remain constant throughout the lifetime of the proposed development, and forms the current and future baseline for the impact assessments.

4.2.1 Soils, Land Use and Agricultural Potential

The terms of reference for the study, was to fulfill the requirements of the *Protocol for the specialist assessment and minimum report content requirements of environmental impacts on agricultural resources by onshore wind and/or solar photovoltaic energy generation facilities where the electricity output is 20 megawatts or more*, gazetted on 20 March 2020 in GN 320 (in terms of Sections 24(5)(A) and (H) and 44 of NEMA, 1998).

The specialist undertook a desk-based assessment of existing soil and agricultural data for the site. Soil data was sourced from the land type data set provided by the DAFF (Department of Agriculture, Forestry and Fisheries). Satellite imagery of the site was sourced from Google Earth. Land capability data, field crop boundaries and rainfall and evaporation data were all sourced from various data applications and data sets.

A site investigation was not considered necessary for this assessment, including for the site sensitivity verification as the land capability limitation is predominantly a function of climate, which cannot be usefully informed by a site assessment.

Based on the specialists' verification of the site as 'less than high' sensitivity, the level of agricultural assessment followed by the specialist was an Agricultural Compliance Statement.

4.2.2 Freshwater and Wetlands (Aquatics)

The methodology used by the specialist was developed with the renewable industry in mind, coupled with the minimum requirements stipulated by DFFE and the Department of Human Settlement, Water and Sanitation (DHSWS). The study followed the approaches of several national guidelines regarded for aquatic assessments. These were then modified by the specialist, to provide a relevant mechanism of assessing the present state of the study systems applicable to the specific environment, and in a clear and objective manner, assess the potential impacts associated with the proposed development site. The methodology also included the considerations of the Macfarlene & Bredin (2017) buffer models and revisions to the SANBI National Wetland Inventory.

The assessment made use of the National Wetland Classification System (NWCS) approach and included delineating any natural waterbodies and assessing the potential consequences of the proposed development on the surrounding watercourses.

The findings of the specialist assessment were supported by baseline data collected over several site visits for other renewable energy and Eskom related projects within the region, (spanning a number of years between 2012 - 2022) and a four-day site specific visit in February and March 2022.

The aquatic report was produced to meet the criteria to fulfil a Specialist Assessment Report as portions of the proposed development area were rated as very high sensitivity as per the DFFE Screening Tool.

4.2.3 Terrestrial Biodiversity

Methodology followed for the assessment included data sourcing and review, various site visits, and sampling. This is defined below:

- Data sources from the literature consulted, were used where necessary for the assessment of vegetation; ecosystems; and fauna, also in the assessment report.
- Six site specific visits were conducted between May 2021 to October 2022. During these visits, potential sensitive features within the site were investigated, validated, and characterised in the field including any pans, rocky outcrops and major drainage features that were observed in the field or from satellite imagery of the site. Particular attention was paid to the integrity of habitats present, as well as the broader ecological context in terms of connectivity and broad-scale ecological processes likely to be operating at the site.
- In order to characterise the biodiversity of the site, a number of sampling techniques were used, including direct sampling of the vegetation through vegetation surveys, as well as the use of camera traps distributed across the Loxton WEF cluster study area. The vegetation of the site was characterised through walk-through surveys distributed across the site, in which plant species lists for the different habitats observed were compiled. Specific attention was paid to the possible presence of SCC, as well as other species which are considered to be of ecological significance. Sensitive plant habitats such as wetlands, rock pavements and rocky slopes were specifically investigated and checked for the presence of plant SCC. The information collected on-site was used to identify no-go areas and sensitive features that would need to be avoided in order to minimise the potential impact of the development on sensitive habitats and associated species of concern.
- In order to characterise the fauna of the site and especially the possible presence of fauna of conservation concern such as the Riverine Rabbit, camera traps were located across the greater Loxton Cluster site within riparian habitats associated with this species, as well as more general habitats across the site and including the Loxton WEF 3 site. A total of 40 cameras were distributed across the site and left in the field for 12 weeks, which is considered sufficient to characterise the fauna of the site and detect fauna of concern if present.

4.2.4 Riverine Rabbit

Habitat Delineation

In order to assess the availability, distribution and extent of potential Riverine Rabbit habitat within the Loxton Wind Energy Facility 3 site, satellite imagery was used to delineate and map areas of possible habitat. Such areas can be reasonably easily delineated from satellite imagery due to the specific habitat requirements of the Riverine Rabbit. According to the IUCN 2016 Mammal Red List Assessment "The Riverine Rabbit inhabits dense riparian growth along the seasonal rivers in the central Karoo (Nama-Karoo shrubland). Specifically, it occurs in riverine vegetation on alluvial soils adjacent to seasonal rivers." Such areas are readily visible on satellite imagery and can be mapped with a relatively high degree of accuracy and reliability. Within the study area, areas of habitat are restricted to the major drainage lines of the study site and in particular the drainage line which runs next to the R63 to the north of the site. Apart from areas deemed to be potentially suitable Riverine Rabbit habitat all major and minor drainage features of the site were mapped and included into the overall sensitivity mapping of the site.

Camera Trapping

Although it is relatively easily to delineate areas of potential habitat, confirming the presence of Riverine Rabbits within these areas is more difficult as this species is shy and not easily observed in the field. As a result, camera trapping was used to assess the

presence of Riverine Rabbits within the major areas of potential habitat that were identified in the mapping procedure for the whole Loxton Wind Cluster. However, although there was a strong focus on camera trapping within the areas considered to be optimal habitat, minor drainage features and areas considered to be marginal in terms of habitat type and condition were also included in the camera trapping to ensure that no areas where this species could be present were missed. The camera trapping was informed by the Riverine Rabbit Camera Trapping Guidelines developed by Endangered Wildlife Trust (EWT) specifically for the assessment of Riverine Rabbits within wind farm developments. The camera traps were placed in the field on the 16-17th of June 2022 and retrieved on the 19th of October 2021, giving rise to 16 weeks of camera trapping on-site. A minimum of 6 weeks is considered adequate in terms of the EWT guidelines. A total of 40 camera locations were distributed across the Loxton Cluster site and used to inform the study. The original cluster site is larger than the current project area for the three Loxton WEFs as some areas have been excluded from the projects due to the presence of various sensitivities including the Riverine Rabbit.

4.2.5 Karoo Dwarf Tortoise

Various literature and electronic data sources were examined to gather Karoo Dwarf Tortoise locality records. The appointed herpetologist also spent a total of four days (15 to 18 October 2022) visiting various areas within the three Loxton WEF sites. The main aims of the site investigations were to specifically search for evidence of actual occurrence of the Karoo Dwarf Tortoises by means of observations of live specimens or shell remains; and to assess the suitability (or not) of the terrain as habitat for this species. The specialist also had consultations with two tortoise specialists and a few landowners (unnamed) about the potential occurrence of the Karoo Dwarf Tortoise within the proposed development area.

4.2.6 Plant

Six site visits were conducted from May 2021 to October 2022. Potential sensitive features within the site were investigated, validated and characterised in the field including any pans, rocky outcrops and major drainage features that were observed in the field or from satellite imagery of the site.

Sampling approaches used include characterising vegetation of the site through surveys distributed across the site. Plant species lists for the different habitats observed were compiled and analysed further through an in-depth desktop study. Specific attention was paid to the presence of species of conservation concern (SCC) as well as other species which are considered to be of ecological significance.

4.2.7 Avifauna

As part of the feasibility investigations towards the suitability for the development of a wind farm, an Avifaunal Screening Assessment and Nest Survey for the site was conducted and the developable area was refined on the basis of identified avifaunal constraints. This included running the Verreaux's Eagle Risk Assessment (VERA) model, to identify high and medium risk areas around known Verreaux's Eagle nests. Following the initial feasibility assessment, the specialist conducted the necessary 12 months' pre-construction bird monitoring which was initiated on site in July 2021 and completed in May 2022. Each seasonal Site Visit consisted of approximately 14 consecutive days by a team of four skilled observers, to record data on bird species and abundance on and near site. These seasonal site visits covered: summer (when summer migrants are present); winter (when raptors breed and Blue Cranes flock); spring (when summer migrants are arriving on site and many species start to breed; and autumn (when summer migrants are leaving and many raptors are preparing to breed).

Following the 12-month monitoring programme for the developable area the Avifaunal Impact Assessment Report was produced. The report and monitoring programme followed the "Protocol for the Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on Avifaunal Species by Onshore Wind Energy Generation Facilities where the Electricity Output is 20 Megawatts or More" (Government Gazette 43110, GN 320, 20 March 2020).

The 12-month monitoring programme included the following and is represented in Plate 4.1 below:

Sample counts of small terrestrial species - Transects were counted by two observers walking along a line recording all birds seen and heard within 200 m either side,

Counts of large terrestrial species and raptors - Transects were counted by driving slowly (40-50km/hr) along the transect scanning for birds. Every two kilometres or at suitable vantage points observers got out of the vehicle to stand and scan with binoculars.

Focal site surveys and monitoring - Focal Sites were surveyed at least once on each site visit and comprised at least 15 - 20 minutes of observation for breeding activity around the nest of interest, or a count of the birds using a dam site. Four Verreaux's Eagle nests identified during screening (FS 1, 2, 3 and 5) were designated as Focal Sites. As monitoring progressed, four of the larger dams on site were identified as important for waterfowl counts (FS 6, 12, 13 and 16). Other raptor nests, a Hamerkop nest and arable land were also included as Focal Sites, and Ludwig's Bustard lekking activity was noted at what became FS 14 and 15.

Incidental observations - This monitoring programme comprised a significant amount of field time on site by the observers, much of it spent driving between the above activities. As such, it is important to record any other relevant information whilst on site. All other incidental sightings of priority species (and particularly those suggestive of breeding or important feeding or roosting sites or flight paths) within the broader study area were recorded. As far as possible, field teams attempted to avoid recording resident species in the same location on consecutive days, however some replication is highly probable, particularly between site visits.

Direct observation of bird flight on site - The aim of direct observation is to record bird flight activity on site. An understanding of this flight behaviour will help explain any future interactions between birds and the wind farm. Spatial patterns in bird flight movement may also be detected, which will allow for input into turbine placement. Direct observation was conducted through counts at a number of fixed Vantage Points (VPs) in the study area. These VPs provided coverage of a reasonable and representative proportion of the entire study area. VP's were identified using GIS (Geographic Information Systems), and then fine-tuned during the project setup, based on access and other factors such as viewsheds and a representation of habitats. Since these VPs aim at capturing both usage and behavioural data, they were positioned mostly on high ground to maximise visibility. The survey radius for VP counts is 2 kilometres (although large birds are sometimes detected further). Vantage Point counts were conducted by two observers and birds were recorded 360° around observers. Data should be collected during representative conditions, so the sessions were spread throughout the day, with each VP being counted over 'early to mid-morning', 'mid-morning to early afternoon', and 'mid-afternoon to evening'. Each VP session was 4 hours long, which is believed to be towards the upper limit of observer concentration span, whilst also maximising duration of data capture relative to the travel time to the Vantage Points. A maximum of two VP sessions were conducted per day, to avoid observer fatigue compromising data quality. At least 48 hours of Vantage Point observation was collected per Vantage Point, with certain VPs receiving a total of 72 hours of observation in compliance with the Verreaux's Eagle guidelines and VERA model identified areas (BirdLife South Africa 2017, 2021).

One of the most important attributes of any bird flight event is its height above ground, since this will determine its risk of collision with turbine blades. Since it is possible that the turbine model (and hence the exact height of the rotor swept zone) could still change on this project, actual flight height was estimated rather than assigning flight height to broad bands (such as proposed by Jenkins *et al.* 2015). This 'raw' data will allow flexibility in assigning to classes later on depending on final turbine specifications.

Control site - At this site, two Vantage Points (12 hours per VP, per Site Visit), one Driven Transect and three Walked Transects were monitored in addition to the main site. The findings from the control site are not presented but are available for comparison post-construction where necessary.

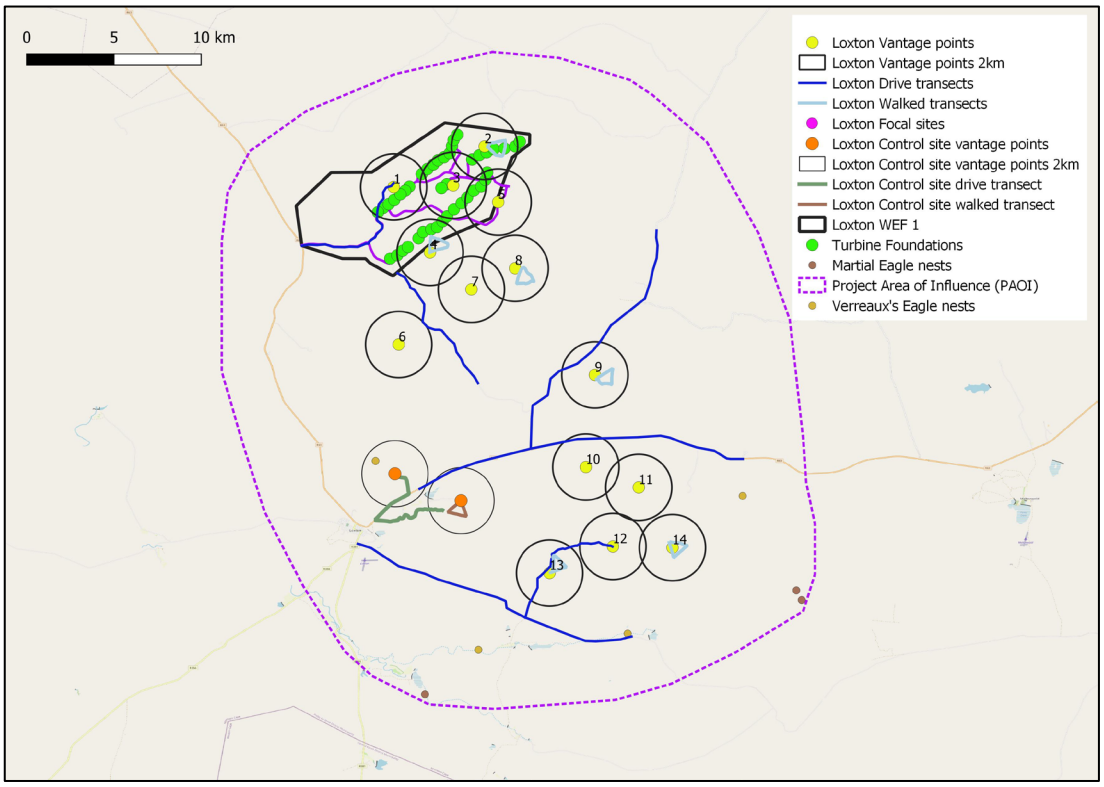

Plate 4-1: Pre-construction bird sampling methods at the proposed development site.

4.2.8 Bats

The specialist undertook a desktop study assessment and an Area of Influence (AoI) was defined as the proposed site area plus a 10 km buffer given that bats are volant mammals (Scottish Natural Heritage 2019). The AoI was first studied at a desktop level to determine which bat species (i.e., impact receptors) are likely to occur at the project, to provide information on their natural history and conservation status, and to contextualise the project site within the larger social-ecological environment with respect to bats. Bats were also studied through 12 months of field surveys which began on 6 November 2021 and completed in November 2022 based on best practise in South Africa (MacEwan et al. 2020). The field data, as well as the desktop information was used to assess impacts.

During the field surveys, bat activity was sampled at 10 locations with Wildlife Acoustics, Inc. SM4 bat detectors. Because a preliminary turbine layout was available, the study design was focused on surveying areas within the project boundary where turbines were likely to be installed. In addition, the study design prioritised collecting bat activity at height because seven meteorological towers were present on site. At three locations, SMM-U2

microphones were positioned at the top of a 10 m aluminium mast. At seven locations, microphones were positioned on a meteorological tower at 50 m and 100 m respectively. Sampling took place nightly from sunset to sunrise.

The EIA assessment is based on 366 nights of bat monitoring data. The sampling period included winter (92 nights), spring (92 nights), summer (90 nights) and autumn (92 nights). The monitoring period spans an annual cycle and is a representative sample of annual bat activity patterns and the variability across seasons.

Roost surveys were undertaken which entailed discussions with landowners to locate any known roosts or potential roosts with evidence of bats. In addition, buildings at farmsteads within the AoI, as well as accessible rocky outcrops/crevices, were systematically surveyed during field visits in April 2022 (autumn), May 2022 (autumn), and September 2022 (spring). The surveys aimed to directly observe roosting bats, locate evidence of roosting bats (e.g., culled insect remains, fur-oil-stained exit and entry points, guano/droppings), and assess the likelihood for each potential roost to support bats.

Acoustic data retrieved from each bat detector were processed using Kaleidoscope® Pro (Version 5.4.2, Wildlife Acoustics, Inc.). Bats were automatically identified using the embedded "Bats of South Africa Version 5.4.0" reference library and verified by inspecting echolocation files. The number of acoustic files recorded was used as a measure to quantify bat activity. The number of acoustic files recorded was used as a measure to quantify bat activity. The metric used was "bat passes per recording hour" and was calculated by dividing the total number of bat passes recorded each night by the total number of recording hours each night. "Bat passes per recording hour" was used to rank the magnitude of bat activity as either low, medium, or high.

4.2.9 Noise

This study considered local regulations and both local and international guidelines, using the terms of reference proposed by SANS 10328:2008 for a comprehensive Environmental Noise Impact Assessment ('ENIA') and as proposed by the requirements specified in the Assessment Protocol for Noise that were published on 20 March 2020, in Government Gazette 43110, GN 320. The study also considered the noise limits as proposed by IFC which is based on studies completed by the World Health Organization ('WHO').

Ambient sound levels were measured previously in areas with a similar developmental character. The data indicate ambient sound levels are generally low, with faunal and other natural sounds as the main source of noise in the area. Wind-induced noises influence ambient sound levels during periods with increased winds, with the ambient sound levels determined by numerous factors (vegetation type and density, faunal species in the area, etc.).

Due to a number of wind turbines proposed within an area with a potential high sensitivity to noise, a full environmental noise impact study was be conducted. The initial assessment was a desktop study and was assessed in terms of the Noise Sensitivity Theme using the National Web-based Environmental Screening Tool. Basic predictive models were also used to identify potential issues of concern.

Residential areas and potential noise-sensitive developments / receptors / communities (NSR) were identified using aerial images up to a distance of 2 000 m (recommendation SANS 10328:2003) from potential turbine locations. The statuses of these structures were verified during the site visit in June 2022 during periods with low winds. The ambient sound levels were measured in terms of Government Notice Regulation 320 of March 2020.

4.2.10 Heritage and Archaeology

A desk-based review of available literature was carried out prior to the field survey to assess the general heritage context into which the development would be set. Maps and aerial photographs were sourced from Google Earth and Geo-spatial Information applications. Background data specific to the site were sourced from the South African Heritage Resources Information System (SAHRIS). Data was also collected via a field survey by two archaeologists subjected to a detailed foot survey on 25 June 2022.

4.2.11 Palaeontology

The study included desktop and field-based palaeontological heritage study based on information resources and the specialist expertise. The study outlined and mapped the recorded fossil sites, their scientific / conservation value and their geological context. Minimum standards for the palaeontological component of heritage impact assessment reports (PIAs) have recently been published by SAHRA (2013) and Heritage Western Cape (2021) and was considered for the development of the study.

4.2.12 Visual / Landscape

The visual assessment methodology included the following steps:

- A 3D digital terrain model of the study area was prepared in order to determine the viewshed of the project, based on the preliminary layout.
- Potential sensitive receptors, such as farmsteads along the route, were identified using the viewshed map, Google Earth and a site visit.
- Landscape features and sensitive receptors were mapped together with recommended buffers for wind turbines, buildings, roads and powerlines.
- Field work was used to verify the existence and significance of landscape features and receptors in order to refine the visual mapping layers.
- A photographic record was made with the emphasis on views from potential sensitive receptors (mainly surrounding farmsteads and guest farms) at varying distances.
- The panoramic photographs, which included their GPS positions, were used to create the photomontages.
- Potential visual impacts relating to the proposed WEF for construction, operational and decommissioning phases of the project were assessed along with their relative significance.
- Mitigation measures to avoid or minimise potential negative visual impacts were formulated.
- Cumulative visual impacts in relation to other existing and proposed wind energy facilities and grids in the area were assessed.
- Impact significance ratings were determined based on the methodology provided by Arcus.

A site visit was carried out from 19 to 21 September 2022. The season was not a consideration for the visual assessment, but clear visibility was required for the photographic survey.

4.2.13 Socio-Economic

The approach to the SIA study was based on the Western Cape Department of Environmental Affairs and Development Planning Guidelines for Social Impact Assessment (February 2007) and IAIA Guidance for Assessing and Managing Social Impacts (2015). These guidelines are based on international best practice. In this regard the study involved:

- Review of socio-economic data for the study area.
- Review of relevant planning and policy frameworks for the area.

- Review of information from similar studies, including the SIAs undertaken for other renewable energy projects.
- Site visit and interviews with key stakeholders.
- Identifying the key potential social issues associated with the proposed project.
- Assessing and assessing the significance of social impacts associated with the proposed project.
- Identification of enhancement and mitigation measures aimed at maximizing opportunities and avoiding and or reducing negative impacts.

4.2.14 Traffic and Transportation

The South African Traffic Impact and Site Traffic Assessment Standards (2014), and the Manual for Traffic Impact Studies (1995), form the basis for this traffic impact assessment. A Traffic Impact Assessment was compiled in line with guidelines for technical appraisal of the traffic impact of the proposed developments on the existing road network within a study area, during the construction, operation and decommissioning phases of the Loxton WEF. A site visit is to be conducted once the position of the WTG has been finalised.

Traffic generation estimates used in the traffic assessment was based on the experience of similar projects. The following steps were undertaken and is considered the methodology used for the impact assessment:

- A road network was identified within the study area using desktop analysis and screening of the area.
- The number of vehicle trips generated during construction, operation and decommissioning phases were established.
- The mode of transport, vehicle type and size for each trip was determined.
- Peak-hour vehicles trip rates were generated for the various project phases.
- Significance and severity of development-related traffic was identified for the existing road network. Existing traffic volumes on the roads were compared against estimated traffic generated for the proposed development.
- Mitigation measures were identified.

4.2.15 Stormwater Management

An in-depth desktop study was undertaken by the specialist in March 2023 which included identifying the pre-liminary stormwater-related matters which may arise during the different phases of the development.

4.2.16 Geotechnical Study

An in-depth desktop study was undertaken by the specialist in February 2023 which included review of available geological records, maps, site topography via the Digital Elevation Model (DEM)-sourced elevation data, and an evaluation of the specialists' geotechnical database of projects conducted near the project area and within similar geotechnical and geological zonation / sequences.

4.2.17 Wake Effect Analysis

The applicant conducted an internal wake effect impact analysis report to calculate the impact that the Loxton WEF 3 would have the on selected surrounding wind farms, using the N163/5.X (5.9) TC120 wind turbine model. The assessment was based on up to 1 year of data from 6 meteorological towers and 6 months of data from 1 meteorological tower, all of them located in the project area and nearby reanalysis long-term data.

4.3 Identification of Potential Impacts

The identification of potential impacts covers the three phases of the proposed development: construction, operation and decommissioning. During each phase, the potential environmental impacts may be different. For example, during the construction phase, traffic volumes are far greater than during the operational life of a WEF.

The project team has experience from environmental studies for other projects in the locality of the proposed development. The team is, therefore, able to identify potential impacts addressed in the EIA based on their experience and knowledge of the type of development proposed and the local area. Their inputs inform the scope for the S&EIA process.

Each specialist assessment considered:

- The extent of the impact (local, regional or (inter) national);
- The intensity of the impact (low, medium or high);
- The duration of the impact and its reversibility;
- The probability of the impact occurring (improbable, possible, probable or definite);
- The confidence in the assessment; and
- Cumulative impacts.

Following identification of potential environmental impacts, the baseline information was used to predict changes to existing conditions and undertake an assessment of the impacts associated with these changes.

4.3.1 Assessment of Potential Impacts

The potential impact that the proposed development may have on each environmental receptor could be influenced by a combination of the sensitivity or importance of the receptor and the predicted degree of alteration from the baseline state (either beneficial or adverse).

Environmental sensitivity (or importance) may be categorised by a multitude of factors, such as the rarity of the species; transformation of natural landscapes or changes to soil quality and land use. The overall significance of a potential environmental impact is determined by the interaction of the above two factors (i.e. sensitivity/importance and predicted degree of alteration from the baseline).

A 7-step approach for the determination of significance of potential impacts was developed by Arcus to align with the requirements of Appendix 3 of the EIA Regulations, 2014 (as amended). This 7-step approach was adapted from standard ranking metrics such as the Hacking Method, Crawford Method etc. and complies with the method provided in the EIA guideline document (GN 654 of 2010) and considers international EIA Regulatory reporting standards such as the newly amended European Environmental Impact Assessment (EIA) Directive (2014/52/EU).

Specialists, in their terms of references, were supplied with this standard method with which to determine the significance of impacts to ensure objective assessment and evaluation, while enabling easier multidisciplinary decision-making.

The approach is both objective and scientific based to allow appointed specialists and EAPs to retain independence throughout the assessment process.

The 7-Step approach for determining the significance of impacts pre, and post mitigation, is described below:

- **Step 1**: Predict potential impacts by means of an appraisal of:
    - Site Surveys,
    - Project-related components and infrastructure,

- Activities related with the project life-cycle,
- The nature and profile of the receiving environment and potential sensitive environmental features and attributes,
- Input received during public participation from all stakeholders, and
- The relevant legal framework applicable to the proposed development

- **Step 2**: Determination of whether the potential impacts identified in **Step 1** will be *direct* (caused by construction, operation, decommissioning or maintenance activities on the proposed development site or immediate surroundings of the site), *indirect* (not immediately observable or do not occur on the proposed development site or immediate surroundings of the site), *residual* (those impacts which remain after post mitigation) and *cumulative* (the combined impact of the project when considered in conjunction with similar projects in proximity).
- **Step 3**: Description and determination of the significance of the predicted impacts in terms of the criteria below to ensure a consistent and systematic basis for the decision-making process. Significance is numerically quantified on the basis score of the following impact parameters:

1. ***Extent*** **(E)** of the impact: The geographical extent of the impact on a given environmental receptor.
2. ***Duration*** **(D)** of the impact: The length of permanence of the impact on the environmental receptor.
3. ***Reversibility*** **(R) of the impact**: The ability of the environmental receptor to rehabilitate or restore after the activity has caused environmental change
4. ***Magnitude*** **(M)** of the impact: The degree of alteration of the affected environmental receptor.
5. ***Probability*** **(P)** of the impact: The likelihood of the impact actually occurring.

A widely accepted numerical quantification of significance is the formula:

$$\underline{\mathbf{S=(E+D+R+M)*P}}$$

Where: *Significance=(Extent+Duration+Reversibility+Magnitude)*Probability*

The following has also been considered when determining the significance of a potential impact.

6. **Nature (N)** of the impact: A description of what causes the effect, what will be affected, and how it will be affected.
7. **Status (S)** of the impact: described as either positive, negative or neutral
8. **Cumulative impacts**.
9. Inclusion of **Public comment.**

The significance of environmental impacts is determined and ranked by considering the criteria presented in **Table 4.2** below. All criteria are rank according to 'Very Low', 'Low', 'Moderate', 'High' and 'Very High' and are assigned scores of 1 to 5 respectively.

Table 4-2: Defining the significant in terms of the impact criteria.

Impact Criteria	Definition	Score	Criteria Description
Extent (E)	Site	1	Impact is on the site only
	Local	2	Impact is localized inside the activity area
	Regional	3	Impact is localized outside the activity area
	National	4	Widespread impact beyond site boundary. May be defined in various ways, e.g. cadastral, catchment, topographic

Impact Criteria	Definition	Score	Criteria Description
	International	5	Impact widespread far beyond site boundary. Nationally or beyond
Duration (D)	Immediate	1	On impact only
	Short term	2	Quickly reversible, less than project life. Usually up to 5 years.
	Medium term	3	Reversible over time. Usually between 5 and 15 years.
	Long term	4	Longer than 10 years. Usually for the project life.
	Permanent	5	Indefinite
Magnitude (M)	Very Low	1	No impact on processes
	Low	2	Qualitative: Minor deterioration, nuisance or irritation, minor change in species/habitat/diversity or resource, no or very little quality deterioration. Quantitative: No measurable change; Recommended level will never be exceeded.
	Moderate	3	Qualitative: Moderate deterioration, discomfort, Partial loss of habitat /biodiversity /resource or slight or alteration. Quantitative: Measurable deterioration; Recommended level will occasionally be exceeded.
	High	4	Qualitative: Substantial deterioration death, illness or injury, loss of habitat /diversity or resource, severe alteration or disturbance of important processes. Quantitative: Measurable deterioration; Recommended level will often be exceeded(e.g. pollution)
	Very High	5	Permanent cessation of processes
Reversibility (R)	Reversible	1	Recovery which does not require rehabilitation and/or mitigation.
	Recoverable	3	Recovery which does require rehabilitation and/or mitigation.
	Irreversible	5	Not possible, despite action. The impact will still persist, and no mitigation will remedy or reverse the impact.
Probability (P)	Improbable	1	Not likely at all. No known risk or vulnerability to natural or induced hazards
	Low Probability	2	Unlikely; low likelihood; Seldom; low risk or vulnerability to natural or induced hazards
	Probable	3	Possible, distinct possibility, frequent; medium risk or vulnerability to natural or induced hazards.
	Highly Probable	4	Highly likely that there will be a continuous impact. High risk or vulnerability to natural or induced hazards
	Definite	5	Definite, regardless of prevention measures.

The *significance* (s) of potential impacts identified according to the criteria above has been colour coded for the purpose of comparison. This colour coding will be used in impact tables.

Significance is deemed Negative (-)	Significance is deemed Positive (+)

0 - 30	31 - 60	61 - 100	0 - 30	31 - 60	61 - 100
Low	Moderate	High	Low	Moderate	High

- **Step 4**: Determination of practical and reasonable mitigation measures based on specialists' inputs and field observations following the mitigation hierarchy (avoid, minimise, manage, mitigate, or rehabilitate).
- **Step 5**: Evaluation of predicted residual impacts after implementation of mitigation measures.
- **Step 6**: Determination of the significance of the impact taking into consideration the predicted residual impacts after implementation of mitigation measures.
- **Step 7**: Based on an acceptable significance of the impact, determination of the need and desirability of the proposed development and an opinion as to whether the development should proceed or not.

The Assessment of the significance of potential impacts is then populated in an Impact Summary Table, see Section 10 of this Report for the specialists' potential impact assessments.

4.3.2 Mitigation

The EIA proposes measures to avoid, reduce or remedy significant adverse impacts which were identified; these are termed mitigation measures. Where the assessment process identified any significant adverse impacts, mitigation measures were proposed to reduce those impacts where practicable. Such measures include the physical design evolutions such as movement of turbines and management and operational measures. Design alterations such as relocating turbines to avoid certain sensitive receptors are mitigation embedded into the design of the proposed development, i.e. embedded mitigation.

This strategy of avoidance, reduction and remediation is a hierarchical one which seeks:

First to avoid potential impacts;

- Then to reduce those which remain; and
- Lastly, where no other measures are possible, to propose compensatory measures.

Each specialist consultant identified appropriate mitigation and enhancement measures (where relevant).

4.3.3 Cumulative Impact Assessment

In accordance with the EIA Regulations, consideration is also given to 'cumulative impacts'.

By definition, cumulative impacts are those that result from incremental changes caused by past, present or reasonably foreseeable future actions together with the proposed development. Cumulative impacts are the combined impacts of several developments that are different to the impacts from the developments on an individual basis. For example the landscape impact of one WEF may be insignificant, but when combined with another it may become significant.

For the purpose of this assessment cumulative impacts is defined and has been assessed in the future baseline scenario, i.e. cumulative impact of the proposed development = change caused by proposed development when added to the cumulative baseline. The cumulative baseline includes all other identified developments. In the cumulative assessment the effect of adding the proposed development to the cumulative baseline is assessed.

In line with best practice, the scope of this assessment will include all operational, approved or current and planned renewable energy applications (including those sites under appeal), within a 35 km radius of the site. Therefore, all potential projects are included, even though it is unknown how many of these will actually be constructed.

Renewable energy sites included for cumulative impact assessment are based on the knowledge and status of the surrounding areas at the time of the specialists compiling their assessments, these will be updated as applicable through the EIA process.

A preliminary assessment of cumulative impacts were made in the Scoping Phase and has been assessed further in this EIA Phase (refer to Section 11).

5 NEED AND DESIRABILITY

Reference is made to the DFFE 2017 Guideline on Need and Desirability[6] which states that while the "*concept of need and desirability relates to the type of development being proposed, essentially, the concept of need and desirability can be explained in terms of the general meaning of its two components in which need refers to time and desirability to place – i.e. is this the right time and is it the right place for locating the type of land-use/activity being proposed? Need and desirability can be equated to wise use of land – i.e. the question of what is the most sustainable use of land*."

The Need and Desirability of the proposed development has been considered in terms of the regional location and the project's cumulative impact. The guidelines pose questions that should be considered in this investigation, which are addressed in the Table 5.1 and Table 5.2 below.

[6]DEA (2017) Guideline on Need and Desirability. Department of Environmental Affairs (DEA), Pretoria, South Africa, ISBN: 978-0-9802694-4-4.

Table 5-1: Ecological Considerations of Need and Desirability for the Loxton WEF 3

"securing ecological sustainable development and use of natural resources"[7]			
Question		**Answer**	**Reference**
How will this development (and its separate elements/aspects) impact on the ecological integrity of the area?		With the effective implementation of the suggested mitigation and avoidance, it is unlikely that the development of the Loxton Wind Facility 3 would significantly compromise the long-term ecological integrity and associated ecosystem services of the affected FEPA Subcatchment.	Volume II: Terrestrial Biodiversity Impact Assessment
How were the following ecological integrity considerations taken into account?	*Threatened Ecosystems*	There are no threatened ecosystems within the site, which was verified through inspection of the ecosystem status maps as included in the 2018 NBA.	Volume II: Terrestrial Biodiversity Impact Assessment
	Sensitive, vulnerable, highly dynamic or stressed ecosystems, such as coastal shores, estuaries, wetlands, and similar systems require specific attention in management and planning procedures, especially where they are subject to significant human resource usage and development pressure	An ecological sensitivity map of the site was produced by integrating information collected on-site with available ecological and biodiversity information. Sensitive features such as wetlands, drainage lines, water bodies, steep slopes and rocky outcrops were mapped and appropriately buffered. The areas mapped as Very High sensitivity are considered no-go areas for wind turbines but may be traversed by overhead cables or turbine access roads where required, subject to review. The areas mapped as High sensitivity represent other sensitive features such as minor drainage lines or slopes deemed to be sub-optimal as Karoo Dwarf Tortoise habitat. These areas should also be avoided by turbines as much as possible, but some habitat loss in these areas is considered acceptable. Under the layout provided for the assessment, there are no turbines in areas mapped as Very High or in the High sensitivity areas. As a result, the development of the Loxton 3 WEF would avoid significant impact on the major ecological features of the site.	Volume II: Terrestrial Biodiversity Impact Assessment
	Critical Biodiversity Areas ("CBAs") and Ecological Support Areas ("ESAs")	Despite the relatively high footprint of the Loxton Wind Energy Facility 3 within CBAs, the current study finds that that overall consequence of development within the CBAs of the site can be assessed as low due to the extensive avoidance that has been implemented. The Northern Cape CBA map relies extensively on biodiversity surrogates and the maintenance of broad-scale process features. As such, the CBA map for the study area is not well under-pinned by biodiversity pattern features and is largely driven by broad-scale vegetation and landscape features, with only moderate alignment between the results of the CBA mapping the specialist findings for the current study.	Volume II: Terrestrial Biodiversity Impact Assessment

[7]Section 24 of The Constitution of South Africa refers.

"securing ecological sustainable development and use of natural resources"[7]			
Question		**Answer**	**Reference**
	Conservation targets	Under the layout provided for the current assessment, there are three turbines located marginally within CBA 1s and the remaining 38 turbines are located within the CBA 2. Since the layout takes account of the fine-scale mapping of biodiversity features, the impact of the Loxton WEF 3 on biodiversity features would be relatively low and while there would be some residual impact on the affected CBAs, it is unlikely that the development would compromise the overall ecological functioning of the area and the affected CBAs.	Volume II: Terrestrial Biodiversity Impact Assessment
	Ecological drivers of the ecosystem	As the broader area is still largely intact, and most direct impacts are associated with the relatively short, transient, construction phase, cumulative impacts associated with the current project are considered low and acceptable. There do not appear to be any ecological processes or corridors that would be specifically disrupted by the Loxton WEF 3. In addition, should all the planned projects in the area be built, the overall extent of habitat loss would not be significant relative to the overall extent of the affected vegetation types. As such, the contribution of the Loxton WEF 3 to habitat loss would not change the overall threat status of any vegetation types or special habitats and the overall level of cumulative impact in the area is considered acceptable.	Volume II: Terrestrial Biodiversity Impact Assessment
	Environmental Management Framework	The proposed Loxton WEF 3 complies with all policies and planning tools and has no intersections with EMFs or with any development zones according to the DFFE screening tool report.	n/a
	Spatial Development Framework	The Northern Cape Provincial Spatial Development Framework (SDF) of 2012 highlights that renewable energy sources such as solar thermal and wind, comprise 25% of the Northern Cape's energy generation capacity by the year 2020, and should be progressively phased in as appropriate into the province. The SDF further sets out energy objectives, which include the following: • To promote the development of renewable energy supply schemes; • Construct a 400 kV transmission power line from Ferrum Substation (near Kathu/Sishen) to Garona Substation (near Groblershoop); • Reinforce additional electricity supply especially renewable energy projects; and • Develop and implement innovative energy technologies to improve access to reliable, sustainable and affordable energy services. Also recognize that the objective should be to obtain sustainable economic growth. Lastly, the PSDF notes that the Northern Cape need to develop large-scale renewable energy supply schemes in order to address the growing demand in energy and to promote a green economy in the province.	Volume II: Social Impact Assessment

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Question		**Answer**	**Reference**
	Global and international responsibilities relating to the environment (e.g. RAMSAR sites, Climate Change, etc.)	All global responsibilities to which South Africa is signatory or party to were assessed within this report. Applicable international treaties and conventions are: • UNFCCC Paris Agreement (2016) • The Equator Principles IIII (2020) • The Convention on Biological Diversity (CBD) (1993) • The Convention on the Conservation of Migratory Species of Wild Animals (CMS or Bonn Convention) (1983) • The Agreement on the Conservation of African-Eurasian Migratory Waterbirds (AEWA) (1999) The proposed development complies with all international responsibilities.	n/a
How will this development disturb or enhance ecosystems and/or result in the loss or protection of biological diversity? What measures were explored to firstly avoid these negative impacts, and where these negative impacts could not be avoided altogether, what measures were explored to minimise and remedy (including offsetting) the impacts? What measures were explored to enhance positive impacts?		The proposed development can disturb listed plant species and vegetation from clearing of the development footprint, soil erosion and alien plant invasion. Increased levels of pollution, noise, disturbance and human presence can impact negatively on faunal communities. Biodiversity value and ecological functioning of the proposed development area are potentially affected by the development. As part of the EIA process specialist studies were conducted to identify areas most environmentally suitable for development within the proposed development site boundary. As a result of these studies a development layout has been produced that avoids sensitive areas and identified constraints. The specialists have proposed mitigation measures to further reduce residual risks or enhance opportunities during construction, operation and decommissioning phases of the development. With implementation of these mitigation measures, all identified negative impacts are expected to be reduced to acceptable levels of medium or low negative significance. All mitigation measures proposed by the specialists are included in the EMPr for the project.	Volume I App B: EMPr Volume II: Specialist reports
How will this development pollute and/or degrade the biophysical environment? What measures were explored to firstly avoid these impacts, and where impacts could not be avoided altogether, what measures were explored to minimise and remedy (including offsetting) the impacts? What measures were explored to enhance positive impacts?		On a national level the development will lessen the country's dependency on coal, and contribute to lowering water consumption, pollution and environmental degradation per kW of electricity produced. The EMPr provides measures for avoidance and minimisation of pollution, as well as enhancing any potential positive impacts.	Volume I App B: EMPr

"securing ecological sustainable development and use of natural resources"[7]			
Question		**Answer**	**Reference**
What waste will be generated by this development? What measures were explored to firstly avoid waste, and where waste could not be avoided altogether, what measures were explored to minimise, reuse and/or recycle the waste? What measures have been explored to safely treat and/or dispose of unavoidable waste?		The generation of waste will largely be restricted to the construction phase of the project and consist of normal construction phase solid waste streams. The EMPr will detail specific mitigation measures that must be implemented for the appropriate management and minimisation of waste, during all phases of the project. Registered service providers will be utilised to transport solid waste to registered landfills.	Volume I App B: EMPr
How will this development disturb or enhance landscapes and/or sites that constitute the nation's cultural heritage? What measures were explored to firstly avoid these impacts, and where impacts could not be avoided altogether, what measures were explored to minimise and remedy (including offsetting) the impacts? What measures were explored to enhance positive impacts?		Visual buffers are applied to cultural landscapes / heritage sites. The development layout is produced by avoiding turbine placement within these visual buffers. A Heritage Impact Assessment and a Visual Impact Assessment were conducted to assess the proposed layout. Comment from the relevant heritage authority has been sought. Mitigation measures have been identified by the heritage specialists to minimise and remedy residual impacts, and enhance positive impacts.	Volume II: Heritage Impact Assessment & Visual Impact Assessment
How will this development use and/or impact on non-renewable natural resources? What measures were explored to ensure responsible and equitable use of the resources? How have the consequences of the depletion of the non-renewable natural resources been considered? What measures were explored to firstly avoid these impacts, and where impacts could not be avoided altogether, what measures were explored to minimise and remedy (including offsetting) the impacts? What measures were explored to enhance positive impacts?		Wind is a renewable resource and will be the 'fuel' for the WEF to generate electricity. Therefore, the development will have a minimal impact on non-renewable resources.	n/a
How will this development use and/or impact on renewable natural resources and the ecosystem of which they are part? Will the use of the resources and/or impact on the		The WEF will use the renewable energy resource of wind to generate power. Construction of the WEF will require use of water, a renewable natural resource. Operation of the WEF will consume relatively small quantities of water when compared to alternative energy technologies such as coal. Impacts on the ecosystem caused by use of these renewable energy resources has been evaluated.	n/a
	Does the proposed development exacerbate the increased dependency on increased use of	The proposed WEF will reduce South Africa's dependency on non-renewable resources, particularly coal, as an energy source.	n/a

"securing ecological sustainable development and use of natural resources"[7]			
Question		**Answer**	**Reference**
ecosystem jeopardise the integrity of the resource and/or system taking into account carrying capacity restrictions, limits of acceptable change, and thresholds? What measures were explored to firstly avoid the use of resources, or if avoidance is not possible, to minimise the use of resources? What measures were taken to ensure responsible and equitable use of the resources? What measures were explored to enhance positive impacts?	*resources to maintain economic growth or does it reduce resource dependency (i.e. de-materialised growth)? (note: sustainability requires that settlements reduce their ecological footprint by using less material and energy demands and reduce the amount of waste they generate, without compromising their quest to improve their quality of life)*	Wind as an energy source is not dependant on water, as compared to the massive water requirements of conventional power stations, has a limited footprint and does not impact on large tracts of land, and poses limited pollution and health risks, specifically when compared to coal and nuclear energy plants.	
	Does the proposed use of natural resources constitute the best use thereof? Is the use justifiable when considering intra- and intergenerational equity, and are there more important priorities for which the resources should be used (i.e. what are the opportunity costs of using these resources this the proposed development alternative?)	The current land use is low-intensity grazing and the land is not suitable for other agricultural uses. The proposed development will increase yield as the landowners will be paid for the use of their land. This will improve cash flow and financial sustainability of farming enterprises on site. The proposed development itself will not cause a significant change in land use, as the development site is primarily low intensity agriculture (grazing), which can still proceed once the development is constructed. Wind is a renewable resource and a wind energy facility is the best use thereof. The WEF site would also be suitable for a solar facility, however the current land use would not be able to continue.	Volume II: Agricultural Impact Assessment; Social Impact Assessment
	Do the proposed location, type and scale of development promote a reduced dependency on resources?	The proposed WEF is predicted to reduce dependency on coal as an energy source. Wind as an energy source is not dependant on water, as compared to the massive water requirements of conventional coal fired power stations, has a limited footprint and does not impact on large tracts of land, and poses limited pollution and health risks, specifically when compared to coal and nuclear energy plants.	n/a
How were a risk-averse and cautious approach applied in terms of ecological impacts?	*What are the limits of current knowledge (note: the gaps, uncertainties and assumptions must be clearly stated)?*	Although the wind farm area is large with the result that not all areas could be sampled in detail, the project footprint area is considered to have been well-covered and it is highly unlikely that there are any significant vegetation features present that would not have been observed during the study. Given the favourable conditions at the time of the site visits, there are few limitations and assumptions required with regards to the vegetation of the site and the presence of plant SCC within the wind farm development footprint. Given the	

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Question		**Answer**	**Reference**
		amount of time spent on the site, the consultants' knowledge of the area and the favorable conditions at the time of the site visits, there are few limitations and assumptions required with regards to the vegetation of the site and the presence of plant SCC within the site. A number of limitations and assumptions are also inherent in the study regarding the fauna of the site including the following: • Camera trapping for fauna was conducted across the greater Loxton cluster site with 40 camera traps for a period of 12 weeks. This confirmed the presence of the Riverine Rabbit within the greater Loxton Cluster and within the Loxton WEF 3 site. • Although there were no camera trap observations of Riverine Rabbit from within the final boundaries of Loxton WEF 3 site, there were potential habitat present within the site and was assumed that the Riverine Rabbit is potentially present. • It is assumed that there are no Riverine Rabbits resident in areas outside of the riparian habitat, which is typically associated with this species in the Upper Karoo. This is considered to be a reasonable assumption, as this species is strongly associated with riparian vegetation within the study area. It is only in the southern population that Riverine Rabbits can usually be found outside of riparian areas. • It is assumed that since no other mammalian fauna of concern were camera trapped at the site, that there are indeed no such other species using the site on a regular basis. • There is potentially suitable habitat for the Karoo Dwarf Tortoise within the site and the possible presence and impact on this species was dealt with in a separate impact assessment report (Volume II).	
	What is the level of risk associated with the limits of current knowledge?	The risk associated with assumptions and limits of current knowledge is the potential for information being assessed to be incorrect. This would translate to erroneous impact identification and mitigation measures. However, due to the amount of site work conducted the risk associated with this is considered to be low.	
	Based on the limits of knowledge and the level of risk, how and to what extent was a risk-averse and cautious approach applied to the development?	Information on plant and animal species recorded for the wider area was extracted from the South African Biodiversity Information Facility (SABIF)/ SANBI Integrated Biodiversity Information System (SIBIS) database hosted by the South African National Biodiversity Institute (SANBI). Data was extracted for a significantly larger area than the study area, but this is necessary to ensure a conservative approach as well as counter the fact that the site itself has not been well sampled in the past	
How will the ecological impacts	*Negative impacts: e.g. access to resources, opportunity costs,*	Impacts on people's rights have been identified and assessed by the social specialist, visual specialist and noise specialist.	Volume II:

"securing ecological sustainable development and use of natural resources"[7]			
Question		**Answer**	**Reference**
resulting from this development impact on people's environmental right in terms following:	*loss of amenity (e.g. open space), air and water quality impacts, nuisance (noise, odour, etc.), health impacts, visual impacts, etc. What measures were taken to firstly avoid negative impacts, but if avoidance is not possible, to minimise, manage and remedy negative impacts?*	The visual specialist identified no g.o areas and areas most visually suitable for development. The significance of the potential negative health risks posed by the development (noise, shadow flicker, electromagnetic radiation) is expected to be low. The noise impact assessment found the level of noise impacts for the Loxton WEF 3 are expected to be of low significance with mitigation. The operational impact on the sense of place is expected to be of medium negative significance with or without mitigation.	Visual Impact Assessment; Social Impact Assessment; Noise Impact Assessment
	Positive impacts: e.g. improved access to resources, improved amenity, improved air or water quality, etc. What measures were taken to enhance positive impacts?	Renewable energy has fewer negative health effects than other forms of non-renewable energy generation and will have overall positive health benefits.	Volume II: Social Impact Assessment
Describe the linkages and dependencies between human wellbeing, livelihoods and ecosystem services applicable to the area in question and how the development's ecological impacts will result in socio-economic impacts (e.g. on livelihoods, loss of heritage site, opportunity costs, etc.)?		The findings of this Social Impact Assessment (SIA) conducted for the proposed Loxton WEF 3 indicates that during the construction and the operational phase of the proposed development project, various employment opportunities, with different levels of skills will be created. In addition, this will also create local business opportunities benefitting the socio-economic development of the local communities of Loxton and the surrounds. The proposed development also represents an investment in clean, renewable energy infrastructure, which, given the negative environmental and socio-economic impacts associated with a coal based energy economy and the challenges created by climate change, represents a significant positive social benefit for society as a whole.	Volume II: Social Impact Assessment
Based on all of the above, how will this development positively or negatively impact on ecological integrity objectives/targets/considerations of the area?		The ecology, avifauna, bat and aquatic specialists have all concluded that the development does not have unacceptable negative impacts that cannot be mitigated to a low or medium level of significance.	Volume II: Specialist Reports
Considering the need to secure ecological integrity and a healthy biophysical environment, describe how the alternatives identified (in terms of all the different elements of the development and all the different impacts being proposed), resulted in the selection of the "best practicable environmental option" in terms of ecological considerations?		Iterative specialists' constraints mapping identified the most suitable areas for development for which a development layout was then produced for assessment. The results of the specialist's studies further informed the development of the preferred layout.	Volume II: Specialist Reports

"securing ecological sustainable development and use of natural resources"[7]		
Question	**Answer**	**Reference**
Describe the positive and negative cumulative ecological/biophysical impacts bearing in mind the size, scale, scope and nature of the project in relation to its location and existing and other planned developments in the area?	In terms of cumulative impacts in and around the site, there are no built wind energy facilities within 30km of the site. The only planned facility within 30km of the site are the rest of the Loxton suite of projects adjacent to the site with an estimated direct footprint of 130 ha and then the Hoogland 1 and Hoogland 1 wind farm projects with an estimated combined footprint of approximately 200 ha. While it is clear that the Loxton suite of projects would create a node of wind energy development north of Loxton, there are no other wind energy projects north of the R63, with the result that cumulative impacts, when considered at a broader scale are still relatively low when considered in the greater Loxton area and especially north of the R63. In terms of specific cumulative impacts, impacts on the Riverine Rabbit and Karoo Dwarf Tortoise would be a potential concern. However, the habitats associated with these two species have been mapped at a fine scale and included into the no-go layer for the development, with the result that direct habitat loss for these two species as a result of the Loxton WEF 3 would be low. As the broader area is still largely intact, and most direct impacts are associated with the relatively short, transient, construction phase, cumulative impacts associated with the current project are considered low and acceptable. There do not appear to be any ecological processes or corridors that would be specifically disrupted by the Loxton WEF 3. In addition, should all the planned projects in the area be built, the overall extent of habitat loss would not be significant relative to the overall extent of the affected vegetation types. As such, the contribution of the Loxton WEF 3 to habitat loss would not change the overall threat status of any vegetation types or special habitats and the overall level of cumulative impact in the area is considered acceptable.	

Table 5-2: Socio-economic Considerations of Need and Desirability for the Loxton WEF 3

"promoting justifiable economic and social development"[8]			
Question		**Answer**	**Reference**
What is the socio-economic context of the area, based on, amongst other considerations, the following considerations?:	*The IDP (and its sector plans' vision, objectives, strategies, indicators and targets) and any other strategic plans, frameworks of policies applicable to the area,*	**Pixley ka Seme District Municipality Integrated Development Plan 2022 - 2027** The vision for the Pixley ka Seme District Municipality (PKSDM) is "Developed and Sustainable District for Future Generations" To mission statement that underpins the vision is:	Volume II: Social Impact Assessment

[8]Section 24 of The Constitution of South Africa refers.

"promoting justifiable economic and social development"[8]			
Question		**Answer**	**Reference**
		• Supporting our local municipalities to create a home for all in our towns, settlements and rural areas to render dedicated services. • Providing political and administrative leadership and direction in the development planning process. • Promoting economic growth that is shared across and within communities. • Promoting and enhancing integrated development planning in the operations of our municipalities. • Aligning development initiatives in the district to the National Development Plan. The Strategic Objectives to address the vision that are relevant to the project includes the promotion of economic growth in the district and enhance service delivery. Chapter 4, Development of Strategies, highlights the key strategies of the PKSDM. The promotion of economic development is the most relevant strategy for the project. The Integrated Development Plan (IDP) also notes that the growth and development context in the district has also changed radically since 2013 (after it had been stagnant for decades) owing mainly to private and public investments in the area as a hub for renewable energy generation and astronomy. The IDP notes that the economy in the Pixley ka Seme municipal area is characterized by: • High levels of poverty and low levels of education. • Low levels of development despite the strategic location in terms of the national transport corridors. • High rate of unemployment, poverty and social grant dependence. • Prone to significant environmental changes owing to long-term structural changes (such as climate change, energy crises and other shifts). Of specific relevance the IDP highlights the potential for renewable energy to help address some of these challenges. **Ubuntu Local Municipality Integrated Development Plan 2022 - 2023** The vision of ULM is "By 2030, Ubuntu Municipality shall be the best rural municipality through relentless pursuit of excellence through focused governance, efficient administration, and effective service delivery for inclusive targeted social and economic development against all odds". The mission is to: • Maximize the utility of the municipal resources in a sustainable, developmental, and economic manner to better the life of all.	

"promoting justifiable economic and social development"[8]			
Question		**Answer**	**Reference**
		• Improve institutional effectiveness and efficiency. • Optimally develop our human, financial and natural resources. • Create an enabling environment for local economic growth in order to create employment opportunities and alleviate poverty. • Work with all our existing and prospective partners to establish a vibrant tourism industry. • Participate in the fight to reduce the HIV/AIDS infection rate and lessen the impact thereof. • Focus on youth development, women empowerment and enabling the disabled to play a meaningful role in unlocking human potential. • Ensure a safe, secure and community friendly environment. • Maintain sound and sustainable management of financial and fiscal affairs. Based on the 2011 Census data the largest town in the ULM was Victoria West with a population of 7 611, followed by Richmond (2 841) and Loxton (921). Key issues facing the municipality include: • High level of illiteracy. • Poverty and unemployment. • Limited educational facilities The IDP identifies a number of challenges facing the area in terms of economic development and growth. Of relevance to the project these include: • Unemployment and poverty. • Shortage of critical skills • Needs of vulnerable groups, including women, disabled and youth. • Access to basic services such as water, sanitation, electricity and housing. • Improved access to services in education, health and social services. • Reduction in the rate of crime. The key sectors in the local economy agriculture is the key economic sector. Livestock and game form the nucleus of farming activities, with limited crop farming. Livestock farming mainly comprises of sheep, goat and cattle. The main agricultural products are wool for the export market and meat for the local market. Biltong and hunting are the major products of game farming. Game biltong is produced at and exported from a factory in Victoria West.	

