EcoFocus
Ecological Specialist Services
Leave a future behind

Aquatic Ecological Site Verification Report

Khauta Solar Photovoltaic (PV) Cluster Development, Riebeeckstad, Free State Province

May 2022

Compiled for:

enviro works
Today's Impact | Tomorrow's Legacy

Compiled by:

AJH Lamprecht (*Pr.Sci.Nat*)

Ecological Specialist

EcoFocus Consulting

072 230 9598

ajhlamprecht@gmail.com

Leave a future behind

EcoFocus Consulting (Pty) Ltd
Registration : 2017/223847/07
7A AG Visser Street, Langenhovenpark, Bloemfontein, 9330
072 230 9598
ajhlamprecht@gmail.com

Table of Content

List of Figures

List of Tables

Abbreviations

CBA	Critical Biodiversity Area
DAFF	Department of Agriculture Forestry and Fisheries
DWS	Department of Water and Sanitation
EAP	Environmental Assessment Practitioner
EIA	Environmental Impact Assessment
EIS	Ecological Importance and Sensitivity
ESA	Ecological Support Area
MAP	Mean Annual Precipitation
NEMA	National Environmental Management Act (Act 107 of 1998)
NWA	National Water Act (Act 36 of 1998)
ONA	Other Natural Area
WULA	Water Use License Application

Declaration of Independence

I, Adriaan Johannes Hendrikus Lamprecht, ID 870727 5043 083, declare that I:

- am the Director and Ecological Specialist of EcoFocus Consulting (Pty) Ltd
- act as an independent specialist consultant in the field of botany and ecology
- am assigned as the Ecological Specialist consultant by the Environmental Assessment Practitioner (EAP), Enviroworks, for the proposed development
- do not have or will not have any financial interest in the undertaking of the proposed project activity other than remuneration for work as stipulated in the Purchase Order terms of reference
- confirm that remuneration for my services relating to the proposed development is not linked to approval or rejection of the project by the competent authority
- have no interest in secondary or subsequent developments as a result of the authorisation of the proposed project
- have no and will not engage in any conflicting interests in the undertaking of the activity
- undertake to disclose to the applicant and the competent authority any information that has or may have the potential to influence the decision of the competent authority
- will provide the applicant and competent authority with access to all relevant project information in my possession whether favourable or not

AJH Lamprecht

Signature

EcoFocus Consulting (Pty) Ltd
Registration : 2017/223847/07
7A AG Visser Street, Langenhovenpark, Bloemfontein, 9330
072 230 9598
ajhlamprecht@gmail.com

1. Introduction

The project applicant, WKN Windcurrent SA, proposes to formally develop a vacant portion of land for a cluster of Photovoltaic (PV) solar power generation facilities and associated electrical transmission lines, outside the town of Riebeeckstad, Free State Province. The proposed development will entail formal construction on numerous portions of agricultural farm land, for the associated solar power generation facilities'- and transmission lines' infrastructure. The assessment area constitutes a single footprint area of approximately 979 ha in size as well as the following three transmission line route alternatives:

- Transmission line route option 1 - 132 kV = 12.4 km
- Transmission line route option 2- 132 kV = 10.6 km
- Transmission line route - 44 kV = 9.95 km

Enviroworks was appointed by the applicant as the independent Environmental Assessment Practitioner (EAP), to conduct the legally required Environmental Impact Assessment (EIA) process.

Due to the nature of potential ecological impacts posed by the proposed development to the local aquatic ecosystem and ecology, an Aquatic Ecological study is required. This is required in order to determine the potential presence of ecologically/conservationally significant or sensitive aquatic features/habitats, -species or -ecosystems, which may be adversely affected by the proposed development. Any potential aquatic ecological impacts associated with the proposed development, must be identified. Impact mitigation and management measures in accordance with the requirements of the National Environmental Management Act (Act No. 107 of 1998): Mitigation Hierarchy, must subsequently be recommended. This must be done in order to attempt to reduce/alleviate the adverse effects of identified potential aquatic ecological impacts.

EcoFocus Consulting was therefore consequently appointed by the EAP as the independent ecological specialist, to conduct the required Aquatic Ecological study for the proposed development. This report constitutes the Aquatic Ecological Site Verification Assessment.

Preliminary preparations conducted prior to the aquatic ecological site assessment, were as follows:

- Georeferenced spatial information was obtained of the proposed development areas, in order to determine the direct impact footprint areas.
- A desktop study was conducted of the most up-to-date information/data available on the relevant vegetation types, national/provincial aquatic conservation significance statuses as well as the quaternary surface water catchment- and drainage area, associated with the proposed development areas.

2. Date of Ecological Site Assessment

Site assessments for the proposed development areas were conducted on 17, 18 & 19 January 2022. These dates form part of the growing season and most plant species present, could therefore be successfully identified.

Due to the inaccessibility of various portions of the assessment area and proposed three transmission line route alternatives as a result of the abnormally high rainfall received during that time period, a follow-up site assessment was conducted on 27 January 2022. This was done in order to attempt to adequately assess all portions of the assessment area and proposed three transmission line route alternatives.

Another follow-up site assessment was conducted on 11 February 2022. This was done in order to finalise the delineations of all aquatic features and all soil type classifications.

Due to the significant increase in size of the original assessment area as well as the changes in the 44 kV transmission line route all at the hand of the applicant, a final follow-up site assessment was also conducted on 25 April 2022.

