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Aquatic Ecology and Surface Water Impact Assessments for the proposed 240MW Klipkraal Phase 2 Wind Farm and associated Battery Energy Storage System in the Northern Cape Province

Aquatic Ecological Specialist Report

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EXECUTIVE SUMMARY

The nature of the aquatic features that are located within the study area is largely dry for long periods. Their "seasonality" is therefore not annually as can be expected of aquatic features in South Africa. The irregular nature of these aquatic features is based on the irregular nature of the rainfall in the larger area. All the aquatic features that were identified, had a PES of Class B (Largely natural) and an EIS that has been classified as being Low (largely based on their irregular nature).

The nature of the wind farm is such that it carries a low intensity impact on aquatic features with the consideration of the prescribed buffers contained in this assessment. A wind farm typically targets higher lying area where wind resources are best, therefore keeping the turbine locations away from the freshwater resources on the study area. However, the associated infrastructure (roads, underground and above ground cabling as well as the construction and operational facilities may come into contact with the aquatic features.

The Klipkraal WEF phase 2 also has a small footprint spread over a large area, allowing for the retention of a much of the natural system so that the system should remain largely unaffected. A variety of aquatic features, mostly ephemeral in nature were observed within the study area and were mapped and buffered as necessary for their protection and handed over as constraints to inform the design of the project layout. The impact assessment was conducted in consideration of the provision of these buffers providing for management and mitigation for potential impacts.

The provided layout (revised by the screening and pre-application scoping phase inputs) has, to a large degree, avoided any sensitive aquatic features and associated buffer areas, significantly reducing the potential overall impact and risk to aquatic resources on the study site. The assessment of the potential impacts associated with the project were completed where avoidance of aquatic features was not possible, or the nature of the activities involve a potential risk to aquatic features even at great distance. Overall, it is expected that the impact on the aquatic environment would be Low Negative.

The assessment report makes a recommendation for the implementation of a 40m buffer around any watercourse and a buffer of 100m from any of the ephemeral wetlands that have been identified as well as any of the farm dams on the property. Adherence to these buffers as prescribed further limits the potential impact on the aquatic environment of the study site. Where watercourses must be crossed by access roads or cable infrastructure, the design of these crossings must make provision for adequate

hydraulic sizing to prevent any damming on the upstream side of these structures. Furthermore, the functionality of these structures must be monitored to ensure that they are kept fully functional.

Typically, the water sources for windfarm developments depend on the groundwater. No information in this regard has been provided, however, it is understood that a Geohydrological Assessment will be conducted to understand the groundwater availability in the area as well as the suitability of this water resources for the provision of water for the windfarm. As a result of the ephemeral nature of the aquatic features that have been identified on the study site as well as their highly irregular inundation, the likelihood of the groundwater abstraction directly affecting these features is highly unlikely.

NATIONAL ENVIRONMENTAL MANAGEMENT ACT, 1998 (ACT NO. 107 OF 1998) AND ENVIRONMENTAL IMPACT REGULATIONS, 2014 (AS AMENDED) - REQUIREMENTS FOR SPECIALIST REPORTS (APPENDIX 6)

Regulation GNR 326 of 4 December 2014, as amended 7 April 2017, Appendix 6	**Section of Report**
1. (1) A specialist report prepared in terms of these Regulations must contain- a) details of- i. the specialist who prepared the report; and ii. the expertise of that specialist to compile a specialist report including a curriculum vitae;	Section 1.2
b) a declaration that the specialist is independent in a form as may be specified by the competent authority;	Section 1.3
c) an indication of the scope of, and the purpose for which, the report was prepared;	Section 3
(cA) an indication of the quality and age of base data used for the specialist report;	Section
(cB) a description of existing impacts on the site, cumulative impacts of the proposed development and levels of acceptable change;	Section 6
d) the date and season of the site investigation and the relevance of the season to the outcome of the assessment;	Section 1.4
e) a description of the methodology adopted in preparing the report or carrying out the specialised process inclusive of equipment and modelling used;	Section 1.4
f) details of an assessment of the specific identified sensitivity of the site related to the proposed activity or activities and its associated structures and infrastructure, inclusive of a site plan identifying site alternatives;	Section 6
g) an identification of any areas to be avoided, including buffers;	Section 5
h) a map superimposing the activity including the associated structures and infrastructure on the environmental sensitivities of the site including areas to be avoided, including buffers;	Section 5

i) a description of any assumptions made and any uncertainties or gaps in knowledge;	Section 2
j) a description of the findings and potential implications of such findings on the impact of the proposed activity, (including identified alternatives on the environment) or activities;	Section 6
k) any mitigation measures for inclusion in the EMPr;	Section 6
l) any conditions for inclusion in the environmental authorisation;	Section 6
m) any monitoring requirements for inclusion in the EMPr or environmental authorisation;	Section 6
n) a reasoned opinion- i. (as to) whether the proposed activity, activities or portions thereof should be authorised; (iA) regarding the acceptability of the proposed activity or activities; and ii. if the opinion is that the proposed activity, activities or portions thereof should be authorised, any avoidance, management and mitigation measures that should be included in the EMPr, and where applicable, the closure plan;	Section 8
o) a description of any consultation process that was undertaken during the course of preparing the specialist report;	NA
p) a summary and copies of any comments received during any consultation process and where applicable all responses thereto; and	NA
q) any other information requested by the competent authority.	NA
2) Where a government notice *gazetted* by the Minister provides for any protocol or minimum information requirement to be applied to a specialist report, the requirements as indicated in such notice will apply.	Section 1.1

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Glossary of Terms and Acronyms

BESS	Battery Energy Storage System
CBA	Critical Biodiversity Area
DFFE	Department of Forestry, Fishers and Environment
DWS	Department of Water and Sanitation
EIA	Environmental Impact Assessment
EIS	Ecological Importance and Sensitivity
ESA	Ecological Support Area
NFEPA	National Feshwater Ecosystem Priority Atlas
PES	Pesent Ecological State
SANBI	South African National Biodiversity Institute
WEF	Wind Energy Facility

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1. INTRODUCTION

The Aura Development Company (Pty) Ltd (hereafter referred to as 'Aura') are proposing to develop up to five (5) wind farms and associated infrastructure [including substations and Battery Energy Storage Systems (BESS)] on a number of properties, majority being adjacent, near the town of Fraserburg in the Northern Cape Province of South Africa. The proposed wind farm projects will have maximum export capacities of up to approximately 240 megawatt (MW) respectively. The proposed wind farms make up a larger wind energy facility (WEF) (with associated BESS) which will be referred to as the Klipraal WEF, consisting of up to five (5) phases, with a combined generation capacity of up to approximately 1 200 MW. This report relates to the aquatic ecology associated with the following component:

- Klipkraal Phase 2 Wind Farm: up to 240MW + BESS (this application)

The overall objective of the proposed wind farm projects is to generate electricity by means of renewable energy technologies, capturing wind energy to feed into the national grid, which will be procured under either the Renewable Energy Independent Power Producer Procurement Programme (REIPPPP), other government run procurement programmes, any other program it intends to supply power to or for sale to private entities, if required. To further ensure efficient power delivery, the facility will also incorporate the use of storage technologies like batteries (i.e. BESS).

It is anticipated that the proposed Klipkraal Phase 2 WEF will comprise 40 wind turbines with a maximum total energy generation capacity of up to approximately 240MW. The electricity generated by the proposed WEF development will be fed into the national grid *via* a 132kV/400kV overhead power line. A Battery Energy Storage System (BESS) will be located next to the onsite 33/132kV substation. The storage capacity and type of technology would be determined at a later stage during the development phase, but most likely will comprise an array of containers, outdoor cabinets and/or storage tanks.

In terms of the Environmental Impact Assessment (EIA) Regulations, which were published on 4 December 2014 [GNR 982, 983, 984 and 985) and amended on 07 April 2017 [promulgated in Government Gazette 40772 and Government Notice (GN) R326, R327, R325 and R324 on 7 April 2017], various aspects of the proposed development are considered listed activities under GNR 327 and GNR 324 which may have an

impact on the environment and therefore require authorisation from the National Competent Authority (CA), namely the Department of Forestry, Fisheries and Environment (DFFE), prior to the commencement of such activities. Specialist studies have been commissioned to assess and verify the project under the new Gazetted specialist protocols.

1.1 Terms of Reference

It is understood that the assessment will be submitted as part of the Application for Environmental Authorisation in accordance with the National Environmental Management Act (Act No. 107 of 1998): Environmental Impact Assessment (EIA) Regulations (2014), as amended. As such, the assessment is completed in accordance with the minimum requirements for specialist assessments as included in Appendix 4 of the EIA Regulations (2014), as amended.

In brief, these requirements have as an outcome to achieve the following:

- A methodology of the site visit and techniques used to assess the specific aspects of the site;
- Details of the assessment of the specific identified sensitivity of the site related to the proposed activity or activities and its associated structures and infrastructure, inclusive of site plan identifying site alternatives (where applicable);
- An indication of any areas that are to be avoided, including provision of buffers;
- A description of any assumptions made and any uncertainties or gaps in knowledge;
- A description of the findings and potential implications of such findings on the impact of the proposed activities;
- Any mitigation measures for inclusion in the Environmental Management Programme Report (EMPr);
- Any conditions for inclusion in the Environmental Authorisation and the Water Use Licence;
- Any monitoring requirements for inclusion into the EMPr or Water Use Licence; and
- A reasoned opinion whether the activity should be authorised based on the findings of the assessment.

Furthermore, an interrogation of the Department of Forestry, Fisheries and Environment's Online Screening Tool has indicated that the Aquatic Biodiversity Theme for the study area is classified as a combination of "Very High" and "Low". The large majority of the property under assessment is classified as having a "Low" sensitivity with only very small portions being classified as having a "Very High" sensitivity. The map below is an extract from the Screening Assessment (full report in Appendix C).

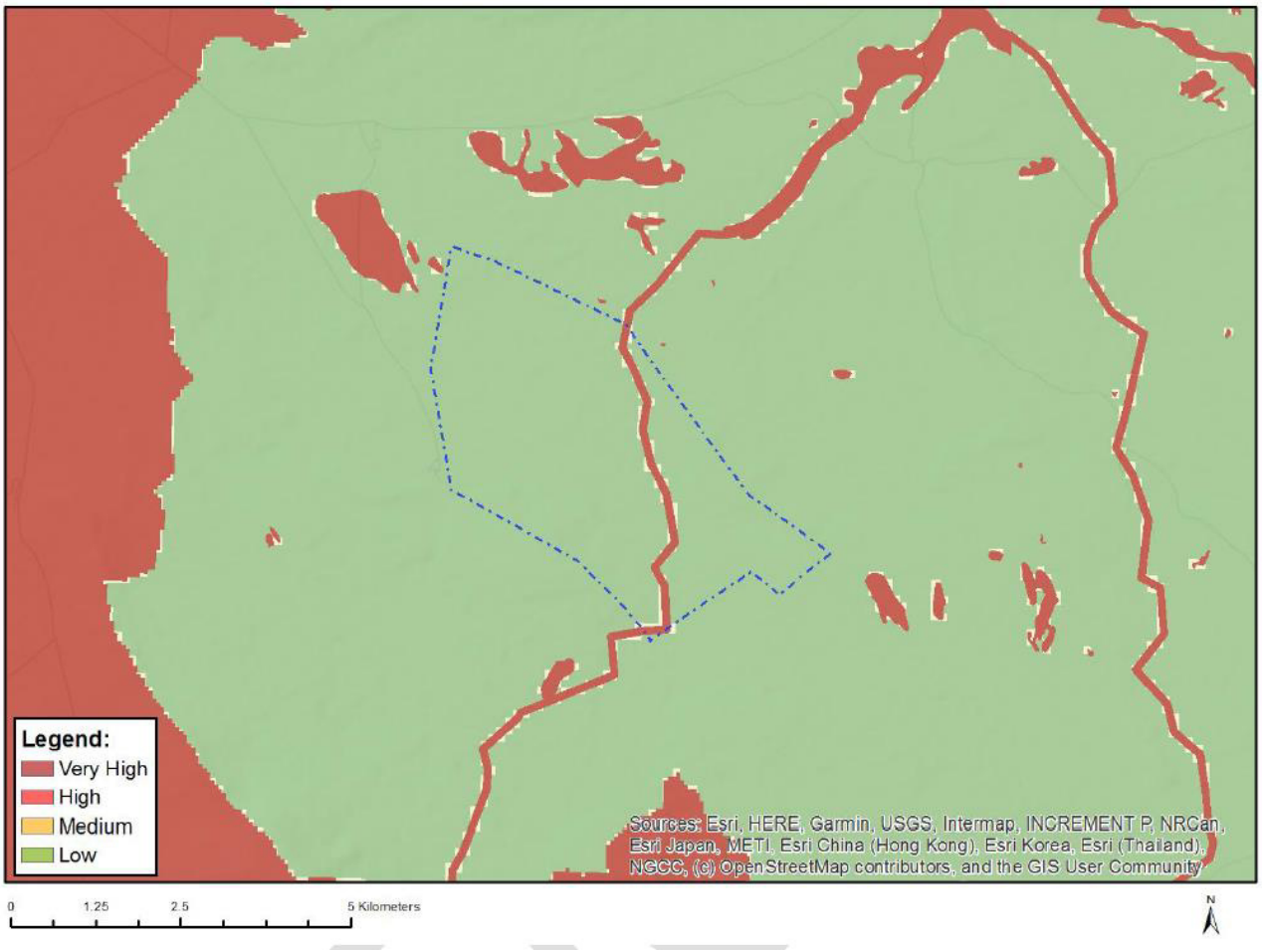


Figure 1-1: Aquatic Sensitivity Map as produced by the DFFE Online Screening Tool

1.2 Specialist Credentials

Mr Magnus van Rooyen is a registered natural scientist with the South African Council of Natural Scientific Professions (SACNASP) and holds a Master's degree in Environmental Management, a BSc Honours degree in Botany and a BSc degree in Botany and Zoology from the University of Stellenbosch. Mr van Rooyen has in excess of 15 years' experience in the field of wetland and terrestrial ecological studies in Southern and Western Africa. The curriculum vitae of the specialist, Mr Magnus van Rooyen is attached in Appendix A.

1.3 Specialist Declaration

I, Magnus Van Rooyen, declare that:

- I act as an independent specialist;
- Results will be interpreted in an objective manner, even if the viewpoints are not favourable to the applicant;
- I have the relevant expertise to conduct a report of this nature, including knowledge of the National Environmental Management Act (Act 107 of 1998) and the National Water Act (Act 36 of 1998);

- I will comply with the act(s) and other relevant legislation; and
- I understand that any false information published in this document is an offense in terms of regulation 71 and is punishable in terms of Section 24 (f) of the Act.

_____

Magnus Van Rooyen
Environmental Scientist
Pr.Sci.Nat 400335/11

1.4 Assessment Methodology

The assessment methodology used for conducting the assessment is in line with achieving the requirements of the DFFE Online Screening Tool Protocol (Attached in Appendix C) as well as to meet the requirements of Appendix 6 of the NEMA EIA Regulations (2014), as amended. As such, the following methodology was followed.

1.4.1 Wetland Identification and Mapping

The initial wetland identification process was conducted at a desktop level during which available GIS databases were interrogated to determine the presence of any wetland areas that has been determined in the past. The key database in that was interrogated was the National Freshwater Ecosystem Priority Area (NFEPA) as managed and updated by the South African National Biodiversity Institute (SANBI).

In addition to the database interrogation, the most recent Google Earth and Zoom Earth Imagery of the site was considered to see if any wetland areas or "anomalies" within the site are visible.

Following the desktop assessment of the site, site visits were conducted on 14 October 2021 and 2-3 March 2022. During the site visit, the potential aquatic features identified through the desktop assessment were verified and any other aquatic features were identified and their boundaries accurately delineated.

1.4.2 Wetland Delineation

The delineation of these wetlands areas was conducted in accordance with the Department of Water and Sanitation document, *"A practical field procedure for identification and delineation of wetlands and riparian areas"* (2005).

This field guide makes use of several specific indicators which show the presence and the boundaries of wetlands. The presence of the following indicators was used during the identification and delineation of the site:

- ***Terrain Unit Indicator*** – Identification of the part of the landscape where wetlands are more likely to occur;
- ***Soil Form Indicator*** – Identification of the soil types which are associated with prolonged and frequent saturation;
- ***Soil Wetness Indicator*** – Identification of the morphological signatures that develop in soil profiles as a result of prolonged and frequent saturation; and
- ***Vegetation Indicator*** – Identification of the hydrophilic vegetation associated with frequently saturated soil.

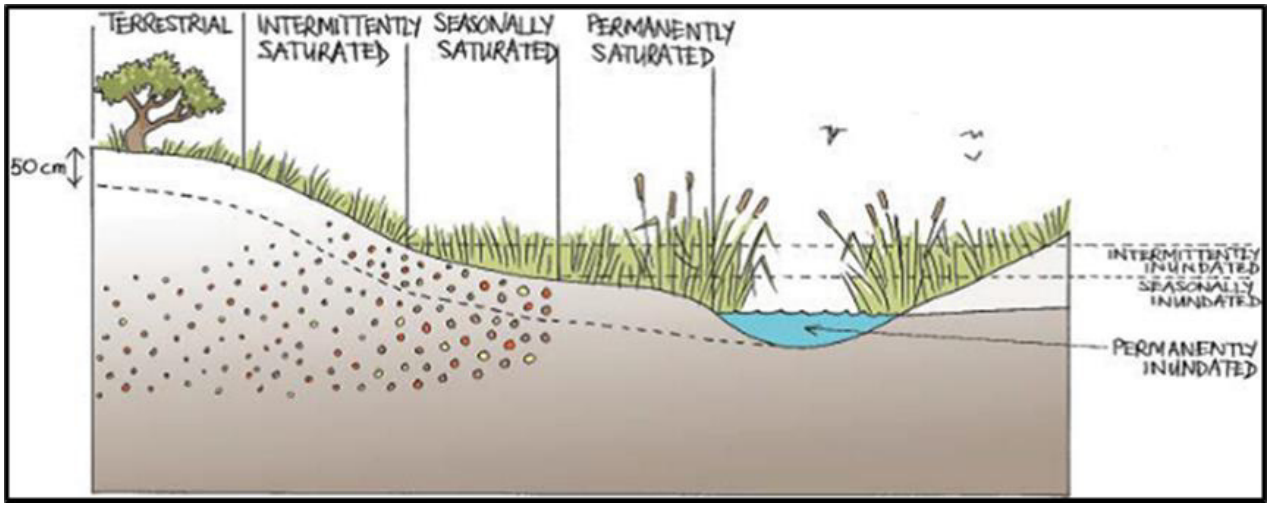
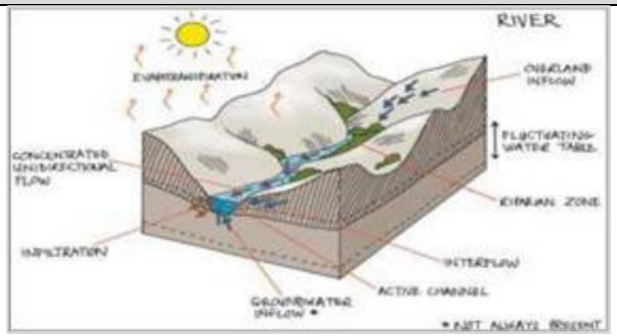
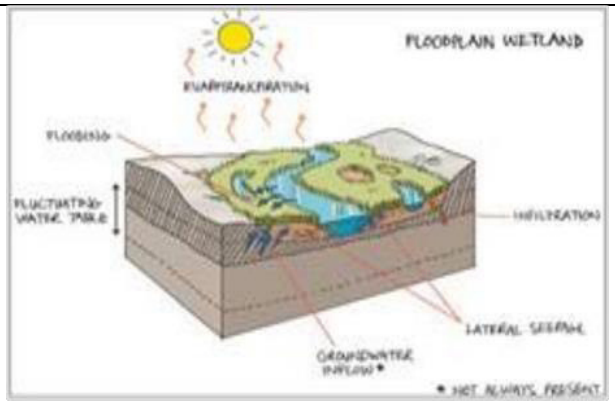
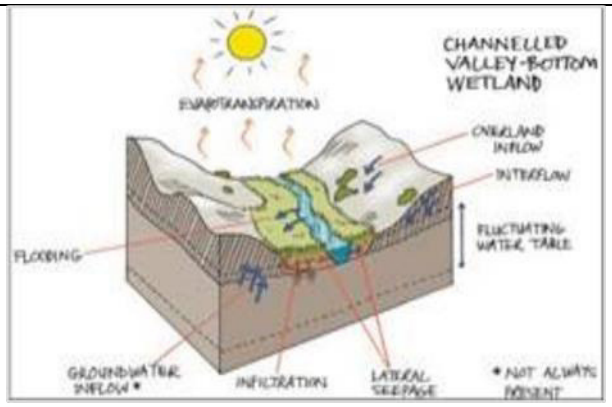
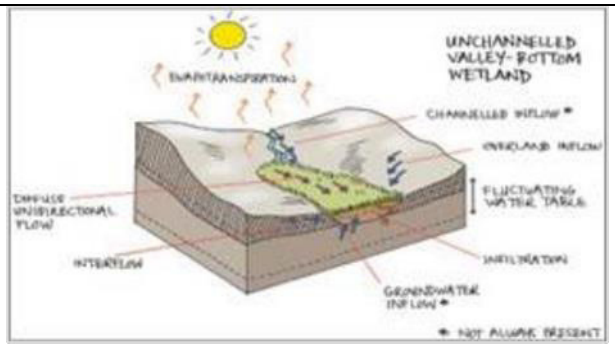
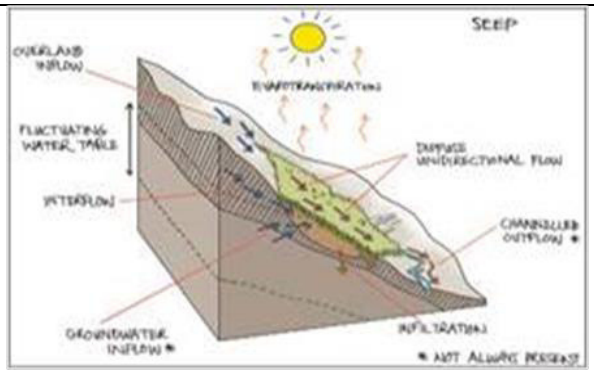


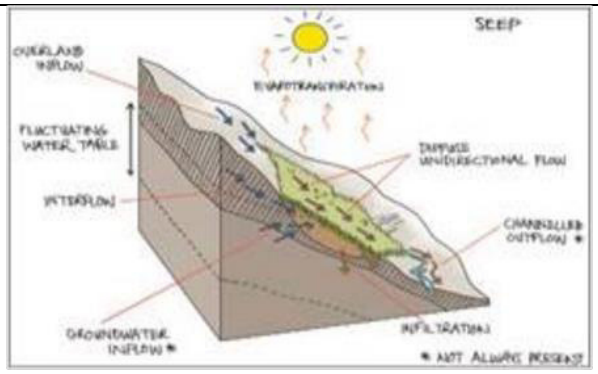
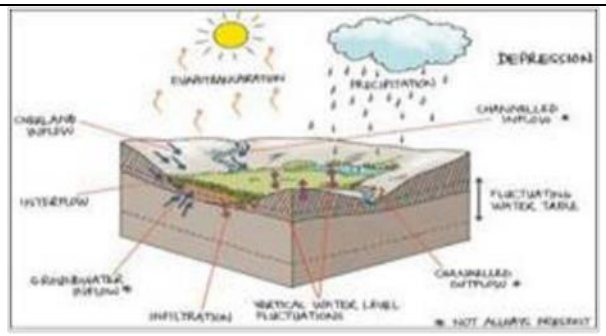
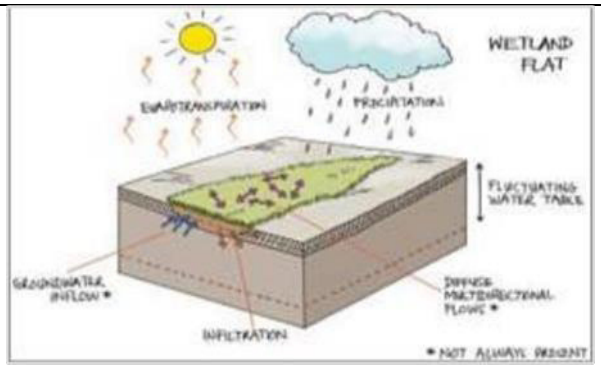
Figure 1-2 Cross section through a wetland, indicating the interaction between the soil wetness and vegetation

Following the identification of the wetland areas on the site, these are then classified into specific hydrogeomorphic (HGM) units according to the Classification System for Wetlands and other Aquatic Ecosystems in South Africa (inland systems) (Ollis *et al.*, 2013).

Table 1-1: Wetland hydrogeomorphic (HGM) types typically supporting inland wetlands in South Africa (Ollis et al., 2013)

Hydrogeomorphic types		Description
River		Rivers are linear landforms with clearly discernible banks and a channel, which permanently or periodically, carries a contained and defined flow of water. A river is taken to include both the active channel and the riparian zone.

Floodplain		Valley bottom areas with a well-defined stream channel, gently sloped and characterised by floodplain features such as oxbow depressions and natural levees and the alluvial (by water) transport and deposition of sediment, usually leading to a net accumulation of sediment. Water inputs from main channel (when channel banks overspill) and from adjacent slopes.
Valley bottom with channel		Valley bottom areas with a well-defined stream channel but lacking characteristic floodplain features. May be gently sloped and characterised by the net accumulation of alluvial deposits or may have steeper slopes and be characterised by the net loss of sediment. Water inputs from main channel (when channel banks overspill) and from adjacent slopes.
Valley bottom without a channel		Valley bottom areas with no clearly defined stream channel, usually gently sloped and characterised by alluvial sediment deposition generally leading to a net accumulation of sediment. Water inputs mainly from channel entering the wetland and also from adjacent slopes.
Hillslope seepage linked to a stream channel		Slopes on hillsides, which are characterised by the colluvial (transported by gravity) movement of materials. Water inputs are mainly sub-surface flow and outflow is usually via a well- defined stream channel connecting the area directly to a stream channel.

Isolated Hillslope seepage		Similar to other hillslope seeps but with no direct surface water connection to a stream channel. Slopes on hillsides, which are characterised by the colluvial (transported by gravity) movement of materials. Water inputs mainly from sub-surface flow and outflow primarily by diffuse sub-surface and/or limited surface flow.
Depression (includes Pans)		A basin shaped area with a closed elevation contour that allows for the accumulation of surface water (i.e. it is inward draining). It may also receive sub-surface water. An outlet is usually absent, and therefore this type is usually isolated from the stream channel network.
Wetland Flat		A flat wetland with no apparent inlet or outlet points. Water is obtained from surface or near surface flows and is lost either by downward percolation or evapotranspiration. May be only seasonal in terms of its wetness and hydromorphic soils may be only weakly developed or else be absent. Vegetation may be the strongest indicator.