"promoting justifiable economic and social development"[8]			
Question		**Answer**	**Reference**
		Chapter 3 of the IDP outlines the development strategies for the ULM. The IDP strategies are aligned with the National Key Performance Areas (KPAs). The KPAs that are relevant to the project include: • KPA 1: Basic Service Delivery and Infrastructure Development The strategic objectives under KPA 1 include the provision of sustainable basic services. • KPA 2: Local Economic Development The strategic objectives under KPA 1 include investment acceleration and attraction, including a focus on private sector investment, promotion of SMMEs, agriculture, tourism and the development of an industrial and commercial economic zone. In terms of Ward 3, the following challenges and needs were identified as part of the IDP process. • High unemployment and poverty rates. • Need for a youth centre. • Need to upgrade firefighting services. • Illegal dumping. These issues can be addressed by Socio-economic Development (SED) and Enterprise Development (ED) spend linked to the project.	
	Spatial priorities and desired spatial patterns (e.g. need for integrated of segregated communities, need to upgrade informal settlements, need for densification, etc.),	The Northern Cape Provincial Spatial Development Framework (SDF) of 2012 highlights that renewable energy sources such as solar thermal and wind, comprise 25% of the Northern Cape's energy generation capacity by the year 2020, and should be progressively phased in as appropriate into the province. The SDF further sets out energy objectives, which include the following: • To promote the development of renewable energy supply schemes; • Construct a 400 kV transmission power line from Ferrum Substation (near Kathu/Sishen) to Garona Substation (near Groblershoop); • Reinforce additional electricity supply especially renewable energy projects; and • Develop and implement innovative energy technologies to improve access to reliable, sustainable and affordable energy services. Also recognize that the objective should be to obtain sustainable economic growth. Lastly, the PSDF notes that the Northern Cape need to develop large-scale renewable energy supply schemes in order to address the growing demand in energy and to promote a green economy in the province.	Volume II: Social Impact Assessment

<table>
<tr><th colspan="4">"promoting justifiable economic and social development"[8]</th></tr>
<tr><th colspan="2">Question</th><th>Answer</th><th>Reference</th></tr>
<tr><td></td><td>Spatial characteristics (e.g. existing land uses, planned land uses, cultural landscapes, etc.), and</td><td>The current land use is primarily used for livestock farming, mainly sheep, with no other land use planned or occurring. No tourism or commercial hunting is associated with any of the site properties.</td><td>Volume II: Social Impact Assessment</td></tr>
<tr><td></td><td>Municipal Economic Development Strategy ("LED Strategy").</td><td>The Khâi-Ma Local Municipality set forth a local development plan in the IDP to strategize on how to create employment opportunities in the KLM, to alleviate poverty, and to redistribute resources and opportunities for the benefits of the people in the KLM.</td><td>Volume II: Social Impact Assessment;</td></tr>
<tr><td colspan="2">Considering the socio-economic context, what will the socio-economic impacts be of the development (and its separate elements/aspects), and specifically also on the socio-economic objectives of the area?</td><td>Social impacts related to the construction phase:
<table>
<tr><th>Potential +/- Impact</th><th><u>Significance rating without mitigation</u></th><th><u>Significance rating with mitigation</u></th></tr>
<tr><td>Potential Positive Impact: The creation of local employment, business opportunities, and opportunities for skills development and on-site training.</td><td>Medium (+)</td><td>Medium (+)</td></tr>
<tr><td>Potential Negative Impact: The presence of construction workers and potential impacts on family structures and social networks.</td><td>Low (-)</td><td>Low (-)</td></tr>
<tr><td>Potential Negative Impact: Influx of job seekers.</td><td>Low (-)</td><td>Low (-)</td></tr>
<tr><td>Potential Negative Impact: Potential safety risk for farmers, risk of livestock theft and theft of farming infrastructure.</td><td>Medium (-)</td><td>Low (-)</td></tr>
<tr><td>Potential Negative Impact: The increased risk of potential grass fires associated with the construction phase.</td><td>Medium (-)</td><td>Low (-)</td></tr>
<tr><td>Potential Negative Impact: The potential impacts of heavy vehicles and construction related activities, damage to roads, and dust pollution.</td><td>Medium (-)</td><td>Low (-)</td></tr>
<tr><td>Potential Negative Impact: The potential loss of farmlands for grazing of sheep and on associated farming activities.</td><td>Medium (-)</td><td>Low (-)</td></tr>
</table></td><td>Volume II: Social Impact Assessment;</td></tr>
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<table>
<tr><th colspan="3">"promoting justifiable economic and social development"[8]</th></tr>
<tr><th>Question</th><th>Answer</th><th>Reference</th></tr>
<tr><td></td><td>
Social impacts related to the operational phase:
<table>
<tr><th>Potential +/- Impact</th><th><u>Significance rating without mitigation</u></th><th><u>Significance rating with mitigation</u></th></tr>
<tr><td>Potential Positive Impact: The establishment of renewable energy infrastructure and the generation of clean, renewable energy.</td><td>Medium (+)</td><td>Medium (+)</td></tr>
<tr><td>Potential Positive Impact: The creation of local employment and business opportunities, skills development and training.</td><td>Low (+)</td><td>Medium (+)</td></tr>
<tr><td>Potential Positive Impact: Potential local economic development initiatives.</td><td>Medium (+)</td><td>High (+)</td></tr>
<tr><td>Potential Positive Impact: The generation of additional income for landowners.</td><td>Low (+)</td><td>Medium (+)</td></tr>
<tr><td>Potential Negative Impact: Visual impact and associated impact on the sense of place.</td><td>Medium - High (-)</td><td>Medium - High (-)</td></tr>
<tr><td>Potential Negative Impact: The potential impact on property values.</td><td>Low (-)</td><td>Low (-)</td></tr>
<tr><td>Potential Negative Impact: The potential impact on tourism.</td><td>Low (-)</td><td>Low (-)</td></tr>
</table>
Social impacts related to the decommissioning phase:
<table>
<tr><th>Potential +/- Impact</th><th><u>Significance rating without mitigation</u></th><th><u>Significance rating with mitigation</u></th></tr>
</table>
</td><td></td></tr>
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"promoting justifiable economic and social development"[8]		
Question	**Answer**	**Reference**

Potential Negative Impact: The potential loss of employment opportunities and associated income.	Medium (-)	Low (-)

Social impacts related to the no-development alternative:

Potential +/- Impact	**Significance rating without mitigation**	**Significance rating with mitigation**
Potential Impact: The potential lost opportunity for South Africa to supplement its current energy needs with clean, renewable energy.	Medium (-)	Medium (+)

Social impacts related to cumulative social impacts:

Potential +/- Impact	**Significance rating without mitigation**	**Significance rating with mitigation**
Potential Positive Impact: The creation of local employment and business opportunities, skills development and training.	n/a	Medium (+)
Potential Negative Impact: Visual impact associated with the establishment of WEFs and impact on sense of place and character of area.	n/a	Medium (-)
Potential Negative Impact: The establishment of the facilities may potentially place pressure on local services, e.g. education, medical, accommodation etc.	n/a	Low (-)

"promoting justifiable economic and social development"[8]			
Question		**Answer**	**Reference**
	Will the development complement the local socio-economic initiatives (such as local economic development (LED) initiatives), or skills development programs?	The proposed development will contribute towards local economic development and skills development programs of the local and district municipality through the support and co-operation between public and private sectors, creation of employment and business opportunities, and the opportunity for skills development and on-site training during both construction and operation phases. An important focus of the REIPPPP is to ensure that the build programme secures sustainable value for the country and enables local communities to benefit directly from the investments attracted into the area. In this regard Independent Power Producers (IPPs) are required to contribute a percentage of projected revenues accrued over the 20-year project operational life toward Socio-economic Development (SED) initiatives. These contributions are linked to Community Trusts and accrue over the 20-year project operation life and are used to invest in housing and infrastructure as well as healthcare, education, and skills development. Community Trusts provide an opportunity to generate a steady revenue stream that is guaranteed for a 20-year period. This revenue can be used to fund development initiatives in the area and support the local community. The long-term duration of the revenue stream also allows local municipalities and communities to undertake long term planning for the area. The revenue from the proposed WEF can be used to support a number of social and economic initiatives in the area, including: • Creation of jobs. • Education. • Support for and provision of basic services. • School feeding schemes. • Training and skills development. • Support for SMME's.	Volume II: Social Impact Assessment
How will this development address the specific physical, psychological, developmental, cultural and social needs and interests of the relevant communities?		The proposed development will contribute towards the local economic development strategies of the local and district municipality through the creation of employment and business opportunities, and the opportunity for skills development and on-site training during the construction, operation and decommissioning phase. The REIPPPP also contributes to Broad Based Black Economic Empowerment (BBBEE) and the creation of black industrialists. In this regard, Black South Africans own, on average, 34% of projects that have reached financial close (BW1-BW4), which is 4% higher than the 30% target. This includes black people in local communities that have ownership in	Volume II: Social Impact Assessment

"promoting justifiable economic and social development"[8]			
Question		**Answer**	**Reference**
		the IPP projects that operate in or near their communities and represents the majority share of total South African Entity Participation.	
Will the development result in equitable (intra- and inter-generational) impact distribution, in the short- and long-term? Will the impact be socially and economically sustainable in the short- and long-term?		Wind energy facilities are socially and economically sustainable in the short and long term. IPP projects require a minimum ownership of 2.5 % by local communities which represents a significant injection of capital into mainly rural areas of South Africa for the lifespan of the facility. In addition local content minimum thresholds result in a substantial stimulus for establishing local manufacturing capacity.	Volume II: Social Impact Assessment
In terms of location, describe how the placement of the proposed development will:	*result in the creation of residential and employment opportunities in close proximity to or integrated with each other,*	The construction phase will extend over a period of approximately 24 - 30 months and create in the region of 300-350 employment opportunities. Members from the local communities in the area, including Loxton, Victoria West and Carnarvon, would be in a position to qualify for percentage of the low skilled and semi-skilled employment opportunities. Most of these employment opportunities will accrue to Historically Disadvantaged (HD) members of the community. The typical lifespan of WEFs is 20 to 25 years. During the operational phase there will be a significant decrease in employment opportunities. The operational phase of the proposed project will create in the region of 50-60 full time employment opportunities during the operational phase, of which 70% will be unskilled, 25% semi-skilled 25%, and 5% skilled. Typical employees that might be required include: Technicians, electricians, engineers, IT specialists, environmental specialists, health and safety managers, and administrators (skilled); drivers and equipment operators (semi-skilled); construction workers and security staff (low-skilled). The recruitment process and the requirements for each skill level and each employment opportunity need to be clearly communicated to local communities to ensure that no unrealistic expectations are created.	Volume II: Social Impact Assessment;
	reduce the need for transport of people and goods,	The need for transport of people and goods will be increased during the construction phase. Lower per capita carbon footprints are predicted due to the commercial forms of transport that will be employed to move the workforce (e.g. public transport, contractor buses).	Volume II: Traffic Impact Assessment;

"promoting justifiable economic and social development"[8]			
Question		**Answer**	**Reference**
	result in access to public transport or enable non-motorised and pedestrian transport (e.g. will the development result in densification and the achievement of thresholds in terms public transport),	Not applicable.	n/a
	compliment other uses in the area,	Local communities and their service providers will benefit from the socio-economic development provided by the WEF and current land use will be able to continue.	Volume II Social Impact Assessment;
	be in line with the planning for the area,	The proposed WEF is in line with applicable international, national, provincial and local planning strategies.	Volume II Social Impact Assessment
	for urban related development, make use of underutilised land available with the urban edge,	The proposed development occurs away from the urban edge.	n/a
	optimise the use of existing resources and infrastructure,	• Wind energy is a renewable, clean resource and reduces pollution and the reliance on non-renewable fossil fuels and water for electricity generation. • Existing access roads will be utilised wherever possible. • The development is proposed to connect to the existing Eskom Gamma substation. • It is expected that any construction water required will be delivered by tankers. • Waste removal will be in accordance with best practice by qualified waste removal contractors to the nearest registered landfill. • Portable sanitation facilities will be utilised during construction, so that no connection to the local sewerage system will be required. • Any additional infrastructure required will be constructed by the developer.	n/a
	opportunity costs in terms of bulk infrastructure expansions in non-priority areas (e.g. not aligned with the bulk	No opportunity costs in terms of bulk infrastructure expansions in non-priority areas are predicted due to the proposed development. The proposed WEF is not located within a bulk infrastructure expansion area.	n/a

"promoting justifiable economic and social development"[8]			
Question		**Answer**	**Reference**
	infrastructure planning for the settlement that reflects the spatial reconstruction priorities of the settlement),		
	discourage "urban sprawl" and contribute to compaction/densification,	Not applicable as the proposed development site lies outside of urban areas.	n/a
	contribute to the correction of the historically distorted spatial patterns of settlements and to the optimum use of existing infrastructure in excess of current needs,	The existing Eskom Gamma substation has capacity for additional energy generation. The proposed development will utilise this existing capacity. Alternatively, the proposed development will connect to an IPP driven MTS. The project will contribute to economic and infrastructure development in the Northern Cape Province, in line with the Northern Cape Provincial Development and Resource Management Plan.	n/a
	encourage environmentally sustainable land development practices and processes,	Construction of the renewable energy Loxton WEF 3 project will assist South Africa in transitioning from a carbon-intensive resource use economy to a sustainable low carbon footprint economy. Sustainable land development is an overarching aspect of the proposed project development.	n/a
	take into account special locational factors that might favour the specific location (e.g. the location of a strategic mineral resource, access to the port, access to rail, etc.),	• Feasibility of access for wind turbine delivery, the site is easily accessible from the national road; • Close proximity to the Eskom grid with available evacuation capacity; • Viable wind resource, therefore suited to wind farm development; • The proposed site is agricultural land and current land use is low intensity gazing; and • Willingness of landowners to host a wind farm on their properties.	Section 7.2: Site Alternatives
	the investment in the settlement or area in question will generate the highest socio-economic returns (i.e. an area with high economic potential),	The proposed development will create jobs and contribute towards socio-economic development in an area that does not have high economic potential. The WEF is likely to result in significant positive socio-economic opportunities.	Vol II: Social Impact Assessment
	impact on the sense of history, sense of place and heritage of the area and the socio-cultural	While the proposed WEF could generally have a 'high' visual impact significance, the current layout has largely avoided the scenic resources and sensitive visual receptors of	Vol II: Social Impact Assessment;

"promoting justifiable economic and social development"[8]			
Question		**Answer**	**Reference**
	and cultural-historic characteristics and sensitivities of the area, and	the area. Impacts to the cultural landscape are unavoidable but only of a medium significance and no other aspects of heritage are expected to be impacted significantly.	Visual Impact Assessment; Heritage Impact Assessment
	in terms of the nature, scale and location of the development promote or act as a catalyst to create a more integrated settlement?	The proposed development aligns with the Pixley ka Seme District Municipality Integrated Development Plan 2022 - 2027. The proposed development is predicted to support the creation of a more integrated settlement.	Vol II: Social Impact Assessment
How were a risk-averse and cautious approach applied in terms of socio-economic impacts?:	*What are the limits of current knowledge (note: the gaps, uncertainties and assumptions must be clearly stated)?*	In preparation of the final SIA report, one limitation that could be identified is that Some of the provincial documents do not contain data from the 2011 Census and or 2016 Household Community Survey. However, where required the relevant 2011 and 2016 data were considered. Therefore, the data can be considered dated and should be treated with caution.	Vol II: Social Impact Assessment
	What is the level of risk (note: related to inequality, social fabric, livelihoods, vulnerable communities, critical resources, economic vulnerability and sustainability) associated with the limits of current knowledge?	The risk due to limits of current knowledge is considered to be low due to the positive socioeconomic impact expected from the proposed WEF.	Vol II: Social Impact Assessment
	Based on the limits of knowledge and the level of risk, how and to what extent was a risk-averse and cautious approach applied to the development?	A risk-averse and cautious approach was utilised throughout the impact assessment process by all specialists. The precautionary approach has been adopted for this study, i.e. assuming the worst-case scenario will occur and then identifying ways to mitigate or manage these impacts. Mitigation measures to manage these impacts have been provided.	Vol II: Social Impact Assessment
How will the socio-economic impacts resulting from this development impact on	*Negative impacts: e.g. health (e.g. HIV-Aids), safety, social ills, etc. What measures were taken to firstly avoid negative impacts, but if avoidance is not*	Negative impacts were identified by the Social Specialist. These are: • The presence of construction workers on-site and in the area on the local communities. • Potential influx of job seekers.	Vol II: Social Impact Assessment App B: EMPr

"promoting justifiable economic and social development"[8]			
Question		**Answer**	**Reference**
people's environmental right in terms following:	*possible, to minimise, manage and remedy negative impacts?*	• The potential loss of farmlands for grazing of sheep and on associated farming activities. • Potential safety risk for farmers, risk of livestock theft and theft of farming infrastructure. • The increased risk of potential grass fires associated with the construction phase. • The potential impacts of heavy vehicles and construction related activities, damage to roads, and dust pollution. • The potential loss of farmland. • Visual impact and associated impact on the sense of place. • The potential impact on tourism. • The potential loss of employment opportunities and associated income (decommissioning impact). • The establishment of a number of renewable energy facilities (WEFs and SEFs), may potentially place pressure on property, local services, e.g. education, medical, accommodation, water supply, waste management etc. (cumulative impact). Measures to avoid negative impacts, but if avoidance is not possible, to minimise, manage and remedy negative impacts are provided in the Social Impact Assessment, Section 10 of this EIAr, and are included in the EMPr.	EIAr Section 10
	Positive impacts. What measures were taken to enhance positive impacts?	Positive impacts were identified by the Social Specialist. These are: • Establishment of renewable energy infrastructure and the generation of clean, renewable energy; • The creation of local employment and business opportunities, and opportunities for skills development and on-site training; • Benefits associated with the local economic development initiatives; and • Benefits for landowners. Details of enhancement measures are provided in the Social Impact Assessment, Section 10 of this EIAr, and are included in the EMPr.	Vol II: Social Impact Assessment EIAr Section 10
Considering the linkages and dependencies between human wellbeing, livelihoods and ecosystem services, describe the linkages and dependencies applicable to the area in question and how the development's socio-economic		It is not expected that the development's socio-economic impacts will result in significant ecological impacts. In terms of fauna, there are several listed fauna which occur in the area and which would potentially be impacted by the development. However, of these only the Karoo Dwarf Tortoise and Riverine Rabbit which are considered likely to be present. The habitats associated with these species have been mapped at a fine scale	Vol II: Terrestrial Biodiversity Assessment

"promoting justifiable economic and social development"[8]			
Question		**Answer**	**Reference**
impacts will result in ecological impacts (e.g. over utilisation of natural resources, etc.)?		and included in the no-go layer for the development while the other sensitive features of the site including drainage lines, riparian areas and rocky hills habitat have been mapped as high or very high sensitivity and would not be impacted by turbine footprint areas. Some impact to these areas from limited amounts of overhead cabling or turbine access roads would occur and is considered acceptable. The whole of the site is mapped as falling within areas of CBA 1 and CBA 2. Under the laout assessed, there are three turbines within the CBA 1, with the remainder within the CBA 2. This is considered unlikely to significantly impact the underlying biodiversity features as these have been mapped in detail in the sensitivity mapping provided to the project. As such, the impact of the Loxton WEF 3 development on the areas of CBA 1 and CBA 2 is considered acceptable The areas of CBA 1 and CBA 2 within the site are also mapped as NPAES Focus Areas. However, as there are no specific features of very high biodiversity value within the affected polygons and the loss of these areas from the NPAES is considered to have low significance after the implementation of avoidance and mitigation, which includes the establishment of a development-free corridor through the site as detailed in the offset needs analysis study. As such, the overall impact of the development on NAPES Focus Areas is considered acceptable. There are no impacts associated with the development of the Loxton WEF 3 on terrestrial biodiversity that cannot be mitigated to an acceptable level. As such, should all the proposed mitigation be implemented, the Loxton WEF 3 development is deemed acceptable from a terrestrial ecological impact perspective. In terms of cumulative impacts, the affected area has not been significantly impacted by renewable energy development to date and the contribution of the current wind farm development to cumulative impact is considered low and acceptable. It is thus the reasoned opinion of the specialist that the Loxton WEF 3 development should be authorised subject to the various mitigation and avoidance measures as indicated.	
What measures were taken to pursue the selection of the "best practicable environmental option" in terms of socio-economic considerations?		Iterative specialists' constraints mapping identified the most suitable areas for development for which a development layout was then produced for assessment. The results of the specialist's studies, including interviews by the Social Specialist, and Scoping phase PPP, further informed the development of the updated site layout.	Volume II: Specialist Assessment Reports
What measures were taken to pursue environmental justice so that adverse	*Considering the need for social equity and justice, do the alternatives identified, allow the "best practicable environmental*	The proposed development aligns with a variety of planning policies that consider environmental and spatial justice. Alternatives were 'scoped' out in the scoping phase and the most feasible environmentally and socially preferred location was chosen for approval in the EIA phase.	n/a

"promoting justifiable economic and social development"[8]			
Question		**Answer**	**Reference**
environmental impacts shall not be distributed in such a manner as to unfairly discriminate against any person, particularly vulnerable and disadvantaged persons (who are the beneficiaries and is the development located appropriately)?	*option" to be selected, or is there a need for other alternatives to be considered?*	Public consultation considers all person(s) and the application process will continue to consider all persons, and disadvantaged people who may be impacted by the development.	
What measures were taken to pursue equitable access to environmental resources, benefits and services to meet basic human needs and ensure human wellbeing, and what special measures were taken to ensure access thereto by categories of persons disadvantaged by unfair discrimination?		The proposed development will contribute to equitable access by supplying electricity to the national grid, and by providing local and regional socioeconomic benefits in terms of the REIPPPP Economic Development requirements, which includes a BBBEE scorecard on which wind projects are evaluated.	n/a
What measures were taken to ensure that the responsibility for the environmental health and safety consequences of the development has been addressed throughout the development's life cycle?		Construction, operation and decommissioning of the proposed development will be done according to environmental health and safety legislative requirements and applicable guidelines.	n/a
What measures were taken to:	*ensure the participation of all interested and affected parties,*	Public participation is being undertaken according to NEMA: EIA Regulations (2014) as amended and DFFE (2017) Public Participation Guidelines.	Section 9; Volume III
	provide all people with an opportunity to develop the understanding, skills and capacity necessary for achieving equitable and effective participation,	The PPP is being undertaken in terms of legislative requirements and best practise guidelines. All notifications are provided in English and Afrikaans. Further languages are made available upon request.	Section 9; Volume III
	ensure participation by vulnerable and disadvantaged persons,	The PPP is being undertaken according to best practise guidelines and regulatory requirements; Notification of initiation of the PPP was provided in all required channels, i.e. newspaper adverts, site notices, local posters and written notifications.	Section 9; Volume III

"promoting justifiable economic and social development"[8]			
Question		**Answer**	**Reference**
	promote community wellbeing and empowerment through environmental education, the raising of environmental awareness, the sharing of knowledge and experience and other appropriate means,	The proposed development fits into the various planning policies and the implementation of a Community Trust will assist the local strategies, including improving education facilities and youth development.	Vol II: Social Impact Assessment
	ensure openness and transparency, and access to information in terms of the process,	Legislative requirements and best practise guidelines are followed throughout the process. The PPP is being undertaken in terms of legislative requirements and best practise guidelines.	Section 9; Volume III
	ensure that the interests, needs and values of all interested and affected parties were taken into account, and that adequate recognition were given to all forms of knowledge, including traditional and ordinary knowledge, and	A PPP is being undertaken in terms of legislative requirements and best practise guidelines. A Social Impact Assessment forms part of the Scoping & EIA process. The independent Social Specialist ensures that all needs and values are taken into account.	Section 9; Volume III: Social Impact Assessment
	ensure that the vital role of women and youth in environmental management and development were recognised and their full participation therein were be promoted?	The Social Impact Assessment and PPP that are conducted according to legislation and guidelines ensure that women and youth are recognised and involved in the process. REIPPPP requirements place specific responsibilities on IPPs in terms of women and youth development.	Section 9; Volume III: Social Impact Assessment
Considering the interests, needs and values of all the interested and affected parties, describe how the development will allow for opportunities for all the segments of the community (e.g. a mixture of low-, middle-, and high-income housing opportunities) that is consistent with the priority needs of the local area (or that is proportional to the needs of an area)?		The proposed WEF has a good planning fit with all applicable policies and will result in substantial local socio-economic opportunities. The key challenges facing the region are poverty and inequality and a shortage of skills. As such the proposed development will be of benefit to the local area by creating job and business opportunities, particularly for unskilled and semi-skilled local workers.	Volume II: Social Impact Assessment

"promoting justifiable economic and social development"[8]			
Question		**Answer**	**Reference**
What measures have been taken to ensure that current and/or future workers will be informed of work that potentially might be harmful to human health or the environment or of dangers associated with the work, and what measures have been taken to ensure that the right of workers to refuse such work will be respected and protected?		Future workers on the proposed development will be educated on their rights to refuse work.	n/a
Describe how the development will impact on job creation in terms of, amongst other aspects:	*the number of temporary versus permanent jobs that will be created,*	An estimated 350 temporary employment opportunities will be created for 24 - 30 months (2 - 3 years) during the construction phase. Approximately 34 - 50 full time employment opportunities will be created for the operational phase of the proposed development (minimum of 20 years).	Volume II: Social Impact Assessment
	whether the labour available in the area will be able to take up the job opportunities (i.e. do the required skills match the skills available in the area),	Members from the local communities in Loxton, Victoria West and Carnarvon would qualify for a percentage of low skilled and semi-skilled employment opportunities and a number of skilled opportunities. Most of these employment opportunities will accrue to Historically Disadvantaged (HD) members from the local community. Given relatively high local unemployment levels and limited job opportunities in the area, this will represent a significant, if localised, social benefit.	Volume II: Social Impact Assessment
	the distance from where labourers will have to travel,	It is expected that most workers will reside in the nearby towns Loxton, Victoria West and Carnarvon.	Volume II: Social Impact Assessment
	the location of jobs opportunities versus the location of impacts (i.e. equitable distribution of costs and benefits), and	Members from the local communities in Loxton, Victoria West and Carnarvon would qualify for a percentage of low skilled and semi-skilled employment opportunities and a number of skilled opportunities. Most of these employment opportunities will accrue to Historically Disadvantaged (HD) members from the local community. Given relatively high local unemployment levels and limited job opportunities in the area, this will represent a significant, if localised, social benefit. It will also be possible to increase the number of local employment opportunities through the implementation of a skills development and training programme linked to the operational phase. A percentage of permanent employees who are not locally based may purchase houses in one of the local towns in the area, such as Loxton, Victoria West and Carnarvon, others may decide to rent. Both options would represent a positive economic benefit for the region. In addition, a percentage of the monthly wage bill earned by permanent staff would be spent in the regional and local economy. This will benefit local businesses in the	Volume II: Social Impact Assessment

"promoting justifiable economic and social development"[8]			
Question		**Answer**	**Reference**
		relevant towns. The benefits to the local economy will extend over the anticipated 20 year operational lifespan of the project. The local hospitality industry is also likely to benefit from the operational phase. These benefits are associated with site visits by company staff members and other professionals (engineers, technicians etc.) who are involved in the company and the project but who are not linked to the day-to-day operations. Procurement during the operational phase will also create opportunities for the local economy and businesses.	
	the opportunity costs in terms of job creation (e.g. a mine might create 100 jobs, but impact on 1000 agricultural jobs, etc.).	The creation of an estimated 350 temporary (24 - 30 month) jobs and 40 - 50 permanent jobs associated with the proposed development represents a high opportunity cost, as the employment by current agriculture operations is very low, and could continue.	Volume II: Social Impact Assessment
What measures were taken to ensure:	*that there were intergovernmental coordination and harmonisation of policies, legislation and actions relating to the environment, and*	All applicable planning policies and legislation were considered. The proposed development fits with all planning policies. Organs of State were pre-identified and registered on the I&AP database and these were updated, if required, as the development phases have progressed.	Volume I: EIA Report Volume III: PP Report
	that actual or potential conflicts of interest between organs of state were resolved through conflict resolution procedures?	As registered I&APs all public correspondence including notifications of reports availability are provided.	Volume III: PP Report
What measures were taken to ensure that the environment will be held in public trust for the people, that the beneficial use of environmental resources will serve the public interest, and that the environment will be protected as the people's common heritage?		The proposed development aims to uphold the principles of sustainable development. The project team consists of suitably qualified individuals that comply with all legal requirements.	Volume I: EIA Report Volume II: Specialist Reports
Are the mitigation measures proposed realistic and what long-term environmental legacy and managed burden will be left?		Specialist mitigation measures were identified during the EIA process and provided in the EIAr and EMPr. These measures are realistic and should they change, the EMPr must be submitted to the Department and made available for public to review and comment.	Volume I: Appendix B: EMPr
What measures were taken to ensure that the costs of remedying pollution, environmental degradation and consequent adverse health effects and of preventing,		An EMPr is submitted with EIAr. The EMPr is a legally binding document, which when enforced during construction, operational or decommissioning phases, hold the applicant or their representative liable for any remedial actions as a result of negligence.	Volume I: Appendix B: EMPr

"promoting justifiable economic and social development"[8]		
Question	**Answer**	**Reference**
controlling or minimising further pollution, environmental damage or adverse health effects will be paid for by those responsible for harming the environment?		
Considering the need to secure ecological integrity and a healthy bio-physical environment, describe how the alternatives identified (in terms of all the different elements of the development and all the different impacts being proposed), resulted in the selection of the best practicable environmental option in terms of socio-economic considerations?	The alternative selection process includes the assessment of the No Development alternative, site alternatives, design layout alternatives and technology alternatives.	Section 7
Describe the positive and negative cumulative socio-economic impacts bearing in mind the size, scale, scope and nature of the project in relation to its location and other planned developments in the area?	*Cumulative impact on sense of place* The establishment of the proposed WEF and the two other WEFs associated with the Loxton WEF Cluster will create the potential for combined and sequential visibility impacts. The cumulative impact on the areas sense of place is rated as **Moderate Negative.** *Cumulative impact on local services and accommodation* The potential cumulative impact on local services and accommodation will depend on the timing construction phases for the three Loxton WEF projects. With effective planning the significance of the potential impact was rated as **Low Negative**. *Cumulative impact on local economy* The significance of this impact with enhancement was rated as **Moderate Positive**.	Volume II: Social Impact Assessment

5.1 The Need and Desirability of Renewable Energy Facilities

Renewable Energy Facilities play a role in mitigating or reducing climate change, addressing South Africa's energy resource constraints, and producing low-cost energy. In addition, operating these facilities in South Africa contribute significantly to the economic development of the areas in which they are located through the requirements of the REIPPPP adjudication process. This section of the report highlights the national, provincial, and local plans and policies, that are in support of renewable energy facilities. Throughout this section, it is demonstrated that at all levels of governance and policy supports the development of renewable energy in order to address energy supply issues, and to promote economic growth in South Africa.

5.1.1 Climate Change, Diversification and Decentralisation of Supply

The scientific consensus is that climate is changing and that these changes are in large part caused by human activities[9]. Of these human activities, increase in carbon dioxide (CO_2) levels due to emissions from fossil fuel combustion is regarded as a significant contributor to anthropogenic climate change. South Africa is one of the world's largest emitters of CO_2 in absolute and per capita terms.

The National Climate Change Adaptation Strategy[10] (NCCAS) for The Republic of South Africa Version UE10, 13 November 2019, explains that the South African primary sectors, such as agriculture and mining, which are natural resource dependent are high consumption uses of energy. The NCCAS is adopting a cluster approach to assist with the changing climate conditions and the affect it has on various sectors. An action in support of this proposed development is the approach to "create a more adaptive energy system to reduce dependence on a centralised system and increase distributed generation, especially in rural areas". "This will involve encouraging the development of an adaptive and decentralised energy system so that the system is more resilient to climate disruptions".

Renewable energy projects will play a significant role in meeting the targets of the Paris Agreement and assisting the transition to a low-carbon economy.

According to the Department of Energy's (DoE) total energy supply data of 2018, the primary source of energy in South Africa is coal, which provides approximately 65% of South Africa's energy, followed by crude oil with 18% and renewables with 11%. Natural gas contributes 3% while nuclear energy contributes approximately 2%[11]. Electricity generation is dominated by the state-owned power company Eskom, which currently produces over 95% of the power used in the country.

If the National Development Plan (NDP) future hope is met, by 2030 South Africa will have an energy sector that promotes economic growth and development through adequate investment in energy infrastructure. The DoE Integrated Resource Plan (IRP) for Electricity 2019, was promulgated in October 2019 and replaced the IRP 2010 as the country's official electricity infrastructure plan. It calls for 37 696 MW of new and committed capacity to be added between 2019 and 2030 from a diverse mix of energy sources and technologies as ageing coal plants are decommissioned and the country transitions to a larger share of renewable energy. By 2030, the electricity generation mix is set to comprise of 33 364 MW (42.6%) coal, 17 742 MW (22.7%) wind, 8 288 MW (10.6%) solar photovoltaic (PV), 6 830 MW (8.7%) gas or diesel, 5 000 MW (6.4%) energy storage, 4 600 MW (5.9%) hydro, 1 860 MW (2.4%) nuclear and 600 MW (0.8%) concentrating solar power (CSP). Additionally, a short-term gap at least 2000 MW is to be filled between 2019 and 2022,

[9] http://adsabs.harvard.edu/abs/2013ERL.....8b4024C.
[10] https://www.environment.gov.za/sites/default/files/docs/nationalclimatechange_adaptationstrategy_ue10november2019.pdf
[11] https://www.energy.gov.za/files/media/explained/2021-South-African-Energy-Sector-Report.pdf

thereby further raising new capacity requirements, while distributed or embedded generation for own-use is positioned to add 4 000 MW between 2023 and 2030. The IRP is intended to be frequently updated, which could impact future capacity allocations from various energy sources and technologies.

The NDP also includes that South Africa will have an adequate supply of electricity and liquid fuels to ensure that economic activities and welfare are not disrupted, and that at least 95% of the population will have access to grid or off-grid electricity.

A diversification of energy supplies and producers, particularly with respect to renewable energy sources, would lead to greater energy security and economic and environmental benefits. The deployment of various renewable technologies increases the diversity of electricity sources and, through local decentralised generation, contributes to the flexibility of the system and its resistance to central shocks.

According to the International Energy Agency, *"renewable energy resources ... exist virtually everywhere, in contrast to other energy sources, which are concentrated in a limited number of countries. Reduced energy intensity, as well as geographical and technological diversification of energy sources, would result in far-reaching energy security and economic benefits.*"[12]

5.1.2 Economic Development and Job Creation

South Africa's energy crisis, which started in 2007 and is ongoing, has resulted in widespread rolling blackouts (referred to as load shedding) due to supply shortfalls. The load shedding has had a significant impact on all sectors of the economy and on investor confidence. The mining and manufacturing sector have been severely impacted and will continue to be impacted until such time as there is a reliable supply to energy. The Minister of Mineral Resources and Energy, Gwede Mantashe, indicated in February 2023 that the cost of load shedding was estimated at R1 billion a day [13]. The South African Reserve Bank indicated in February 2023 that stage 3 and stage 6 loadshedding cost the South African economy between R204 million and R899 million a day.[14]

A survey of 3 984 small business owners in 2019 found that 44% said that they had been severely affected by load shedding with 85% stating that it had reduced their revenue, with 40% of small businesses losing 20% or more or revenue during due to load shedding period[15].

The REIPPP programme represents the country's most comprehensive strategy to date in achieving the transition to a greener economy. The main economic development (ED) beneficiaries of approved projects are currently communities living within a 50 km radius of renewable energy facilities.

REIPPPP contributes to Broad Based Black Economic Empowerment (BBBEE) and the creation of black industrialists. In this regard, Black South Africans own, on average, 34 % of projects that have reached financial close between bid window (BW) 1 and BW 4, which is 4% higher than the 30% target. This includes black people in local communities that have ownership in the Independent Procurement Programme (IPP) projects that operate in or near their communities and represents the majority share of total South African Entity Participation. The regulations require a minimum ownership of 2.5% by local communities

[12] www.iea.org/textbase/npsum/ETP2012SUM.pdf
[13] https://www.citizen.co.za/news/load-shedding-cost-economy-billion/
[14] https://businesstech.co.za/news/energy/662515/stage-6-load-shedding-costs-south-africa-r900-million-a-day-sarb/
[15] "How does load shedding affect small business in SA?". The Yoco Small Business Pulse (3: Q1 2019):

in IPP projects as a procurement condition. This is to ensure that a substantial portion of the investments has been structured and secured as local community equity. An individual community's dividends earned will depend on the terms of each transaction corresponding with the relevant equity share. To date all shareholding for local communities have been structured through the establishment of community trusts. For projects in BW 1 to BW 4, qualifying communities will receive R25.5 billion net income over the life of the projects (20 years). The report notes that the bulk of the money will however only start flowing into the communities from 2028 due to repayment obligations in the preceding years (repayment obligations are mostly to development funding institutions). However, despite the delay this represents a significant injection of capital into mainly rural areas of South Africa. If the net projected income for the first seven bid windows (BW 1 – BW 4) was structured as equal payments overtime, it would represent an annual net income of R1.27 billion per year. Income to all shareholders only commences with operation of the facility. Revenue generated to date by the 85 operational IPPs amounts to R149.9 billion.

In addition to the financial investments into the economy and favourable equity structures aimed at supporting BEE, the REIPPPP also targets broader economic and socio-economic investment. This is through procurement spend and local content.

To date, a total of 63 291 job years[16] have been created for South African citizens, of which 48 110 job years were in construction and 15 182 in operations. These job years should rise further past the planned target as more projects enter the construction phase. Employment opportunities across BW 1 - 4 are 143 % of the planned number during the construction phase (i.e., 33 707 job years), with 6 projects still in construction and employing people. The number of employment opportunities is therefore likely to continue to grow beyond the original expectations. By the end of December 2021, 85 projects had successfully completed construction and moved into operation. These projects created 44 172 job years of employment, compared to the anticipated 30 488. This was 45 % more than planned.

An important focus of the REIPPPP is to ensure that the build programme secures sustainable value for the country and enables local communities to benefit directly from the investments attracted into the area. In this regard, IPPs are required to contribute a percentage of projected revenues accrued over the 20-year project operational life toward socio-economic development (SED) initiatives. These contributions accrue over the 20-year project operation life and are used to invest in housing and infrastructure as well as healthcare, education, and skills development.

The minimum compliance threshold for SED contributions is 1% of the revenue with 1.5% the targeted level over the 20-year project operational life. For the current portfolio of projects, the average commitment level is 2%, which is 101% higher than the minimum threshold level. To date (across BW 1 - 4) a total contribution of R22.8 billion has been committed to SED initiatives. Assuming an even, annual revenue spread, the average contribution per year would be R1.1 billion. Of the total commitment, R18.5 billion is specifically allocated for local communities where the IPPs operate. With every new IPP on the grid, revenues and the respective SED contributions will increase.

In terms of ED and SED spend, education, social welfare, and health care initiatives have a SED focus. IPPs have supported 1 388 education institutions with a total of R437 million in contributions, from 2015 to the end of June 2021. A total of 1 276 bursaries, amounting to R210.8 million, have been awarded by 67 IPPs from 2015 until the end of June 2021. The largest portion of the bursaries were awarded to African and Coloured students (97.4%), with women and girls receiving 56.3% of total bursaries. The Northern Cape province benefitted most from the bursaries awarded, with 57.2%, followed by the Eastern

[16] The equivalent of a full-time employment opportunity for one person for one year.

Cape (20.2%) and Western Cape (14.1%). Enterprise development and social welfare are the focus areas that have received the second highest share of the contributions to date.

5.2 Policies in Support of Renewable Energy

Both national and provincial policies and planning documents support the development of renewable energy facilities. The development of and investment in renewable energy is supported by the NDP, New Growth Path Framework, IRP, and the National Infrastructure Plan. At a provincial level, the development of renewable energy is supported by the Northern Cape Provincial Growth and Development Strategy (NCPGDS), Provincial Spatial Development Framework (PSDF) of 2020, Northern Cape Climate Change Response Strategy; Pixley Ka Seme District Municipality Integrated Development Plan (IDP) for 2022-2027, and Spatial Development Framework; and the Ubuntu Local Municipality Integrated Development Plan for 2022 - 2023.

The need and desirability for renewable energy developments play a role in South Africa meeting its energy and climate change targets and provides a socio-economic boost at the local level in areas that are in need of it.

Aside from environmental considerations, investment in renewables have been driven by dramatic reductions in their costs. Plate 8.1 shows this trend and that in the six years between BW 4 and 5, the average price of electricity purchased through the REIPPPP fell by 54% (Magoro, 2021).

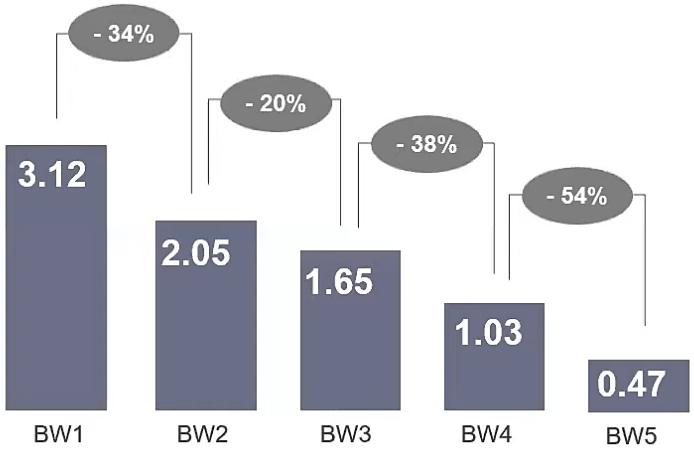


Plate 5-1: REIPPP average bid prices in April 2021 terms (Magaro, 2021)

6 DESCRIPTION OF THE BASELINE ENVIRONMENT

In order to evaluate the potential environmental impacts, information relating to the existing environmental conditions or baseline environment is collected through field and desktop research. The baseline environment also extends into the future, although predictions of any changes can involve a high number of variables and may be subject to potentially large uncertainties. As a result, in most cases, the baseline is assumed to remain unchanged throughout the operation of the development. Where this is not the case, this is stated.

The baseline environment has been used to identify any potential sensitive receptors on and near the site, and it is used to assess what changes may take place during the construction, operation and decommissioning phases of the development and the effects, if any, that these changes may have on these receptors.

Within each technical assessment, the methods of data collection are discussed with the relevant specialists. Data is also collected from public records and other archive sources and where appropriate, extensive field surveys are carried out. The timing/seasonality of the work within the study area is also outlined within each assessment where applicable.

6.1 Regional and Local Context

The project development site is located approximately 15 km east of Loxton within the Ubuntu Local Municipality (ULM) which falls within the jurisdiction of the Pixley Ka Seme District Municipality (PKSDM) in the Northern Cape Province.

The PKSDM is made up of eight category B local municipalities which include Emthanjeni, Kareeberg, Thembelihle, Siyathemba, Renosterberg, Ubuntu, Siyancuma and Umsobomvu municipalities, see Plate 5.1 below. The town of Victoria West is the administrative seat of the ULM. The project area is located in Ward 3 of the ULM. The district municipal area is however well located in a central position in terms of its regional context with three major transport routes dissecting the municipal area. These routes include the N1 between Cape Town and Johannesburg, the N9 route from Colesberg joining the N10, which links Namibia with the Eastern Cape and the N12 route from Johannesburg via Kimberly to Cape Town.

One of South Africa's largest rivers, the Orange River also flows through the heart of the municipal area providing water for irrigation, farming, drinking and recreational uses along the banks of the river. The Gariep Dam, Vanderkloof Dam and the Boegoeberg major dams all located within the district municipal area. The abundance of water is however only limited to the areas around the river, with the largest part of the district municipal area identified as a water scare area, which adversely influence the economy of these areas.

The population of the ULM in 2016 was 19 471 (Community Household Survey 2016). Of this total, 38.6% were under the age of 18, 55.9% were between 18 and 64, and the remaining 5.5% were 65 and older. The population of Ward 3 in 2011 was 4 715. Of this total, 37% were under the age of 18, 58% were between 18 and 64, and the remaining 5% were 65 and older. The ULM and Ward 3 therefore have a high percentage of the population that fall within the economically active group of 18-65. The figures are similar to the figures for the PKSDM and Northern Cape (58.5% and 57.7% respectively).

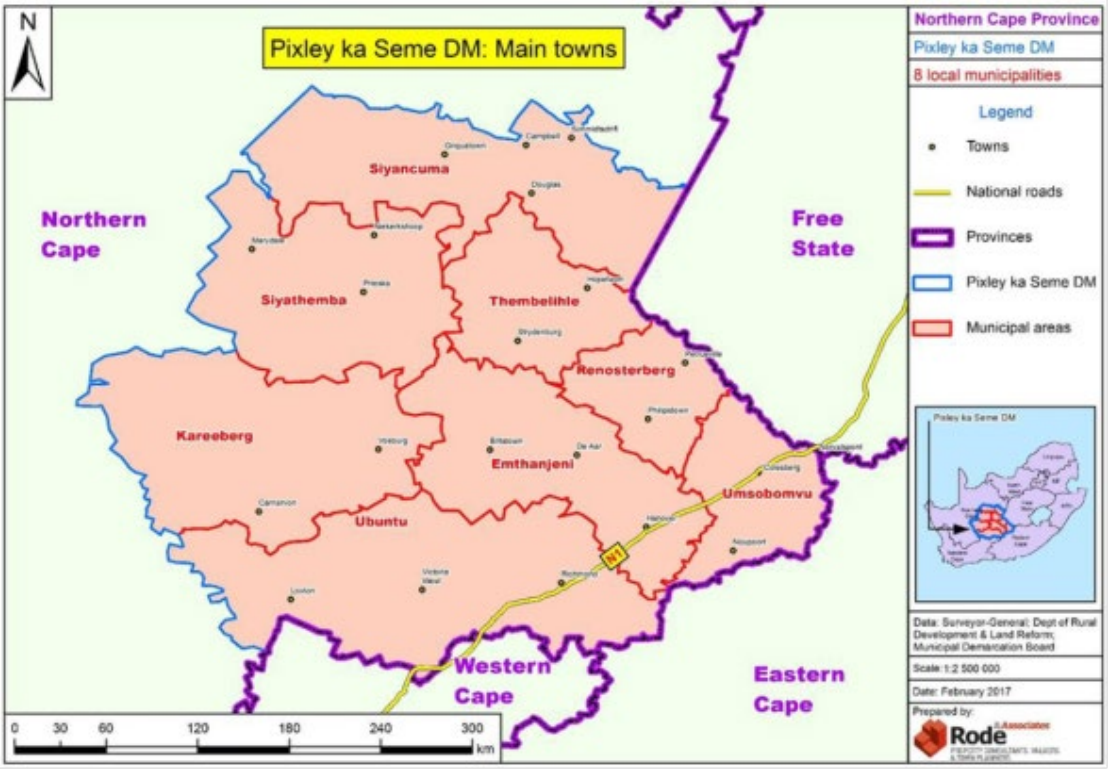


Plate 6-1: Location of Pixley Ka Seme District Municipality within the Northern Cape Province

6.2 Biophysical Characteristics

6.2.1 Topography and Terrain

The topography of the region is one of its main assets with vast open spaces and unspoilt panoramic visual vistas stretching over great distances. The topography is related to the geology and relief with altitudes ranging between 1000m to 1800m above sea level. Land reforms associated with plains, hills and lowlands cover approximately 80% of the region. Plains have slopes of less than 5° (8%) and result in a gradual change of climatic conditions. Ridges have slopes of more than 5° and therefore have more variable climatic conditions.

The farm is located in a sheep farming agricultural region. Grazing is the dominant agricultural land use on the site and surrounds. Grazing capacity of the site is low at between 10-14 hectares per large stock unit.

6.2.2 Climate conditions

The PKSD lies in the upper regions of the Karoo and experiences moderate to hot summers and cold dry winters. Being a very hot area, the average annual maximum temperature is around 40°C, while the average annual minimum temperature is -10°C. The winters are cold and dry with moderate frost occurring during the night. The coldest months are during June and July. The area is located in a summer rainfall region with very little rainfall. This region is very dry and most of the region receives less than 300mm of rain per annum with the areas in the east receiving generally more rain than the dryer areas in the west. Rain occurs predominantly in the form of summer thunderstorms and 60% of the average annual rainfall occurs between October and April. The mean annual rainfall ranges from 130mm - 300mm per year. Average annual evaporation ranges between 1600mm in the east and 2400mm in the west. The PKSD is situated in part of the Orange and the Gamtoos

River catchment areas. The Orange and Vaal Rivers are the two perennial rivers in the region.

The district is known for severe droughts and often experiences heavy rainfalls which leads to flooding and erosion. Due to the dry climate the area also experiences a lot of dust pollution that can be exacerbated by overgrazing and poor farming management systems.

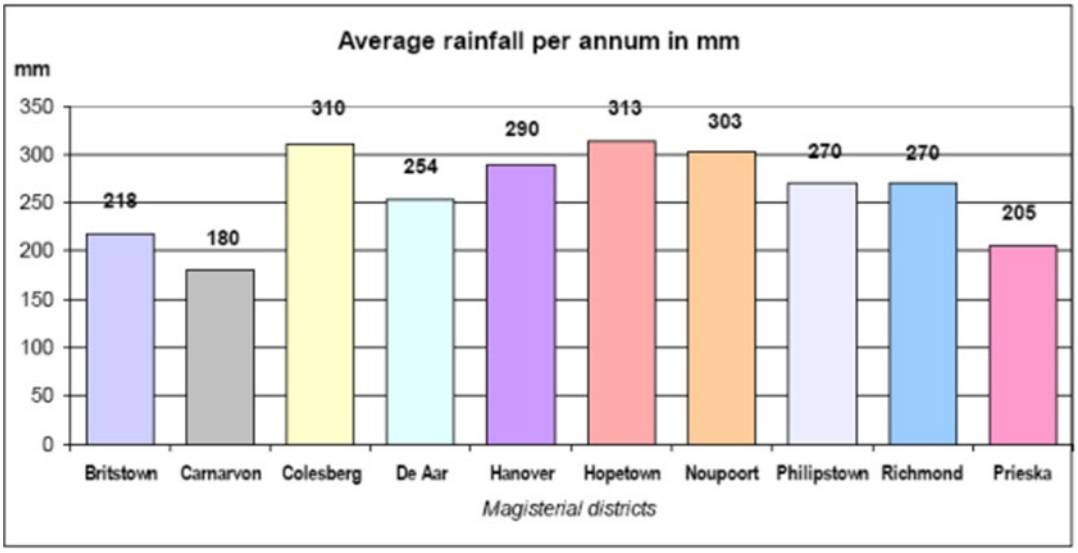


Plate 6-2: Average rainfall per magisterial district in Pixley Ka Seme District

6.2.3 Geology

The geology in the PKSDM area is dominated by horizons of dolerite rocks. Dolerite covers approximately 36% of the area, followed by Tillite (12%) and the rock types of Sand, Andesite, and Quartzite covering between 7% and 5% of the area. The remainder of the rock types cover less than 4%. (Pixley Ka Seme District SDF 2007).

6.2.4 Soils, Land Use and Agricultural Potential

The arid climate (low rainfall of approximately 199 to 221 mm per annum and high evaporation of approximately 1,371 to 1,412 mm per annum) (Schulze, 2009) is the limiting factor for land capability, regardless of the soil capability and terrain. Moisture availability is very limiting to any kind of agricultural production, including grazing. Because climate is the limiting factor that controls production potential, it is the only aspect of the agro-ecosystem description that is required for assessing the agricultural impact of this development. All other agricultural potential parameters become irrelevant under the dominant limitation of aridity.

6.2.5 Freshwater and Wetlands (Aquatics)

The study area is dominated by three major types of natural aquatic features and a small number of artificial barriers associated with catchments and rivers, characterised as follows:

- Ephemeral watercourses - alluvial systems with or without riparian vegetation. These range from narrow channels to broad flood plain areas;
- Depressions
- Minor watercourses; and
- Dams and weirs / berms with no wetland or aquatic features.

The site is mostly located within the D55D (Soutpoort River), with small portions in the D5G (Gansvlei River) and the D61J (Groen River) Quinary Catchments of the Nama Karoo Ecoregion in the Orange River Water Management Area (Kimberley Regional Office). The

DFFE screening reports high sensitivity rating was based on the presence of these rivers, and the report also contain National Freshwater Priority Ecosystem Areas (NFEPAs).

Several wetlands were found within the region however, only riverine features such as alluvial floodplains and riparian thickets dominated by *Vachellia karroo*, *Searsia lancea*, *Euclea undulata* and *Gymonsporia buxifolia* were observed.

The study area is not located within an International Bird Area (IBA) or a Strategic Water Resource Area and did not contain any Wetland Clusters or listed Threatened Ecosystems.

The Present Ecological State (PES) of a river, watercourse or wetland represents the extent to which it has changed from near pristine condition (Category A) towards a highly impacted system where there has been an extensive loss of natural habit and biota, as well as ecosystem functioning (Category E). All the systems assessed by DHSWS (2014) on a Subquaternary level within the study area were rated as PES B = Largely Natural to C = Moderately Modified. While these were also rated as High in terms of Ecological Sensitivity and Low in terms of Ecological Importance respectively. Based on the information collected during the preliminary field investigations, these ratings were verified and upheld for the riverine systems. The high ecological sensitivity rating for the natural water sources was further substantiated by the fact that some of the affected catchments are included in both the National Freshwater Priority Atlas and the respective provincial Biodiversity Spatial Plan CBA spatial layers, with one CBA being linked to the Gansvlei / Soutpoort rivers. Overall, these catchment areas and subsequent rivers / watercourses are largely in a natural state with localised impacts in some areas, which include the following:

- Erosion and sedimentation associated with road crossings, and
- Impeded water flow due to several in channel farm dams and weirs.

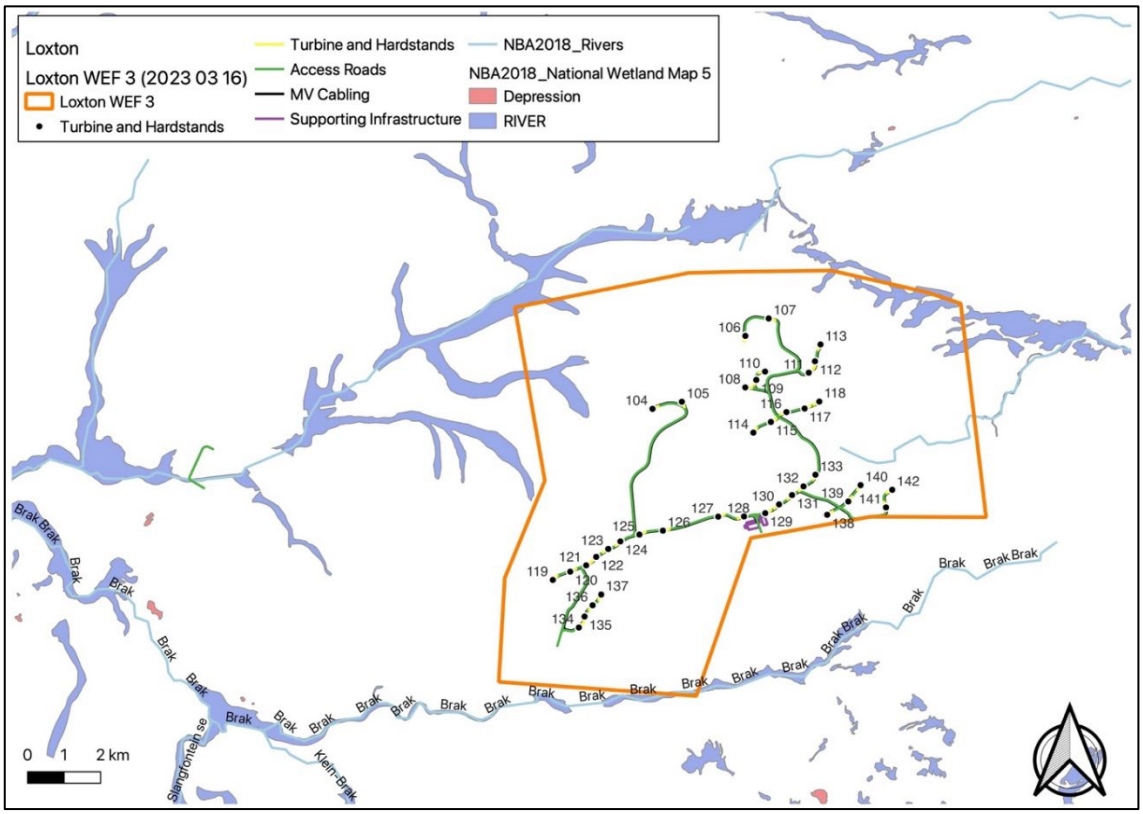


Plate 6-3: National Wetland Inventory wetlands and waterbodies (van Deventer et al., 2020)

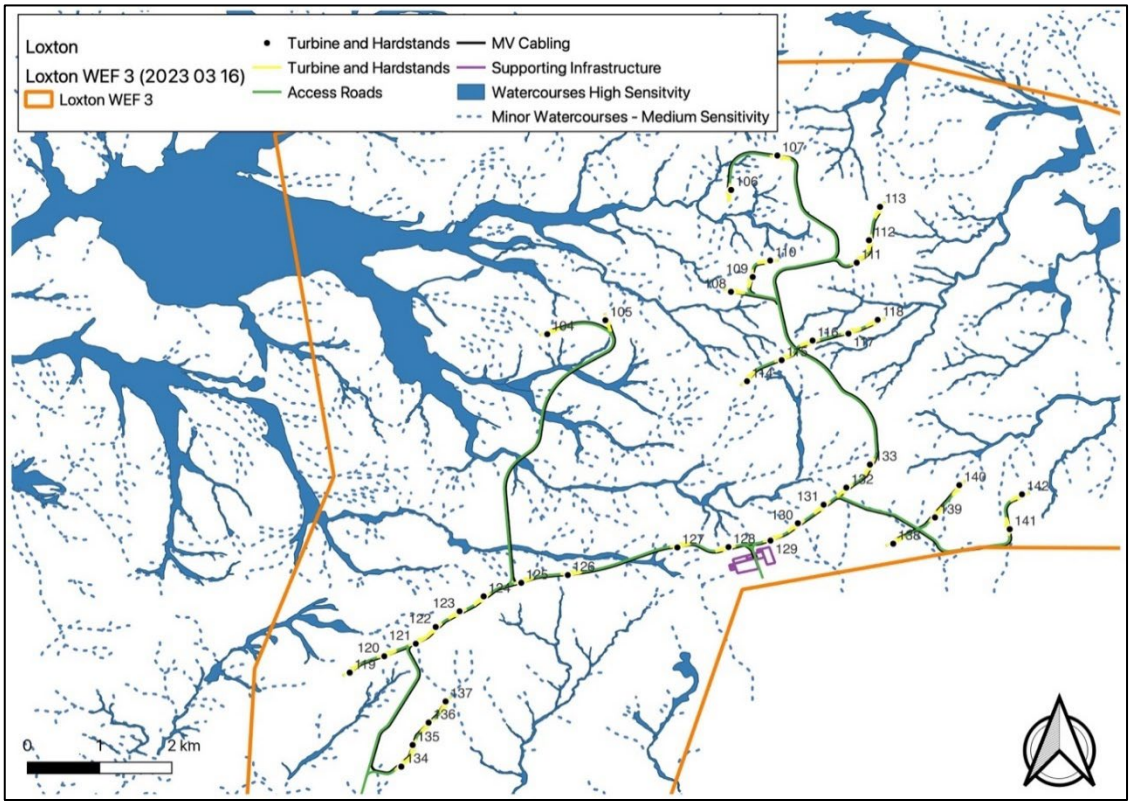


Plate 6-4: Waterbodies delineated in this assessment based on ground-truthing information collected

6.2.6 Terrestrial Biodiversity

Flats and gently sloping plains are found within the Eastern Upper Karoo vegetation unit, which is 'Least Threatened' and has the largest mapped area of all units in the country. The entire site is comprised of this vegetation unit. Dwarf microphyllous shrubs dominate this landscape and 'white' grasses (Aristida and Eragrostis species) are prominent after good summer rains. Karoo scrub species of Pentzia, Eriocephalus, Rosenia and Lycium are important taxa (Mucina & Rutherford 2012). Beaufort Group sandstones and mudstones are common in this vegetation unit, and some Jurassic dolerites are also to be found. There are some fairly extensive tracts of Upper Karoo Hardeveld within the site, as well as a few areas of riparian vegetation which would currently fall into the Bushmanland Vloere vegetation type but are more-closely allied to the Southern Karoo Riviere vegetation type.

6.2.7 Vegetation Types

The national vegetation map (Mucina & Rutherford 2006 & SANBI 2018 update) for the study area is depicted below in Figure 5. The whole of the Loxton WEF 3 site is primarily classified as falling within the Eastern Upper Karoo vegetation type. This is clearly an oversimplification of the vegetation of the site and the on-site field assessment for the Loxton WEF 3 site indicates that there are some fairly extensive tracts of Upper Karoo Hardeveld within the site, as well as a few areas of riparian vegetation which would currently fall into the Bushmanland Vloere vegetation type but are more-closely allied to the Southern Karoo Riviere vegetation type. These three vegetation types are described and illustrated briefly below.

Eastern Upper Karoo

Eastern Upper Karoo has an extent of 49 821 km^2 and is the most extensive vegetation type in South Africa and forms a large proportion of the central and eastern Nama Karoo

Biome. This vegetation type is classified as Least Threatened, and about 2% of the original extent has been transformed largely for intensive agriculture. Eastern Upper Karoo is however poorly protected and less than 1% of the 21% target has been formally conserved. Mucina & Rutherford (2006) list eight endemic species for this vegetation type, which considering that it is the most extensive unit in the country, is not very high. As a result, this is not considered to represent a sensitive vegetation type.

Within the study area, this is dominant vegetation type and forms the matrix in which the other vegetation units are embedded. There is however a fairly large degree of variation in the structure and composition of Eastern Upper Karoo within the site, driven largely by the substrate conditions, with the main differences being associated with dolerite-derived soils vs. shale and mudstone- derived soils. Overall, these tend to be represented by large tracts of fairly homogenous landscapes of low plant diversity. Dominant and characteristic species include low woody shrubs such as Pentzia globosa, Rosenia humulis, Asparagus capensis, Eriocephalus ericoides, Pteronia sordida, Pteronia incana, Plinthus karooicus, Helichrysum luciloides, Felicia muricata, with a varying density of low succulent shrubs such as Zygophyllum lichtensteinii, Aridaria noctiflora and Ruschia spinosa, with a variable grass layer dominated by Stipagrostis ciliata, Stipagrostis obtusa, Enneapogon desvauxii and Tragus berteronianus.

Upper Karoo Hardeveld
The majority of dolerite hills within the site can be considered to represent this vegetation type. The Upper Karoo Hardeveld vegetation type is associated with 11 734 km2 of the steep slopes of koppies, buttes mesas and parts of the Great Escarpment covered with large boulders and stones. The vegetation type occurs as discrete areas associated with slopes and ridges from Middelpos in the west and Strydenburg, Richmond and Nieu-Bethesda in the east, as well as most south-facing slopes and crests of the Great Escarpment between Teekloofpas and eastwards to Graaff-Reinet. Altitude varies from 1000-1900m. Mucina & Rutherford (2006) list 17 species known to be endemic to the vegetation type. This is a high number given the wide distribution of most karoo species and illustrates the relative sensitivity of this vegetation type compared to the surrounding Eastern Upper Karoo.

Most of the hills, outcrops and steep slopes within the site consist of Upper Karoo Hardeveld and this unit has been significantly under-mapped within the national vegetation map. This vegetation type usually consists of very rocky ground and is often associated with steep slopes, with the result that it is considered vulnerable to disturbance but is also an important habitat for fauna. It also contains a higher abundance of protected plant species than the adjacent areas of Eastern Upper Karoo. Consequently, it is generally considered higher ecological sensitivity than the surrounding areas. This habitat creates a wide variety of microhabitats for fauna and flora and the areas with large amounts of exposed rock have therefore been mapped as high sensitivity.

Southern Karoo Riviere
The vegetation along the major rivers within the site corresponds with the Southern Karoo Riviere vegetation type. The Southern Karoo Riviere vegetation type is associated with the rivers of the central karoo such as the Buffels, Bloed, Dwyka, Gamka, Sout, Kariega and Sundays Rivers. About 12% has been transformed as a result of intensive agriculture and the construction of dams. Although it is classified as Least Threatened, it is associated with rivers and drainage lines and as such represents areas that are considered ecologically significant. Common and dominant species in the drainage lines and within the adjacent floodplain vegetation include Sporobolus ioclados, Helichrysum pentzioides, Drosanthemum lique, Pentzia globosa, Salsola aphylla, Tribulis terrestris, Felicia muricata, Atriplex vestita, Zygophyllum retrofractum, Cynodon dactylon, Chrysocoma ciliate,

Stipagostis namaquensis, Lycium pumilum, Lycium cinereum, Artemisia africana, Tripteris spinescens, Exomis microphylla and Derverra denudata.
Within the Loxton WEF 3 area, the Soutpoort River is the most prominent riparian feature. This appears to be the only drainage feature within the site where there are floodplains that have a composition and structure indicating that these areas are potentially favourable for the Riverine Rabbit.

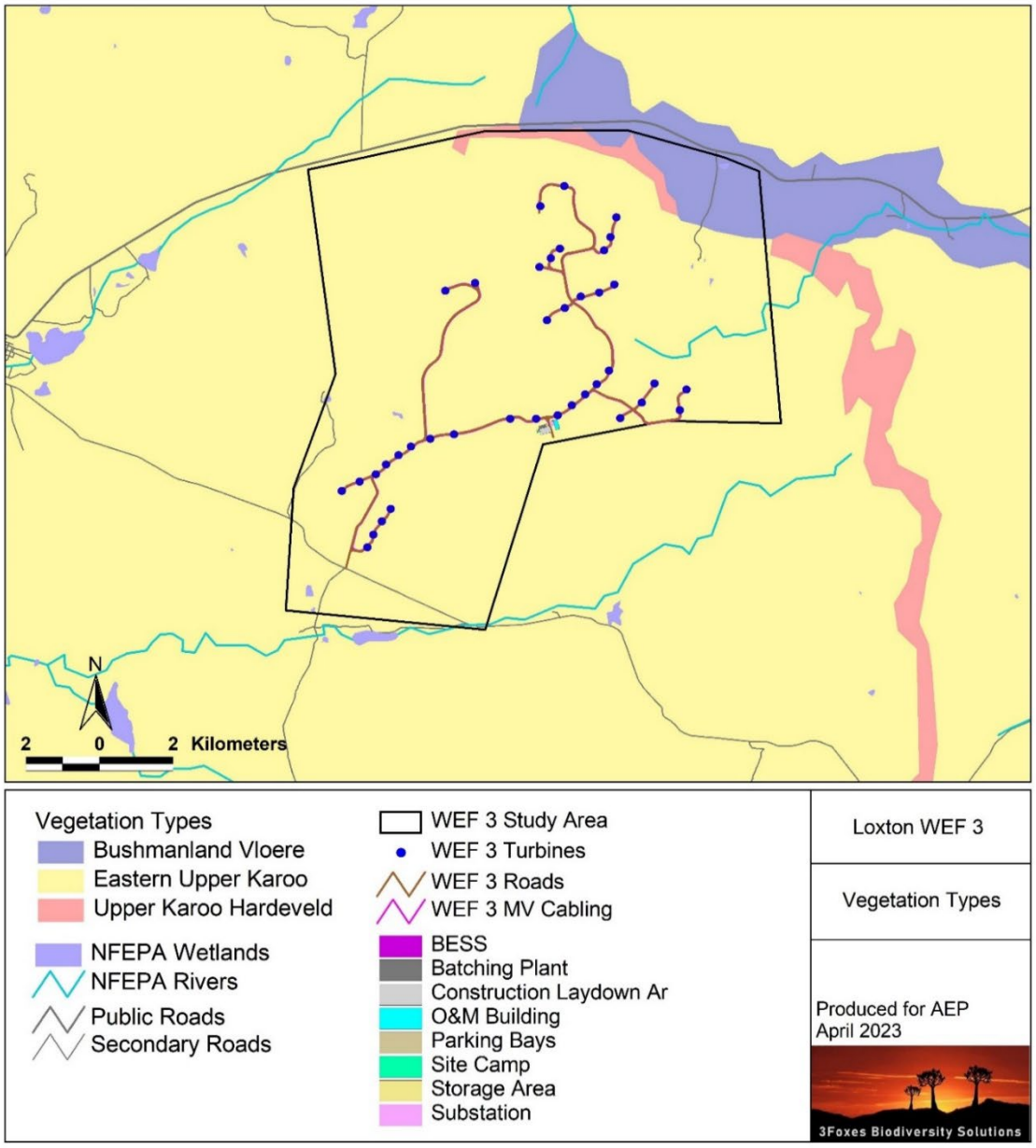


Plate 6-5: The national vegetation map (SANBI 2018 Update) for the Loxton WEF 3 and surrounding area.

6.2.8 Critical Biodiversity Areas & Broad-Scale Processes

The whole of the Loxton WEF 3 site consists of areas of CBA 1 and CBA 2. According to the lookup layer associated with the CBA layer, the attributes underlying the affected CBAs include the following for each CBA category:

CBA 1

- Bushmanland Vloere
- Eastern Upper Karoo
- Upper Karoo Hardeveld
- Conservation Areas
- Natural Wetlands
- Rivers
- Threatened Species
- NPAES PA and Focus
- Landscape structural elements

CBA 2

- Eastern Upper Karoo
- Upper Karoo Hardeveld
- Conservation Areas (interpreted to mean EWT Riverine Rabbit stewardship sites)
- Natural wetlands
- Rivers
- Landscape structural elements

Under the EIA turbine layout, there are three turbines located within the areas of CBA 1 (Plate 6.6), which would have a footprint of less than 5 ha within the CBA 1. The turbines within the CBA 1 are largely associated with areas of Upper Karoo Hardeveld or higher-lying ground associated with the dominant ridges of the site.

The remainder of the development footprint is located within the area of CBA 2. Since the actual biodiversity features present in this area have been mapped at a fine scale and avoided by the layout, the impact would be within low sensitivity areas of the CBA 2. The representation of the Eastern Upper Karoo vegetation type within the CBA 2 would not be a significant issue as this is an extensive vegetation type that has been little impacted by transformation. As a result, the areas within the CBA 2 are not considered of especially high value and would have low irreplaceability. There are no FEPA priority subcatchments within the site.

The whole of the site is also a NPAES Focus Area and this represents a potentially greater concern than development within the CBA. The development would reduce the value of the affected NPAES FA for future conservation expansion. Although the development footprint of 65 ha within the NPAES FA, would not be likely to compromise the ability to reach conservation targets in the area as the affected vegetation types are widespread, the development would have implications for the configuration of any future conservation expansion projects in the area as it is likely that the area affected by the wind farm would need to be avoided. In terms of actual impacts on biodiversity patterns and processes, there are no specific features of very high biodiversity value within the affected polygons and those features considered sensitive would be avoided. In addition, the site does not appear to fall on any significant gradients or corridors that are likely to be of high importance for biodiversity processes such as migration and faunal movement. As such, the overall impact of the development on CBAs and NAPES Focus Areas is considered acceptable.