EcoFocus Consulting (Pty) Ltd
Registration : 2017/223847/07
7A AG Visser Street, Langenhovenpark, Bloemfontein, 9330
072 230 9598
ajhlamprecht@gmail.com

3. Assumptions, Uncertainties and Gaps in Knowledge

Various assumptions need to be made during the assessment process, at the hand of the relevant specialist. It is therefore assumed that:

- all relevant project information provided to the ecological specialist by the EAP, was correct and valid at the time that it was provided.
- the proposed development areas as provided by the EAP, are correct and will not be significantly deviated from, as this was the only area assessed.
- strategic level investigations undertaken by the applicant prior to the commencement of the Environmental Impact Assessment process, determined that the proposed development areas represent potentially suitable and technically acceptable locations.
- the public, local communities, relevant organs of state and surrounding landowners will receive a sufficient reoccurring opportunity to participate and comment on the proposed development during the Environmental Impact Assessment process, through the provision of adequately facilitated public participation interventions and timeframes as stipulated in the NEMA: EIA Regulations, 2014.
- the need and desirability of the proposed development is based on strategic national, provincial and local plans and policies, which reflect the interests of both statutory and public viewpoints.
- the EIA process is a project-level framework and the specialists are limited to assessing the anticipated environmental impacts, associated with the construction and operational phases of the proposed development.
- it is assumed that strategic level decision making by the relevant authorities will be conducted through cooperative governance principles, with the consideration of environmentally sustainable and responsible development principles underpinning all decision making

Given that an EIA involves prediction, the uncertainty factor forms part of the assessment process. Two types of uncertainty are associated with the EIA process, namely process-related and prediction-related.

- Uncertainty of prediction is critical at the data collection phase as observations, recommendations and conclusions are made, solely based on professional specialist opinion. Final certainty will only be obtained upon actual implementation of the proposed development. Adequate research, specialist experience and expertise should however minimise this uncertainty.
- Uncertainty of relevant decision making relates to the interpretation of provided information by relevant authorities during the EIA process. Continual two-way communication and coordination between EAP's and relevant authorities should however decrease the uncertainty of subjective interpretation. The importance of widespread/comprehensive consultation towards minimising the risk/possibility of omitting significant information and impacts is further stressed. The use of quantitative impact significance rating formulas (as utilised in this document) can further standardise the objective interpretation of results and limit the occurrence and scale of uncertainty and subjectivity.
- The principle of human nature provides for uncertainties and unpredictability with regards to the socio-economic impacts of the proposed development and the subsequent public reaction/opinion, which will be received during the Public Participation Process (PPP)

Gaps in knowledge can be attributed to:

- This report purely constitutes an Aquatic Ecological Assessment; no terrestrial ecological aspects were therefore assessed or taken into account during any discussions, conclusions and/or recommendations associated with this report.
- The aquatic ecological assessment process was undertaken prior to the availing of certain information, which would only be derived from the final development design and layout. The design layout for the proposed development, had not been finalised yet at the time of the aquatic ecological assessment.
- The potential for future solar power generation facility developments in the same geographical area, which could lead to further cumulative impacts, cannot be meaningfully anticipated. It is however unlikely that further similar solar developments and associated transformation will take place within the local or broader area, over time.
- The broader region surrounding the assessment area forms a mosaic of undeveloped natural landscapes intertwined with extensive agricultural cultivation transformation.

- An approximate 500 m 'zone of influence' was also assessed surrounding the assessment area.
- An approximate 300 m corridor was assessed for the proposed three transmission line route alternatives.
- Due to the inaccessibility of various portions of the assessment area and proposed three transmission line route alternatives as a result of the abnormally high rainfall received during that time period, a follow-up site assessment was conducted on 27 January 2022. This was done in order to attempt to adequately assess all portions of the assessment area and proposed three transmission line route alternatives.
- Another follow-up site assessment was conducted on 11 February 2022. This was done in order to finalise the delineations of all aquatic features and all soil type classifications.
- Due to the significant increase in size of the original assessment area as well as the changes in the 44 kV transmission line route all at the hand of the applicant, a final follow-up site assessment was also conducted on 25 April 2022.
- The boundary delineation of wetlands and other aquatic features on the significant size scale associated with the assessment area, cannot be considered to be 100 % exact and accurate, as transitional zones between terrestrial and aquatic features are subjectively interpretable. A minimum 90 % confidence level can however be assigned to the boundary delineation process.

EcoFocus Consulting is an independent ecological specialist company. All information and recommendations as per this report are therefore provided in a fair and unbiased/objective manner and are based on qualitative data gathered as well as professional specialist observation and opinion.

4. Assessment Area

The proposed development will entail formal construction on numerous portions of agricultural farm land, for the associated solar power generation facilities'- and transmission lines' infrastructure. The assessment area constitutes a single footprint area of approximately 979 ha in size as well as the following three transmission line route alternatives:

- Transmission line route option 1 - 132 kV = 12.4 km
- Transmission line route option 2- 132 kV = 10.6 km
- Transmission line route - 44 kV = 9.95 km

The assessment area is situated on the following properties:

- Remaining Extent of- as well as Portions 1 & 3 of the Farm Kopje Alleen No. 81 (SG 21 Digit Codes: F02400000000008100000, F02400000000008100001 & F02400000000008100003)
- Remaining Extent of the Farm Taffel Baai No. 413 (SG 21 Digit Code: F02400000000041300000)
- Portion 9 of the Farm Commandants Pan No. 382 (SG 21 Digit Code: F02400000000038200009)
- Portion 12 of the Farm Nooitgedacht No. 74 (SG 21 Digit Code: F03900000000007400012)