1.4.3 Riparian Delineation

The delineation of the riparian areas was conducted in accordance with the Department of Water and Sanitation document, *"A practical field procedure for identification and delineation of wetlands and riparian areas" (2005).*

Like wetlands, riparian areas have their own unique set of indicators. It is possible to delineate riparian areas by checking for the presence of these indicators. The riparian delineation process takes the following physical aspects into consideration:

- ***Topography associated with the watercourse*** – The topography is a good rough indicator of the outer edge of the riparian area as the riparian edge is the same as the edge of the macro channel bank.
- ***Vegetation*** – The delineation of riparian areas relies primarily on the vegetative indicators. Using vegetation, the outer boundary of a riparian area must be adjacent to a watercourse and can be defined as the zone where a distinctive change occurs:

- In species composition relative to the adjacent terrestrial area; and
- In the physical structure, such as vigour or robustness of growth forms of species similar to that of adjacent terrestrial areas. Growth form refers to the health, compactness, crowding, size, structure and/or numbers of individual plants.

- ***Alluvial soils and deposited material*** – Alluvial soils can be defined as relatively recent deposits of sand, mud, etc. set down by flowing water, especially in the valleys of large rivers. Riparian areas often, but not always, have alluvial soils.

1.4.4 Wetland Functional Assessment

Once the wetland areas had been identified and their boundaries determined, the assessment of the ecosystem services these wetland areas provide to the hydraulic system that they contribute to, as well as the immediate natural and social environment, was undertaken. An understanding of this functionality of the wetland contributes directly to the level importance that is attributed to the specific wetland is developed. The assessment was conducted by using a wetland modelling tool that forms part of the WET-Management Series (issued by the Water Research Commission), WET-EcoServices (Kotze *et al*. 2008).

The WET-EcoServices tool makes provision for the rapid assessment of the ecosystem services provided by a wetland and is designed for inland palustrine wetlands, i.e. marshes, floodplains, vleis and seeps. The process of applying the tool is based on the characterisation of hydrogeomorphic wetland types based on desktop and field assessment and observations of identified and delineated wetland areas. This model, furthermore, considers the biophysical and social conditions around a wetland and converts these considerations into a fixed score for a series of defined ecosystem services that the wetland delivers. The services include the following:

- Flood Attenuation
- Sediment trapping
- Nitrate Assimilation
- Erosion control
- Maintenance of biodiversity
- Provision of harvestable resources
- Cultural significance
- Education and research
- Streamflow regulation
- Phosphate assimilation
- Toxicant Assimilation
- Carbon storage (sequestration)
- Provision of water for human use
- Provision of cultivated food
- Tourism and recreation

The maximum score for any service is a value of 4 and the rating of the probable extent of the service is shown in the table below.

Table 1-2: Ecoservices rating of the probable extent to which a benefit is being supplied

Score	Rating of likely extent to which a benefit is being supplied
< 0.5	Low
0.6 - 1.2	Moderately Low
1.3 - 2.0	Intermediate
2.1 - 3.0	Moderately High
> 3.0	High

1.4.5 Determining the Present Ecological State of Wetlands

The determination of the present ecological state (PES) of wetlands was conducted by using a tool from the WET-Management Series (issued by the Water Research Commission), the WET-Health (Macfarlane et al. 2008).

This tool is designed to assess the health or integrity of a wetland. Wetland health is defined as a measure of the deviation of wetland structure and function form the wetland's natural reference condition. The tool therefore attempts to assess the hydrological, geomorphological and vegetation impacts that has been imparted on the wetland at the time of assessment.

The overall approach is to quantify the impacts of human activity or clearly visible impacts on wetland health, and then to convert the impact scores to a PES score. This takes the form of assessing the spatial extent of impact of individual activities/occurrences and then separately assessing the intensity of impact of each activity in the affected area. The extent and intensity are then combined to determine an overall magnitude of impact. The impact scores and Present State categories are provided in the tables below.

Table 1-3: The magnitude of impacts on wetland functionality (Macfarlane et al, 2008)

Impact Category	Description	Score
None	No Discernible modification or the modification is such that it has no impacts on the wetland integrity	0 to 0.9
Small	Although identifiable, the impact of this modification on the wetland integrity is small.	1.0 to 1.9
Moderate	The impact of this modification on the wetland integrity is clearly identifiable, but limited.	2.0 to 3.9
Large	The modification has a clearly detrimental impact on the wetland integrity. Approximately 50% of wetland integrity has been lost.	4.0 to 5.9
Serious	The modification has a highly detrimental effect on the wetland integrity. More than 50% of the wetland integrity has been lost.	6.0 to 7.9
Critical	The modification is so great that the ecosystem process of the wetland integrity is almost totally destroyed, and 80% or more of the integrity has been lost.	8.0 to 10

The level of impacts on these three parameters is a direct indication of the PES of the wetland as well as the functioning of the wetland. A wetland area that has undergone severe impacts on its hydrology, geomorphology or vegetation or a combination of all three will reflect a low present ecological state while the converse is also true for pristine wetlands. Since hydrology, geomorphology and vegetation are interlinked in the model, their scores are aggregated to obtain the overall PES health score using the formula:

Health = ((Hydrology value x 3) + (Geomorphology value x 2) + (Vegetation value x 2))/7

Table 1-4: Definitions of the PES categories (Macfarlane et al, 2008)

Impact Category	Description	Impact Score Range	Present State Category
None	Unmodified, natural	0 to 0.9	A
Small	Largely Natural with few modifications. A slight change in ecosystem processes is discernible and a small loss of natural habitats and biota may have taken place.	1.0 to 1.9	B
Moderate	Moderately Modified. A moderate change in ecosystem processes and loss of natural habitats has taken place, but the natural habitat remains predominantly intact.	2.0 to 3.9	C
Large	Largely Modified. A large change in ecosystem processes and loss of natural habitat and biota has occurred.	4.0 to 5.9	D
Serious	Seriously Modified. The change in ecosystem processes and loss of natural habitat and biota is great, but some remaining natural habitat features are still recognizable.	6.0 to 7.9	E
Critical	Critical Modification. The modifications have reached a critical level and the ecosystem processes have been modified completely with an almost complete loss of natural habitat and biota.	8.0 to 10	F

1.4.6 Determining the Ecological Integrity of the Wetlands

The ecological integrity (EI) of a wetland is determined by a combining the findings of the WET-EcoServices and WET-Health tool as both these tools provide considerations in this regard. For instance, a wetland that makes very little ecosystem services contribution to the hydraulic system that it is linked to and has a low PES score will consequently have a low ecological integrity. The converse is also therefore true for wetlands making a large ecological contribution to the hydraulic system it is linked to as well as a high PES score.

1.4.7 Determining the Ecological Importance and Sensitivity of Wetlands

The outcomes of the implementation of the WET-EcoServices tool discussed above, is key in the determination of the ecological importance and sensitivity of wetlands as the results is a direct indication of the contribution that the wetland is making to the hydraulic system with which it is linked. This contribution is linked to the sensitivity of this wetland to any possible change and how this will impact on the hydraulic system it is linked to.

1.4.8 Ecological Classification and Description

The ecological classification and description are direct results of the implementation of the methodology and tools described above as the results of these determinations contribute to the understanding of the ecology of the wetland. The description of the wetland will therefore make provision for a description of the physical

attributes of the wetland (location, size, etc.), the ecosystem services that the wetland provides, the current ecological state of the wetland and the importance of the wetland as well as its sensitivity.

1.4.9 Hydropedological conditions

The methodology used to conduct the assessment consists of a Desktop Assessment of the soils on the property. This assessment aims to characterize the dominant surface and subsurface flow paths of water through the landscape to wetland and streams or groundwater. The key steps to follow during the desktop assessment is as follows:

1. Identification of dominant hillslopes;
2. Conceptualizing hillslope hydropedological responses;
3. Quantification of hydraulic properties and flowrates; and
4. Quantification of hydropedological fluxes.

Only steps 1 and 2 above has been conducted for this assessment as the nature of the development will not result in a drastic land use change (e.g. open cast mine, etc.).

The hydropedological conditions on the assessment area was determined by using desktop soil classifications to assist in the understanding of the soil characteristics that are present on the site. In addition to the soil characteristics, various GIS datasets were used to determine the various slopes that occur within the development area to identify areas that may be prone to the development of seep wetland areas.

The desktop soil classification will be used to categories the soils on the site into the applicable hydropedological soil type based on their characteristics. These soil types and their descriptions are provided in Table 1-5.

Table 1-5: Hydropedological soil categories (Le Roux, et al., 2015)

Hydropedo-logical soil type	Description	Symbol
Recharge	Soils without any morphological indication of saturation. Vertical flow through and out the profile into the underlying bedrock is the dominant flow direction. These soils can either be shallow or fractured bedrock with limited contribution to evapotranspiration or deep freely drained soils with significant contribution to evapotranspiration.	
Interflow (A/B)	Duplex soils where the textural discontinuity facilitates build-up of water in the topsoil. Duration of drainable water depends on the rate of evapotranspiration, position in the hillslope (lateral addition/release) and slope (discharge in a predominantly lateral direction).	
Interflow (soil/bedrock)	Soils overlying relatively impermeable bedrock. Hydromorphic properties signify temporal build-up of water on the soil/bedrock interface and slow discharge in a predominantly lateral direction.	
Responsive (shallow)	Shallow soils overlying relatively impermeable bedrock. Limited storage capacity results in the generation of overland flow after rain events.	

Responsive (saturated)	Soils with morphological evidence of long periods of saturation. These soils are close to saturation during rainy seasons and promote the generation of overland flow due to saturation excess.	

2. ASSUMPTIONS AND LIMITATIONS

No direct knowledge gaps have been identified that may influence the outcome of this assessment. The following assumptions, however, have been made in the completion of the study:

- The assessment is based on the initial site visits conducted on 14 October 2021 and 3 March 2022 by Mr Magnus van Rooyen of GCS. Even though the assessment consisted of two site visits, the seasonality of these visits does not influence the findings of the assessment.
- The assessment is based on the design information provided by the SiVEST (Pty) Ltd.
- The following standardised and accepted methods to determine the various aspects of the study were used:
    - Electronic biodiversity databases managed by the South African National Biodiversity Institute (SANBI);
    - Available provincial electronic biodiversity databases;
    - Wetland and Riparian Habitat Delineation Document (Department of Water and Sanitation report);
    - Wetland Buffer Determination Guideline (SANBI Water Research Commission project report);
    - Classification system for wetlands and other aquatic ecosystems in South Africa (Inland Systems) (Ollis et al., 2013 – SANBI Biodiversity Series 22); and
    - Risk Assessment Protocol and associated Matrix (Department of Water and Sanitation).

3. TECHNICAL DESCRIPTION

3.1 Project Background

Aura Development Company (Pty) Ltd (Aura), has appointed SiVest Environmental (SiVest) to undertake the required Application for Environmental Authorisation processes for the proposed construction of five (5) wind farms and associated infrastructure [including substations and Battery Energy Storage Systems (BESS)] on a number of properties, majority being adjacent, near the town of Fraserburg in the Northern Cape Province of South Africa. The proposed wind farms make up a larger wind energy facility (WEF), with associated BESS, which will be referred to as the Klipkraal WEF. Each of the wind farm facilities making up the Klipkraal WEF will be subjected to an individual Application for Environmental Authorisation process.

The overall objective of the proposed wind farm project is to generate electricity by means of renewable energy technologies, capturing wind energy to feed into the national grid, which will be procured under either the Renewable Energy Independent Power Producer Procurement Programme (REIPPPP), other government run procurement programs, and any other program it intends to supply power to or for sale to

private entities, if required. To further ensure the efficient power delivery, the facility will also incorporate the use of storage technologies like batteries (i.e. BESS).

As such, this assessment report is limited to the Klipkraal WEF 2 of the development of the larger Klipkraal WEF.

3.2 Project Location

The Klipkraal WEF 2 is located approximately 30km southeast of the town of Fraserburg in the Northern Cape Province. The location of the project site is provided in the figure below with the properties associated with the facility provided in the table below.

Table 3-1: Properties on which the Klipkraal WEF 2 will be implemented (as identified in the DFFE Online Screening Tool)

No.	Farm name	Farm / Erf No.	Portion	Latitude	Longitude	Property type
1	Klipfontein	447	0	32° 06' 47.24" S	21° 48' 00.96" E	Farm
2	Matjesfontein	409	0	32° 04' 07.87" S	21° 46' 16.24" E	Farm
3	Matjesfontein	409	0	32° 04' 07.87" S	21° 46' 16.24" E	Farm Portion
4	Klipfontein	447	0	32° 07' 05.84" S	21° 49' 39.32" E	Farm Portion
5	Klipfontein	447	1	32° 06' 30.03" S	21° 46' 30.03" E	Farm portion

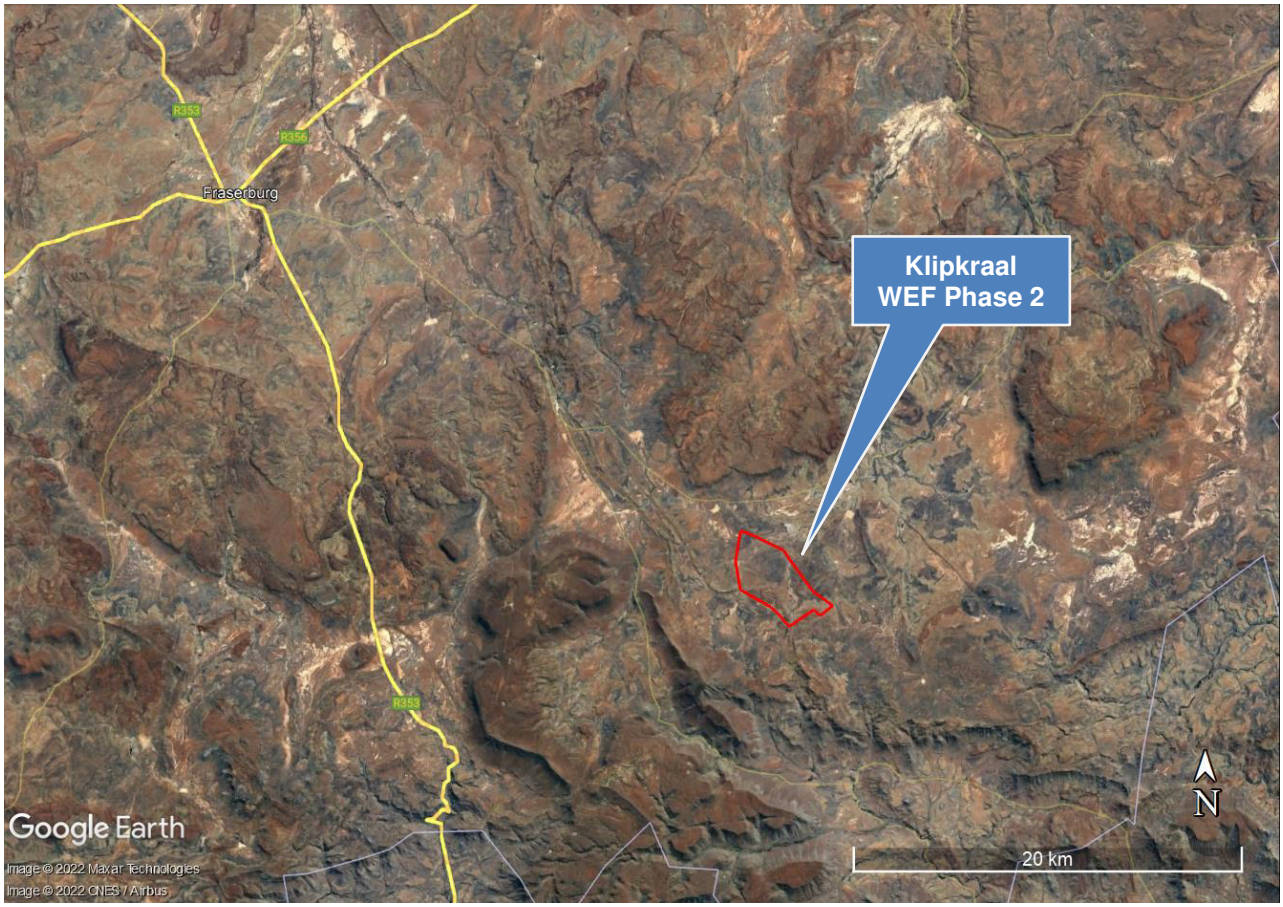


Figure 3-1: Location of the Klipkraal WEF Phase 2 project southeast of the town of Fraserburg

3.3 Project Description

The application site assessed during the scoping phase (which incorporates the farm portions / properties listed above) is approximately 1 190ha in extent.

At this stage it is anticipated that the proposed Klipkraal WEF 2 will comprise up to fourty (40) wind turbines with a maximum total energy generation capacity of up to approximately 300 MW. In summary, the proposed Klipkraal 1 WEF development will include the following components:

Wind Turbines:

- Approximately 40 turbines, between 5MW and 8MW, with a maximum export capacity of up to approximately 300MW. This will be subject to allowable limits in terms of the Renewable Energy Independent Power Producer Procurement Programme (REIPPPP) or any other program.
- The final number of turbines and layout of the wind farm will, however, be dependent on the outcome of the Specialist Studies in the EIA phase of the project;
- Each wind turbine will have a maximum hub height of up to approximately 200m;

- Each wind turbine will have a maximum rotor diameter of up to approximately 200m;
- Permanent compacted hardstanding areas / platforms (also known as crane pads) of approximately 100m x 100m (total footprint of approx. 10 000m^2) per wind turbine during construction and for on-going maintenance purposes for the lifetime of the proposed wind farm projects. This will however depend on the physical size of the wind turbine;
- Each wind turbine will consist of a foundation (i.e. foundation rings) which may vary in depth, from approximately 3m and up to 10m or greater, depending on the physical size of each wind turbine. It should be noted that the foundation can be up to as much as approximately 700m^3;

Electrical Transformers:

- Electrical transformers will be constructed near the foot of each respective wind turbine in order to step up the voltage to 66kV.
- The typical footprint of the electrical transformers is up to approximately 10m x 10m, but can be up to 20m x 20m at certain locations;

Step-up / Collector Substations:

- One 11-66/132-400kV step-up / collector substation, each occupying an area of up to approximately 2ha,
- The proposed substation will include an Eskom portion and an Independent Power Producer (IPP) portion, hence the substation has been included in this EIA and in the grid connection infrastructure BA (separate application - substations, switching stations and power lines) to allow for handover to Eskom.
- Following construction, the substation will be owned and managed by Eskom. The current applicant will retain control of the medium voltage components (i.e. 33kV components) of the substation, while the high voltage components (i.e. 400kV components) of the substation will likely be ceded to Eskom shortly after the completion of construction;

Main Transmission Substations (MTS):

- One (1) new 132/400kV Main Transmission Substation (MTS) is being proposed, occupying an area of up to approximately 120ha.
- The proposed MTS will include an Eskom portion and an IPP portion.
- Following construction, the substation will be owned and managed by Eskom. The current applicant will retain control of the 132-400kV and lower voltage components of each MTS, while the 132/400kV voltage components of the MTS will likely be ceded to Eskom shortly after the completion of construction;

Electrical Infrastructure:

- The wind turbines will be connected to the proposed substation via medium voltage (i.e. 33kV) cables.

- These cables will be buried along access roads wherever technically feasible, however, the cables can also be overhead (if required);
- Each WEF will then connect to the MTS via an up to 400kV powerline.

Battery Energy Storage Systems (BESS):

- One (1) Battery Energy Storage System (BESS) will be constructed for the wind farm and will be located next to the 33-66/132-400kV step-up / collector substations which form part of the respective wind farms, or in between the wind turbines.
- It is anticipated that the type of technology will be either Lithium Ion or Sodium-Sulphur (or as determined prior to construction).
- These batteries are not considered hazardous goods as they will be storing 'energy'.
- The size, storage capacity and type of technology will be determined / confirmed prior to construction. This information will be provided to I&APs prior to the commencement of construction.

Roads:

- Internal roads with a temporary width of up to approximately 15m will provide access to the location each wind turbine. These roads will be rehabilitated back to 8m once construction has been completed.
- Existing site roads will be used wherever possible, although new site roads will be constructed where necessary.
- Existing site roads may also be upgraded using temporary concrete stones in order to accommodate for the heavy loads.
- Turns will have a radius of up to 50m for abnormal loads (especially turbine blades) to access the various wind turbine positions.

Site Access:

- The proposed wind farm application site will be accessed via existing gravel roads from the R353 Regional Route;

Temporary Staging Areas:

- A temporary staging area will be required for the wind farm and will be located both at the foot of each wind turbine and at the storage facility (i.e. turbine development area) to allow for working requirements.
- One (1) temporary staging area per wind turbine / range of wind turbines will be required.
- Temporary staging areas will cover an area of up to approximately 100m x 100m (10 000m^2 / 1ha) each;

Temporary Construction Camps:

- One (1) temporary construction camp will be required during the construction phase for the wind farm.
- This area will be used as a permanent maintenance area during the operational phase.
- The combined Temporary Construction Camp / Permanent Maintenance Area will cover an area of up to approximately 2.25ha.
- A cement batching plant as well as a chemical storage area will fall within the Temporary Construction Camp and Permanent Maintenance Area.
- The Temporary Construction Camp and Permanent Maintenance Area will be strategically placed within the proposed wind farm site and will avoid all high sensitivity and/or 'no-go' areas;

Offices, Accommodation, a Visitors' Centre and Operation & Maintenance (O&M) Buildings:

- An office (including ablution facilities), accommodation (including ablution facilities), a Visitors' Centre and an Operation & Maintenance (O&M) building will be required and will occupy areas of up to approximately 100m x 100m (i.e. 1ha).
- Each wind farm (i.e. each phase) will have its own O&M building and Office, however, the Accommodation and Visitors' Centre will be centralised locations which will be shared between certain wind farm projects (i.e. shared between certain phases which will be confirmed at a later stage);

Septic Tank and Soak-Away Systems:

- The proposed wind farm will consist of a septic tank and soak-away system.
- This will be required for construction as well as long term use.
- The septic tank and soak-away system will be placed 100m or more from water resource (which includes boreholes);

Fencing:

- Fencing will be required and will surround the wind farm.
- The maximum height of the fencing as well as the area which the fencing will cover will be confirmed during the detailed design phase, prior to construction commencing.
- Fences will however be constructed according to specifications recommended by the Ecologist and Avifauna specialist (as per the EMPr);

Temporary Infrastructure to Obtain Water from Available Local Sources:

- Temporary infrastructure to obtain water from available local sources will be required. Water may also be obtained from onsite boreholes and from the town of Fraserburg.
- New or existing boreholes, including a potential temporary above ground pipeline (approximately 50cm in diameter) for each wind farm, to feed water to the sites are being proposed.
- Water will potentially be stored in temporary water storage tanks.

- The necessary approvals from the Department of Water and Sanitation (DWS) will be applied for separately (should this be required); and

Temporary Containers:

- Temporary containers of up to approximately 80m^3 will be required for the storage of fuel on-site during the construction phase of the wind farm.
- The chemical storage area will fall within the Temporary Construction Camp and permanent Maintenance Area.

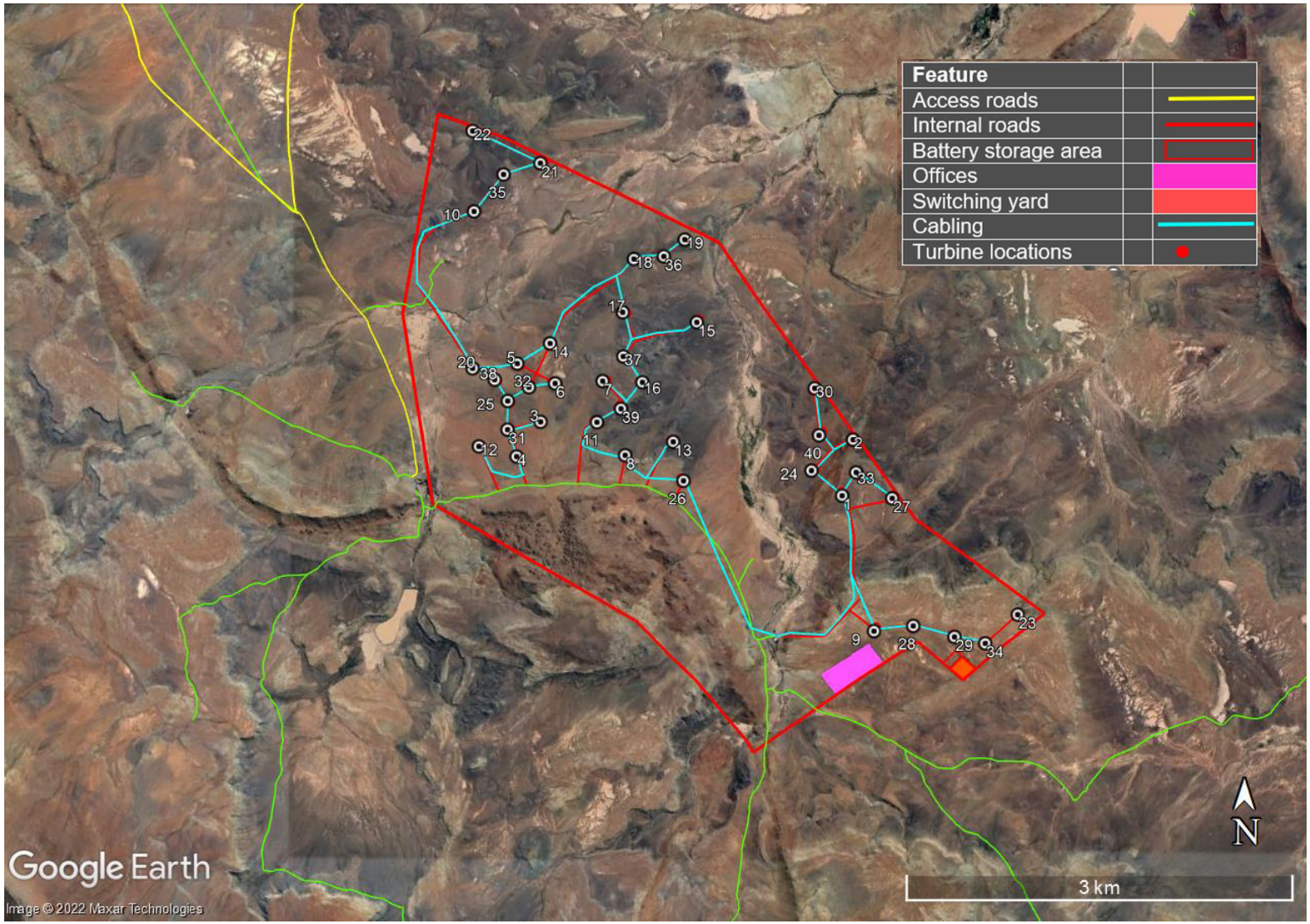


Figure 3-2: Layout of the Klipkraal WEF 2

4. LEGAL REQUIREMENT AND GUIDELINES

The legal requirements described in this section of the report pertains only to the legislation directly associated with the field of assessment, i.e. the aquatic environment of the project site. As such, the following legislation is considered to be pertinent.