While the current assessment is restricted to the Loxton WEF 3 project, and finds that impacts on CBAs and NPAES Focus Areas are acceptable, this fails to consider the potential for broader-scale cumulative impacts resulting from wind energy development in the greater Loxton area. This raises the potential for significant impacts on ecological processes such as connectivity in the area and also significant cumulative impacts on NPAES Focus Areas and the ability to meet conservation targets for the affected ecosystems and habitat types. Due to these issues, a separate offset assessment was undertaken (Section 7 of this EIAr).

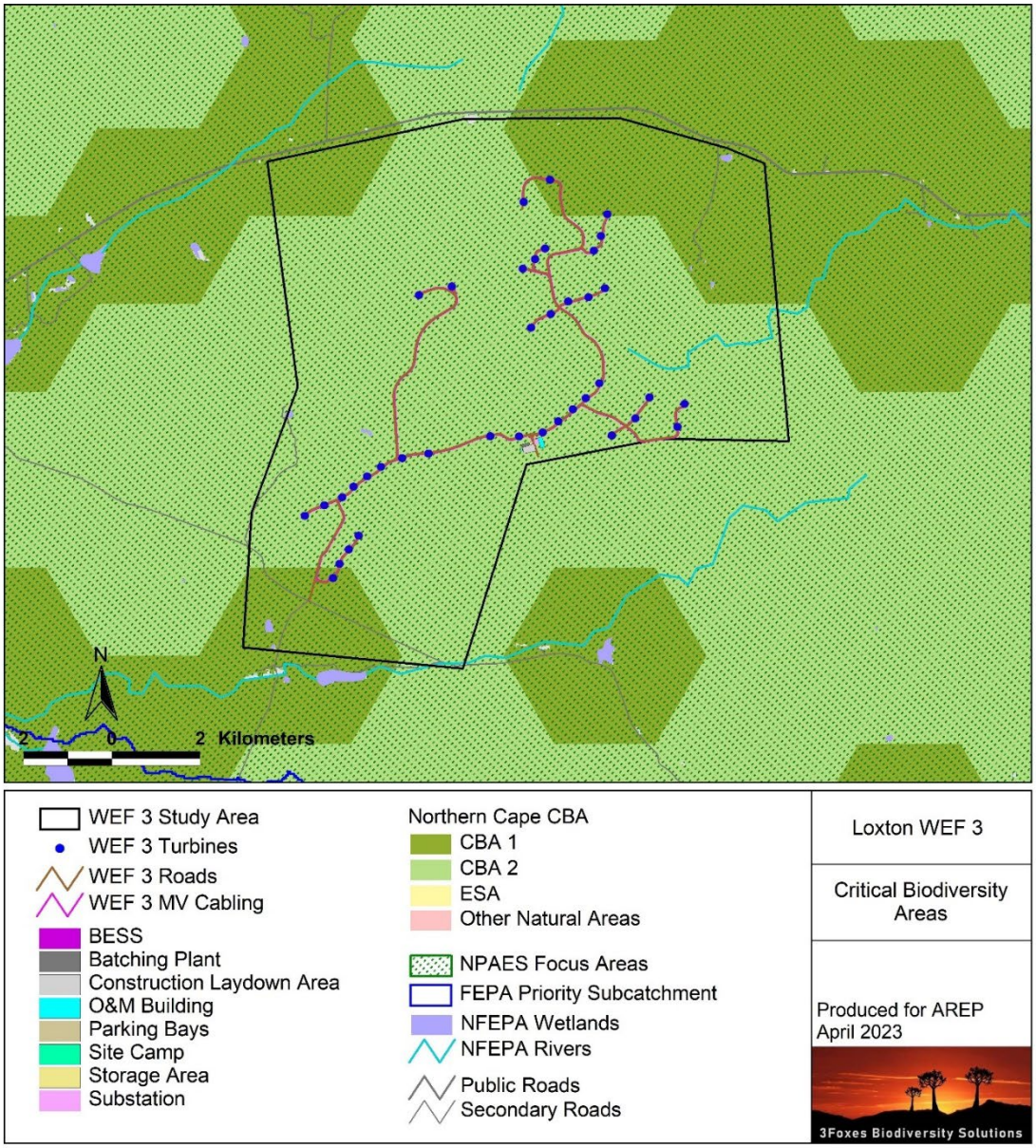


Plate 6-6: Extract of the Northern Cape CBA map for the study area, showing that there are a few turbines located within CBAs and NPAES Focus Areas

6.2.9 Fauna

Mammals

As many as 70 mammals are listed for the wider study area in the MammalMap database, but many of these are introduced or conservation-dependent and approximately 48 can be considered to be free-roaming and potentially impacted by the development. Species confirmed present through camera trapping or direct observation include Steenbok, Kudu, Springbok, Aardvark, Bat-eared Fox, Black-backed Jackal, Grey Mongoose, Yellow Mongoose, Water Mongoose, Suricate, Springhare, Cape Hare, South African Ground Squirrel, Cape Porcupine, Rock Hyrax, African Wildcat, Caracal and Small-spotted Genet. Red-listed species that potentially occur in the area include the Riverine Rabbit *Bunolagus monticularis* (CR), Black-footed Cat *Felis nigripes* (VU), and Grey Rhebok *Pelea capreolus* (NT). Based on the camera trapping conducted on the site, only the Riverine Rabbit is

considered likely present within the site. In general, the mammalian community of the site is likely to be typical of the area.

In terms of the sensitivity mapping relating more generally to mammals, the larger riparian areas have been classified as Very High sensitivity based on their value as Riverine Rabbit habitat but also as a result of their general ecological significance. The rocky hills and steep slopes have been classified as Very High sensitivity on account of the value of these areas as habitat for mammals associated with rocky areas and the more general ecological value of these areas. While these features occupy a fairly large proportion of the site, the overall degree of potential conflict between the development and these areas appears to be fairly low.

Riverine Rabbit

The Riverine Rabbit is endemic to the semi-arid central Karoo region of South Africa. It is associated with dense riparian scrub fringing the seasonal rivers of the region. This habitat specificity is assumed to be related to a dependence on soft and deep alluvial soils along the river courses for constructing stable breeding stops. Home range has been estimated as approximately 12 ha (Duthie 1989). Riverine Rabbits are nocturnal, spending daylight hours in a scrape beneath riparian vegetation. They are solitary, and will only be found in breeding pairs for short periods, or in female-juvenile pairs for rearing purposes (Duthie 1989). Results of the current camera trapping exercise indicate that they only come out to forage after dark, but may still be active in the early morning after sunrise.

Based on mapping from satellite imagery and ground truthing of habitat patches in the field, the areas identified as potential Riverine Rabbit habitat are illustrated below in Plate 6-6. The areas of suitable habitat occur along the larger drainage features of the site. The total area of mapped potential habitat across the Loxton site is 565 ha. Based on the Riverine Rabbit density reported by Duthie (1989) for an area near Victoria West which can be assumed to similar to the current site, this area would be able to support between 30 and 95 individuals of Riverine Rabbits assuming that all of the identified areas were fully occupied. In reality, the quality and condition of the habitat varies to some degree and hence the density of Riverine Rabbits is also likely to vary significantly.

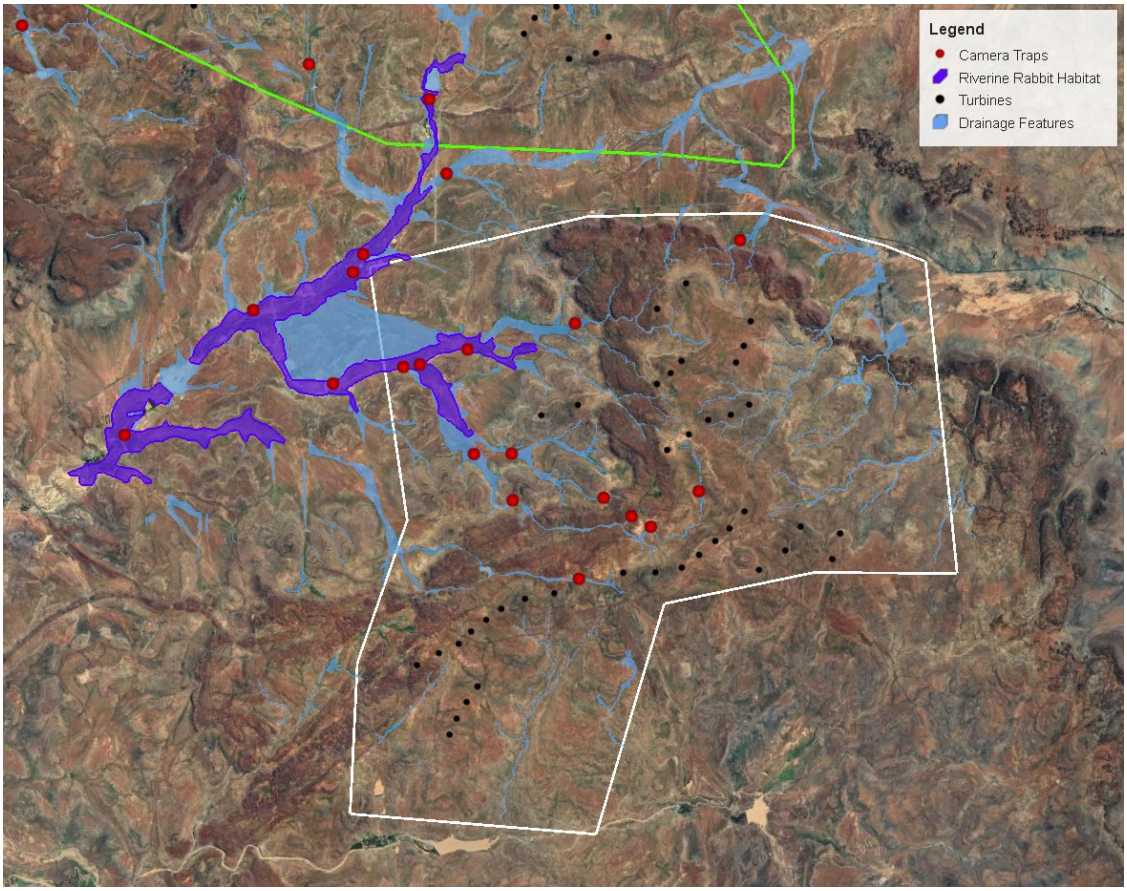


Plate 6-7: Map of areas in proximity to the Loxton WEF 3 which are considered to represent potentially suitable Riverine Rabbit habitat based on ground-truthed mapping from satellite imagery.

Riverine Rabbits were detected at two of the camera locations, giving rise to a total of 117 captures across the two cameras. Spatially, both of the sites with positive observations were from the large contigous habitat patch that runs adjacent to the R63. No rabbits were detected along any of the minor drainage features of the site, or within areas considerd sub-optimal for this species, supporting the high fidelity of this species for specific riparian communities.

Based on the results of the camera trapping and assuming the patch where rabbits are present is fully occupied, the area occupied by Riverine Rabbits can be estimated as approximately 565 ha and based on the higher density estimate of Duthie (1989) could potentially hold as many as 95 rabbits, but could be as few as 30 individuals. The estimated home range for the Riverine Rabbit is 12 ha and assuming that these are non-overlapping for different individuals, then the 565 ha could support 47 individuals which aligns well with the median of the previous estimate. An alternative and more robust method to estimate population size would be use the minimum number of animals alive, which in the current case can be assumed to be 2 individuals as it is unlikely that any rabbits moved between the camera trap sites that are far apart.

As these two individuals occupy an area of 565 ha, the population density for the study area converts to 1 rabbit per 282 ha, which is likely an underestimate given the number of observations there were at the two camera locations. The Area of Occupancy of the Riverine Rabbit has been estimated at 2943 km^2 and assuming that the density across the range is similar to the current study (which is considered highly conservative), that converts to an estimated overall population size of 1041 individuals. This is similar to the estimated

population size of 1435 individuals estimated by Duthie *et al.* (1989), but as this is based on the current density estimate which is not considered reliable for the current study, as this is lower than the average density recorded from similar sites near Loxton by the consultant, the results are considered to be an under-estimate of the local population of rabbits as it is clear that there would more than 2 individuals present within the study area. These wide discrepancies in the estimate of the overall population size are a consequence of the difficulty in establishing a reliable density estimate across the range of this species and the paucity of information on which such an estimate must be based. However, the known range of the Riverine Rabbit has been significantly expanded since 1989, with the result that the estimate of Duthie is clearly an underestimate.

Reptiles

Reptile diversity in the wider area is relatively high which can be ascribed to the diversity of habitats present, especially along the Nuweveld escarpment south of the site. Approximately 60 reptile species are known from the general region and may potentially occur within the study area, with 14 being of confirmed occurrence, 45 of probable occurrence and four of possible occurrence. Species of potential concern include the local endemic, Braack's Pygmy Gecko and the Karoo Padloper. Braack's Pygmy Gecko *Goggia braacki* is a Western Cape endemic with an extremely restricted distribution range. Most of its distribution is associated with a section of the Hoogland Mountains range within the Karoo National Park. It is however not currently red-listed, but it can perhaps be regarded as the reptile icon for the Hoogland Mountains/Beaufort West region. It has thus far, not been recorded in the current area, but it may possibly (not probably) be present within the wind farm area. The only threatened (Red Listed) reptile species in this region is the Karoo Padloper (EN). This small tortoise is seldom observed, even when specifically targeted during herpetofaunal surveys as it is active for only very short parts of the day and may also aestivate for extended periods during unfavourable environmental conditions. They are associated with dolerite ridges and rocky outcrops of the southern Succulent and Nama Karoo biomes. Threats to this species include habitat degradation due to agricultural activities and overgrazing, and predation by Pied Crows which in recent decades have expanded in distribution range. There are nodes of suitable habitat within the Loxton WEF 3 site and it is concluded that the Karoo Dwarf Tortoise is indeed likely to occur within the Loxton WEF 3 site. Fortunately, tortoises are one of the few groups of reptiles that have been specifically studied with regards to their responses to wind energy development and no significant negative impacts have been detected within population's resident on wind farms (Agha *et al*. 2015, Lovich *et al*. 2011). Consequently, habitat loss for this species is likely to be the major avenue of potential impact resulting from the wind farm development. Specific attention to potential habitat loss for this species was paid during the sensitivity mapping and all areas which represent highly favourable habitat for this species have been mapped as no-go areas for turbines. There would however, still be some impact on the smaller ridges due to turbines and access roads and hence some degree of habitat loss for this species.

Amphibians

The diversity of amphibians in the study area is relatively low with only 11 species having being recorded in the area. Species observed at the vicinity of the site include the Karoo Toad, Clawed Toad and Poynton's River Frog. There are no listed amphibian species known from the area although the Giant Bull Frog *Pyxicephalus adspersus* was previously listed as Near Threatened but has revised to Least Concern. This species is associated with temporary pans in the Karoo, Grassland and Savannah Biomes, but is not commonly recorded in the study area and its presence at the site is considered unlikely. Within the sites, the major drainage lines present have permanent or long-lived pools that can be used by toads and frogs for seasonal breeding purposes. But given that these areas are considered important for Riverine Rabbits and other ecological considerations, areas

important for amphibians are captured through other sensitivities and there are no areas that would need to be avoided on specific account of amphibians. Given the localised nature of important amphibian habitats at the site as well as the generally arid nature of the site and the low overall abundance of amphibians, a significant long-term impact on amphibians is unlikely.

Table 6-1: Faunal species conservation concern known from the broad area, and their likely presence within the site

Species	Wider area	Loxton 1 WEF
Grey Rhebok (NT)	Present on higher ground, especially the Nuweveld mountains.	Not observed within the Loxton WEF 3 site, but confirmed present within the wider site. The Loxton WEF 3 site is considered low sensitivity for this species.
Black-footed Cat (VU)	Known from records from the area, but no recent records within either the Virtual Museum or iNaturalist.	No recent records from the area and the regular presence of this species within the site is considered unlikely. The site is considered low sensitivity for this species.
Riverine Rabbit (CR)	Confirmed present in the Loxton area.	Confirmed present through camera trapping in close vicinity to the Loxton WEF 3 and is considered potentially present within the site.
Karoo Dwarf Tortoise (NT)	Occasional records from the broad area. Associated with dolerite outcrops.	Potentially present as there is suitable habitat within the site and there are some records from similar habitat nearby.

6.3 Avifauna

Loxton WEF 3 is entirely comprised of Eastern Upper Karoo vegetation. A number of micro habitats are available to birds in the area which includes: man-made dams, wetlands, streams / drainage lines, rocky ridges and small cliffs, limited grassland, Karoo shrubland and small areas of pasture / crops.

In general terms, the proposed project lies in a wilderness area, little disturbed by anthropogenic factors. Very few if any vertical man-made structures exist in this landscape currently. Human presence and noise pollution are very low. The proposed project would therefore result in a significant change from the *status quo* for avifauna.

The avifaunal community is comprised perhaps most importantly of raptors and large terrestrials. The larger raptors' breeding sites have been avoided by placing large No-go buffers around nests in accordance with current Best Practice Guidelines. These species have however still been recorded flying outside of these areas and on site. Large terrestrials such as cranes, bustards and korhaans are more dispersed on site but spend less time in flight.

The South African Bird Atlas Project 2 (SABAP 2) has a relatively low reporting rate across the 16 pentads that span the site boundary, ranging between 0 – 13 full protocol cards submitted per pentad (some, if not most, of these cards have been contributed by our own monitors). The SABAP 2 assemblage of 164 reported species were similar to what the observers reported. The SABAP 2 dataset has thus been excluded and is not presented in addition to the comprehensive findings of the specialist monitoring and assessment programme.

Throughout the year of avifaunal monitoring, observers identified 165 bird species on site across all methodologies, and incidentally. Totals per site visit were as follows: 95 species in site visit 1 (S1), 103 in S2, 145 in S3 and 125 in S4. The third site visit fell over the

summer period and produced the greatest species list, as expected, when migrant species were present on site.

Eleven species observed to occur on the site are Red Listed: Martial Eagle (*Polemaetus bellicosus*), Ludwig's Bustard (*Neotis ludwigii*) and Black Harrier (*Circus maurus*) are Endangered; Verreaux's Eagle (*Aquila verreauxii*), Lanner Falcon (*Falco biarmicus*), Secretarybird (*Sagittarius serpentarius*) and Black Stork (*Ciconia nigra*) are Vulnerable, and Blue Crane (*Grus paradisea*), Karoo Korhaan (*Eupodotis vigorsii*), Sclater's Lark (*Spizocorys sclateri*) and African Rock Pipit (*Anthus crenatus*) are Near-Threatened. Twenty-four of the recorded species are either endemic or near endemic to South Africa, or endemic to South Africa, Lesotho and Eswatini.

Table 6.1 below presents the seasonal presence of each priority species on the site and a qualitative assessment of the risk of each type of impact (pre-mitigation) occurring for each of the priority species if the proposed wind farm is built. Species are presented in descending order of regional conservation status. This assessment was made on the basis of the data collected on site during the monitoring programme.

Table 6-2: Priority bird species (Species of Conservation Concern) assessment and risk profile

Common Name	Scientific Name	Red List: Regional, Global (Endemism)	Collision risk (Retief *et al.* 2014)	S1	S2	S3	S4	Specialist Risk Assessment (pre mitigation)	Likely impacts
Bustard, Ludwig's	*Neotis ludwigii*	EN, EN	14	√	√	√	√	**High**	Collision with turbines
Eagle, Martial	*Polemaetus bellicosus*	EN, VU	4	√	√	√	√	**Medium**	Collision with turbines
Harrier, Black	*Circus maurus*	EN, EN (NE)	6			√		**Medium**	Collision with turbines
Eagle, Verreaux's	*Aquila verreauxii*	VU, LC	3	√	√	√	√	**High**	Collision with turbines
Falcon, Lanner	*Falco biarmicus*	VU, LC	24	√		√	√	**Low**	Collision with turbines
Secretarybird	*Sagittarius serpentarius*	VU, EN	13	√	√		√	**Low**	Collision with turbines, Disturbance & Displacement
Stork, Black	*Ciconia nigra*	VU, LC	10		√	√		**Low**	Collision with turbines
Crane, Blue	*Grus paradisea*	NT, VU	11			√		**Low**	Collision with turbines, Disturbance & Displacement
Korhaan, Karoo	*Eupodotis vigorsii*	NT, LC	51	√	√	√	√	**Low**	Collision with turbines, Disturbance & Displacement
Lark, Sclater's	*Spizocorys sclateri*	NT, NT (NE)	50	√	√			**Low**	Collision with turbines
Pipit, African Rock	*Anthus crenatus*	NT, LC (SLS)	78			√	√	**Low**	Collision with turbines, Disturbance & Displacement
Buzzard, Jackal	*Buteo rufofuscus*	(NE)	43	√	√	√	√	**High**	Collision with turbines
Francolin, Grey-winged	*Scleroptila afra*	(SLS)	80	√	√	√		**Low**	Collision with turbines
Buzzard, Common	*Buteo buteo*		67		√	√		**Low**	Collision with turbines
Courser, Double-banded	*Rhinoptilus africanus*		72	√	√	√	√	**Low**	Collision with turbines, Disturbance & Displacement
Eagle, Black-chested Snake	*Circaetus pectoralis*		60	√		√	√	**Low**	Collision with turbines
Eagle, Booted	*Hieraaetus pennatus*		59	√	√	√		**Low**	Collision with turbines
Falcon, Amur	*Falco amurensis*		66			√		**Low**	Collision with turbines
Falcon, Peregrine	*Falco peregrinus*		49			√		**Low**	Collision with turbines
Goshawk, Pale Chanting	*Melierax canorus*		75	√	√	√	√	**Low**	Collision with turbines
Hawk, African Harrier-	*Polyboroides typus*		85	√		√	√	**Low**	Collision with turbines

Common Name	Scientific Name	Red List: Regional, Global (Endemism)	Collision risk (Retief *et al.* 2014)	S1	S2	S3	S4	Specialist Risk Assessment (pre mitigation)	Likely impacts
Kestrel, Greater	*Falco rupicoloides*		95			√		**Low**	Collision with turbines
Kestrel, Lesser	*Falco naumanni*		64			√		**Low**	Collision with turbines
Korhaan, Northern Black	*Afrotis afraoides*		90	√	√	√	√	**Low**	Collision with turbines
Lark, Melodious	*Mirafra cheniana*		91			√		**Low**	Collision with turbines
Owl, Cape Eagle-	*Bubo capensis*		42	√			√	**Low**	Collision with turbines
Owl, Spotted Eagle-	*Bubo africanus*		98	√		√	√	**Low**	Collision with turbines
Sparrowhawk, Rufous-breasted	*Accipiter rufiventris*		101	√		√		**Low**	Collision with turbines

6.4 Bats

Based on current taxonomic information and bat occurrence data, 10 bat species could occur within the study area. The proposed development is in the arid Nama Karoo Biome and the landscape is characterised by relatively flat or gently sloping plains interspersed with mountainous terrain (inselbergs and koppies).

Bat roosting sites are relatively limited and unlikely to support large congregations of bats. The closest known major bat roost is approximately 55 km north of the development site. Rocky outcrops are present on site and these geological features may provide roosting spaces for species such as Roberts's flat-headed bat, Egyptian free-tailed bat, Lesueur's wing-gland bat, and Long-tailed serotine that roost in rocky crevices (Monadjem et al. 2018). The Long-tailed serotine roosts in small groups of a few individuals while Roberts's Flat-headed bat tends to roost communally in small groups of tens of individuals (Jacobs and Fenton 2002). Egyptian free-tailed bats can roost in groups of tens to a few hundred individuals (Herselman and Norton 1985).

Bats are also likely to roost in buildings associated with farmsteads within and bordering the project especially Cape serotine and Egyptian Free-tailed Bat (Monadjem et al. 2018). Trees growing at these farmsteads, and in limited places elsewhere on site usually at livestock water points, could also provide roosting spaces for bats although the extent of this is limited since these trees are typically not large and day-time temperatures may be too hot to use them as roosts (Monadjem et al. 2018). The building inspections on site did not reveal any roosting bats although bats do typically use these structures for roosts and visible signs of bat presence (brown, stained exit/entry points) was found at some buildings.

Sensitive features at which bat foraging activity may be concentrated include farmsteads, wetlands, farm dams, irrigated cultivated areas, the livestock water points, rocky outcrops, and along drainage networks/riparian areas. The presence of water, vegetation and lighting at these features could promote insect activity and hence attract foraging bats. For example, Long-tailed serotine have been captured foraging for flies at a livestock kraal (Shortridge 1942). Activity could also be concentrated along the non-perennial rivers and smaller streams.

In total, 153,991 bat passes were recorded over the 366-nights of acoustic monitoring. Most bat activity, approximately 60 %, was attributed to Egyptian free-tailed bat. Natal long-fingered bat and Long-tailed serotine were seldomly recorded. The acoustic activity data suggest that risk for these two species [based on the risk levels in MacEwan et al. (2020)] will be low for all months and heights and hence these were not discussed in further detail in the assessment report. The assessment focused on activity patterns and risk to Egyptian free-tailed bat, Roberts's flat-headed bat and Cape serotine.

6.5 Noise

The surrounding area in the vicinity of the development are sparsely populated, with only a few noise-sensitive developments (each which could include a number of people and animals) identified in the area. Most of the area can be considered wilderness, with animal husbandry (sheep) and ecotourism (game and guest farms). None of which influences the ambient sound levels in the development.

Due to the height of the wind turbines, as well as the position where they may be developed (on top of the hills and ridges), it is unlikely that topographical features will limit the propagation of sound from the wind turbines.

There are no formal residential areas within 5,000 m from the WEF, with the town of Loxton located approximately 20 km south of the closest wind turbines of the preliminary layout.

There are no roads that carry sufficient traffic to be considered of acoustic significance. Land use is mostly wilderness, including ecotourism and game farming, with some agricultural activities - mainly sheep farming.

The R63 road passes the development area at the west, though traffic on this road is low and does not influence ambient sound levels within the development area. There are a number of small access roads leading from the R63, mainly to serve the farmers in the area. Traffic volumes on these small access roads are low and are of no acoustical significance.

Potential Noise-sensitive receptors (NSR) were initially identified using aerial images as well as the DFFE Screening Tool, with the statuses of the NSR verified during the site visit in June 202, refer to Plate 5.7 below. The NSR as identified were given buffers of either 500 m, 1,000 m or 2,000 m. Generally, noise from wind turbines, depending on the layout as well as the specific sound power emission levels of the selected wind turbine:

- Could be significant within 500 m, with receptors staying within 500 m from operational wind turbines subject to noises at a potentially sufficient level to be considered disturbing;
- Are normally limited to a distance of approximately 1,000 m from operational wind turbines. Night-time ambient sound levels are elevated and the potential noise impact might be measurable. Cumulative noises from multiple wind turbines surrounding an NSR may be high and exceed 45 dBA;
- May be audible up to a distance of 2,000 m at night; and
- Are generally of a low concern at a distance greater than 2,000 m.

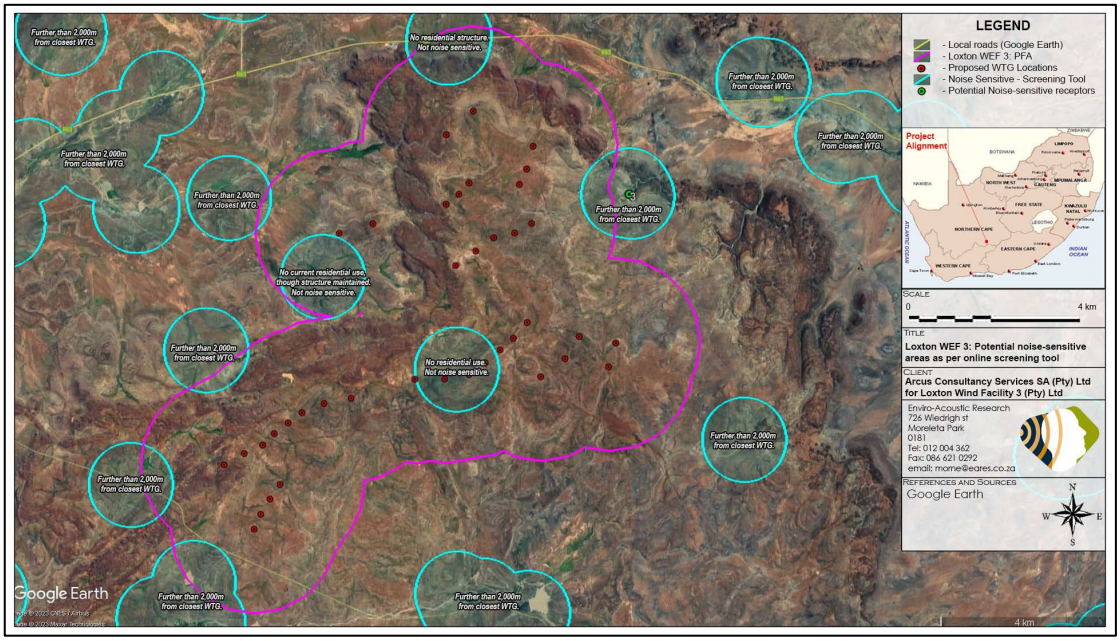


Plate 6-8: Potential Noise-sensitive receptors (NSR) identified by the DFFE Screening Tool

6.6 Heritage and Archaeology

Loxton was established in 1899 on the farm Phezantefontein and was named after A.E. Loxton, the last owner of the farm (Raper n.d.). The town was given municipal status in 1905 and the first town dam was built in 1912 (Schoeman 2013). The town is quite famously associated with Deon Meyer, the well-known South African crime novelist. There does not seem to have been any significant Anglo-Boer War action in the vicinity of Loxton.

The name Loxton does not appear in Packenham (1993) or Grobler (2004), but since the town was only established and named on the eve of the war this might be unsurprising.

The site is comprised of long, low sandstone hills with intervening river valleys. Occasional dolerite outcrops occur and vegetation tends to be sparse and very low. Farmsteads occur in places and the only infrastructure on the site is related to farming (e.g. tracks, fences, dams, wind pumps). Archaeological resources were found to be very rare in the areas targeted for development, with most sites being in river valleys. Rare artefact scatters from the MSA and LSA were seen, while historical resources included ruins of houses, kraals and other features along with some artefactual debris. The farmsteads and surrounding arable lands are pockets of cultural landscape, while the broader landscape also has cultural significance. Bedrock is exposed in places but, aside from some dolerite ridges in the northern part, usually only in small patches.

Stone Age materials were found in a few places but were generally not common. No ESA artefacts were seen and just one site was ascribed to the MSA. There was a scatter of well-patinated artefacts on hornfels and no formal tools were noted but the scar pattern on the dorsal surfaces of some flakes suggests that they date to the MSA. Three LSA sites were found, the largest on high ground far from any obvious source of water. The artefacts were almost all on dolerite, with a chert flake being the exception. A few pieces of ostrich eggshell were present, while a single glass fragment may be a chance inclusion or might indicate that the site is very late. An adze and an endscraper were seen along with some ostrich eggshell fragments.

A few historical archaeological sites were also found. No graves were seen during the survey. Although the Springfontein farmstead itself was not visited, the eastern part of the broader werf was examined and a number of archaeological features were seen. These included a stone-walled house ruin with two rooms and a scatter of historical debris around it, a low density dump of 19th and 20th century artefacts, two very well-preserved stone kraals, and the remains of a circular feature assumed to have been a threshing floor.

North of Springfontein the river emerges from a dolerite poort. To the north of this poort is the aptly named Rooipoort complex. It is in ruin and abandoned and, although not visited, many stone-walled kraals were seen on aerial photography. No graves were seen during the site survey. Although there was a suspicious collection of stones on sandy substrate alongside a fence, the collection was far too small to be a grave covering.

The landscape of the study area is largely a natural landscape but with many pockets of cultivation and other anthropogenic features. These are farm complexes that lie along the rivers. Although it is true that the entire Karoo is a cultural landscape, the smaller cultural landscape features are more important to the present assessment. Some farmsteads are abandoned while others continue to be occupied. Key elements of these agricultural landscapes are the many in-stream dams that have been built over the years. Many of them have been breached.

The study area lies east of the R63 which, as one of the main roads through the area, can be regarded as a scenic route. It links Victoria West to the east with Loxton and the proceeds north to Carnarvon, and west to Williston and Calvinia. As such, it is probably the most important route through the western Karoo.

6.7 Palaeontology

The project area comprises semi-arid, gently hilly, rocky to sandy and gravelly terrain of the Upper Karoo, situated at elevations between c. 1390 and 1580m amsl. to the east of the small town of Loxton and the Loxton – Carnarvon road (R63) as well as straddling the R63 road sector between Loxton and Victoria West (1: 250 000 sheet 3122 Victoria West; 1: 50 000 sheets 3122AB Alarmskraal, 3122 AD Loxton, 3122BC Schimmelfontein, 3122CB

Slangfontein, 3122DB Slypfontein). Much of the terrain is of fairly subdued, rolling relief, with occasional dolerite-capped koppies and ridges, especially in the south (e.g. Kleinberg 1534 m, Die Rooikoppie 1514 m, Rooiaar dyke just east of the project area). There are no major rivers; much of the area is drained by a network of small, mostly unnamed, non-perennial streams (e.g. Springbokfontein se Leegte), variously draining SW into the Loxton Dam and Biesjespoort Dam and the Soutpoortrivier or eastwards into the Klein-Brakrivier and the Bitterwaterspruit.

Historical palaeontological site mapping for the region between Loxton and Victoria West reveals a paucity of recorded vertebrate fossil sites within the project area. This is supported by recent palaeontological field surveying undertakan by the specialist both within the development area and in neighbouring WEF project areas, which shows that: (1) Levels of Beaufort Group bedrock exposure are very limited here due to pervasive cover by Late Caenozoic superficial sediments; (2) Intensive intrusion by dolerite sills and dykes has compromised fossil preservation over large areas; and (3) The Beaufort Group bedrocks span the catastrophic end-Middle Permian Extinction Event which is associated with an unusually low abundance of well-preserved fossil remains.

The project area is largely underlain at depth by continental (fluvial / lacustrine) sediments of the Lower Beaufort Group (Karoo Supergroup) of Middle to Late Permian age (*c*. 260 to 256 Ma = million years ago) (Johnson *et al.* 2006). The sedimentary succession in the north-western sector of the Main Karoo Basin represented here broadly gets younger from north to south. The beds here are assigned to the Abrahamskraal Formation and the lowermost, sandstone-rich part of the Teekloof Formation (Poortjie Member), while the overlying mudrock-dominated Hoedemaker Member only crops out within the associated Grid Connection corridor towards Victoria West (to be separately assessed). The fine-scale lithostratigraphy of the Lower Beaufort Group succession in this sector of the Main Karoo Basin - including the correlation of the main channel sandstone packages such as the Poortjie Member - remains unresolved (*cf* Day & Rubidge 2020a).

Over the course of eight days, only a handful of fossil sites were recorded, the majority of which are poorly preserved and of limited scientific or conservation significance. Even occasional small areas showing excellent, fresh mudrock exposure ideal for palaeontological recording yielded hardly any fossils. No fossil sites were recorded within the Late Caenozoic superficial deposits.

In this subregion of the Upper Karoo the Beaufort Group sediments are intruded by an extensive network of dyke and sill complexes of the Early Jurassic Karoo Dolerite Suite, especially in the southern sector of the combined project area (*e.g.* Kleinberg 1534 m, Die Rooikoppie 1514 m, Rooiaar dyke just east of the project area) (Chevallier & Woodford 1999, Duncan & Marsh 2006). These intrusions have thermally metamorphosed and altered the adjoining country rocks, locally compromising fossil preservation as well as generating large volumes of tough quartzitic colluvial and eluvial rubble that mantles the neighbouring potentially fossiliferous bedrocks. Kimberlite pipes or other intrusions are not mapped within the project area itself but do occur shortly to the east (small black diamond symbols on the geological map).

Levels of tectonic deformation (including folding, cleavage development) within the wider region are probably low; satellite imagery suggests that the Beaufort Group sediments are fairly flat-lying while they are also cut by numerous small faults which are often picked out by dark lines of shrubs as well as by dolerite dykes.

The Permian and Jurassic bedrocks within the project area are extensively mantled by a range of Late Caenzoic superficial deposits, limiting exposure levels of fresh (unweathered), potentially fossiliferous Permian sediments. In addition to thick alluvial sediments along numerous active or defunct drainage lines, these younger cover sediments include pan and spring deposits, colluvial (slope) and eluvial (downwasted) surface gravels, pedocretes

(*e.g.* calcrete hardpans, especially in doleritic terrain) *plus* a spectrum of mainly sandy to gravelly soils.

The Middle to Late Permian Abrahamskraal and Teekloof Formation bedrocks in the combined Loxton Cluster study area are characterised by fossil assemblages of the *Tapinocephalus* and *Endothiodon* Assemblage Zones (the latter was previously termed the *Pristerognathus* and *Tropidostoma* Assemblage Zones (Kitching 1977, Keyser & Smith 1977-78, Rubidge 1995, Rubidge 2005, Van der Walt *et al.* 2010, Smith *et al.* 2012, Smith *et al.* 2020, Day & Rubidge 2020b, Day & Smith 2020). They include a wide range of fossil tetrapods - especially reptiles and therapsids ("mammal-like reptiles" or protomammals"") - as well as fish, amphibians, plant remains (*e.g.* petrified wood, plant compressions), microfossils and trace fossils (*e.g.* vertebrate and invertebrate burrows, trackways). These fossil assemblages and the sedimentary bedrocks within which they occur are of special scientific interest because they span the environmentally critical boundary between the Middle and Late Permian Periods which was associated with the catastrophic end-Capitanian Mass Extinction Event of *c*. 260 Ma (million years ago) (Day *et al.* 2015).

Only a few historical vertebrate fossil sites are mapped near Loxton on the published 1: 250 000 geological map and in the key early review by Kitching (1977). The Karoo fossil vertebrate site map of Nicolas (2007) shows low density of fossil records east of Loxton with just a few sites recorded south and north of the town. The region between Loxton and Victoria West is the subject of ongoing palaeontological research by Professor Bruce Rubidge of the Evolutionary Studies Institute (ESI), Wits University as well as Dr Mike Day of the Natural History Museum, London. Important concentrations of fossil sites are known *c.* 20 km east of the WEF project area near Melton Wold and west of Gamma Substation as a result of a long history of palaeontological fieldwork in the Biesiespoort area (close to the eastern sector of the proposed associated Grid Connection Corridor). Recent palaeontological fieldwork by the specialist in the broader Loxton – Victoria West – Beaufort West region (*e.g.* Nuweveld WEFs, Hoogland WEFs, Modderfontein WEF, Victoria West WEF Cluster, Skietkuil / iLanga project areas – see References under Almond) and earlier research by other Karoo palaeontologists (*e.g.* Smith 1993) suggest that unrecorded fossil sites of scientific and conservation value are likely to occur here. However, vertebrate fossil records are often sparse in areas intruded by dolerite. New tetrapod fossil finds within the project area should help resolve outstanding lithostratigraphic ambiguities in the region as well as contributing to on-going scientific research concerning palaeoenvironmental and evolutionary events before and during the catastrophic end-Middle Permian Extinction Event of *c*. 260 million years ago as well as during the succeeding biotic recovery (Retallack *et al.* 2006, Day *et al.* 2015).

Most of the varied Late Caenozoic superficial sediments within the project area are largely of low palaeosensitivity. However, relict and often consolidated older (Neogene / Pleistocene) alluvial deposits along drainage lines might contain sporadic fossil assemblages of mammals (bones, teeth, horn cores), freshwater invertebrates (*e.g.* unionid bivalves) and trace fossils (*e.g.* calcretised termitaria, rhizoliths / plant root casts).

While additional, unrecorded fossil sites of high palaeontological and conservation value are likely to occur at and beneath the land surface, they are probably very sparse and sporadic in distribution and can be effectively handled in the Construction Phase through a Chance Fossil Finds Protocol, which will be recommended for inclusion in the EMPr during the EIA Phase.

6.8 Visual / Landscape

The proposed development is located in the Great Karoo to the north of the town of Loxton. The site lies to the east of the R63 Provincial Main Road, between Loxton and Carnarvon. It is an expansive semi-arid landscape, with widely scattered farmsteads. The large farms

mainly support merino sheep, and occasionally dorper sheep, goats and horses, as well as game, such as small antelope.

The landscape in this part of the Great Karoo has been eroded over time, the once deeply buried Beaufort Group mudstones and sandstones and the dolerite intrusions having been exposed to form the present-day Karoo landscape. The regional plateau is characterised by horizontal sills and dykes of erosion-resistant dolerite forming steep slopes in places, boulder-strewn mesas and flat-topped koppies that are the main scenic features of the study area. The gentler, lower hillslopes and plains consist of more easily weathered mudstone, with occasional narrow ledges of harder sandstone. The flattish plains are at around 1400-1500 m elevation, and the dolerite ridges and mesas around 1600 m elevation in the study area.

There are a number of scattered farmsteads within the site and in the surroundings within the viewshed. The farmsteads are on average 5 to 10km+ apart, linked by narrow gravel roads. The farms are generally extensive in area and support mainly sheep farming and game. Game farms in the area offer farm stay and safaris, such as Jakhalsdans on the R381 to the west. Loxton is the nearest town, being about 10 km from the nearest currently proposed wind turbines

The flat-topped hills and dolerite ridges are a characteristic feature of the Great Karoo in an otherwise fairly featureless, parched landscape, an area noted mainly for its empty, uncluttered landscapes, stillness, red sunsets, dark nights and starry skies.

Springbok and many other smaller antelope roam free on game farms, the isolated farmsteads forming green oases in the semi-arid landscape.

Plate 6-9: Altona farmstead looking north, 5,26 km from the proposed Loxton WEF 3. Wind turbines would be partly visible to the north.

Plate 6-10: Erasmuskraal farmstead looking west, 2,7 km from the proposed Loxton WEF 3. Wind turbines would be partly visible to the north-east.

Plate 6-11: Arizona farmstead looking south, 5,4 km from the proposed Loxton WEF 3. The wind turbines would be partly visible to the west and south-west.

Plate 6-12: View from R63 Route of scarp edge 2,6 km from the proposed Loxton WEF 3. The turbines would be partly visible behind the ridgeline.

6.9 Traffic and Transportation

The road network within the study area, servicing the proposed development is well-established consisting of a combination of national roads, first, second and third-order roads, which provides the proposed development accessibility to local towns and the major commercial centres within South Africa. Majority of these public roads are surfaced roads while the minor / private access roads to the proposed development from the main roads are gravel roads.

Access to the WEF 3 is via an existing entrance. This point is on the DR 02314, approximately 11 km east of the TR 05801 as shown in Plate 6.13 below:

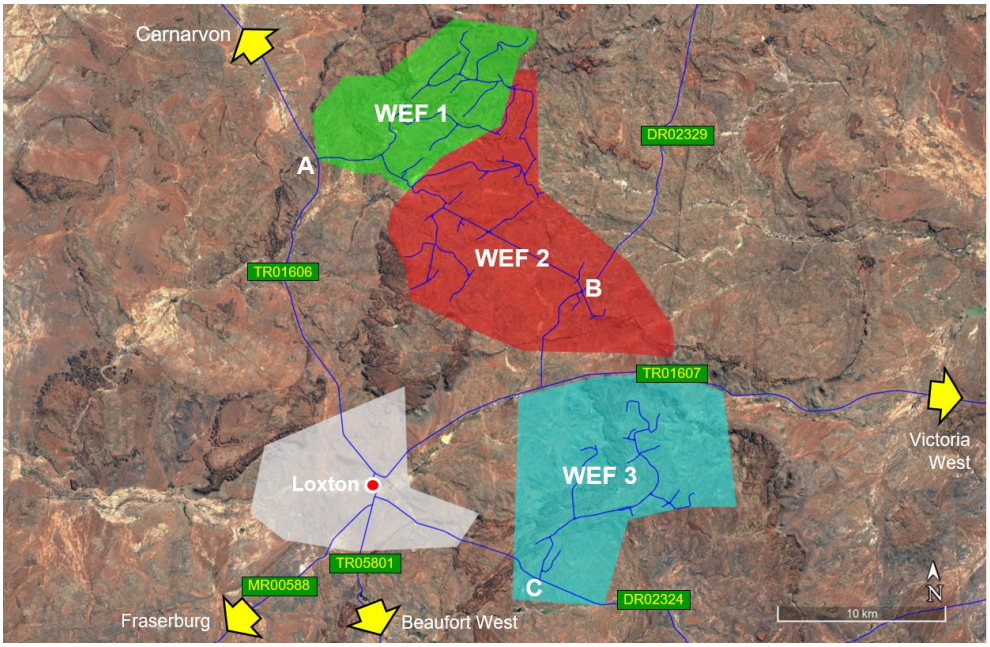


Plate 6-13: Site Access to Loxton WEF 3

6.9.1 Transportation Routes

Commuter Routes

The towns in this part of the country are few and far apart. There are several towns within a 100 km radius of the proposed development from which the workforce is to be drawn for the proposed development, which include Carnarvon, Loxton, and Victoria West. The commuting routes to the proposed development from the surrounding towns are as follows

- Carnarvon – travel approximately 63 km on the TR 01606, towards Loxton, pass through Loxton, travel approximately 1 km on the TR 05801, towards Beaufort West, turn left onto the DR 02324, travel approximately 13 km to Access Point C on the left.
- Loxton – travel approximately 1 km on the TR 05801, towards Beaufort West, turn left onto the DR 02324, travel approximately 13 km to Access Point C on the left.
- Victoria West – travel approximately 81 km on the TR 01607, towards Loxton, pass through Loxton, travel approximately 1 km on the TR 05801, towards Beaufort West, turn left onto the DR 02324, travel approximately 13 km to Access Point C on the left.

The proportionality of the workforce from the surrounding towns is based on a 'working-age' population, modified by a 'weighting factor', calculated based on the distance travelled to the proposed development from the relevant town.

Freight Routes

Transnet Port Terminals is a division of Transnet SOC Limited, South Africa's state-owned freight transport company, which owns and operates the terminal at several Ports in South African. Operations are divided into the major market sectors: containers, bulk, breakbulk, and automotive, organised into three geographical regions – Eastern Cape, Western Cape, and Kwa-Zulu Natal. The port of entry into South Africa for all import WTG components is limited to Ngqura (located close to Gqeberha) or Saldanha Terminals. The possible routes from these terminals to the proposed development is via Victoria West. The preferred transportation route would ultimately be identified by the logistic company appointed to transport the various WTG components from the port of entry to the proposed development.

The most likely transportation routes for domestically supplied and manufactured components from the major commercial centres to the proposed development are either Cape Town or Johannesburg (or any supplier along these routes).

6.10 Socio-economic Baseline

The study area is located within the Ubuntu Local Municipality (ULM), which forms part of the Pixley Ka Seme District Municipality (PKSDM). The PKSDM is made up of eight category B local municipalities which include Emthanjeni, Kareeberg, Thembelihle, Siyathemba, Renosterberg, Ubuntu, Siyancuma and Umsobomvu municipalities (Figure 3.2). The town of Victoria West is the administrative seat of the ULM. The project area is located in Ward 3 of the ULM.

Population

The population of the ULM in 2016 was 19 471 (Community Household Survey 2016). Of this total, 38.6% were under the age of 18, 55.9% were between 18 and 64, and the remaining 5.5% were 65 and older. The population of Ward 3 in 2011 was 4 715. Of this total, 37% were under the age of 18, 58% were between 18 and 64, and the remaining 5% were 65 and older. The ULM and Ward 3 therefore have a high percentage of the population that fall within the economically active group of 18-65. The figures are similar to the figures for the PKSDM and Northern Cape (58.5% and 57.7% respectively).

The dependency ratio is the ratio of non-economically active dependents (usually people younger than 15 or older than 64) to the working age population group (15-64). The higher the dependency ratio the larger the percentage of the population dependent on the economically active age group. This in turn translates reduced revenue for local authorities

to meet the growing demand for services. The national dependency ratio in 2011 was 52.7%, while the Northern Cape Province was 55.7%. The high provincial dependency ratio is also reflected at a local municipal and ward level. The traditional approach is based people younger than 15 or older than 64. The information provided provides information for the age group under 18. The total number of people falling within this age group will therefore be higher than the 0-15 age group. However, most people between the age of 15 and 17 are not economically active (i.e. they are likely to be at school).

Using information on people under the age of 18 is therefore likely to represent a more accurate reflection of the dependency ratio. Based on these figures, the dependency ratios for the ULM (2016) and Ward 3 (2011) were 79% and 72% respectively. Based on this approach the figures are similar to the figure for the Northern Cape (73.3%). The high dependency ratios reflect the limited employment and economic opportunities in the area.

In terms of race groups, Coloureds made up 73% of the population on the ULM, followed by Black Africans, 22.5% and Whites, 4.5%. In Ward 3, Coloureds made up 77.3% of the population, followed by Whites, 14.8% and Black Africans, 6.7The main first language spoken in both the ULM and Ward 3 was Afrikaans, 82.5% and 92.5% respectively.

Households and house types

There were a total number of 6 034 (2016) and 1 609 (2011) households in the ULM respectively. Of these 90.4% (ULM) and 92.4% (Ward 7) were formal houses. 6.6% of the structures in the ULM and 1.2% in Ward 3 were shacks. The majority of dwellings in the ULM and Ward 3 are therefore formal structures. The majority of the properties in the ULM (59.2%) were owned and fully paid off. In Ward 3 the majority of properties were occupied rent free. This figure reflects the rural nature of Ward 3 and the rent-free status of farm workers. Approximately 33.6% of the households in the ULM and 18.8% of the households in Ward 3 were headed by women. These figures are lower than the rate for the PKSDM (37%) and Northern Cape (39%). Despite the figures for the ULM being lower than the district and provincial averages, women headed households tend to be more vulnerable.

Household income

Based on the data from the 2011 Census, 11.7% of the population of the ULM had no formal income, 3.6% earned less than R 4 800, 6.2% earned between R 5 000 and R 10 000 per annum, 24.1% between R 10 000 and R 20 000 per annum and 24% between R 20 000 and 40 000 per annum (2016). For Ward 3, 5.9% of the population had no formal income, 2.5% earned less than R 4 800, 5.1% earned between R 5 000 and R 10 000 per annum, 30.9% between R 10 000 and 20 000 per annum and 29% between R 20 000 and 40 000 per annum (Census 2011).

The poverty gap indicator produced by the World Bank Development Research Group measures poverty using information from household per capita income/consumption. This indicator illustrates the average shortfall of the total population from the poverty line. This measurement is used to reflect the intensity of poverty, which is based on living on less than R3 200 per month for an average sized household (~ 40 000 per annum). Based on this measure, in the region of 69.6% of the households in the ULM and 73.4% in Ward 3 live close to or below the poverty line. The low-income levels reflect the rural nature of the local economy and the limited formal employment opportunities outside in the area. This is also reflected in the high unemployment rates. The low-income levels are a major concern given that an increasing number of individuals and households are likely to be dependent on social grants. The low-income levels also result in reduced spending in the local economy and less tax and rates revenue for the ULM. This in turn impacts on the ability of the ULM to maintain and provide services.

Household income levels are likely to have been impacted by the COVID-19 pandemic. The number of households in the ULM and Ward 3 that live close to or below the poverty line

is likely to have increased over the last 18 months. This, coupled with the high dependency ratio, is a major cause of concern for the area.

Employment

The official unemployment rate in the ULM in 2011 was 18.1%, while 44.2% were employed, and 33.2% were regarded as not economically active. The figures for Ward 3 in 2011 were 6.8% unemployed, 62.5% employed and 28.4% not economically active. The unemployment rates for the ULM and Ward 3 are lower than the Provincial rate of 14.5% and the District rate of 14.8%. However, the COVID-19 pandemic is likely to have resulted in an increase in unemployment rates in both the ULM and Ward 3. Recent figures released by Stats South Africa also indicate that South Africa's unemployment rate is in the region of 36%, the highest formal unemployment rate in the world.

Education

In terms of education levels, the percentage of the population over 20 years of age in the ULM and Ward 3 with no schooling was 11.8% (2016) and 20.7% (2011) respectively, compared to 7.9% and 11.1% for the Northern Cape Province in 2016 and 2011 respectively. The percentage of the population over the age of 20 with matric was 23.2% and 15.6% respectively, compared to 29.1% (2016) and 25.2% (2011) for the Northern Cape. The lower education levels are linked to rural, isolated nature of the area.

7 BIODIVERSITY OFFSET NEEDS ANALYSIS

The outcome of the scoping process for the proposed Loxton WEF Cluster (Loxton WEF 1, Loxton WEF 2 and Loxton WEF 3) determined that an offset needs analysis is required based on the large extent of CBA and NC-PAES Focus Areas with the Loxton WEF 3 project area.

In terms of the draft Biodiversity Offset Guideline (Government Gazette 46088 (Notice No. 1924) on 25 March 2022 in terms of Section 24J of the National Environmental Management Act, 1998 (Act No. 107 of 1998), "A biodiversity offset is required when a proposed listed or specified activity, or activities, is/are likely to have residual negative impacts on biodiversity of moderate or high significance. These negative impacts could affect biodiversity pattern (e.g. threatened ecosystems, species or special habitats), ecological processes (e.g. migration patterns, climate change corridors enabling shifts in species distributions over time,14 or wetland function), ecosystem services (e.g. provision of clean water) or a combination of all three." The central question of the current study is therefore the degree to which the Loxton Wind Energy Facilities would generate residual impacts on biodiversity either singly or in combination that are considered to be of moderate or high significance. A secondary question that would follow on from the above would then be, if there are indeed medium or high residual impacts, what type and nature of offset would be most appropriate for the development in context of the site, the surrounding landscape and associated biodiversity patterns and processes operating in the area?

This Ecological Offset Needs Analysis has the following broad aims:

- Summarise and outline of the current framework for biodiversity offsets. A summary of the most relevant sections of the Draft National Biodiversity Offset Guideline is provided, highlighting the relevant sections as they pertain to the current development.
- Provide a summary of the biodiversity features present within the Loxton Wind Energy Facility cluster, highlighting unique, threatened or otherwise significant species, ecosystems and processes within the area that may be negatively impacted by the development.
- Provide an analysis of the residual and cumulative impacts of the development on specific species of concern, ecosystems and general biodiversity patterns and

processes, as well as the impact of the development of the ability to meet conservation targets for the affected ecosystems.
- If relevant, explore potential offset areas in terms of the draft national offset guidelines and the regional conservation context to ensure that identified offset areas meet the like for like offset criterion, but also occur in an area where their long-term sustainability can be ensured.
- Identify any further actions and priorities required for taking the offset process forward.

A biodiversity offset is required when a proposed listed or specified activity, or activities, is/are likely to have residual negative impacts on biodiversity of moderate or high significance. These negative impacts could affect biodiversity pattern (e.g. threatened ecosystems, species or special habitats), ecological processes (e.g. migration patterns, climate change corridors enabling shifts in species distributions over time, or wetland function), ecosystem services (e.g. provision of clean water) or a combination of all three.

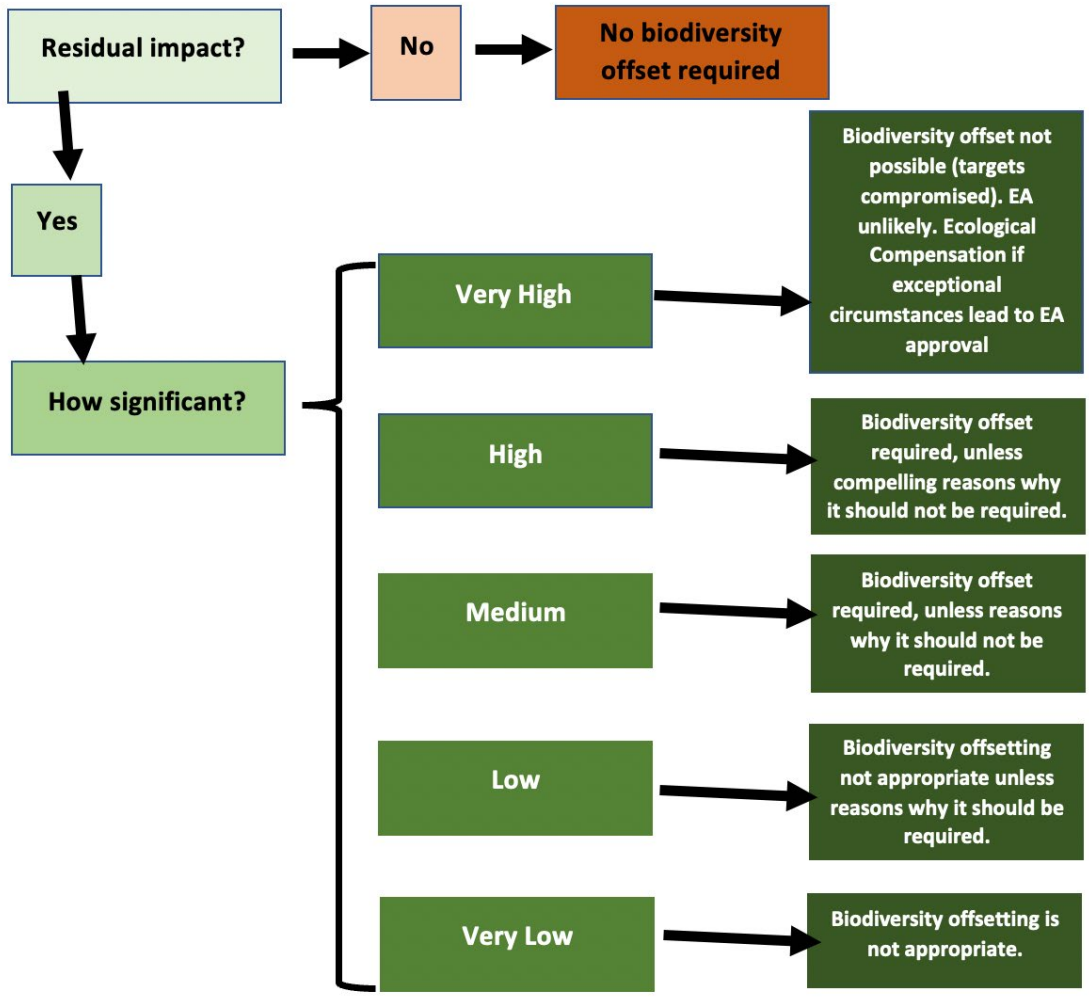


Plate 7-1: Flow diagram illustrating the process to determine whether an offset should be considered for a development or not.

All of the affected vegetation types within the Loxton WEF site have experienced relatively little transformation to date. Of the three vegetation types present, Eastern Upper Karoo is considered least sensitive and is an extensive and homogenous vegetation type with very few species of concern present. The riparian ecosystems, regardless of their classification as either Bushmanland Vloere or more correctly, Southern Karoo Riviere, are considered sensitive and important habitats for fauna and for the maintenance of ecosystem services such as water provision. The larger riparian systems of the site are home to the Riverine Rabbit, which is a species of high potential concern and highlights the importance of this habitat. The Upper Karoo Hardeveld, which is under-mapped within the study area but also across the karoo in general, is considered more sensitive than the surrounding plains as the dolerite outcrops associated with this vegetation type have a significantly higher botanical and faunal diversity than the surrounding areas. The rocky hills are also home to the only red-listed reptile of the area, the Karoo Dwarf Tortoise, which has not been confirmed from the site to date, but as this species is difficult to detect, a conservative, risk-avoidant approach suggests that it should be assumed to be present within these areas. In terms of the sensitivity mapping and avoidance implemented as part of the EIA, all the larger riparian areas and associated flood-plains have been mapped as no-go areas and as such would be avoided. Buffers of 500m have also been included around all floodplain habitat areas considered suitable for Riverine Rabbits regardless of whether they were detected in that patch or not. The rocky hills have been differentiated into high sensitivity areas where some limited local impact is considered acceptable and into very high sensitivity areas considered to represent no-go areas. No rare or unique vegetation features were observed within the site. The development would not alter the threat status of any of the affected vegetation types and they are all extensive in comparison with the footprint of the development.

it was also found that with overall impact avoidance and with mitigation, limited impact would occur within the aquatic environment and any residual impact would be limited to small changes to the hydrological environment, which could lead to sedimentation and erosion. This would also be the only impacts that could have a cumulative impact on the respective catchments if not monitored and provided with mitigation. However, with proposed engineering considerations, that would limit inundation and or diversion of flows, with proper stormwater management, both residual and cumulative impacts would be low.

In terms of the sensitivity mapping relating to mammals, the larger riparian areas have been classified as Very High sensitivity based on their value as Riverine Rabbit habitat but also as a result of their general ecological significance. All areas deemed potentially suitable for the Riverine Rabbit have been buffered by 500m and mapped as no-go areas for turbines. The rocky hills and steep slopes have been classified as either High Sensitivity or Very High sensitivity on account of the value of these areas as habitat for mammals associated with rocky areas and the more general ecological value of these areas.

Given the avoidance of the riparian habitats and the primacy of the Riverine Rabbit as a species of concern at the site, the impact of the final layouts on the Riverine Rabbit and associated habitat would be negligible, while general faunal impacts are considered acceptable.

The Offset Needs Analysis Report (Volume II) provides a synopsis of broad scale vegetation patterns, aquatic ecosystems and faunal communities (terrestrial mammals, reptiles, amphibians, avifauna and bats). The analysis finds that the consequence of residual and cumulative impacts associated with the current suite of projects are likely to be low for vegetation and plant species, aquatic ecosystems, terrestrial fauna, bats and CBAs. This can be ascribed largely to the fine-scale feature mapping that has been done in service of the current project and the resultant stringent avoidance of important biodiversity features that has been implemented by the developer in response. The long-term consequence of the development on NPAES Focus Areas is considered moderate. Despite the relatively

high footprint of the Loxton Wind Energy Facility 3 within CBAs, the current study finds that that overall consequence of development within the CBAs of the site can be assessed as low due to the extensive avoidance that has been implemented.

The constraints/sensitivity map for the Loxton Wind Farm cluster area for terrestrial fauna is depicted below in Plate 7.2. There are a variety of constraints operating across the site, associated largely with Riverine Rabbit habitat and their associated drainage features and also the steep slopes and dolerite outcrops of the site which are associated with the Karoo Dwarf Tortoise as well as fauna more generally. There are no turbines located in Very High or High sensitivity areas within any of the three wind farms, including the Loxton WEF 3. Based on the avoidance that has been implemented for the very high and high sensitivity features present within the wind farm, the development footprint would be restricted largely to the medium and low sensitivity areas, where impacts on biodiversity are likely to be lower. As such, based on the fine-scale feature mapping and the draft layouts of the three wind farms, the overall impacts of the development on terrestrial biodiversity is likely to be low and would be considered acceptable without the need or consideration of an offset, when considered solely with regards to faunal impacts.