The proposed three transmission line route alternatives traverse the following properties:

- Transmission line route option 1 - 132 kV
    - Portion 9 of the Farm Commandants Pan No. 382 (SG 21 Digit Code: F02400000000038200009)
    - Portions 1 & 12 of the Farm Nooitgedacht No. 74 (SG 21 Digit Codes: F03900000000007400001 & F03900000000007400012)
    - Portion 2 of the Farm Dankbaarheid No. 187 (SG 21 Digit Code: F03500000000018700002)
    - Portions 1 & 2 of the Farm Helderwater No. 494 (SG 21 Digit Codes: F03500000000049400001 & F03500000000049400002)
    - Portions 1, 2, 3 & 4 of the Farm Erfdeel No. 188 (SG 21 Digit Codes: F03500000000018800001, F03500000000018800002, F03500000000018800003 & F03500000000018800004)

EcoFocus Consulting (Pty) Ltd
Registration : 2017/223847/07
7A AG Visser Street, Langenhovenpark, Bloemfontein, 9330
072 230 9598
ajhlamprecht@gmail.com

- Transmission line route option 2- 132 kV
  - Portion 9 of the Farm Commandants Pan No. 382 (SG 21 Digit Code: F02400000000038200009)
  - Portions 1 & 12 of the Farm Nooitgedacht No. 74 (SG 21 Digit Codes: F03900000000007400001 & F03900000000007400012)
  - Remaining Extent as well as Portions 2 & 4 of the Farm Dankbaarheid No. 187 (SG 21 Digit Codes: F03500000000018700000, F03500000000018700002 & F03500000000018700004)
  - Portions 3, 9, 18, 19 & 21 of the Farm Nooitgedacht No. 74 (SG 21 Digit Codes: F03900000000007400003, F03900000000007400009, F03900000000007400018, F03900000000007400019 & F03900000000007400021)
  - Remaining Extent & Portion 28 of the Farm Kijknou No. 81 (SG 21 Digit Codes: F03900000000008100000 & F03900000000008100028)
  - Portion 19 of the Farm Kaalvalley No. 61 (SG 21 Digit Code: F03900000000006100019)
- Transmission line route - 44 kV
  - Portion 3 of the Farm Kopje Alleen No. 81 (SG 21 Digit Code: F02400000000008100003)
  - Portions 6 & 9 of the Farm Commandants Pan No. 382 (SG 21 Digit Codes: F02400000000038200006 & F02400000000038200009)
  - Remaining Extent of- as well as Portions 1 & 2 of the Farm Klein Kopje Alleen No. 182 (SG 21 Digit Codes: F02400000000018200000, F02400000000018200001 & F02400000000018200002)
  - Portion 1 of the Farm Mimosa No. 334 (SG 21 Digit Code: F02400000000033400001)
  - Portions 1 & 2 of the Farm De Hoop No. 276 (SG 21 Digit Codes: F02400000000027600001 & F02400000000027600002)
  - Portions 1, 4 & 6 of the Farm Elsinore No. 12 (SG 21 Digit Codes: F02400000000001200001, F02400000000001200004 & F02400000000001200006)
  - Remaining Extent of- as well as Portions 5, 6, 12, 13, 14 & 15 of the Farm Wonderkop No. 15 (SG 21 Digit Codes: F03900000000001500000, F03900000000001500005, F03900000000001500006, F03900000000001500012, F03900000000001500013, F03900000000001500014 & F03900000000001500015)
  - Portions 2 & 9 of the Farm Nooitgedacht No. 74 (SG 21 Digit Codes: F03900000000007400002 & F03900000000007400009)
  - Portions 2, 14 & 15 of the Farm Vooruitgang No. 52 (SG 21 Digit Codes: F03900000000005200002, F03900000000005200014 & F03900000000005200015)

The assessment area is located approximately 5 km north-east of the town of Riebeeckstad. The proposed three transmission line route alternatives are located within an approximate 9 km radius around the town. The town forms part of the Matjhabeng Local Municipality which in turn, forms part of the Lejweleputswa District Municipality, Free State Province. Access to the assessment area is obtained by way of the R 34 provincial road and a subsequent dirt road, from the north.

See locality maps below (see A3 sized maps in the Appendices).