National Environmental Management Act (Act No. 107 of 1998): Environmental Impact Assessment Regulations (2014), as amended

The legislative review is based on the consideration of the requirements of the National Environmental Management Act (Act No. 107 of 1998): Environmental Impact Assessment Regulations (2014), as amended.

These regulations make provision for lists of activities that have been identified to potentially result in environmental degradation and as such require assessment and authorisation before they can be undertaken.

The Listed Activities occur in three separate lists, referred to as Listing Notice 1 (Government Notice R327), Listing Notice 2 (Government Notice R325) and Listing Notice 3 (Government Notice R324). Each of these Listed Activities in the individual Listing Notices have specific Application for Environmental Authorisation procedures.

The following are key definitions contained in the regulations that are pertinent to the project:

- **"development"** means the building, erection, construction or establishment of a facility, structure or infrastructure, including associated earthworks or borrow pits, that is necessary for the undertaking of a listed or specified activity, including any associated post development monitoring, but excludes any modification, alteration or expansion of such a facility structure or infrastructure, including associated earthworks or borrow pits, and excluding the redevelopment of the same facility in the same location, with the same capacity and footprint;
- **"development footprint"** means any evidence of physical alteration as a result of the undertaking of any activity;
- **"NEMBA"** means the National Environmental Management: Biodiversity Act (Act No. 10 of 2004);
- **"NEMPAA"** means the National Environmental Management: Protected Areas Act (Act No. 57 of 2003)
- **"watercourse"** means – (a) a river or spring; (b) a natural channel in which water flows regularly or intermittently; (c) a wetland, pan, lake or dam into which, or from which, water flows; and (d) any collection of water which the Minister may, by notice in the Gazette, declare to be a watercourse as defined in the National Water Act (Act No. 28 of 1998); and a reference to a watercourse includes, where relevant, its bed and banks;
- **"wetland"** means land which is transitional between terrestrial and aquatic systems where the water table is usually at or near the surface, or the land is periodically covered in shallow water, and which land in normal circumstances supports or would support vegetation typically adapted to life in saturated soil.

The tables below provides and assessment of the potential Listed Activities that may be enacted by the construction and operation of the proposed Klipkraal WEF.

Table 4-1: NEMA: Environmental Impact Assessment Regulations: Listing Notice 1 (GN R327) (2014 as amended)

ACTIVITY	**12**
Description	
The **development** of – (i) dams or weirs, where the dam or weir, including infrastructure and water surface area, exceeds 100 square metres; or (ii) infrastructure or structures with a physical footprint of 100 square metres or more; where such development occurs – (a) within a watercourse; (b) in front of a development setback; or (c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse; - excluding – (aa) the development of infrastructure or structures within existing ports of harbours that will not increase the development footprint of the port of harbour; (bb) where the development activities are related to the development of a port or harbour, in which case Activity 26 of Listing Notice 2 of 2014 applies; (cc) activities listed in Activity 14 in Listing Notice 2 of 2014 or Activity 14 in Listing Notice 3 of 2014, in which case that activity applies; (dd) where such development occurs within an urban area; (ee) where such development occurs within existing roads, road reserves or railway line reserves; or (ff) the development of temporary infrastructure or structures where such infrastructure or structures will be removed within 6 weeks of the commencement of the development and where the indigenous vegetation will not be cleared.	
Discussion	
If any of the components of the Klipkraal WEF, that exceeds 100 square metres, is located within 32 metres of any watercourse as defined by the Regulations an Environmental Authorisation will be required for this Listed Activity. Based on the current available information, the watercourse crossing structures will likely exceed the 100 square metre threshold of the Listed Activity which will mean that the establishment of these structures will require an Environmental Authorisation.	
Outcome	**ENVIRONMENTAL AUTHORISATION REQUIRED**

ACTIVITY	**19**
Description	
The infilling or depositing of any material of more than 10 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 10 cubic metres from a watercourse; but excluding where such infilling, depositing, dredging, excavation, removal or moving – (a) will occur behind a development setback; (b) is for maintenance purposes undertaken in accordance with a maintenance management plan; (c) falls	

within the ambit of activity 21 in this Notice, in which case that activity applies; (d) occurs within existing ports or harbours that will not increase the development footprint of the port or harbour; or (e) where such development is related to the development of a port or harbour, in which case activity 26 of Listing Notice 2 of 2014 applies.	
Discussion	
If any of the components of the Klipkraal WEF, requires the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 10 cubic metres or more, into or from any watercourse as defined by the Regulations an Environmental Authorisation will be required for this Listed Activity. Based on the current available information, the watercourse crossing structures will likely exceed the 10 cubic metre threshold of the Listed Activity which will mean that the establishment of these structures will require an Environmental Authorisation.	
Outcome	**ENVIRONMENTAL AUTHORISATION REQUIRED**

Table 4-2: NEMA: Environmental Impact Assessment Regulations: Listing Notice 3 (GN R324) (2014 as amended)

ACTIVITY	**10**
Description	
The development and related operation of facilities or infrastructure for the storage, or the storage and handling of a dangerous good, where such storage occurs in containers with a combined capacity of 30 but not exceeding 80 cubic metres, in the (g) Northern Cape: (i)…; (ii) Areas within a watercourse or wetland; or within 100 metres from the edge of a watercourse or wetland; (iii)…	
Discussion	
If any storage of diesel or petrol or any other substance that meets the definitions of a “dangerous good” as per the Regulations in containers of 30 but not exceeding 80 cubic metres are to be located within 100 metres from the edge of a watercourse, this Listed Activity will require an Environmental Authorisation before it can commence.	
Outcome	**ENVIRONMENTAL AUTHORISATION REQUIRED**

ACTIVITY	**14**
Description	
The development of - (i)…; or (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; or (c) if no development setback has been adopted, within 32 metres of a watercourse measured	

from the edge of a watercourse;… In the (g) Northern Cape (i)…; (ii) Outside urban areas: (aa) A protected area identified in terms of NEMPAA, excluding conservancies; (bb) National Protected Area Expansion Strategy Focus areas; (cc) World Heritage Sites; (dd) Sensitive areas as identified in an Environmental Management Framework as contemplated in Chapter 5 of the Act and as adopted by the competent authority; (ee) Sites or areas identified in terms of an international convention; (ff) Critical biodiversity areas or ecosystem service areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans; (gg) Core areas in biosphere reserves; (hh) Areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any other protecte area identified in terms of NEMPAA or from the core area of a biosphere reserve; (ii) Areas seawards of the development setback line or within 1 kilometre from the high-water mark of the sea if no such development setback line is determined;…	
Discussion	
As can be determined, no part of the WEF project falls within any of the areas identified in (aa) to (ii) of the Listed Activity, as such, this Listed Activity will not require an Environmental Authorisation. However, it must be noted that Listed Activity 12 and 19 of Listing Notice 1 will still be applicable if any infrastructure with a footprint larger than 100 square metres are to be established within 32 metres of any watercourse or wetland.	
Outcome	**NO ENVIRONMENTAL AUTHORISATION REQUIRED**

National Water Act (Act No. 36 of 1998) and associated water use license regulations (2017)

Section 21 of the National Water Act (Act No. 36 of 1998) makes provision for the Water Uses that requires a Water Use License or General Authorisation in terms of the Act. The following definitions provided in the Act as well as the associated regulations are appliable to the project.

- **"diverting"** means to, in any manner, cause the instream flow of water to be rerouted temporarily or permanently;
- **"impeding"** means to, in any manner, hinder or obstruct the instream flow of water temporarily or permanently, but excludes the damming of flow so as to cause storage of water;
- **"regulated area of a watercourse"** for Section 21 (c) or (i) of the Act water uses in terms of this Notice means: (a) the outer edge of the 1 in 100 year flood line and/or delineated riparian habitat, whichever is the greatest distance, measured from the middle of the watercourse of a river, spring, natural channel, lake or dam; (b) in the absence of a determined 1 in 100 year flood line or riparian area the area within 100m from the edge of a watercourse where the edge of the watercourse is the first identifiable annual bank fill flood bench; or (c) a 500m radius from the delineated boundary (extent) of any wetland or pan.
- **"riparian habitat"** included the physical structure and associated vegetation of the areas associated with a watercourse which are commonly characterized by alluvial soils, and which are inundated or flooded to an extent and with a frequency sufficient to support vegetation of species with a composition and physical structure distinct from those of adjacent land areas;
- **"watercourse"** means (a) a river or spring; (b) a natural channel in which water flows regularly or intermittently; (c) a wetland, lake or dam into which, or from which, water flows; and (d) any collection of water which the Minister may, by notice in the Gazette, declare to be a watercourse and a reference to a watercourse includes, where relevant, its bed and banks;
- **"water resource"** includes a watercourse, surface water, estuary, or aquifer;
- **"wetland"** means land which is transitional between terrestrial and aquatic systems where the water table is usually at or near the surface, or the land is periodically covered with shallow water, and which land in normal circumstances supports or would support vegetation typically adapted to life in saturated soil;

The table below provides the possible Section 21 Water Uses that may require an authorisation.

Table 4-3: Possible Section 21 Water Use Authorisation required

Section 21 Water Use	Description	Applicability	Water Use Authorisation (Yes/No)
(a)	Taking water from a water resource	If any water is to be abstracted from any water resources as defined in the Act, for the establishment or operation of the Klipkraal WEF, an authorisation in terms of the Act will be required.	**YES**
(b)	Storing water	It any water is to be stored on the development site associated with the Klipkraal WEF and this storage exceeds the limits set out in the Act, an authorisation in terms of the Act will be required.	**YES**
(c)	Impeding or diverting the flow of water in a watercourse	If any part of the Klipkraal WEF is to be located within the "regulated area of a watercourse" as defined in the Act, an authorisation for these part(s) of the facility will be required in accordance with the Act.	**YES**
(d)	Engaging in a stream flow reduction activity contemplated in Section 36 of the Act	It is understood that no part of the Klipkraal WEF will result in a stream flow reduction activity as contemplated in Section 36 of the Act.	**NO**
(e)	Engaging in a controlled activity identified as such in Section 37(1) or declared under Section 38(1)	It is understood that no part of the Klipkraal WEF will result in a controlled activity as contemplated in Section 37(1) of the Act.	**NO**
(f)	Discharging waste or water containing waste into a water resource through a pipe, canal, sewer, sea outfall or other conduit	If any discharge of waste or water containing waste (eg. discharge from the on site waste water treatment works) into a watercourse will take place as part of the establishment and/or operation of the Klipkraal WEF, an authorisation in terms of the Act will be required.	**YES**

Section 21 Water Use	Description	Applicability	Water Use Authorisation (Yes/No)
(g)	Disposing of waste in a manner which may detrimentally impact on a water resource	If the establishment and/or operations of the Klipkraal WEF will require the disposing of waste or waste water (eg. septic tanks, soak away or French drains), an authorisation in terms of the Act will be required.	**YES**
(h)	Disposing in any manner of water which contains waste from, or which has been heated in, any industrial or power generation process	Neither the construction or the operation of the Klipkraal WEF will require the discharge of water containing waste that has been heated in an industrial or power generation process.	**NO**
(i)	Altering the bed, banks, course or characteristics of a watercourse	If any part of the Klipkraal WEF is to be located within the "regulated area of a watercourse" as defined in the Act, an authorisation for these part(s) of the facility will be required in accordance with the Act.	**YES**
(j)	Removing, discharging or disposing of water found underground if it is necessary for the efficient continuation of an activity or for the safety of people	Neither the construction nor the operation of the Klipkraal WEF will require the dewatering of underground water. As, there will be no need for a Water Use Authorisation for this water use.	**NO**
(k)	Using water for recreational purposes	No water associated with the Klipkraal WEF will be used for recreational purposes. As, there will be no need for a Water Use Authorisation for this water use.	**NO**

5. DESCRIPTION OF THE RECEIVING ENVIRONMENT

5.1 Topography and drainage

The project site is located immediately north of the border between the Western Cape and the Northern Cape Provinces. The Klipkraal se Berg (altitude of 1 907m) and the Skurwekop (altitude 1 599m) are the two dominant topographical features in the area and are located to the south of the project site with an unnamed ridge line is located at the northern extremity of the site which reaches a height of approximately 1 400m. The elevation across the study area varies from a high point in the south of with an elevation of 1 486m to a low point in the north with an elevation of 1 369m. The areas between these two elevations are relatively flat.

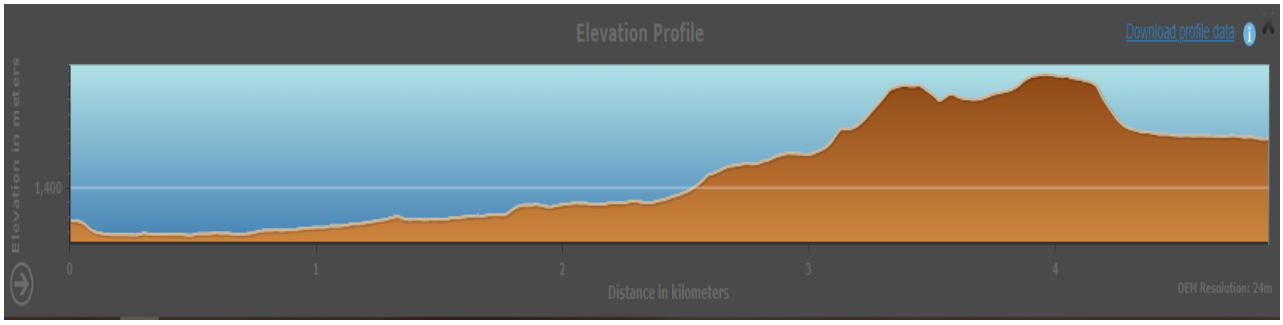


Figure 5-1: North – South topographical profile through the study site (northern extreme being to the left of figure).

All the drainage in the area is to the north and east away from the higher lying areas in the south. The key water resources information for the water resources associated with the project site is provided in the table below.

Table 5-1: Key water resources information for the project area

Descriptor	Name / details	Notes
Water Management Area	Orange WMA	
Primary Catchment	Region D (Orange)	
Secondary Catchment	D5	
Tertiary Catchment	D55	
Quaternary Catchment	D55B	Dominant rivers are the Sout River and Dronkfontein se Leegte River
Ecological Importance (EI) and Ecological Sensitivity (ES)*	Sout River Dronkfontein se Leegte River	EI – Moderate; ES – Very low EI and ES – not assessed
Present Ecological State (PES)*	Sout River Dronkfontein se Leegte River	Class B – Largely natural Class B – Largely natural
Type of water resources	Seasonal rivers, ephemeral streams and pans	

*as per DWS (2012)

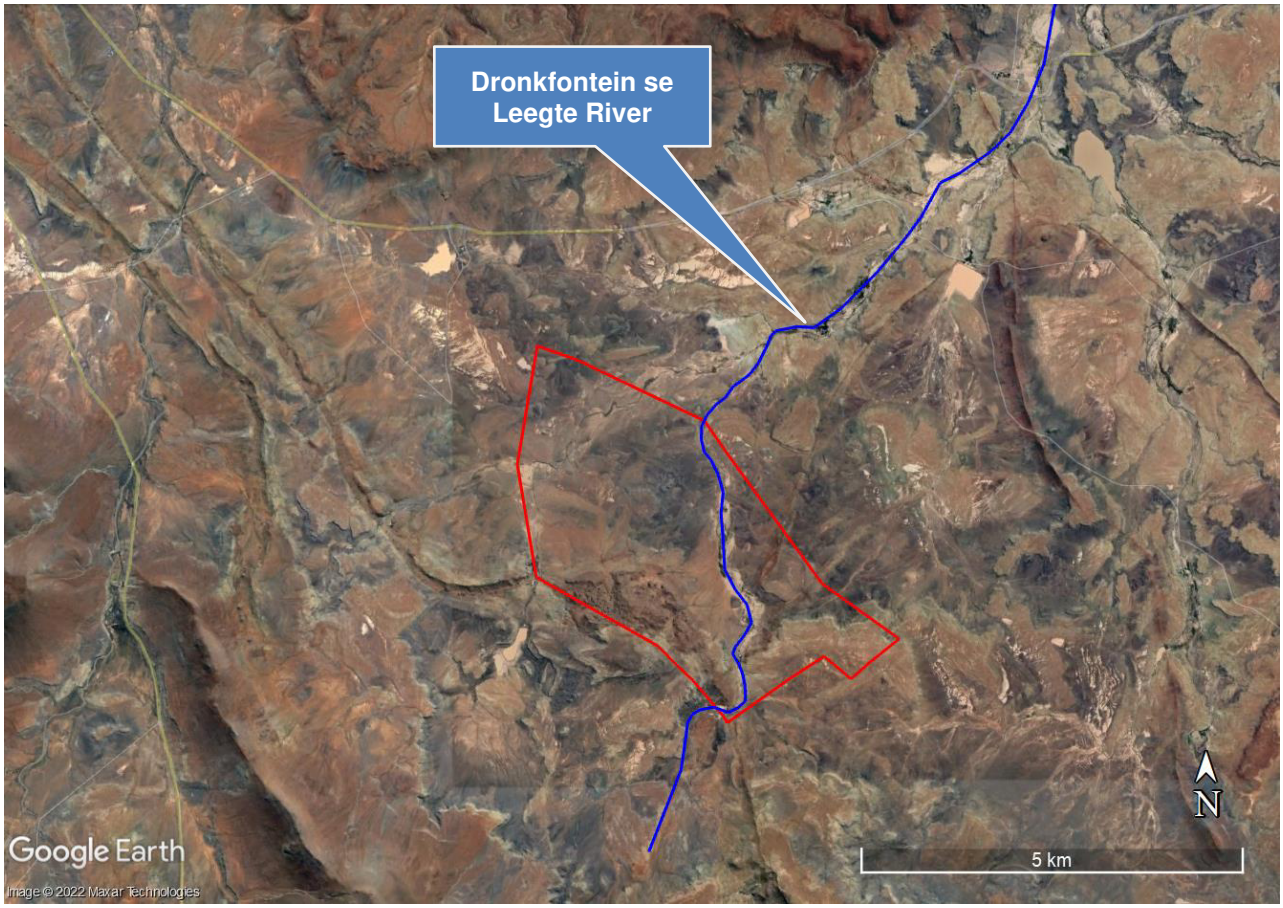


Figure 5-2: Key water resources associated with the project site (shown in red)

5.2 Climate and hydrology

The study site experiences low rainfall of approximately 110mm per annum, with the major rainfall months being in the summer months (December to April). The Koppen-Geiger Climate Zones (2071 – 2100) classifies the climaite in the area as arid, desert, and cold. The graph below provides an indication of the average monthly rainfall figures for the town of Fraserburg which has the nearest weather station to the site.

The flow patterns in the watercourses are similar to the rainfall pattern, with flow being present in these features only during rainfall events. These rainfall events being very episodic, making the flow in the watercourses very episodic with very little to no flow in the watercourses for much of the year. Water flow in the watercourse typically only occur for a short period of time following localised rainfall. In addition, when flow occurs in the watercourses, it occurs as high flow events. This flow nature does however make erosion control measures in the watercourse, particularly on the slopes, and essential mitigation consideration.

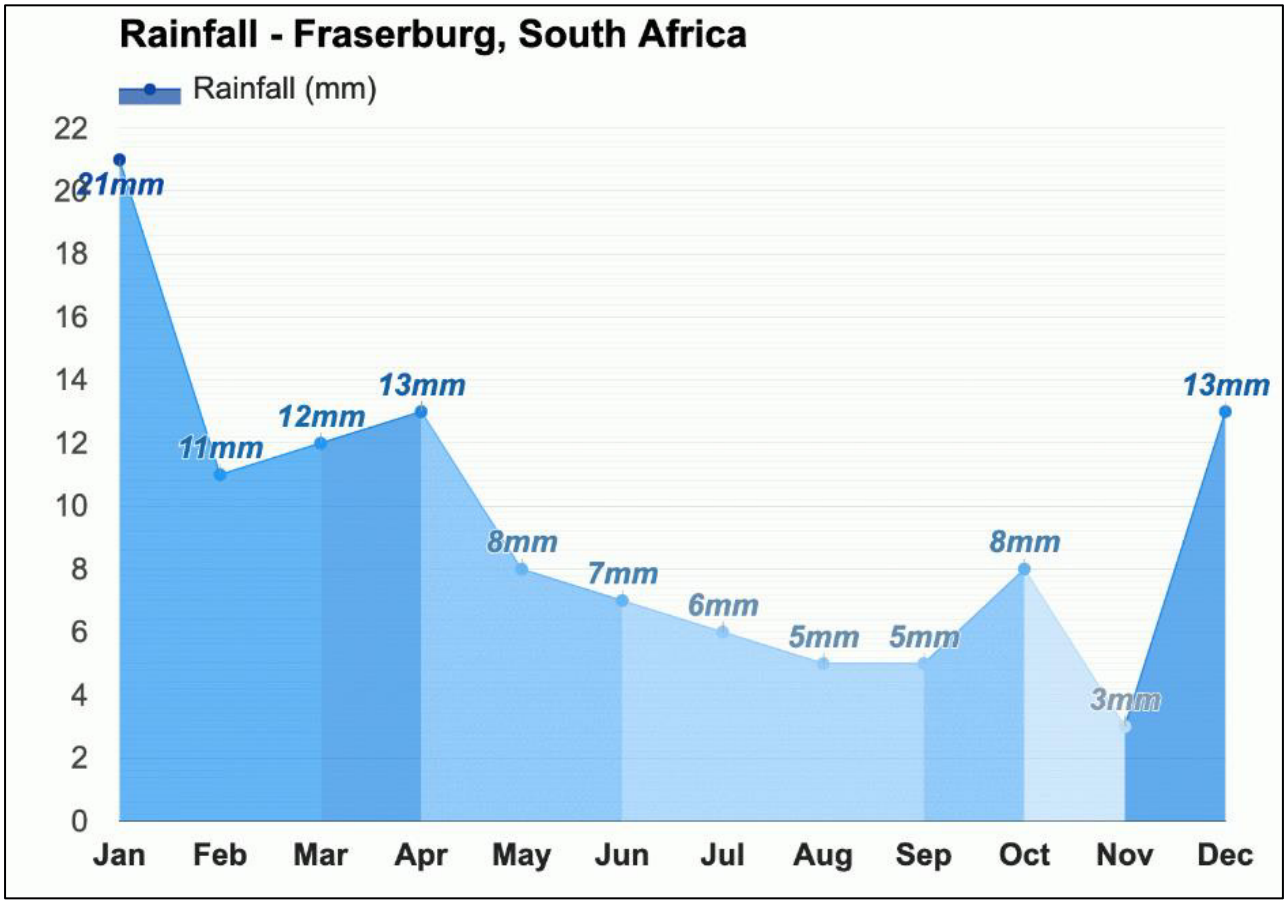


Figure 5-3: Monthly average rainfall figures for the town of Fraserburg

5.3 Geology and soils

Three distinct geological formations associated with the study site, these area as follows:

- Middleton Formation in the central portion; and
- Balfour Formation in the south.

The Middleton Formation consists of brownish-red and greenish-grey mudstone, subordinate siltstone and sandstone and makes up the largest part of the daylighting geology on the study site. The Balfour Formation is located in the southern corner of the site and consists of greenish- to bluish-grey and greyish-red mudstone, siltstone and subordinated sandstone.

The location and extent of these formations in the project area are provided in the figure below (CapeFarmMapper ver. 2.6.13).

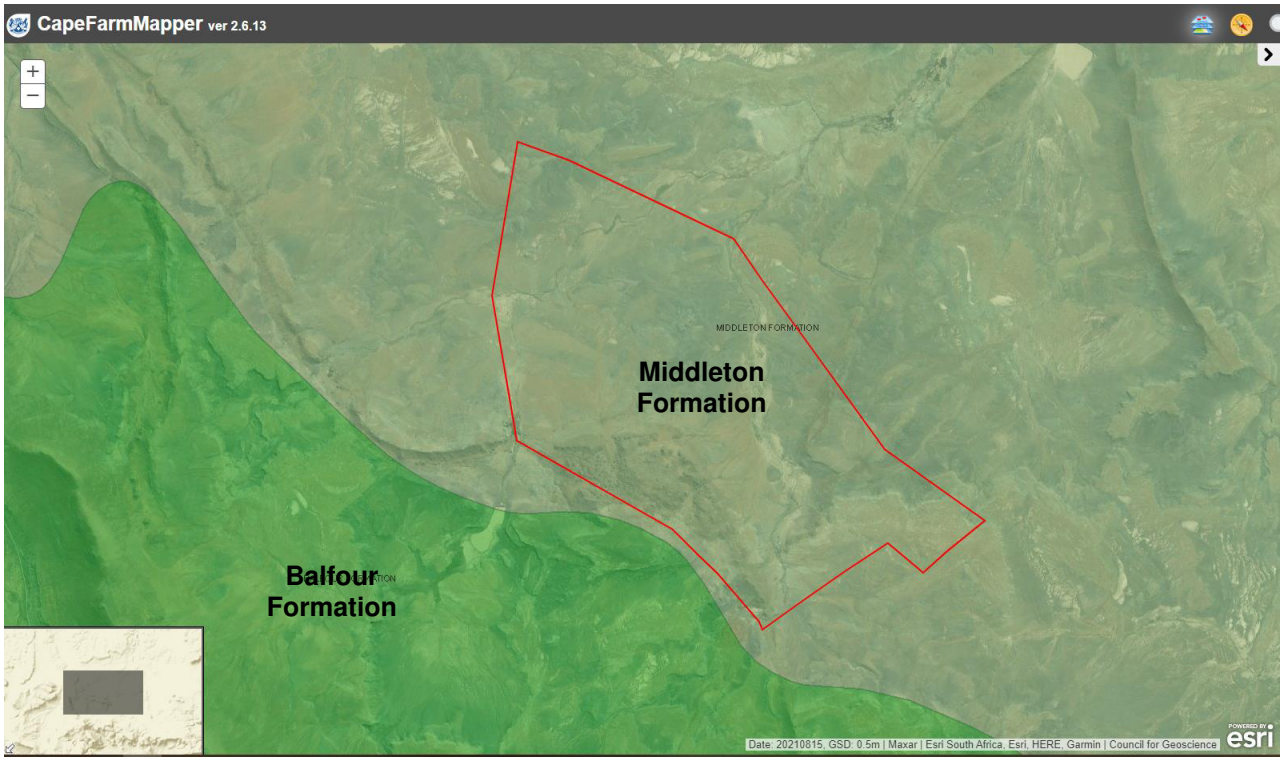


Figure 5-4: Geological formations present on the study site

The soil landforms on the largest part of the study site consist of land type Da52 that is made up of Red B horizons with prismacutanic and/or pedocutanic diagnostic horizons dominant. The southern portion of the study site consists of land type Fc190 which is characterized by lime present in the entire landscape with Glenrosa and Mispah soils forms being dominant. The figure below indicates the location of these landforms.