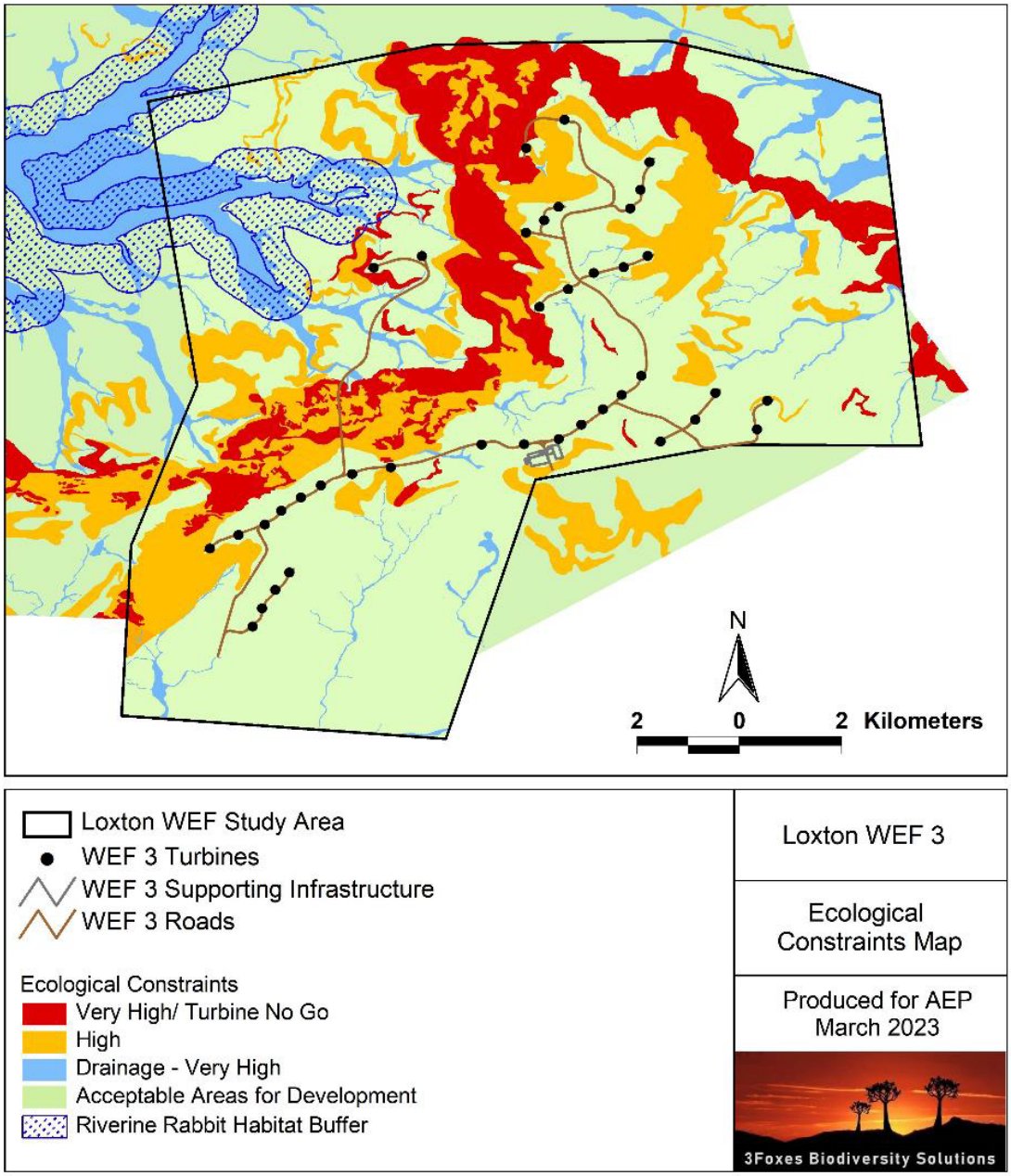


Plate 7-2: Terrestrial ecological sensitivity map for the proposed Loxton WEF study area.

Table 7-1: Consideration of residual and cumulative impacts related to the current Loxton suite of projects and the concomitant risks due to uncertainty associated with the assessment and the resultant potential consequence for biodiversity.

Biodiversity Component	Residual Impacts	Cumulative Impact	Risks	Consequence
Vegetation & Plant Species	Low	Low	Low	Low
	There are no threatened ecosystems at the site and very few listed species that would be impacted by WEF development.	The affected vegetation types are widespread and even at a cumulative level, the overall footprint would not be considered significant in relation to the national extent of these vegetation types	Direct impacts of WEF development on vegetation can be accurately quantified with the result that there is very low risk and uncertainty associated with the assessment.	There are no significant residual or cumulative impacts likely to be associated with the development of the three Loxton wind farms.
Aquatic Ecosystems	Low	Low	Low	Low
	Aquatic environments would be avoided as much as possible with the result that disturbance would be low and long-term residual impact are considered to be low.	As the impact on aquatic environments would be low and with the implementation of the suggested mitigation, there would be low potential for cumulative impacts.	Due to the avoidance of sensitive aquatic features and the generally low potential impact of the development on aquatic systems, the risks associated with wind energy development in the area is low.	No major long-term impacts on the aquatic systems of the area are anticipated.
Terrestrial Fauna	Medium	Medium	Medium	Low
	There would be some residual habitat loss and long-term disturbance associated with the development that cannot be well mitigated.	It is likely that the cumulative development of wind farms in the Loxton are will have a significant cumulative impact on some species.	While the long-term impacts of wind energy development on South African fauna is not well known, the sensitive species of the area such as the Riverine Rabbit have been well-avoided, with the result that there are few significant long-term risks and uncertainties on fauna SCC. However, there remains some general uncertainty as to impacts on faunal community structure and this uncertainty	While there is likely to be some long-term impact on fauna from wind energy development in the area, the overall risk is assessed as being low as this is unlikely to significantly impact any terrestrial fauna of concern.

Biodiversity Component	Residual Impacts	Cumulative Impact	Risks	Consequence
			could be addressed through the current project.	
Avifauna	Medium	Medium	Medium	Medium
	There is likely to be a long-term residual impact of the development on avifauna as a result of collisions with turbine blades as well as mortality associated with power lies.	The potential for cumulative impacts is considered moderate given the relatively large number of potential developments in the area as well as the high number of listed species present in the area.	As it is still uncertain as to which species would be most-affected by wind energy development in the area, there is some risk that certain species may be significantly impacted beyond the current predictions.	As a result of the long-term cumulative impacts on susceptible avifauna, there is potential that wind energy development will have a locally significant impact on certain species considered to be of moderate consequence.
Bats	Medium	Medium	Low	Low
	There is likely to be a long-term residual impact of the development on susceptible bats as a result of barotrauma and collisions with turbine blades.	The potential for cumulative impacts is considered moderate given the relatively large number of potential developments in the area.	Although there is some risk that certain species may be significantly impacted by wind energy development, the bat density in the area is low and the species most likely to be affected are widespread species.	Despite the potential for wind energy development to have a locally significant impact on certain bat species susceptible to wind turbine impact, this would be on widespread species with the result that the overall consequence of such impact would be considered low.
Critical Biodiversity Areas	Medium	Medium	Low	Low
	Development within CBAs would result in long-term habitat loss within CBAs that cannot be avoided or well mitigated.	As there are numerous proposed developments with infrastructure located within CBAs, there is a moderate potential for cumulative impact on CBAs.	Given the fine-scale feature mapping that has been conducted as part of the various specialist studies for the current as well as other development applications in the area, there is a relatively low risk of significant unpredicted impacts on biodiversity.	Although there would be some negative impact on the CBAs of the area, when considered at a broader scale, there are no specific features of concern or with demonstrated biodiversity features of high value that would be impacted by the development. As such, the overall consequence of

Biodiversity Component	Residual Impacts	Cumulative Impact	Risks	Consequence
				development within the affected CBAs is considered to be low.
NPAES Focus Areas	Medium	Medium	Low	Medium
	This impact is considered moderate after mitigation as it is clear that the development is located within a broadly sensitive area and while the development footprint would largely avoid the sensitive features of the site, it lies within an area with several notable biodiversity features present.	The overall footprint within NPAES Focus Areas from the current as well as other developments is low.	As the ecosystems of the area are not unique and have relatively low irreplaceability, there are few risks and uncertainties regarding potential impacts on NPAES Focus Areas.	The presence of the development would pose some limitations on the location and configuration of any conservation areas that may be developed in the area in the future.

Despite the relatively high footprint of the Loxton Wind Energy Facility 3 within CBAs, the current study finds that that overall consequence of development within the CBAs of the site can be assessed as low due to the extensive avoidance that has been implemented. The Northern Cape CBA map relies extensively on biodiversity surrogates and the maintenance of broad-scale process features. As such, the CBA map for the study area is not well under-pinned by biodiversity pattern features and is largely driven by broad-scale vegetation and landscape features, with only moderate alignment between the results of the CBA mapping the specialist findings for the current study. The fine-scale feature mapping that has been conducted and which informs the layout of the three Loxton Wind Energy Facilities classifies all important biodiversity features as no-go areas, with the result that the overall impact of the development on biodiversity pattern features within the study area would be low. Since these are the features the CBA mapping is aimed at protecting, the development would be unlikely to compromise the overall ecological functioning of the affected CBAs.

The offset needs analysis undertaken to assess the need and desirability of applying an offset to the Loxton 3 WEF in order to account for residual impacts of the development, especially those related to impacts on CBAs and NPAES Focus Areas. The finding of the needs analysis is that no high or moderate residual impacts on irreplaceable biodiversity features have been identified, and thus, an offset is not required. The project does however occur in a NPAES focus area, and the developer Applicant is cognisant of the need to maintain ecological processes within and across the site. As a mitigation measure to promote the maintenance of connectivity through the affected area into the long term, the developer Applicant has committed to the implementation of a development-free corridor that would facilitate and enhance landscape connectivity. This study has identified the most suitable area within the site where such a corridor would have maximal effect and which should form the basis for the conservation set-aside to be implemented before construction commences on the site.

8 ASSESSMENT OF ALTERNATIVES

In accordance with the requirements of Appendix 1 of the 2014 EIA Regulations (as amended), an assessment report must contain consideration of all alternatives, which can include activity alternatives, site alternatives, location alternatives and the "No Development" alternative. At a minimum, this chapter must address:

- The consideration of the No Development alternative as a baseline scenario;
- A comparison of reasonable and feasible selected alternatives; and
- The provision of reasons for the elimination of an alternative.

Alternatives are required to be assessed in terms of social, biophysical, economic and technical factors.

When assessing alternatives, they should be "practical", "feasible", "relevant", "reasonable" and "viable", and that I&APs should be provided with an opportunity to provide input into the process of formulating alternatives. In this instance, this chapter provides an overview of the alternatives that have been considered for this development.

8.1 The No Development Scenario or "No-Go Option"

This scenario assumes that the proposed development does not proceed. It is equivalent to the future baseline scenario in the absence of the proposed development. Relative to the proposed development, the implications of this scenario include:

- The land-use remains agricultural, with no further benefits derived from the implementation of a complementary land use;
- There is no change to the current landscape or environmental baseline;
- No additional electricity will be generated on-site or supplied through means of renewable energy resources. This would have negative implications for the South African government in achieving its proposed renewable energy target, given the need for increased generation;
- There would be a lost opportunity for South Africa to generate renewable energy. This would represent a significant negative social cost;
- There is no opportunity for additional employment (permanent or temporary) in the local area where job creation is identified as a key priority; and
- The national and local economic benefits associated with the proposed project's REIPPPP commitments and broader benefits would not be realised.

The purpose of the proposed development is to generate renewable electricity and export this to the national grid. Other socio-economic and environmental benefits will result from the proposed development such as:

- Reduced air pollution emissions - burning fossil fuels generates CO_2 emissions which contributes to global warming. Emissions of sulphurous and nitrous oxides are produced which are hazardous to human health and impact on ecosystem stability;
- Water resource saving – conventional coal-fired power stations use large quantities of water during their cooling processes. WEFs require limited amounts of water during construction and a minimal amount of water during operation. As a water stressed country, South Africa needs to be conserving such resources wherever possible;
- Improved energy security – renewables can be deployed in a decentralised way close to consumers, improving grid strength while reducing expensive transmission and distribution losses. Renewable energy projects contribute to a diverse energy portfolio;
- Exploit significant natural renewable energy resources – biomass, solar and wind resources remain largely unexploited;

- Sustainable energy solutions – the uptake of renewable energy technology addresses the country's energy needs, generation of electricity to meet growing demands in a manner which is sustainable for future generations; and
- Employment creation and other local economic benefits associated with support for a new industry in the South African economy.

The development compliments agriculture by providing an additional income source, without excluding agriculture from the land, or decreasing production. Therefore, the negative agricultural impact of the no-go alternative is more significant than that of the development, and so, purely from an agricultural impact perspective, the proposed development is the preferred alternative between the development and the no-go.

If the project were not implemented, then the site would stay as it currently is and likely continue to degrade due to the prevalence of grazing and or erosion within the water courses. This would continue into the long-term with a Low intensity that would impact on the regional scale due to loss of important habitat. Little in the way of mitigation could be proposed due to the social needs of the surrounding residents and their requirement for grazing areas, coupled to the need access. Many fauna species are to some degree negatively affected by farming including many predators which are targeted due to their negative impact on livestock, while some species may also be vulnerable to habitat loss or degradation and may experience depressed populations within the farming landscape. In terms of vegetation and plant species, extensive grazing may result in changes in composition towards less palatable species and a reduction in plant cover. It is however important to recognise that the development does not represent an alternative to extensive livestock farming, but rather an additional impact and stressor independent of the current land use. Overall, the no-go alternative is considered to result in a low negative impact on terrestrial biodiversity.

Although the heritage impacts with implementation would be greater than the existing impacts, the loss of socio-economic benefits is more significant and suggests that the No-Go option is less desirable in heritage terms.

Although the proposed development will likely affect the avifaunal community on site, they do not appear to have pushed key species towards extinction in most cases. Furthermore, existing impacts to birds, such as agrochemical poisoning (accidental), fence entanglement, road kill, power line electrocution and collision, disturbance of breeding, subsistence hunting, snaring and others, would not be replaced by the proposed project, they would all still persist in addition to the new impacts associated with the wind farm. The No-Go alternative therefore has much lower impacts on avifauna than the proposed project, and would be preferred from an avifaunal perspective. However, since the No-go constraints/buffers have already been taken into account, and with the recommended mitigation measures implemented going forward, the preference for developing the project is also acceptable.

The primary goal of the project is to assist in providing additional capacity to Eskom to assist in addressing the current energy supply constraints. The 'No Development' alternative would not assist the government in addressing climate change, energy security and economic development. Addressing climate change is one of the benefits associated with the implementation of this proposed development. Climate change is widely considered by environmental professionals as one of the single largest threats to the environment on a local, national and global scale. Energy supply constraints and the associated load shedding have had a significant impact on the economic development of the South African economy. South Africa also relies on coal-powered energy to meet more than 90% of its energy needs. South Africa is therefore one of the highest per capita producers of carbon emissions in the world and Eskom, as an energy utility, has been identified as the world's second largest producer carbon emissions.

The No-Development option would represent a lost opportunity for South Africa to improve energy security and supplement is current energy needs with clean, renewable energy. Given South Africa's current energy security challenges and its position as one of the highest per capita producers of carbon emissions in the world, this would represent a significant negative social cost

Based on the above, the 'No Development' alternative is not a preferred alternative.

8.2 Site Selection

The Applicant identified the Loxton WEF 3 after conducting a series of pre-feasibility assessments by considering aspects such as climatic conditions (wind speed databases, pre-dominant wind directions), grid connection scenarios, site geography and topography, avifauna nest survey to identify restrictive no go buffers, ecological features and site accessibility.

Feasibility studies undertaken by the Project Applicant indicated that the Loxton WEF 3 site is suitable to develop and operate a wind farm as it satisfies the following criteria:

- Feasibility of access for wind turbine delivery as the site is easily accessible from the national road;
- Viable wind resource;
- The surrounding area is not densely populated;
- The proposed site is largely previously transformed agricultural land and current land use is grazing;
- Willingness of landowner to host a wind farm on their property;
- Grid connection options and capacity availability on the existing national grid; and
- No environmental fatal flaws identified in the screening assessment.

The unique features of this site eliminate the possibility of alternatives with similar site conditions. Alternatives are restricted to on-site aspects such as turbine footprints and layouts, roads and related infrastructure options.

It is concluded, based on available information, that the Loxton WEF 3 site is suitable for the construction and operation of the WEF.

8.3 Technology Alternatives

Alternative renewable energy technologies include hydro-electric power, photovoltaic solar or concentrated solar power. The site itself has no resource for hydro-electricity and a solar electricity generation would require a much greater infrastructure footprint and water consumption (for cleaning panels) to generate the equivalent energy of the proposed WEF. The question if wind energy technology is the best technology for the proposed location was answered as part of the Need and Desirability assessment (Section 5).

Wind energy presents less of an impact on the continued use of the land for grazing, as it does not result in the shading that occurs from solar facilities which affects vegetation and consequently farming practices. Whilst there are potential impacts associated with wind energy which are not associated with solar, such as collision risk with avifauna, there are different potential impacts for solar facilities such as loss of habitat and foraging areas for avifauna and other ecological receptors.

Based on the site's physical characteristics and existing land uses, the wind energy technology is best suited to the site.

8.4 BESS Alternatives

Unlike conventional energy storage facilities, such as pumped hydro, a BESS has the advantage of being flexible in terms of site location and sizing. Therefore, they can be incorporated into, and placed in close proximity, to a wind or solar facility. They also have the advantage of being easily scaled and designed to meet specific demands.

The function of the BESS will be to store peak kinetic energy produced by the proposed Loxton WEF 3 for use in the following ways:

- To power the operation of the development when the national grid is strained by high (or peak) demand, often resulting in load-shedding.
- To provide excess generation to the national grid which will assist with stabilizing electricity supply during peaks and troughs of demand.
- To reduce the impact caused by the variability and limited predictability of wind generation.

The preferred battery technology being considered would be Solid-State, Lithium Ion (Li-Ion) batteries, which consists of multiple battery cells that are assembled together to form module. With rapid developments in battery technology globally, the EAP has undertaken a high-level desktop study of the BESS. The battery technology under consideration is explained further below, and compared in a table of advantages and disadvantages.

8.4.1 The NEMA and BESS

Although international BESS standards are currently being updated, current BESS regulations in South Africa are mostly written for backup power (uninterrupted power supply) applications.

Battery storage does not trigger any listed activities relating to the generation of electricity as technology does not 'generate' electricity, it simply stores electricity generated by a renewable energy facility (proposed Loxton WEF 3 in this instance) and discharges the stored electricity as and when required by the grid. Furthermore,

- 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.

8.4.2 BESS Technology Considered

Typically, a BESS consist of multiple battery cells that are assembled together to form modules. Each cell contains a positive electrode, a negative electrode and an electrolyte. A module may consist of thousands of cells working in conjunction. The preferred location of the BESS has been considered and assessed by the specialists, and the ancillary (or associated) infrastructure will include (but not limited to):

- a battery room;
- inverters;
- switch gear room; and
- Supervisory Control and Data Acquisition (SCADA) equipment.

Preferred Technology - Lithium ion (Li-ion) batteries are the most common stationary battery in the market today. Simply put, the batteries consist of a graphite electrode and a lithium-based electrode immersed in a liquid. When the battery is in use, charged lithium atoms ions flow from the graphite electrode to the lithium-based electrode through the liquid, and that flow of charged particles is what generates electricity. When the battery is

recharged the flow is reversed, sending the lithium ions back to the graphite anode where they are stored ready for discharge.

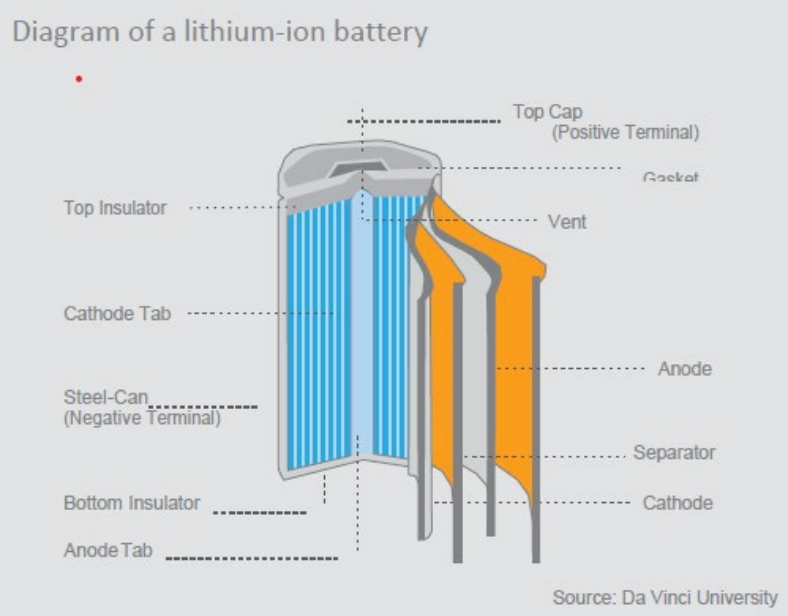


Plate 8-1: Diagram of a Lithium-Ion Battery

Solid State Battery is an acceptable solution to assist with reducing the fire risk Li-ion batteries pose. Unlike Li-Ion Batteries, Solid State Batteries have an ionic liquid made up of non-flammable molten salts with low melting points i.e. the electrolyte is considered a solid. Compared to Li-ion batteries with liquid electrolytes, SSBs offer an attractive option owing to their potential in improving safety and achieving both higher power and high energy densities. The trade-off with this type of battery is that electrically charged atoms do not move as freely and easily through a solid as they do through a liquid, so thus making them less efficient at generating electricity.

A sodium sulphur (NaS) battery is a molten state battery constructed from sodium (Na) and sulphur (S). The battery casing is the positive electrode while the molten core is the negative electrode. The battery operates at high temperatures of between 300-350 degrees Celsius (°C), while lower temperature versions are under development. In charging, the sodium ions are transported through the ion selective conductor to the anode reservoir. Discharge is the reverse of this process. Since sodium ions move easily across the ion selective conductor, electrons cannot, therefore there is no self-discharge. When not in use the batteries are typically left under charge so that they will remain molten and be ready for use when needed. If shut down and allowed to solidify, a reheating process is initiated before the batteries can be used again.

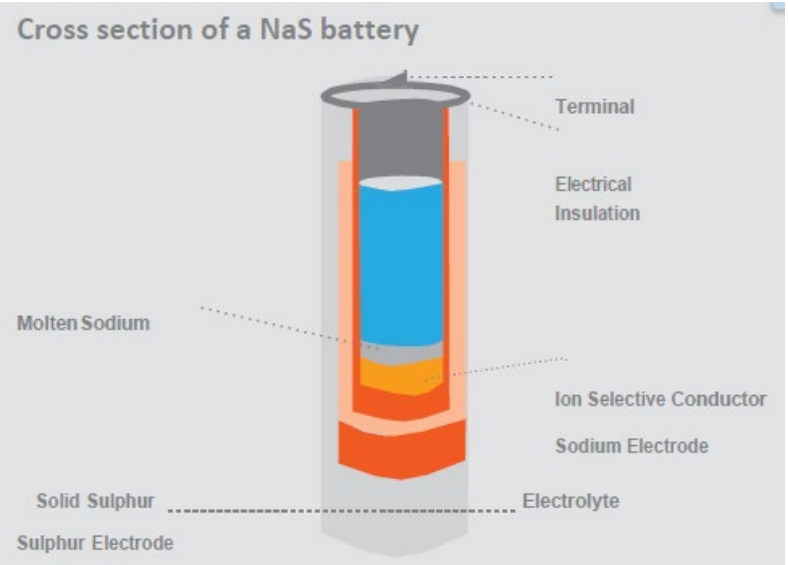


Plate 8-2: Diagram of a Sodium-Sulphur Battery

Flow Batteries consist of two tanks of liquids that feed into electrochemical cells. The main difference between flow and conventional batteries is that flow batteries store the electricity in the liquid rather than in the electrodes. They're far more stable than Li-ion, they have longer lifespans, and the liquids are less flammable. Not only that, but a flow battery can be scaled up by simply building bigger tanks for the liquids. The most widely known and used flow battery is vanadium flow battery.

Table 8.1 describes the most widely used technologies available in the market, and the most feasible technology for large utilities projects. It must be noted that the technology is constantly changing and evolving and as such the Applicant would utilise the best possible technology available at the time of placement.

Table 8-1: The technology options for the BESS

Activity Alternative	Advantage	Disadvantage
Preferred Technology: Li-Ion Batteries[17]	• Lithium ion has the smallest installation footprint when compared to the technologies for the similar energy capacity. • Li-ion batteries are able to tolerate more discharge cycles than other technologies. • High efficiency. • Produce the highest voltage compared to other batteries by driving high electron flow.	• Negative effects of overcharging / over discharging. • Volatility leading to Fire and Explosions. • Potential for issues associated with overheating (Certain Lithium chemistry's). • The Lithium element in this technology is considered hazardous / dangerous goods. • Lithium is a finite resource with concerns of its availability in the long term.
Solid State Battery[18]	• Potential to substitute Lithium for another electrode material. • Marked improvement in safety at cell and battery levels: solid electrolytes are non-flammable	• Reduced conductivity. • Sourcing of a suitable electrolyte. • Not as well researched and widely accepted as Li-Ion batteries.

[17]Li-Ion Battery: https://ensia.com/features/battery-innovations-renewable-energy/
[18] Solid State Battery: https://www.greentechmedia.com/articles/read/us-storage-companies-quietly-grow-bets-on-solid-state-batteries

Activity Alternative	Advantage	Disadvantage
	when heated, unlike their liquid counterparts. • It permits the use of innovative, high-voltage high-capacity materials, enabling denser, lighter batteries with better shelf-life as a result of reduced self-discharge. • Simplified mechanics as well as thermal and safety management.	• Narrow temperature range and cannot tolerate varying temperature.
NaS Batteries[19]	• Long life cycle. • Able to tolerate a high number of charge/discharge cycles. • ability to discharge fully with no effects to the performance.	• Low energy to size ratio. • Heating may be required. • Potential safety issues with the molten sodium. • Has the potential to catch on fire.
Flow Batteries[20]	• More stable than Li-Ion battery. • Are known to have the longest lifespan. • Less flammable liquids. • Technology is scalable for large grid infrastructure and renewable energy project.	• The liquids can be costly, so there's a greater up-front cost for the batteries. • Not as efficient as Li-Ion Battery.

8.5 Design Evolution Alternatives

Following the selection of a suitable site, consideration is given to the design of the WEF. It is important that wind turbines are sited in the optimum position to maximise the wind energy yield whilst minimising environmental impacts as far as possible.

Information collated during the scoping phase was used to inform the design of the preliminary WEF and associated infrastructure layout progressively. This approach was adopted with respect to this proposed development, and where potentially significant impacts were identified, efforts were made to avoid these through evolving the design of the proposed development. Best practice advises that the EIA should be an iterative process rather than a post design environmental appraisal. In this way, the findings of the technical environmental studies were used to inform the design for EA of a development.

Various wind turbine designs and layouts were considered for the site in order to maximise the electricity generation capacity and efficiency, whilst taking into account environmental constraints.

During the scoping phase, 38 turbine locations, and two laydown and on-site substation alternative were provided to the specialists. This layout has been adjusted, based on the initial scoping assessment and specialists' findings. Due to the design evolution of the Loxton WEF 3 turbine positions, the placements of the laydown area and on-site substation have both been revisited. A design evolution summary report is presented in Appendix C of this EIAr.

The layout presented and assessed in full detail during this EIA phase is considered the 'preferred layout' for the Loxton WEF 3 development.

[19] Li-Ion Battery and Na-S Battery: https://ensia.com/features/battery-innovations-renewable-energy/
[20] Flow Battery: https://newatlas.com/energy/iron-aqds-flow-battery-usc/

9 THE PREFERRED ALTERNATIVE

The proposed Loxton WEF 3 is located 15 km east of Loxton within the Ubuntu Local Municipality and the Pixley Ka Seme District Municipality in the Northern Cape Province.

The proposed development will consist of:

- Up to 39 wind turbines with a maximum hub height of up to 160 m and a rotor diameter of up to 200 m.
- A transformer at the base of each turbine.
- Concrete turbine foundations with a permanent footprint of approximately 6 ha.
- Each turbine will have a crane hardstand of 70 m x 45 m. The permanent footprint for turbine hardstands will be up to approximately 13 ha.
- Each turbine will have a temporary blade hardstand of 80 m x 45 m. The temporary footprint for blade hardstands will be up to approximately 14 ha.
- Temporary laydown areas (with a combined footprint of up to 25 ha) which will accommodate the boom erection, storage and assembly area.
- Battery Energy Storage System (with a footprint of up to approximately 5 ha).
- Medium voltage (33 kV) cables/powerlines running from wind turbines to the facility substations. The routing will follow existing/proposed access roads and will be buried where possible.
- One on-site substations up to 4 ha in extent to facilitate the connection between the wind farm and the electricity grid.
- Construction period laydown areas (temporary) up to 6 ha.
- Access roads to the site and between project components inclusive of stormwater infrastructure. A 15 m road corridor may be temporarily impacted upon during construction and rehabilitated to 6m wide after construction. The WEF will have a total road network of up to 50 km.
- A temporary site camp establishment and concrete batching plants (with a combined footprint of up to 2ha).
- Operation and Maintenance buildings (with a combined footprint of up to 2 ha) including a gate house, security building, control centre, offices, warehouses, a workshop, parking bays and a storage area.
- Total permanent development footprint of up to 65 ha.

9.1 Wind Energy Facility Components

The WEF will comprise components described below. It should be noted that as the design of the proposed development is not yet finalised, all dimensions are maximums as is required by the EIA process. The final design may include infrastructure which is of equal or less than dimensions to those stated below, but not more than.

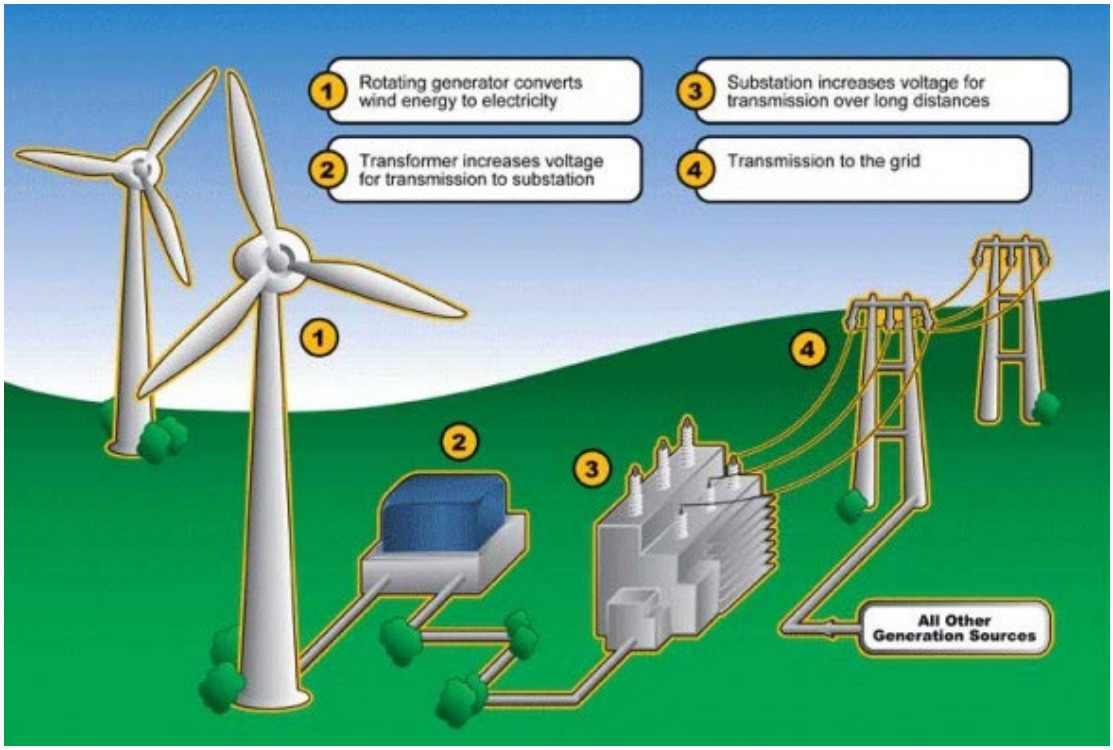


Plate 9-1: Simple illustration of a typical Wind Energy Facility operating sequence

9.1.1 Wind Turbine Generators and Hardstand Areas

The proposed WEF will comprise of up to 42 turbines.

At this stage, it is envisaged that the turbines will each have a capacity to generate up to 8 MW of power. The turbines will be three-bladed horizontal-axis design with a hub height of up to 200 m, a rotor diameter of up to 200 m and a blade length of up to 100 m. The exact turbine model has not yet been selected and will be identified based on the wind resource distribution, technical, commercial and site-specific considerations.

The turbine rotor speed will vary according to the energy available in the wind, the wind speed. The turbines will generate power in wind speeds between approximately 3 metres per second (m/s) and 28 m/s (depending on the model of turbine) with maximum power output usually achieved at wind speeds of around 10 - 12 m/s. On average, wind speeds greater than approximately 25 m/s the turbines will automatically turn the angle of the blade to reduce energy capture (this is known as 'feathering') and stop turning to prevent damage.

Each turbine will require a transformer that will be located at the base of the turbine.

Each turbine will have a circular foundation with a diameter of up to 32 m and this will be placed alongside the 45 m wide hardstand resulting in an area of about 32 m x 45 m that will be permanently disturbed for the turbine foundation. The combined permanent footprint for the turbine foundations will be approximately 6 ha.

Each turbine will have a crane hardstand of 70 m x 45 m. The permanent footprint for turbine hardstands will be approximately 13.5 ha.

Each turbine will have a blade hardstand of 80 m x 45 m. The temporary footprint for turbine hardstands will be approximately 14ha.

The precise location of the turbines within the WEF site has not yet been finalised and will be confirmed during the EIA process, following the assessment of technical and environmental constraints.

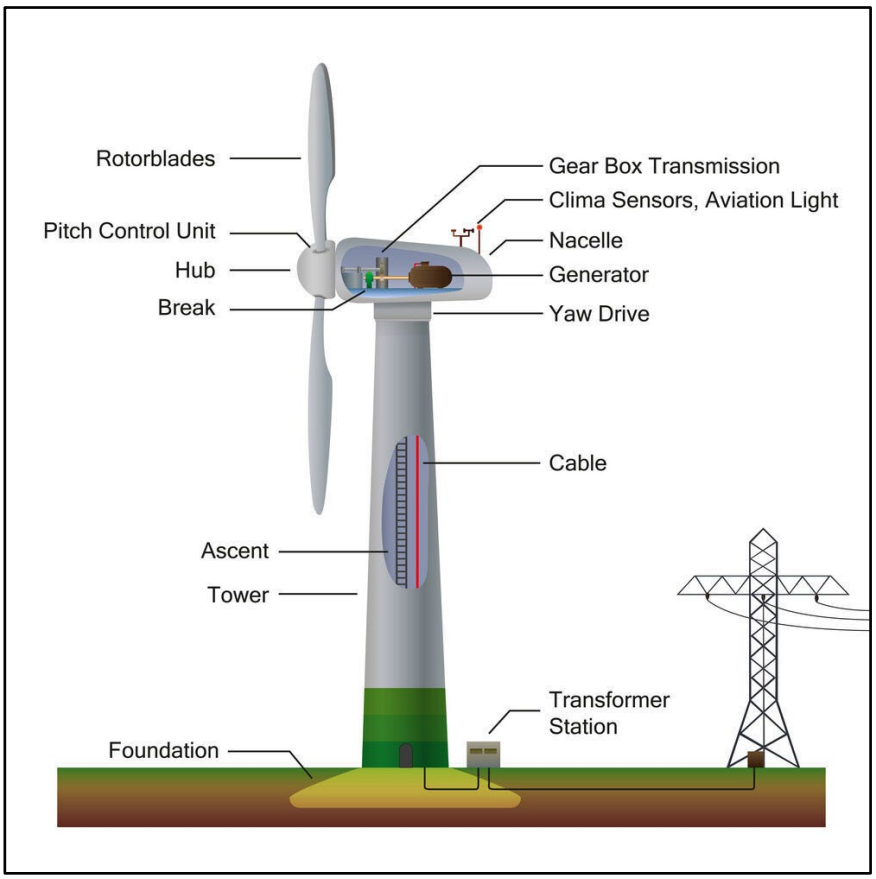


Plate 9-2: An illustration of typical components of a wind turbine generator (WTG)

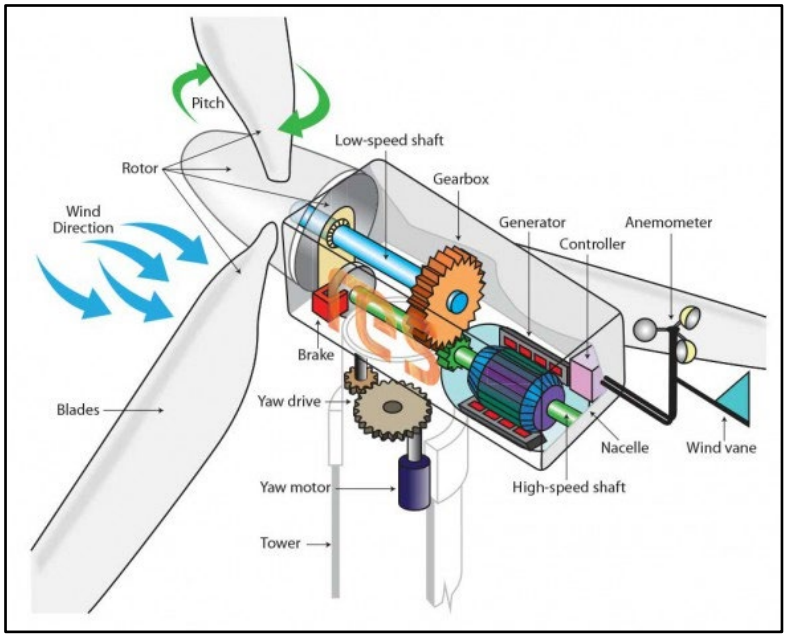


Plate 9-3: The inside operation of a typical wind turbine

Plate 9-4: Illustration of a typical Turbine Hardstand and Laydown Area

9.1.2 Electrical Cabling and On-site Substation

Medium-voltage (MV) power lines internal to the WEF will be entrenched and located adjacent to the access roads and /or within the footprint of the internal roads to an on-site substation. The 132 kV high-voltage (HV) powerline that transmits power from the Eskom Switching Station on site to the proposed Loxton WEF Cluster Collector Substation (assessed as part of a separate S&EIR) will be strung overhead, supported either on monopole or lattice tower structures. The 400 kV high-voltage (HV) powerline that transmits power from the Loxton WEF Cluster Collector Substation to the Gamma MTS (assessed as part of an application process) will be strung overhead, supported either on lattice tower or cross-rope suspension structures.

The general height of the substation will be a maximum of 10 m and approximately 100 m x 200 m (2 ha), however will include switchgear portals up to 15 m in height and lightning masts up to 25 m in height.

9.1.3 Battery Energy Storage System

The substation area will also house the battery energy storage system (BESS). The function of the BESS will be to store peak kinetic energy produced by the Loxton WEF 3 for use in the following ways:

- To power the operation of the proposed development when the national grid is strained by high (or peak) demand, often resulting in load-shedding.
- To provide excess generation to the national grid which will assist with stabilizing electricity supply during peaks and troughs of demand.
- To reduce the impact caused by the variability and limited predictability of wind generation.

The preferred battery technology being considered would be Solid-State, Lithium Ion (Li-Ion) batteries, which consists of multiple battery cells that are assembled together to form module. Each cell contains a positive electrode, a negative electrode and an electrolyte. A module may consist of thousands of cells working in conjunction. Modules are normally packaged inside containers (similar to shipping containers) and these containers are delivered pre-assembled to the project site.

The containers will have approximate dimension ranges of: height 2 m - 5 m, width 1.5 m - 3 m, length 7 m - 20 m. The containers are raised slightly off the ground and are bunded to prevent possible environmental damage resulting from any equipment malfunction. The proposed development is considering the option of stacking these containers vertically to a maximum of two container layers or a height of 8 m.

The BESS storage capacity will be up to 1000 (MWh) with up to four hours of storage, and will be placed on a concrete footprint of up to 5 ha. The BESS will be located in close proximity to the on-site substation, will be fenced off and will be linked to the substation via internal cables and will not have any additional office / operation / maintenance infrastructure as those of the substation.

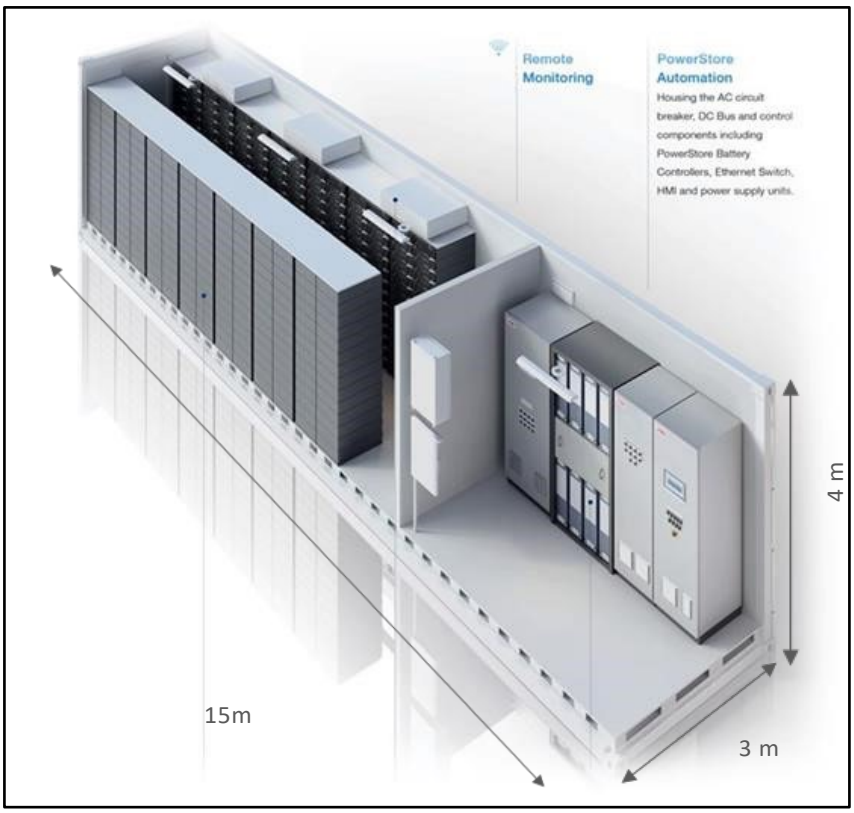


Plate 9-5: Typical representation of how batteries and battery modules are housed and assembled.

This proposed development will have similar project components and will be designed in a similar manner.

Plate 9-6: SolarCity's Tesla Battery Storage facility, Hawaii.

Plate 9-7: A stock image of a similar development with an on-site substation and BESS.

9.1.4 Laydown Areas and Site Offices

Individual turbine temporary laydown areas including crane boom laydown areas, blade laydown areas and other potential temporary areas will be up to a maximum of 6000 m^2. A total footprint of approximately 22.8 ha.

The construction laydown area will be up to 6 ha.

9.1.5 Internal Site Access Roads

Permanent roads will be up to 8 m wide and may require side drains on one or both sides. All roads may have underground cables running next to them. A 15 m wide road corridor may be temporarily impacted during construction and rehabilitated to 8 m wide after construction. The WEF will have a total road network of about 50 km (approximately 30 ha). Temporary clearing of up to 50 m may be required in areas where cut and fill may be required as well as for the construction of the bell mouth road junction, turning circles and temporary passing lanes.

9.2 Service Provision

9.2.1 Health and Safety

The IFC guidelines for Health and Safety are based on the Occupational Health and Safety Act (OHSA) of America and are subsequently aligned with South African legislation (OHS Act no 85 of 1993). It is understood that the project infrastructure and equipment will be designed to good industry standards to minimise risks personnel working at the proposed development site.

Loxton Wind Facility 1 (Pty) Ltd will institute a Health and Safety (H&S) Plan prior to construction, for all persons working at the proposed development site. The policy will need to evaluate the risks and impacts to the health and safety of the affected community during the design, construction and operation of the proposed development, and establish preventive measures to address them in a manner commensurate with the identified risks and impacts within this assessment. Such measures need to adhere to the precautionary principle for the prevention or avoidance of risks and impacts over minimization and reduction.

9.2.2 Water Requirements

Water will be sourced from either the Local Municipality, supplied from a contractor and trucked in, from existing boreholes located within the application site or from a new licensed borehole (if feasible) if none of these options are available. Note, however, that should municipal water supply not be confirmed, the Applicant will investigate other water sources considering any necessary and relevant legal requirements.

High water use is only anticipated during the first twelve months of the construction phase mainly for purposes of the turbine foundations, roads and dust suppression. Thereafter the water usage will decrease drastically. The anticipated water usage for the proposed development for the duration of the construction phase includes the following:

- Drinking;
- Ablution facilities;
- Access Road construction;
- Dust suppression;
- Fire-fighting reserve;
- Cleaning of facilities; and
- Construction of foundations for the WEF infrastructure, i.e., turbines and substation, etc.

The water use requirement during the operational phase will be primarily for human consumption and sanitation purposes.

9.2.3 Stormwater Management

Stormwater drainage systems will be constructed and kept separate from the sewerage effluent system on site to ensure that stormwater run-off from site is appropriately

managed. Water from these systems is not likely to contain any chemicals or hazardous substances and will be released into the surrounding environment based on the natural drainage contours.

Wastewater and sludge will be managed by local authorities and service providers. All waste water will be handled in accordance with the *Guidelines for the Utilisation and Disposal of Wastewater Sludge Volumes 1 to 6 (Herselmann & Snyman, 2006)*.

A project specific stormwater management plan was produced and has been included in the EMPr (Appendix B) for implementation.

9.2.4 Waste

During the construction phase, it is estimated that the Wind Energy Facility would generate solid waste which includes (but is not limited to) packaging material, building rubble, discarded bricks, wood, concrete, plant debris and domestic waste. Solid waste will be collected and temporarily stockpiled within designated areas on site during construction, and thereafter removed and disposed of at a nearby registered waste disposal facility on a regular basis as per agreement with the local municipality. Where possible, recycling and re-use of materials will be encouraged.

During the operational phase, the Wind Energy Facility will typically produce minor quantities of general non-hazardous waste mainly resulting from the O&M and office areas. General waste will be collected and temporarily stockpiled in skips in a designated area on site and thereafter removed and disposed of at a nearby registered waste disposal facility (or registered landfill) on a regular basis as per agreement with the local municipality. Where possible, recycling and re-use of materials will be encouraged.

Any hazardous waste such as chemicals or contaminated soil as a result of spillages, which may be generated during the construction and operational phases, will be temporarily stockpiled within a designated area on site and thereafter removed off site by a suitable service provider for safe disposal at a registered hazardous waste disposal facility.

9.2.5 Sewage

The Wind Energy Facility will require sewage services during the construction and operational phases. Low volumes of sewage or liquid effluent are estimated during both phases. Liquid effluent will be limited to the ablution facilities during the construction and operational phases. Portable sanitation facilities (i.e. Chemical toilets) will be used during the construction phase, which will be regularly serviced and emptied by a registered contractor on a regular basis.

The Applicant may consider a conservancy tank system which will be employed on site during the operational phase for which a registered company will be contracted to store and transport sewage from site to an appropriate municipal wastewater treatment facility.

9.2.6 Electricity for Construction Phase

Electricity on site will be from on-site diesel generators as well as sourced from the national grid distribution networks.

9.3 Summary of Project Information

WEF Technical Details

WEF Technical Details Components	Description/Dimensions
Maximum Generation Capacity	Up to 240 MW

WEF Technical Details Components	Description/Dimensions
Type of technology	Onshore Wind
Number of Turbines	Up to 39
WTG Hub Height from ground level	Up to 160 m
Blade Length	Up to 100 m
Rotor Diameter	Up to 200 m
Structure height (Tip Height)	Maximum of 260 m tip height
Structure orientation	Vertical towers with 3 blades attached
Area occupied by both permanent and construction laydown areas	• Concrete turbine foundations with a permanent footprint 6 ha; • Each turbine will have a crane hardstand of 70 m x 45 m. The permanent footprint for turbine hardstands will be up to 13.5 ha. • Each turbine will have a temporary blade hardstand of 80 m x 45 m. The temporary footprint for blade hardstands will be up to 14 ha. • Temporary laydown areas (with a combined footprint of up to 23 ha) which will accommodate the boom erection, storage and assembly area; and • A temporary site camp establishment and concrete batching plants (with a combined footprint of up to 1 ha).
Operations and maintenance buildings (O&M building) with parking area	Up to 2 ha including a gate house, security building, control centre, offices, warehouses, a workshop and visitor's centre.
Site Access	Access roads to the site and between project components inclusive of stormwater infrastructure. A 15 m road corridor may be temporarily impacted upon during construction and rehabilitated to 8 m wide after construction. The WEF will have a total road network of up to 50 km.
Area occupied by inverter transformer stations/substations	Up to 2 ha
Capacity of on-site substation	132 / 400 kV
Battery Energy Storage System footprint	Footprint of up to 5 ha
Length of internal roads	Up to 50 km
Width of internal roads	Up to 15 m including road reserve, during construction and rehabilitated to up to 8 m after construction.

WEF Technical Details Components	Description/Dimensions
Proximity to grid connection	Between 85 – 100 km, depending on the preferred alternative route (separate application process is being followed for the grid connection).
Internal Cabling	Medium voltage (33 kV) electrical cabling between the turbines. The routing will follow existing / proposed access roads and will be laid underground where practical.
Height of fencing	Up to 5 m
Type of fencing	Palisade fencing or similar

10 PUBLIC PARTICIPATION PROCESS

The first stage of public consultation was undertaken during the initial notification phase prior to the completion and public review of the Draft Scoping Report. On the 09 November 2022, advertisements were placed in the Victoria West Newspaper and the Diamond Field Advertiser Newspaper; site notices were erected on the site; and written notices were sent out to the affected landowners, surrounding landowners and occupiers of the site as well as to key stakeholders and organ of state. The objective of this phase was to inform the National, Provincial and local Government Authorities, relevant public, private sector entities, NGOs and local communities about the project and capture their initial views and issues of concern that is important for the formulation of a plan of study and to allow the public to register as I&APs. Following the initial phase, notification letters were sent to all I&APs informing them of the availability of the draft scoping report for public review and comment, which took place for a period of 30-days from the 14 November 2022 to Wednesday, 14 December 2022 (both days inclusive)

All issues raised during the initial and scoping phase has been taken into consideration and included in the EIA report. Volume II contains the Comments and Response Report which addresses all Interested and Affected Parties (I&APs) comments received to date Volume III – Public Participation Report, expands on the PPP conducted to date.

The primary aims of the public participation process (PPP) are:

- To inform I&APs of the proposed development;
- To identify issues, comments and concerns as raised by I&APs;
- To promote transparency and an understanding of the project and its potential consequences;
- To assist in identifying potential environmental (biophysical and socio-economic) impacts associated with the proposed development; and
- To ensure that all I&AP issues and comments are accurately recorded, addressed and documented in the comments and responses report.

10.1 EIA Phase Public Participation

During the EIA phase the following tasks will be undertaken for public participation:

- Notification letters to be sent out to registered I&APs, key stakeholders, and organs of state to inform them of the availability of the Draft Environmental Impact Assessment Report (DEIAR) for review and comment (30 days);
- The Comments and Reponses Report will be updated, recording comments and/or queries received and the responses provided;

- Notification letters to all registered I&APs, key stakeholders, and organs of state to inform them of the decision by the DFFE and the appeal procedure; and
- Placement of advertisements in the same local and regional newspapers to inform I&APs of the decision taken by the DFFE.

Furthermore, I&APs will also be able to register on the I&AP database throughout the duration of the EIA process and registered I&APs will be informed about the progress of the application.

The public participation in the EIA phase has the following objectives:

- Inform I&APs about the EIA process followed to date;
- Present the specialist studies undertaken, impacts and proposed mitigation measures;
- Present the results of the Environmental Impact Assessment; and
- Collect concerns and expectations and take them into consideration in the EIA.
- Details of the above information is attached in a public participation report (Volume II).

10.2 Summary of Comments

Initial Scoping Phase

During the initial notification phase, no comments / queries / questions / concerns were received from I&APs.

Scoping Phase

During the scoping phase comment was received from the DFFE, other authority and I&APs. Responses to comments received is provided in Section 6, Table 6.1 of the PP Report (Volume III), with EAP / specialist / applicant responses, and the original comment and responses has been appended to the PP report (Appendix 6).

It must also be noted that a focus group meeting was held via MS Teams with the DAEARL prior to the submission of the EIA report. The meeting concluded that the undertaking of further biodiversity studies was required for the Loxton WEF 3 (see Volume III: PP Report: Appendix 7 for minutes of the meeting).

11 ASSESSMENT OF POTENTIAL IMPACTS

11.1 Soil, Land Use and Agricultural Potential

An agricultural impact is a temporary or permanent change to the future production potential of land. If a development will not change the future production potential of the land, then there is no agricultural impact. A decrease in future production potential is a negative impact and an increase is a positive impact. The significance of the agricultural impact is directly proportional to the extent of the change in production potential.

An Agricultural Compliance Statement was produced to assess the agricultural impacts following the requirements of the NEMA, as amended, Protocols.

The terms of reference for the study, was to fulfill the requirements of the *Protocol for the specialist assessment and minimum report content requirements of environmental impacts on agricultural resources by onshore wind and/or solar photovoltaic energy generation facilities where the electricity output is 20 megawatts or more*, gazetted on 20 March 2020 in GN 320 (in terms of Sections 24(5)(A) and (H) and 44 of NEMA, 1998).

The specialist undertook a desk-based assessment of existing soil and agricultural data for the site. Soil data was sourced from the land type data set provided by the DAFF (Department of Agriculture, Forestry and Fisheries). Satellite imagery of the site was sourced from Google Earth. Land capability data, field crop boundaries and rainfall and evaporation data were all sourced from various data applications and data sets.

A site investigation was not considered necessary for this assessment, including for the site sensitivity verification as the land capability limitation is predominantly a function of climate, which cannot be usefully informed by a site assessment.

When the agricultural impact of a development involves the permanent or long term loss / non-agricultural use of potential agricultural land, as it does in this case, the focus and defining question of the agricultural impact assessment is: "Does the loss of future agricultural production potential that will result from this development, justify keeping the land solely for potential agricultural production and therefore not approving the development?"

If the loss is small, then it is unlikely to justify non approval. If the loss is big, then it is likely to justify it.

The extent of the loss is a direct function of two things, firstly the amount of land that will be lost and secondly, the production potential of the land that will be lost. In the case of wind farms, the first factor, amount of land loss, is so small that the total extent of the loss of future agricultural production potential is insignificantly small, regardless of how much production potential the land has. This is because the required spacing between turbines means that the amount of land actually excluded from agricultural use is extremely small in relation to the surface area over which a wind farm is distributed. Wind farm infrastructure (including all associated infrastructure and roads) typically occupies less than 2 % of the surface area, according to the typical surface area requirements of wind farms in South Africa (DFFE, 2015). Most wind energy facilities, occupy less than 1% of the surface area. All agricultural activities are able to continue unaffectedly on all parts of the farmland other than this small agricultural footprint and the actual loss of production potential is therefore insignificant.

In this case, the second factor, the production potential of the land, is also low which means that the loss of future agricultural production potential as a result of the proposed development is entirely insignificant.

It is also important to note that renewable energy facilities have both positive and negative effects on the production potential of land and so it is the net sum of these positive and negative effects that determines the extent of the change in future production potential. The significance of the small loss of production potential is reduced even more because it is compensated by the positive impacts that enhance production potential.

Another aspect to consider is the scale at which the significance of the agricultural impact is assessed. The change in production potential of a farm or significant part of a farm is likely to be highly significant at the scale of that farm, but may be much less so at larger scales. This assessment considers a regional and national scale to be the most appropriate one for assessing the significance of the loss of agricultural production potential because, as has been discussed above, the purpose is to ensure the conservation of agricultural land required for national food security.

There is ultimately only ever a single agricultural impact of a development and that is a change to the future agricultural production potential of the land. This impact occurs by way of different mechanisms some of which lead to a decrease in production potential and some of which lead to an increase. It is the net sum of positive and negative effects that determines the overall agricultural impact.

Two direct mechanisms have been identified that lead to decreased (negative) agricultural potential by:

Occupation of Land - Agricultural land directly occupied by the development infrastructure will become restricted for agricultural use, with consequent potential loss of agricultural productivity for the duration of the project lifetime. As discussed above, the

small and widely distributed nature of the agricultural footprint of the facility means that only an insignificant proportion of the available agricultural land currently used for grazing will be impacted in this way.

Soil Erosion and Degradation – Erosion can occur as a result of the alteration of the land surface run-off characteristics, predominantly through the establishment of hard surface areas including roads. Soil erosion is completely preventable. The storm water management that will be an inherent part of the road engineering on site and standard, best practice erosion control measures recommended and included in the EMPr, are likely to be effective in preventing soil erosion. Loss of topsoil can result from poor topsoil management during construction related excavations.

Two indirect mechanisms have been identified that lead to increased (positive) agricultural potential through:

Increased Financial Security for Farming Operations – Reliable and predictable income will be generated by the farming enterprises through the lease of the land to the energy facility. This is likely to increase their cash flow and financial security and could improve farming operations and productivity through increased investment into farming.

Improved Security against Stock Theft and Other Crime due to the presence of security infrastructure and security personnel at the energy facility.

Considering what is detailed above, the extent to which any of these mechanisms is likely to actually affect levels of agricultural production is small and the overall impact of a change in agricultural production potential is therefore small.

Furthermore, the agricultural protocol requires confirmation that all *reasonable measures have been taken through micro-siting to minimize fragmentation and disturbance of agricultural activities*. As long as the agricultural footprint avoids all areas used for crop production, which it does, the exact position of the footprint and all infrastructure within it will not make any material difference to agricultural impacts and disturbance.

Impact Phase: All Phases					
Nature of the impact: Soil erosion and degradation					
Description of Impact: Erosion can occur as a result of the alteration of the land surface run-off characteristics, predominantly through the establishment of hard surface areas including roads. Soil erosion is completely preventable. The storm water management that will be an inherent part of the road engineering on site and standard, best practice erosion control measures recommended and included in the EMPr, are likely to be effective in preventing soil erosion. Loss of topsoil can result from poor topsoil management during construction related excavations.					
Impact Status: Negative					
	E	**D**	**R**	**M**	**P**
Without Mitigation	Local	Medium Term	Irreversible	Low	Probable
Score	n/a	n/a	n/a	n/a	n/a
With Mitigation	Site	Short Term	Recoverable	Very Low	Improbable
Score	n/a	n/a	n/a	n/a	n/a
Significance Calculation	**Without Mitigation**		**With Mitigation**		
S=(E+D+R+M)*P	**Not determined.**		**Not determined.**		
Was public comment received?	No.				

Has public comment been included in mitigation measures?	No.
Mitigation measures to reduce residual risk or enhance opportunities: • A system of storm water management, which will prevent erosion, will be an inherent part of the road engineering on site. Any occurrences of erosion must be attended to immediately and the integrity of the erosion control system at that point must be amended to prevent further erosion from occurring there. • Any excavations done during the construction phase, in areas that will be re-vegetated at the end of the construction phase, must separate the upper 30 cm of topsoil from the rest of the excavation spoils and store it in a separate stockpile. When the excavation is back-filled, the topsoil must be back-filled last, so that it is at the surface. Topsoil should only be stripped in areas that are excavated. Across the majority of the site, including construction lay down areas, it will be much more effective for rehabilitation, to retain the topsoil in place. If levelling requires significant cutting, topsoil should be temporarily stockpiled and then re-spread after cutting, so that there is a covering of topsoil over the entire surface.	

11.2 Freshwater and Wetlands (Aquatics)

The greatest number of impacts could occur within the construction phase, but if the High sensitivity / No-Go areas are avoided, then the impacts would be limited on the aquatic environment. Regarding the decommissioning phase, these impacts would be the same as those in the construction phase, but again limited if all sensitive aquatic habitats are avoided, as is the case in the current EIA site layout.

The following potential impacts were assessed with regard aquatic environment that would be affected by the proposed development:

- Impact 1: Loss of habitat containing protected species or Species of Special Concern and / or habitats that could contain species listed as Critically Endangered and or Vulnerable
- Impact 2: Loss of any critical ecological corridors and the connectivity of habitats which are linked to future conservation plans or protected areas expansion and NFEPAs, associated within any riverine or wetland systems.
- Impact 3: Potential spread of alien vegetation
- Impact 4: Loss of riparian habitat
- Impact 5: Changes to the hydrological regime and increased potential for erosion
- Impact 6: Changes to water quality

11.2.1 Construction and Decommissioning Phase

Impact Phase: Construction and Decommissioning							
Nature of the impact: Loss of vegetation and in particular species / habitats that could contain species listed as Critically Endangered and or Vulnerable (direct)							
Description of Impact: Activities resulting in physical disturbance of aquatic systems which provide ecosystem services, especially where new water course crossings are required or large hard engineered surfaces are placed within the buffer zones. Losses can also include a functional loss, through change in vegetation type via alien encroachment, thus reducing aquatic biodiversity.							
Impact Status: Negative							
Without Mitigation	Local	Probable	Irreversible	No Loss	Long Term	Low	Medium
Score	2	3	4	1	3	2	2
With Mitigation	Site	Possible	Partly reversible	No Loss	Short Term	Negligible	Low

Score	1	2	3	1	1	1	1
Significance Calculation		**Without Mitigation**			**With Mitigation**		
S=(E+P+R+I+D+C)*M		**Moderate Negative Impact (30)**			**Low Negative Impact (9)**		
Was public comment received?		No.					
Has public comment been included in mitigation measures?		No.					

Mitigation measures to reduce residual risk or enhance opportunities:

- A pre-construction walkthrough with an aquatic specialist is recommended. Furthermore, the aquatic specialist should assist with the development of the stormwater management plan and the Aquatic Rehabilitation and Monitoring plan, which should inform the micro-siting of the final layout. This of particular importance where the proposed alignments have deviated from existing tracks or roads.
- Where large cut and fill areas are required these must be stabilised and rehabilitated during the construction process, to minimise erosion and sedimentation.
- Suitable stormwater management systems must be installed along roads and other areas and monitored during the first few months of use. Any erosion / sedimentation must be resolved through whatever additional interventions maybe necessary (i.e., extension, energy dissipaters, spreaders, etc).

To minimise the impact of the access roads:

- Use the smallest possible working corridor. Outside the working corridor, all watercourses are to be considered no go areas. Any unnecessary intrusion into these areas must be prohibited. Where intrusion is required, the working corridor must be kept to a minimum and demarcated clearly, before any construction commences.
- Removal of riparian vegetation must only be undertaken if it is essential for the continuation of the project. Disturbance to the adjoining natural vegetation cover or soils should be kept to a minimum.
- All pipe culverts should be removed and replaced with suitable sized box culverts, where road levels are raised. Crossings that are installed below the natural ground level are to be constructed with an appropriate drop inlet structure on the upstream side to ensure that headcut erosion does not develop as a result of the gradient change from the natural ground level to the invert level of the culvert.
- The channel profile, regardless of the current state of the river / water course, will be reinstated thus preventing any impoundments from being formed. The related designs must be assessed by an aquatic specialist during a pre-construction walkdown.
- Water diversions must be temporary in nature and no permanent walls, berms or dams may be installed within a watercourse. Sandbags used in any diversion or for any other activity within a watercourse must be in a good condition, so that they do not burst and empty sediment into the watercourse. Upon completion of the construction at the site, the diversions shall be removed to restore natural flow patterns. Under no circumstance shall a new channel or drainage canals be excavated to divert water away from construction activities.
- Any fauna (frogs, snakes, etc.) that are found within the construction area must be moved to the closest point of similar habitat type outside of the areas to be impacted.
- All disturbed areas beyond the construction site that are intentionally or accidentally disturbed during the construction phase must be rehabilitated.
- It is the contractor's responsibility to continuously monitor the area for newly established alien species during the contract and establishment period, which if present must be removed. Removal of these species shall be undertaken in a way which prevents any damage to the remaining indigenous species and inhibits the re-infestation of the cleaned areas.