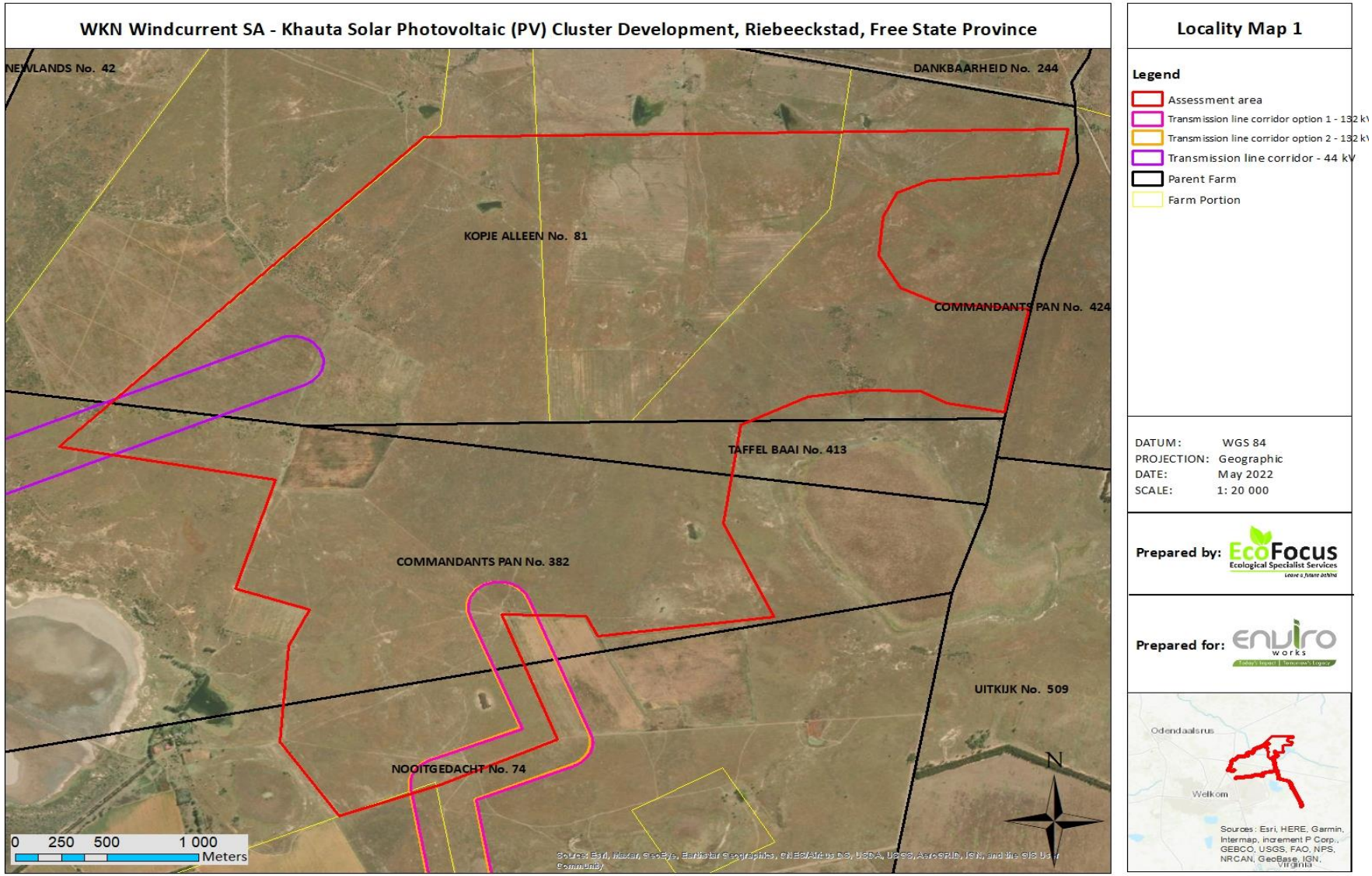

Figure 1: Locality map 1 illustrating the assessment area

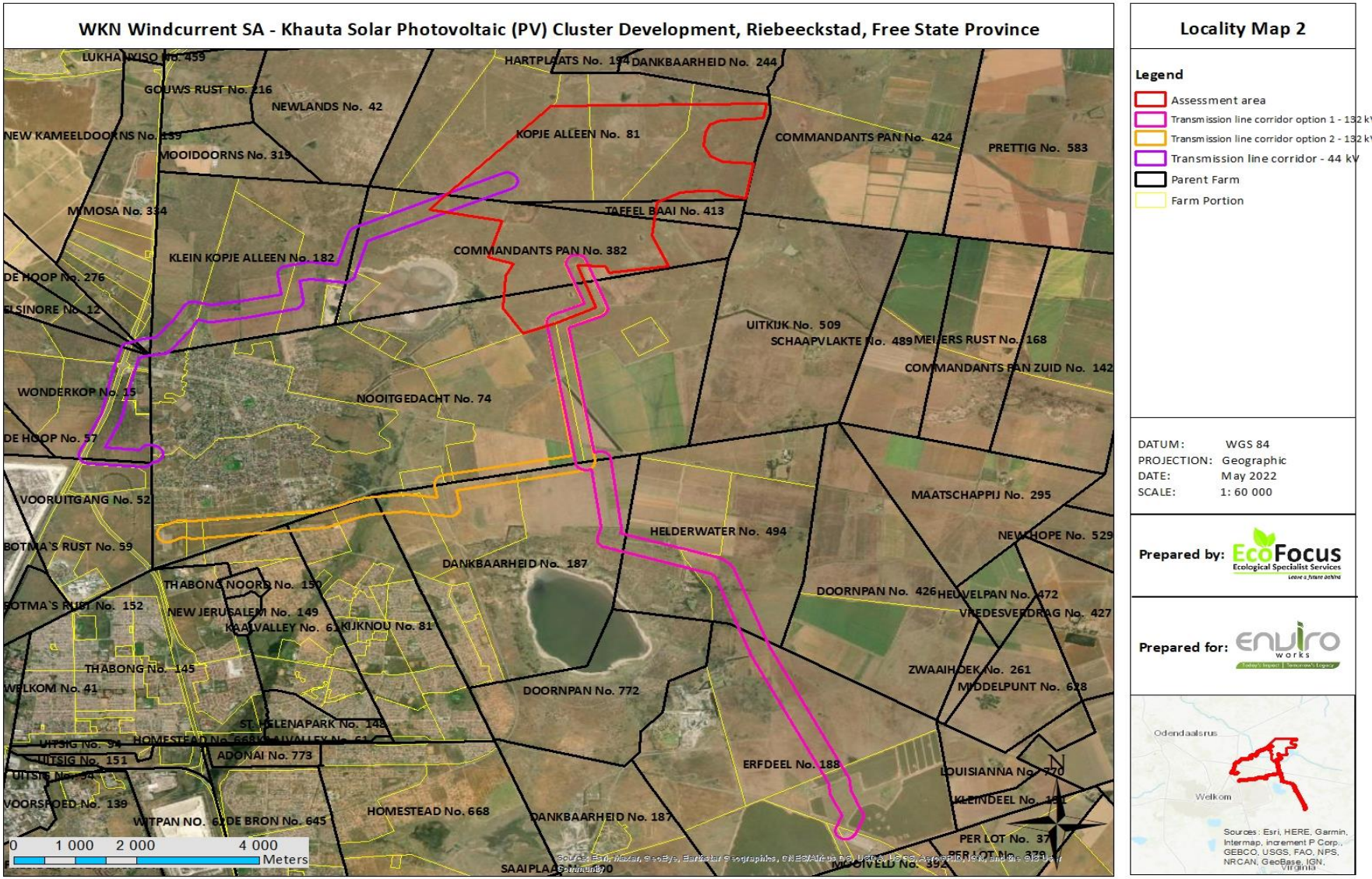

Figure 2: Locality map 2 illustrating the assessment area and proposed three transmission line route alternatives

4.1. Climate

The rainfall of the region peaks during the summer months and the Mean Annual Precipitation (MAP) of the area is approximately 577 mm (www.climate-data.org). The maximum average monthly temperature is approximately 23.3°C in the summer months while the minimum average monthly temperature is approximately 9.7°C during the winter. Maximum daily temperatures can reach up to 29.7°C in the summer months and dip to as low as 2.4°C during the winter.

4.2. Geology and Soils

According to Mucina & Rutherford (2006) the main geology of the landscape and associated vegetation type can be described as the following:

The assessment area is mainly covered by deep sandy to clayey alluvial soils developed over Quaternary alluvial sediments.

4.3. Vegetation Type and Conservation Status

Vegetation Type

According to SANBI (2006-2019), the entire assessment area falls within the Highveld Alluvial Vegetation vegetation type (Aza 5). The commencement portions of the proposed three transmission line route alternatives also fall within this vegetation type. This vegetation type mainly consists of a flat topography supporting riparian thickets accompanied by seasonally flooded grasslands. This vegetation type is classified as Least Concerned (SANBI, 2006-2019).

The remaining majority portions of the proposed three transmission line route alternatives however all fall within the Vaal-Vet Sandy Grassland vegetation type (Gh 10), which is characterised by a plains-dominated landscape, with some scattered, slightly irregular undulating plains and hills (SANBI, 2006-2019). The vegetation usually consists of low tussock grasslands with an abundant karroid element (SANBI, 2006-2019). Dominance of the grass species *Themeda triandra* is an important feature of the natural condition of this vegetation type, while localised lower cover of this species and an associated increase in cover of grass species such as *Elionurus muticus, Cymbopogon pospischilii* and *Aristida congesta* is usually an indication of heavy grazing and/or erratic rainfall (SANBI, 2006-2019). This vegetation type is classified as Endangered (SANBI, 2006-2019).

Aquatic Conservation Status