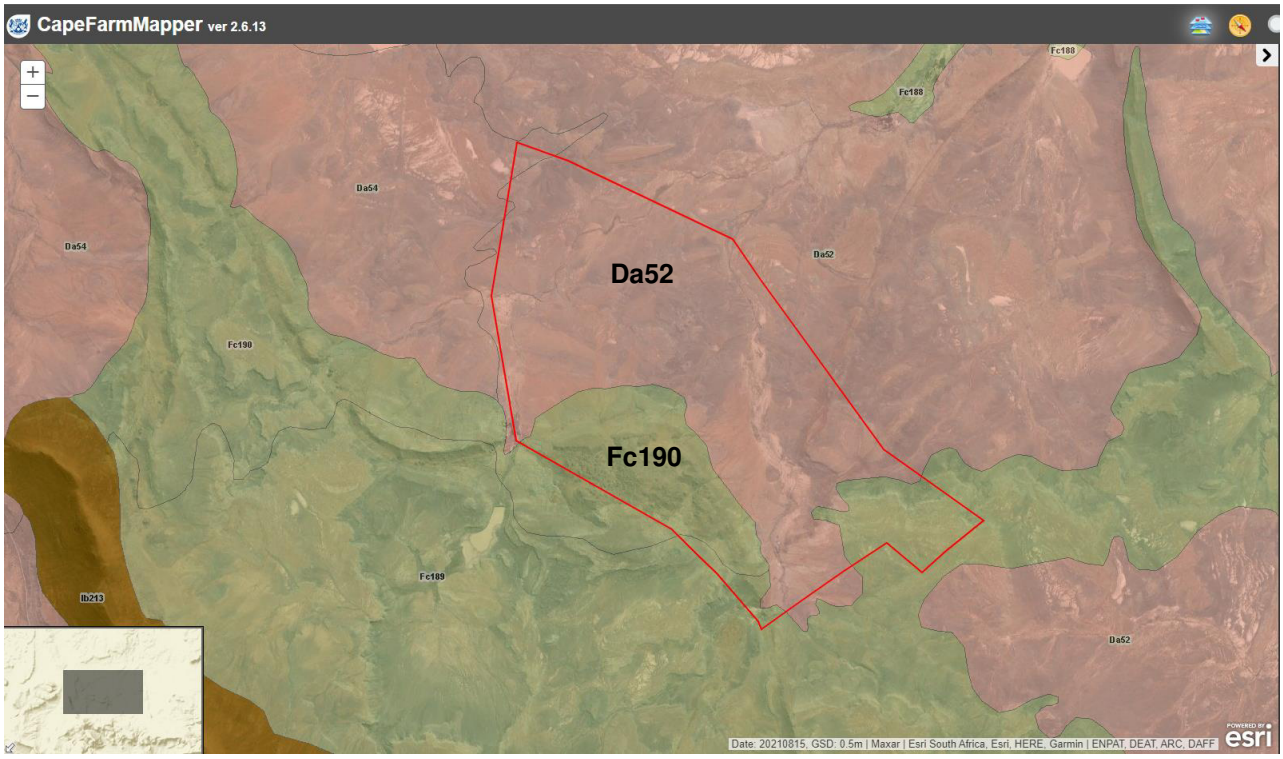


Figure 5-5: Soil landforms within the study site

5.4 Vegetation

The study site is located in the Nama Karoo Biome (Low Rebelo) with the unmodified vegetation type classification making provision for the Eastern Upper Karoo (NKu4) in the central part of the site and the Western Upper Karoo (NKu1) in the south and north. Both of these vegetation types have a threat status classification of "least concern". The location of these vegetation types is provided in the figure below.

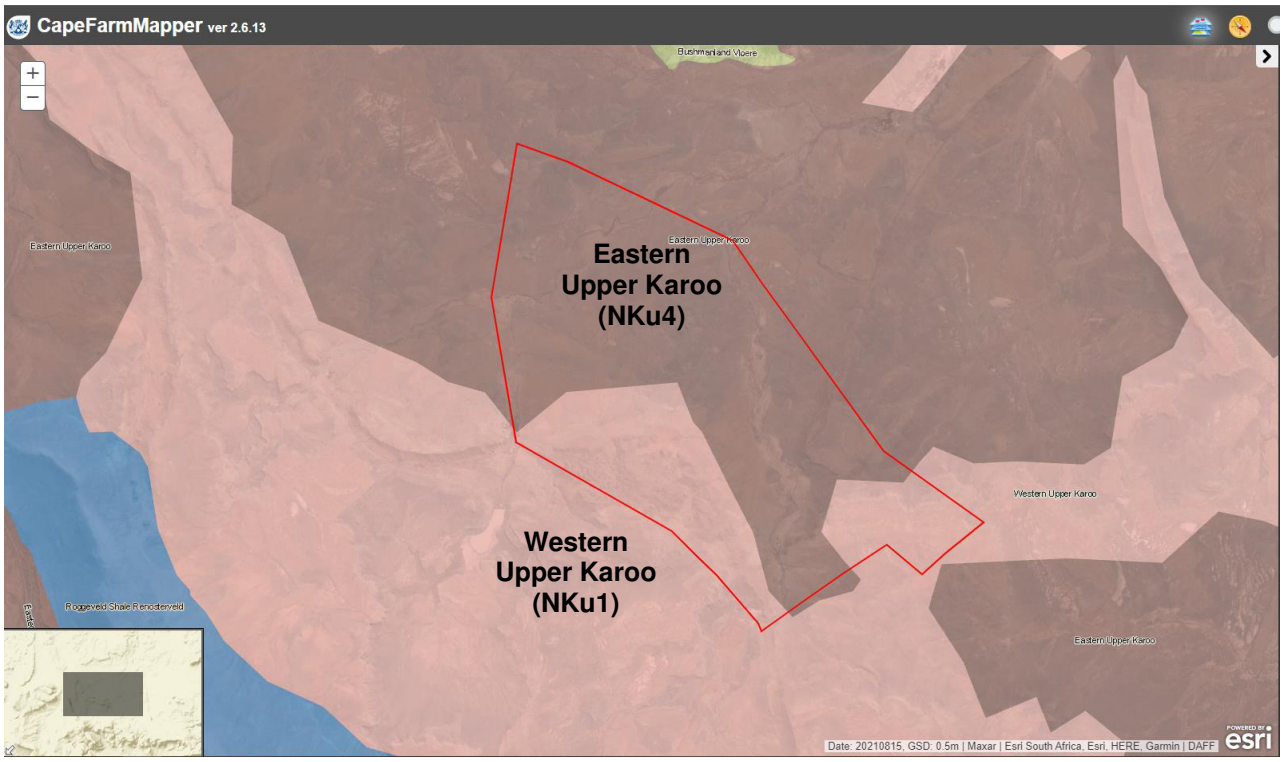


Figure 5-6: Vegetation types on the study site

Plate 5-1: View of the vegetation on the site

5.5 Biodiversity conservation value

There are two freshwater biodiversity conservation mapping initiatives of relevance to the study area, these are the National Freshwater Ecosystem Priority Areas (NFEPA) and the 2016 Northern Cape Critical Biodiversity Areas.

The NFEPAs are intended to provide strategic spatial priorities for conserving South Africa's freshwater ecosystem and supporting sustainable use of water resources. The NFEPAs were determined through a process of systematic biodiversity planning and were identified using a range of criteria for serving ecosystems and associated biodiversity of rivers, wetlands and estuaries. The study area is located largely outside of any NFEPA River with a small number of NFEPA Wetland areas occurring within the boundaries of the study site.

The locations of these NFEPA Wetlands are indicated in the figure below. The two wetland feature identified within the study site are classified as a Channelled Valley Bottom wetlands and the wetland area at the northern tip of the study are as a Depression wetland (Pan). The two Channelled Valley Bottom wetlands are identified as to be artificial in nature as they are directly related to farm dams and the Depression wetland is considered to be a natural feature typical of the area.

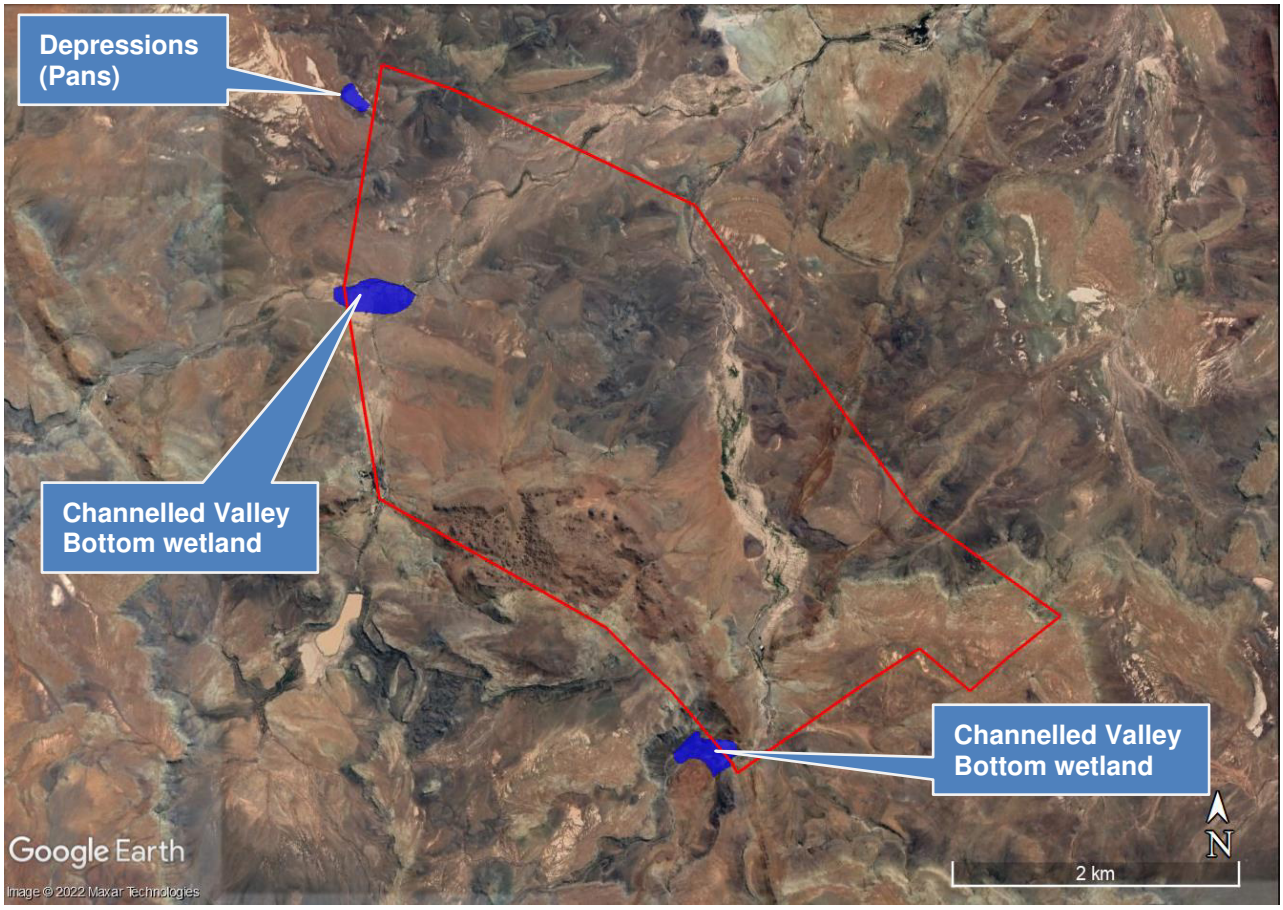


Figure 5-7: Location of the NFEPA wetlands within the study area

The Northern Cape Critical Biodiversity Areas mapping initiative has indicated that no Critical Biodiversity Areas (CBA) are present within the study site. Two CBA2 areas are present within the study area and they are both directly associated with the major seasonal watercourses that drain the site in a northerly direction. An ESA is associated with the eastern CBA2 area with the remainder of the study site being classified as "other natural areas". The locations of these areas are provided in the figure below.

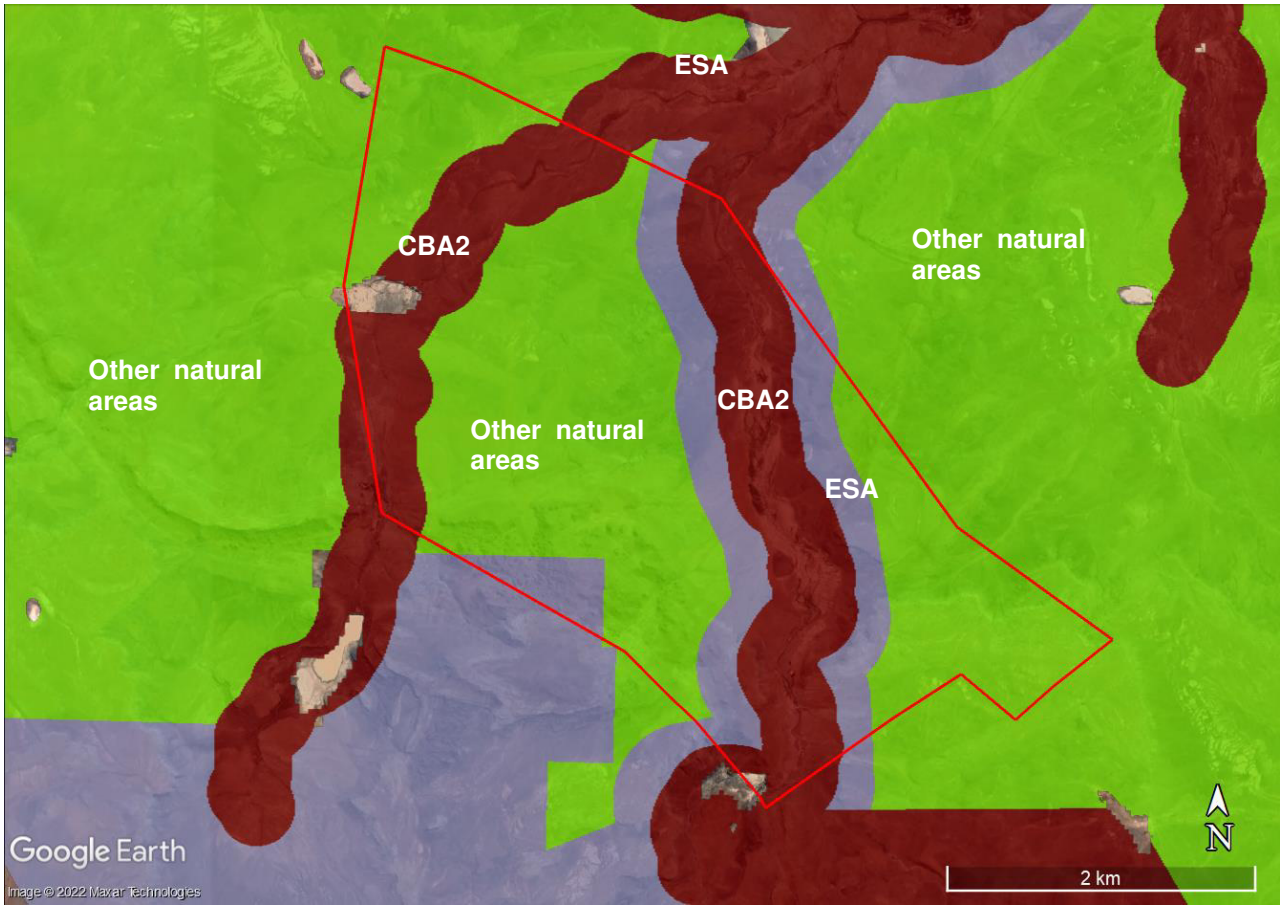


Figure 5-8: Location of the Critical Biodiversity Areas (CBA) and Ecological Support Areas (ESA) associated with the study site

5.6 Aquatic features

In addition to the aquatic features that were identified in the NFEPA Database indicated in the section above, the field assessment of the property has identified a single additional farm dam feature. In addition, to this, the two Channelled Valley Bottom wetland features identified in the database was confirmed to be artificial in nature, while two Depression wetlands are considered to be a natural features typical to the area.

The Depression wetlands are ephemeral in nature with water accumulating in these features during rainfall events. No water flows out of these features with the primary water loss being as a result of evaporation. The location of these depression wetlands and dams are indicated in the figure below.

A number of seasonal watercourses were also identified within the study area. These watercourses predominantly form unnamed tributaries of the Dronkfontein se Leegte River and drains towards this feature (to the northeast). These watercourses are very seasonal in nature and will only have flow during heavy rainfall events. Years might pass between flow events in these watercourses. The location of the larger watercourses is indicated in the figure below.

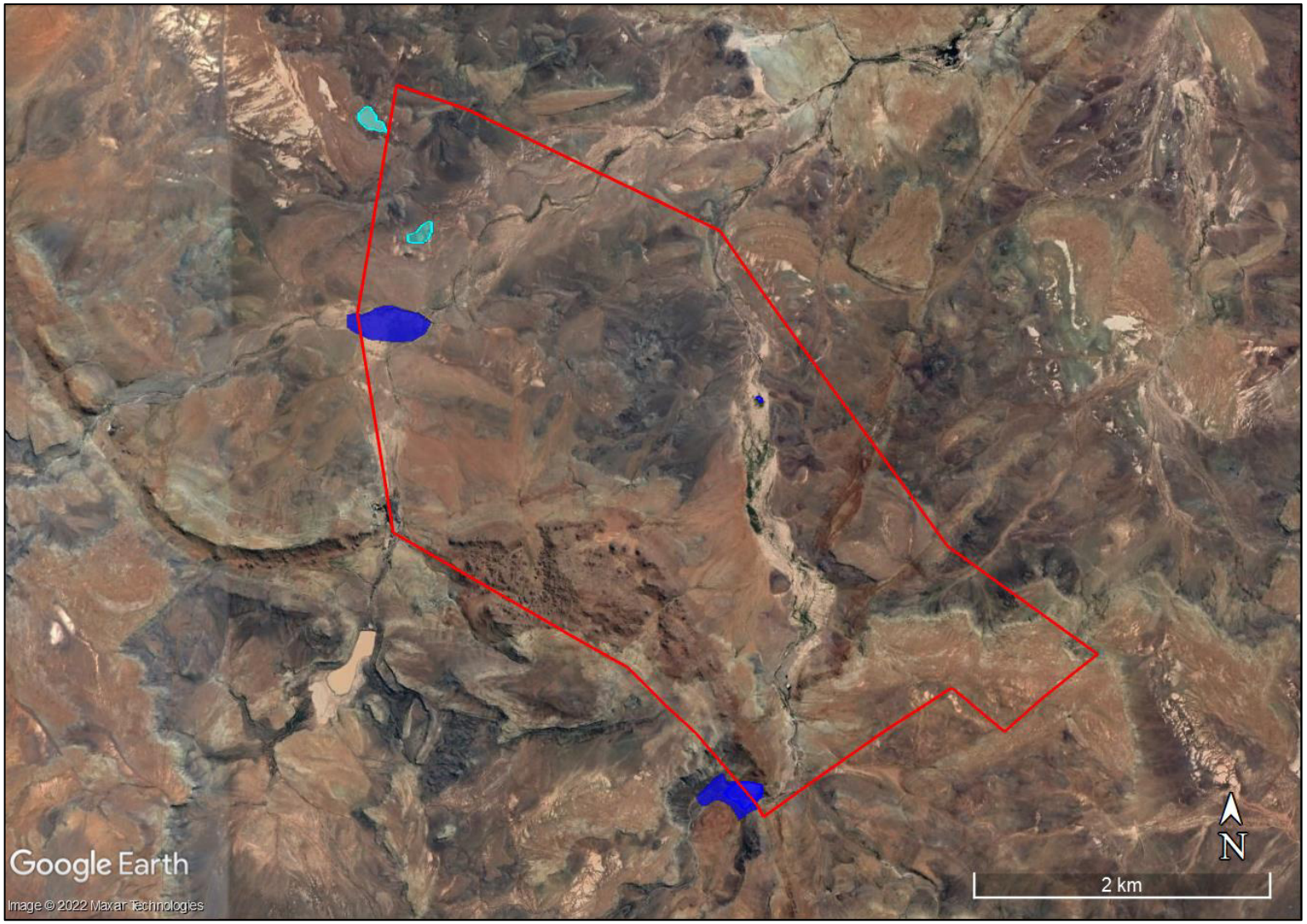


Figure 5-9: Location of the Depression wetlands (in light blue) and the dams (dark blue) within the study site

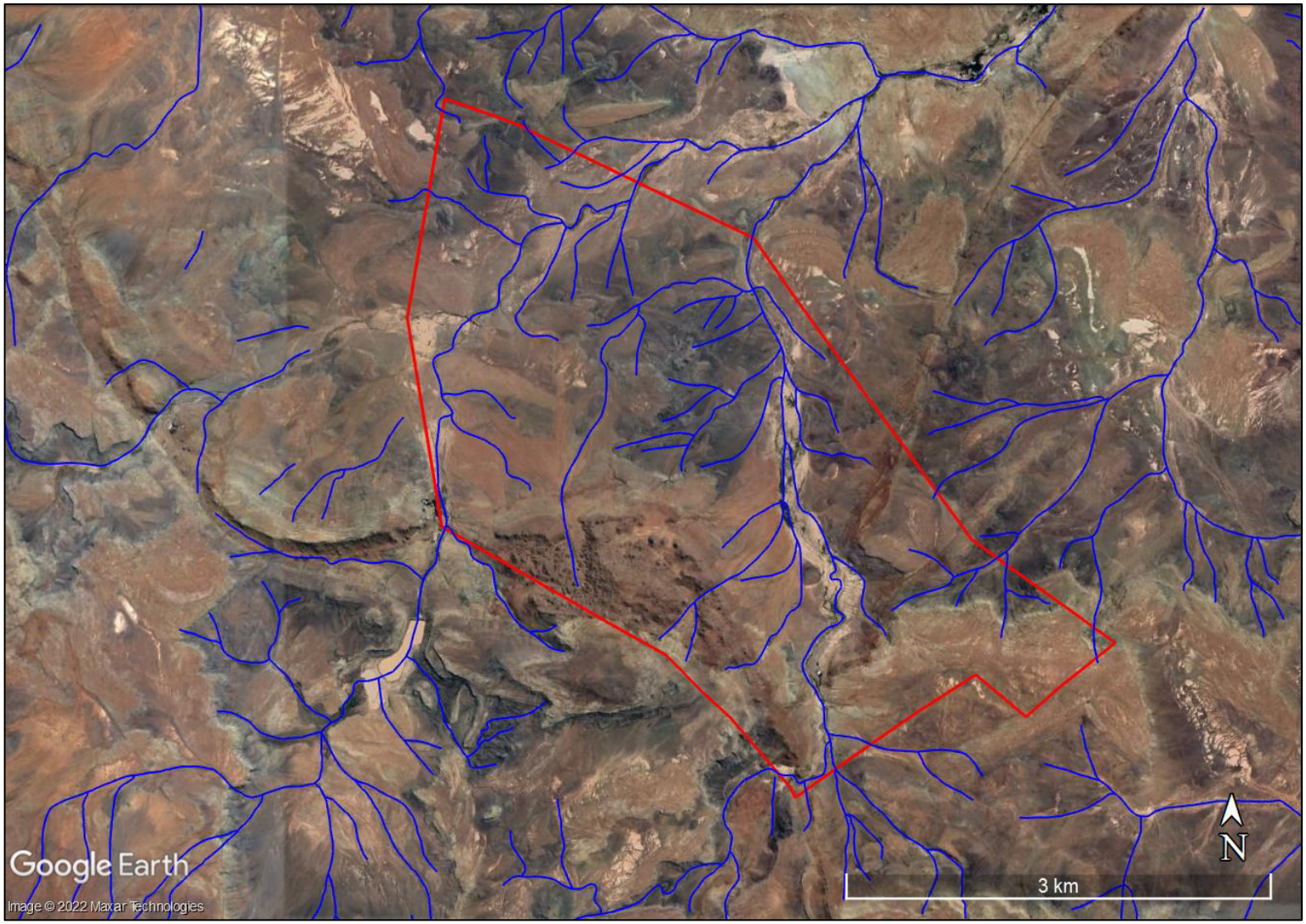


Figure 5-10: Location of the larger seasonal watercourses identified within the study site

Plate 5-2: View of a typical Depression wetland found within the study site

Table 5-2: View of a typical seasonal watercourse occurring within the study area

5.7 Characteristics of the Aquatic Features

Present Ecological State

The overall Present Ecological State (PES) of all the Depression wetland features associated with the study site has been determined to be Class B (Largely natural) with this classification being stable, i.e. no regression. In additions, the PES of the watercourses has been determined to be Class B (Largely natural) with the classification being stable, i.e. no regression.

Ecological Importance and Sensitivity

The overall Ecological Importance and Sensitivity (EIS) of the Depression wetland features as well as the watercourses have been determined to be Low to Moderate largely as a result of their highly seasonal nature. The contribution to the surrounding ecology is significant when the features have water, however, the regularity of the features containing water is not frequent enough to make a significant contribution to the larger regional ecology.

Ecosystem Service Provision

The inconsistency of the aquatic features containing water severely limits the ecosystem service provision of these features. During the time that the features have water, the Depression wetland will act as water resource to the animals in the surrounding areas, act as a sink of any contaminants, phosphates and nitrates that might be in the runoff water and capture any sediment that flows into the features with the runoff. The watercourses will contribute to the larger hydrological system of the catchments in which they occur only during rainfall events that are large enough to support runoff flow in the channels.