Impact Phase: Construction and Decommissioning

Nature of the impact: Loss of any critical ecological corridors and connectivity of habitats that are linked to any future conservation plans or protected areas expansion (direct)

Description of Impact: Activities resulting in physical disturbance of aquatic systems which provide ecosystem services, especially where new water course crossings are required for access roads etc, or large hard engineered surfaces are placed within the aquatic buffer zones or Critical Biodiversity Areas associated with the mainstem watercourses.

Impact Status: Negative

	E	P	R	I	D	C	M
Without Mitigation	Local	Probable	Irreversible	No Loss	Long Term	Low	Medium
Score	2	3	4	1	3	2	2
With Mitigation	Site	Possible	Partly reversible	No Loss	Short Term	Negligible	Low
Score	1	2	3	1	1	1	1

Significance Calculation	**Without Mitigation**	**With Mitigation**
S=(E+P+R+I+D+C)*M	**Moderate Negative Impact (30)**	**Low Negative Impact (9)**

Was public comment received?	No.
Has public comment been included in mitigation measures?	No.

Mitigation measures to reduce residual risk or enhance opportunities:

- The aquatic systems have been mapped to a finer scale and have taken cognizance of any potential CBAs, as well as NFEPA river systems. All High / No-Go areas have been avoided by the major infrastructure. Although Turbine 1 is located with a CBA it does not have any direct impact on the aquatic features within the CBA buffer.
- A pre-construction walkthrough with an aquatic specialist is recommended. Furthermore, the aquatic specialist should assist with the development of the stormwater management plan and the Aquatic Rehabilitation and Monitoring plan, which should inform the micro-siting of the final layout. This of particular importance where the proposed alignments have deviated from existing tracks or roads.
- Where large cut and fill areas are required, these must be stabilised and rehabilitated during the construction process, to minimise erosion and sedimentation.
- Suitable stormwater management systems must be installed along roads and other areas and monitored during the first few months of use. Any erosion / sedimentation must be resolved through whatever additional interventions maybe necessary (i.e., extension, energy dissipaters, spreaders, etc).
- Use the smallest possible working corridor. Outside the working corridor, all watercourses are to be considered no go areas. Any unnecessary intrusion into these areas is prohibited. Where intrusion is required, the working corridor must be kept to a minimum and demarcated clearly, before any construction commences.
- Removal of vegetation must only be undertaken when essential for the continuation of the project. Disturbance to the adjoining natural vegetation cover or soils should be kept to a minimum.
- All pipe culverts must be removed and replaced with suitable sized box culverts, where road levels are raised. Crossings that are installed below the natural ground level are to be constructed with an appropriate drop inlet structure on the upstream side to ensure that head cut erosion does not develop as a result of the gradient change from the natural ground level to the invert level of the culvert.
- The channel profile, regardless of the current state of the river / water course, will need to be reinstated thus preventing any impoundments from being formed. The related designs must be assessed by an aquatic specialist during a pre-construction walkdown.

• Water diversions must be temporary in nature and no permanent walls, berms or dams may be installed within a watercourse. Sandbags used in any diversion or for any other activity within a watercourse must be in a good condition, so that they do not burst and empty sediment into the watercourse. Upon completion of the construction at the site, the diversions shall be removed to restore natural flow patterns. Under no circumstance shall a new channel or drainage canals be excavated to divert water away from construction activities. • Any fauna (frogs, snakes, etc.) that are found within the construction area should be relocated to the closest point of similar habitat type outside of the areas to be impacted. • All disturbed areas beyond the construction site that are intentionally or accidentally disturbed during the construction phase must be rehabilitated. • It is the contractor's responsibility to continuously monitor the area for newly established alien species during the contract and establishment period, which if present must be removed. Removal of these species shall be undertaken in a way which prevents any damage to the remaining indigenous species and inhibits the re-infestation of the cleaned areas.	
Residual impact	Very low and acceptable with adoption of mitigation measures.

Impact Phase: Construction and Decommissioning

Nature of the impact: Loss of riparian vegetation

Description of Impact: During construction, complete clearing of the works areas, as well any ancillary structures (offices and substations) will be required, which may impact the aquatic function or connectivity between aquatic systems. However, the majority of the High Sensitivity Areas, without current disturbance have been avoided by the proposed layout.

Impact Status: Negative

	E	P	R	I	D	C	M
Without Mitigation	Local	Probable	Irreversible	No Loss	Long Term	Low	Medium
Score	2	3	4	1	3	2	2
With Mitigation	Site	Possible	Partly reversible	No Loss	Short Term	Negligible	Low
Score	1	2	3	1	1	1	1

Significance Calculation	**Without Mitigation**	**With Mitigation**
S=(E+P+R+I+D+C)*M	**Moderate Negative Impact (30)**	**Low Negative Impact (9)**

Was public comment received?	No.
Has public comment been included in mitigation measures?	No.

Mitigation measures to reduce residual risk or enhance opportunities:

- A pre-construction walkthrough with an aquatic specialist is recommended. Furthermore, the aquatic specialist should assist with the development of the stormwater management plan and the Aquatic Rehabilitation and Monitoring plan, which should inform the micro-siting of the final layout. This of particular importance where the proposed alignments have deviated from existing tracks or roads.
- Where large cut and fill areas are required these must be stabilised and rehabilitated during the construction process, to minimise erosion and sedimentation.
- Suitable stormwater management systems must be installed along roads and other areas and monitored during the first few months of use. Any erosion / sedimentation must be resolved through whatever additional interventions maybe necessary (i.e., extension, energy dissipaters, spreaders, etc).

To minimise the impact of the access roads:

• Use the smallest possible working corridor. All watercourses outside of the development area are to be considered no go areas. • Removal of riparian vegetation must only be undertaken if essential for the continuation of the project. disturbances to the adjoining natural vegetation cover or soils should be kept to a minimum. • All pipe culverts must be removed and replaced with suitable sized box culverts, where road levels are raised. Crossings that are installed below the natural ground level are to be constructed with an appropriate drop inlet structure on the upstream side to ensure that head cut erosion does not develop as a result of the gradient change from the natural ground level to the invert level of the culvert. • The channel profile, regardless of the current state of the river / water course, will be reinstated thus preventing any impoundments from being formed. The related designs must be assessed by an aquatic specialist during a pre-construction walkdown. • Water diversions must be temporary in nature and no permanent walls, berms or dams may be installed within a watercourse. Sandbags used in any diversion or for any other activity within a watercourse must be in a good condition, so that they do not burst and empty sediment into the watercourse. Upon completion of the construction at the site, the diversions shall be removed to restore natural flow patterns. Under no circumstance shall a new channel or drainage canals be excavated to divert water away from construction activities. • Any fauna (frogs, snakes, etc.) that are found within the construction area must be moved to the closest point of similar habitat type outside of the areas to be impacted. • All disturbed areas beyond the construction site that are intentionally or accidentally disturbed during the construction phase must be rehabilitated. • It is the contractor's responsibility to continuously monitor the area for newly established alien species during the contract and establishment period, which if present must be removed. Removal of these species shall be undertaken in a way which prevents any damage to the remaining indigenous species and inhibits the re-infestation of the cleaned areas.	
Residual impact	Very low and acceptable with adoption of mitigation measures.

Impact Phase: Construction and Decommissioning							
Nature of the impact: An increase in hardened surfaces and or stormwater features can increase and or divert surface water flows							
Description of Impact: Increase in hard surface areas, and roads that require stormwater management will increase through the concentration of surface water flows that could result in localised changes to flows (volume) that would result in form and function changes within aquatic systems, which are currently ephemeral. This then increases the rate of erosions and sedimentation of downstream areas.							
Impact Status: Negative							
	E	**P**	**R**	**I**	**D**	**C**	**M**
Without Mitigation	Local	Probable	Irreversible	No Loss	Long Term	Low	Medium
Score	2	3	4	1	3	2	2
With Mitigation	Site	Possible	Partly reversible	No Loss	Short Term	Negligible	Low
Score	1	2	3	1	1	1	1
Significance Calculation	**Without Mitigation**		**With Mitigation**				
S=(E+P+R+I+D+C)*M	**Moderate Negative Impact (30)**		**Low Negative Impact (9)**				
Was public comment received?	No.						

Has public comment been included in mitigation measures?	No.

Mitigation measures to reduce residual risk or enhance opportunities:

- No stormwater discharged may be directed to delineated aquatic zones or the associated buffers.
- A detailed stormwater management plan must be compiled prior to construction once the final site layout plan has been completed. The SWMP should include the structures and actions that must be installed to prevent the increase of surface water flows directly into any natural systems, the requirements of the Stormwater Management Plan, should be included in the Final EMPr.
- Effective stormwater management must include measures to slow, spread and deplete the energy of concentrated flows thorough effective stabilisation (gabions and Reno mattresses) and the re-vegetation of any disturbed areas.

To minimise the impact of the access roads:

- Use the smallest possible working corridor. Outside the working corridor, all watercourses are to be considered no go areas. Any unnecessary intrusion into these areas is prohibited. Where intrusion is required, the working corridor must be kept to a minimum and demarcated clearly, before any construction commences.
- Removal of riparian vegetation must only be undertaken if essential for the continuation of the project. disturbances to the adjoining natural vegetation cover or soils should be kept to a minimum.
- All pipe culverts must be removed and replaced with suitable sized box culverts, where road levels are raised. Crossings that are installed below the natural ground level are to be constructed with an appropriate drop inlet structure on the upstream side to ensure that head cut erosion does not develop as a result of the gradient change from the natural ground level to the invert level of the culvert.
- The channel profile, regardless of the current state of the river / water course, will be reinstated thus preventing any impoundments from being formed. The related designs must be assessed by an aquatic specialist during a pre-construction walkdown.
- Water diversions must be temporary in nature and no permanent walls, berms or dams may be installed within a watercourse. Sandbags used in any diversion or for any other activity within a watercourse must be in a good condition, so that they do not burst and empty sediment into the watercourse. Upon completion of the construction at the site, the diversions shall be removed to restore natural flow patterns. Under no circumstance shall a new channel or drainage canals be excavated to divert water away from construction activities.
- Any fauna (frogs, snakes, etc.) that are found within the construction area must be moved to the closest point of similar habitat type outside of the areas to be impacted.
- All disturbed areas beyond the construction site that are intentionally or accidentally disturbed during the construction phase must be rehabilitated.
- It is the contractor's responsibility to continuously monitor the area for newly established alien species during the contract and establishment period, which if present must be removed. Removal of these species shall be undertaken in a way which prevents any damage to the remaining indigenous species and inhibits the re-infestation of the cleaned areas.

Residual impact	Very low and acceptable with adoption of mitigation measures.

Impact Phase: Construction and Decommissioning

Nature of the impact: Potential impact on localised surface water quality (indirect)

Description of Impact: During construction or decommissioning, earthworks will expose and mobilise earth materials, and a number of materials as well as chemicals will be imported and used on site and may end up in the surface water, including soaps, oils, grease and fuels, human wastes, cementitious wastes, paints and solvents, etc. Any spills during transport or while works area conducted in proximity to a watercourse has the potential to affect the surrounding biota. This can result in possible deterioration in aquatic ecosystem integrity and species diversity.

Impact Status: Negative

	E	P	R	I	D	C	M

Without Mitigation	Local	Probable	Irreversible	No Loss	Long Term	Low	Medium
Score	2	3	4	1	3	2	2
With Mitigation	Site	Possible	Partly reversible	No Loss	Short Term	Negligible	Low
Score	1	2	3	1	1	1	1

Significance Calculation	**Without Mitigation**	**With Mitigation**
S=(E+P+R+I+D+C)*M	**Moderate Negative Impact (30)**	**Low Negative Impact (9)**
Was public comment received?	No.	
Has public comment been included in mitigation measures?	No.	

Mitigation measures to reduce residual risk or enhance opportunities:

- All liquid chemicals including fuels and oil, including for the BESS, must be stored in with secondary containment (bunds or containers or berms) that can contain a leak or spill. Such facilities must be inspected routinely and must have the suitable PPE and spill kits needed to contain likely worst-case scenario leak or spill in that facility, safely.
- Washing and cleaning of equipment must be done in designated wash bays, where rinse water is contained in evaporation/sedimentation ponds (to capture oils, grease cement and sediment).
- Mechanical plant and bowsers must not be refuelled or serviced within 100m of a river channel or wetland.
- All construction camps, lay down areas, wash bays, batching plants or areas and any stores should be more than 100 m from any demarcated water courses.
- Littering and contamination associated with construction activity must be avoided through effective construction camp management.
- No stockpiling should take place within or near a water course.
- All stockpiles must be protected and located in flat areas where run-off will be minimised and sediment recoverable.
- ESO to monitor the site on a daily basis to ensure plant is in working order (minimise leaks), spills are prevented and if they do occur, are quickly rectified.

Residual impact	Low risk and acceptable, with adoption of mitigation measures and monitoring.

11.2.2 Construction and Operation Phase

Impact Phase: Construction and Operation

Nature of the impact: Any physical disturbance could result in the spread of alien vegetation (direct)

Description of Impact: During construction, complete clearing of the works areas, as well any ancillary structures (offices and substations) will be required. This disturbance then allows for the alien species to colonise the soils, if left unmanaged.

Impact Status: Negative

	E	**P**	**R**	**I**	**D**	**C**	**M**
Without Mitigation	Local	Probable	Irreversible	No Loss	Long Term	Low	Medium
Score	2	3	4	1	3	2	2
With Mitigation	Site	Possible	Partly reversible	No Loss	Short Term	Negligible	Low

Score	1	2	3	1	1	1	1
Significance Calculation	**Without Mitigation**			**With Mitigation**			
S=(E+P+R+I+D+C)*M	**Moderate Negative Impact (30)**			**Low Negative Impact (9)**			
Was public comment received?	No.						
Has public comment been included in mitigation measures?	No.						
Mitigation measures to reduce residual risk or enhance opportunities: • Alien vegetation management must be initiated at the beginning of the construction period and must extend into any remaining areas into the operation phase on the facility, a plan for this is included in the EMPr. • The revegetation of any temporary sites as well as any previously degraded areas must begin from the onset of the project, with the involvement of a botanist to assist with the revegetation specifications, as included in the EMPr. • Regeneration of alien vegetation must be monitored once all areas have been cleared, forming part of a long-term alien vegetation management plan.							
Residual impact	Very low and acceptable, with adoption of mitigation measures and monitoring.						

11.3 Terrestrial Biodiversity

The proposed development is likely to result in a variety of impacts, associated largely with the disturbance, loss and transformation of intact vegetation and faunal habitat during construction. During operation, the impacts would be reduced and restricted largely to potential noise impacts and occasional disturbance from operational and maintenance activities. The following impacts are identified as the major impacts that are likely to be associated with the development of the Loxton WEF 3.

Impact 1 - Impacts on CBAs

The development would result in some impact on the CBAs within the site through habitat loss and disturbance. The noise generated by the turbines would generate disturbance for some fauna, which would decrease the value of the area for the affected fauna. In addition, the development would cause general habitat fragmentation and pose some impact on broad-scale ecological processes in the area. These impacts cannot be entirely mitigated and there is likely to be some residual impact on broad-scale ecological processes due to the presence and operation of the wind energy facility.

Impact 2 - Impact on NPAES Focus Areas

The development would have an impact on NPAES Focus areas within the development footprint. The estimated footprint within these areas is estimated at 65 ha and while the direct footprint of the development is unlikely to have a significant impact on the affected NPAES, this impact should be considered at a broader scale and consider noise and other edge affects associated with the development as well as the possible impacts on future configuration options for protected area expansion in the area.

11.3.1 Construction Phase

Impact Phase: Construction Phase
Nature of the impact: impact on CBAs
Description of Impact: Impacts on CBAs as a result of construction phase activities, including disturbance and habitat loss.

Impact Status: Negative					
	E	**D**	**R**	**M**	**P**
Without Mitigation	Local	Long Term	Recoverable	Moderate	Probable
Score	2	4	3	3	4
With Mitigation	Local	Long Term	Recoverable	Low	Low Probability
Score	2	4	3	2	2
Significance Calculation	**Without Mitigation**		**With Mitigation**		
S=(E+D+R+M)*P	**Moderate Negative Impact (48)**		**Low Negative Impact (22)**		
Was public comment received?	No.				
Has public comment been included in mitigation measures?	No.				

Mitigation measures reduce residual risk or enhance opportunities:

- The development footprint within the CBAs should be minimized as far as possible.
- Should access roads, internal cables and overhead lines traverse drainage lines and riparian areas mapped as CBAs these should be micro-sited by a suitably qualified ecological and aquatic specialist before construction in that area starts to ensure any potential impacts are minimised.
- Minimise the development footprint as far as possible, which includes locating temporary-use areas such as construction camps and lay-down areas in low sensitivity or previously disturbed areas. The current layout depicts that the substations, camps and lay-down areas are in low sensitivity areas, and this is therefore acceptable.
- Avoid impact to restricted and specialised habitats such as pans, wetlands and rock pavements. The final development footprint to be authorised should be checked for such sensitive features in the field, such that there is a high degree of confidence that the final layout avoids such features so that significant changes to turbines or roads are not required at the preconstruction phase.

Residual impact	Despite mitigation, there is likely to be some residual disturbance and habitat loss within the CBAs and ESAs.

Impact Phase: Construction Phase					
Nature of the impact: Impact on NPAES Focus Areas					
Description of Impact: The construction of the development will impact on the value of the affected NPAES Focus Areas for long-term conservation expansion.					
Impact Status: Negative					
	E	**D**	**R**	**M**	**P**
Without Mitigation	Local	Long Term	Recoverable	Moderate	Probable
Score	2	4	3	3	3
With Mitigation	Local	Long Term	Recoverable	Low	Low Probability
Score	2	4	3	2	2
Significance Calculation	**Without Mitigation**		**With Mitigation**		
S=(E+D+R+M)*P	**Moderate Negative Impact (36)**		**Low Negative Impact (22)**		

Was public comment received?	No.
Has public comment been included in mitigation measures?	No.
Mitigation measures to reduce residual risk or enhance opportunities: • Minimise the development footprint as far as possible, which includes locating temporary-use areas such as construction camps and lay-down areas in low sensitivity or previously disturbed areas. The current layout depicts that the substations, camps and lay-down areas are in low sensitivity areas, and this is therefore acceptable. • Avoid impact to restricted and specialised habitats such as pans, wetlands and rock pavements. The final development footprint to be authorised should be checked for such sensitive features in the field, such that there is a high degree of confidence that the final layout avoids such features so that significant changes to turbines or roads are not required at the preconstruction phase. • Implementation of the development-free corridor through the site in accordance with the findings of the offset needs analysis.	
Residual impact	Despite mitigation, there would be some residual impact on the NPAES Focus Areas due to the presence and operation of the facility.

11.3.2 Operation Phase

Impact Phase: Operational Phase					
Nature of the impact: Impact on CBAs					
Description of Impact: Impacts on CBAs as a result of operational phase activities, including disturbance and turbine noise.					
Impact Status: Negative					
	E	**D**	**R**	**M**	**P**
Without Mitigation	Local	Long Term	Recoverable	Low	Probable
Score	2	4	3	2	3
With Mitigation	Local	Long Term	Reversible	Low	Low Probability
Score	1	4	1	2	2
Significance Calculation	**Without Mitigation**		**With Mitigation**		
S=(E+D+R+M)*P	**Medium Negative Impact (36)**		**Low Negative Impact (24)**		
Was public comment received?	No.				
Has public comment been included in mitigation measures?	No.				
Mitigation measures to reduce residual risk or enhance opportunities: • Adhere to the open space management plan which makes provision for the favourable management of the facility and the surrounding area for fauna. • A log should be kept detailing and fauna-related incidences or mortalities that occur on site, including roadkill, electrocutions etc. These should be reviewed annually and used to inform operational management and mitigation measures. • Ensure that maintenance staff remain within the operational footprint of the facility. • Ensure that vehicles remain within speed limits of 40km/h within the site. • Reduce night driving within the site as much as possible and ensure that only essential activities and driving within the site occur at night. • All night-lighting at the site should be of environmentally friendly types such as HPS and other bulb types that attract fewer insects.					

• All fauna such as snakes that are encountered or enter operational areas, are removed to safety by a suitably qualified person or allowed to move off naturally without persecution or disturbance. • An erosion monitoring programme should be put in place for at least 3 years after construction. Any problems observed should be rectified as soon as possible using the appropriate revegetation and erosion control works.	
Residual impact	Despite mitigation, there is likely to be some residual disturbance within the CBAs and ESAs.

11.4 Riverine Rabbit

The development of the Loxton Wind Energy Facility 3 would result in a number of potential impacts on the Riverine Rabbit during the construction and operational phases of the development. During construction, the major impacts would likely be disturbance and roadkill while during the operational phase, direct disturbance would be reduced but there would still be some potential impact from noise and occasional disturbance from operational activities. The following impacts are identified as the major impacts that are likely to be associated with the development of the Loxton Wind Energy Facility 3 on Riverine Rabbits and their associated habitat.

Impact 1. Construction-Phase Impact on the Riverine Rabbit

During construction, the increased levels of traffic at the site would increase collision risk with rabbits, which is a known major cause of mortality for this species. Furthermore, the noise and disturbance associated with construction activity may deter rabbits from the affected areas where these are in close proximity to areas where Rabbits are present.

Impact 2. Operational-Phase Impact on the Riverine Rabbit

During operation, impacts would be significantly reduced, but noise from the turbines would potentially impact the Riverine Rabbit, resulting in local habitat degradation within and adjacent to the site in areas exposed to turbine noise. There may also be occasional disturbance associated with wind farm operational and maintenance activities as well as increased traffic within, to and from the site which may increase vehicle-related mortality. The distance between turbines and Riverine Rabbit habitat is however quite large with the result that turbine-noise related impacts are likely to be low.

11.4.1 Construction Phase

Impact Phase: Construction Phase					
Nature of the impact: Construction Phase impact on the Riverine Rabbit					
Description of Impact: Impacts on Riverine Rabbit as a result of construction phase activities, including vehicle collisions, disturbance and habitat loss.					
Impact Status: Negative					
	E	**D**	**R**	**M**	**P**
Without Mitigation	Local	Short Term	Reversible	Moderate	Highly Probable
Score	2	2	1	3	4
With Mitigation	Local	Short Term	Reversible	Low	Low Probability
Score	2	2	1	2	2
Significance Calculation	**Without Mitigation**		**With Mitigation**		

S=(E+D+R+M)*P	Moderate Negative Impact (32)	Low Negative Impact (14)
Was public comment received?	Yes	
Has public comment been included in mitigation measures?	Yes	
Mitigation measures to reduce residual risk or enhance opportunities: • All vehicles should adhere to a low speed limit on site. Heavy vehicles should be restricted to 30km/h and light vehicles to 40km/h. • During construction, driving between sunset and sunrise should be reduced as far possible as this is when Riverine Rabbits are most active and the risk of collisions is highest. • No dogs should be allowed on site and precautions to ensure that there is poaching or other direct faunal disturbance on site should be implemented. • Where any new roads, cabling and/or overhead lines traverse areas mapped as High Riverine Rabbit habitat sensitivity, the route should be microsited by a suitably qualified ecological specialist before construction commences to ensure any potential impacts are minimised. Existing tracks through these areas should be used where present. • There should be a monitoring programme for Riverine Rabbit roadkill during construction that should be used to inform any additional mitigation and avoidance that should be implemented. Should rabbits be killed by traffic, then the traffic management to and from the site should be reviewed in collaboration with the EWT Drylands Programme, to identify additional mitigation and avoidance that should be implemented to further reduce roadkill. • Ensure that riparian areas near to the development footprint are clearly demarcated as no-go areas with appropriate signage and barriers.		
Residual impact	Despite mitigation, there is likely to be some minor residual disturbance on the local population of Riverine Rabbits, either/and within the site and in the wider area affected by construction activity.	

11.4.2 Operation Phase

Impact Phase: Operational Phase					
Nature of the impact: Operational Phase impact on the Riverine Rabbit					
Description of Impact: There would potentially be impact on Riverine Rabbits at the site during operation due to operational activities (vehicles/disturbance) as well as turbine noise.					
Impact Status: Negative					
	E	**D**	**R**	**M**	**P**
Without Mitigation	Local	Long Term	Reversible	Moderate	Probable
Score	2	4	1	3	3
With Mitigation	Local	Long Term	Reversible	Low	Low Probability
Score	2	4	1	2	2
Significance Calculation	**Without Mitigation**		**With Mitigation**		
S=(E+D+R+M)*P	Low Negative Impact (30)		Low Negative Impact (18)		
Was public comment received?	yes				
Has public comment been included in	Yes				

mitigation measures?	

Mitigation measures to reduce residual risk or enhance opportunities:

- A Riverine Rabbit Monitoring Programme should be implemented at the site to evaluate the post-construction impact of the development on the Riverine Rabbit as well as other key fauna at the site. As there is some potential for noise and disturbance-related impacts on Riverine Rabbits, the development presents a clear opportunity to evaluate the degree to which wind farms are compatible with the maintenance and conservation of Riverine Rabbit populations within their boundaries. The monitoring programme should be conducted with input from EWT and should include preconstruction monitoring to establish a reliable baseline of Riverine Rabbit abundance and distribution at the site. This should be followed by matched post-construction monitoring to evaluate the potential negative impacts on the Riverine Rabbit population. The exact duration and frequency of monitoring would need to be determined based on the number of cameras to be used and the desired precision and statistical power to be obtained.
- The monitoring should include a feedback mechanism to use these findings to improve future wind energy development in Riverine Rabbit areas should be developed.
- All incidents involving Riverine Rabbits should be documented and reported to the local EWT field office in Loxton. If Rabbits are killed, the carcasses should be collected and provided to EWT for the collection of DNA and other samples.

Residual impact	Despite mitigation, there is likely to be some minor residual disturbance on the local population of Riverine Rabbits, either/and within the site and in the wider area affected by noise and maintenance activities.

11.4.3 Decommissioning Phase

Impact Phase: Decommissioning Phase

Nature of the impact: Construction Phase impact on the Riverine Rabbit

Description of Impact:
Impacts on Riverine Rabbit as a result of decommissioning phase activities, including vehicle collisions and disturbance.

Impact Status: Negative

	E	D	R	M	P
Without Mitigation	Local	Short Term	Reversible	Moderate	Highly Probable
Score	2	2	1	3	4
With Mitigation	Local	Short Term	Reversible	Low	Low Probability
Score	2	2	1	2	2

Significance Calculation	**Without Mitigation**	**With Mitigation**
S=(E+D+R+M)*P	Moderate Negative Impact (32)	Low Negative Impact (14)
Was public comment received?	No	
Has public comment been included in mitigation measures?	No	

Mitigation measures to reduce residual risk or enhance opportunities:

- All vehicles should adhere to a low-speed limit on site. Heavy vehicles should be restricted to 30km/h and light vehicles to 40km/h.
- During decommissioning, driving between sunset and sunrise should be reduced as far possible as this is when Riverine Rabbits are most active, and the risk of collisions is highest.

• No dogs should be allowed on site and precautions to ensure that there is poaching or other direct faunal disturbance on site should be implemented. • Where any roads, cabling and/or overhead lines traverse areas mapped as High Riverine Rabbit habitat sensitivity, any remaining open and disturbed areas after decommissioning should be rehabilitated with local plant species appropriate for the affected habitat. • Should rabbits be killed by traffic, then the traffic management to and from the site should be reviewed in collaboration with the EWT Drylands Programme, to identify additional mitigation and avoidance that should be implemented to further reduce roadkill. • Ensure that riparian areas near to the development footprint are clearly demarcated as no-go areas with appropriate signage and barriers.	
Residual impact	Despite mitigation, there is likely to be some minor residual disturbance on the local population of Riverine Rabbits, either/and within the site and in the wider area affected by construction activity.

11.5 Karoo Dwarf Tortoise

A number of studies have investigated the effects of wind energy operation on tortoise ecology, behaviour and survival (e.g. Agha et al. 2015, Lovich et al. 2011, 2018). The general findings of these studies were that for tortoises, the negative impacts associated with wind energy facilities during the operation phase are typically of low significance or severity. In some cases, such facilities also offer positive prospects that may safeguard or boost local tortoise populations.

The main ecological components and processes that are of relevance to the population viability of the Karoo Dwarf Tortoise within the landscape are the presence of habitat elements that cater for shelter and dietary needs; climatic events (i.e., drought vs periods of good rainfall); and the extent of predation by corvids. Of these, the two components that may potentially be impacted by the proposed Loxton WEF 3 development are loss / degradation of habitat and an increase of tortoise mortalities due to corvid predation. The following potential impacts have been assessed in the context of the Loxton WEF 3 site:

- Construction phase: Habitat loss and degradation.
- Construction phase: Tortoise mortalities due to earthworks and roadkill.
- Operation phase: Tortoise mortalities due to roadkill.
- Operation phase: Tortoise mortalities due to predation by corvids.
- Decommissioning phase: Tortoise mortalities due to roadkill.

11.5.1 Construction Phase

Impact Phase: Construction Phase					
Nature of the impact: Habitat loss and degradation					
Description of Impact: Habitat loss and habitat degradation may impact the Karoo Dwarf Tortoise during construction phase activities in the following three ways: • Loss / degradation of rocky habitat, i.e., reduced shelter opportunities; • Loss / degradation of vegetation, i.e., reduced food sources; and • New roads and turbine platforms adding to the fragmentation of the landscape.					
Impact Status: Negative					
	E	**D**	**R**	**M**	**P**
Without Mitigation	Local	Long Term	High	High	Probable
Score	-	-	-	-	-
With Mitigation	Local	Long Term	Medium	Medium	Conceivable
Score	-	-	-	-	-

Significance Calculation	Without Mitigation	With Mitigation
S=(E+D+R+M)*P	High Negative Impact	Low Negative Impact
Was public comment received?	No.	
Has public comment been included in mitigation measures?	No.	

Mitigation measures to reduce residual risk or enhance opportunities:

- The development is to avoid areas identified as prime Karoo Dwarf Tortoise habitat, as per the layouts produced during the planning and design phase and presented in the EIA component. This has been implemented via the sensitivity mapping and identification of the PAOI which has included areas of habitat that were rated as high or very high (= no-go) sensitivity areas.
- Access to areas outside of the construction footprint during construction must be limited to additional habitat degradation.
- Construction activities must be monitored by ECO with the aim to guard against potential impacts on Karoo Dwarf Tortoises where feasible.

Impact Phase: Construction Phase

Nature of the impact: Mortalities due to earthworks and roadkill

Description of Impact: Karoo Dwarf Tortoises may inadvertently be killed during earthworks activities when clearing habitat for new roads, turbine platforms and other associated infrastructure. Additionally, tortoises may be killed on roads by construction/support vehicles.

Impact Status: Negative

	E	D	R	M	P
Without Mitigation	Local	Short Term	Medium	High	Probable
Score	-	-	-	-	-
With Mitigation	Local	Short Term	Medium	Medium	Conceivable
Score	-	-	-	-	-

Significance Calculation	Without Mitigation	With Mitigation
S=(E+D+R+M)*P	Medium Negative Impact	Low Negative Impact
Was public comment received?	No.	
Has public comment been included in mitigation measures?	No.	

Mitigation measures to reduce residual risk or enhance opportunities:

- The development is to avoid areas identified as prime Karoo Dwarf Tortoise habitat, as per the layouts produced during the planning and design phase and presented in the EIA component. This has been implemented via the sensitivity mapping and identification of the PAOI which has included areas of habitat that were rated as high or very high (= no-go) sensitivity areas.
- Limit construction activities within the defined development footprints to minimise the chances of killing tortoise inadvertently.
- Incorporate special design features to on-site roads to provide safer options for tortoises to minimise the potential of roadkill mortalities.
- All vehicles must adhere to a low-speed limit, i.e., 40 km/h on site and in areas where Karoo Dwarf Tortoises are likely to be present both within the wind farm as well as on the public roads to the site.

• Construction activities must be monitored by an on-site ECO with the aim to guard against potential impacts on Karoo Dwarf Tortoises where feasible.

11.5.2 Operation Phase

Impact Phase: Operation Phase					
Nature of the impact: Mortalities due to earthworks and roadkill					
Description of Impact: Karoo Dwarf Tortoises may inadvertently be killed by vehicular traffic on the new roads.					
Impact Status: Negative					
	E	**D**	**R**	**M**	**P**
Without Mitigation	Local	Long Term	High	High	Probable
Score	-	-	-	-	-
With Mitigation	Local	Long Term	Medium	Medium	Conceivable
Score	-	-	-	-	-
Significance Calculation	**Without Mitigation**		**With Mitigation**		
S=(E+D+R+M)*P	**High Negative Impact**		**Low Negative Impact**		
Was public comment received?	No.				
Has public comment been included in mitigation measures?	No.				
Mitigation measures to reduce residual risk or enhance opportunities: • The development is to avoid areas identified as prime Karoo Dwarf Tortoise habitat, as per the layouts produced during the planning and design phase and presented in the EIA component. This has been implemented via the sensitivity mapping and identification of the PAOI which has included areas of habitat that were rated as high or very high (= no-go) sensitivity areas. • Adhere to the open space management plan which makes provision for the favourable management of the facility and the surrounding area for fauna. • Keep a log of on-site tortoise roadkill mortalities. This log must be reviewed annually to inform operational management and mitigation measures. • Adhere to on-site speed limits and exercise vigilance of tortoises crossing the roads. • Monitor (keep log of) on-site tortoise roadkill mortalities.					

11.5.3 Decommissioning Phase

Impact Phase: Decommissioning Phase					
Nature of the impact: Mortalities due to earthworks and roadkill					
Description of Impact: Karoo Dwarf Tortoises may inadvertently be killed by vehicular traffic on the new roads.					
Impact Status: Negative					
	E	**D**	**R**	**M**	**P**
Without Mitigation	Local	Short Term	Medium	High	Probable
Score	-	-	-	-	-
With Mitigation	Local	Short Term	Medium	Medium	Conceivable
Score	-	-	-	-	-

Significance Calculation	Without Mitigation	With Mitigation
S=(E+D+R+M)*P	**Medium Negative Impact**	**Low Negative Impact**
Was public comment received?	No.	
Has public comment been included in mitigation measures?	No.	

Mitigation measures to reduce residual risk or enhance opportunities:

- Adhere to the open space management plan which makes provision for the favourable management of the facility and the surrounding area for fauna.
- Keep a log of on-site tortoise roadkill mortalities. This log must be reviewed annually to inform operational management and mitigation measures.
- Adhere to on-site speed limits and exercise vigilance of tortoises crossing the roads.
- Monitor (keep log of) on-site tortoise roadkill mortalities.

11.6 Avifauna

The avifaunal community is comprised most importantly of raptors and large terrestrials. The larger raptors' breeding sites have been avoided by placing large No-go buffers around nests in accordance with current Best Practice Guidelines. The potential impact to the avian community is provided for each proposed phase, i.e., construction, operation and decommission of the proposed development.

11.6.1 Construction Phase

Impact Phase: Construction Phase

Nature of the impact: Destruction of avifaunal habitat

Description of Impact: With the current proposed layout of up to 42 turbines and associated infrastructure such as roads, laydown areas, collector substations etc, the wind farm will impact on natural habitat through its clearing for construction. Given the relatively undisturbed nature of vegetation on site, most of this is likely to be natural vegetation. This is a small proportion of the overall site extent, and the habitat is neither particularly unique, nor threatened, or in limited availability. However, the fragmented nature of the remaining habitat will experience an "edge effect", whereby an area greater than the exact footprint of construction is affected by the impact under consideration. Of course, the effect on the avifaunal community is not as simple as the surface area affected. In addition to surface area alteration, the effect of large, dispersed infrastructure projects such as wind farms on birds is likely to be far more complex through factors such as habitat fragmentation, disruption of territories and other factors. These effects have however proven extremely difficult to measure. Since this habitat destruction is largely unavoidable, and our confidence in the effectiveness of habitat rehabilitation is uncertain, we anticipate that the impact significance will remain unchanged by mitigation.

Impact Status: Negative

	E	D	R	M	P
Without Mitigation	Site	Long term	Recoverable	Moderate	Highly probable
Score	1	4	3	3	4
With Mitigation	Site	Long term	Recoverable	Low	Highly probable
Score	1	4	3	2	4

Significance Calculation	Without Mitigation	With Mitigation

S=(E+D+R+M)*P	Moderate Negative Impact (40)	Moderate Negative Impact (36)
Was public comment received?	No.	
Has public comment been included in mitigation measures?	No.	
Mitigation measures reduce residual risk or enhance opportunities: • The constraint areas identified should be adhered to. • A pre-construction avifaunal walk down should be conducted to confirm final layout and identify any sensitivities that may arise between the conclusion of the EIA process and the construction phase. This can be done in any season, although May to October would be raptor breeding season and should be prioritised if possible. • All human activities associated with construction, operation and decommissioning should be strictly managed according to generally accepted environmental best practice standards, so as to avoid any unnecessary impact on the receiving environment. • Existing roads and tracks should be used as far as possible. • Movement of all staff, vehicle and machinery activities should be strictly controlled at all times so as to ensure that the absolute minimum of surface area is impacted. • Care should be taken not to introduce or propagate alien plant species/weeds during construction. • Any underground cabling should follow roads at all times to reduce the impact on the habitat by grouping these linear infrastructures. • The "during construction" and "post-construction" monitoring programme (see Appendix B - EMPr) should be implemented according to the latest available version of the Best Practice Guidelines at the time. The findings from operational phase monitoring should inform an adaptive management programme to mitigate any impacts on avifauna to acceptable levels. In particular, any Verreaux's Eagle fatalities should be reported to Dr Megan Murgatroyd in order to close the feedback loop back to the VERA modelling performed for this.		
Residual impact	The destruction of habitat is inevitable, and the significance remains at Moderate with mitigation.	

Impact Phase: Construction Phase					
Nature of the impact: Disturbance of birds					
Description of Impact: Effects of disturbance on birds are particularly likely during breeding and could include loss of breeding productivity; temporary or permanent abandonment of breeding; or even abandonment of nest site. The avoidance measures (in the form of large No-go buffers) already taken to protect the various eagle nests and their breeding have reduced the significance of this impact.					
Impact Status: Negative					
	E	**D**	**R**	**M**	**P**
Without Mitigation	Local	Short term	Reversible	Low	Probable
Score	2	2	1	2	3
With Mitigation	Local	Short term	Reversible	Low	Probable
Score	2	2	1	2	3

Significance Calculation	Without Mitigation	With Mitigation
S=(E+D+R+M)*P	Low Negative Impact (21)	Low Negative Impact (21)
Was public comment received?	No.	
Has public comment been included in mitigation measures?	No.	

Mitigation measures to reduce residual risk or enhance opportunities: • The constraint areas identified should be adhered to. • A pre-construction avifaunal walk down should be conducted to confirm final layout and identify any sensitivities that may arise between the conclusion of the EIA process and the construction phase. This can be done in any season, although May to October would be raptor breeding season and should be prioritised if possible. • All human activities associated with construction, operation and decommissioning should be strictly managed according to generally accepted environmental best practice standards, so as to avoid any unnecessary impact on the receiving environment. • Existing roads and tracks should be used as far as possible. • Movement of all staff, vehicle and machinery activities should be strictly controlled at all times so as to ensure that the absolute minimum of surface area is impacted. • Care should be taken not to introduce or propagate alien plant species/weeds during construction. • Any underground cabling should follow roads at all times to reduce the impact on the habitat by grouping these linear infrastructures. • The "during construction" and "post-construction" monitoring programme (see Appendix B - EMPr) should be implemented according to the latest available version of the Best Practice Guidelines at the time. The findings from operational phase monitoring should inform an adaptive management programme to mitigate any impacts on avifauna to acceptable levels. In particular, any Verreaux's Eagle fatalities should be reported to Dr Megan Murgatroyd in order to close the feedback loop back to the VERA modelling performed for this.	
Residual impact	The disturbance of birds is somewhat inevitable, although the most sensi-tive receptors have already been protected through impact avoidance, through the application of no-go buffers.

11.6.2 Operation Phase

Impact Phase: Operation Phase					
Nature of the impact: Disturbance of birds					
Description of Impact: The indications from operational wind farms are that this impact may be of fairly low importance, although it is acknowledged that a longer term or more detailed means of measuring this impact may be required. The impact of human-induced disturbance during the operational phase of the development is likely to be less severe than during the construction phase.					
Impact Status: Negative					
	E	**D**	**R**	**M**	**P**
Without Mitigation	Local	Long term	Reversible	Low	Probable
Score	2	4	1	2	3
With Mitigation	Local	Long term	Reversible	Low	Probable
Score	2	4	1	2	3
Significance Calculation	**Without Mitigation**		**With Mitigation**		
S=(E+D+R+M)*P	**Low Negative Impact (27)**		**Low Negative Impact (27)**		
Was public comment received?	No.				
Has public comment been included in mitigation measures?	No.				
Mitigation measures to reduce residual risk or enhance opportunities: • All human activities associated with construction, operation and decommissioning should be strictly managed according to generally accepted environmental best practice standards, so as to avoid any unnecessary impact on the receiving environment. • A post-construction inspection must be conducted by an avifaunal specialist to confirm that all aspects have been appropriately handled and in particular that road and hard stand verges do not					

	provide additional substrate for raptor prey species. It is essential that the new wind farm does not create favourable conditions for such mammals in high risk areas. We therefore recommend that within the first year of operations a full assessment of this aspect be made by the ornithologist contracted for post-construction monitoring. If such conditions have been created, case-specific solutions will need to be developed and implemented by the wind farm. It is strongly recommended that rodenticides not be used at the newly established Operation and Maintenance (O&M) buildings or around auxiliary infrastructure on the project site. While pest control of this nature may be effective, even so-called "environmentally friendly" rodenticides are toxic and pose significant secondary poisoning risk to predatory avifauna, especially owls. • The "during construction" and "post-construction" monitoring programme (see Appendix B - EMPr) should be implemented according to the latest available version of the Best Practice Guidelines at the time. The findings from operational phase monitoring should inform an adaptive management programme to mitigate any impacts on avifauna to acceptable levels. In particular, any Verreaux's Eagle fatalities should be reported to Dr Megan Murgatroyd in order to close the feedback loop back to the VERA modelling performed for this.
Residual impact	The disturbance of birds is somewhat inevitable, although the most sensitive receptors have already been protected through impact avoidance, through the application of no-go buffers.

Impact Phase: Operation Phase

Nature of the impact: Displacement of birds

Description of Impact: As for disturbance above, the indications from operational wind farms are that this impact may be of fairly low importance, although it is acknowledged that a longer term or more detailed means of measuring this impact may be required. Birds may be displaced from using the landscape for breeding, foraging and commuting purposes due to the loss of habitat, increased noise pollution and human presence. This may reduce population size or force individuals into suboptimal habitat.

Impact Status: Negative

	E	D	R	M	P
Without Mitigation	Local	Long term	Reversible	Low	Probable
Score	2	4	1	2	3
With Mitigation	Local	Long term	Reversible	Low	Probable
Score	2	4	1	2	3

Significance Calculation	**Without Mitigation**	**With Mitigation**
S=(E+D+R+M)*P	**Low Negative Impact (27)**	**Low Negative Impact (27)**
Was public comment received?	No.	
Has public comment been included in mitigation measures?	No.	

Mitigation measures to reduce residual risk or enhance opportunities:

- All human activities associated with construction, operation and decommissioning should be strictly managed according to generally accepted environmental best practice standards, so as to avoid any unnecessary impact on the receiving environment.
- A post-construction inspection must be conducted by an avifaunal specialist to confirm that all aspects have been appropriately handled and in particular that road and hard stand verges do not provide additional substrate for raptor prey species. It is essential that the new wind farm does not create favourable conditions for such mammals in high risk areas. We therefore recommend that within the first year of operations a full assessment of this aspect be made by the ornithologist contracted for post-construction monitoring. If such conditions have been created, case-specific solutions will need to be developed and implemented by the wind farm. It is strongly recommended that rodenticides not be used at the newly established Operation and Maintenance (O&M) buildings

	or around auxiliary infrastructure on the project site. While pest control of this nature may be effective, even so-called "environmentally friendly" rodenticides are toxic and pose significant secondary poisoning risk to predatory avifauna, especially owls. • The "during construction" and "post-construction" monitoring programme (see Appendix B - EMPr) should be implemented according to the latest available version of the Best Practice Guidelines at the time. The findings from operational phase monitoring should inform an adaptive management programme to mitigate any impacts on avifauna to acceptable levels. In particular, any Verreaux's Eagle fatalities should be reported to Dr Megan Murgatroyd in order to close the feedback loop back to the VERA modelling performed for this.
Residual impact	The disturbance of birds is somewhat inevitable, although the most sensi-tive receptors have already been protected through impact avoidance, through the application of no-go buffers.

Impact Phase: Operation Phase

Nature of the impact: Bird collision with turbine blades

Description of Impact: Turbine collisions have been discussed in depth in the literature section of this report. They represent the greatest risk to avifauna at this development. Turbine blades are not always visible to birds flying at rotor swept height and evasive action is not always possible. Striking a moving blade al-most certainly results in death or serious injury. In the case of resident species, or those that occupy home ranges on a fairly permanent basis, fatalities represent the loss of individuals in the great-er study area, both directly (due to fatalities themselves) as well as indirectly (due to the loss of breeding potential, particularly between monogamous pairs). Human caused fatalities of regionally Red Listed or otherwise threatened bird species are always cause for concern and should be avoid-ed as far as possible. The estimated fatalities we have predicted are therefore of some concern for the relevant species. There are currently no established thresholds for acceptable impacts on bird species in South Africa. To establish these thresholds would require complex modelling incorporating accurate information on many factors for each species (including population size, age-specific fatality rates, breeding productivity, etc). Such modelling and information are not available in South Africa at present. In the absence of this information, we are forced to make a somewhat subjective decision as to the acceptability of the estimated annual fatalities.

Impact Status: Negative

	E	D	R	M	P
Without Mitigation	National	Long term	Irreversible	High	Highly probable
Score	4	4	5	4	4
With Mitigation	National	Long Term	Irreversible	Moderate	Probable
Score	4	4	5	3	3

Significance Calculation	**Without Mitigation**	**With Mitigation**
S=(E+D+R+M)*P	**High Negative Impact (68)**	**Moderate Negative Impact (48)**
Was public comment received?	No.	
Has public comment been included in mitigation measures?	No.	

Mitigation measures reduce residual risk or enhance opportunities:

- All human activities associated with construction, operation and decommissioning should be strictly managed according to generally accepted environmental best practice standards, so as to avoid any unnecessary impact on the receiving environment.
- A post-construction inspection must be conducted by an avifaunal specialist to confirm that all aspects have been appropriately handled and in particular that road and hard stand verges do not provide additional substrate for raptor prey species. It is essential that the new wind farm does not create favourable conditions for such mammals in high risk areas. It is recommended that within

	the first year of operations a full assessment of this aspect be made by the ornithologist contracted for post-construction monitoring. If such conditions have been created, case-specific solutions will need to be developed and implemented by the wind farm. It is strongly recommended that rodenticides not be used at the newly established Operation and Maintenance (O&M) buildings or around auxiliary infrastructure on the project site. While pest control of this nature may be effective, even so-called "environmentally friendly" rodenticides are toxic and pose significant secondary poisoning risk to predatory avifauna, especially owls. • A bird fatality threshold and adaptive management plan has been designed for the project (see Appendix B – EMPr). This plan identifies the number of bird fatalities of priority species which will trigger a management response, appropriate responses, and time lines for such responses. Fatalities of priority bird species are usually rare events (but with very high consequence) and it is difficult to analyse trends or statistics related to these fatalities as they occur. It is therefore important to have an adaptive management plan in place proactively to assist management. • Should identified priority bird species fatality thresholds be exceeded in Year 1 and 2, an observer-led turbine Shutdown on Demand (SDOD) programme must be implemented on site. This programme must consist of a suitably qualified, trained and resourced team of observers present on site for all daylight hours 365 days of the year. This team must be stationed at vantage points with full visible coverage of all turbine locations. The observers must detect incoming priority bird species, track their flights, judge when they enter a turbine proximity threshold, and alert the control room to shut down the relevant turbine until the risk has reduced. A full detailed method statement or protocol must be designed by an ornithologist. • The combination of hub height and rotor diameter must be optimised (where technically feasible) to maximise the lower blade tip height above ground. Raising the lower turbine blade tip height from a typical 30m above ground to 60m above ground (for example) will reduce collision risk for cranes, Ludwig's Bustards, Black Harrier and korhaans, which typically fly low over the ground. Raising the lower blade tip from 30 to 60m above ground as a mitigation measure benefited every target species (in terms of reduced predicted mortality). We strongly recommend that any opportunity to raise the lower blade tip as much as possible, should be taken as this could significantly reduce the bird collision risk. • Turbine blades must be painted according to a protocol currently under development by the South African Wind Energy Association (SAWEA) from the outset. Painting one of the three rotor blades black reduces motion smear and may greatly reduce avian collision risk. Provision must be made by the developer for the resolution of any technical, warranty, and supplier challenges that this may present. • Any residual impacts during the operational phase after all possible mitigation measures have been implemented will need to be mitigated off site. The facility will need to address other sources of mortality of priority species in a measurable way so as to compensate for residual effects on the facility itself. This will need to be detailed in a Biodiversity Action Plan compiled by an ornithologist. Since most priority species for this project face considerable threat through overhead power lines across their range, a likely off-site mitigation measure could be the mitigation of power line impacts on Eskom's network. These are measurable and easily mitigated impacts which could result in a no nett loss or even nett gain scenario for priority bird species. • The "during construction" and "post-construction" monitoring programme (see Appendix B - EMPr) should be implemented according to the latest available version of the Best Practice Guidelines at the time. The findings from operational phase monitoring should inform an adaptive management programme to mitigate any impacts on avifauna to acceptable levels. In particular, any Verreaux's Eagle fatalities should be reported to Dr Megan Murgatroyd in order to close the feedback loop back to the VERA modelling performed for this.
Residual impact	There is some uncertainty around the effectiveness of bird-turbine collision mitigation at this stage in SA. As a result the significance remains at Moderate post mitigation.

11.6.3 Decommissioning Phase

Impact Phase: Decommission Phase
Nature of the impact: Disturbance of birds
Description of Impact: Effects of disturbance on birds are particularly likely during breeding and could include loss of breeding productivity; temporary or permanent abandonment of breeding; or even abandonment of nest site. The avoidance measures (in the form of large No-go buffers) already taken to protect the various eagle nests and their breeding have reduced the significance of this impact.

Impact Status: Negative					
	E	**D**	**R**	**M**	**P**
Without Mitigation	Local	Short term	Reversible	Low	Probable
Score	2	2	1	2	3
With Mitigation	Local	Short term	Reversible	Low	Probable
Score	2	2	1	2	3
Significance Calculation	**Without Mitigation**		**With Mitigation**		
S=(E+D+R+M)*P	**Low Negative Impact (21)**		**Low Negative Impact (21)**		
Was public comment received?	No.				
Has public comment been included in mitigation measures?	No.				
Mitigation measures reduce residual risk or enhance opportunities: • All human activities associated with construction, operation and decommissioning should be strictly managed according to generally accepted environmental best practice standards, so as to avoid any unnecessary impact on the receiving environment. • Movement of all staff, vehicle and machinery activities should be strictly controlled at all times so as to ensure that the absolute minimum of surface area is impacted.					
Residual impact	The disturbance of birds is somewhat inevitable, although the most sensitive receptors have already been protected through impact avoidance, through the application of no-go buffers.				

11.7 Bats

Impacts to bats that are likely to occur because of the construction, operation and decommissioning of the wind energy facility are identified and assessed below. The unit of analysis against which impacts were assessed is the local bat community and their associated habitats within the proposed development. Impacts considered for assessment include habitat modification and disturbance, fatality due to collisions with wind turbine blades, and light pollution since these are the major impacts likely to be associated with the project (Kunz et al. 2007b, Cryan and Barclay 2009). For each impact, the respective mitigation measures were categorised into those aimed at first avoiding impacts, then minimising impacts, and finally restoring areas impacted.

11.7.1 Construction Phase

Removal of vegetation, noise and dust generated during construction activities, and the presence of new infrastructure in the landscape, will negatively and indirectly impact bats by removing habitat used for foraging and commuting, through disturbance, and displacement (Kunz et al. 2007b, Millon et al. 2015, Millon et al. 2018, Bennun et al. 2021, Leroux et al. 2022).

Construction of WEF infrastructure could result in destruction (direct impact) of bat roosts (rocky crevices, buildings) and disturbance (indirect impact) of bat roosts potentially resulting in roost abandonment. Bat mortality can occur if roosts which contain bats are destroyed. Installation of new infrastructure in the landscape (e.g., buildings, turbines, road culverts) can provide new roosting spaces for some bat species, attracting them to areas with wind turbines and potentially increasing the likelihood of collisions.

Impact Phase: Construction Phase
Nature of the impact: Modification and Disturbance of Bat Habitat (Roosting, Foraging, Commuting)

Description of Impact: Removal of vegetation, noise and dust generated during construction activities, and the presence of new infrastructure in the landscape, will negatively and indirectly impact bats by removing habitat used for foraging and commuting, through disturbance, and displacement. Construction of WEF infrastructure could result in destruction and/or disturbance to bat roosts, and inadvertently provide new roosting spaces for some bat species in risky locations.

Impact Status: Negative

	E	D	R	M	P
Without Mitigation	Site	Short Term	Recoverable	Moderate	Probable
Score	1	2	3	3	3
With Mitigation	Site	Short Term	Recoverable	Low	Low Probability
Score	1	2	2	2	2

Significance Calculation	**Without Mitigation**	**With Mitigation**
S=(E+D+R+M)*P	**Low Negative Impact (27)**	**Low Negative Impact (14)**
Was public comment received?	No.	
Has public comment been included in mitigation measures?	No.	

Mitigation measures to reduce residual risk or enhance opportunities:

Avoid:

- Limit potential for bats to roost in project infrastructure (e.g., buildings, turbines, road culverts) by ensuring they are properly sealed such that bats cannot gain access.
- No placement of infrastructure (except roads and MV Cabling) in no-go areas.
- No blasting near rocky crevices.

Minimise:

- Minimise clearing of vegetation.
- Minimise disturbance and destruction of rocky outcrops, trees and buildings, and where this is required, these features should be examined for roosting bats.
- Apply good construction abatement control practices to reduce emissions and pollutants (e.g., noise, erosion, waste) created during construction.

Restore:

- Rehabilitate all areas disturbed during construction (including aquatic habitat).

Residual impact	Residual impacts are likely to be minor although buffer distances have been shown to be ineffective at avoiding and minimizing risk to bats because these are two small for some species (Barré et al. 2018).

11.7.2 Operational Phase

Bat mortality (direct impact) through collisions with wind turbine blades is the principal impact of wind energy facilities on bats (Cryan and Barclay 2009, Arnett et al. 2016). Construction of project infrastructure will increase ecological light pollution from artificial lighting associated with the substation and other operational and maintenance buildings. Light pollution can alter ecological dynamics (Horváth et al. 2009). Lighting attracts and can cause direct mortality of insects, reducing the prey base for bats, especially bat species that are light phobic. These species may also be displaced from previous foraging areas due to lighting. Other bat species forage around lights, attracted by higher numbers of insects. This may bring these species into the vicinity of the project and indirectly increase the risk of collision with wind turbines.

Impact Phase: Operation Phase

Nature of the impact: Bat Fatality					
Description of Impact: Bat mortality (direct impact) through collisions and/or barotrauma with wind turbine blades is the principal impact of wind energy facilities on bats.					
Impact Status: Negative					
	E	**D**	**R**	**M**	**P**
Without Mitigation	Local	Long Term	Recoverable	High	Highly Probable
Score	2	4	3	4	4
With Mitigation	Local	Long Term	Recoverable	Moderate	Probable
Score	2	4	3	3	3
Significance Calculation	**Without Mitigation**		**With Mitigation**		
S=(E+D+R+M)*P	**Moderate Negative Impact (52)**		**Moderate Negative Impact (33)**		
Was public comment received?	No.				
Has public comment been included in mitigation measures?	No.				
Mitigation measures to reduce residual risk or enhance opportunities: Avoid: • No placement of turbines within no-go bat buffers. • Maintain a minimum blade sweep of 30 m to avoid impacts to lower flying bats such as clutter-edge species (e.g., Cape serotine, Natal long-fingered bat). Minimise: • Minimise the rotor diameter. • Feather blades to prevent free-wheeling below the turbine cut-in speed from start of operation. • Implement post-construction fatality monitoring and apply curtailment or deterrents if fatality thresholds are exceeded.					
Residual impact	Curtailment and deterrents can successfully reduce bat fatality (Arnett 2011, Arnett et al. 2016, Weaver et al. 2020), but not completely. Through the application of fatality thresholds, residual impacts should be minimized.				

Impact Phase: Operation Phase					
Nature of the impact: Light Pollution					
Description of Impact: Light pollution can alter ecological dynamics.					
Impact Status: Negative					
	E	**D**	**R**	**M**	**P**
Without Mitigation	Local	Long Term	Recoverable	Moderate	Probable
Score	2	4	3	3	3
With Mitigation	Local	Long Term	Recoverable	Moderate	Low Probability
Score	2	4	2	3	2
Significance Calculation	**Without Mitigation**		**With Mitigation**		
S=(E+D+R+M)*P	**Moderate Negative Impact (36)**		**Low Negative Impact (22)**		

Was public comment received?	No.
Has public comment been included in mitigation measures?	No.
Mitigation measures to reduce residual risk or enhance opportunities: Avoid: • No placement of substations and operational and maintenance buildings within no-go areas. • Avoid excessive lighting. Minimise: • Use of motion-sensor lighting, avoid sky-glow by using hoods, increase spacing between lighting units, and use low pressure sodium lights (Rydell 1992, Stone 2012).	
Residual impact	Given the limited extent of light pollution currently in the region, the application of the above mitigation measures is likely to result in minor residual impacts.

11.7.3 Decommissioning Phase

Impacts during the decommissioning phase will be indirect and involve disturbance to bats through excessive noise and dust, and damage to vegetation.

Impact Phase: Decommissioning Phase					
Nature of the impact: Disturbance of Bats					
Description of Impact: Impacts during the decommissioning phase will be indirect and involve disturbance to bats through excessive noise and dust, and damage to vegetation.					
Impact Status: Negative					
	E	**D**	**R**	**M**	**P**
Without Mitigation	Site	Short Term	Recoverable	Moderate	Probable
Score	1	2	3	3	3
With Mitigation	Site	Short Term	Recoverable	Low	Low Probability
Score	1	2	2	2	2
Significance Calculation	**Without Mitigation**		**With Mitigation**		
S=(E+D+R+M)*P	**Low Negative Impact (27)**		**Low Negative Impact (14)**		
Was public comment received?	No.				
Has public comment been included in mitigation measures?	No.				
Mitigation measures to reduce residual risk or enhance opportunities: Avoid: • No decommissioning activities at night. Minimise: • Apply good abatement control practices to reduce emissions and pollutants (e.g., noise, erosion, waste) created during decommissioning activities. Restore: • Rehabilitate all areas disturbed during construction (including aquatic habitat).					
Residual impact	Residual impacts are likely to be minor since ceasing project activities on site is likely to benefit bats.				

11.8 Noise

Increased noise levels are directly linked with the various activities associated with the construction of the proposed development, as well as the operation phase of the activity. In South Africa the document that addresses the issues concerning environmental noise is SANS 10103. It provides the maximum average ambient noise levels, $L_{Req,d}$ and $L_{Req,n}$, during the day and night respectively to which different types of developments may be exposed. For rural areas the Zone Sound Levels (Rating Levels) are:

- Day (06:00 to 22:00) - $L_{Req,d}$ = 45 dBA, and
- Night (22:00 to 06:00) - $L_{Req,n}$ = 35 dBA.

11.8.1 Construction Phase

There are a number of factors that determine the audibility as well as the potential of a noise impact on receptors. Maximum noises generated can be audible over a large distance, however, these maximum noises are generally of very short duration. If maximum noise levels however exceed 65 dBA at a receptor, or if it is clearly audible with a significant number of instances where the noise level exceeds the prevailing ambient sound level with more than 15 dB, the noise can increase annoyance levels and may ultimately result in noise complaints. Average or equivalent sound levels are another factor that impacts on the ambient sound levels and is the constant sound level that the receptor can experience.

A potential significant source of noise during the construction phase is additional traffic to and from the site, as well as traffic on the site. The use of a borrow pit(s), on site crushing and screening and concrete batching plants will significantly reduce heavy vehicle movement to and from the site. Construction traffic is expected to be generated throughout the entire construction period, expected to take approximately 24 – 36 months, however, the volume and type of traffic generated will be dependent upon the construction activities being conducted, which will vary during the construction period. Noise levels due to traffic can be estimated using various different noise algorithms.

Impact Phase: Construction Phase					
Nature of the impact: Construction of access roads					
Description of Impact: Daytime ambient sound levels could range from less than 20 dBA to more than 72 dBA, averaging at 35.9 dBA. Daytime ambient sound levels are thus typical of a rural noise district most of the times and it is expected that introduced noises will be audible over large distances during quiet periods (during low wind conditions). Road construction activities will increase ambient sound levels due to air-borne noise.					
Impact Status: Negative					
	E	**D**	**R**	**M**	**P**
Without Mitigation	Local	Temporary	High	Very high	Possible
Score	2	1		10	2
With Mitigation	Local	Temporary	High	Very high	Possible
Score	2	1		10	2
Significance Calculation	**Without Mitigation**		**With Mitigation**		
S=(E+D+R+M)*P	**Low Negative Impact (26)**		**Low Negative Impact (26)**		
Was public comment received?	No.				

Has public comment been included in mitigation measures?	No.
Mitigation measures reduce residual risk or enhance opportunities: While the construction (or upgrading) of the access roads may be very temporary, noise levels will be very high during close construction activities. Passing traffic during the construction phase will extend the duration of the construction related noises, and it is recommended that the applicant consider: • Locating access roads further than 15 m from verified NSR, and further than 60 m from NSR if the roads may be used during the night-time period; • Permitting only road construction activities during the daytime period; and • Notifying verified NSR when activities may take place within 100m from residential dwellings.	
Residual impact	None.