The Free State Province does not possess separate/specific spatial data for terrestrial and aquatic provincial biodiversity conservation statuses/categories. The relevant provincial information is rather combined into a single wholistic provincial biodiversity conservation status/category spatial data set, which sets out biodiversity priority areas in the province. This spatial data set is known as the Free State Provincial Spatial Biodiversity Plan 2018 (Collins, 2018).

The assessment area forms a mosaic of mainly Ecological Support Area one (ESA 1) intertwined with Ecological Support Area two (ESA 2), Other Natural Area (ONA) and Degraded land, in accordance with the Free State Provincial Spatial Biodiversity Plan 2018 (Collins, 2018). ESA's are areas that must be maintained in at least fair ecological condition (semi-natural/moderately modified state) in order to support the ecological functioning of a Critical Biodiversity Area (CBA) or protected area, or to generate or deliver ecosystem services, or to meet remaining biodiversity targets for ecosystem types or species when it is not possible or not necessary to meet them in natural or near-natural areas (Collins, 2018).

The western and north-western portions of the assessment area however fall within a Critical Biodiversity Area one (CBA 1), in accordance with the Free State Provincial Spatial Biodiversity Plan 2018 (Collins, 2018). CBA 1 are areas that are deemed irreplaceable or near-irreplaceable for meeting biodiversity targets. There are no or very few other options for meeting biodiversity targets for the features associated with the site (Collins, 2018).

Transmission line route option 1 - 132 kV

The overwhelming majority of the proposed transmission line route option 1 - 132 kV is classified as Degraded land, while merely the commencement portion falls within an Ecological Support Area one (ESA 1) and Other Natural Area (ONA), in accordance with the Free State Provincial Spatial Biodiversity Plan 2018 (Collins, 2018).

The central and southern portions of the proposed transmission line route option 1 - 132 kV however traverse a Critical Biodiversity Area one (CBA 1) as well as the formally protected Thabong Game Ranch.

Transmission line route option 2 - 132 kV

The proposed transmission line route option 2 - 132 kV forms a mosaic of Ecological Support Area one (ESA 1), Other Natural Area (ONA) and Degraded land, in accordance with the Free State Provincial Spatial Biodiversity Plan 2018 (Collins, 2018).

The central portion of the proposed transmission line route option 2 - 132 kV however traverses the formally protected Thabong Game Ranch, while the end portion of the route falls within a Critical Biodiversity Area one (CBA 1), in accordance with the Free State Provincial Spatial Biodiversity Plan 2018 (Collins, 2018).