5.8 Buffers and No-go Areas

Due to the water scarce nature of the area as well as the study site, the provision of buffers around the artificial and natural wetland areas as well as the watercourses must be adhered to. The primary reason for these buffers is to protect these features from any impacts that might arise from the development of the Klipkraal WEF. As such, the following buffers are suggested:

- No turbine platforms (construction or operational) associated with the Klipkraal WEF must be allowed within 40m of any watercourse on the site;
- No turbine platforms (construction or operational) associated with the Klipkraal WEF must be allowed within 100m of any of the Depression wetlands or dams on the site; and
- No construction camp or operational facility must be allowed within 100m of any watercourses, Depression wetlands or dams on the site.

In addition, all watercourse crossings (access roads and other linear infrastructure) must be designed to be free draining during rainfall events and the size must be kept as small as possible to allow for adequate operations of the WEF. No infrastructure must be allowed within the delineated boundaries or within 100m of the Depression wetlands on the site.

The figure below indicates the proposed extent of these buffers, the yellow lines make provision for the 100m buffers around the dams and wetland features while the green lines represent the 40m buffer around the watercourses.

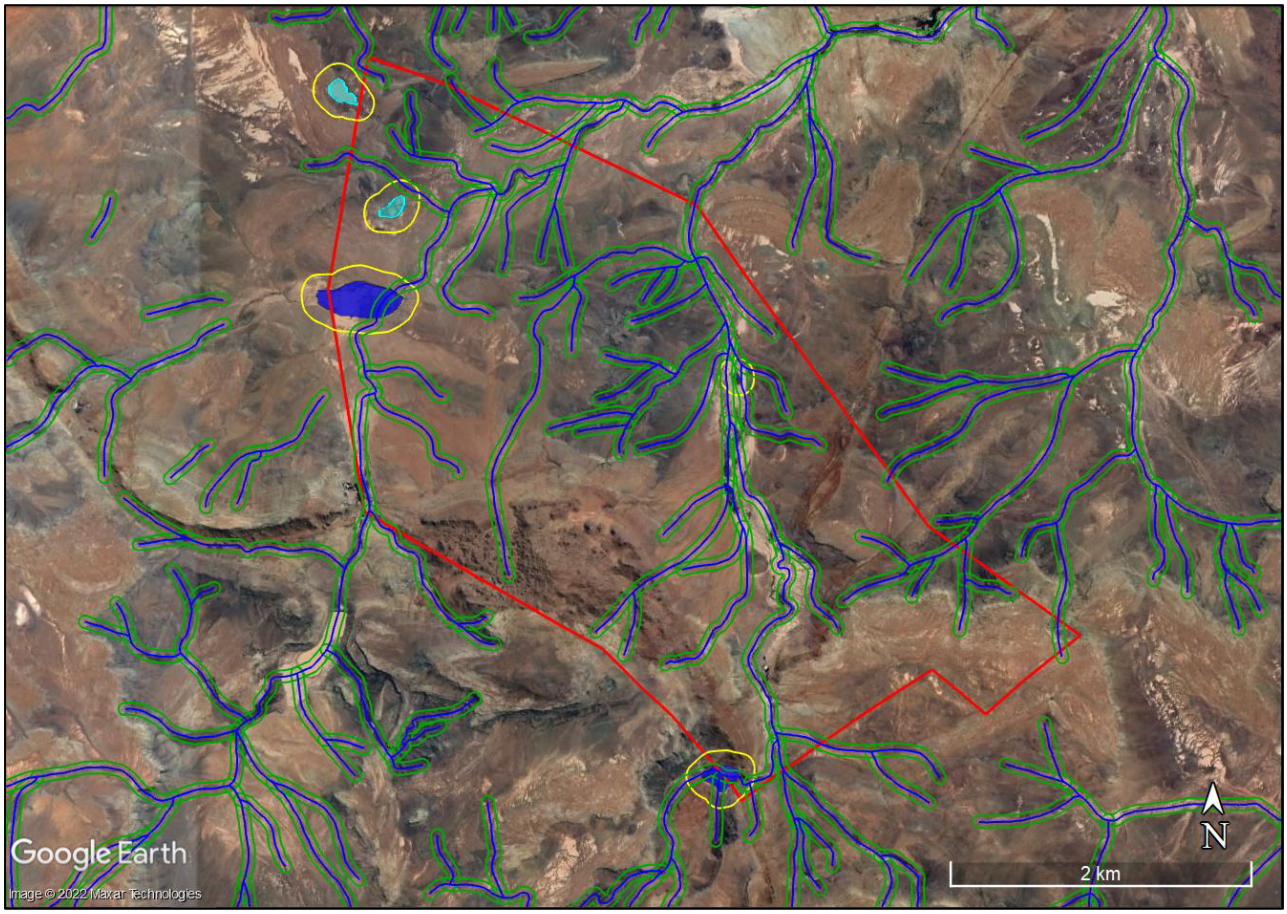


Figure 5-11: Proposed buffers and no-go areas within the Klipkraal WEF phase 1 (yellow lines are 100m and green lines are 40m)

6. SPECIALIST FINDINGS / IDENTIFICATION AND ASSESSMENT OF IMPACTS

Likely impacts associated with the proposed activities associated with the Klipkraal WEF phase 2 on the aquatic biodiversity baseline have been identified through the undertaking of site visits, consultation of published information, comments from the relevant authority and independent assessment by the Environmental Project Team. The impact assessment is based on the understanding that the buffer areas as indicated in this report has been adhered to as much as possible in the presented layout.

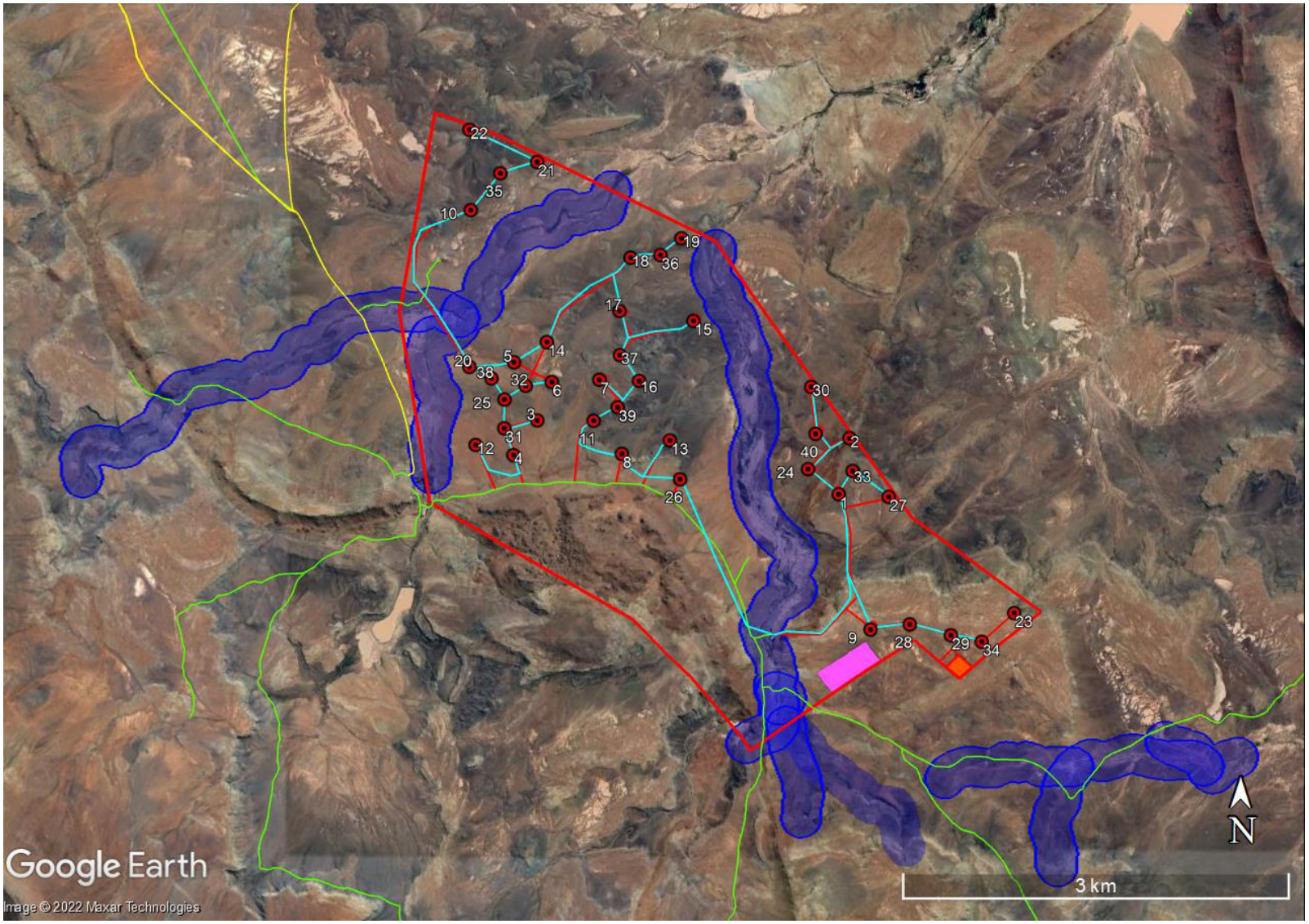


Figure 6-1: Location of the aquatic features (in blue) in relation to the infrastructure associated with the Klipkraal WEF 2

Impacts have also been identified by the specialist assessments undertaken. The impact assessment will make provision for the assessment of the following impacts:

- No-go impacts;
- Planning and design phase impacts;
- Construction phase impacts;
- Operational phase impacts;
- Decommissioning phase impacts; and
- Cumulative impacts

The assessment methodology that was used to determine the significance of the impacts is based on the methodology provided by SiVest and is attached in Appendix B or this report.

6.1 No-go impacts

To contextualise the potential impacts of the project's activities and associated infrastructure, the existing impacts (or *status quo*) associated with current aquatic biodiversity conditions need to be described in terms of the presence of aquatic features. This *status quo* should be used as the comparison against which the other project impacts are assessed. Should the project not proceed, then the current status quo with regards to the aquatic environmental would remain unchanged. Overall, the catchment and subsequent watercourses are largely in a natural state. However, impacts are present in localised areas and include the following:

- Erosion as a result of road crossings;
- Several farm dams; and
- Undersized culverts within present day road crossings.

These impacts have resulted in a slow degradation within the aquatic systems but the rated in change is not noticeable within the timeframe of this assessment. These activities are likely to continue intermittently into the future and since these impacts will occur in the absence of the implementation of the project, these are considered to be "no-go" impacts.

6.2 Planning and design phase impacts

Activities associated with the design and pre-construction phase pertain mostly to a feasibility assessment which is done mostly at a desktop level. In some cases, further site visits need to take place, but the impacts

of these visits on the aquatic environment on the site is negligible, if any. The typical activities that will be undertaken during these visits will be taking of photographs and field surveys.

For the purposes of this assessment, no impacts have been identified that are directly associated with the project.

6.3 Construction phase impacts

This section will assess the impacts associated with the implementation of the proposed project on the aquatic ecology associated with the site. During the construction phase of the project, the following potential impacts have been identified:

- Potential impact to the water quality in the aquatic features as a result of inadequate stormwater management.
- Potential impact to the hydrological characteristics of the aquatic features.
- Potential impacts to the water quality as a result of leaking portable chemical toilets used during construction.
- Potential impact to the water quality in the aquatic features as a result of petrochemical spillages from plant and equipment.
- Potential impact to the water quality in the aquatic features as a result of leaking petrochemical storage facilities.
- Potential impact to the flow of water in the watercourses that will be crossed by infrastructure.

6.4 Operational phase impacts

This section assess the impacts associated with the operational phase of the proposed project on the aquatic ecology of the site. The following impacts have been identified:

- Potential impact to the hydrological characteristics of the aquatic features.
- Potential impact to the water quality in the aquatic features as a result of leakages from plant and equipment using the road.
- Potential impact to the water quality in the aquatic features as a result of inadequate stormwater management.
- Potential impact of the spread of alien invasive vegetation into the aquatic features.
- Potential impact to the water quality in the aquatic features as a result of leakages from vehicles and plant moving on the site.
- Potential impact to the water quality in the aquatic features because of petrochemical spillages from petrochemical storage areas within the site.
- Potential impact to the water quality in the aquatic features as a result of leakages from the sanitation infrastructure servicing the operations.

6.5 Decommissioning phase impacts

This section assess the impacts associated with the decommissioning phase of the proposed project on the aquatic ecology of the site.

The following impacts have been identified:

- Potential impact to the water quality in the aquatic features because of the leakages from the portable chemical toilets that will be used during decommissioning.
- Potential impact to the water quality in the aquatic features because of petrochemical spillages from plant and equipment.
- Potential impact to the water quality in the aquatic features as a result of leaking petrochemical storage facilities.

6.6 Cumulative impacts

The cumulative impacts that have been identified in this section relates to the cumulative impact of the Klipkraal WEF on the receiving environment. It is believed that the nature of the aquatic features (highly seasonal) significantly limits the spread of the cumulative impacts from the site to the neighbouring developments. As such, the cumulative impacts assessed is limited to these impacts on the development site.

Cumulative impacts of the cabling and road infrastructure on the aquatic resources in the area

- Potential impact to the hydrological regime of the aquatic features.
- Potential impact to the water quality of the aquatic features as a result of inadequate stormwater management.

Table 6-1: No-go impacts associated with the Klipkraal WEF phase 2

ENVIRONMENTAL PARAMETER	ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION									RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION								
		E	P	R	L	D	I/M	TOTAL	STATUS	S		E	P	R	L	D	I/M	TOTAL	STATUS	S
Hydrology, geomorphology and biodiversity	The current impacts (formal and informal infrastructure) will persist to impact on the aquatic features which will result in a degradation of the characteristics of these features.	1	3	2	2	3	2	22	N	Low	Outline/explain the mitigation measures to be undertaken to ameliorate the impacts that are likely to arise from the proposed activity. These measures will be detailed in the EMPr.	1	3	2	2	3	2	22	N	Low

Table 6-2: Construction phase impacts associated with the Klipkraal WEF phase 2

ENVIRONMENTAL PARAMETER	ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION									RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION								
		E	P	R	L	D	I/M	TOTAL	STATUS	S		E	P	R	L	D	I/M	TOTAL	STATUS	S
Water quality	Impact to the water quality in the aquatic feature because of inadequate stormwater management.	2	2	2	3	3	2	24	N	Medium	The stormwater outlets associated with the watercourse crossing infrastructure as well as the turbine platforms must make provision for energy dissipators at the mouth of the outlets. This will reduce the risk of erosion and associated siltation which can contaminate the water quality.	2	2	2	2	3	1	11	N	Low
Hydrology	Impact to the hydrological characteristics of the aquatic feature due to changes in the catchment.	2	2	2	3	3	2	24	N	Medium	The provision for adequate stormwater management (as described above) as well as the hydraulic structures that have adequate sizes to prevent any damming of water upstream of the structure must be ensured.	2	2	2	2	3	1	11	N	Low
Water quality	Impact to the water quality in the aquatic features because of the leakages from the portable chemical toilets that will be used during construction.	2	2	2	3	2	2	22	N	Low	The following management and mitigation measures must be included into the EMPr Report for the project to limit the potential impacts of leakages from the ablution facilities: • No portable chemical toilets may be placed within 40m of any watercourse or 100m from the edge of any wetland area. • Only portable chemical toilets with a sealed reservoir will be allowed on site.	2	1	2	1	2	1	9	N	Low

ENVIRONMENTAL PARAMETER	ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION									RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION								
		E	P	R	L	D	I/M	TOTAL	STATUS	S		E	P	R	L	D	I/M	TOTAL	STATUS	S
											• The capacity of the reservoirs in the portable chemical toilets must be monitored on a daily basis to ensure that they can be serviced timeously. • All removal of the collected sewage waste from the portable chemical toilets must be conducted by a registered service provider for disposal at a municipal wastewater treatment facility.									
Water quality	Impact to the water quality in the aquatic features because of petrochemical spillages from plant and equipment.	2	2	2	2	2	3	30	N	Medium	The following management and mitigation measures must be included into the EMPr for the project: • All plant and equipment that make use of petrochemical substances must be checked leakages daily before operations commence. • All plant and equipment that are found to be leaking must be removed from the property and only returned once the leakages have been addressed. • All refuelling of plant and equipment must be conducted over a drip-tray. • If any plant or equipment is to be parked on the site, these must be	2	1	2	1	2	2	16		Low

ENVIRONMENTAL PARAMETER	ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION									RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION								
		E	P	R	L	D	I/M	TOTAL	STATUS	S		E	P	R	L	D	I/M	TOTAL	STATUS	S
											parked at a designated parking area that is 40m away from any watercourse and 100m away from the delineated edge of a wetland. • If any spillages from plant or equipment occur, the spill must be immediately contained, the contaminated soils must be collected and bagged in impermeable bags and stored on site to be removed and disposed of by a registered service provider. For this purpose, the presence of spill-kits on site for the duration of the construction phase is imperative.									
Water quality	Impact to the water quality in the aquatic features as a result of leaking petrochemical storage facilities.	2	2	2	2	2	3	30	N	Medium	It is assumed that all petrochemical storage facilities will be located within the construction camp, as such, the location of the construction camp may not be located within 40m of the edge of any watercourse or within a 100m of the delineated edge of a wetland. In addition, the following management and mitigation measures must be included in the EMPr: • All storage containers must be contained in a bunded area that has	2	1	2	1	2	2	16		Low

ENVIRONMENTAL PARAMETER	ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION									RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION								
		E	P	R	L	D	I/M	TOTAL	STATUS	S		E	P	R	L	D	I/M	TOTAL	STATUS	S
											the capacity of 110% of the total volume of the storage containers. • The bunded area must consist of an impermeable floor as well as walls and be fitted with a valve that can be used to drain any spillages. • If the storage facility will be in use during the rainy season, the bunded area must be rooved to prevent any rainwater entering the bund and reducing its capacity. • The filling of containers, plant, equipment or vehicles from these storage facilities must be done on an impermeable surface to ensure the containment of any possible spillages.									
Hydrology	Impact to the flow of water in the watercourses that will be crossed by infrastructure.	2	2	2	2	2	3	30	N	Medium	In the absence of any design drawings making provision for the watercourse crossing structures, the following recommendations are made: • Where possible, all works in the watercourses must be conducted during the dry season to limit the potential flow of water in the watercourses.	2	1	2	1	2	2	16	N	Low

ENVIRONMENTAL PARAMETER	ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION									RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION								
		E	P	R	L	D	I/M	TOTAL	STATUS	S		E	P	R	L	D	I/M	TOTAL	STATUS	S
											• If the above is not possible, all efforts must be made during the construction phase to allow for unobstructed flow through the construction works. • The crossing structures that will be put in place must all be size accordingly to ensure that all water that flows in the watercourse can pass unobstructed.									

Table 6-3: Operational phase impacts associated with the Klipkraal WEF phase 2

ENVIRONMENTAL PARAMETER	ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION									RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION								
		E	P	R	L	D	I/M	TOTAL	STATUS	S		E	P	R	L	D	I/M	TOTAL	STATUS	S
Hydrology	Impact to the hydrological characteristics of the aquatic feature due to changes in the catchment	2	2	2	3	3	2	24	N	Medium	The stormwater outlets associated with the infrastructure associated with the Klipkraal WEF must make provision for energy dissipators at the mouth of the outlets. This will reduce the risk of erosion and	2	2	2	2	2	1	10	N	Low

ENVIRONMENTAL PARAMETER	ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION									RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION								
		E	P	R	L	D	I/M	TOTAL	STATUS	S		E	P	R	L	D	I/M	TOTAL	STATUS	S
											associated siltation which can contaminate the water quality. In addition, provision must be made for adequate stormwater management (as described above) as well as the adequate sizing of the hydraulic structures that will be used for the watercourse crossings to prevent any upstream damming by the structure. These hydraulic structures will also need to be monitored on a regular basis to ensure that they are free draining and have no blockages that can cause damming on the upstream side.									
Water quality	Impact to the water quality in the aquatic features because of inadequate stormwater management.	2	2	2	3	3	2	24	N	Medium	The stormwater outlets associated with the infrastructure associated with the Klipkraal WEF must make provision for energy dissipators at the mouth of the outlets. This will reduce the risk of erosion and associated siltation which can contaminate the water quality. In addition, provision must be made for adequate stormwater management (as described above) as well as the adequate sizing of the hydraulic structures that will be	2	2	2	2	3	1	11	N	Low

ENVIRONMENTAL PARAMETER	ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION									RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION								
		E	P	R	L	D	I/M	TOTAL	STATUS	S		E	P	R	L	D	I/M	TOTAL	STATUS	S
											used for the watercourse crossings to prevent any upstream damming by the structure. These hydraulic structures will also need to be monitored on a regular basis to ensure that they are free draining and have no blockages that can cause damming on the upstream side.									
Water quality	Impact to the water quality in the aquatic features as a result of leakages from vehicles and plant moving on the site.	2	2	2	2	2	3	30	N	Medium	As the majority of the vehicles, plant and equipment that will travel within the site will be associated with the Klipkraal WEF, the regular management and maintenance of these vehicles, plant and equipment must be ensured to limit the risk of any leakages.	2	1	2	1	2	1	8	N	Low
Water quality	Impact to the water quality in the aquatic features because of petrochemical spillages from petrochemical storage areas within the site.	2	2	2	2	2	3	30	N	Medium	It is assumed that all petrochemical storage facilities will be located within the operational facility, as such, the location of this facility may not be located within 40m of the edge of any watercourse or within a 100m of the delineated edge of a wetland. In addition, the following management and mitigation measures must be included in the EMPr: • All storage containers must be contained in a bunded area that has the capacity of 110% of the total volume of the storage containers.	2	1	2	1	2	2	16		Low

ENVIRONMENTAL PARAMETER	ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION									RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION								
		E	P	R	L	D	I/M	TOTAL	STATUS	S		E	P	R	L	D	I/M	TOTAL	STATUS	S
											• The bunded area must consist of an impermeable floor as well as walls and be fitted with a valve that can be used to drain any spillages. • If the storage facility will be in use during the rainy season, the bunded area must be rooved to prevent any rainwater entering the bund and reducing its capacity. • The filling of containers, plant, equipment or vehicles from these storage facilities must be done on an impermeable surface to ensure the containment of any possible spillages.									
Water quality	Impact to the water quality in the aquatic features as a result of leakages from the sanitation infrastructure servicing the operations.	2	2	2	3	2	3	33	N	Medium	It is understood that provision has been made in the project design for a septic tank or soak-away-system. It is suggested that the design should be finalised with a septic tank system that is serviced on a regular basis by a registered service provider which will significantly limit the risk of contamination on the site. The septic tank must be monitored on a regular basis to ensure that it is cleared before it spills into the environment.	2	1	2	1	2	2	16		Low

ENVIRONMENTAL PARAMETER	ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION									RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION								
		E	P	R	L	D	I/M	TOTAL	STATUS	S		E	P	R	L	D	I/M	TOTAL	STATUS	S
											The collected sewage must be disposed of at a municipal sewage treatment facility.									

Table 6-4: Decommissioning phase impacts associated with the Klipkraal WEF phase 2

ENVIRONMENTAL PARAMETER	ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION									RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION								
		E	P	R	L	D	I/M	TOTAL	STATUS	S		E	P	R	L	D	I/M	TOTAL	STATUS	S
Water quality	Impact to the water quality in the aquatic features because of the leakages from the portable chemical toilets that will be used during decommissioning.	2	2	2	3	2	2	22	N	Low	The following management and mitigation measures must be included into the EMPr Report for the project to limit the potential impacts of leakages from the ablution facilities: • No portable chemical toilets may be placed within 40m of any watercourse or 100m from the edge of any wetland area. • Only portable chemical toilets with a sealed reservoir will be allowed on site. • The capacity of the reservoirs in the portable chemical toilets must be monitored on a daily basis to ensure that they can be serviced timeously. • All removal of the collected sewage waste from the portable chemical toilets must be conducted by a registered service provider for disposal at a municipal wastewater treatment facility.	2	1	2	1	2	1	9	N	Low
Water quality	Impact to the water quality in the aquatic features because	2	2	2	2	2	3	30	N	Medium	The following management and mitigation measures must be included into the EMPr for the project:	2	1	2	1	2	2	16		Low

ENVIRONMENTAL PARAMETER	ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION									RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION								
		E	P	R	L	D	I/M	TOTAL	STATUS	S		E	P	R	L	D	I/M	TOTAL	STATUS	S
	of petrochemical spillages from plant and equipment.										• All plant and equipment that make use of petrochemical substances must be checked leakages daily before operations commence. • All plant and equipment that are found to be leaking must be removed from the property and only returned once the leakages have been addressed. • All refuelling of plant and equipment must be conducted over a drip-tray. • If any plant or equipment is to be parked on the site, these must be parked at a designated parking area that is 40m away from any watercourse and 100m away from the delineated edge of a wetland. • If any spillages from plant or equipment occur, the spill must be immediately contained, the contaminated soils must be collected and bagged in impermeable bags and stored on site to be removed and disposed of by a registered service provider. For this purpose, the presence of spill-kits on site for the									

ENVIRONMENTAL PARAMETER	ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION									RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION								
		E	P	R	L	D	I/M	TOTAL	STATUS	S		E	P	R	L	D	I/M	TOTAL	STATUS	S
											duration of the decommissioning phase is imperative.									
Water quality	Impact to the water quality in the aquatic features as a result of leaking petrochemical storage facilities.	2	2	2	2	2	3	30	N	Medium	It is assumed that all petrochemical storage facilities will be located within the construction camp, as such, the location of the construction camp may not be located within 40m of the edge of any watercourse or within a 100m of the delineated edge of a wetland. In addition, the following management and mitigation measures must be included in the EMPr: • All storage containers must be contained in a bunded area that has the capacity of 110% of the total volume of the storage containers. • The bunded area must consist of an impermeable floor as well as walls and be fitted with a valve that can be used to drain any spillages. • If the storage facility will be in use during the rainy season, the bunded area must be rooved to prevent any rainwater entering the bund and reducing its capacity. • The filling of containers, plant, equipment or vehicles from these	2	1	2	1	2	2	16		Low

ENVIRONMENTAL PARAMETER	ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION									RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION								
		E	P	R	L	D	I/M	TOTAL	STATUS	S		E	P	R	L	D	I/M	TOTAL	STATUS	S
											storage facilities must be done on an impermeable surface to ensure the containment of any possible spillages.									