Impact Phase: Construction Phase					
Nature of the impact: Construction traffic noise					
Description of Impact: Daytime ambient sound levels could range from less than 20 dBA to more than 72 dBA, averaging at 35.9 dBA. Daytime ambient sound levels are thus typical of a rural noise district most of the times and it is expected that introduced noises will be audible over large distances during quiet periods (during low wind conditions). Road construction activities will increase ambient sound levels due to air-borne noise.					
Impact Status: Negative					
	E	**D**	**R**	**M**	**P**
Without Mitigation	Local	Temporary	High	Very high	Improbable
Score	2	1		10	1
With Mitigation	Local	Temporary	High	Very high	Improbable
Score	2	1		10	1
Significance Calculation	**Without Mitigation**		**With Mitigation**		
S=(E+D+R+M)*P	**Low Negative Impact (14)**		**Low Negative Impact (14)**		
Was public comment received?	No.				
Has public comment been included in mitigation measures?	No.				
Mitigation measures reduce residual risk or enhance opportunities: While the significance of the noise impact is low, noise levels will be very high during the construction phase if traffic pass close to NSR. It is therefore recommended that the applicant consider: • Locating access roads further than 15 m from verified NSR, and further than 60 m from NSR if the roads may be used during the night-time period; • Permitting only construction activities during the daytime period if the roads are closer than 60 m from NSR. Unless prior consultation is undertaken with the occupants of the specific NSR.					
Residual impact	None.				

Impact Phase: Construction Phase
Nature of the impact: Daytime construction activities
Description of Impact: Daytime ambient sound levels could range from less than 20 dBA to more than 72 dBA, averaging at 35.9 dBA. Daytime ambient sound levels are thus typical of a rural noise

district most of the times and it is expected that introduced noises will be audible over large distances during quiet periods (during low wind conditions). Various construction activities (development of laydown areas and the hard standing areas, excavation of foundations, concreting of foundations and the assembly of the wind turbines tower and components, as well as construction of other infrastructure) taking place simultaneously during the day will increase ambient sound levels due to air-borne noise.					
Impact Status: Negative					
	E	**D**	**R**	**M**	**P**
Without Mitigation	Local	Short-term	High	Very high	Improbable
Score	2	2		10	1
With Mitigation	Local	Short-term	High	Very high	Improbable
Score	2	2		10	1
Significance Calculation	**Without Mitigation**		**With Mitigation**		
S=(E+D+R+M)*P	**Low Negative Impact (14)**		**Low Negative Impact (14)**		
Was public comment received?	No.				
Has public comment been included in mitigation measures?	No.				
Mitigation measures reduce residual risk or enhance opportunities: The significance of the noise impact is low for daytime construction activities and no additional mitigation is required or recommended.					
Residual impact	None.				

Impact Phase: Construction Phase					
Nature of the impact: Night-time construction activities					
Description of Impact: Night-time ambient sound levels could range from less than 20 dBA to more than 44 dBA, averaging at 25.2 dBA. Ambient sound levels are expected to be very low during period of low winds, and it is expected that introduced noises will be audible over large distances during quiet periods (during low wind conditions). Various construction activities (likely limited to the pouring of concrete as well as erection of WTG components) taking place simultaneously at night will increase ambient sound levels due to air-borne noise.					
Impact Status: Negative					
	E	**D**	**R**	**M**	**P**
Without Mitigation	Regional	Short-term	High	Very high	Likely
Score	3	2		10	3
With Mitigation	Regional	Short-term	High	Very high	Improbable
Score	3	2		10	1
Significance Calculation	**Without Mitigation**		**With Mitigation**		
S=(E+D+R+M)*P	**High Negative Impact (60)**		**Low Negative Impact (15)**		
Was public comment received?	No.				
Has public comment been included in mitigation measures?	No.				

Mitigation measures reduce residual risk or enhance opportunities: The significance of the potential noise impact is high for night-time construction activities and additional mitigation is required. However, night-time construction activities may generate noises that some NSR may find disturbing and it is recommended that the applicant consider: • Minimize night-time activities when working within 2,000m from any structure used for residential purposes. Work should only take place at one WTG location to minimize potential night-time cumulative noises (when working at night within 2,000m from NSR used for residential purposes); • The applicant must notify the NSR when night-time activities will be taking place within 1,000m from the NSR; and • The applicant must plan the completion of noisiest activities (such a pile driving, rock breaking and excavation) during the daytime period (even though it is expected that it is highly unlikely that this may take place at night).	
Residual impact	None.

11.8.2 Operation Phase

The proposed development would be designed to have an operational life of up to 25 years with the possibility to further expand the lifetime of the WEF. The only development related activities on-site will be routine servicing (access roads and light traffic) and unscheduled maintenance. The noise impact from maintenance activities is insignificant, with the main noise source being the wind turbine blades and the nacelle (components inside). Noise emitted by wind turbines can be associated with two types of noise sources. These are aerodynamic sources due to the passage of air over the wind turbine blades and mechanical sources which are associated with components of the power train within the turbine, such as the gearbox and generator and control equipment for yaw, blade pitch, etc. These sources normally have different characteristics and can be considered separately. In addition, there are other noise sources of lower levels, such as the substations and traffic (maintenance). Although considered rare, there is one other characteristic of wind turbine sound that increases the sleep disturbance potential above that of other long-term noise sources. The amplitude modulation (AM) of the sound emissions from the wind turbines creates a repetitive rise and fall in sound levels synchronized to the blade rotation speed, sometimes referred to as a "swish" or "thump". Even though there are thousands of wind turbine generators in the world, AM is still one subject receiving the least complaints and due to these very few complaints, little research went into this subject and it is not possible to predict whether AM may occur, nor to calculate the potential related impact.

Impact Phase: Operation Phase					
Nature of the impact: Daytime operation activities					
Description of Impact: WTG will only operate during period with increased winds, when ambient sound levels are higher than periods with no or low winds. Numerous WTG of the Loxton WEF 3 operating simultaneously during the day will increase ambient sound levels due to air-borne noise from the WTG. Ambient sound levels are normally higher during the daytime period, with receptors generally more active and distracted which would decrease the probability of an impact occurring (when compared to the night-time period).					
Impact Status: Negative					
	E	**D**	**R**	**M**	**P**
Without Mitigation	Local	Long-term	High	Low	Improbable
Score	2	4		4	1
With Mitigation	Local	Long-term	High	Low	Improbable
Score	2	4		4	1

Significance Calculation	Without Mitigation	With Mitigation
S=(E+D+R+M)*P	**Low Negative Impact (10)**	**Low Negative Impact (10)**
Was public comment received?	No.	
Has public comment been included in mitigation measures?	No.	
Mitigation measures reduce residual risk or enhance opportunities: The significance of a noise impact occurring during the daytime period is low and no additional mitigation is required or recommended.		
Residual impact	None.	

Impact Phase: Operation Phase					
Nature of the impact: Night-time operation activities					
Description of Impact: WTG will only operate during period with increased winds, when ambient sound levels are higher than periods with no or low winds. Numerous WTG of the Loxton WEF 3 operating simultaneously at night will increase ambient sound levels due to air-borne noise from the WTG.					
Impact Status: Negative					
	E	**D**	**R**	**M**	**P**
Without Mitigation	Regional	Long-term	High	Low	Possible
Score	3	4		4	2
With Mitigation	Regional	Long-term	High	Low	Possible
Score	3	4		4	2

Significance Calculation	Without Mitigation	With Mitigation
S=(E+D+R+M)*P	**Low Negative Impact (22)**	**Low Negative Impact (22)**
Was public comment received?	No.	
Has public comment been included in mitigation measures?	No.	
Mitigation measures reduce residual risk or enhance opportunities: The significance of a noise impact is low and no additional mitigation is required.		
Residual impact	None.	

11.9 Heritage and Archaeology

All aspects of the proposed Loxton WEF 3 development are relevant, since excavations for foundations and / or services may impact on archaeological and / or palaeontological remains, while all above-ground aspects create potential visual (contextual) impacts to the cultural landscape and any significant heritage sites that might be visually sensitive.

Impacts to archaeology (construction phase) and the cultural landscape (all phases) are expected to occur and require assessment. Impacts on graves are theoretically possible but owing to the largely rocky substrate no impacts are expected. Impacts to built heritage resources are not expected.

Any impact to an archaeological or palaeontological resource or a grave is deemed unacceptable until such time as the resource has been inspected and studied further if necessary. Impacts to the landscape are difficult to quantify but in general a development that visually dominates the landscape from many publicly accessible vantage points is undesirable. Because of the height of the proposed development, such an impact may well occur but due to the socio-economic benefits the impact is considered acceptable.

There are currently no obvious threats to heritage resources on the site aside from the natural degradation, weathering and erosion that will affect archaeological materials. Trampling from grazing animals and/or farm/other vehicles could also occur. These impacts would be of negligible negative significance. There are no threats to the cultural landscape.

11.9.1 Construction Phase

Direct impacts to archaeological resources would occur during the construction phase when construction begins. With one exception, no archaeological resources occur within the areas where project infrastructure would be placed. The exception is the access road from the west which will directly impact an archaeological site, which means that the expected impacts are high negative. If it cannot be avoided, the site will need to be excavated and described in detail prior to construction and a pre-construction survey will be needed to identify any further areas along the final road alignment where avoidance (through micrositing) or mitigation might still be required. After mitigation the significance calculates to low negative. There are no fatal flaws in terms of construction phase impacts to the archaeology.

Impact Phase: Construction Phase					
Nature of the impact: Damage to or destruction of archaeological resources					
Description of Impact: Archaeological resources may be impacted during construction when equipment is brought onto site and excavations four foundations, services and roads commence.					
Impact Status: Negative					
	E	**D**	**R**	**M**	**P**
Without Mitigation	Site	Permanent	Irreversible	Low	Low Probability
Score	1	5	5	2	2
With Mitigation	Site	Permanent	Irreversible	Very Low	Low Probability
Score	1	5	5	1	2
Significance Calculation	**Without Mitigation**		**With Mitigation**		
S=(E+D+R+M)*P	**High Negative Impact (65)**		**Low Negative Impact (24)**		
Was public comment received?	No.				
Has public comment been included in mitigation measures?	No.				
Mitigation measures reduce residual risk or enhance opportunities: • Avoid the ruin (waypoint 1238) or conduct archaeological excavation and documentation of the site. • Conduct pre-construction survey of the full layout, including all ancillary infrastructure. This survey will make specific recommendations for any mitigation (avoidance or sampling) that might be required.					

Residual impact	There will still be isolated finds of very low cultural significance that might not be found during a survey. These are of no consequence.

Direct impacts to the cultural landscape would occur throughout the construction phase due to the presence of construction equipment and industrial-type structures in the rural/natural landscape. Impacts could be of fairly high magnitude but are rated moderate due to the distance between the project and public viewpoints. The significance calculates to moderate negative. Mitigation will make very little difference because it is not possible to hide the activity and turbines and after mitigation the significance remains moderate negative. There are no fatal flaws in terms of construction phase impacts to the cultural landscape.

Impact Phase: Construction Phase					
Nature of the impact: Impacts to the cultural landscape					
Description of Impact: The cultural landscape will be negatively affected through the visual intrusion of all the construction equipment and activity and the introduction of the large wind turbines as these are erected.					
Impact Status: Negative					
	E	**D**	**R**	**M**	**P**
Without Mitigation	Regional	Short Term	Recoverable	Moderate	Definite
Score	3	2	3	3	5
With Mitigation	Regional	Short Term	Recoverable	Low	Definite
Score	3	2	3	2	5
Significance Calculation	**Without Mitigation**		**With Mitigation**		
S=(E+D+R+M)*P	**Moderate (55)**		**Moderate (50)**		
Was public comment received?	No.				
Has public comment been included in mitigation measures?	No.				
Mitigation measures reduce residual risk or enhance opportunities: • Keep construction period as short as possible. • Minimise landscape scarring by minimizing cut and fill and ensuring rehabilitation of all areas not required during operation. • Use low contrast materials for road surfacing where required. • Place ancillary infrastructure (substations, offices, etc.) in low visibility areas. • Follow visual mitigation measures.					
Residual impact	No matter what measures are applied, nothing can screen the development due to its size and there will always be impacts.				

11.9.2 Operation Phase

Direct impacts to the cultural landscape would occur during the operation phase through the presence of the facility in what is otherwise a rural / natural landscape. Although the extent and magnitude are likely to be limited, the long-term duration means that the significance calculates to high negative. Mitigation will slightly reduce the magnitude and after mitigation the significance is moderate negative. There are no fatal flaws in terms of operation phase impacts to the cultural landscape.

Impact Phase: Operation Phase					
Nature of the impact: Impacts to the cultural landscape					
Description of Impact: The cultural landscape will be negatively affected through the visual intrusion of the large wind turbines and related infrastructure in the landscape.					
Impact Status: Negative					
	E	**D**	**R**	**M**	**P**
Without Mitigation	Regional	Long Term	Recoverable	Moderate	Definite
Score	3	4	3	3	5
With Mitigation	Regional	Long Term	Recoverable	Low	Definite
Score	3	4	3	2	5
Significance Calculation	**Without Mitigation**		**With Mitigation**		
S=(E+D+R+M)*P	**High (65)**		**Moderate (60)**		
Was public comment received?	No.				
Has public comment been included in mitigation measures?	No.				
Mitigation measures reduce residual risk or enhance opportunities: • Ensure that all maintenance operations remain within designated areas. • Ensure that visual recommendations with regards to lighting are followed. • Make use of an early warning system that can switch on navigation lights only when they are needed (if such a system is available and approved at the time of construction).					
Residual impact	No matter what measures are applied, nothing can screen the development due to its size and there will always be impacts.				

11.9.3 Decommissioning Phase

Direct impacts to the cultural landscape would occur throughout the decommissioning phase due to the presence of construction equipment and activity and industrial-type structures (which would become less with time) in the rural / natural landscape. Impacts would be of fairly high intensity but because of the short duration of the decommissioning period the significance calculates to moderate negative. Mitigation will make very little difference because it is not possible to hide the activity and equipment and after mitigation the significance remains moderate negative. There are no fatal flaws in terms of decommissioning phase impacts to the cultural landscape.

Impact Phase: Decommissioning Phase					
Nature of the impact: Impacts to the cultural landscape					
Description of Impact: The cultural landscape will be negatively affected through the visual intrusion of all the construction equipment and activity while the turbines and related infrastructure are being removed.					
Impact Status: Negative					
	E	**D**	**R**	**M**	**P**
Without Mitigation	Regional	Short Term	Recoverable	High	Definite
Score	3	2	3	4	5
With Mitigation	Regional	Short Term	Recoverable	Low	Definite

Score	3	2	3	2	5
Significance Calculation	**Without Mitigation**		**With Mitigation**		
S=(E+D+R+M)*P	**Moderate (60)**		**Moderate (50)**		
Was public comment received?	No.				
Has public comment been included in mitigation measures?	No.				
Mitigation measures reduce residual risk or enhance opportunities: • Keep decommissioning period as short as possible. • Ensure effective rehabilitation of all areas following advice of the relevant specialist.					
Residual impact	Minimal landscape scarring will still be visible but will reduce over time as the rehabilitated areas return to normal.				

11.10 Palaeontology

The proposed development will involve substantial surface clearance and bedrock excavations, for example, for wind turbine foundations, access road networks, underground cables, construction laydown areas/camps, O&M buildings, on-site substations and electrical pylon footings, which may disturb, damage or destroy legally projected palaeontological heritage resources of scientific and conservation value.

Despite the substantial project footprints as well as the known occurrence of important vertebrate and other fossil sites elsewhere in the wider region between Loxton and Victoria West, the impact significance of the proposed renewable energy developments on local palaeontological heritage is anticipated to be low. This is based on the inferred Low Palaeo-sensitivity of the project area overall based on desktop and field-based data. These impacts, including cumulative impacts considering other renewable energy projects in the broader region, are expected to fall within acceptable limits and therefore require no impact rating assessment.

11.11 Visual / Landscape

Shadow Flicker Effect

Receptors falling within the shadow flicker envelope could potentially be affected by shadow flicker from the rotating wind turbine blades when the sun is low in the sky. However, the blades would need to be orientated toward the receptor, they would need to be rotating and the weather would need to be clear with bright sunlight to cast shadows. The orientation of buildings, as well as topography and trees would all determine the potential flicker effect.

Only two farmsteads within 2 km of the proposed WEFs could potentially be affected, although these are both within the project boundary. Incidences of flicker are therefore expected to be minimal.

11.11.1 Construction Phase

Impact Phase: Construction Phase
Nature of the impact: Visual effect of construction activities on scenic resources and sensitive receptors
Description of Impact:

Visual intrusion of cranes, heavy vehicles and construction activities required for the erection of wind turbines, and related infrastructure. Temporary construction areas e.g. camps and batching plants. Visual scarring from earthworks for assembly platforms. Soil/ rubble stockpiles from earthworks. Litter generated from construction site. Noise and dust from construction activity.					
Impact Status: Negative					
	E	**D**	**R**	**M**	**P**
Without Mitigation	Local	Short Term	Recoverable	Moderate	Definite
Score	2	2	3	3	5
With Mitigation	Local	Short Term	Recoverable	Moderate	Highly probable
Score	2	2	3	3	4
Significance Calculation	**Without Mitigation**		**With Mitigation**		
S=(E+D+R+M)*P	**Moderate Negative Impact (50)**		**Moderate Negative Impact (40)**		
Was public comment received?	No.				
Has public comment been included in mitigation measures?	No.				
Mitigation measures reduce residual risk or enhance opportunities: • Disturbed areas to be rehabilitated / revegetated as soon as possible during the construction phase. • Temporary laydown areas and batching plants to be located away from arterial or district roads. • Stockpiles to be located within approved construction footprints. • Recycling and refuse bins to be provided to eliminate litter from the site.					
Residual impact	Visual disturbance caused by vehicles, cranes.				

11.11.2 Operation Phase

Impact Phase: Operation Phase					
Nature of the impact: Visual effect of wind turbines on the rural landscape					
Description of Impact: Potential visual intrusion of tall wind turbines on the rural landscape, scenic resources and sensitive receptors. Change in the pastoral character and sense of place of the local area.					
Impact Status: Negative					
	E	**D**	**R**	**M**	**P**
Without Mitigation	Regional	Long Term	Recoverable	High	Definite
Score	3	4	3	4	5
With Mitigation	Regional	Long Term	Recoverable	High	Definite
Score	3	4	3	4	5
Significance Calculation	**Without Mitigation**		**With Mitigation**		
S=(E+D+R+M)*P	**High Negative Impact (70)**		**High Negative Impact (70)**		

Was public comment received?	No.
Has public comment been included in mitigation measures?	No.
Mitigation measures reduce residual risk or enhance opportunities: • Mitigation achieved in the revised layout by means of avoidance of high visual sensitivity areas and receptors in siting of turbines.	
Residual impact	Visual intrusion of wind turbines on the exposed landscape.

Impact Phase: Operation Phase					
Nature of the impact: Visual effect of substation and BESS on the rural landscape					
Description of Impact: Visual effect of industrial-type substations and BESS on the rural landscape. Visual intrusion of internal overhead powerlines, including silhouette effect on skylines of ridges. Visual intrusion of internal access roads and hardstands in the local area.					
Impact Status: Negative					
	E	**D**	**R**	**M**	**P**
Without Mitigation	Local	Long Term	Recoverable	Moderate	Definite
Score	2	4	3	3	5
With Mitigation	Local	Long Term	Recoverable	Moderate	Highly probable
Score	2	4	3	3	4
Significance Calculation	**Without Mitigation**		**With Mitigation**		
S=(E+D+R+M)*P	**Moderate Negative Impact (60)**		**Moderate Negative Impact (48)**		
Was public comment received?	No.				
Has public comment been included in mitigation measures?	No.				
Mitigation measures reduce residual risk or enhance opportunities: • Substations, BESS and O&M Buildings to be located in unobtrusive low-lying areas away from the R319 and district roads, as per recommended visual buffers, as currently indicated. • On-site signage to be discrete, and billboards prohibited. Signage to be fixed against a backdrop to avoid intrusion on the skyline. • Powerlines to follow valleys and avoid peaks/ridges where possible. (Final route of internal lines to be reviewed). • Security and other outdoor lighting to be fitted with reflectors to conceal light source and prevent light spillage.					
Residual impact	Visual intrusion of industrial facilities on the local landscape.				

Impact Phase: Operation Phase
Nature of the impact: Visual intrusion of lighting at night

Description of Impact: Visual effect on the rural countryside created by lights on turbines for aircraft navigation. Visual intrusion of area and security lighting around the substations and O&M buildings.					
Impact Status: Negative					
	E	**D**	**R**	**M**	**P**
Without Mitigation	Local	Long Term	Recoverable	Moderate	Definite
Score	2	4	3	3	5
With Mitigation	Local	Long Term	Recoverable	Moderate	Highly probable
Score	2	4	3	3	4
Significance Calculation	**Without Mitigation**		**With Mitigation**		
S=(E+D+R+M)*P	**Moderate Negative Impact (60)**		**Moderate Negative Impact (48)**		
Was public comment received?	No.				
Has public comment been included in mitigation measures?	No.				
Mitigation measures reduce residual risk or enhance opportunities: • Use of available technology to minimise the visual effect of navigation lights, conforming with CAA requirements. • Use of reflectors on general area and security lighting to conceal light sources.					
Residual impact	Visual intrusion of light spillage on the local landscape.				

11.11.3 Decommissioning Phase

Impact Phase: Decommissioning Phase					
Nature of the impact: Visual intrusion of activities to remove infrastructure					
Description of Impact: Visual effect of construction activities to remove infrastructure at the end of the life of the project, including wind turbines, substation, buildings, internal overhead powerlines and access roads.					
Impact Status: Negative					
	E	**D**	**R**	**M**	**P**
Without Mitigation	Local	Short Term	Recoverable	Moderate	Definite
Score	2	2	3	3	5
With Mitigation	Local	Short Term	Recoverable	Moderate	Highly probable
Score	2	2	3	3	4
Significance Calculation	**Without Mitigation**		**With Mitigation**		
S=(E+D+R+M)*P	**Moderate Negative Impact (50)**		**Moderate Negative Impact (40)**		
Was public comment received?	No.				

Has public comment been included in mitigation measures?	No.
Mitigation measures reduce residual risk or enhance opportunities: • Disturbed areas to be rehabilitated / revegetated as soon as possible after the decommissioning phase. • Wind turbines and building structures removed at the end of the life of the project. • Hardstands and access roads no longer required to be ripped and regraded. • Exposed or disturbed areas to be revegetated and returned to grazing pasture or natural veld to blend with the surroundings.	
Residual impact	Visual intrusion of remaining roads and slabs on the local landscape.

11.12 Socio-Economic

The identification of key issues was based on:

- Review of project related information.
- Site visit and interviews with affected landowners.
- Experience of the author with the area and local conditions.
- Experience with similar projects.

It must be noted that the potential social impacts associated with the BESS will be limited. The focus of the SIA is therefore on the assessment of the impact of the wind turbines.

11.12.1 Construction Phase

The key social issues associated with the construction phase include:

Potential positive impacts

- Creation of employment and business opportunities, and the opportunity for skills development and on-site training.

Potential negative impacts

- Impacts associated with the presence of construction workers on local communities.
- Impacts related to the potential influx of jobseekers.
- Increased risks to livestock and farming infrastructure associated with the construction related activities and presence of construction workers on the site.
- Increased risk of grass fires associated with construction related activities.
- Nuisance impacts, such as noise, dust, and safety, associated with construction related activities and vehicles.
- Impact on productive farmland.

Impact Phase: Construction Phase
Nature of the impact: Creation of employment and business opportunities
Description of Impact: The construction phase will extend over a period of approximately 24 - 30 months and create in the region of 300-350 employment opportunities. Members from the local communities in Loxton, Carnarvon and the ULM would qualify for the majority of low skilled and semi-skilled employment opportunities and a number of skilled opportunities. The Most of these employment opportunities will accrue to Historically Disadvantaged (HD) members from the local community. Given relatively high local unemployment levels and limited job opportunities in the area, this will represent a significant, if localised, social benefit. The total wage bill will be in the region of R 150 million (2022 Rand values). A percentage of the wage bill will be spent in the local economy which will also create opportunities for local businesses in the ULM. The capital expenditure associated with the construction phase will be approximately R 6 billion (2022 Rand value). This will create opportunities for local companies and the

regional and local economy. The local service sector will also benefit from the construction phase. The potential opportunities would be linked to accommodation, catering, cleaning, transport, and security, etc. associated with the construction workers on the site.

Impact Status: Positive

	E	D	R	M	P
Without Mitigation	Local	Short Term	n/a	Medium	Probable
Score	2	2	0	3	3
With Mitigation / Enhancement	Local	Short Term	n/a	Medium	Highly probable
Score	3	2	0	3	4

Significance Calculation	**Without Mitigation**	**With Mitigation / Enhancement**
S=(E+D+R+M)*P	**Low Positive Impact (21)**	**Moderate Positive Impact (40)**
Was public comment received?	No.	
Has public comment been included in mitigation measures?	No.	

Mitigation measures reduce residual risk or enhance opportunities:

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 Local Municipality 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

- The proponent should liaise with the Local Municipality 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 service providers. These companies should be notified of the tender process and invited to bid for project-related work.

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.

Residual impact	Opportunity to up-grade and improve skills levels in the area.

Impact Phase: Construction Phase

Nature of the impact: Construction workers on local communities

Description of Impact:

The presence of construction workers poses a potential risk to family structures and social networks. While the presence of construction workers does not in itself constitute a social impact, the manner in which construction workers conduct themselves can impact on local communities. The most significant negative impact is associated with the disruption of existing family structures and social networks. This risk is linked to potentially risky behaviour, mainly of male construction workers, including:

- An increase in alcohol and drug use.
- An increase in crime levels.
- The loss of girlfriends and/or wives to construction workers.
- An increase in teenage and unwanted pregnancies.
- An increase in prostitution.
- An increase in sexually transmitted diseases (STDs), including HIV.

While the objective will be to source as many low and semi-skilled workers for the construction phase from the local towns in the area, specifically Loxton, Victoria West and Carnarvon, based on experience from other renewable energy projects the employment opportunities for local community members in the semi and skilled categories is likely to be limited. The majority of semi and skilled construction workers are therefore likely to be from outside of the area. These workers are likely to be accommodated in Loxton, Victoria West and Carnarvon where they may pose a risk to local communities. While the risks associated with construction workers at a community level will be low, at an individual and family level they may be significant, especially in the case of contracting a sexually transmitted disease or an unplanned pregnancy. However, given the nature of construction projects, it is not possible to totally avoid these potential impacts at an individual or family level.

Impact Status: Negative

	E	D	R	M	P
Without Mitigation	Local	Short Term	With rehabilitation / mitigation	Medium	Probable
Score	2	2	3	3	3
With Mitigation	Local	Short Term	With rehabilitation / mitigation	Low	Probable
Score	1	2	3	2	3

Significance Calculation	**Without Mitigation**	**With Mitigation**
S=(E+D+R+M)*P	**Moderate Negative Impact (30)**	**Low Negative Impact (24)**
Was public comment received?	No.	
Has public comment been included in mitigation measures?	No.	

Mitigation measures reduce residual risk or enhance opportunities:

- 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 Committee (MC) for the construction phase that representatives from local landowners, farming associations, and the local municipality. This MC should be established prior to commencement of the construction phase and form part of the SEP.

• The proponent and contractor should develop a Code of Conduct (CoC) for construction workers. The code should identify which types of behaviour and activities are not acceptable. Construction workers in breach of the code should be subject to appropriate disciplinary action and/or dismissed. All dismissals must comply with the South African labour legislation. The CoC should be signed by the proponent and the contractors before the contractors move onto site. The CoC should form part of the CHSSP. • The proponent and the contractor should implement an HIV/AIDS, COVID-19 and Tuberculosis (TB) awareness programme for all construction workers at the outset of the construction phase. The programmes should form part of the CHSSP. • 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. • 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. • No construction workers, with the exception of security personnel, should be permitted to stay over-night on the site.	
Residual impact	Impacts on family and community relations that may, in some cases, persist for a long period of time. Also, in cases where unplanned / unwanted pregnancies occur or members of the community are infected by an STD, specifically HIV and or AIDS, the impacts may be permanent and have long term to permanent residual/cumulative impacts on the affected individuals and/or their families and the community.

Impact Phase: Construction Phase

Nature of the impact: Influx of job seekers

Description of Impact:

Large construction projects tend to attract people to the area in the hope that they will secure a job, even if it is a temporary job. These job seekers can in turn become "economically stranded" in the area or decide to stay on irrespective of finding a job or not. While the proposed project on its own does not constitute a large construction project, the establishment of a number of renewable energy projects in the area may attract job seekers to the area. As in the case of construction workers employed on the project, the actual presence of job seekers in the area does not in itself constitute a social impact. However, the way in which they conduct themselves can impact on the local community. The main areas of concern associated with the influx of job seekers include:

- Impacts on existing social networks and community structures.
- Competition for housing, specifically low-cost housing.
- Competition for scarce jobs.
- Increase in incidences of crime.

These issues are similar to the concerns associated with the presence of construction workers. Based on experience from the construction of other renewable energy facilities the potential for economically motivated in-migration and subsequent labour stranding is likely to limited. This is due to the relatively limited number of employment opportunities, short duration of the construction phase and limited economic opportunities in towns such as Loxton, Victoria West, and Carnarvon.

Impact Status: Negative

	E	D	R	M	P
Without Mitigation	Local	Short Term	With rehabilitation / mitigation	Low	Probable
Score	2	2	3	2	3
With Mitigation	Local	Short Term	With rehabilitation / mitigation	Low	Probable
Score	1	2	3	2	3

Significance Calculation	Without Mitigation	With Mitigation
S=(E+D+R+M)*P	**Low Negative Impact (27)**	**Low Negative Impact (24)**
Was public comment received?	No.	
Has public comment been included in mitigation measures?	No.	

Mitigation measures reduce residual risk or enhance opportunities:

It is impossible to stop people from coming to the area in search of employment. However, the proponent should ensure that the employment criteria favour residents from the area. In addition:

- 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 proponent, in consultation with the LM, should investigate the option of establishing a MC to monitor and identify potential problems that may arise due to the influx of job seekers to the area. The MC should also include the other proponents of solar energy projects in the area.
- The proponent should implement a "locals first" policy, specifically with regard to unskilled and low skilled opportunities.
- The proponent should implement a policy that no employment will be available at the gate.

Residual impact	Impacts on family and community relations that may, in some cases, persist for a long period of time. Also, in cases where unplanned / unwanted pregnancies occur or members of the community are infected by an STD, specifically HIV and or AIDS, the impacts may be permanent and have long term to permanent residual/cumulative impacts on the affected individuals and/or their families and the community.

Impact Phase: Construction Phase

Nature of the impact: Risk to safety, livestock, and farm infrastructure

Description of Impact:

The presence on and movement of construction workers on and off the site poses a potential safety threat to local famers and farm workers in the vicinity of the site. In addition, farm infrastructure, such as fences and gates, may be damaged and stock losses may also result from gates being left open and/or fences being damaged, or stock theft linked either directly or indirectly to the presence of construction workers on the site. The potential risks (safety, livestock, and farm infrastructure) can be effectively mitigated by careful planning and managing the movement of construction workers and construction related activities during the construction phase.

Impact Status: Negative

	E	D	R	M	P
Without Mitigation	Local	Short Term	Reversible with compensation	Medium	Probable
Score	2	2	3	3	3
With Mitigation	Local	Short Term	Reversible with compensation	Low	Probable
Score	1	2	3	2	3

Significance Calculation	Without Mitigation	With Mitigation

S=(E+D+R+M)*P	Moderate Negative Impact (30)	Low Negative Impact (24)
Was public comment received?	No.	
Has public comment been included in mitigation measures?	No.	

Mitigation measures reduce residual risk or enhance opportunities:

- 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 proponent should enter into an agreement with the local farmers within the WEF development whereby damages to farm property etc. during the construction phase will be compensated for. The agreement should be signed before the construction phase commences.
- 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.
- The proponent should establish a MC and CoC for workers (see above).
- 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 proponent should implement a Grievance Mechanism that provides local farmers with an effective and efficient mechanism to address issues related to report issues related to damage to farm infrastructure, stock theft and poaching etc.
- 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 in 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 CoC. 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.

Residual impact	No, provided losses are compensated for.

Impact Phase: Construction Phase

Nature of the impact: Increased risk of grass fires

Description of Impact:

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. The potential risk of grass fires will be higher during the dry, windy winter months from May to October. The impacts will be largely local and can be effectively mitigated.

Impact Status: Negative

	E	D	R	M	P
Without Mitigation	Local	Short Term	Reversible with compensation	Medium	Probable
Score	2	2	3	3	3

With Mitigation	Local	Short Term	Reversible with compensation	Low	Low Probability
Score	1	2	3	2	2

Significance Calculation	**Without Mitigation**	**With Mitigation**
S=(E+D+R+M)*P	**Moderate Negative Impact (30)**	**Low Negative Impact (16)**
Was public comment received?	No.	
Has public comment been included in mitigation measures?	No.	

Mitigation measures reduce residual risk or enhance opportunities:

- 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 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.
- 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 should ensure that construction related activities that pose a potential fire risk, such as welding, are properly 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.
- A fire management plan in compliance with Veld Fire Management Act should be compiled by the main contractor prior to the commencement of construction.
- Contractor should provide adequate fire-fighting equipment on-site, including a fire fighting vehicle.
- Contractor should 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 onsite, an investigation in terms of the Veld Fire Management Act must be undertaken by an independent veld fire inspector to identify the source of the fire, if the results of the investigation indicate the fire was caused by construction workers or construction related 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.

Residual impact	No, provided losses are compensated for.

Impact Phase: Construction Phase

Nature of the impact: Nuisance impacts

Description of Impact:

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 to local roads. The impacts will be largely local and can be effectively mitigated.

Impact Status: Negative

	E	**D**	**R**	**M**	**P**
Without Mitigation	Local	Short Term	Reversible	Low	Probable
Score	2	2	1	2	3

With Mitigation	Local	Short Term	Reversible	Low	Low Probability
Score	1	2	1	2	2

Significance Calculation	**Without Mitigation**	**With Mitigation**
S=(E+D+R+M)*P	**Low Negative Impact (21)**	**Low Negative Impact (12)**
Was public comment received?	No.	
Has public comment been included in mitigation measures?	No.	

Mitigation measures reduce residual risk or enhance opportunities:

- 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.
- Timing of construction activities should be planned to avoid / minimise impact on key farming activities, including planting and harvesting operations.
- The proponent should establish a MC to monitor the construction phase and the implementation of the recommended mitigation measures. The MC should be established before the construction phase commences, and should include key stakeholders, including representatives from local farmers and the contractor(s). The MF should also address issues associated with damage to roads and other construction related impacts.
- Ongoing communication with landowners and road users during construction period. This should be outlined in the SEP.
- The proponent should implement 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.
- Implementation of a road maintenance programme throughout the construction phase to ensure that the affected roads maintained in a good condition and repaired once the construction phase is completed.
- Repair of all affected road portions at the end of construction period where required.
- Dust suppression measures must be implemented on un-surfaced roads, such as wetting on a regular basis and ensuring that vehicles used to transport building materials are fitted with tarpaulins or covers.
- All vehicles must be roadworthy, and drivers must be qualified and made aware of the potential road safety issues and need for strict speed limits.

Residual impact	If damage to local roads is not repaired then this will affect the other road users and result in higher maintenance costs. The costs will be borne by road users who were no responsible for the damage.

Impact Phase: Construction Phase

Nature of the impact: Loss of farmland

Description of Impact:

The activities associated with the construction phase and establishment of the proposed project and associated infrastructure will result in the disturbance and loss of land available for grazing. The impact on farmland associated with the construction phase can be mitigated by locating laydown areas in already disturbed areas, minimising the footprint of the construction related activities and ensuring that disturbed areas are fully rehabilitated on completion of the construction phase. In addition, the landowner will be compensated for the loss of land.

Impact Status: Negative

	E	D	R	M	P

Without Mitigation	Local	Short Term	Reversible with compensation and rehabilitation	Medium	Highly Probable
Score	2	2	3	3	3
With Mitigation	Local	Short Term	Reversible with compensation and rehabilitation	Low	Probable
Score	1	2	3	2	2

Significance Calculation	**Without Mitigation**	**With Mitigation**
S=(E+D+R+M)*P	**Moderate Negative Impact (40)**	**Low Negative Impact (12)**
Was public comment received?	No.	
Has public comment been included in mitigation measures?	No.	

Mitigation measures reduce residual risk or enhance opportunities:

- The proponent should investigate the alternative internal access road identified by the owner of Rietfontein 572/11
- The loss of high-quality agricultural land should be avoided and or minimised by careful planning of the final layout of the proposed WEF facilities. The recommendations of the agricultural / soil assessment should be implemented.
- Affected landowners should be consulted about the timing of construction related activities in advance.
- The footprint associated with the construction related activities (access roads, construction platforms, workshop etc.) should be minimised.
- An Environmental Control Officer (ECO) should be appointed to monitor the establishment phase of the construction phase.
- All areas disturbed by construction related activities, such as access roads on the site, construction platforms, workshop area etc., should be rehabilitated at the end of the construction phase.
- The implementation of a rehabilitation programme should be included in the terms of reference for the contractor/s appointed. The specifications for the rehabilitation programme should be drawn up by the Environmental Consultants appointed to manage the EIA.
- The implementation of the Rehabilitation Programme should be monitored by the ECO.

Residual impact	If damage to and or loss of productive land is not avoided and or minimised can impact on viability of farming operations and livelihoods.

11.12.2 Operation Phase

The following key social issues are of relevance to the operational phase:

Potential positive impacts

- Generate renewable energy to produce green hydrogen and ammonia.
- Creation of employment opportunities.
- Benefits associated with establishment of community trust.
- Benefits for local landowners.

Potential negative impacts

- Visual impacts and associated impacts on sense of place.
- Potential impact on property values.

- Potential impact on tourism.

Impact Phase: Operation Phase					
Nature of the impact: Development of infrastructure to improve energy security and support renewable sector					
Description of Impact: The primary goal of the proposed project is to improve energy security in South Africa by generating additional energy. The proposed WEF 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.					
Impact Status: Positive with mitigation					
	E	**D**	**R**	**M**	**P**
Without Mitigation	Local, Regional and National	Long Term	n/a	High	Highly probable
Score	4	4	0	4	4
With Mitigation / Enhancement	Local, Regional and National	Long Term	n/a	High	Definite
Score	4	4	0	4	5
Significance Calculation	**Without Mitigation**		**With Mitigation / Enhancement**		
S=(E+D+R+M)*P	**Moderate Negative Impact (48)**		**High Positive Impact (60)**		
Was public comment received?	No.				
Has public comment been included in mitigation measures?	No.				
Mitigation measures reduce residual risk or enhance opportunities: • 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.					
Residual impact	Overall reduction in CO_2 emission, reduction in water consumption for energy generation, contribution to the development of the renewable energy sector in South Africa and benefit for economic development and investment.				

Impact Phase: Operation Phase
Nature of the impact: Creation of employment opportunities
Description of Impact: The proposed development will create in the region of 50-60 full time employment opportunities during the operational phase, of which 70% will be unskilled, 25% semi-skilled 25%, and 5% skilled 5%. Based on similar projects the annual operating budget will be in the region of R 8 million (2023 Rand values), including wages.
Impact Status: Positive

	E	D	R	M	P
Without Mitigation	Local and Regional	Long Term	n/a	Low	Low Probability
Score	1	4	0	2	2
With Mitigation / Enhancement	Local and Regional	Long Term	n/a	Medium	Highly probable
Score	2	4	0	3	4

Significance Calculation	**Without Mitigation**	**With Mitigation / Enhancement**
S=(E+D+R+M)*P	**Low Positive Impact (14)**	**Moderate Positive Impact (36)**
Was public comment received?	No.	
Has public comment been included in mitigation measures?	No.	

Mitigation measures reduce residual risk or enhance opportunities:

Employment

- 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 operation phase commences the proponent should meet with representatives from the Local Municipality 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 operation 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 operation phase of the project.
- Where feasible, training and skills development programmes for locals should be initiated prior to the initiation of the operation phase.
- The recruitment selection process should seek to promote gender equality and the employment of women wherever possible.

Business

- The proponent should investigate providing training and skills development to enable locally based service providers to provide the required services for the operational phase.
- The proponent should liaise with the Local Municipality 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 service providers. These companies should be notified of the tender process and invited to bid for project-related work.
- 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 operation phase.

Residual impact	Creation of permanent employment and skills and development opportunities for members from the local community and creation of additional business and economic opportunities in the area.

Impact Phase: Operation Phase
Nature of the impact: Local economic development initiatives
Description of Impact:

An important focus of the REIPPPP is to ensure that the build programme secures sustainable value for the country and enables local communities to benefit directly from the investments attracted into the area. In this regard IPPs are required to contribute a percentage of projected revenues accrued over the 20-year project operational life toward Socio-economic Development (SED) initiatives. These contributions are linked to Community Trusts and accrue over the 20-year project operation life and are used to invest in housing and infrastructure as well as healthcare, education, and skills development.

Community Trusts provide an opportunity to generate a steady revenue stream that is guaranteed for a 20-year period. This revenue can be used to fund development initiatives in the area and support the local community. The long-term duration of the revenue stream also allows local municipalities and communities to undertake long term planning for the area. The revenue from the proposed WEF can be used to support a number of social and economic initiatives in the area, including:

- Creation of jobs.
- Education.
- Support for and provision of basic services.
- School feeding schemes.
- Training and skills development.
- Support for SMME's.

The minimum compliance threshold for SED contributions is 1% of the revenue with 1.5% the targeted level over the 20-year project operational life. For the current portfolio of projects, the average commitment level is 2%, which is 101% higher than the minimum threshold level. To date (across BW1-4) a total contribution of R22.8 billion has been committed to SED initiatives. Assuming an even, annual revenue spread, the average contribution per year would be R1.1 billion. Of the total commitment, R18.5 billion is specifically allocated for local communities where the IPPs operate. With every new IPP on the grid, revenues and the respective SED contributions will increase.

As a percentage of revenue, SED obligations become effective only when operations commence, and revenue is generated. Of the 91 IPPs that have reached financial close (BW1–BW41), 85 are operational. The SED contributions associated with these 85 projects has amounted to R 1.8 billion to date.

In terms of ED and SED spend, education, social welfare, and health care initiatives have a SED focus. SED spend on education has been almost double the expenditure on enterprise development. In this regard IPPs have supported 1 388 education institutions with a total of R437 million in contributions, from 2015 to the end of June 2021. A total of 1 276 bursaries, amounting to R210.8 million, have been awarded by 67 IPPs from 2015 until the end of June 2021. The largest portion of the bursaries were awarded to African and Coloured students (97.4%), with women and girls receiving 56.3% of total bursaries. The Northern Cape province benefitted most from the bursaries awarded, with 57.2%, followed by the Eastern Cape (20.2%) and Western Cape (14.1%). Enterprise development and social welfare are the focus areas that have received the second highest share of the contributions to date.

The Green Jobs study (2011) found that the case for renewable energy is enhanced by the positive effect on rural or regional development. Renewable energy facilities located in rural areas create an opportunity to benefit the local and regional economy through the creation of jobs and tax revenues.

Impact Status: Positive

	E	D	R	M	P
Without Mitigation	Local and Regional	Long Term	n/a	Medium	High probability
Score	2	4	0	3	4
With Mitigation / Enhancement	Local and Regional	Long Term	n/a	High	Definite
Score	3	4	0	4	5

Significance Calculation	**Without Mitigation**	**With Mitigation / Enhancement**
S=(E+D+R+M)*P	**Moderate Positive Impact (36)**	**Moderate Positive Impact (55)**
Was public comment received?	No.	

Has public comment been included in mitigation measures?	No.

Mitigation measures reduce residual risk or enhance opportunities:

- The ULM should liaise should liaise with the proponents of other renewable energy projects in the area to investigate economic development opportunities for the local community.
- 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 funds generated for the local economic development.

Residual impact	Promotion of social and economic development and improvement in the overall well-being of the community.

Impact Phase: Operation Phase

Nature of the impact: Generate income for affected landowner

Description of Impact:

The proponent will enter into rental agreements with the affected landowners for the use of the land for the establishment of the proposed WEF. In terms of the rental agreement the affected landowner will be paid an annual amount dependent upon the area affected. The additional income will reduce the risk to his livelihoods posed by droughts and fluctuating market prices for farm outputs and farming inputs, such as fuel, feed etc. The additional income represents a significant benefit for the affected landowner.

Impact Status: Positive

	E	D	R	M	P
Without Mitigation	Local and Regional	Long Term	n/a	Low	Probability
Score	1	4	0	2	3
With Mitigation / Enhancement	Local and Regional	Long Term	n/a	Medium	Definite
Score	2	4	0	3	5

Significance Calculation	**Without Mitigation**	**With Mitigation / Enhancement**
S=(E+D+R+M)*P	**Low Positive Impact (21)**	**Moderate Positive Impact (45)**

Was public comment received?	No.
Has public comment been included in mitigation measures?	No.

Mitigation measures reduce residual risk or enhance opportunities:

- Implement agreements with affected landowners.
- The loss of high-quality agricultural land should be avoided and or minimised by careful planning in the final layout of the proposed WEF facilities. The recommendations of the agricultural / soil assessment should be implemented.

Residual impact	Support for local agricultural sector and farming.

Impact Phase: Operation Phase

Nature of the impact: Visual impact and impact on sense of place

Description of Impact:

The proposed WEF has the potential to impact on the areas existing rural sense of place. The findings of the Visual Impact Assessment (VIA) (Lawson and Oberholzer, February 2023) indicate that the significance of the potential visual intrusion of tall wind turbines on the rural landscape, scenic resources, and sensitive receptors, and change in the areas character and sense of place would be high negative. Effective mitigation is not possible. The visual effect of substation and BESS on the rural landscape was rated as Moderate Negative. The visual impact significance for navigation lights at night was rated as medium, with some potential for mitigation depending on the technology used, specifically the use of radar activated civil aviation lighting.

In conclusion the VIA notes that "it is the opinion of the Visual Specialists that while the proposed WEF could generally have a 'high' visual impact significance, the current layout has largely avoided the scenic resources and sensitive visual receptors of the area. Provided the recommended mitigation measures are implemented, the project would not present a potential fatal flaw in visual terms and could be authorised from a visual perspective. Based on the findings of the SIA none of the affected landowners raised concerns about the potential impact on the areas sense of place. In this regard the perception of what constitutes a visual impact is subjective and varies from person to person.

Impact Status: Negative

	E	D	R	M	P
Without Mitigation	Regional	Long Term	Reversible with rehabilitation	Medium	Highly Probable
Score	2	4	3	3	4
With Mitigation	Regional	Long Term	Reversible with rehabilitation	Medium	Highly Probable
Score	1	4	3	3	4

Significance Calculation	**Without Mitigation**	**With Mitigation**
S=(E+D+R+M)*P	**Moderate Negative Impact (48)**	**Moderate Negative Impact (48)**
Was public comment received?	No.	
Has public comment been included in mitigation measures?	No.	

Mitigation measures reduce residual risk or enhance opportunities:

- The recommendations contained in the VIA should also be implemented.

Residual impact	Potential impact on current rural sense of place.

Impact Phase: Operation Phase

Nature of the impact: Potential impact on property values

Description of Impact:

The potential visual impacts associated with the proposed WEF have the potential to impact on property values. Based on the results of a literature review undertaken for wind farms the potential impact on property values in rural areas is likely to be limited. In this regard a study undertaken in Australia in 2016 (Urbis Pty Ltd) found that:

- Appropriately located wind farms within rural areas, removed from higher density residential areas, are unlikely to have a measurable negative impact on surrounding land values.

- There is limited available sales data to make a conclusive finding relating to value impacts on residential or lifestyle properties located close to wind farm turbines, noting that wind farms in NSW have been constructed in predominantly rural areas.

Based on the findings of the literature review the impact of the proposed WEF on property values is therefore likely to be low. This was confirmed by the findings of the SIA. None of the affected or surrounding landowners raised any concerns about potential impact on property values. There also no known eco-tourism or commercial hunting operations located in the vicinity of the WEF whose operations would be affected by the potential visual impact on the areas sense of place.

Impact Status: Negative

	E	D	R	M	P
Without Mitigation	Local	Long Term	n/a	Low	Low Probability
Score	2	4	0	2	2
With Mitigation	Local	Long Term	n/a	Low	Low Probability
Score	1	4	0	2	2

Significance Calculation	**Without Mitigation**	**With Mitigation**
S=(E+D+R+M)*P	**Low Negative Impact (16)**	**Low Negative Impact (14)**
Was public comment received?	No.	
Has public comment been included in mitigation measures?	No.	

Mitigation measures reduce residual risk or enhance opportunities:

- The recommendations contained in the VIA should also be implemented.

Residual impact	Potential impact on current rural sense of place and property values.

Impact Phase: Operation Phase

Nature of the impact: Potential impact on tourism

Description of Impact:

Impact on tourism facilities and tourism in the area. Based on the findings of the literature review there is limited evidence to suggest that the proposed WEF would impact on the tourism in the ULM and or PKSDM.

At a local site level there no eco-tourism or commercial operations located in the vicinity of the WEF whose operations would be affected by the potential visual impact on the areas sense of place. As indicated above, none of the affected or surrounding landowners raised concerns about the potential impact on the areas sense of place. The impact at a local level will also be low.

Impact Status: Negative

	E	D	R	M	P
Without Mitigation	Local	Long Term	n/a	Very Low	Low Probability
Score	2	4	0	1	2
With Mitigation	Local	Long Term	n/a	Very Low	Low Probability
Score	1	4	0	1	2

Significance Calculation	**Without Mitigation**	**With Mitigation**

S=(E+D+R+M)*P	Low Negative Impact (14)	Low Negative Impact (14)
Was public comment received?	No.	
Has public comment been included in mitigation measures?	No.	
Mitigation measures reduce residual risk or enhance opportunities: • The recommendations contained in the VIA should also be implemented.		
Residual impact	Potential impact on current rural sense of place and future tourism opportunities in the area.	

11.12.3 Decommissioning Phase

Impact Phase: Decommissioning Phase					
Nature of the impact: Loss of jobs and associated income					
Description of Impact: Typically, the major social impacts associated with the decommissioning phase are linked to the loss of jobs and associated income. This has implications for the households who are directly affected, the communities within which they live, and the relevant local authorities. However, in the case of the proposed facility the decommissioning phase is likely to involve the disassembly and replacement of the existing components with more modern technology. This is likely to take place in the 20 - 25 years post commissioning. The decommissioning phase is therefore likely to create additional, construction type jobs, as opposed to the jobs losses typically associated with decommissioning. Given the relatively small number of people employed during the operational phase (~ 40 - 50), the social impacts at a community level associated with decommissioning will be limited. In addition, potential impacts associated with the decommissioning phase can be effectively managed with the implementation of a retrenchment and downscaling programme. With mitigation, the impacts are assessed to be Low (negative). Decommissioning will also create temporary employment opportunities, which would represent a positive temporary impact. The significance would be Low with enhancement due to limited opportunities and short duration.					
Impact Status: Negative					
	E	**D**	**R**	**M**	**P**
Without Mitigation	Local	Short Term	Recoverable	Medium	Probable
Score	1	2	3	3	3
With Mitigation	Local	Short Term	Recoverable	Low	Probable
Score	1	2	3	2	3
Significance Calculation	**Without Mitigation**			**With Mitigation**	
S=(E+D+R+M)*P	**Low Negative Impact (27)**			**Moderate Negative Impact (24)**	
Was public comment received?	No.				
Has public comment been included in mitigation measures?	No.				
Mitigation measures reduce residual risk or enhance opportunities: • 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.					

Residual impact	Loss of income and employment.

11.13 Traffic and Transportation

There will be a notable increase in traffic volumes on the public road network within the study area, during the construction phase of the proposed development and less conspicuous traffic volumes during the operational phase. The specialist also assessed the cumulative impact of the additional traffic on the road network within the study area and found that the level of service on these roads is still acceptable.

The increase in traffic volumes on the roads will lead to significant wear and tear, especially during the construction phase of the proposed development, but will not have an undue detrimental impact on the structural integrity of the roads within the study area. Due to budgetary constraints within various spheres of government, only minor maintenance is undertaken on the road network. To this end, it is strongly suggested that the developer contributes towards the ongoing maintenance of the road network associated with the various phases of the proposed development.

There are no serious concerns regarding the public road network accessing the proposed development. All access points onto the proposed development shall be design in accordance with standard geometric requirements and are to be finalised in the design phase of the project.

The traffic delivering material and equipment, including abnormal loads, to the proposed development shall be via Victoria West.

It should be noted that it is not possible to determine the expected traffic volumes generated during the decommissioning phase. It can be assumed that these volumes will be lower than during the construction phase as much of the infrastructure (e.g., roads, platforms, etc.) will be retained by the landowners. As part of the decommissioning process, a separate traffic impact assessment should be undertaken since many of the characteristics related to the traffic impact assessment, i.e., access routes, road geometry, traffic volumes, etc., would have changed over the operational life of the development.

11.13.1 Construction Phase

The following safety and road network integrity impacts have been assessed for the peak construction phase of the development:

- Increased road incidents.
- Road degradation.
- Dust.
- Intersection Safety.

Impact Phase: Construction Phase					
Nature of the impact: Increased road incidents					
Description of Impact: The increased traffic volumes on the public roads will increase the potential of incidents on the road network within the study area.					
Impact Status: Negative					
	E	**D**	**R**	**M**	**P**
Without Mitigation	Regional	Short Term	Irreversible	High	Highly probable
Score	3	2	5	4	4

With Mitigation	Regional	Short Term	Irreversible	High	Probable
Score	3	2	5	4	3
Significance Calculation	**Without Mitigation**		**With Mitigation**		
S=(E+D+R+M)*P	**Moderate Negative Impact (56)**		**Moderate Negative Impact (42)**		
Was public comment received?	No.				
Has public comment been included in mitigation measures?	No.				

Mitigation measures reduce residual risk or enhance opportunities:

- Post relevant road signage along affected routes.
- Create local WhatsApp Group, notifying other road users of expected deliveries and associated routes.
- Transport Management Plan (TMP) is to be compiled once the contractor has been appointed and all the relevant details of the construction process are known. The TMP needs to address, inter alia:
  - clearly defined route/s to the site for specific vehicles needed to transport equipment and materials; and
  - scheduled deliveries to avoid local congestion.
- Ensure all vehicles are roadworthy, visible, adequately marked, and operated by an appropriately licenced operator.

Residual impact	Fatality is irreversible.

Impact Phase: Construction Phase

Nature of the impact: Road degradation

Description of Impact:

The increased traffic volumes on public roads will increase the potential for localised road network degradation within the study area.

Impact Status: Negative

	E	D	R	M	P
Without Mitigation	Regional	Short Term	Recoverable	Moderate	Highly probable
Score	3	2	3	3	4
With Mitigation	Regional	Short Term	Recoverable	Moderate	Probable
Score	3	2	3	3	3
Significance Calculation	**Without Mitigation**		**With Mitigation**		
S=(E+D+R+M)*P	**Moderate Negative Impact (44)**		**Moderate Negative Impact (33)**		
Was public comment received?	No.				
Has public comment been included in mitigation measures?	No.				

Mitigation measures reduce residual risk or enhance opportunities:

• Create a local WhatsApp Group for the local community and post notices of road conditions and proposed alternatives. Project Developer to contribute to the maintenance of the public roads in the area during the construction phase of the development/s. • A photographic record of the road condition should be maintained throughout the various phases of the development/s. This provides an objective assessment and mitigates any subjective views from road users. • Upgrade unpaved roads to a suitable condition for proposed construction vehicles. • Ensure that the roads are left in the same or better condition, post-construction.	
Residual impact	The condition of the roads are to be left in the same or better condition, post-construction.

Impact Phase: Construction Phase					
Nature of the impact: Dust					
Description of Impact: The increased traffic volumes on unpaved public roads will generate more dust. The higher the speed and the larger the vehicle, the more dust is likely to be generated. This dust hinders the drivers wishing to over-take without a clear view of over-taking, resulting in drivers taking unnecessary chances, which could result in unfavourable consequences.					
Impact Status: Negative					
	E	**D**	**R**	**M**	**P**
Without Mitigation	Regional	Short Term	Reversible	Moderate	Highly probable
Score	3	2	1	3	4
With Mitigation	Regional	Short Term	Reversible	Moderate	Probable
Score	3	2	1	1	3
Significance Calculation	**Without Mitigation**		**With Mitigation**		
S=(E+D+R+M)*P	**Moderate Negative Impact (36)**		**Low Negative Impact (27)**		
Was public comment received?	No.				
Has public comment been included in mitigation measures?	No.				
Mitigation measures reduce residual risk or enhance opportunities: • Create a local WhatsApp Group for the local community and post notices of road conditions and Reduce travel speed for construction vehicles on the gravel road to reduce dust • Dust suppression of the roads in the immediate vicinity of the site where feasible • Regular preventative maintenance of roads within the immediate vicinity of the site should be conducted over weekends to minimise the impact on the average construction period.					
Residual impact	None.				

Impact Phase: Construction Phase
Nature of the impact: Intersection safety
Description of Impact: The increased traffic volumes at intersections will increase the potential risk of accidents at the intersections, resulting in serious injuries or even fatalities, especially at the intersection on the main roads, when slow moving vehicles from the site need to cross over fast travelling oncoming traffic.

Impact Status: Negative					
	E	**D**	**R**	**M**	**P**
Without Mitigation	Regional	Short Term	Irreversible	High	Highly probable
Score	3	2	5	4	4
With Mitigation	Regional	Short Term	Irreversible	High	Probable
Score	3	2	5	4	3
Significance Calculation	**Without Mitigation**		**With Mitigation**		
S=(E+D+R+M)*P	**Moderate Negative Impact (56)**		**Moderate Negative Impact (42)**		
Was public comment received?	No.				
Has public comment been included in mitigation measures?	No.				
Mitigation measures reduce residual risk or enhance opportunities: • Compile a TMP. • Reduce speed at intersections and use appropriate traffic warning signs. • Identify alternative routes where possible. • Request the assistance of local law enforcement. • Ensure that all construction vehicles are roadworthy, visible, adequately marked, and operated by an appropriately licenced operator. • Provide drivers with advanced driver training.					
Residual impact	Fatality is irreversible.				

11.13.2 Operation Phase

During the operational phase of the development, the traffic volumes are considerably less than during the construction phase of the proposed development. Thus, all impacts associated with increased traffic volumes have been omitted.

The only impact deemed essential is Intersection Safety.

Impact Phase: Operation Phase					
Nature of the impact: Increased Road Incidents					
Description of Impact: The increased traffic volumes at intersections will increase the potential risk of accidents at the intersections, resulting in serious injuries or even fatalities, especially at the intersection on the main roads, when slow moving vehicles from the site need to cross over fast travelling oncoming traffic.					
Impact Status: Negative					
	E	**D**	**R**	**M**	**P**
Without Mitigation	Regional	Short Term	Irreversible	Very low	Probable
Score	3	2	5	1	3
With Mitigation	Regional	Short Term	Irreversible	Very low	Probable
Score	3	2	5	1	3
Significance Calculation	**Without Mitigation**		**With Mitigation**		

S=(E+D+R+M)*P	Moderate Negative Impact (33)	Moderate Negative Impact (33)
Was public comment received?	No.	
Has public comment been included in mitigation measures?	No.	
Mitigation measures reduce residual risk or enhance opportunities: • Compile a TMP. • Reduce speed at intersections and use appropriate traffic warning signs. • Identify alternative routes where possible. • Request the assistance of local law enforcement. • Ensure that all construction vehicles are roadworthy, visible, adequately marked, and operated by an appropriately licenced operator. • Provide drivers with advanced driver training.		
Residual impact	Fatality is irreversible.	

11.13.3 Decommissioning Phase

It is recommended that as part of the decommissioning process, a separate traffic impact assessment be undertaken. Many of the characteristics related to the traffic impact assessment, i.e., access routes, road geometry, traffic volumes, etc., would have changed over the operational life of the development. The impact assessment for the decommissioning phase has not been provided at this stage and should be undertaken before decommissioning activities commences.

12 CUMULATIVE IMPACTS

The cumulative impact assessment considers the combined impact of the remaining and other renewable projects within a 35 km radius, that are also in the development phase and the associated grid lines on the aquatic resources. The combination of the Loxton WEFs 1, 2 and 3, as well as other similar renewable energy projects, either existing or proposed, was considered to assess cumulative visual impacts within a 35 km radius of the proposed project. There are 12 wind energy applications in the broader area to the south of the Loxton project. Not all of these are within 35 km, but were considered as they are part of the same landscape. The proposed Hoogland North WEF, and Nuweveld WEF by Redcap fall within this radius, however, only parts of the Hoogland North WEF would potentially be seen in combination with the Loxton 1 WEF. Other developments are outside of the 35 km radii, however were still considered during the assessment, namely:

- Hoogeland North WEF 1
- Hoogeland North WEF 2
- Hoogeland South WEF 3
- Hoogeland South WEF 4
- Nuweveld North WEF
- Nuweveld East WEF
- Nuweveld West WEF
- Taaibos North WEF
- Taaibos South WEF
- Soutrivier North WEF
- Soutrivier Central WEF
- Soutrivier South WEF

12.1 Soil, Land Use and Agriculture Potential

The cumulative impact assessment considered all renewable energy projects within a 30 km radius. In quantifying the cumulative impact, the area of land taken out of agricultural use as a result of all the projects, namely Loxton WEF 1 - 3 (total generation capacity of 720 MW), will amount to a total of approximately 216 hectares. This is calculated using the industry standards of 2.5 and 0.3 hectares per megawatt for solar and wind energy generation respectively, as per the DFFE Phase 1 Wind and Solar Strategic Environmental Assessment (SEA) (2015). As a proportion of the total area within a 30 km radius (approximately 282,700 ha), this amounts to only 0.08% of the surface area. This is well within an acceptable limit in terms of loss of low potential agricultural land which is only suitable for grazing, and of which there is no scarcity in the country.

All of the projects contributing to cumulative impact for this assessment have the same agricultural impacts in an almost identical agricultural environment, and therefore the same mitigation measures apply to all. Due to all of the considerations discussed above, the cumulative impact of loss of future agricultural production potential is assessed as low as it will not have an unacceptable negative impact on the agricultural production capability of the area.

12.2 Freshwater and Wetlands

The rating below is based on the premise that important or sensitive features will be avoided by the various projects, while the mitigations proposed will ensure that the form and or function of downstream areas remain intact.

Impact Phase: Cumulative impacts on the aquatic resources of the area							
Nature of the impact: Cumulative impacts on the aquatic resources of the area							
Impact Status: Negative							
	E	**P**	**R**	**I**	**D**	**C**	**M**
Without Mitigation	Local	Probable	Irreversible	No Loss	Long Term	Low	Medium
Score	2	3	4	1	3	2	2
With Mitigation	Site	Possible	Partly reversible	No Loss	Short Term	Negligible	Low
Score	1	2	3	1	1	1	1
Significance Calculation	**Without Mitigation**		**With Mitigation**				
S=(E+P+R+I+D+C)*M	**Moderate Negative Impact (30)**		**Low Negative Impact (9)**				
Was public comment received?	No.						
Has public comment been included in mitigation measures?	No.						
Mitigation measures to enhance opportunities: • The project should share roads and infrastructure where possible to reduce the overall footprint and reduce stormwater and erosion and sedimentation related impacts • The projects should collaborate with provincial roads authority to upgrade the main access routes and improve the crossings and stormwater controls.							
Residual impact	Low						

12.3 Terrestrial Biodiversity

In terms of cumulative impacts in and around the site, there are no existing developments within 30 km of the site. The proposed / planned facilities within 30 km of the site are the proposed Loxton WEF 2 and Loxton WEF 3 projects adjacent to the site with an estimated direct footprint of 130 ha. Other proposed sites include the Hoogland WEF 1 and Hoogland WEF 2 projects with an estimated combined footprint of approximately 200 ha. The Loxton WEF cluster development will create a node of wind energy development north of Loxton. The cumulative impacts, when considered at a broader scale are still relatively low within the greater Loxton area and especially north of the R63.