Transmission line route - 44 kV

The overwhelming majority of the proposed transmission line route - 44 kV falls within a Critical Biodiversity Area one (CBA 1), while merely the commencement and end portions of the route are classified as Degraded land, in accordance with the Free State Provincial Spatial Biodiversity Plan 2018 (Collins, 2018). A small central portion of the route traverses an Ecological Support Area two (ESA 2), while the near-end portion of the route traverses an Other Natural Area (ONA), in accordance with the Free State Provincial Spatial Biodiversity Plan 2018 (Collins, 2018).

See vegetation type- and conservation status maps below (see A3 sized maps in the Appendices).

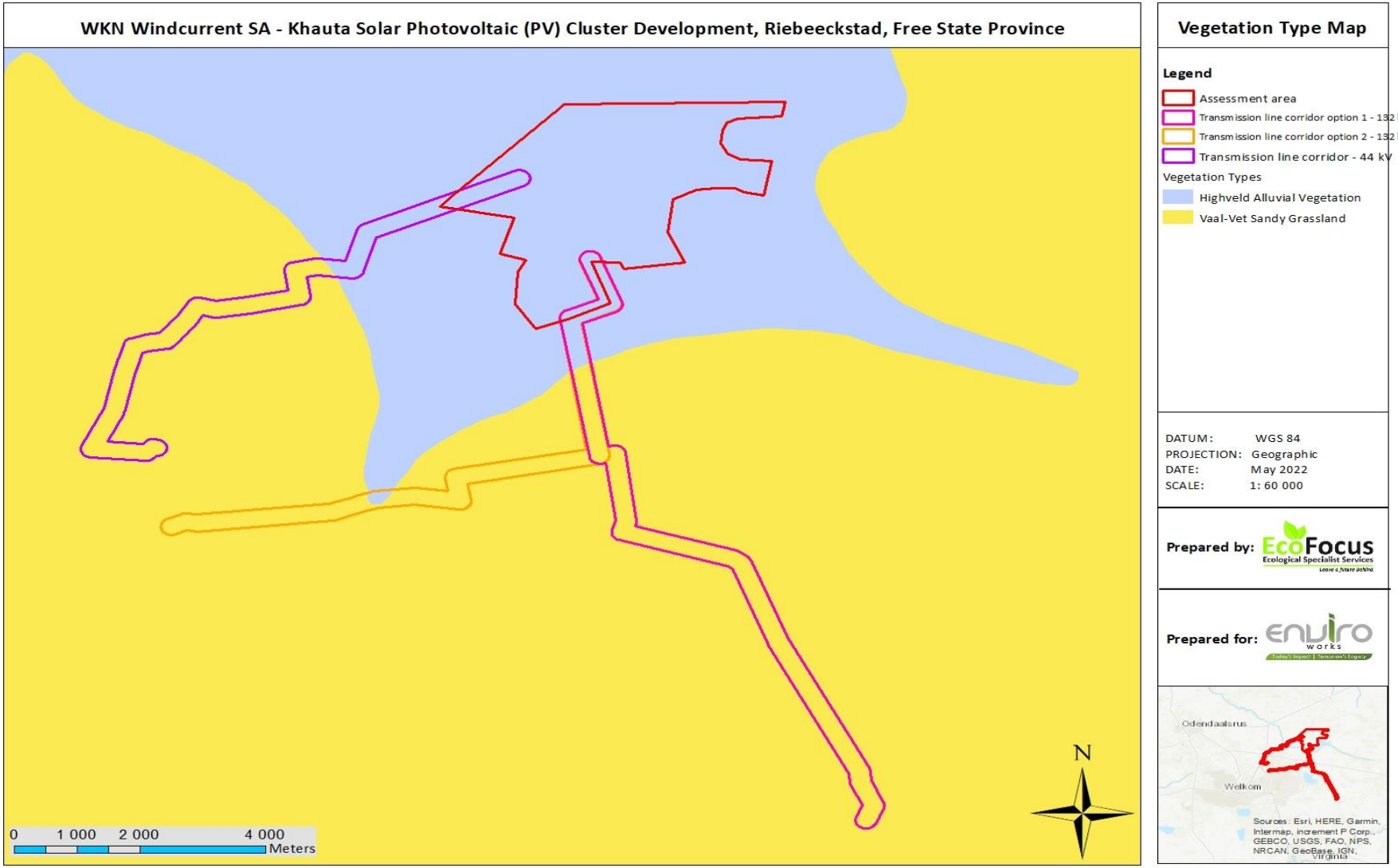

Figure 3: Vegetation type map illustrating the vegetation types associated with the assessment area and proposed three transmission line route alternatives