Table 6-5: Cumulative impacts associated with the Klipkraal WEF phase 2

ENVIRONMENTAL PARAMETER	ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION									RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION								
		E	P	R	L	D	I/M	TOTAL	STATUS	S		E	P	R	L	D	I/M	TOTAL	STATUS	S
Hydrology	Impact to the hydrological regime of the aquatic features.	2	2	2	2	2	3	30	N	Medium	Provision of adequate stormwater measures associated with the discharge of stormwater from the construction and operational areas (as discussed in sections above) will limit the impact on the hydrological regime in the area. In addition, the design and management of all the watercourse crossing structures and measures must be conducted in accordance with the measures provided above which will significantly limit the impact on the regional hydrological regime of the aquatic features.	2	1	1	1	2	1	7	N	Low
Water quality	Impact to the water quality of the aquatic features as a result of inadequate stormwater management.	2	2	2	2	2	3	30	N	Medium	The potential cumulative impact on the water quality of the water in the identified aquatic features is a critical aspect that must be addressed. The management and mitigation measures discussed in other sections of this report must be implemented to ensure that the potential sources of contamination is adequately designed and managed to ensure that the risk of water contamination is limited.	2	1	1	1	2	1	7	N	Low

7. COMPARATIVE ASSESSMENT OF ALTERNATIVES

No alternative technological options or project layouts were provided which makes and alternative assessment impossible. It must however be pointed out that it is believed that consideration of the prescribed buffers in any alternative layout and management and mitigation measures for the various project phases contained in this assessment, that the impacts will be similar for these alternative layouts.

8. CONCLUSION AND SUMMARY

8.1 Summary of Findings

The nature of the aquatic features that are located within the study area is largely dry for long periods. Their "seasonality" is therefore not annually as can be expected of aquatic features in South Africa. The irregular nature of these aquatic features is based on the irregular nature of the rainfall in the larger area. All the aquatic features that were identified, had a PES of Class B (Largely natural) and an EIS that has been classified as being Low (largely based on their irregular nature).

The nature of the wind farm is such that it carries a low intensity impact on aquatic features with the consideration of the prescribed buffers contained in this assessment. A wind farm typically targets higher lying area where wind resources are best, therefore keeping the turbine locations away from the freshwater resources on the study area. However, the associated infrastructure (roads, underground and above ground cabling as well as the construction and operational facilities may come into contact with the aquatic features.

The Klipkraal WEF also has a small footprint spread over a large area, allowing for the retention of a much of the natural system so that the system should remain largely unaffected. A variety of aquatic features, mostly ephemeral in nature were observed within the study area and were mapped and buffered as necessary for their protection and handed over as constraints to inform the design of the project layout. The impact assessment was conducted in consideration of the provision of these buffers providing for management and mitigation for potential impacts.

8.2 Conclusion and Impact Statement

The provided layout (revised by the screening and pre-application scoping phase inputs) has, to a large degree, avoided any sensitive aquatic features and associated buffer areas, significantly reducing the potential overall impact and risk to aquatic resources on the study site. The assessment of the potential impacts associated with the project were completed where avoidance of aquatic features was not possible, or the nature of the activities involve a potential risk to aquatic features even at great distance. Overall, it is expected that the impact on the aquatic environment would be **Low Negative**.

The assessment report makes a recommendation for the implementation of a 40m buffer around any watercourse and a buffer of 100m from any of the ephemeral wetlands that have been identified as well as

any of the farm dams on the property. Adherence to these buffers as prescribed further limits the potential impact on the aquatic environment of the study site. Where watercourses have to be crossed by access roads or cable infrastructure, the design of these crossings must make provision for adequate hydraulic sizing to prevent any damming on the upstream side of these structures. Furthermore, the functionality of these structures must be monitored to ensure that they are kept fully functional.

Typically, the water sources for windfarm developments depend on the groundwater. No information in this regard has been provided, however, it is understood that a Geohydrological Assessment will be conducted to understand the groundwater availability in the area as well as the suitability of this water resources for the provision of water for the windfarm. As a result of the ephemeral nature of the aquatic features that have been identified on the study site as well as their highly irregular inundation, the likelihood of the groundwater abstraction directly affecting these features is highly unlikely.

As such, based on the findings of this study, the specialist has no objection to the authorisation of the proposed activities assuming that all mitigation and management measures indicated in this assessment are implemented to limit the impact on the aquatic environment of the study site.

9. REFERENCES

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APPENDIX A

SPECIALIST CURRICULUM VITAE

Magnus van Rooyen

Technical Director - Environment

CORE SKILLS

- Environmental Impact Assessment
- Specialist Ecological (Terrestrial and Aquatic) Assessment
- Environmental Screening Assessment
- Due Diligence Assessment and Feasibility Studies
- Mining Applications
- Environmental Management Programmes and Plans
- Strategic Environmental Assessments
- Wildlife Management Plans

DETAILS

Qualifications

- MPil. Environmental Management
- BSc (Hon) Botany
- BSc (Botany and Zoology)
- Post Graduate Certificate in Education (Science and Biology)

Memberships

- South African Council for Natural Scientific Professions (Pr. Sci. Nat. 400335/11)
- International Association of Impact Assessors (Ref No. 1839)

Languages

- Afrikaans - fluent
- English - fluent
- German - fair
- Zulu - communication

Countries worked in:

South Africa, Namibia, Lesotho, Mozambique, Botswana, Guinea, Liberia, United States, United Kingdom

PROFILE

Mr van Rooyen is currently a Technical Director – Environment and the Branch Manager of the KwaZulu-Natal Office of GCS in Durban.

In addition to holding a Masters degree in Environmental Management, he also holds a BSc degree in Botany and Zoology, an Honors degree in Botany and a Post Graduate Certificate in Education. He has in excess of 18 years' experience in the environmental consulting field through conducting and managing Environmental Impact Assessments, Specialist Terrestrial and Aquatic Ecology Assessments and Strategic Environmental Management inputs into various project feasibility studies.

Through these services, he has been exposed to projects in a range of sectors which include the general public infrastructure sector (national and provincial roads, harbour and rail developments, water (dams and supply) and wastewater (treatment works and reticulation), private infrastructure sector (small and large scale housing developments, lodges, private dams, etc.), agricultural sector (dams, establishment of orchards, plantations and feedlots), mining sector (coal mines, gold mine, manganese mines, aggregates and associated mining infrastructure) and the industrial sector (light and heavy industrial infrastructure development).

In addition, Mr van Rooyen has extensive experience in conducting specialist terrestrial and aquatic ecological assessments for various infrastructure (roads, dams, ports) and industrial (smelters, power plants) development projects in a number of diverse ecosystems across Africa. He has experience in the compilation of Resettlement Policy Framework Plans, Due Diligence Assessments and Feasibility Studies associated with infrastructure development projects. Mr van Rooyen has experience in working on various private and public sectors as well as rural and urban environments in various countries

Previous Experience

Year	Client	Project Description	Role/ Responsibility
2020	Private client	**Wetland Assessment for the farm dam on the Farm Compentation near Matatiele** Undertaking of the wetland assessment for the development of an irrigation dam on the Farm Compensation near Matatiele in KwaZulu-Natal.	Wetland Specialist
2020	Senekal Boerdery	**Wetland and Biodiversity Assessment for the Mkuze Township Establsishment** Undertaking of the wetland and biodiversity assessment associated with the township establishment in the town of Mkuze, KwaZulu-Natal.	Wetland and Biodiversity Specialist
2020	WSP Consulting	**Wetland Assessment associated with the establishment of a flood protection berm at the SAPPI Saiccor Mill** Undertaking of the wetland assessment for the construciton of a flood protection berm between the uMkomaas River and the SAPPI Saiccor Mill in KwaZulu-Natal.	Wetland Specialist
2020	Transnet National Ports Authority	**Forest mapping within the Port of Richards Bay** Undertaking of the mapping and classification of all the indigenous forest areas withini the Port of Richards Bay, KwaZulu-Natal.	Biodiverstiy Specialist
2020	RHDHV	**KwaMathanya Water Supply Scheme Wetland Assessment** Undertaking of the wetland assessment of the KwaMathanya water supply scheme near town of Ixopo in KwaZulu-Natal.	Wetland Specialist
2020	Private client	**Brownsdrift Hydropedological Assessment** Undertaking of the wetland and hydropedological assessment associated with the proposed residential developmnet on the site in Browndrift, eThekwini Municipality, KwaZulu-Natal.	Wetland Specialist
2020	GreenScene Environmental	**Wetland and Biodiversity Assessment for a residential property in Pumula** Undertaking of the wetland and biodiversity assessment for the residential development on Lot 967 Pumula, KwaZulu-Natal.	Wetland and Biodiversity Specialist
2020	GreenScene Environmental	**Wetland and Biodiversity Assessment for Lot 962 and 965 Port Edward** Undertaking of the wetland and biodiversity assessment for the residential development on Lot 962 and 965 Port Edward, KwaZulu-Natal.	Wetland and Biodiversity Specialist
2020	Msunduzi Municipality	**Wetland and Biodiversity Assessment for various Military Veterans Housing sites within the Msuduzi Municipality** Undertaking of the wetland and biodiversity assessment for the various sites earmarked for the establishment of residential houses for the Military Veterans in the Msunduzi Municipality, KwaZulu-Natal.	Wetland and Biodiversity Specialist

2020	Private client	**Forest delineation of a private property in Munster** Undertaking of the delineation of the forest margins on the residential property in Munster, KwaZulu-Natal.	Biodiverstiy Specialist
2020	JG Afrika (Pty) Ltd	**Gunyana Water Supply Scheme Wetland and Biodiviersity Assessment** Undertaking of the wetland and biodiverstiy assessment of the Gunyana community water supply scheme near town of Pomeroy in KwaZulu-Natal.	Wetland and Biodiversity Specialist
2020	GreenScene Environmental	**Wetland and Vegetation Assessment associated with the construction of the Ingwebaba Pedestrian Bridge near Shelly Beach** Undertaking of the wetland and vegetaiton assessment for the construction of the Ingwebaba Pedestrian Bridge near Shelly Beach in KwaZulu-Natal.	Wetland and Biodiversity Specialist
2020	Terratest (Pty) Ltd	**Wetland and Vegetation Assessment associated with the construction of the KwaHlokohloko Rural Water Supply Scheme near Eshowe** Undertaking of the wetland and biodiverstiy assessment of the KwaHlokoloko community water supply scheme near town of Eshowe in KwaZulu-Natal.	Wetland and Biodiversity Specialist
2020	Coastal Macadamias	**Wetland Assessment associated with the development of an irrigation dam for Coastal Macadamias near Ramsgate** Undertaking of the wetland assessment for the development of an irrigation dam for the Coastal Macadamias property near Ramsgate, KwaZulu-Natal.	Wetland Specialist
2019	South African National Roads Agency Limited	**Ballito to Tinley Manor Wetland and Biodiveristy Assessment** Undertaking of the wetland and biodiversity study to support the preliminary design for the upgrade of the N3 between Ballito and Tinley Manor.	Wetland and Biodiversity Specialist
2019	Vale Limitada	**Biodiversity Assessment for the alternative water supply pipeline** Undertaking of the biodiversity assessment to suport the preliminary design of the proposed alternative water supply pipeline at the Moatize Mine in Tete, Mozambique.	Biodiversity Specialist
2019	GIB Consulting Engineers	**Aquadene Wetland Assessment** Undertaking of the wetland assessment for the Aquadene housing development in Richards Bay.	Wetland Specialist
2019	JG Afrika (Pty) Ltd	**Wetland Assessment for the pipeline route for the drought relief pipeline in Laingsburg** Undertakaing of the wetland assessment assocaited with the 25km pipeline route from the watersource to the town of Laingsburg in the Western Cape.	Wetland Specialist
2019	Seche International	**Wetland and Biodiversity Assessment for the proposed new uMgungundlovu Landfill Site** Preliminary wetland and biodiversity assessment for the proposed new uMgungundlovu Landfill site outside of Pietermaritzburgg.	Wetland and Biodiversity Specialist
2019	South African National Roads	**Wetland and Vegetation Assessment associated with the upgrading of the N1 between**	Wetland and

	Agency Limited	**Heuningspruit and Koppies** Undertaking of the wetland and biodiversity assessment for the upgrading of the N1 between Heuningspruit and Koppies in the Freestate Province.	Biodiversity Specialist
2019	Terratest (Pty) Ltd	**Wetland and Vegetation Assessment associated with the upgrading of the Nelson Mandelar Museum at Qunun** Undertaking of the wetland and vegetation assessment associated with the upgrading of the Nelson Mandela Museum in Qunu in the Eastern Cape Province.	Wetland and Biodiversity Specialist
2019	GreenScene Environmental	**Wetland and Vegetation Assessment associated with the construction of the Ulundi Water Supply Scheme** Undertaking of the wetland and biodiverstiy assessment of the Ulundi water supply scheme near town of Eshowe in KwaZulu-Natal.	Wetland and Biodiversity Specialist
2018 to 2019	MOZAL	**Biodiversity Assessment for the raw water supply pipeline for the Mozal Aluminium Smelter in Mozambique** Undertkaing of the biodiversity assessment for the raw water supply pipeline from the desalination plant in the Port of Matola to the MOZAL smelter int Boane, Maputo, Mozambique.	Biodiversity Specialist
2018 to 2019	JG Afrika (Pty) Ltd	**Wetland and Biodiveristy Assessment for various water supply schemes in the Cedarberg Municpality** Undertaking of the wetland and biodiversity assessments for the water supplys schemes for the town of Whupperthal, Clanwilliam and Citrusdal in the Western Cape.	Biodiversity Specialist
2017 and 2019	uKhozi Environmentalists	**Phalanndwa Coal Mine Biodiversity and Wetland Assessment** Undertaking the wetland and biodiversity specialist study in support of the Application for Environmental Authorisation for the Phalanndwa Coal Mine Expansion near Delmas.	Wetland and Biodiversity Specialist
2017	Kongiwe Environmental Consultants	**Lephalale Coal Mine Biodiversity and Wetland Assessment** Undertaking the wetland and biodiversity specialist study in support of the Application for Environmental Authorisation for the Lephalale Coal Mine near Lephalale.	Wetland and Biodiversity Specialist
2017	Nzingwe Consultancy	**Riversdale Coal Mine Wetland Assessment** Undertaking the wetland specialist study in support of the Application for Environmental Authorisation and the Water Use Licence Application for the Riversdale Coal Mine near Vryheid.	Wetland Specialist
2017 and 2020	WSP Environmental	**SAPPI Saiccor Wetland Assessment** Undertaking the wetland specialist study in support of the Application for	Wetland Specialist

		Environmental Authorisation for the construction of flood protection measures associated with the SAPPI Saiccor Mill, uMkomaas.	
2017	WSP Environmental	**11th Avenue Interchange Wetland Assessment** Undertaking the wetland specialist study in support of the Application for Environmental Authorisation for the construction of the 11th Avenue Interchange, Durban	Wetland Specialist
2017	WSP Environmental	**SAPPI Saiccor Alien Invasive Plant – Risk Assessment** Undertaking of the risk assessment of the presence of various listed category I and II alien invasive plant species on the SAPPI Saiccor Mill site, uMkomaas.	Vegetation Specialist
2017 and 2020	Environmental Resources Management	**Bhangazi Community Tented Camp Wetland and Biodiversity Assessment** Undertaking of the wetland and biodiversity specialist study in support of the Application for Environmental Authorisation for the establishment of the Bhangazi Community Tented Camp in the isiMangoliso Wetland Park, St. Lucia.	Wetland and Biodiversity Specialist
2016	South African National Roads Agency Limited	**N3 – Market Road Interchange Wetland and Biodiversity Assessment** Undertaking of the wetland and biodiversity specialist study in support of the Application for Environmental Authorisation for the upgrading of the N3 – Market Road Interchange, Pietermaritzburg.	Wetland and Biodiversity Specialist
2015 to present	ESKOM SOC	**ESKOM 22 kVA Lines Vegetation Assessments** Undertaking of vegetation assessments for the establishment of various 22kVA electrification lines in KwaZulu-Natal.	Vegetation Specialist
2014	ESKOM SOC	**Tombo to Mafini 300kVA Line Vegetation Assessments** Undertaking of vegetation assessment for the route alignment of the 300kVA high voltage electricity line from the Tombo Substation to Mafini, Port St. Johns.	Vegetation Specialist
2014	Element Consulting Engineers	**Port St. Johns Water Treatment Works Wetland and Biodiversity Assessment** Undertaking of the wetland and biodiversity specialist study in support of the Application for Environmental Authorisation for the establishment of the Port St. Johns Water Treatment Works, Port St. Johns.	Wetland and Biodiversity Specialist
2012	South African National Roads Agency Limited	**N2 – uMgeni Road Interchange Wetland and Biodiversity Assessment** Undertaking of the wetland and biodiversity specialist study in support of the Application for Environmental Authorisation for the upgrading of the N2 – uMgeni Road Interchange, Durban.	Wetland and Biodiversity Specialist

December 2012	South African National Roads Agency Limited	**N2 – Mt Edgecombe Interchange Wetland and Biodiversity Assessment** Undertaking of the wetland and biodiversity specialist study in support of the Application for Environmental Authorisation for the upgrading of the N2 – Mt Edgecombe Interchange, Durban.	Wetland and Biodiversity Specialist
2011	Afrimat	**Ladysmith Quarry Wetland and Biodiversity Assessment** Undertaking the wetland and biodiversity specialist study in support of the Mining Right Application for the establishment of the Afrimat Quarry, Ladysmith.	Wetland and Biodiversity Specialist
2010	South African National Roads Agency Limited	**N3 – Epworth Road Interchange Wetland and Biodiversity Assessment** Undertaking of the wetland and biodiversity specialist study in support of the Application for Environmental Authorisation for the upgrading of the N3 – Epworth Road Interchange, Pietermaritzburg	Wetland and Biodiversity Specialist
2010	Millennium Challenge Account - Mozambique	**Nacala Dam rehabilitation Biodiversity Assessment** Undertaking of the biodiversity specialist study in support of the Application for an Environmental Permit for the rehabilitation and raising of the Nacala Dam, Mozambique.	Biodiversity Specialist
2010	WSP Environmental	**SAPPI Ngodwana Mill Expansion Wetland and Biodiversity Assessment** Undertaking of the wetland and biodiversity specialist study in support of the Application for Environmental Authorisation for the expansion of the Ngodwana Mill, Waterval Boven.	Wetland and Biodiversity Specialist
2009	South African National Roads Agency Limited	**N3 – Chota Motala Road Interchange Wetland and Biodiversity Assessment** Undertaking of the wetland and biodiversity specialist study in support of the Application for Environmental Authorisation for the upgrading of the N3 – Chota Motala Road Interchange, Pietermaritzburg.	Wetland and Biodiversity Specialist
2008	South African National Roads Agency Limited	**R30 Glen Lyon to Brandfort Wetland and Biodiversity Assessment** Undertaking of the wetland and biodiversity specialist study in support of the Application for Environmental Authorisation for the upgrading of the R30 between Glen Lyon and Brandfort.	Wetland and Biodiversity Specialist
2008	South African National Roads Agency Limited	**R30 Virginia to Beatrix Mine Wetland and Biodiversity Assessment** Undertaking of the wetland and biodiversity specialist study in support of the Application for Environmental Authorisation for the upgrading of the R30 between Virginia and Beatrix Mine.	Wetland and Biodiversity Specialist
2008	Miranda Minerals	**Sesikhona Colliery Wetland and Biodiversity Assessment** Undertaking the wetland and biodiversity specialist study in support of the	Wetland and Biodiversity Specialist

		Mining Right Application for the establishment of the Sesikhona Colliery, Dannhauser.	
2008	Miranda Minerals	**Uithoek Colliery Wetland and Biodiversity Assessment** Undertaking the wetland and biodiversity specialist study in support of the Mining Right Application for the establishment of the Uithoek Colliery, Dundee.	Wetland and Biodiversity Specialist
2007	Miranda Minerals	**Burnside Colliery Wetland and Biodiversity Assessment** Undertaking the wetland and biodiversity specialist study in support of the Mining Right Application for the establishment of the Burnside Colliery, Dundee.	Wetland and Biodiversity Specialist
2006	Ultimate Goal	**Ultimate Goal Colliery Biodiversity Assessment** Undertaking the wetland and biodiversity specialist study in support of the Mining Right Application for the establishment of the Ultimate Goal Colliery, Dundee.	Biodiversity Specialist
2006	Canton Trading	**Taylors Halt Quarry Wetland and Biodiversity Assessment** Undertaking the wetland and biodiversity specialist study in support of the Mining Right Application for the establishment of the Taylor Halt Quarry, Pietermaritzburg.	Wetland and Biodiversity Specialist
2005	South African National Roads Agency Limited	**uMtamvuna Quarry Biodiversity Assessment** Undertaking the biodiversity specialist study in support of the Mining Right Application for the establishment of the SANRAL Quarry, Kokstad.	Biodiversity Specialist

APPENDIX B

IMPACT ASSESSMENT METHODOLOGY

1 ENVIRONMENTAL IMPACT ASSESSMENT (EIA) METHODOLOGY

The Environmental Impact Assessment (EIA) Methodology assists in evaluating the overall effect of a proposed activity on the environment. Determining of the significance of an environmental impact on an environmental parameter is determined through a systematic analysis.

1.1 Determination of Significance of Impacts

Significance is determined through a synthesis of impact characteristics which include context and intensity of an impact. Context refers to the geographical scale (i.e. site, local, national or global), whereas intensity is defined by the severity of the impact e.g. the magnitude of deviation from background conditions, the size of the area affected, the duration of the impact and the overall probability of occurrence. Significance is calculated as shown in **Table 1**.

Significance is an indication of the importance of the impact in terms of both physical extent and time scale, and therefore indicates the level of mitigation required. The total number of points scored for each impact indicates the level of significance of the impact.

1.2 Impact Rating System

The impact assessment must take account of the nature, scale and duration of effects on the environment and whether such effects are positive (beneficial) or negative (detrimental). Each issue / impact is also assessed according to the various project stages, as follows:

- Planning;
- Construction;
- Operation; and
- Decommissioning.

Where necessary, the proposal for mitigation or optimisation of an impact should be detailed. A brief discussion of the impact and the rationale behind the assessment of its significance has also been included.

The significance of Cumulative Impacts should also be rated (As per the Excel Spreadsheet Template).

1.2.1 Rating System Used to Classify Impacts

The rating system is applied to the potential impact on the receiving environment and includes an objective evaluation of the possible mitigation of the impact. Impacts have been consolidated into one (1) rating. In assessing the significance of each issue the following criteria (including an allocated point system) is used:

Table 1: Rating of impacts criteria

ENVIRONMENTAL PARAMETER		
A brief description of the environmental aspect likely to be affected by the proposed activity (e.g. Surface Water).		
ISSUE / IMPACT / ENVIRONMENTAL EFFECT / NATURE		
Include a brief description of the impact of environmental parameter being assessed in the context of the project. This criterion includes a brief written statement of the environmental aspect being impacted upon by a particular action or activity (e.g. oil spill in surface water).		
EXTENT (E)		
This is defined as the area over which the impact will be expressed. Typically, the severity and significance of an impact have different scales and as such bracketing ranges are often required. This is often useful during the detailed assessment of a project in terms of further defining the determined.		
1	Site	The impact will only affect the site
2	Local/district	Will affect the local area or district
3	Province/region	Will affect the entire province or region
4	International and National	Will affect the entire country
PROBABILITY (P)		
This describes the chance of occurrence of an impact		
1	Unlikely	The chance of the impact occurring is extremely low (Less than a 25% chance of occurrence).
2	Possible	The impact may occur (Between a 25% to 50% chance of occurrence).
3	Probable	The impact will likely occur (Between a 50% to 75% chance of occurrence).
4	Definite	Impact will certainly occur (Greater than a 75% chance of occurrence).
REVERSIBILITY (R)		
This describes the degree to which an impact on an environmental parameter can be successfully reversed upon completion of the proposed activity.		
1	Completely reversible	The impact is reversible with implementation of minor mitigation measures
2	Partly reversible	The impact is partly reversible but more intense mitigation measures are required.
3	Barely reversible	The impact is unlikely to be reversed even with intense mitigation measures.
4	Irreversible	The impact is irreversible and no mitigation measures exist.
IRREPLACEABLE LOSS OF RESOURCES (L)		
This describes the degree to which resources will be irreplaceably lost as a result of a proposed activity.		
1	No loss of resource.	The impact will not result in the loss of any resources.
2	Marginal loss of resource	The impact will result in marginal loss of resources.
3	Significant loss of resources	The impact will result in significant loss of resources.
4	Complete loss of resources	The impact is result in a complete loss of all resources.
DURATION (D)		
This describes the duration of the impacts on the environmental parameter. Duration indicates the lifetime of the impact as a result of the proposed activity.		

1	Short term	The impact and its effects will either disappear with mitigation or will be mitigated through natural process in a span shorter than the construction phase (0 – 1 years), or the impact and its effects will last for the period of a relatively short construction period and a limited recovery time after construction, thereafter it will be entirely negated (0 – 2 years).
2	Medium term	The impact and its effects will continue or last for some time after the construction phase but will be mitigated by direct human action or by natural processes thereafter (2 – 10 years).
3	Long term	The impact and its effects will continue or last for the entire operational life of the development, but will be mitigated by direct human action or by natural processes thereafter (10 – 50 years).
4	Permanent	The only class of impact that will be non-transitory. Mitigation either by man or natural process will not occur in such a way or such a time span that the impact can be considered transient (Indefinite).
INTENSITY / MAGNITUDE (I / M)		
Describes the severity of an impact (i.e. whether the impact has the ability to alter the functionality or quality of a system permanently or temporarily).		
1	Low	Impact affects the quality, use and integrity of the system/component in a way that is barely perceptible.
2	Medium	Impact alters the quality, use and integrity of the system/component but system/ component still continues to function in a moderately modified way and maintains general integrity (some impact on integrity).
3	High	Impact affects the continued viability of the system/component and the quality, use, integrity and functionality of the system or component is severely impaired and may temporarily cease. High costs of rehabilitation and remediation.
4	Very high	Impact affects the continued viability of the system/component and the quality, use, integrity and functionality of the system or component permanently ceases and is irreversibly impaired (system collapse). Rehabilitation and remediation often impossible. If possible rehabilitation and remediation often unfeasible due to extremely high costs of rehabilitation and remediation.
SIGNIFICANCE (S)		
Significance is determined through a synthesis of impact characteristics. Significance is an indication of the importance of the impact in terms of both physical extent and time scale, and therefore indicates the level of mitigation required. This describes the significance of the impact on the environmental parameter. The calculation of the significance of an impact uses the following formula: **Significance = (Extent + probability + reversibility + irreplaceability + duration) x magnitude/intensity.**		

The summation of the different criteria will produce a non-weighted value. By multiplying this value with the magnitude/intensity, the resultant value acquires a weighted characteristic which can be measured and assigned a significance rating.