In terms of specific cumulative impacts, impacts on the Riverine Rabbit and Karoo Dwarf Tortoise would be a potential concern. However, the habitats associated with these two species have been mapped at a fine scale and included into the no-go layer for the development, with the result that direct habitat loss for these two species as a result of the Loxton WEF 3 would be low. As the broader area is still largely intact, and most direct impacts are associated with the relatively short, transient, construction phase, cumulative impacts associated with the current project are considered low and acceptable. There do not appear to be any ecological processes or corridors that would be specifically disrupted by the Loxton WEF 3. In addition, should all the planned projects in the area be built, the overall extent of habitat loss would not be significant relative to the overall extent of the affected vegetation types. As such, the contribution of the Loxton WEF 3 to habitat loss would not change the overall threat status of any vegetation types or special habitats and the overall level of cumulative impact in the area is considered acceptable.

Cumulative Impact: Cumulative impacts on broad-scale ecological processes					
Description of Impact: Impacts on broad-scale ecological processes such as connectivity, dispersal and movement of fauna about the landscape.					
Impact Status: Negative					
	E	**D**	**R**	**M**	**P**
Without Enhancement	Local	Long Term	Recoverable	Moderate	Probable
Score	2	4	3	3	3
With Enhancement	Local	Long Term	Reversible	Low	Low Probability
Score	1	4	1	2	2
Significance Calculation	**Without Enhancement**		**With Enhancement**		
S=(E+D+R+M)*P	Moderate Negative Impact (36)		Low Negative Impact (24)		
Was public comment received?	No.				
Has public comment been included in mitigation measures?	No.				
Mitigation measures to reduce residual risk or enhance opportunities: • Locate temporary-use areas such as construction camps and lay-down areas in low sensitivity or previously disturbed areas. • Minimise the development footprint in areas mapped as high sensitivity (i.e. near watercourses and other ecologically significant features). • Clearly demarcate riparian areas near to the development footprint as No-Go areas with appropriate signage and barriers.					

• Appropriate design of roads and other infrastructure to minimise faunal impacts and allow fauna to pass over, through or underneath these features as appropriate. • The fencing around substations or other infrastructure should not have any electrified strands within 30cm of the ground as this may result in tortoises being electrocuted. Alternatively, guard wires or mesh can be placed outside of the fence to prevent tortoises from accessing the electrified fence. • Appropriate design of roads and other infrastructure to minimise faunal impacts and allow fauna to pass over, through or underneath these features as appropriate. • A log should be kept detailing and fauna-related incidences or mortalities that occur on site, including roadkill, electrocutions etc. These should be reviewed annually by the Environmental Officer and used to inform operational management • Erosion and alien vegetation management on site, with annual surveys and annual implementation of clearing and erosion remediation. • Establishment of the development-free corridor through the site in accordance with the recommendations of the offset needs analysis study.	
Residual impact	Despite mitigation, there are likely to be some residual cumulative impacts on broad-scale ecological processes, but these are likely to be low after mitigation.

12.4 Riverine Rabbit

In terms of the cumulative impacts on the Riverine Rabbit, there are numerous projects in the Loxton area which could potentially contribute to cumulative impact on this species. The current project is part of a cluster with the Loxton WEF 2 and Loxton WEF 3 located north of the surrent site. However, no Riverine Rabbits were recorded on either site, with the result that these two projects would not contribute significantly to habitat loss for the Riverine Rabbit. South of the site, the two Hoogland WEF projects both have confirmed Riverine Rabbit sightings within their project areas and would have a low post-mitigation impact on the Riverine Rabbit. The Nuweveld suite of three wind energy facilities is also located south of the site but on higher ground and no Riverine Rabbits were observed within this site and it is considered absent from the Nuweveld project area. The adjacent WKN projects are still in-process but also have confirmed Riverine Rabbit sightings with the result that these would contribute towards cumulative impacts. All of the above projects have however implemented significant avoidance of Riverine Rabbit habitat with the result that direct habitat loss associated with wind energy development in the area is likely to be minimal. However, there is still likely to be some impact as a result of roadkill, construction phase disturbance and in the longer-term turbine noise. The impacts of turbine noise on the Riverine Rabbit are not known and hence monitoring of such impacts is recommended.

Cumulative Impact: Cumulative impacts on the Riverine Rabbit.					
Description of Impact: Impacts on Riverine Rabbit as a result of decommissioning phase activities, including vehicle collisions and disturbance.					
Impact Status: Negative					
	E	**D**	**R**	**M**	**P**
Without Enhancement	Local	Long Term	Recoverable	Moderate	Probable
Score	2	4	3	3	3
With Enhancement	Local	Long Term	Reversible	Low	Probable
Score	2	4	1	2	3
Significance Calculation	**Without Enhancement**		**With Enhancement**		
S=(E+D+R+M)*P	Moderate Negative Impact (36)		Low Negative Impact (27)		

Was public comment received?	No
Has public comment been included in mitigation measures?	No Coments Received to Date
Mitigation measures to reduce residual risk or enhance opportunities: • Avoidance of areas of mapped optimal Riverine Rabbit during construction and maintenance activities. • Adherence to the speed limits of 40km/h for light vehicles and 30km/h for heavy vehicles when off of public roads. • Erosion and alien vegetation management on site, with annual surveys and annual implementation of clearing and erosion remediation.	
Residual impact	Despite mitigation, there are likely to be some residual cumulative impacts on the local population of Riverine Rabbits, through disturbance and roadkill.

12.5 Karoo Dwarf Tortoise

At a regional scale, several other WEF projects have been initiated within 100 km of Loxton WEF 3 site. These are Loxton WEF 1, Loxton WEF 2, Hoogland North WEF 1 (Redcap/Enel), Hoogland North WEF 2 (Redcap/Enel), Hoogland South WEF 3 (Redcap/Enel), Hoogland South WEF 4 (Redcap/Enel), Nuweveld North WEF (Redcap/Enel), Nuweveld East WEF (Redcap/Enel), Nuweveld West WEF (Redcap/Enel), Taaibos North (WKN), Taaibos South (WKN), Soutrivier North (WKN), Soutrivier Central (WKN) and Soutrivier South (WKN). To varying degrees, these WEF projects all fall within the general distribution of the Karoo Dwarf Tortoise. At a more local scale, some of these new WEF are situated within a 35 km radius of the Loxton WEF 3 site. These are clustered south and south-east of Loxton WEF 3.

Cumulative impacts tend to progressively weaken the overall ecological resilience / integrity of a natural system and should is assessed in addition to the site assessments. Compared to the impacts of agricultural activities in the area (especially cases of large-scale overgrazing) on Karoo Dwarf Tortoises, the various impacts that are specifically associated with WEF developments are substantially lower. The significance ratings of the various WEF impacts are all low (with mitigation), and it is likely that the cumulative impacts would also still be of low significance and would therefore not constitute a fatal flaw for the Loxton WEF 3 project.

Impact Phase: Cumulative Phase		
Nature of the impact: Cumulative impact during Construction Phase		
Description of Impact: Habitat loss and habitat degradation may impact the Karoo Dwarf Tortoise during construction phase activities in the following three ways: • Loss / degradation of rocky habitat, i.e., reduced shelter opportunities; • Loss / degradation of vegetation, i.e., reduced food sources; and • New roads and turbine platforms adding to the fragmentation of the landscape.		
Impact Status: Negative		
Significance Calculation	**Without Mitigation**	**With Mitigation**
S=(E+D+R+M)*P	Medium Negative Impact	Low Negative Impact
Was public comment received?	No.	

Has public comment been included in mitigation measures?	No.
Mitigation measures reduce residual risk or enhance opportunities: • None.	
Residual impact	Cumulative impacts of habitat loss and degradation on the Karoo Dwarf Tortoise are predicted to be low with mitigation because habitat loss in general would be low, and project roads have mostly avoided sensitive habitat. These scenarios also pertain to the other WEF projects in the general region

Impact Phase: Cumulative Phase		
Nature of the impact: Cumulative impact during all phases of the development		
Description of Impact: Karoo Dwarf Tortoises may inadvertently be killed during earthworks activities when clearing habitat for new roads, turbine platforms and other associated infrastructure. Additionally, tortoises may be killed on roads by construction / support vehicles during the construction phase, and by vehicular traffic on the new roads during the operation and decommissioning phases. These types of impact are also associated with other WEF projects in the general region and would therefore also be considered as cumulative impacts in this regard.		
Impact Status: Negative		
Significance Calculation	**Without Mitigation**	**With Mitigation**
S=(E+D+R+M)*P	Medium Negative Impact	Low Negative Impact
Was public comment received?	No.	
Has public comment been included in mitigation measures?	No.	
Mitigation measures reduce residual risk or enhance opportunities: • None.		
Residual impact	The development would contribute to cumulative impacts on the Karoo Dwarf Tortoise, but this would be transient and the overall long-term contribution to cumulative impacts on this species would be low.	

12.6 Plant

The Loxton WEF 3 will have a very low impact on plants of special conservation concern. The vegetation the site comprises of, namely the Eastern Upper Karoo and Upper Karoo Hardeveld, have been minimally impacted by renewable energy developments to date. As a result, the contribution of the Loxton WEF 3 towards cumulative impact on plant SCC and vegetation is considered acceptable.

12.7 Avifauna

The 12 wind energy applications in the broader area to the south of the Loxton project present similar risks to avifauna. The projects' combined could result in up to 508 wind turbines in addition to those planned at the Loxton Wind Farm Cluster (142 - Loxton WEF 1 up to 42 turbines, Loxton WEF 2 up to 62 turbines, Loxton WEF 3 up to 38 turbines). This could bring the total number of turbines in this area to 650.

The cumulative impacts of wind energy on avifauna in the Loxton area have been carefully assessed according to the guidance in the DEA (DEAT (2004) Cumulative Effects Assessment, Integrated Environmental Management, Information Series 7, Department of

Environmental Affairs and Tourism (DEAT), Pretoria); and the IFC guidelines (Good Practice Handbook - Cumulative Impact Assessment and Management: Guidance for the Private Sector in Emerging Markets".

Impact Phase: Cumulative Phase					
Nature of the impact: Cumulative impact on Avifauna					
Description of Impact: Habitat destruction during construction, and bird fatalities through collision with turbines during operation.					
Impact Status: Negative					
	E	**D**	**R**	**M**	**P**
Without Mitigation	National	Long term	Recoverable	High	Highly probable
Score	4	4	3	4	4
With Mitigation	Regional	Long term	Recoverable	Moderate	Probable
Score	3	4	3	3	3
Significance Calculation	**Without Enhancement**		**With Enhancement**		
S=(E+D+R+M)*P	High Negative Impact (60)		Moderate Negative Impact (39)		
Was public comment received?	No.				
Has public comment been included in mitigation measures?	No.				
Mitigation measures reduce residual risk or enhance opportunities: • The fatality impact can be mitigated at each wind farm. The habitat destruction impact cannot be enhanced, it is inevitable. Although the current farming land use on these properties appears not to impact on biodiversity, this is not always the case. Grazing regimes, veld management, pesticide use, problem animal control, fencing, water management and other practices all take their toll on biodiversity. There is an opportunity to enhance the natural habitat on projects through input into these management practices, perhaps through a biodiversity stewardship approach.					
Residual impact	The destruction of habitat is inevitable, and the significance remains at Moderate with mitigation				

12.8 Bats

Cumulative impacts are defined as the total impacts resulting from the successive, incremental, and / or combined effects of a project when added to other existing, planned and / or reasonably anticipated future projects, as well as background pressures (IFC 2013). The goal of this assessment is to evaluate the potential resulting impact to the vulnerability and / or risk to the sustainability of the bat species affected (IFC 2013).

Impact Phase: Cumulative Impacts					
Nature of the impact: Cumulative Impact					
Description of Impact: The total impacts resulting from the successive, incremental, and / or combined effects of the project when added to other existing, planned and/or reasonably anticipated future projects, as well as background pressures.					
Impact Status: Negative					
	E	**D**	**R**	**M**	**P**

Without Mitigation	National	Long Term	Recoverable	High	Highly Probable
Score	4	4	4	4	4
With Mitigation	Local	Long Term	Recoverable	Moderate	Probable
Score	2	4	3	3	3
Significance Calculation	**Without Mitigation**		**With Mitigation**		
S=(E+D+R+M)*P	**High Negative Impact (27)**		**Moderate Negative Impact (14)**		
Was public comment received?	No.				
Has public comment been included in mitigation measures?	No.				
Mitigation measures to reduce residual risk or enhance opportunities: The mitigation measures proposed (buffering key habitats used by bats, use of appropriate lighting technology, blade feathering, and using curtailment and/or acoustic deterrents) should be applied to all future projects so that there is a collective management responsibility (IFC 2013).					
Residual impact	Curtailment and deterrents can successfully reduce bat fatality (Arnett 2011, Arnett et al. 2016, Weaver et al. 2020), but not completely. Through the application of fatality thresholds across all projects in the cumulative impact area, residual impacts should be minimized.				

12.9 Noise

There is a very low risk of cumulative noises during the construction phase, because it is unlikely that construction activities will take place simultaneously at the different proposed Loxton WEFs.

There are no NSR located between the WTG of the Loxton WEF 3 and Taaibos North WEF, with NSR04 located between the WTG of the Loxton WEF 2 and Loxton WEF 3. The effect of noise from the Taaibos North WEF on NSR03 is insignificant. Noises from other WEFs within 35 km will have an insignificant influence on the noise levels at the NSR.

Impact Phase: Cumulative Phase					
Nature of the impact: Night-time activities					
Description of Impact: Numerous WTG from various WEFs operating simultaneously at night with increases in ambient sound levels due to air-borne noise from the WTG.					
Impact Status: Negative					
	E	**D**	**R**	**M**	**P**
Without Mitigation	Regional	Long-term	High	Low	Possible
Score	3	4		2	2
With Mitigation	Regional	Long-term	High	Low	Possible
Score	3	4		2	2
Significance Calculation	**Without Mitigation**		**With Mitigation**		
S=(E+D+R+M)*P	**Low Negative Impact (9)**		**Low Negative Impact (9)**		
Was public comment received?	No.				

Has public comment been included in mitigation measures?	No.
Mitigation measures to enhance opportunities: The significance of the potential cumulative noise impact is low and additional mitigation is not required to reduce noise levels due to potential cumulative effects.	
Residual impact	None.

12.10 Heritage and Archaeology

In relation to an activity, cumulative impact means "the past, current and reasonably foreseeable future impact of an activity, considered together with the impact of activities associated with that activity, that in itself may not be significant, but may be significant when added to the existing and reasonably foreseeable impacts eventuating from similar or diverse activities" (NEMA EIA Reg GN R982 of 2014). The table below presents an 'average' cumulative impact on heritage resources from these and other potential activities in the area. The impacts relate largely to the landscape, since specific heritage sites are almost entirely avoided.

Impact Phase: Cumulative Impacts					
Nature of the impact: Impacts to all heritage resources					
Description of Impact: Impacts to archaeology, graves, buildings and the cultural landscape through destruction and/or visual intrusion.					
Impact Status: Negative					
	E	**D**	**R**	**M**	**P**
Without Enhancement	Regional	Long term	Recoverable	High	Definite
Score	3	4	3	4	5
With Enhancement	Regional	Long term	Recoverable	Low	Probable
Score	3	4	3	2	3
Significance Calculation	**Without Enhancement**		**With Enhancement**		
S=(E+D+R+M)*P	**High (70)**		**Moderate (36)**		
Can Impacts be Enhanced?	There are no positive impacts to enhance but negative impacts can be reduced through the application of the stipulated mitigation measures.				
Mitigation measures to enhance opportunities: • Apply all relevant mitigation measures as recommended for each project. Pre-construction surveys are an important component of this.					
Residual impact	It is never possible to locate every heritage resource and some impacts will always occur. Through pre-construction surveys, however, the significance of these impacts should be minimised. It is also not possible to hide most developments and visual impacts to the landscape will always occur.				

12.11 Palaeontology

Despite the substantial project footprints as well as the known occurrence of important vertebrate and other fossil sites elsewhere in the wider region between Loxton and Victoria West, the impact significance of the proposed renewable energy developments on local palaeontological heritage is anticipated to be low. This is based on the inferred Low Palaeo-sensitivity of the project area overall based on desktop and field-based data. These

impacts, including cumulative impacts considering other renewable energy projects in the broader region, are expected to fall within acceptable limits and therefore require no impact rating assessment.

12.12 Visual / Landscape

The proposed Hoogland North WEF, and Nuweveld WEF by Redcap fall within 35 radii of the site. Only parts of the Hoogland North WEF would potentially be seen in combination with the Loxton 3 WEF, although the nature of the topography would result in some visual screening of the various WEF turbines. The proposed WEF does form part of a suite of 3 WEF projects, namely the Loxton 1 and 2 WEFs. The potential for combined and sequential visibility does therefore exist.

The cumulative visual impact significance of the WEF, seen in combination with other renewable energy projects in the area has been rated as medium negative.

Impact Phase: Cumulative Impacts					
Nature of the impact: Combined visual effect of existing and proposed WEFs on scenic resources and sensitive receptors					
Description of Impact: To assess cumulative visual impacts within a 35 km radius of the proposed project.					
Impact Status: Negative					
	E	**D**	**R**	**M**	**P**
Without Mitigation	Regional	Long Term	Recoverable	Moderate	Highly probable
Score	3	4	3	3	4
With Mitigation	Regional	Long Term	Recoverable	Moderate	Highly probable
Score	3	4	3	3	4
Significance Calculation	**Without Mitigation**		**With Mitigation**		
S=(E+D+R+M)*P	**Moderate Negative Impact (52)**		**Moderate Negative Impact (52)**		
Was public comment received?	No.				
Has public comment been included in mitigation measures?	No.				
Mitigation measures to enhance opportunities: • None.					
Residual impact	Visual effect of existing and proposed WEFs on sense of place.				

12.13 Socio-Economic

Impact Phase: Cumulative Impacts
Nature of the impact: Sense of place and the landscape
Description of Impact:

The potential cumulative impacts on the areas sense of place will be largely linked to potential visual impacts. In this regard the Scottish Natural Heritage (2005) describes a range of potential cumulative landscape impacts associated with wind farms on landscapes. These issues are also likely to be relevant to solar facilities and associated infrastructure. The relevant issues identified by Scottish Natural Heritage study include:

- Combined visibility (whether two or more wind farms will be visible from one location).
- Sequential visibility (e.g. the effect of seeing two or more wind farms along a single journey, e.g. road or walking trail).
- The visual compatibility of different wind farms in the same vicinity.
- Perceived or actual change in land use across a character type or region.
- Loss of a characteristic element (e.g. viewing type or feature) across a character type caused by developments across that character type.

The guidelines also note that cumulative impacts need to be considered in relation to dynamic as well as static viewpoints. The experience of driving along a tourist road, for example, needs to be considered as a dynamic sequence of views and visual impacts, not just as the cumulative impact of several developments on one location. The viewer may only see one renewable energy facility and the associated infrastructure at a time, but if each successive stretch of the road is dominated by views of renewable energy facilities, then that can be argued to be a cumulative visual impact (National Wind Farm Development Guidelines, DRAFT - July 2010).

Impact Status: Negative

	E	D	R	M	P
Without Mitigation	Regional	Long Term	Reversible with rehabilitation	Moderate	Highly probable
Score	3	4	3	3	4
With Mitigation	Regional	Long Term	Reversible with rehabilitation	Moderate	Highly probable
Score	3	4	3	3	4

Significance Calculation	**Without Mitigation**	**With Mitigation**
S=(E+D+R+M)*P	**Moderate Negative Impact (52)**	**Moderate Negative Impact (52)**
Was public comment received?	No.	
Has public comment been included in mitigation measures?	No.	

Mitigation measures to enhance opportunities:

- The recommendations contained in the VIA should be implemented.

Residual impact	None.

Impact Phase: Cumulative Impacts

Nature of the impact: Local services and accommodation

Description of Impact:

The establishment of a number of REFs has the potential to place pressure on local services and accommodation, specifically during the construction phase. The objective will be to source as many low and semi-skilled workers for the construction phase from the IYM and EMM. This will reduce the pressure on local services and accommodation and the nearby towns of Loxton, Victoria West and Carnarvon. The cumulative impact during the construction phase will depend on the timing of the construction phase for the three WEF associated with the Loxton WEF cluster. If they are constructed simultaneously

this is likely to place pressure on accommodation and services in the nearby towns of Loxton, Victoria West and Carnarvon. However, if they are constructed sequentially this impact will be mitigated.

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 GML. These benefits will create opportunities for investment in the ULM, including the opportunity to up-grade and expand existing services and the construction of new houses. Socio-economic development (SED) contributions also represent an important focus of the REIPPPP and is aimed at ensuring that the build programme secures sustainable value for the country and enables local communities to benefit directly from the investments attracted into the area. These contributions extend over the 20-25 operational life of the WEF and provide revenue that can be used by the ULM to invest in up-grading local services where required.

In should also be noted that it is the function of national, provincial, and local government to address the needs created by development and provide the required services. The additional demand for services and accommodation created by the establishment of development renewable energy projects should therefore be addressed in the Integrated Development Planning process undertaken by the ULM.

Impact Status: Negative

	E	D	R	M	P
Without Mitigation	Local	Short Term	n/a	Low	Low probability
Score	2	2	0	2	2
With Mitigation	Local	Short Term	n/a	Medium	Low probability
Score	2	2	0	3	2

Significance Calculation	**Without Mitigation**	**With Mitigation**
S=(E+D+R+M)*P	**Low Negative Impact (12)**	**Low Negative Impact (18)**
Was public comment received?	No.	
Has public comment been included in mitigation measures?	No.	

Mitigation measures to enhance opportunities:

- The proponent should liaise with the ULM to address potential impacts on local services.

Residual impact	None.

Impact Phase: Cumulative Impacts

Nature of the impact: Local economy

Description of Impact:

In addition to the potential negative impacts, the establishment of renewable energy facilities and associated infrastructure, including the proposed WEF, will also create several socio-economic opportunities for the ULM. The positive cumulative opportunities include creation of employment, skills development and training opportunities, and downstream business opportunities.

The review of the REIPPPP (December 2021) indicates that to date (across BW1-4) a total contribution of R22.8 billion has been committed to SED initiatives. Assuming an even, annual revenue spread, the average contribution per year would be R1.1 billion. Of the total commitment, R18.5 billion is specifically allocated for local communities where the IPPs operate. With every new IPP on the grid, revenues and the respective SED contributions will increase.

The potential cumulative benefits for the local and regional economy are therefore associated with both the construction and operational phase of renewable energy projects and associated infrastructure and extend over a period of 20-25 years. However, steps must be taken to maximise employment

opportunities for members from the local communities in the area and support skills development and training programmes.					
Impact Status: Positive					
	E	**D**	**R**	**M**	**P**
Without Mitigation	Local and regional	Long Term	n/a	Low	Highly probable
Score	2	4	0	2	4
With Mitigation / Enhancement	Local and regional	Long Term	n/a	High	Definite
Score	3	4	0	4	5
Significance Calculation	**Without Mitigation**		**With Mitigation / Enhancement**		
S=(E+D+R+M)*P	**Low Positive Impact (12)**		**Low Positive Impact (18)**		
Was public comment received?	No.				
Has public comment been included in mitigation measures?	No.				
Mitigation measures to enhance opportunities: • The proponent should liaise with the ULM to identify potential opportunities for the local economy and businesses.					
Residual impact	None.				

12.14 Traffic and Transportation

During the peak construction phase, should all Loxton WEF (1 – 3) be developed at the same time, the following safety and road network integrity impacts have been considered for assessment:

- Cumulative Construction Phase: Increased Road Incidents
- Cumulative Construction Phase: Road Degradation
- Cumulative Construction Phase: Dust
- Cumulative Construction Phase: Intersection Safety
- Cumulative Operational Phase: Intersection Safety

Impact Phase: Cumulative Construction Phase					
Nature of the impact: Increased road incidents					
Description of Impact: The increased traffic volumes on the public roads will increase the potential of incidents on the road network within the study area.					
Impact Status: Negative					
	E	**D**	**R**	**M**	**P**
Without Mitigation	Regional	Short Term	Irreversible	High	Highly probable
Score	3	2	5	4	4
With Mitigation	Regional	Short Term	Irreversible	High	Probable
Score	3	2	5	4	3
Significance Calculation	**Without Mitigation**		**With Mitigation**		

S=(E+D+R+M)*P	Moderate Negative Impact (56)	Moderate Negative Impact (42)
Was public comment received?	No.	
Has public comment been included in mitigation measures?	No.	
Mitigation measures reduce residual risk or enhance opportunities: • Post relevant road signage along affected routes. • Create local WhatsApp Group, notifying other road users of expected deliveries and associated routes. • Transport Management Plan (TMP) is to be compiled once the contractor has been appointed and all the relevant details of the construction process are known. The TMP needs to address, inter alia: - clearly defined route/s to the site for specific vehicles needed to transport equipment and materials; and - scheduled deliveries to avoid local congestion. • Ensure all vehicles are roadworthy, visible, adequately marked, and operated by an appropriately licenced operator.		
Residual impact	Fatality is irreversible.	

Impact Phase: Cumulative Construction Phase					
Nature of the impact: Road degradation					
Description of Impact: The increased traffic volumes on public roads will increase the potential for localised road network degradation within the study area.					
Impact Status: Negative					
	E	**D**	**R**	**M**	**P**
Without Mitigation	Regional	Short Term	Recoverable	Moderate	Highly probable
Score	3	2	3	3	4
With Mitigation	Regional	Short Term	Recoverable	Moderate	Probable
Score	3	2	3	3	3

Significance Calculation	Without Mitigation	With Mitigation
S=(E+D+R+M)*P	Moderate Negative Impact (44)	Moderate Negative Impact (33)
Was public comment received?	No.	
Has public comment been included in mitigation measures?	No.	
Mitigation measures reduce residual risk or enhance opportunities: • Create a local WhatsApp Group for the local community and post notices of road conditions and proposed alternatives. Project Developer to contribute to the maintenance of the public roads in the area during the construction phase of the development/s. • A photographic record of the road condition should be maintained throughout the various phases of the development/s. This provides an objective assessment and mitigates any subjective views from road users. • Upgrade unpaved roads to a suitable condition for proposed construction vehicles.		

• Ensure that the roads are left in the same or better condition, post-construction.	
Residual impact	The condition of the roads are to be left in the same or better condition, post-construction.

Impact Phase: Cumulative Construction Phase					
Nature of the impact: Dust					
Description of Impact: The increased traffic volumes on unpaved public roads will generate more dust. The higher the speed and the larger the vehicle, the more dust is likely to be generated. This dust hinders the drivers wishing to over-take without a clear view of over-taking, resulting in drivers taking unnecessary chances, which could result in unfavourable consequences.					
Impact Status: Negative					
	E	**D**	**R**	**M**	**P**
Without Mitigation	Regional	Short Term	Reversible	Moderate	Highly probable
Score	3	2	1	3	4
With Mitigation	Regional	Short Term	Reversible	Moderate	Probable
Score	3	2	1	1	3
Significance Calculation	**Without Mitigation**		**With Mitigation**		
S=(E+D+R+M)*P	**Moderate Negative Impact (36)**		**Low Negative Impact (27)**		
Was public comment received?	No.				
Has public comment been included in mitigation measures?	No.				
Mitigation measures reduce residual risk or enhance opportunities: • Create a local WhatsApp Group for the local community and post notices of road conditions and Reduce travel speed for construction vehicles on the gravel road to reduce dust • Dust suppression of the roads in the immediate vicinity of the site where feasible • Regular preventative maintenance of roads within the immediate vicinity of the site should be conducted over weekends to minimise the impact on the average construction period.					
Residual impact	None.				

Impact Phase: Cumulative Construction Phase					
Nature of the impact: Intersection safety					
Description of Impact: The increased traffic volumes at intersections will increase the potential risk of accidents at the intersections, resulting in serious injuries or even fatalities, especially at the intersection on the main roads, when slow moving vehicles from the site need to cross over fast travelling oncoming traffic.					
Impact Status: Negative					
	E	**D**	**R**	**M**	**P**
Without Mitigation	Regional	Short Term	Irreversible	High	Highly probable
Score	3	2	5	4	4

With Mitigation	Regional	Short Term	Irreversible	High	Probable
Score	3	2	5	4	3
Significance Calculation	**Without Mitigation**		**With Mitigation**		
S=(E+D+R+M)*P	**Moderate Negative Impact (56)**		**Moderate Negative Impact (42)**		
Was public comment received?	No.				
Has public comment been included in mitigation measures?	No.				

Mitigation measures reduce residual risk or enhance opportunities:

- Compile a TMP.
- Reduce speed at intersections and use appropriate traffic warning signs.
- Identify alternative routes where possible.
- Request the assistance of local law enforcement.
- Ensure that all construction vehicles are roadworthy, visible, adequately marked, and operated by an appropriately licenced operator.
- Provide drivers with advanced driver training.

Residual impact	Fatality is irreversible.

Impact Phase: Cumulative Operation Phase

Nature of the impact: Increased Road Incidents

Description of Impact:

The increased traffic volumes at intersections will increase the potential risk of accidents at the intersections, resulting in serious injuries or even fatalities, especially at the intersection on the main roads, when slow moving vehicles from the site need to cross over fast travelling oncoming traffic.

Impact Status: Negative

	E	D	R	M	P
Without Mitigation	Regional	Short Term	Irreversible	Very low	Probable
Score	3	2	5	1	3
With Mitigation	Regional	Short Term	Irreversible	Very low	Probable
Score	3	2	5	1	3
Significance Calculation	**Without Mitigation**		**With Mitigation**		
S=(E+D+R+M)*P	**Moderate Negative Impact (33)**		**Moderate Negative Impact (33)**		
Was public comment received?	No.				
Has public comment been included in mitigation measures?	No.				

Mitigation measures reduce residual risk or enhance opportunities:

- Compile a TMP.
- Reduce speed at intersections and use appropriate traffic warning signs.
- Identify alternative routes where possible.
- Request the assistance of local law enforcement.

• Ensure that all construction vehicles are roadworthy, visible, adequately marked, and operated by an appropriately licenced operator. • Provide drivers with advanced driver training.	
Residual impact	Fatality is irreversible.

12.15 Wake Impact

In March 2023, a wake effect impact analysis was undertaken to calculate the impact that the Loxton WEF 3 would have the on the selected Taaibos North, Soutrivier North and Hoogeland North Wind Farms, using the N163/5.X (5.9) TC120 wind turbine model.

The results of external wake efficiency produced by the operation of the Loxton WEF 3 over the Taaibos North, Soutrivier North and Hoogeland North Wind Farms are shown in Table 12.1. The wake losses are considered to be insignificant as these are based on a worst-case theoretical analysis and negligible for the Hoogeland North Wind Farm, as the analysed wake impact has no influence over the wind farm.

Table 12-1: Summary of the wake effect results

External Wake Efficiency	Energy Loss (%)
Loxton WEF (1-3) effect on the Taaibos North WEF	
0,984	1,6 %
Loxton WEF (1-3) effect on the Soutrivier North WEF	
0,996	0,4 %
Loxton WEF (1-3) effect on the Hoogland North WEF	
1,000	0,0 %

13 SUMMARY OF FINDINGS, RECOMMENDATIONS AND CONCLUSION

13.1 Soils, Land Use and Agricultural Potential

Impacts assessed are likely to have low impact on future agricultural production potential and are therefore assessed as having very low significance. The site has low agricultural potential and is unsuitable for crop production, and agricultural production is limited to low capacity grazing. The land impacted by the development footprint is verified in this assessment as being of low agricultural sensitivity.

In conclusion to the assessment, the proposed development will not have an unacceptable negative impact on the agricultural production capability of the area. This is substantiated by the fact that the land is of limited land capability and is not suitable for crop production, the amount of agricultural land loss is well within the allowable development limits prescribed by the agricultural protocol, and that the proposed development offers some positive impact on agriculture by way of improved financial security for farming operations and improved security against stock theft and crime, as well as wider, societal benefits.

The acceptability of the proposed development and the recommendation for its approval is not subject to any conditions, other than the recommended mitigation measures. From an agricultural impact point of view, it is recommended that the **development be approved**.

13.2 Freshwater and Wetlands (Aquatics)

It was determined that the impacts upon aquatic biodiversity associated with the project are of low significance, after mitigation. This assumes that the mitigations recommended are considered and that the overall layouts avoid any of the High / No-Go areas, unless

making use of areas with impacts such as existing farm tracks. The main riverine systems are noteworthy areas which should be avoided for infrastructure development.

Most of the anticipated impacts include disturbance during the construction phase, while changes to form and function of the site due to increased runoff roads or hard surfaces that would occur in the operational and maintenance (O&M) phase. This is largely based on the assumption that all sensitivity terrestrial habitats will be avoided, which then also includes any of the observed CBAs. Disturbance of any aquatic CBAs, which are closely represented by the Biodiversity Spatial Plan (BSP - river lines only) can be avoided using the existing tracks and roads. This would also then prevent any additional damage to the aquatic systems within the area, while present and opportunity to improve the condition of any of the existing road crossings (improve flows and prevent erosion and sedimentation).

The loss of irreplaceable aquatic habitat and/or important aquatic obligate biota is highly unlikely. The significant impacts are associated with the access road crossings river systems. These systems are generally in a less modified state and still provide some habitat and important ecological functions. Mitigation should focus on these areas and include measures to halt erosion and rehabilitate habitat in the sections affected by the construction. The impacts are easily mitigated (provided the mitigation measures and monitoring plan within the EMPr are implemented and adhered to during all phases of the project). Without the implementation of mitigation measures, the project has potential to cause a Moderate cumulative impact upon aquatic biodiversity. However, with the adoption of mitigation, the proposed project will have a Low impact upon aquatic biodiversity.

The **specialist has no objection to the authorisation of the proposed activities assuming that all mitigations and buffer zones are implemented**.

13.2.1 Permit Requirements

Certain aspects of the proposed development may also trigger the need for Section 21, Water Use License Applications (WULAs) (or General Authorisation (GA) applications) such as river or watercourse crossings or any activities within 500 m of a wetland boundary. DHSWS will determine if a GA or WULA application will be required during the pre-application phase, and typically if one of the below identified water-uses requires a WULA then all applications will be treated as a WULA and not GA.

Based on an assessment of the proposed activities and past engagement with DHSWS, the following WULs / GA's could be required based on the following thresholds as listed in the following Government Notices:

- DHSWS Notice 538 of 2016, 2 September in GG 40243– Section 21 a, Abstraction of water.
- Government Notice 509 in GG 40229 of 26 August 2016 – Section 21 c & i, Impeding or diverting the flow of water in a watercourse and or altering the bed, banks, course or characteristics of a watercourse.
- Government Notice 665, 6 September 2013 in GG 36820 - Section 21 g, Disposal of waste in a manner that may detrimentally impact on a water source which includes temporary storage of domestic wastewater i.e. conservancy tanks under Section 37 of the Notice.

The application process will be initiated by the Applicant / Developer and will be separate to this S&EIA process and only once a final project scope is known.

	Water Use Activity	**Applicable to this development proposal**
S21(a)	Taking water from a water resource	Yes, if water is abstracted from new and/ or existing boreholes which will also require a change of use from agricultural to industrial. The use of surface water in this region due to the ephemeral

	Water Use Activity	Applicable to this development proposal
		nature of the rivers / watercourses is not recommended.
S21(b)	Storing water	Only if water is stored within a instream dam. The use of tanks and or reservoirs is thus advised as these **do not require** a license.
S21(c)	Impeding or diverting the flow of water in a watercourse	If any works (permanent or temporary) are located within a watercourse then a GA process can potentially be followed if the DWS Risk Assessment Matrix indicates that all impacts with mitigation are low.
S21(d)	Engaging in a stream flow reduction activity	Not applicable
S21(e)	Engaging in a controlled activity	Not applicable
S21(f)	Discharging waste or water containing waste into a water resource through a pipe, canal, sewer or other conduit	Not applicable
S21(g)	Disposing of waste in a manner which may detrimentally impact on a water resource	Typically, the conservancy tanks at construction camps and the Operations and Maintenance (O&M) buildings require a license (GA if volumes are less than 10 000 m^3).
S21(h)	Disposing in any manner of water which contains waste from, or which has been heated in, any industrial or power generation process	Not applicable
S21(i)	Altering the bed, banks, course or characteristics of a watercourse	If any works (permanent or temporary) are located within a watercourse, then a GA process can potentially be followed if the DWS Risk Assessment Matrix indicates that all impacts with mitigation are low.
S21(j)	Removing, discharging or disposing of water found underground for the continuation of an activity or for the safety of persons	Not applicable
S21(k)	Using water for recreational purposes	Not applicable

13.3 Terrestrial Biodiversity

The proposed development was mapped as falling primarily within the Eastern Upper Karoo vegetation type with a small extent of Upper Karoo Hardeveld and Bushmanland Vloere present in the northeast of the site. However, the site verification and field assessment indicate that the extent of Upper Karoo Hardeveld is far greater than mapped and that the areas of Bushmanland Vloere are in fact more closely allied with the Southern Karoo Riviere vegetation type. These vegetation types have been impacted to a limited extent by transformation to date, and are classified as Least Threatened. In terms of fauna, there are several listed fauna which occur in the area and which would potentially be impacted by the development. However, of these only the Karoo Dwarf Tortoise and Riverine Rabbit are considered likely to be present. The habitats associated with these species have been mapped at a fine scale and included in the no-go layer for the development while the other sensitive features of the site including drainage lines, riparian areas and rocky hills habitat have been mapped as high or very high sensitivity and would not be impacted by turbine footprint areas. Some impact to these areas from limited amounts of overhead cabling or turbine access roads would occur and is considered acceptable.

The whole of the site is mapped as falling within areas of CBA 1 and CBA 2. Under the layout assessed, there are three turbines within the CBA 1, with the remainder within the CBA 2. This is considered unlikely to significantly impact the underlying biodiversity features as these have been mapped in detail in the sensitivity mapping provided to the project. As such, the impact of the Loxton WEF 3 development on the areas of CBA 1 and CBA 2 is considered acceptable

The areas of CBA 1 and CBA 2 within the site are also mapped as NPAES Focus Areas. However, as there are no specific features of very high biodiversity value within the affected polygons and the loss of these areas from the NPAES is considered to have low significance after the implementation of avoidance and mitigation, which includes the establishment of a development-free corridor through the site as detailed in the offset needs analysis study. As such, the overall impact of the development on NAPES Focus Areas is considered acceptable.

There are no impacts associated with the development of the Loxton WEF 3 on terrestrial biodiversity that cannot be mitigated to an acceptable level. As such, should all the proposed mitigation be implemented, the Loxton WEF 3 development is deemed **acceptable from a terrestrial ecological impact perspective**. It is thus the reasoned opinion of the specialist that the **Loxton WEF 3 development should be authorised subject to the various mitigation and avoidance measures**.

13.4 Riverine Rabbit

The Riverine Rabbit was detected at two localities near to the Loxton Wind Energy Facility 3 but not within the final wind farm project area which was adjusted to avoid these areas. The sightings are both within the typical riparian floodplain vegetation environment associated with this species, confirming the high fidelity for specific riparian communities associated with the larger drainage systems of the area. A minimum number of 2 individuals can be confirmed present within the area investigated, but based on published estimates of population density, the areas of confirmed habitat within the site could potentially hold between 30 and 95 individuals. Assuming a similar population density across the range, within the published area of occupancy, the site is likely to hold less than 0.2% of the overall population of Riverine Rabbits.

Due to the presence of the Riverine Rabbit at the site and the condition and extent of habitat, the areas of habitat within the site are considered to have a High Site Ecological Importance (SEI). The area with confirmed sightings has been excluded from the wind farm project area and the remaining areas of identified suitable habitat within the site have been buffered from turbines by up to 500m depending on the landscape context and the potential for impact due to turbine noise and flicker. The areas where Riverine Rabbits occur are disjunct and it is assumed that Rabbits move between the areas of more extensive suitable habitat along the riparian corridors between these areas. These buffers and corridor linkages between the major habitat patches have been integrated into the turbine no-go layer and this explicitly informs the location of turbines at the site. Under the assessed layout there are no turbines within the areas of habitat or within the applied buffers. With the implementation of the above avoidance as well as the other recommended mitigation measures, the overall long-term impact of the development on Riverine Rabbits and their associated habitat is likely to be acceptable and would not be likely to compromise the local or regional population of this species.

13.5 Karoo Dwarf Tortoise

The potential occurrence of Karoo Dwarf Tortoise was assessed as being probable within the Loxton WEF 3 site. Comprehensive information about the population demographics of Karoo Dwarf Tortoises in this area is not available. Based on the absence of on-site records

and the scarcity of historic and recent records in the general region, and the fact that landowners are generally not familiar with this species, the area is presumably not a stronghold for Karoo Dwarf Tortoises.

The site layout design for the Loxton WEF 3 project has been through various iterations during the screening and initial design phases. The sensitivity analysis for the Karoo Dwarf Tortoise was also factored into Loxton WEF 3 layout design, as per the following caveats:

- As a precautionary measure, the dolerite outcrops within the Loxton WEF3 are considered as no-go areas of very high sensitivity. The proposed wind farm development footprints may not overlap with any of the specified dolerite habitat nodes.
- As additional caution, other rocky ridges of 10 to 38 degrees slopes are rated as high sensitivity areas. Development within these zones is generally undesirable and may only take place minimally.
- Rocky features with gentle (5 to 9 degrees) slopes are rated as medium sensitivity areas. A degree of development activities is acceptable within the medium zones, but it is preferable to side-step these areas where practically feasible.
- The low sensitivity areas are deemed to be generally suboptimal for supporting Karoo Dwarf Tortoise populations and development may take place within these areas.

With the exception of the Karoo Dwarf Tortoise, no other SCC reptiles or amphibians were observed during the October 2022 survey and none are expected to occur within the Loxton WEF 3 study area. The potential occurrence of Karoo Dwarf Tortoises within the study area was taken into consideration during the assessment of potential impacts. The most significant mitigating measure to safeguard these tortoises was the mapping of sensitive zones so that the layout design could avoid areas of high and very high sensitivity. The integration of the sensitivity components into the layout design is deemed to be an appropriate buffering scheme that would adequately safeguard Karoo Dwarf Tortoises within the Loxton WEF 3 site. Accordingly, the impacts on Karoo Dwarf Tortoises in the context of the proposed Loxton WEF 3 project are projected to be LOW after mitigation.

As a result, and with the application of the recommended mitigation and avoidance measures, the **impacts associated with the Loxton WEF 3 project are considered acceptable**. As such, **the proposed development is not opposed** based on the potential or probable occurrence of Karoo Dwarf Tortoises within the PAOI.

13.6 Plant

The plant compliance statement is applicable to the Loxton WEF 3 development with specific reference to the layout as provided for the assessment. Although the vegetation of the site is comprised as exclusively Eastern Upper Karoo with areas of Upper Karoo Hardeveld and Southern Karoo Riviere present. There are no threatened vegetation types present within the site or nearby. No plant species of concern (SCC) were observed within the site despite extensive surveys across the site, confirming the low sensitivity of the project footprint. The low sensitivity of the site as identified by the DFFE Screening Tool for the Plant Species Theme was confirmed by the field assessment.

13.7 Avifauna

The species arguably at greatest risk at this wind farm is the Ludwig's Bustard, as much flight activity as well as breeding display behaviour was recorded on site. Risk can be reduced by excluding construction activities entirely from the No-go lek areas and keeping disturbance to an absolute minimum in the High sensitivity zones surrounding them in the breeding months which for this location are from approximately November to April, although breeding appears to be rainfall-dependant (Mucina & Rutherford 2006, Tarboton 2011) and thus subject to unpredictability. Increasing the minimum turbine blade height

above ground from 30m to 60m can potentially reduce collision risk by as much as 75% for this species and for almost every other target species assessed, to varying degrees. Increasing minimum rotor swept height is strongly recommended.

Avifaunal impacts have been assessed and have been mostly determined to be of Low or Moderate Negative significance post-mitigation, with the exception of habitat destruction and the impact of fatalities as a direct result of turbine and power line collisions, which remain at Moderate Negative post mitigation. Cumulative impacts will be of High negative significance pre-mitigation, and Moderate negative significance post mitigation.

It is recommended that any opportunity to raise the lower blade tip as much as possible should be taken, as this could significantly reduce the bird collision risk.

The work done to date on the proposed site has established a baseline understanding of the distribution, abundance and movement of key bird species on and near the site. However, this is purely the 'before' baseline and aside from providing input into turbine micro-siting, it is not very informative until compared to post-construction data. The avifaunal specialist concludes that based on data collected on, that the **project can receive environmental authorisation, provided all recommendations are met**.

13.8 Bats

The impact assessment was based on 12 months of baseline data on bat activity recorded at the proposed Loxton WEF 3. Based on these data, the key issue for the WEF will be managing collision impacts to high-flying free-tailed bats; specifically, Egyptian free-tailed bat, but also possibly Roberts's flat-headed bat. The magnitude of Egyptian fee-tailed bat activity was high across the study area, including at 50 m and 100 m, based on median bat activity with reference to MacEwan et al. (2020). While this was restricted to certain nightly time periods and seasons, this high risk needs to be addressed and the mitigation options for high-flying species are relatively limited. This is because these bats are active across most of the rotor swept zone and hence are likely to encounter wind turbine blades should they be foraging or commuting in the vicinity of these structures. Additionally, bats may also be attracted to wind turbines (Guest et al. 2022, Leroux et al. 2022).

The first mitigation measure proposed to manage risk is to adhere to the no-go buffers which aim to spatially avoid impacts by buffering key habitat features used by bats. This measure is likely to be effective for most bat species recorded at the project, but additional mitigation measures are needed to avoid impacts to free-tailed bats, which forage high in the air, and to reduce residual impacts. Turbine design can be effective, and it is recommended to maintain a minimum blade sweep of at least 30 m. However, free-tailed bats will still collide with turbine blades above this height and as such, the rotor diameter must be limited as much as practicable to minimise the space where collisions might occur. Additionally, blade feathering for all turbines must be implemented from the start of operation to limit the rotation of turbine blades below the turbine cut-in speed when electricity is not being generated.

Mitigation measures to minimise residual impacts after the application of the above measures include curtailment and acoustic deterrents. These measures are effective, and given the predicted risk, it is possible they may need to be implemented because the fatality thresholds are relatively low. The residual impacts must be monitored using post-construction fatality monitoring for a minimum of two years (Aronson et al. 2020). Curtailment and/or acoustic deterrents must be used if this monitoring indicates that species fatality thresholds have been exceeded (MacEwan et al. 2018) to maintain the impacts to bats within acceptable limits of change and prevent declines in the impacted bat populations.

On a species level, the project presents differential risks, and impacts must be managed adaptively during the operational phase, particularly for those species (e.g., Egyptian free-tailed bat) for which high risk is predicted. This adaptive management will be guided by the EMPr for bats which must include the development of a Biodiversity Management Plan (BMP) to manage impacts to bats during the operation of the facility. The BMP for bats must be developed by a bat ecologist before the commencement of operation and must include the post-construction fatality monitoring plan design, fatality thresholds calculations and rationale, a curtailment plan, and an adaptive management response plan that provides a timeous action pathway for mitigation, including roles and responsibilities, should fatality thresholds be exceeded. Considering that the overall impact to bats was assessed as moderate after the application of the mitigation measures proposed to avoid and minimise impacts to bats, **the proposed project can be approved for environmental authorisation**.

13.9 Noise

This study considers the potential noise impact on the surrounding environment due to the construction, operational and future decommissioning activities associated with the Loxton WEF 3 project. It was determined that the potential noise impacts, without mitigation, would be:

- of a low significance for the construction of access roads;
- of a low significance relating to noises from construction traffic;
- of a low significance for the daytime construction activities (hard standing areas, excavation and concreting of foundations and the assembly of the turbines and other infrastructure);
- of a potential high significance for the night-time construction activities (the potential pouring of concrete, erection of turbines). Mitigation measures are available and were included in this assessment that would reduce the potential significance of the noise impact to low;
- of a low significance for daytime operational activities (noises from wind turbines) when considering the worst-case sound pressure level (SPL); and
- of a low significance for night-time operational activities (noises from wind turbines) when considering the worst-case SPL.

There is a low significance for a cumulative noise impact to occur during the operational phase.

Community involvement needs to continue throughout the project. Annoyance is a complicated psychological phenomenon, as with many industrial operations, expressed annoyance with sound can reflect an overall annoyance with the project, rather than a rational reaction to the sound itself. At all stages, surrounding receptors should be informed about the project, providing them with factual information without setting unrealistic expectations. It is counterproductive to suggest that the activities will be inaudible due to existing high ambient sound levels. The magnitude of the sound levels will depend on a multitude of variables and will vary from day to day and from place to place with environmental and operational conditions. Audibility is distinct from the sound level, because it depends on the relationship between the sound level from the activities, the spectral character and that of the surrounding soundscape (both level and spectral character).

The developer must implement a line of communication (i.e., a help line where complaints could be lodged). All potential sensitive receptors should be made aware of these contact numbers. The proposed WEFs should maintain a commitment to the local community (people staying within 2,000 m from construction or operational activities) and respond to noise concerns in an expedient fashion. Sporadic and legitimate noise complaints could be

raised. For example, sudden and sharp increases in sound levels could result from mechanical malfunctions or perforations or slits in the blades. Problems of this nature can be corrected quickly and it is in the developer's interest to do so.

From an acoustic perspective the turbine layout is considered acceptable should the applicant select to use a turbine model with a SPL less than 109.2 dBA (re 1 pico Watt (pW)) and it is **recommended that the Loxton WEF 3 be authorised**.

It should be noted that this is subject to the condition that the applicant select appropriate measures to ensure that the potential high significance noise impact associated with night-time construction activities be eliminated.

13.10 Biodiversity Offset Needs Analysis

In terms of the Loxton Wind Energy Facility 3, impacts on NPAES Focus Areas have been assessed as being medium after mitigation. This suggests that some kind of non-standard mitigation to reduce this impact is required. As mentioned above, a primary concern regarding the development would be its' impact on broad-scale connectivity and landscape functionality. In order to address this impact, the following mitigation is recommended:

The major drainage feature on the farm Biesjespoort 140 which includes part of the site and runs adjacent to the R63, represents a significant feature of the area and has an uncharacteristically large floodplain area which has confirmed Riverine Rabbit sightings from the current project as well as older records from EWT. This is considered to represent an important area for Riverine Rabbits and also represents the likely best connection between the Brak-Sak River system west of the site and the Klein Brak/Ongers River system east of the site. This area is likely to represent an important faunal movement corridor for most larger fauna present in the area as well as the Riverine Rabbit. It is therefore concluded that the protection and management of this feature for biodiversity purposes would represent the most favourable outcome for the current development in terms of mitigating potential impacts on broad-scale ecological processes. The identified area is illustrated below in Plate 13-1.

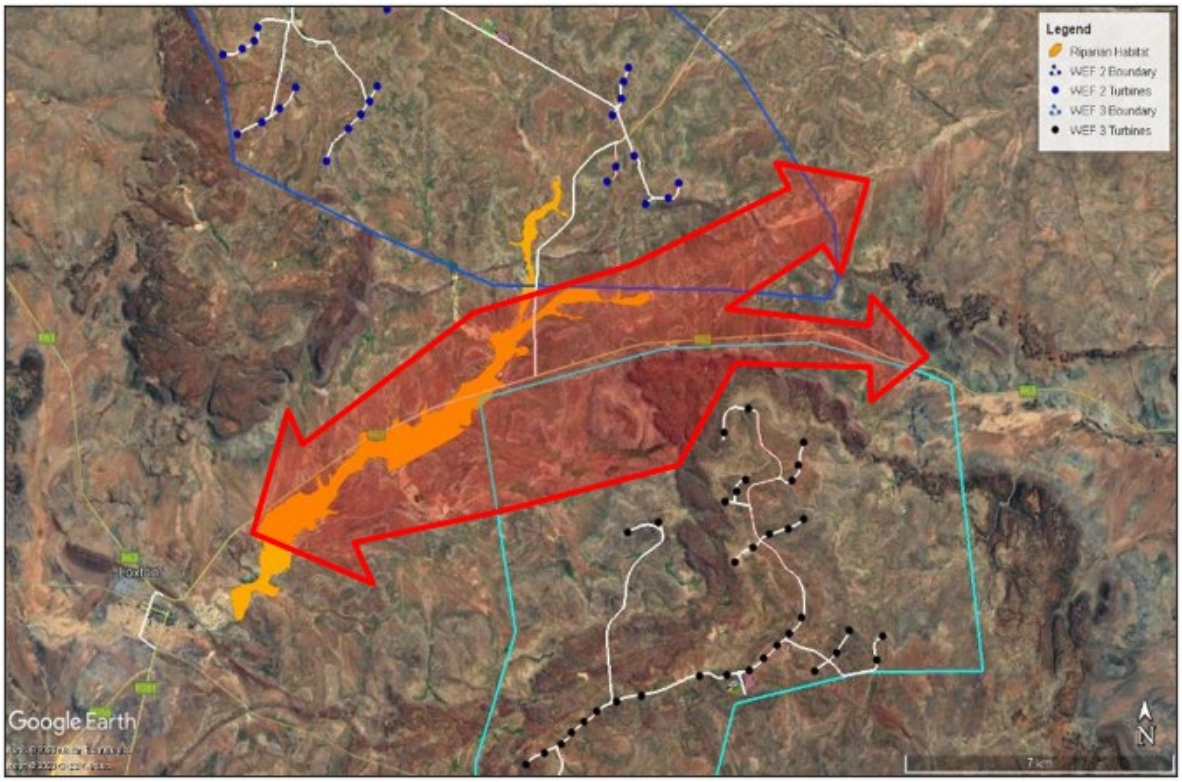


Plate 13-1: Recommended general area within which a development-free zone should be established, showing the primary drainage feature in orange that should form the core feature of the set-aside development-free zone.

The proposed development-free zone should be established within the above demarcated area as illustrated above in Plate 13-1. In terms of promoting the functionality of the corridor, the following recommendations are made:

- The corridor should at most points be at least 1km wide and should not be less than 300m wide at any point. The exact configuration should be delimited in consultation with the relevant landowners and should take existing livestock camps and fencing into account. New fencing can be added if required in order to accommodate practical and operational issues such as existing roads, existing irrigated fields etc., but should not be of the jackal-proof type, made of mesh.
- Grazing within the corridor should be reduced to a maximum of 50% of the Department of Agriculture recommendation for the area when calculated on an annual basis. Livestock grazing represents a major impact on biodiversity and has ecosystem-wide impacts. As such, the reduction in grazing pressure within the corridor would improve the habitat condition within the corridor for a wide range of fauna. In addition, it would have positive impacts on flora and vegetation cover. This would significantly increase the use of the corridor by fauna and would improve the ability of fauna to move through the area.
- The corridor should be kept clear of any additional development for the lifetime of the wind energy facility. Existing areas of intensive agriculture i.e cultivated crop fields should be allowed to remain within the corridor but should not be expanded.
- The overall extent of the development free corridor should not be less than 2000 ha, which is approximately 30 times larger than the development footprint of 65 ha.
- An agreement in-principle with the landowner/s should be obtained and included in the final EIA demonstrating the practicability of the corridor in terms of landowner buy-in and willingness.

- The corridor would only come into effect should the Loxton WEF 3 become a preferred bidder under the REIPPP or another power-supply arrangement.
- The final development free corridor should be defined and binding contracts signed with all relevant landowners before construction commences. The contracts should be valid for the lifetime of the facility.

In addition to the establishment of the above corridor an associated Fauna Monitoring Programme should be implemented at the site to evaluate the post-construction impact of the development on fauna including the Riverine Rabbit as well as other key species at the site. Such monitoring has also been recommended for the Nuweveld and Hoogland suite of projects and the current development should align with those projects in order to create a broader initiative examining the impacts of the wind energy development on key biodiversity features of the area. It is important to note that such monitoring is not simply for its' own sake, but is also important to demonstrate the effectiveness of the implemented conservation set-aside and the on-site mitigation and avoidance measures. In addition, it can also be used to ensure compliance with some of the recommended measures in terms of livestock numbers and grazing duration. At a minimum, the monitoring should align with the existing recommended wind farm monitoring protocols for the area and should take the following basic form in order to ensure credibility and scientific rigour:

- The monitoring should adhere to a BACI (before-after-control-impact) approach with regards to examining the impacts of the wind farm on terrestrial fauna. As such, this would necessitate preconstruction monitoring to establish a reliable baseline of faunal activity, abundance and distribution at the site as well as the use of a matched control site. In terms of practicality and repeatability, it is recommended that camera trap-monitoring is used as this is the norm for such studies.
- The preconstruction monitoring would be followed up by matched post-construction monitoring to evaluate the potential negative impacts of the development on community structure, activity and distribution in relation to wind turbine density and proximity.
- It is estimated this would require up to 1 year for preconstruction monitoring and then 3-to 5 years post construction monitoring to evaluate long-term impacts on fauna, which may take several years to become apparent. The monitoring must be conducted in a manner which allows for reliable effect sizes and statistically-backed inferences to be made.
- A detailed methodology would need to be developed prior to construction, which should include an outline of the experimental layout with regards to the camera trapping sampling approach with details on the number, frequency and distribution of camera traps in relation of the wind turbines and features of the site, such that the above criteria with regards to the statistical reliability of the results can be met.
- The results of the monitoring should be written up in a formal publication and made available to public.

13.11 Heritage and Archaeology

Section 38(3)(d) of the NHRA requires an evaluation of the impacts on heritage resources relative to the sustainable social and economic benefits to be derived from the development. The project will result in construction period jobs as well as a small number of operation phase jobs. However, the biggest benefit to society is in the provision of electricity to the national grid which will assist in stabilising electricity supply and, in general, improve economic activity. These are clear economic and social benefits and, if mitigation is applied as suggested above, then the socio-economic benefits outweigh the residual impacts.

There are currently no obvious threats to heritage resources on the site aside from the natural degradation, weathering and erosion that will affect archaeological materials.

Trampling from grazing animals and/or farm/other vehicles could also occur. These impacts would be of negligible negative significance. There are no threats to the cultural landscape.

With mitigation, impacts to the broader cultural landscape may be of moderate significance. Importantly, the ancillary infrastructure has been placed in a low area that is almost entirely screened from the R63 by topography and is located 6.2 km away from it. In time the facility will become an accepted component of the landscape and the perceived impact will diminish. Also, if multiple similar facilities are constructed in the area, then a new electrical 'layer' will develop and become part of the landscape. At the smaller scale, the agricultural landscapes around the historical farmsteads will not be directly affected aside from upgrades and / or realignment of existing farm tracks, although they will, at times, be overshadowed by turbines placed on hills within a few hundred meters of the 50 m buffers around the outside of these landscapes. Although large parts of the final road layout have not been surveyed, field experience shows that sites requiring *in situ* conservation are not expected to be found in the kinds of areas proposed for development, and it is expected that any conservation-worthy sites will be very easily sampled in advance of development should avoidance by micro-siting not be possible.

There are no heritage impacts that are unacceptable and any direct impacts that may still be unavoidable in the construction phase are expected to be easily mitigated. Places where the project roads and / or cables come close to heritage resources are expected to be manageable with No-Go signage and monitoring. As such, it is the opinion of the heritage specialist that the **Loxton WEF 3 project should be authorised in its entirety**.

13.12 Palaeontology

Despite the substantial WEF project footprints as well as the known occurrence of important vertebrate and other fossil sites elsewhere in the wider region between Loxton and Victoria West, the impact significance of the proposed renewable energy developments on local palaeontological heritage is anticipated to be low. These impacts, including cumulative impacts considering other renewable energy projects in the broader region, are expected to fall within acceptable limits. There are therefore **no objections on palaeontological heritage grounds to authorisation of the proposed development**.

The potential for unrecorded palaeontological sites of scientific and conservation value cannot be completely excluded. These are best mitigated through the application of a Chance Fossil Finds Protocol by the ECO / ESO during the Construction which has been incorporated into the EMPr. The qualified palaeontologist responsible for mitigation work will need to apply for a Fossil Collection Permit for the Northern Cape from SAHRA. Minimum standards for PIA reports have been compiled by Heritage Western Cape (2021) and SAHRA (2013).

13.13 Visual / Landscape

The layout of the WEF has been subject to an iterative planning process, based on the various specialist findings, including the mapping of scenic resources and sensitive receptors. The current proposed layout largely succeeds in avoiding visually sensitive areas as indicated on the visual sensitivity maps.

The visual assessment findings are the following:

- The viewshed is fairly extensive in all directions given the visually open nature of the treeless, hilly landscape.
- There are a number of visual receptors in close proximity to the proposed WEF, these being mainly small farmsteads and guest farms in some cases.

- The overall visual impact significance for the wind turbines has been rated as high, both before and after mitigation, as there would be a significant change in character to the area.
- The visual impact significance for related infrastructure, (such as substations and O&M buildings) has been rated as medium, being in fairly remote locations.
- The visual impact significance for navigation lights at night has been rated as medium, with some potential for mitigation depending on the technology used.
- The cumulative visual impact significance of the WEF, seen in combination with other renewable energy projects in the area has been rated as medium.
- Effective mitigation for the wind turbines is limited to 'avoidance', such as a reduction in the number of wind turbines, and/or relocating turbines further from nearby receptors.

It is the opinion of the specialist that while the proposed WEF could generally have a 'high' visual impact significance, the current layout has largely avoided the scenic resources and sensitive visual receptors of the area and it's the specialist opinion that the significance is more likely to be medium-high visual impact.

Provided the recommended mitigation measures are implemented, the **project would not present a potential fatal flaw in visual terms and could be authorised from a visual perspective**.

13.14 Socio-Economic

The findings of the SIA study indicate that the proposed Loxton WEF 3 and associated infrastructure will create a number of social and socio-economic benefits, including creation of employment and business opportunities during both the construction and operational phase. The project will also create economic development opportunities for the local community. The enhancement measures listed in the report should be implemented in order to maximise the potential benefits. The significance of this impact is rated as High Positive. The proposed development also represents an investment in clean, renewable energy infrastructure, which, given the negative environmental and socio-economic impacts associated a coal-based energy economy and the challenges created by climate change, represents a significant positive social benefit for society as a whole. The Renewable Energy Independent Power Producers Procurement Programme (REIPPPP) has resulted in significant socio-economic benefits, both at a national level and at a local, community level. These benefits are linked to foreign Direct Investment, local employment and procurement and investment in local community initiatives.

The findings 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 Loxton WEF 3 and associated infrastructure is therefore **supported by the findings of the SIA**.

13.15 Traffic and Transportation

A range of management and mitigation strategies are identified for implementation during the construction and operation phases of the development to minimise traffic impacts, reduce community disruption and the risk of traffic incidents.

It can be concluded that Loxton WEF 3 will generate an increase in the traffic volumes on the surrounding road network, however, this increase will be significantly less than the traffic volumes during peak construction phases. Cumulative impacts have been assessed and have found the level of service on the road network to be acceptable. Provided the

developer assists with continued maintenance of the public road, from a traffic and transportation perspective, **there are no constraints or notable impacts that would jeopardise the implementation of this development**.