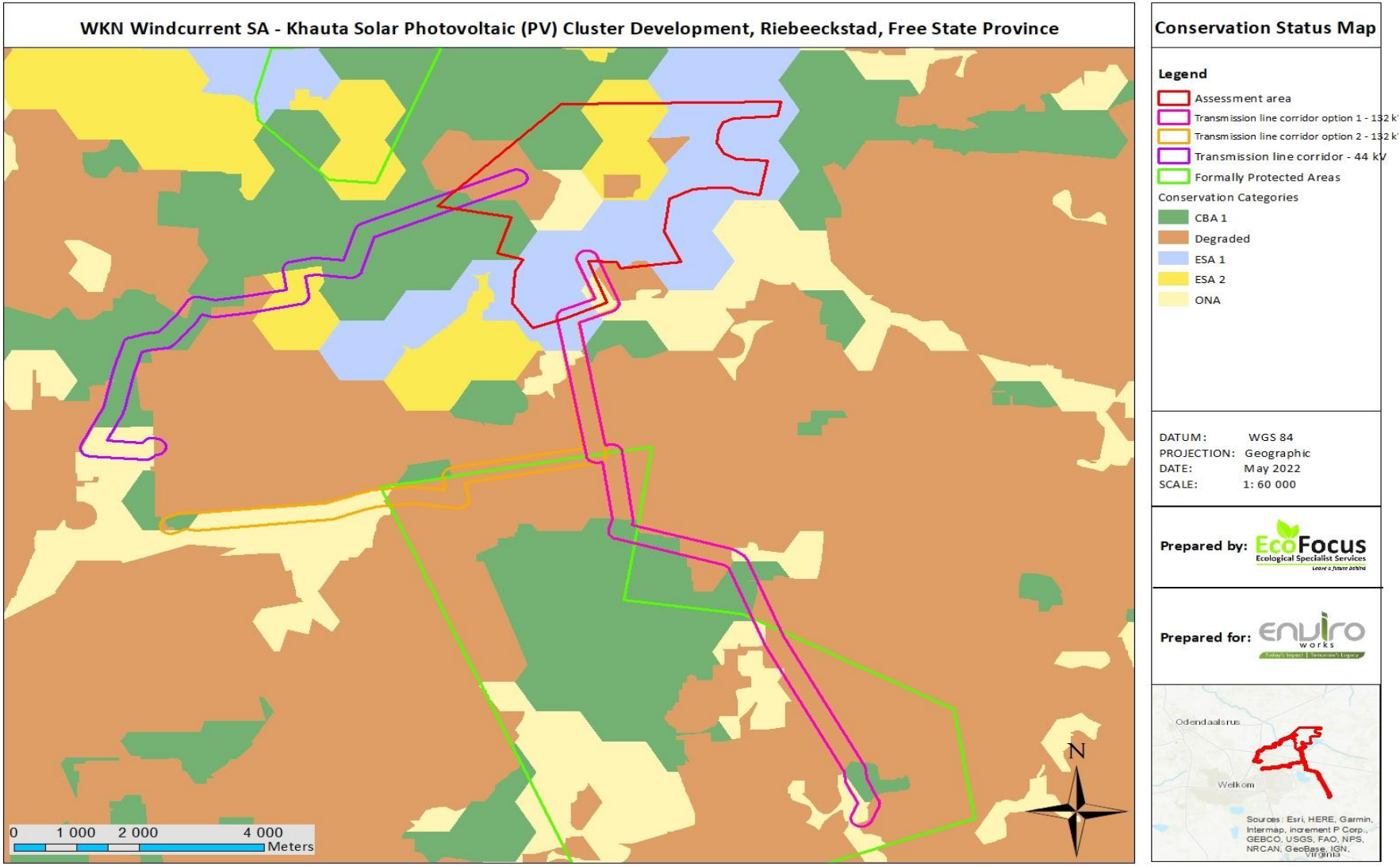

Figure 4: Conservation status map illustrating the conservation statuses/categories associated with the assessment area and proposed three transmission line route alternatives

5. Objectives of the Assessment

- Identify, delineate and discuss any significant watercourses/wetlands and/or other ecologically sensitive/conservationally significant aquatic features/habitats, if potentially found to be present within the assessment area or along the proposed three transmission line route alternatives.
    - The delineations do not include formal 1:100-year floodline calculations, as this is deemed to be an engineering function.
- Assess and discuss the Ecological Importance and Sensitivity (EIS) of the identified watercourses/wetlands and/or aquatic features/habitats, in order to provide an indication of their ecological sensitivity/conservational significance.
- Identify, evaluate, rate and discuss any potential aquatic ecological impacts associated with the proposed development.
    - Provide recommendations on impact mitigation and management measures in accordance with the requirements of the NEMA (Act No. 107 of 1998): Mitigation Hierarchy, in order to attempt to reduce/alleviate the adverse effects of identified potential aquatic ecological impacts.
- Provide recommendations on the aquatic ecological suitability/acceptability of the assessment area and proposed three transmission line route alternatives for the proposed development.
- A digital report (this document) as well as digital .KML files will be provided to the EAP, of any identified significant watercourses/wetlands and/or other ecologically sensitive/conservationally significant aquatic features/habitats, if potentially found to be present within the assessment area or along the proposed three transmission line route alternatives.

6. Methodology

- The proposed development area was assessed on foot and with the use of a vehicle.
    - An ATV/quad motorcycle had to be used to gain access to most areas, due to the inaccessibility of the broader area as a result of the abnormally high rainfall received during that time period.
- Visual observations/identifications were made of any significant watercourses/wetlands and/or other ecologically sensitive/conservationally significant aquatic features/habitats and their conditions, as well as relevant species present.
- Identified species were listed and categorised as per the Red Data Species List; Protected Species List of the National Forests Act (Act No. 84 of 1998), Invasive Species List of the National Environmental Management: Biodiversity Act (Act No. 10 of 2004), Alien and Invasive Species Regulations, 2014 as well as the Provincially Protected species of the Free State's Nature Conservation Ordinance (No 8 of 1969).
- Significant watercourses/wetlands and/or other ecologically sensitive/conservationally significant aquatic features/habitats which were found to be present within the assessment area, were identified, delineated and discussed as per the methodology described below:
    - For the purposes of this investigation a wetland was defined according to the definition in the National Water Act (Act 36 of 1998) as: "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 in normal circumstances, supports or would support vegetation typically adapted to life in saturated soil."
    - In 2005 DWAF published a wetland delineation procedure in a guideline document titled "A Practical Field Procedure for the Identification and Delineation of Wetlands and Riparian Areas". Guidelines for the undertaking of biodiversity assessments exist. These guidelines contain a number of stipulations relating to the protection of wetlands and the undertaking of wetland assessments.
    - The wetland delineation procedure identifies the outer edge of the temporary zone of the wetland, which marks the boundary between the wetland and adjacent terrestrial areas. This constitutes the part of the wetland that might remain flooded or saturated close to the soil surface for only a few weeks in the year, but long enough to develop anaerobic conditions and determine the nature of the plants growing in the soil.
    - The guidelines also state that the locating of the outer edge of the temporary zone must make use of four specific indicators namely:
        - terrain unit indicator
        - soil form indicator
        - soil wetness indicator
        - vegetation indicator