Points	Impact Significance Rating	Description
5 to 23	Negative Low impact	The anticipated impact will have negligible negative effects and will require little to no mitigation.
5 to 23	Positive Low impact	The anticipated impact will have minor positive effects.
24 to 42	Negative Medium impact	The anticipated impact will have moderate negative effects and will require moderate mitigation measures.
24 to 42	Positive Medium impact	The anticipated impact will have moderate positive effects.
43 to 61	Negative High impact	The anticipated impact will have significant effects and will require significant mitigation measures to achieve an acceptable level of impact.
43 to 61	Positive High impact	The anticipated impact will have significant positive effects.
62 to 80	Negative Very high impact	The anticipated impact will have highly significant effects and are unlikely to be able to be mitigated adequately. These impacts could be considered "fatal flaws".
62 to 80	Positive Very high impact	The anticipated impact will have highly significant positive effects.

The table below is to be represented in the Impact Assessment section of the report. The excel spreadsheet template can be used to complete the Impact Assessment.

Table 2: Rating of impacts template and example

ENVIRONMENTAL PARAMETER	ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION									RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION								
		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S
Construction Phase																				
Vegetation and protected plant species	Vegetation clearing for access roads, turbines and their service areas and other infrastructure will impact on vegetation and protected plant species.	2	4	2	2	3	3	39	-	Medium	**Outline/explain the mitigation measures to be undertaken to ameliorate the impacts that are likely to arise from the proposed activity. These measures will be detailed in the EMPr.**	2	4	2	1	3	2	24	-	Low

Operational Phase																				
Fauna	Fauna will be negatively affected by the operation of the wind farm due to the human disturbance, the presence of vehicles on the site and possibly by noise generated by the wind turbines as well.	2	3	2	1	4	3	36	-	Medium	**Outline/explain the mitigation measures to be undertaken to ameliorate the impacts that are likely to arise from the proposed activity. These measures will be detailed in the EMPr.**	2	2	2	1	4	2	22	-	Low
Decommissioning Phase																				
Fauna	Fauna will be negatively affected by the decommissioning of the wind farm due to the human disturbance, the presence and operation of vehicles and heavy machinery on the site and the noise generated.	2	3	2	1	2	3	30	-	Medium	**Outline/explain the mitigation measures to be undertaken to ameliorate the impacts that are likely to arise from the proposed activity. These measures will be detailed in the EMPr.**	2	2	2	1	2	2	18	-	Low

Cumulative																				
Broad-scale ecological processes	Transformation and presence of the facility will contribute to cumulative habitat loss and impacts on broad-scale ecological processes such as fragmentation.	2	4	2	2	3	2	26	-	Medium	**Outline/explain the mitigation measures to be undertaken to ameliorate the impacts that are likely to arise from the proposed activity. These measures will be detailed in the EMPr.**	2	3	2	1	3	2	22	-	Low

APPENDIX C

DFFE SCREENING ASSESSMENT

SCREENING REPORT FOR AN ENVIRONMENTAL AUTHORIZATION AS REQUIRED BY THE 2014 EIA REGULATIONS – PROPOSED SITE ENVIRONMENTAL SENSITIVITY

EIA Reference number: TBA

Project name: Klipkraal WEF 2

Project title: Klipkraal WEF 2

Date screening report generated: 06/05/2022 15:28:15

Applicant: Aura Development Company

Compiler: Luvanya Naidoo

Compiler signature:

.....

Application Category: Utilities Infrastructure|Electricity|Generation|Renewable|Wind

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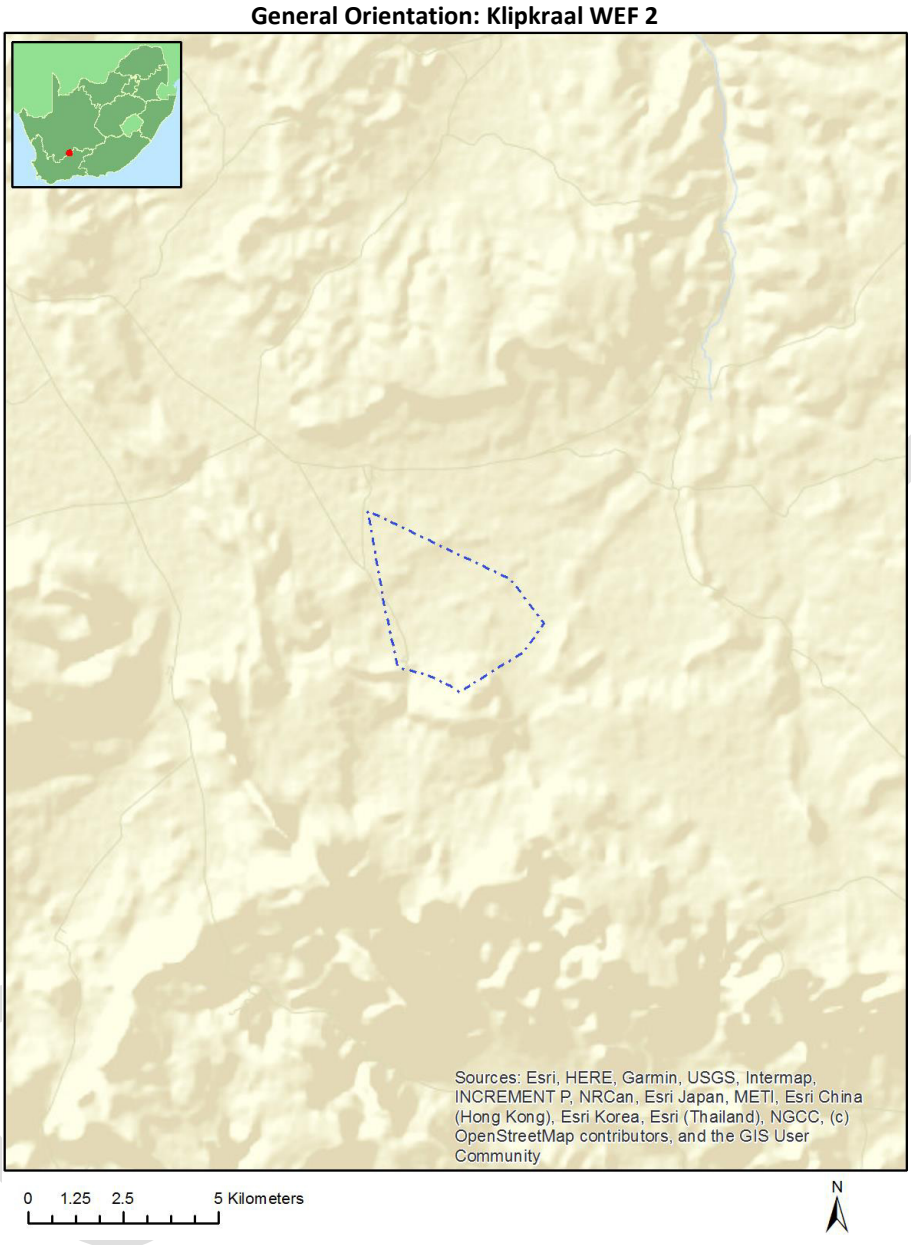
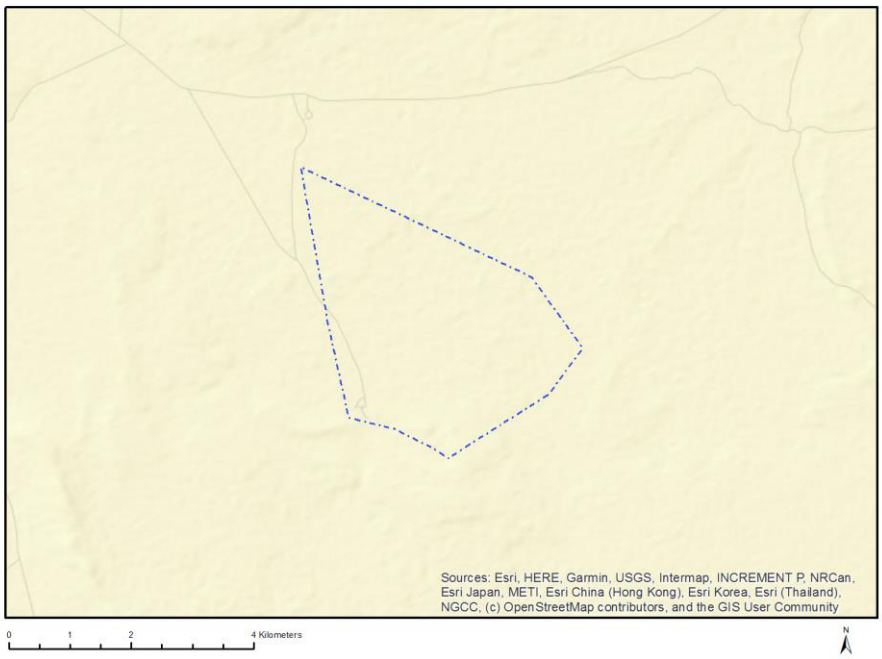
Proposed Project Location

Orientation map 1: General location



Map of proposed site and relevant area(s)



Cadastral details of the proposed site

Property details:

No	Farm Name	Farm/ Erf No	Portion	Latitude	Longitude	Property Type
1	MATJES FONTEIN	409	0	32°4'7.87S	21°46'16.24E	Farm
2	KLIPFONTEIN	447	0	32°6'47.24S	21°48'0.96E	Farm
3	MATJES FONTEIN	409	0	32°4'7.87S	21°46'16.24E	Farm Portion
4	KLIPFONTEIN	447	0	32°7'5.84S	21°49'39.32E	Farm Portion
5	KLIPFONTEIN	447	1	32°6'30.03S	21°46'30.03E	Farm Portion

Development footprint[1] vertices:
No development footprint(s) specified.

Wind and Solar developments with an approved Environmental Authorisation or applications under consideration within 30 km of the proposed area

No nearby wind or solar developments found.

Environmental Management Frameworks relevant to the application

[1] "development footprint", means the area within the site on which the development will take place and incudes all ancillary developments for example roads, power lines, boundary walls, paving etc. which require vegetation clearance or which will be disturbed and for which the application has been submitted.

No intersections with EMF areas found.

Environmental screening results and assessment outcomes

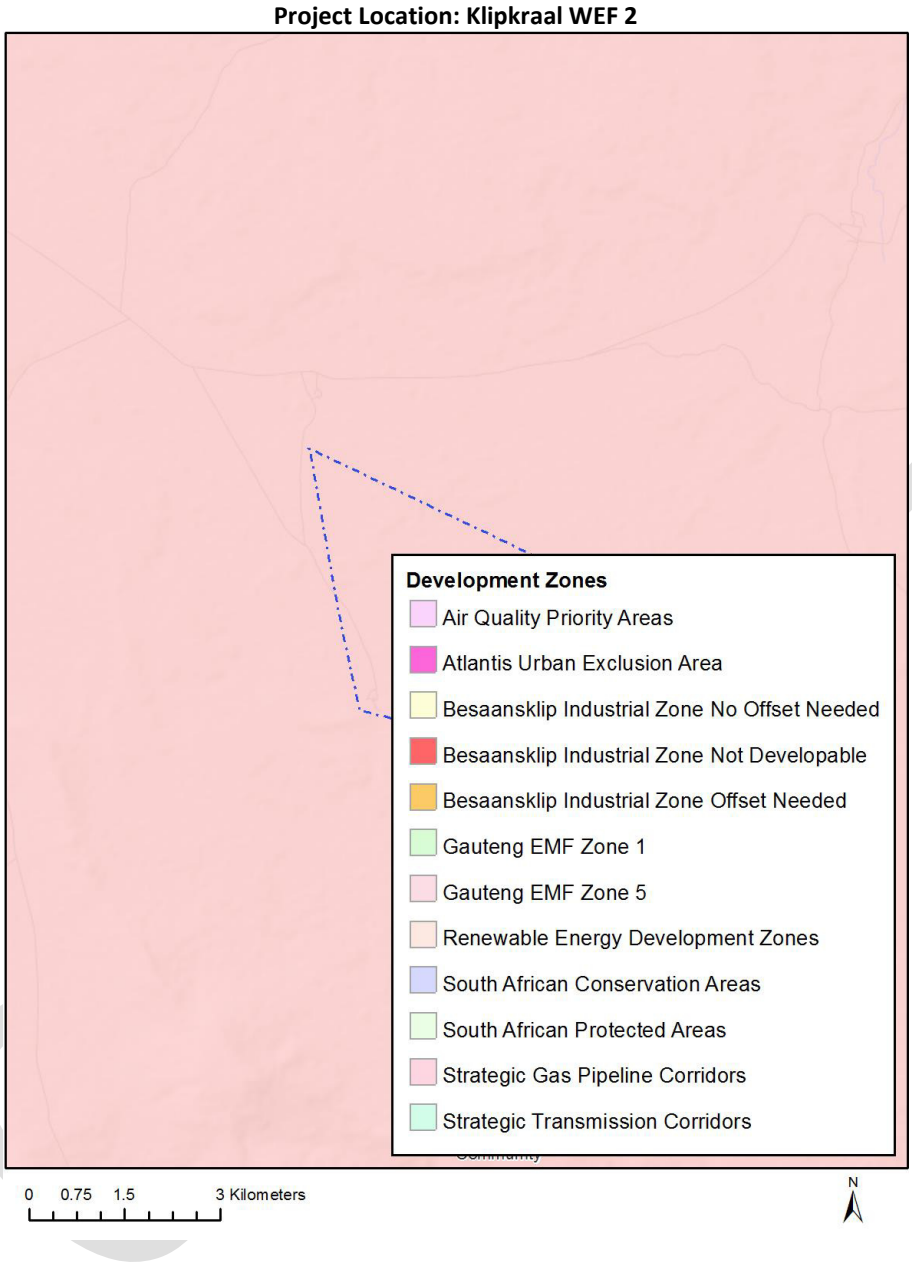
The following sections contain a summary of any development incentives, restrictions, exclusions or prohibitions that apply to the proposed development site as well as the most environmental sensitive features on the site based on the site sensitivity screening results for the application classification that was selected. The application classification selected for this report is: **Utilities Infrastructure|Electricity|Generation|Renewable|Wind**.

Relevant development incentives, restrictions, exclusions or prohibitions

The following development incentives, restrictions, exclusions or prohibitions and their implications that apply to this site are indicated below.

Incentive, restriction or prohibition	Implication
Strategic Gas Pipeline Corridors-Phase 9: Inland Corridor from Saldanha to Coega	https://screening.environment.gov.za/ScreeningDownloads/DevelopmentZones/Combined_GAS.pdf

Map indicating proposed development footprint within applicable development incentive, restriction, exclusion or prohibition zones



Proposed Development Area Environmental Sensitivity

The following summary of the development site environmental sensitivities is identified. Only the highest environmental sensitivity is indicated. The footprint environmental sensitivities for the proposed development footprint as identified, are indicative only and must be verified on site by a suitably qualified person before the specialist assessments identified below can be confirmed.

Theme	Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
Agriculture Theme			X	
Animal Species Theme			X	

Aquatic Biodiversity Theme	X			
Archaeological and Cultural Heritage Theme				X
Avian (Wind) Theme				X
Bats (Wind) Theme		X		
Civil Aviation (Wind) Theme				X
Defence (Wind) Theme				X
Flicker Theme	X			
Landscape (Wind) Theme	X			
Paleontology Theme	X			
Noise Theme	X			
Plant Species Theme			X	
RFI (Wind) Theme	X			
Terrestrial Biodiversity Theme	X			

Specialist assessments identified

Based on the selected classification, and the environmental sensitivities of the proposed development footprint, the following list of specialist assessments have been 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 including the provision of photographic evidence of the site situation.

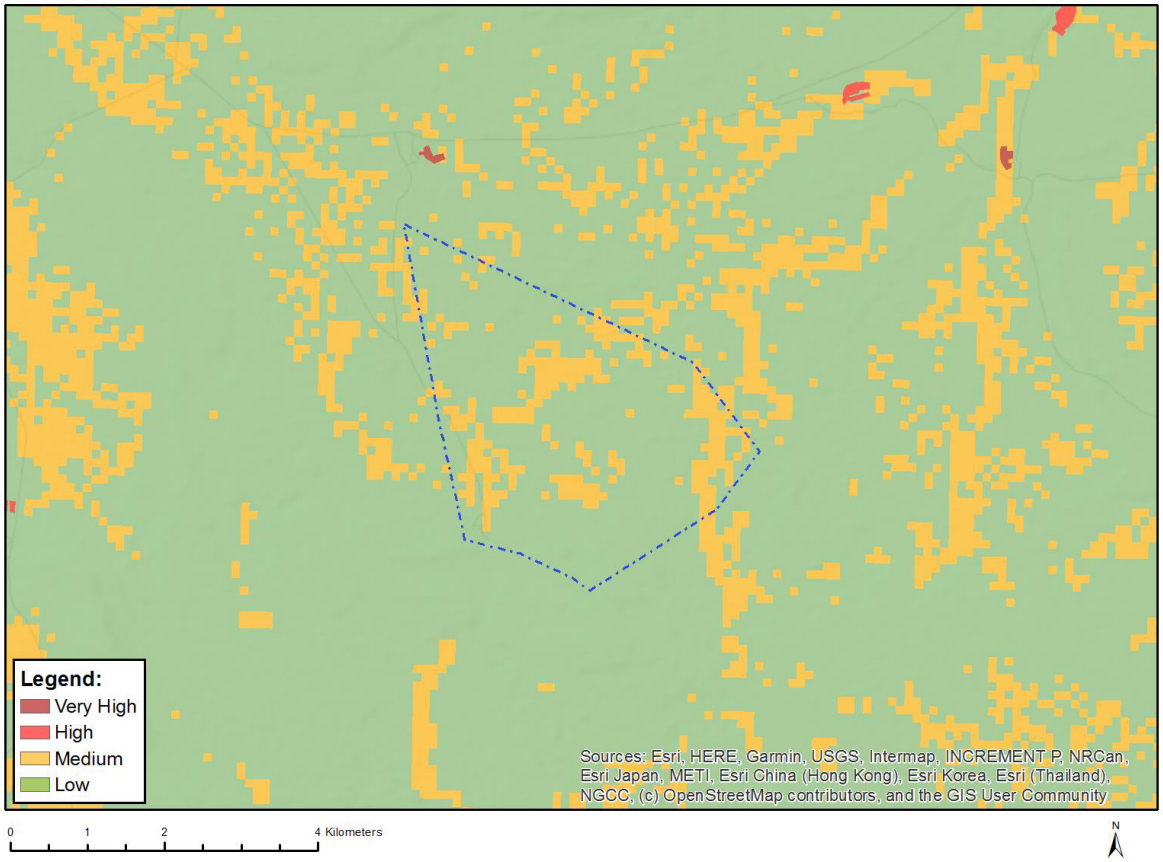
No	Specialist assessment	Assessment Protocol
1	Agricultural Impact Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_WindAndSolar_Agriculture_Assessment_Protocols.pdf
2	Landscape/Visual Impact Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_General_Requirement_Assessment_Protocols.pdf
3	Archaeological and Cultural Heritage Impact Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_General_Requirement_Assessment_Protocols.pdf
4	Palaeontology Impact Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_General_Requirement_Assessment_Protocols.pdf
5	Terrestrial Biodiversity Impact Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_Terrestrial_Biodiversity_Assessment_Protocols.pdf

6	Aquatic Biodiversity Impact Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_Aquatic_Biodiversity_Assessment_Protocols.pdf
7	Avian Impact Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_Avifauna_Assessment_Protocols.pdf
8	Civil Aviation Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_Civil_Aviation_Installations_Assessment_Protocols.pdf
9	Defense Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_Defence_Installations_Assessment_Protocols.pdf
10	RFI Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_General_Requirement_Assessment_Protocols.pdf
11	Noise Impact Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_Noise_Impacts_Assessment_Protocol.pdf
12	Flicker Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_General_Requirement_Assessment_Protocols.pdf
13	Traffic Impact Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_General_Requirement_Assessment_Protocols.pdf
14	Geotechnical Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_General_Requirement_Assessment_Protocols.pdf
15	Socio-Economic Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_General_Requirement_Assessment_Protocols.pdf
16	Plant Species Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_Plant_Species_Assessment_Protocols.pdf
17	Animal Species Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_Animal_Species_Assessment_Protocols.pdf

Results of the environmental sensitivity of the proposed area.

The following section represents the results of the screening for environmental sensitivity of the proposed site for relevant environmental themes associated with the project classification. It is the duty of the EAP to ensure that the environmental themes provided by the screening tool are comprehensive and complete for the project. Refer to the disclaimer.

MAP OF RELATIVE AGRICULTURE THEME SENSITIVITY

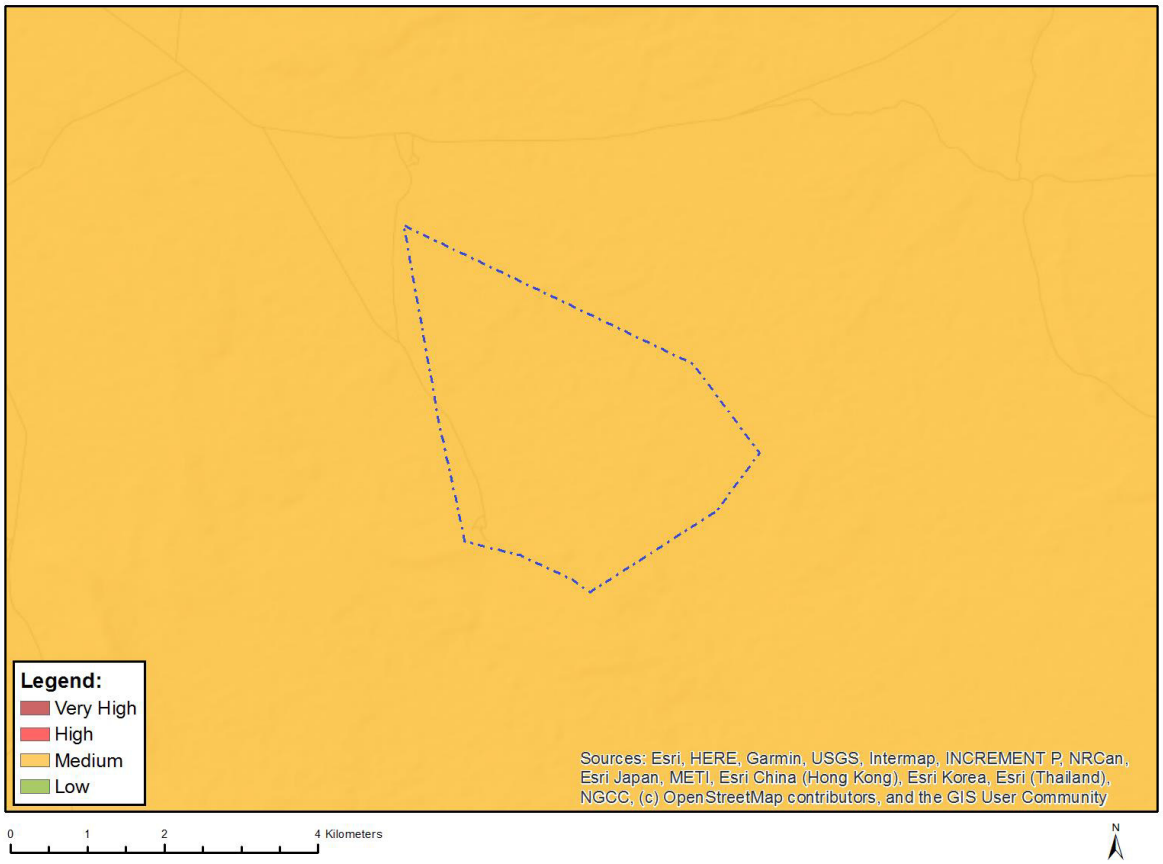


Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
		X	

Sensitivity Features:

Sensitivity	Feature(s)
Low	Land capability;01. Very low/02. Very low/03. Low-Very low/04. Low-Very low/05. Low
Medium	Land capability;06. Low-Moderate/07. Low-Moderate/08. Moderate

MAP OF RELATIVE ANIMAL SPECIES THEME SENSITIVITY



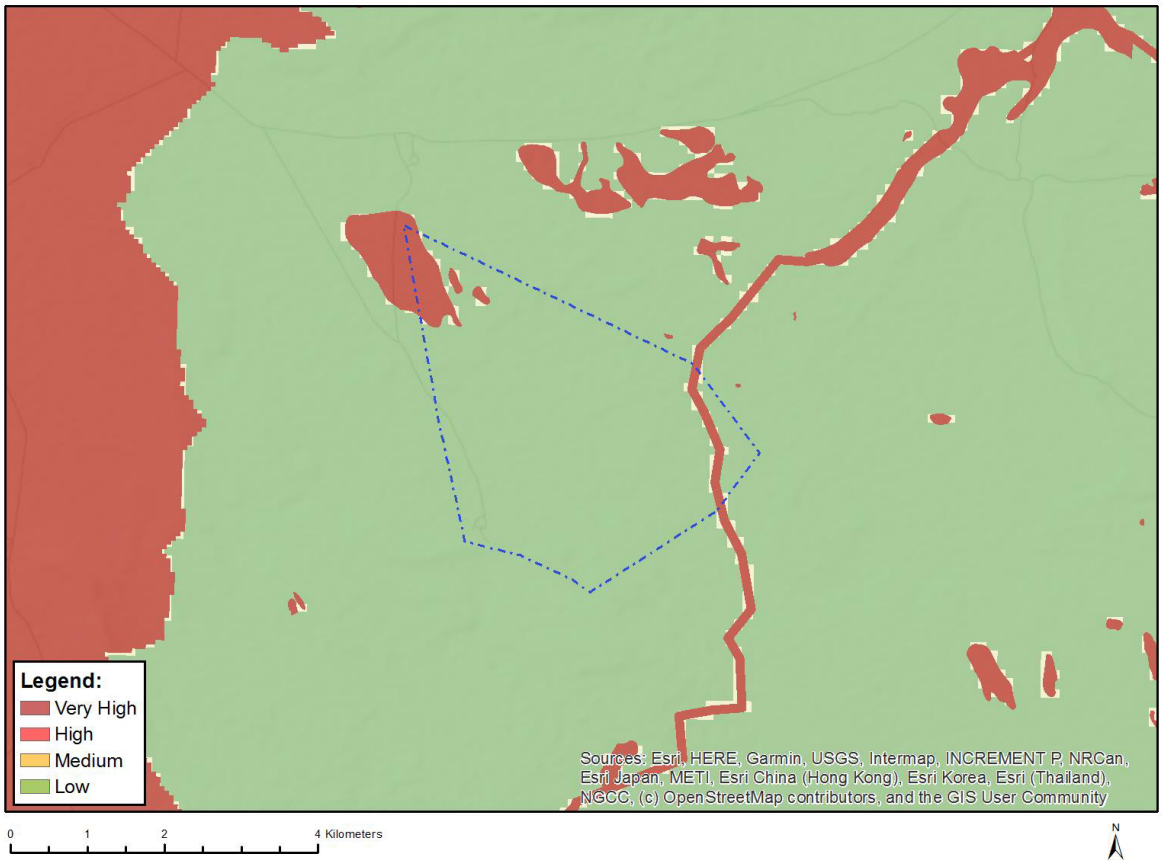
Where only a sensitive plant unique number or sensitive animal unique number is provided in the screening report and an assessment is required, the environmental assessment practitioner (EAP) or specialist is required to email SANBI at eiadatarequests@sanbi.org.za listing all sensitive species with their unique identifiers for which information is required. The name has been withheld as the species may be prone to illegal harvesting and must be protected. SANBI will release the actual species name after the details of the EAP or specialist have been documented.

Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
		X	

Sensitivity Features:

Sensitivity	Feature(s)
Medium	Aves-Neotis ludwigii
Medium	Mammalia-Bunolagus monticularis
Medium	Reptilia-Chersobius boulengeri

MAP OF RELATIVE AQUATIC BIODIVERSITY THEME SENSITIVITY



Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
X			

Sensitivity Features:

Sensitivity	Feature(s)
Low	Low sensitivity
Very High	Rivers
Very High	Wetlands and Estuaries

MAP OF RELATIVE ARCHAEOLOGICAL AND CULTURAL HERITAGE THEME SENSITIVITY

Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
			X

Sensitivity Features:

Sensitivity	Feature(s)
Low	Low sensitivity

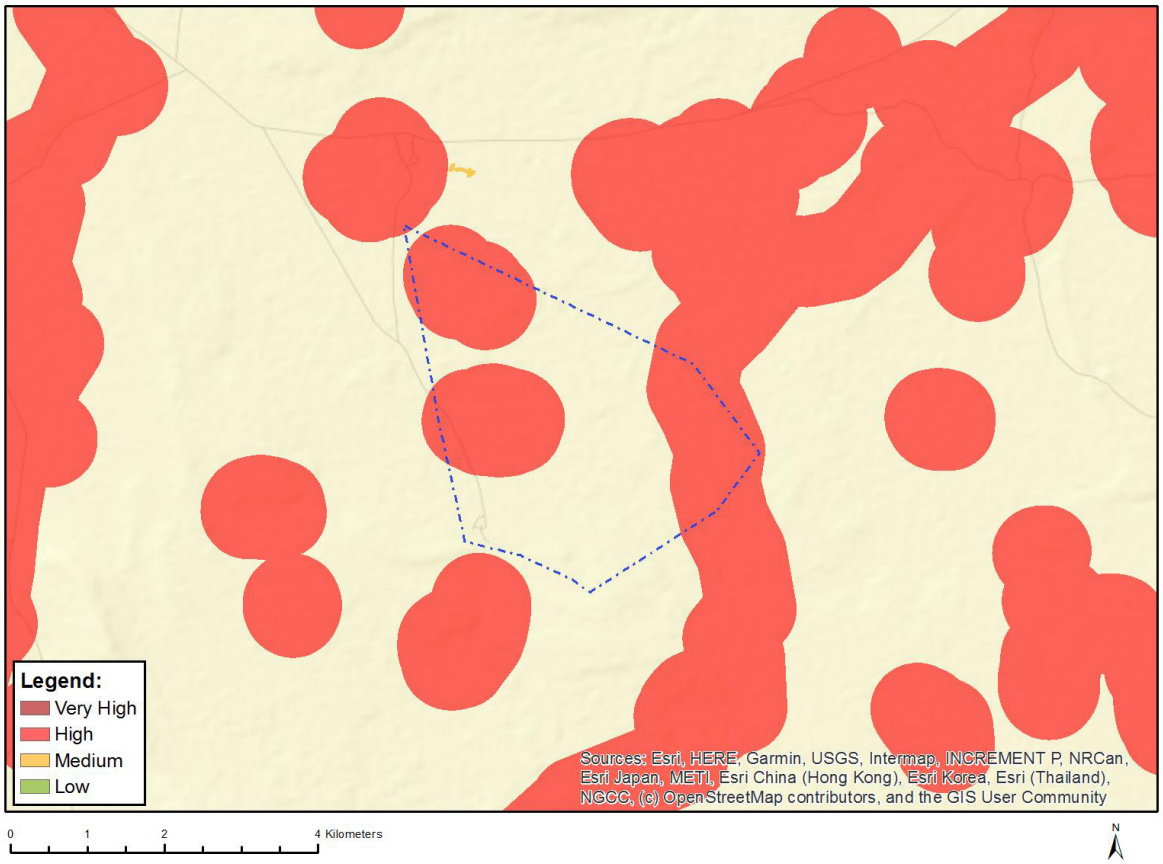
MAP OF RELATIVE AVIAN (WIND) THEME SENSITIVITY

Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
			X

Sensitivity Features:

Sensitivity	Feature(s)
Low	Area Outside Sensitivities

MAP OF RELATIVE BATS (WIND) THEME SENSITIVITY



Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
	X		

Sensitivity Features:

Sensitivity	Feature(s)
High	Within 500 m of a river
High	Wetland
High	Within 500 m of a wetland

MAP OF RELATIVE CIVIL AVIATION (WIND) THEME SENSITIVITY

Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
			X

Sensitivity Features:

Sensitivity	Feature(s)
Low	Low sensitivity

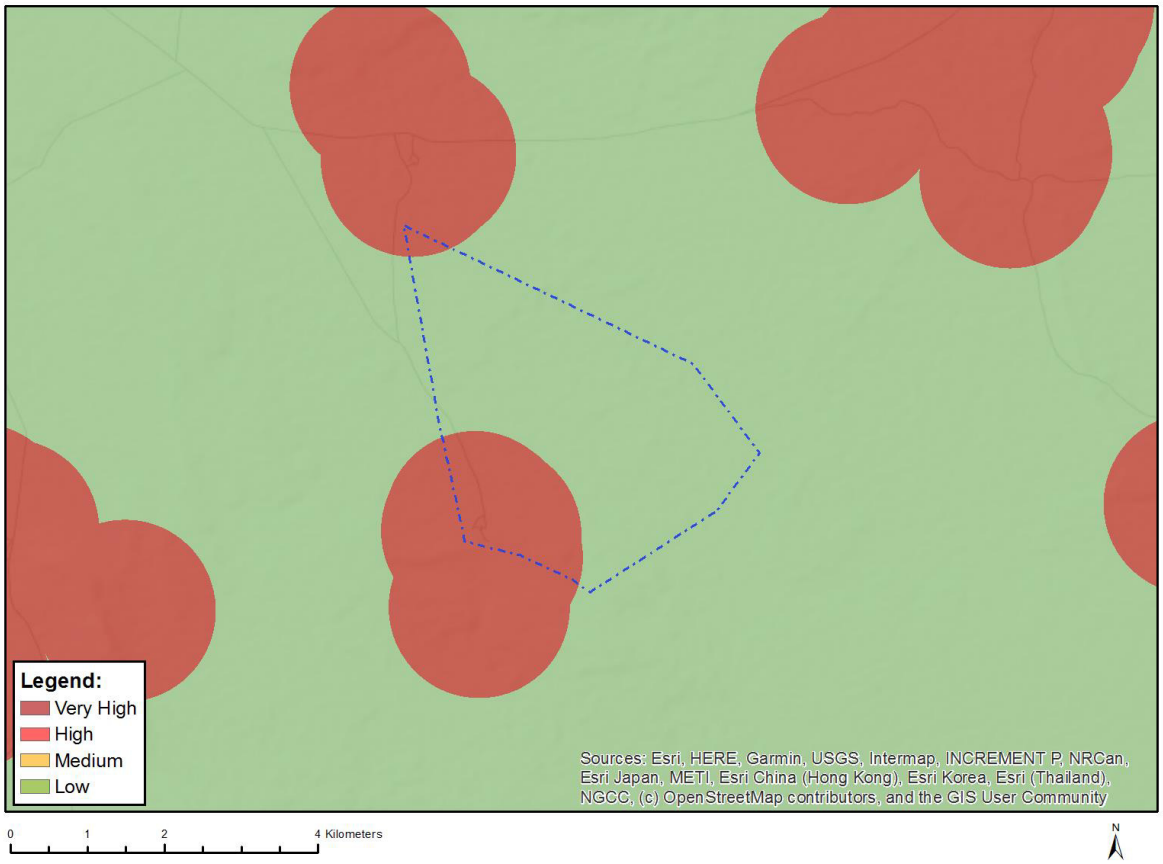
MAP OF RELATIVE DEFENCE (WIND) THEME SENSITIVITY

Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
			X

Sensitivity Features:

Sensitivity	Feature(s)
Low	Low sensitivity

MAP OF RELATIVE FLICKER THEME SENSITIVITY

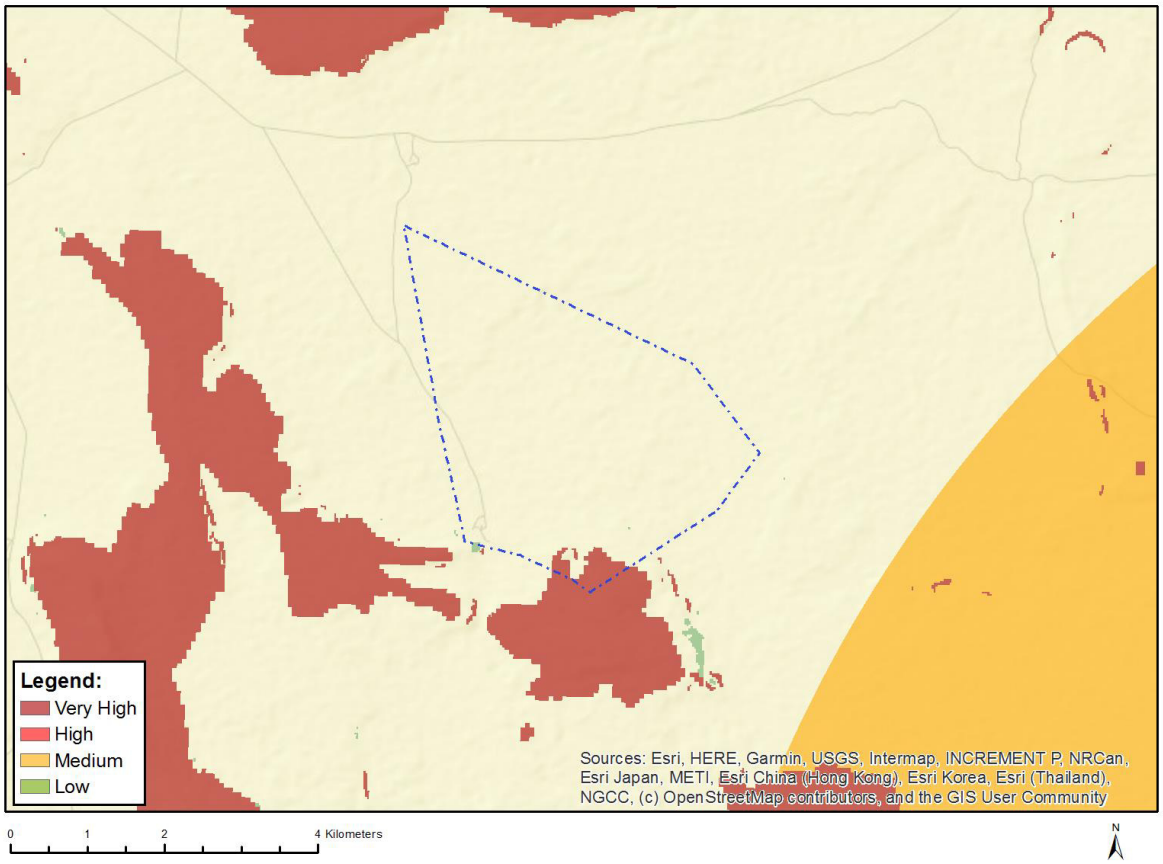


Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
X			

Sensitivity Features:

Sensitivity	Feature(s)
Low	Area of low sensitivity
Very High	Potential temporarily or permanently inhabited residence

MAP OF RELATIVE LANDSCAPE (WIND) THEME SENSITIVITY

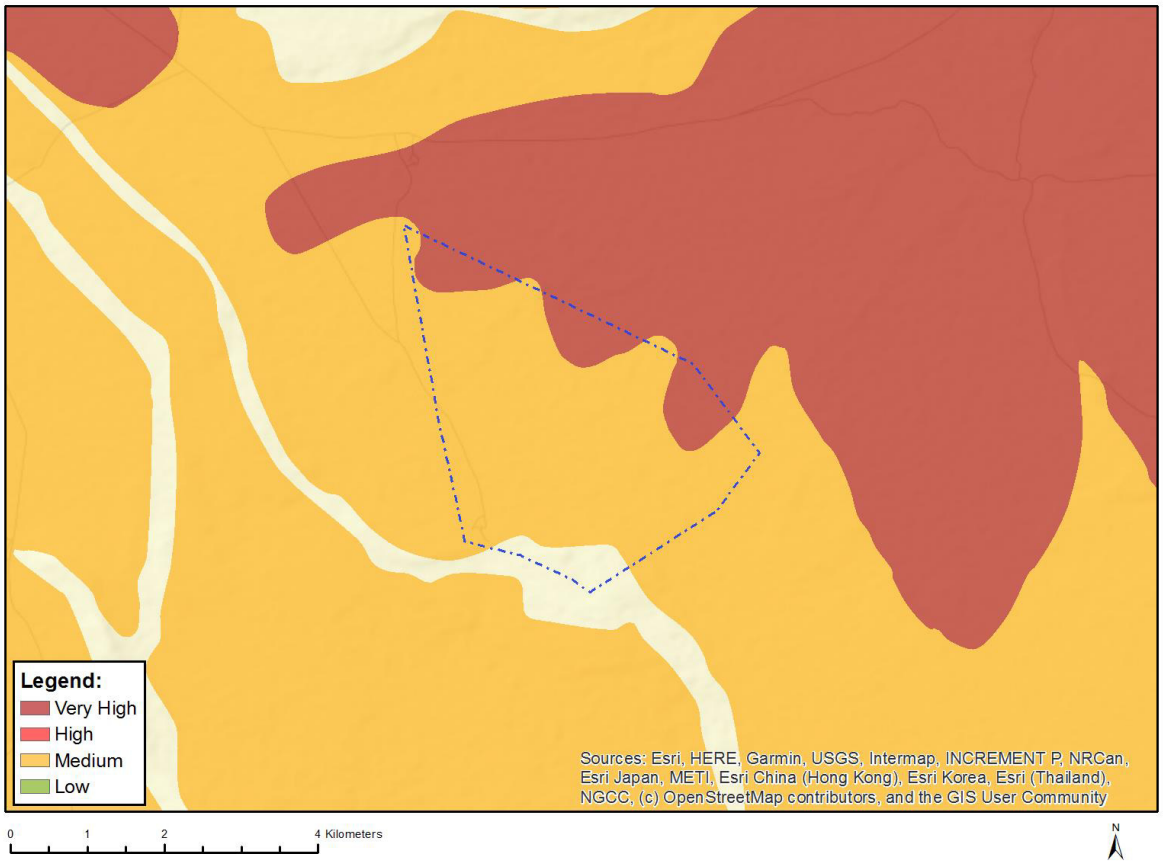


Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
X			

Sensitivity Features:

Sensitivity	Feature(s)
Low	Slope less than 1:10
Very High	Mountain tops and high ridges
Very High	Slope more than 1:4

MAP OF RELATIVE PALEONTOLOGY THEME SENSITIVITY

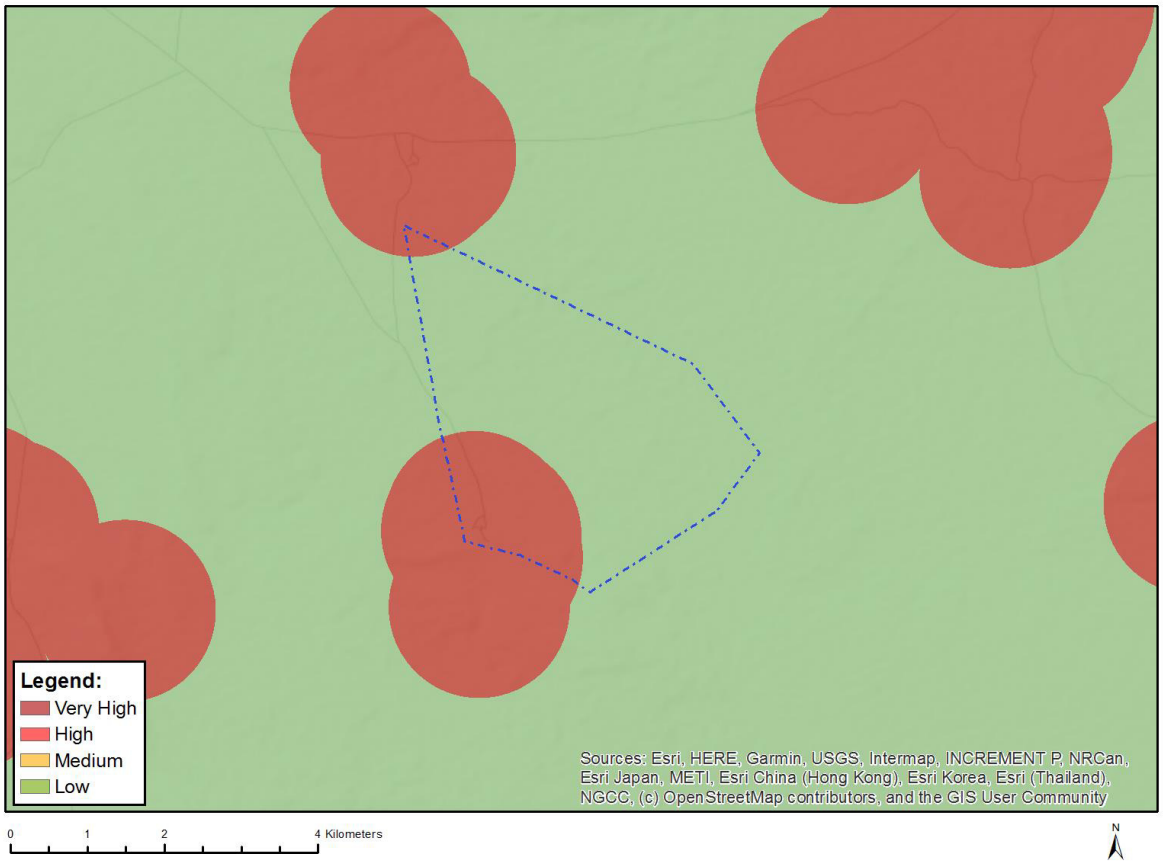


Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
X			

Sensitivity Features:

Sensitivity	Feature(s)
Medium	Features with a Medium paleontological sensitivity
Very High	Features with a Very High paleontological sensitivity

MAP OF RELATIVE NOISE THEME SENSITIVITY

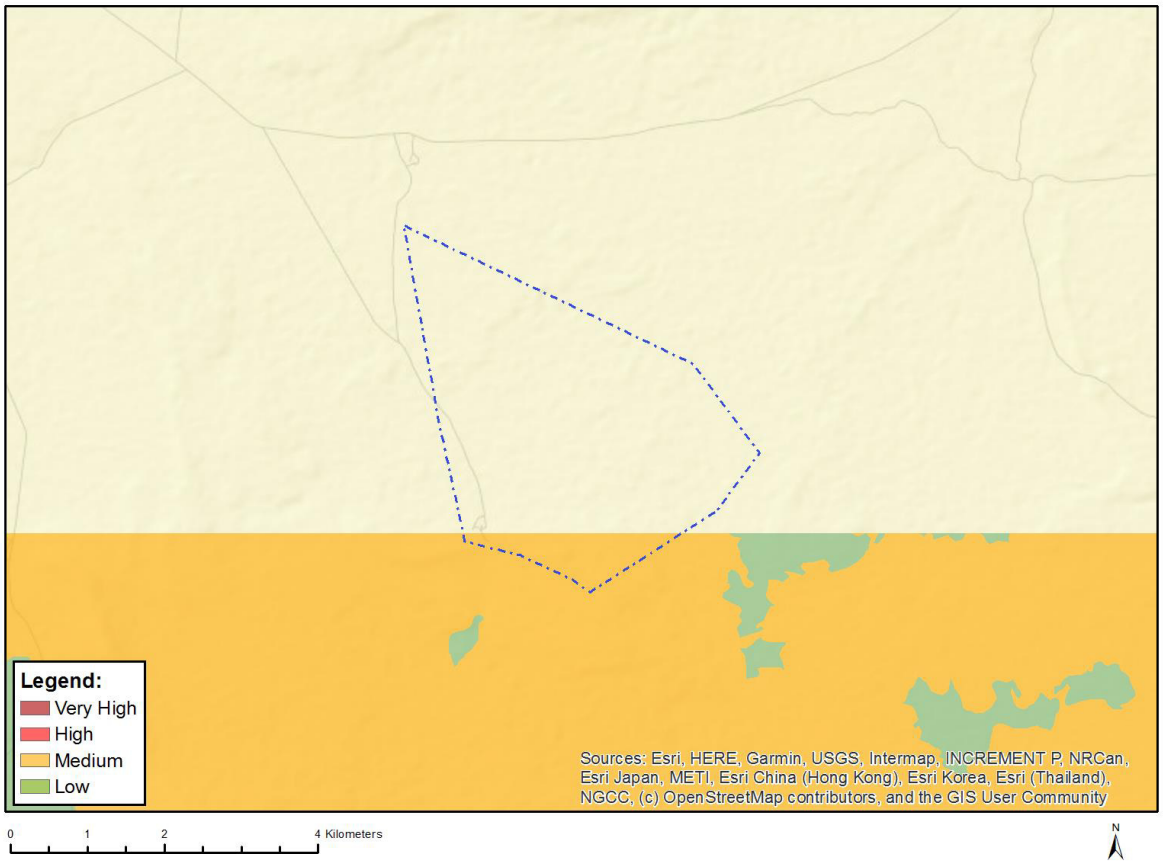


Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
X			

Sensitivity Features:

Sensitivity	Feature(s)
Low	Area of low sensitivity
Very High	Potential temporarily or permanently inhabited residence

MAP OF RELATIVE PLANT SPECIES THEME SENSITIVITY



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Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
		X	

Sensitivity Features:

Sensitivity	Feature(s)
Low	Low Sensitivity
Medium	Sensitive species 484

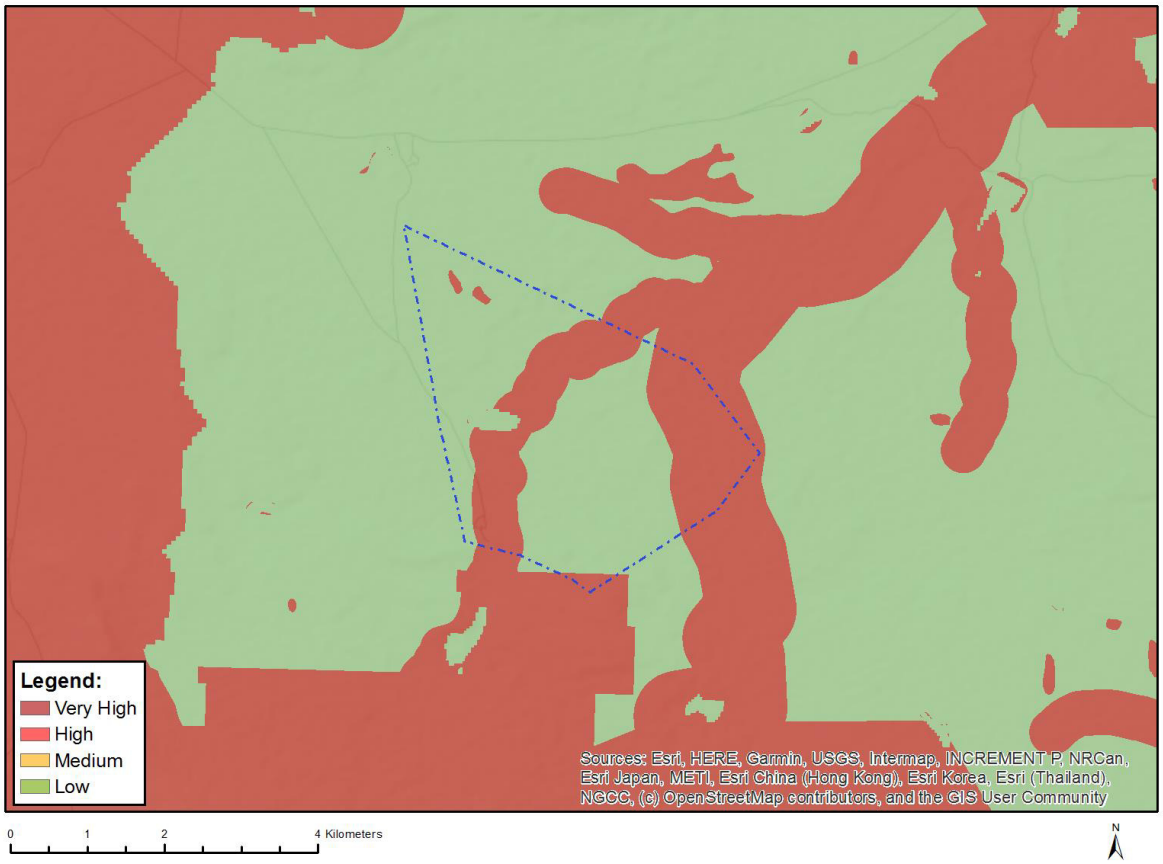
MAP OF RELATIVE RFI (WIND) THEME SENSITIVITY

Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
X			

Sensitivity Features:

Sensitivity	Feature(s)
High	Low sensitivity for telecommunications;Between 18 km and 26 km of the Radio Astronomy Advantage Area;More than 60 km from a Weather Radar installation
Medium	Low sensitivity for telecommunications;Between 26 and 48 km of the Radio Astronomy Advantage Area;More than 60 km from a Weather Radar installation
Very High	Low sensitivity for telecommunications;Inside or within 18 km of the Radio Astronomy Advantage Area;More than 60 km from a Weather Radar installation

MAP OF RELATIVE TERRESTRIAL BIODIVERSITY THEME SENSITIVITY



Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
X			

Sensitivity Features:

Sensitivity	Feature(s)
Low	Low Sensitivity
Very High	Critical biodiveristy area 2
Very High	Ecological support area