It is the reasoned opinion of the author that the proposed development of the Loxton WEF 3 can be considered for environmental authorisation.

13.16 Stormwater Management

The objective of the stormwater management plan was to determine the impacts of Loxton WEF 3 on the immediate and greater area concerning stormwater. No significant risks are foreseen provided the recommendations suggested by the specialist are enforced before and during the construction phase of the project. The impacts will be temporary, and mitigation can increase recoverability. In conclusion:

- The Surface Modelling revealed that the proposed development / infrastructure will have a minimal impact on the stormwater quality and quantities of post-development stormwater flow (operational phase).
- The highest impact will, in all likelihood, occur during the construction phase, and these impacts must be strictly managed under the advisement of the guidelines set out in the management plan.
- The need for formal stormwater interventions can be minimised if the development is designed to maintain the existing drainage patterns. Overland flow via poorly-defined drainage paths will be the primary form of conveyance.
- The Civil Engineers must prepare a detailed stormwater management plan for construction purposes describing and illustrating the proposed stormwater and erosion control measures during the detailed design phase.
- A comprehensive geotechnical study is completed before the detailed design stage of this development.
- The stormwater management and guidelines included in the management plan should be incorporated into the detailed design of the development.
- The stormwater management policy should be implemented.

From a stormwater perspective, the proposed development will have a nominal impact on existing stormwater catchments, provided the recommendations and mitigation measures are implemented. The project is deemed acceptable and can be considered for environmental authorisation.

13.17 Geotechnical Study

The geotechnical study highlights the anticipated geological ground conditions expected at the Loxton WEF 3. Soft to hard rock mudstone interlayered with sandstone is anticipated to be the dominant profile at the site, estimated to be 80% of the site. 20% of the site is estimated to be underlain with medium-hard to very hard rock dolerite. The planned turbines are on hilltops with a few located along hill slopes. A site walkover will aid in determining if any slope instabilities may pose a risk during construction. Several tributaries characterise the site and the surroundings; it is recommended that the structures are placed at least 100 meters from a 1:100-year flood line. The main concerns regarding development of the project site and which will need to be determined via on-site investigations are:

- Undefined rock mass competence laterally and with depth at the planned turbine locations.
- Potentially hard to very hard rock conditions, particularly for areas underlain by dolerite, requiring hard excavation techniques (blasting) to excavate foundations and construct access roads.

- Irregular topography and local steep slopes with considerable elevation differences across dolerite ridges.
- Unquantified durability of mudstone upon exposure to atmosphere and moisture.
- Localised perched groundwater table.
- Undefined depth to permanent groundwater table and whether this is suitable for use during construction.

The specialist has found no fatal flaws in terms of the projects' progress. Geotechnical assessments help determine feasibility of proposed developments and ongoing geotechnical investigations should be carried out as the project's development moves forward.

13.18 Wake Impact

An Energy Resource Assessment was prepared to determine the wake effects which the Loxton WEF 3 would have on the surrounding authorised Hoogland WEF's and the proposed North, Taaibos North and Soutrivier WEF's, currently in the EA application phase. The wake losses from the proposed Loxton WEF 3 were deemed to be insignificant on the Hoogeland North WEF's, due to the prevailing wind direction and the fact that the distance between the Loxton turbines and the Hoogland North boundary is 13km.

The wake losses on the Taaibos North, Soutrivier North Wind Farms were considered negligible, as the assessment was based on a worst-case theoretical analysis and was analysed to have little to none wake impact influence. The external wake losses are displayed in the table below.

Loxton WF affection over Taaibos North WF	
External wake efficiency	Energy loss (%)
0,984	1,6%
Loxton WF affection over reduced Taaibos North WF	
External wake efficiency	Energy loss (%)
0,990	1,0%
Loxton WF affection over Soutrivier North WF	
External wake efficiency	Energy loss (%)
0,996	0,4%
Loxton WF affection over Hoogeland North WF	
External wake efficiency	Energy loss (%)
1,000	0,0%

14 IMPACT STATEMENT

The proposed Loxton WEF 3 has the potential to provide much needed renewable energy to the country's grid. The use of renewable energy to provide power to South Africa is supported at international, national, provincial and local level. Given South Africa's need for additional electricity generation and the need to decrease the country's dependency on coal-based power, renewable energy has been identified as a national priority, with wind energy identified as one of the readily available, technically viable and commercially cost-effective sources of renewable energy.

The impacts of the proposed development need to be viewed in the context of the country's energy mix and the negative externalities associated with the current dominant energy source of coal, often in areas of high potential soils, such as the Eastern Highveld, and the

pollution that this form of energy generates. With this comparison in mind the impact of a wind energy facility is minimal compared to the damaging impacts of coal mining and coal-fired power generation. Indeed, wind energy is associated with positive externalities in the form of Economic Development benefits and the cheaper tariff at which it is bought. Therefore, in perspective, the impacts of the proposed facility can be motivated as necessary in decreasing the impacts in areas where agricultural potential plays a more significant role and in the role of externalities associated with power production.

The potential positive impacts associated with the proposed project is further recognised through the creation of jobs for the local community, and the positive contributions to the socio-economic development of the surrounding areas and local communities.

Should the proposed Loxton WEF 3 be developed, the actual physical footprint of the wind turbines and associated infrastructure will occupy a small area of land compared to the total project area. Livestock grazing and other agricultural activities can continue in parallel with the operation of the turbines. The project will have no significant impact in terms of loss of agricultural productivity. Should the mitigation measures identified by specialists and the recommendations of the EMPr be effectively implemented the negative impacts associated with the proposed project will be significantly reduced.

Although Riverine Rabbits and associated habitat have been confirmed present within the Loxton Wind Energy Facility 3 site, habitat loss within these areas would be minimal after the implementation of the recommended mitigation and avoidance. The buffers implemented around the identified areas of suitable habitat are seen to be sufficient to minimise long-term noise and disturbance impacts on this species. As a result, long-term impacts associated with the Loxton Wind Energy Facility 3 on the Riverine Rabbit are likely to be low. Consequently, the development of the Loxton Wind Energy Facility 3 is considered acceptable with the implementation of the suggested avoidance and monitoring as indicated.

The offset needs analysis concluded that its highly unlikely that the development will lead to "loss of irreplaceable biodiversity" given the extensive avoidance that has been implemented. It is recommended though that a development free corridor be established and maintained through the project site which would encourage and facilitate the linkage between the Klein Brak and Brak River systems. The needs analysis concludes that an offset is not required, but an area set aside for broad scale connectivity and landscape functionality. Mitigation measures included in the Offset Needs Analysis Report is included in the EMPr and must be implemented by the Applicant.

The negative impacts associated with the proposed Loxton WEF 3 are considered acceptable by the specialists, provided that all recommendations and mitigations are complied with and adhered to.

Taking into consideration the findings of the EIA process for the proposed development and the fact that recommended mitigation measures have been used to inform the project design and preferred layout of the facility, it is the opinion of the Environmental Assessment Practitioner (EAP) that the majority of negative impacts associated with the implementation of the proposed project have been 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.

14.1 Conditions to be included in the Environmental Authorisation

Any specialist conditions which is must be considered during all phases of the development and / or not included in the EMPR, is provided below for the Department to consider should the development receive favourable Environmental Authorisation.

Fauna

A Faunal Monitoring Programme should be implemented at the site to evaluate the post-construction impact of the development on terrestrial fauna including the Riverine Rabbit as well as other key fauna at the site. As there is some potential for noise and disturbance-related impacts on Riverine Rabbits, the development presents a clear opportunity to evaluate the degree to which wind farms are compatible with the maintenance and conservation of Riverine Rabbit populations within their boundaries. The details of the monitoring programme should be developed in collaboration with the EWT Dryland Programme.

Biodiversity Offset Needs Requirements

Applicant must appoint an ecologist with experience in conservation planning to prepare an open space management plan to outline the monitoring, measurement and management processes associated with the conservation set-aside. The open-space management plan would need to be developed prior to the commencement of construction of the Loxton WEF 3.

The proposed development-free zone should be established within the above demarcated area as illustrated above in Plate 13.1.

Bats

- A Biodiversity Management Plan (BMP) for bats must be developed by a bat ecologist before operations which includes the post-construction fatality monitoring plan design, fatality thresholds calculations and rationale, an initial curtailment plan, and an adaptive management response plan that provides a timeous action pathway for mitigation should fatality thresholds be exceeded.

Aquatic

- An Aquatic specialist must be appointed to conduct post-authorisation micro-siting with the design engineers, to reduce potential impacts relating to the Aquatic Environment.
- Update the Stormwater Management Plan following micro-siting of the final layout.

Noise

It is recommended that the project applicant:

- Re-evaluate the noise impact should the layout be revised where:
  - any turbine, located within 1,500 m from a confirmed NSR, are moved closer to the NSR;
  - the number of WTG within 2,000m from an NSR are increased.
- Re-evaluate the noise impact once the final make and model of turbine has been selected.
- Design and implement a noise monitoring program, measuring ambient sound levels before construction activities start, as well as during the operational phase.

RFI

- Due to the medium risk to the SKA and based on a request from SARAO, a detailed EMI control plan must be developed prior to construction based on the final design and in consultation with SARAO.

Heritage and Archaeology

- Existing roads should be reused where possible and if any surfacing is required then high contrast materials should be avoided.
- Where existing roads pass through sensitive areas this is preferred over making new roads but the alignments should ensure the integrity of any specific resources in those sensitive areas. In this regard, No-go signage will need to be put in place and the sites monitored at waypoints 003, 004, 1229, and 1230.
- The archaeological site at waypoint 1238 will need to be avoided through micro-siting the access road or alternatively excavated, sampled and recorded as necessary prior to construction. If it is avoided then No-Go signage must be installed and the site monitored during the construction phase.
- No stones or other materials may be removed from any historical sites.
- The expertise of an Archaeologist and Palaeontologist, are to be enlisted post-authorisation to conduct a walk-through inspection required for the micro-siting of the WEF infrastructure to reduce potential impacts relating to any heritage and palaeontological features identified.
- Implement a Chance Finds Procedure for the rescuing of any fossils or heritage resources discovered during construction.

Socio Economic

- Set targets for use of local labour, based on REIPPPP thresholds and targets outlined in DMRE, 2021 (e.g., RSA-based employees who are citizens and from local communities should make up at least 20% of the workforce).
- Maximise the use of local sub-contractors where possible through tendering and procurement and ensure meeting the REIPPPP local content requirements.
- Communicate with local municipal and other stakeholders involved in socio-economic development in order to ensure that any projects are integrated into wider strategies. and plans with regard to socio-economic development.

Traffic

- A Traffic Management Plan (TMP) is required to outline specific traffic management measures across all phases of the development.

General

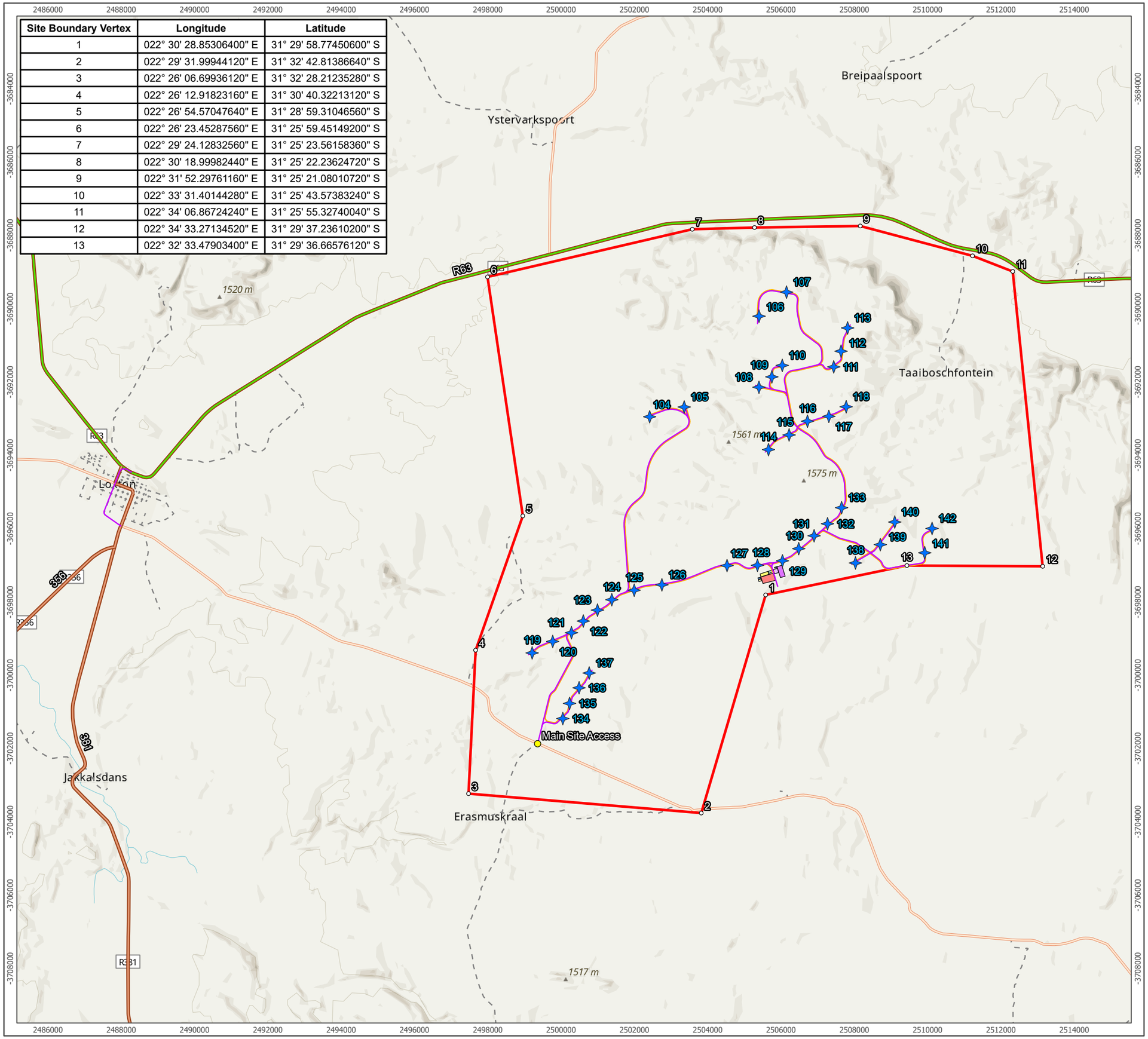
Following the final design of the Loxton WEF 3, a Final Site Layout Plan must be submitted to DFFE for review and approval prior to commencing with construction.

A validity period of 15 years of the Environmental Authorisation is requested, should the project obtain approval from DFFE.

15 CONCLUSION

Based on the finding of the specialist studies, the information contained in this environmental impact assessment report and the evolution of the site development plan, it is the opinion of the EAP that the proposed development can be authorised, provided the above listing mitigation measures as well as those contained in the Draft EMPr are adhered to by the applicant.

Site Boundary Vertex	Longitude	Latitude
1	022° 30' 28.85306400" E	31° 29' 58.77450600" S
2	022° 29' 31.99944120" E	31° 32' 42.81386640" S
3	022° 26' 06.69936120" E	31° 32' 28.21235280" S
4	022° 26' 12.91823160" E	31° 30' 40.32213120" S
5	022° 26' 54.57047640" E	31° 28' 59.31046560" S
6	022° 26' 23.45287560" E	31° 25' 59.45149200" S
7	022° 29' 24.12832560" E	31° 25' 23.56158360" S
8	022° 30' 18.99982440" E	31° 25' 22.23624720" S
9	022° 31' 52.29761160" E	31° 25' 21.08010720" S
10	022° 33' 31.40144280" E	31° 25' 43.57383240" S
11	022° 34' 06.86724240" E	31° 25' 55.32740040" S
12	022° 34' 33.27134520" E	31° 29' 37.23610200" S
13	022° 32' 33.47903400" E	31° 29' 36.66576120" S



ARCUS

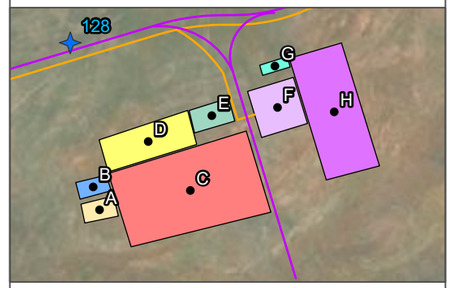
- Turbine Location
- Site Access Location
- Access Road
- MV Cable
- Site Boundary Vertex
- Site Boundary

Associated Infrastructure

- BESS
- Batching Plant
- Construction Laydown Area
- O&M Building
- Parking Bays
- Site Camp
- Storage Area
- Substation

Public Roads

- Arterial Road
- Main Road
- Secondary Road
- Minor Roads



Sources: Esri, HERE, Garmin, FAO, NOAA, USGS, © OpenStreetMap contributors, CNES/Airbus DS, InterMap, NASA/METI, NASA/NGS and the GIS User Community , Earthstar Geographics, Maxar

1:100,000 Scale @ A3

0 2 4 km

NORTH

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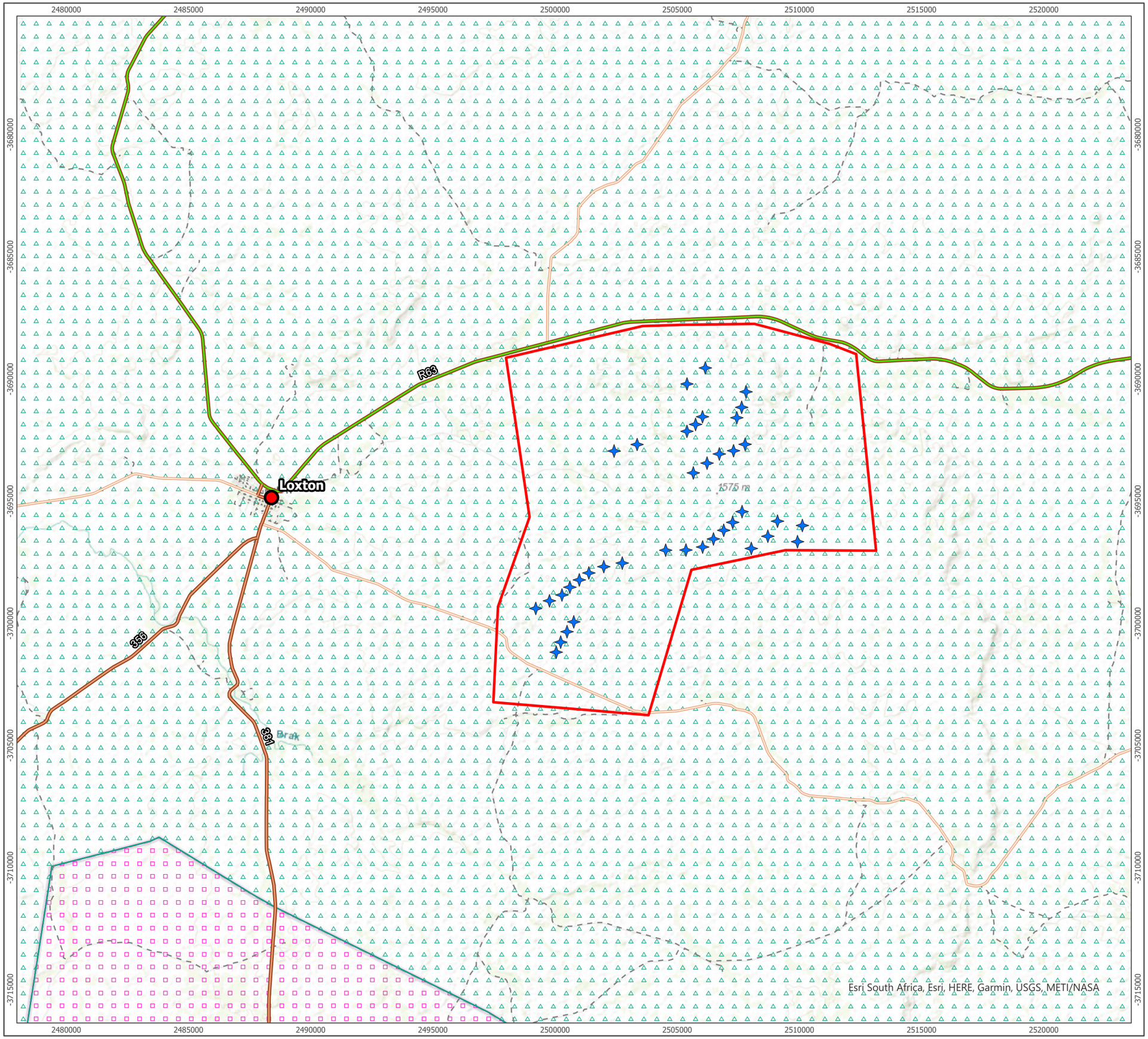
Preliminary Development Geographical Co-ordinates
Figure 15

Loxton WEF 3
Scoping Report

\\uksprdgisfs01\Data\Arcus\SA-GIS\Ecology\4462 Loxton WEF\4462_Loxton_WEF\4462_Loxton_WEF_WB.aprx\4462-GIS-015 Loxton WEF 3 Proposed Developmental Geographical Co-ordinates



\\uksprdgisfs01\Data\Arcus\SA-GIS\Ecology\4462 Loxton WEF\4462_Loxton_WEF\4462_Loxton_WEF_WB.aprx\4462-GIS-016 Loxton WEF 3 Site Location

ARCUS

- Turbine Location
- Loxton
- Site Boundary

Local Municipalities

- Beaufort West
- Ubuntu

Public Roads

- Arterial Road
- Main Road
- Secondary Road
- Minor Roads

1:150,000 Scale @ A3

0 3 6 km

NORTH

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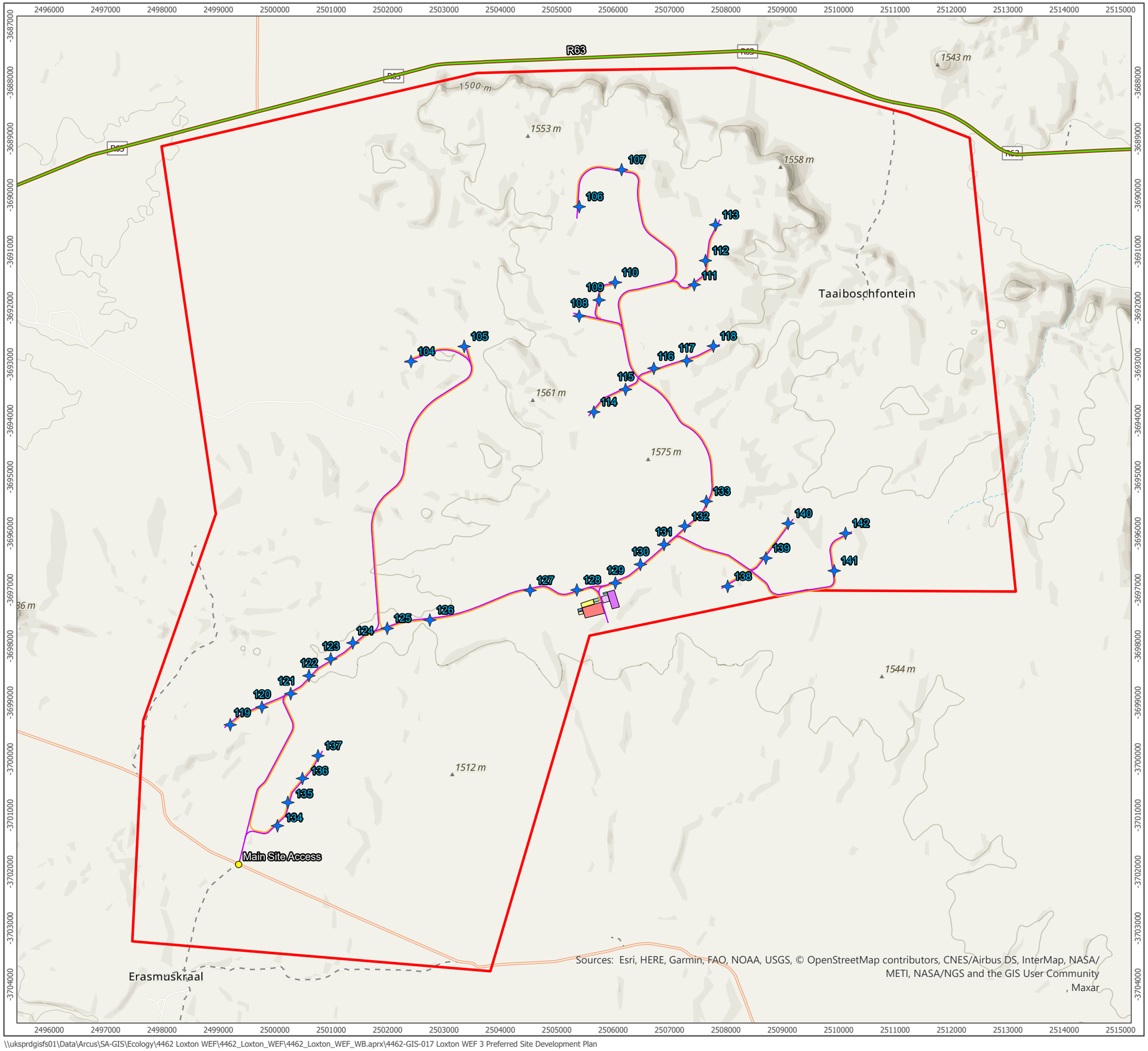
Site Locality
Figure 16

Loxton WEF 3
Scoping Report



ARCUS

- Turbine Location
- Site Access Location
- Access Road
- MV Cable
- Site Boundary

Associated Infrastructure

- BESS
- Batching Plant
- Construction Laydown Area
- O&M Building
- Parking Bays
- Site Camp
- Storage Area
- Substation

Public Roads

- Arterial Road
- Secondary Road
- Minor Roads

1:65,000 Scale @ A3

0 1 2 km

NORTH

Produced By: WB	Ref: 4462-GIS-017
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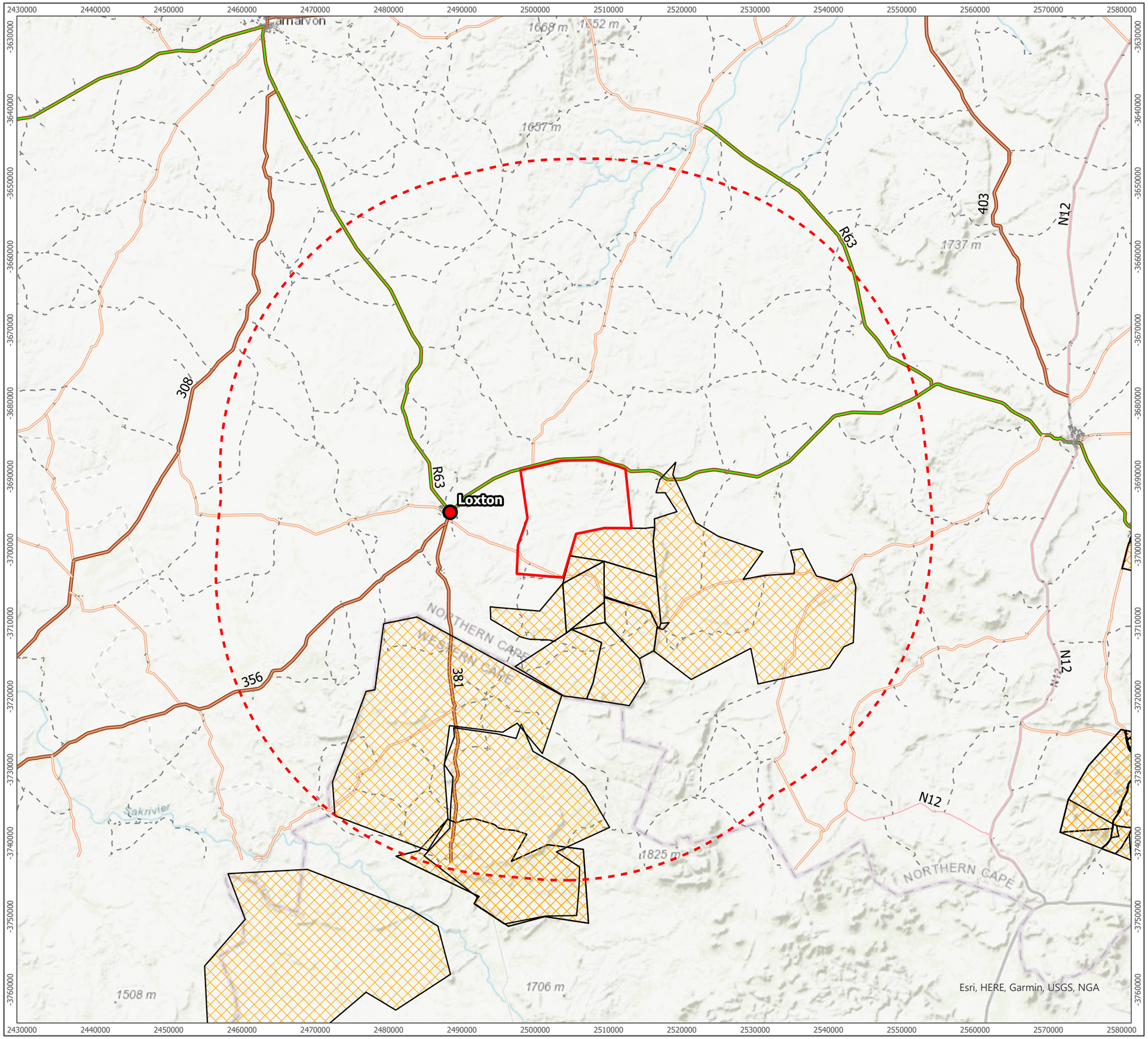
Preferred Site Development Plan
Figure 17

Loxton WEF 3 Scoping Report

\\uksprdgisfs01\Data\Arcus\SA-GIS\Ecology\4462 Loxton WEF\4462_Loxton_WEF\4462_Loxton_WEF_WB.aprx\4462-GIS-017 Loxton WEF 3 Preferred Site Development Plan



ARCUS

- Site Boundary
- 35 km Buffer of Site Boundary
- Renewable Energy EIA Applications (2022 Q4)
- Loxton

Public Roads

- Arterial Road
- Main Road
- National Road
- Secondary Road
- Minor Roads

1:500,000 Scale @ A3

0 10 20 km

NORTH

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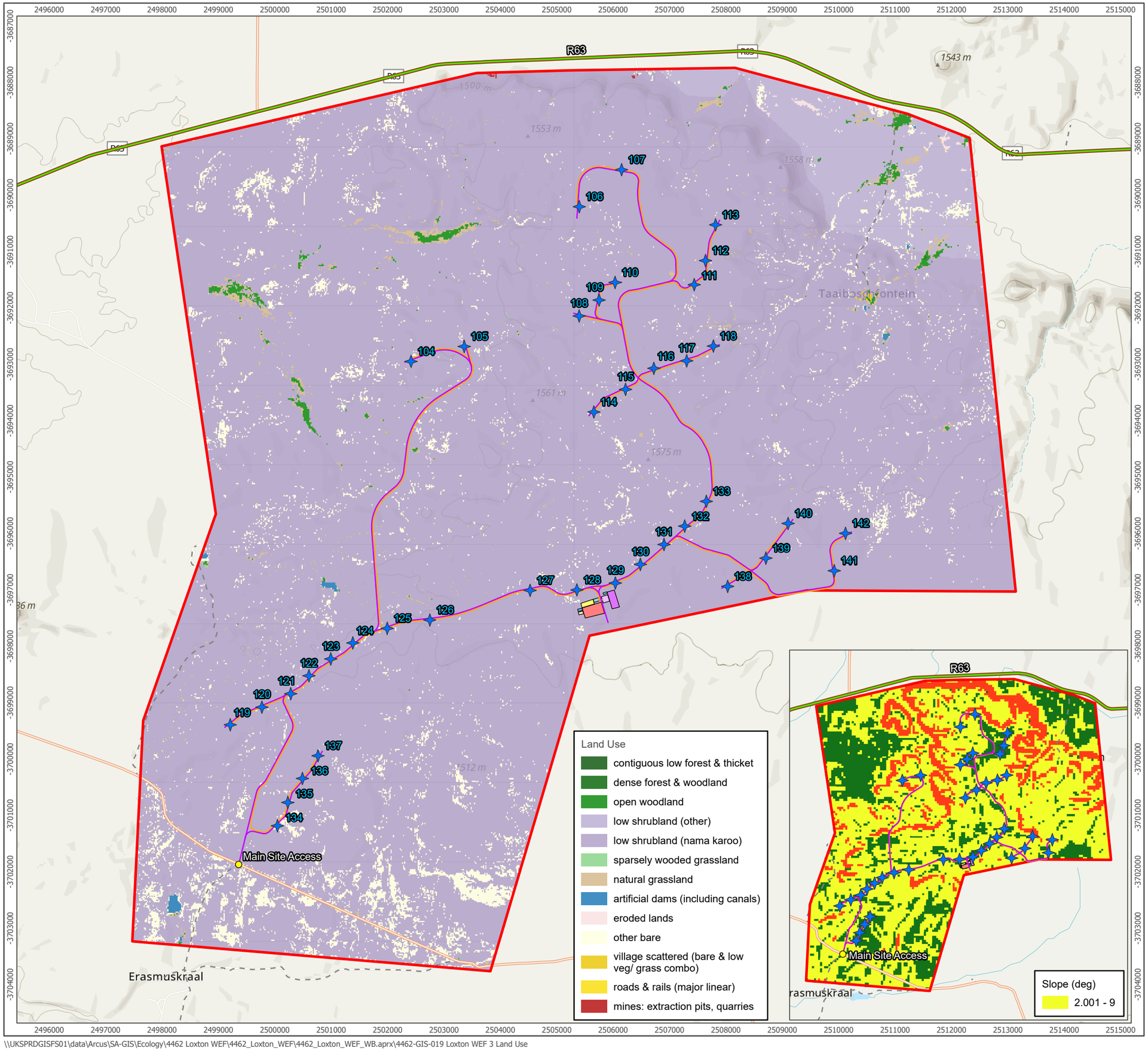
Checked By: AA	Date: 11/05/2023

Renewable Energy Projects within 35 km radius

Figure 18

Loxton WEF 3
Scoping Report

\\uksprdgisfs01\Data\Arcus\SA-GIS\Ecology\4462 Loxton WEF\4462_Loxton_WEF\4462_Loxton_WEF_WB.aprx\4462-GIS-018 Loxton WEF 3 Renewable Energy Projects within 35 km radius



ARCUS

- Turbine Location
- Site Access Location
- Access Road
- MV Cable

Associated Infrastructure

- BESS
- Batching Plant
- Construction Laydown Area
- O&M Building
- Parking Bays
- Site Camp
- Storage Area
- Substation
- Site Boundary

Public Roads

- Arterial Road
- Secondary Road
- Minor Roads

1:65,000 Scale @ A3

0 1 2 km

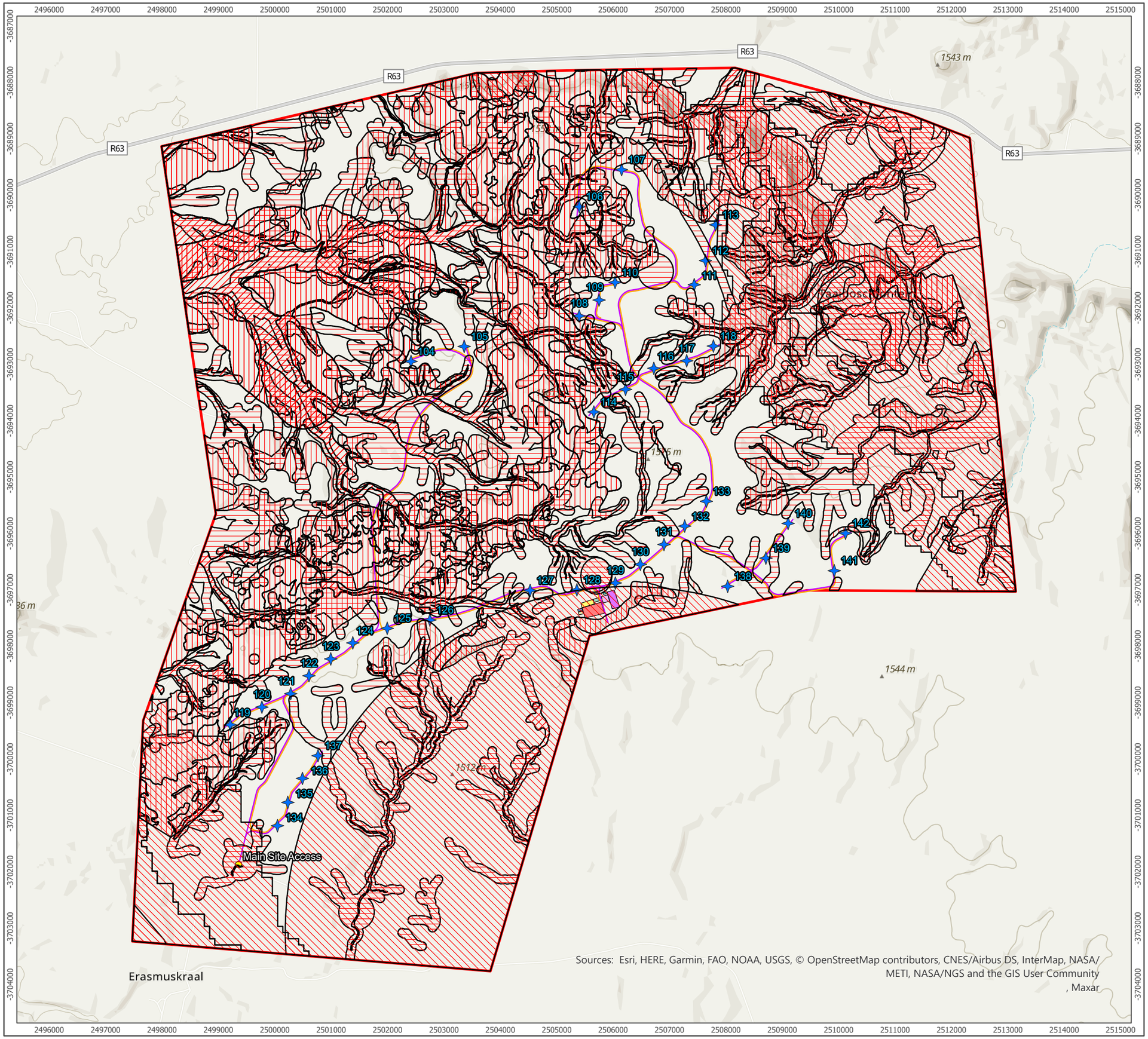
NORTH

Produced By: WB	Ref: 4462-GIS-019
Checked By: AA	Date: 11/05/2023

Land Use
Figure 19

Loxton WEF 3
Scoping Report

\\UKSPRDGISFS01\data\Arcus\SA-GIS\Ecology\4462 Loxton WEF\4462_Loxton_WEF\4462_Loxton_WEF_WB.aprx\4462-GIS-019 Loxton WEF 3 Land Use



ARCUS

- Turbine Location
- Site Access Location
- Access Road
- MV Cable
- Site Boundary
- Aquatic No Go Areas
- Turbines - Avifauna No Go Areas
- Ecology No Go Areas
- Bat No Go Areas

Associated Infrastructure

- BESS
- Batching Plant
- Construction Laydown Area
- O&M Building
- Parking Bays
- Site Camp
- Storage Area
- Substation

1:65,000 Scale @ A3

0 1 2 km

NORTH

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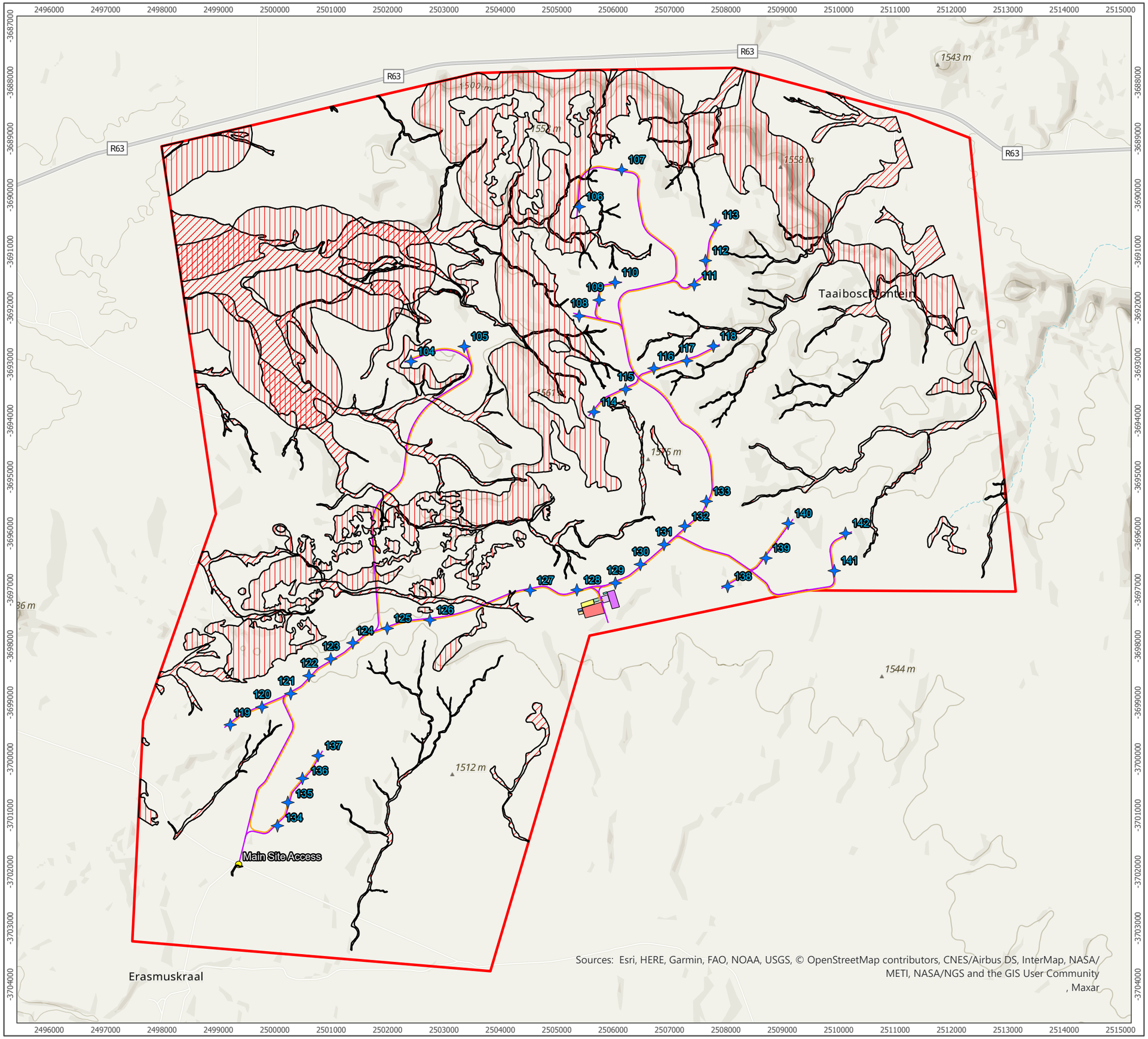
Environmental Sensitivity Map (No Go Areas)
Figure 21

Loxton WEF 3
Scoping Report

\\UKSPRDGISFS01\data\Arcus\SA-GIS\Ecology\4462 Loxton WEF\4462_Loxton_WEF\4462_Loxton_WEF_WB.aprx\4462-GIS-021 Loxton WEF 3 Environmental Sensitivity Map - All NG



ARCUS

- Turbine Location
- Site Access Location
- Access Road
- MV Cable
- Site Boundary
- Associated Infrastructure - Aquatic No Go Areas
- Associated Infrastructure - Ecology No Go Areas

Associated Infrastructure

- BESS
- Batching Plant
- Construction Laydown Area
- O&M Building
- Parking Bays
- Site Camp
- Storage Area
- Substation

1:65,000 Scale @ A3

0 1 2 km

NORTH

Produced By: WB	Ref: 4462-GIS-021
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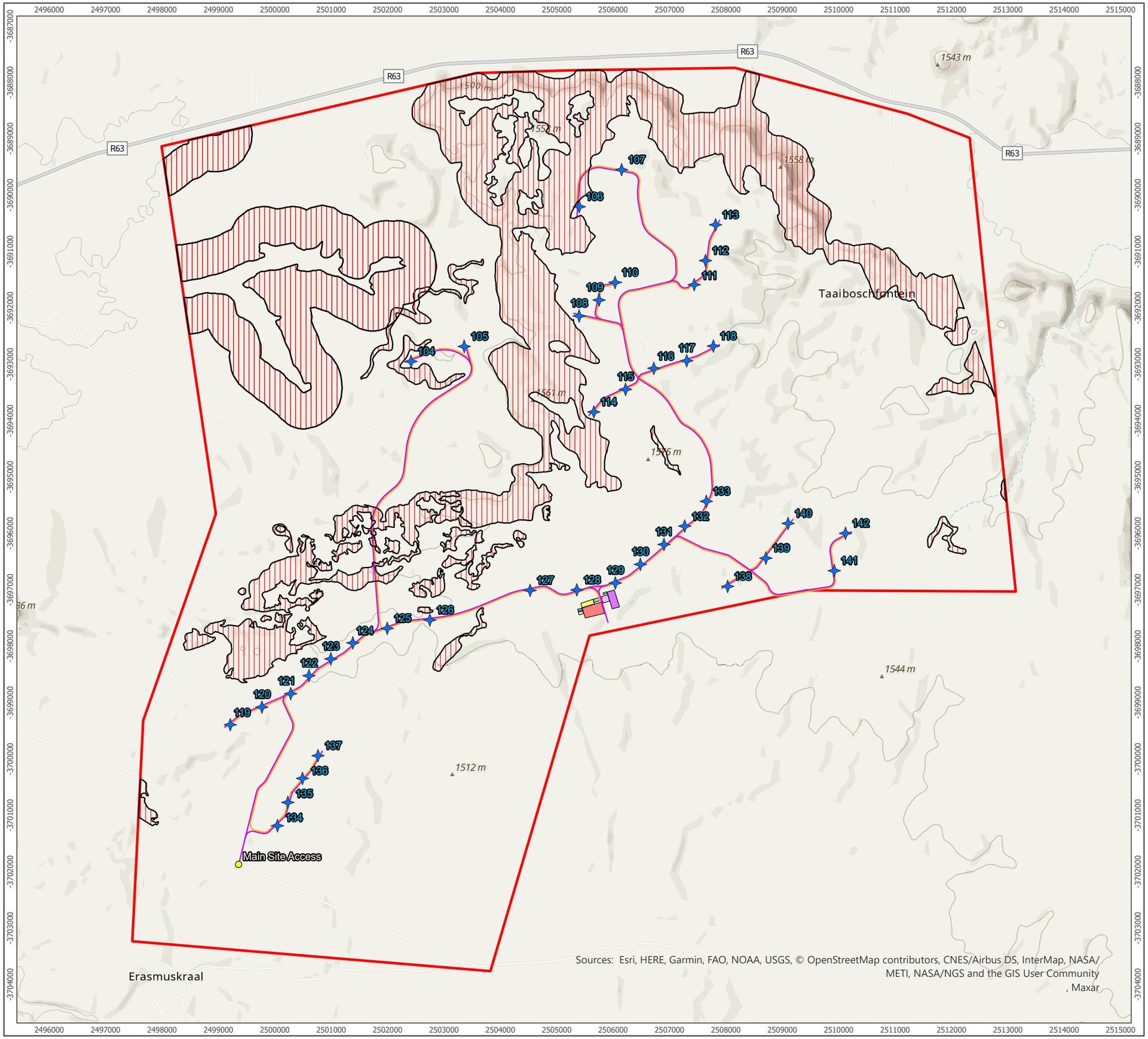
Environmental Sensitivity Map (Turbine No Go Areas)
Figure 21.1

Loxton WEF 3
Scoping Report

\\UKSPRDGISFS01\data\Arcus\SA-GIS\Ecology\4462 Loxton WEF\4462_Loxton_WEF\4462_Loxton_WEF_WB.aprx\4462-GIS-021 Loxton WEF 3 Environmental Sensitivity Map - Associated Infrastructure NG



Sources: Esri, HERE, Garmin, FAO, NOAA, USGS, © OpenStreetMap contributors, CNES/Airbus DS, InterMap, NASA/ METI, NASA/NGS and the GIS User Community , Maxar

ARCUS

- Turbine Location
- Site Access Location
- Access Road
- MV Cable
- Roads and MV Cables - Ecology No Go Areas
- Site Boundary

Associated Infrastructure

- BESS
- Batching Plant
- Construction Laydown Area
- O&M Building
- Parking Bays
- Site Camp
- Storage Area
- Substation

1:65,000 Scale @ A3

0 1 2 km

NORTH

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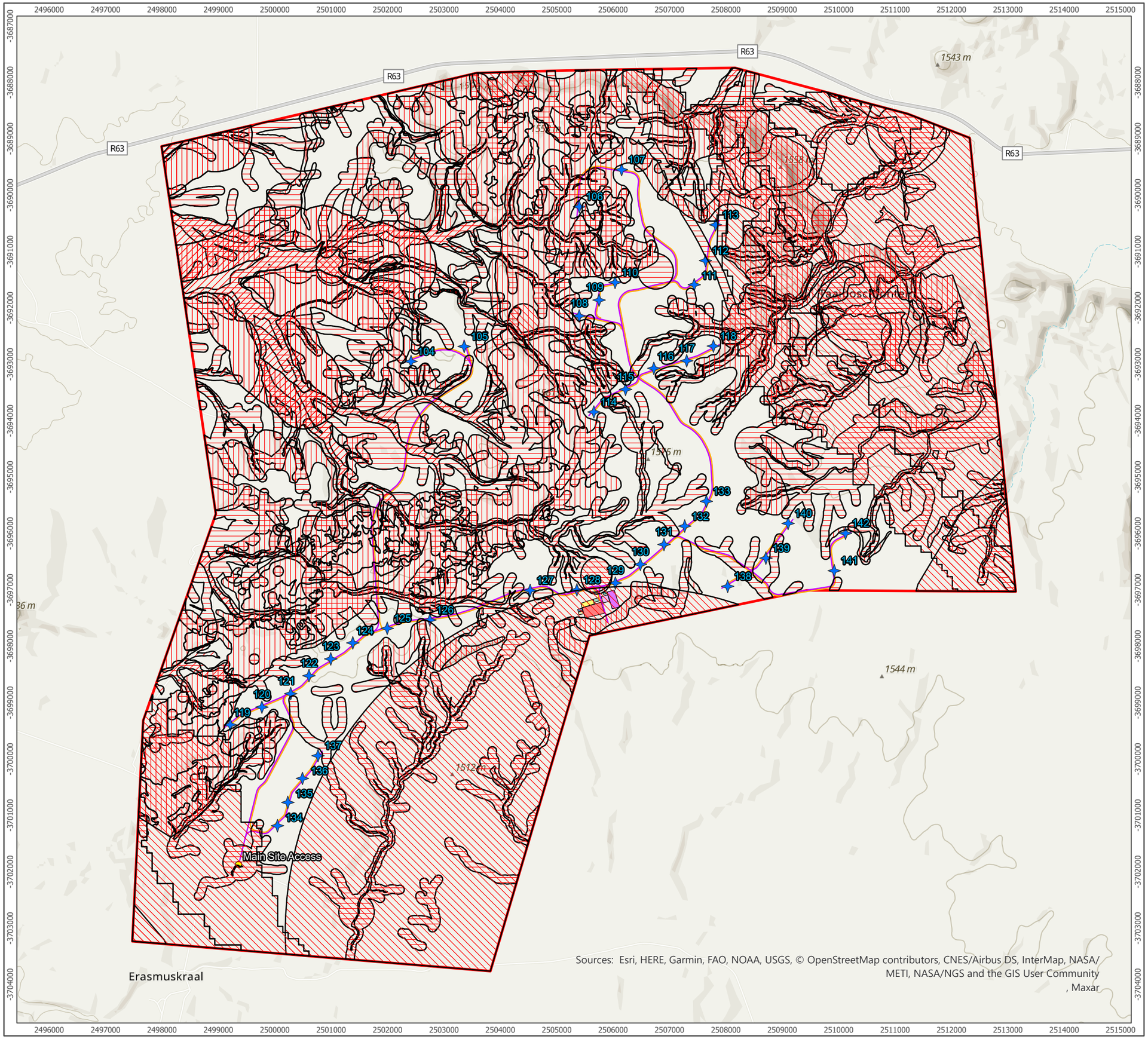
Environmental Sensitivity Map (Roads and MV Cables No Go Areas)
Figure 21.2

Loxton WEF 3
Scoping Report

\\UKSPRDGISFS01\data\Arcus\SA-GIS\Ecology\4462 Loxton WEF\4462_Loxton_WEF\4462_Loxton_WEF_WB.aprx\4462-GIS-021 Loxton WEF 3 Environmental Sensitivity Map - Roads and Cables NG



ARCUS

- Turbine Location
- Site Access Location
- Access Road
- MV Cable
- Turbines - Aquatic No Go Areas
- Turbines - Avifauna No Go Areas
- Turbines - Ecology No Go Areas
- Bat No Go Areas
- Site Boundary

Associated Infrastructure

- BESS
- Batching Plant
- Construction Laydown Area
- O&M Building
- Parking Bays
- Site Camp
- Storage Area
- Substation

1:65,000 Scale @ A3

0 1 2 km

NORTH

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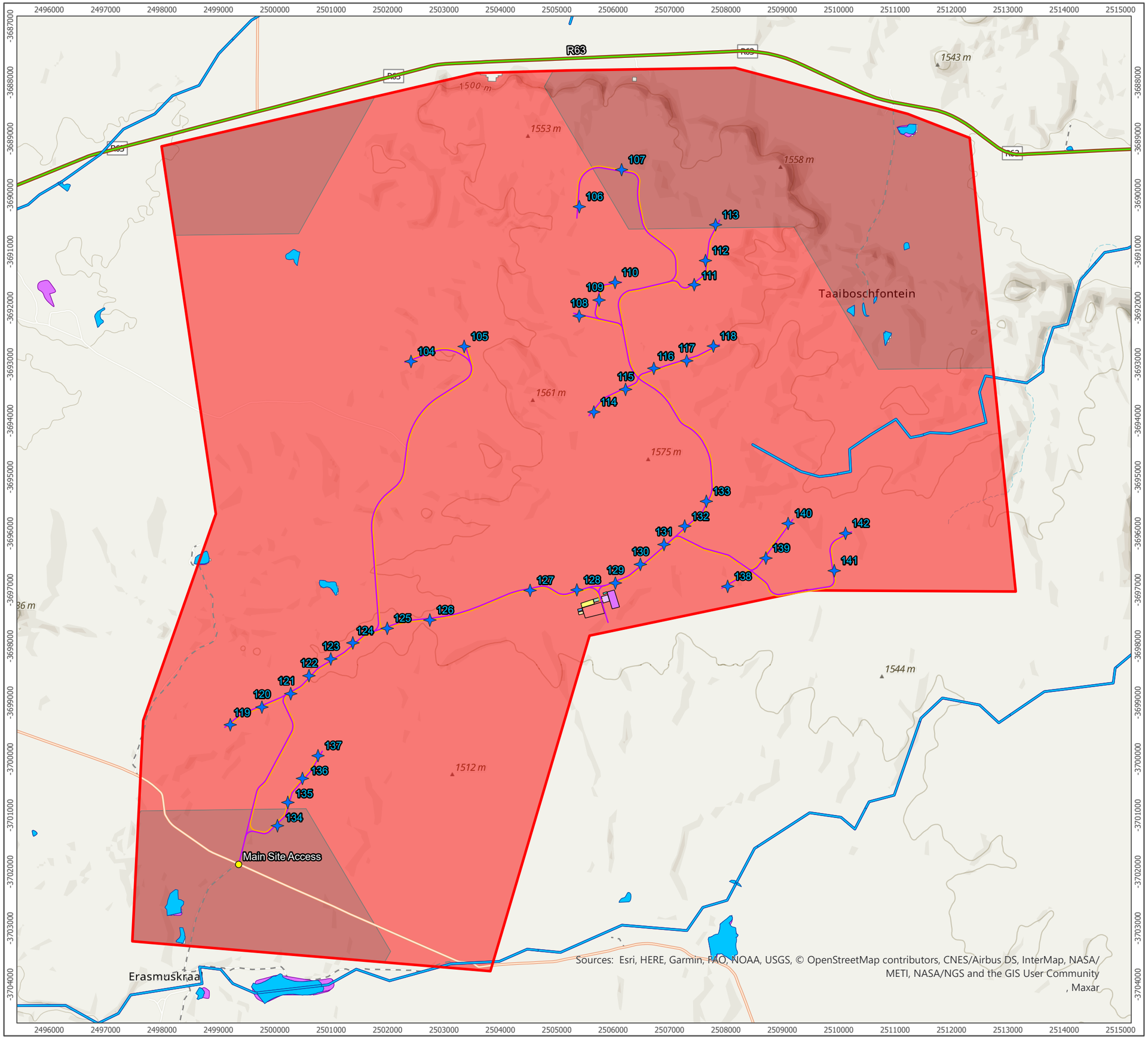
Environmental Sensitivity Map (Turbine No Go Areas)
Figure 21.1

Loxton WEF 3
Scoping Report

\\UKSPRDGISFS01\data\Arcus\SA-GIS\Ecology\4462 Loxton WEF\4462_Loxton_WEF\4462_Loxton_WEF_WB.aprx\4462-GIS-021 Loxton WEF 3 Environmental Sensitivity Map - Turbines NG



ARCUS

- Turbine Location
- Site Access Location
- Access Road
- MV Cable
- Site Boundary

Associated Infrastructure

- BESS
- Batching Plant
- Construction Laydown Area
- O&M Building
- Parking Bays
- Site Camp
- Storage Area
- Substation
- Rivers (NBA)
- Rivers (NFEPA)
- Artificial Wetlands (NBA)
- Wetlands (NFEPA)

Public Roads

- Arterial Road
- Secondary Road
- Minor Roads
- Critical Biodiversity Area One
- Critical Biodiversity Area Two

1:65,000 Scale @ A3

0 1 2 km

NORTH

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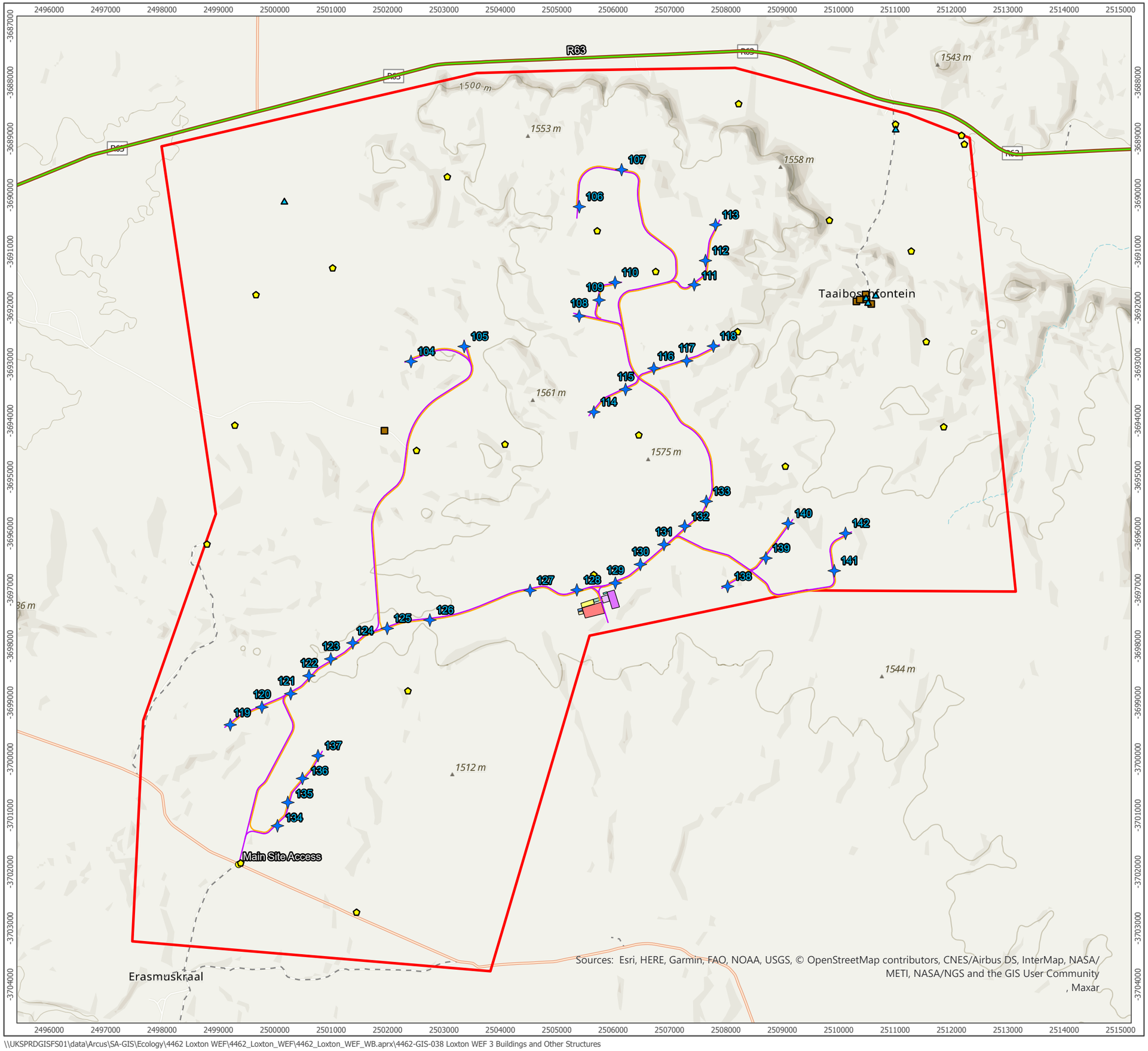
Critical Biodiversity Areas
Figure 20

Loxton WEF 3
Scoping Report

\\UKSPRDGISFS01\data\Arcus\SA-GIS\Ecology\4462 Loxton WEF\4462_Loxton_WEF\4462_Loxton_WEF_WB.aprx\4462-GIS-020 Loxton WEF 3 Critical Biodiversity Areas



ARCUS

- House
- Water Reservoir
- Wind Pump
- Turbine Location
- Site Access Location
- Access Road
- MV Cable

Associated Infrastructure

- BESS
- Batching Plant
- Construction Laydown Area
- O&M Building
- Parking Bays
- Site Camp
- Storage Area
- Substation
- Site Boundary

Public Roads

- Arterial Road
- Secondary Road
- Minor Roads

1:65,000 Scale @ A3

0 1 2 km

NORTH

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Checked By: AB	Date: 12/05/2023

Buildings and Other Structures
Figure 38

Loxton WEF 3
Scoping Report

\\UKSPRDGISFS01\data\Arcus\SA-GIS\Ecology\4462 Loxton WEF\4462_Loxton_WEF\4462_Loxton_WEF_WB.aprx\4462-GIS-038 Loxton WEF 3 Buildings and Other Structures