- In addition, the wetland/watercourse and a protective buffer zone beginning from the outer edge of the wetland temporary zone, was designated as sensitive in a sensitivity map. The guidelines stipulate buffers to be delineated around the boundary of a wetland. An adequate protective buffer zone, beginning from the outer edge of the wetland temporary zone, was implemented and designated as sensitive within which no development must be allowed to occur.

- Georeferenced photographs were taken of any significant watercourses/wetlands and/or other ecologically sensitive/conservationally significant aquatic features/habitats, as well as any Red Data Species Listed-, nationally- or provincially protected species if encountered. This was done in order to indicate their specific locations in a Geographic Information System (GIS) mapping format.

The **Ecological Importance and Sensitivity (EIS)** of the identified watercourses/wetlands and/or aquatic features/habitats was assessed and discussed as per the table below.

- The Ecological Importance and Sensitivity (EIS) of an area is an expression of its importance to the maintenance of ecological diversity and functioning on local and wider scales. Both abiotic and biotic components of the system are taken into consideration. Sensitivity refers to the system's ability to resist disturbance and its capability to recover from disturbance, once it has occurred.

Table 1: Criteria for EIS calculations

EIS Categories	Score	Description
Low/Marginal	**D**	Not ecologically important and/or sensitive on any scale. Biodiversity is ubiquitous and not unique or sensitive to habitat modifications.
Moderate	**C**	Ecologically important and sensitive on local or possibly provincial scale. Biodiversity is still relatively ubiquitous and not usually sensitive to habitat modifications.
High	**B**	Ecologically important and sensitive on provincial or possibly national scale. Biodiversity is relatively unique and may be sensitive to habitat modifications.
Very High	**A**	Ecologically important and sensitive on national and possibly international scale. Biodiversity is very unique and sensitive to habitat modifications.

7. Results and Discussion

7.1. Assessment Area Catchment and Watercourse Baseline Information

The assessment area as well as the proposed three transmission line route alternatives all fall within the Middle Vaal Water Management Area (WMA 9). The overwhelming majority of the assessment area as well as the commencements portions of the proposed transmission line route options 1 & 2 - 132 kV and the majority of the proposed transmission line route - 44 kV, all fall within the associated C25B quaternary surface water catchment- and drainage area. The small eastern and southern portions of the assessment area as well as the majority portions of the proposed transmission line route options 1 & 2 - 132 kV and the small end portion of the proposed transmission line route - 44 kV, however rather fall within the associated C42J quaternary surface water catchment- and drainage area.

The significant second-order seasonal Sandspruit flows past the assessment area, approximately 400 m - 600 m to the north and continues in a westerly direction. It then eventually discharges into the Vaal River. The Sandspruit is deemed the only significant watercourse associated with the assessment area and the proposed three transmission line route alternatives.

The following baseline watercourse information and categorisation is applicable to the specific portion of the Sandspruit, which flows to the north of the assessment area, in accordance with the latest South African National Biodiversity Assessment of 2018 (Van Deventer et al., 2019):

- River order = First-order river; second-order watercourse
- Mainstem = 1 (quaternary mainstem)
- Flow = Ephemeral
- Geomorphic zone = Lower foothills
- River condition = Moderately Modified
- Present Ecological State (PES), 2018 = Class C (Moderately Modified)
- Ecosystem Threat Status (ETS), 2018 = Critically Endangered (CR)
- Ecosystem Protection Level (EPL), 2018 = Poorly Protected (PP)

It is therefore evident from a hydrological perspective, that the Sandspruit constitutes a significant tributary of the Vaal River and forms an important part of the local and broader quaternary surface water catchment- and drainage area, towards the west. The Vaal River is considered a primary national water resource; any potentially significant negative impacts on the ecological functionality and/or -services provided by the river, which could pose a potential threat to national water security, should therefore be avoided as far as practicably/reasonably possible.

7.2. Assessment Area

The assessment area constitutes a single footprint area of approximately 979 ha in size. The assessment area consists of a mosaic of mainly natural undisturbed terrestrial grassland and to a lesser extent, old historically cultivated agricultural lands.

A localised linear topographic highpoint/ridge apex traverses the central portion of the assessment area, which roughly lies in a south-west to north-east direction. This highpoint/ridge apex acts as a natural surface water runoff and drainage linear separation, between the portions of the assessment area situated north and south of the highpoint/ridge apex, respectively. Surface water runoff from the assessment area consequently mainly drains either in a northerly- or southerly direction, depending on which side of the highpoint/ridge apex the area is.

The mechanical clearance associated with the proposed solar power generation facility development, will in all probability completely transform the majority of the existing surface vegetation within the PV grid-, internal access/services road- and other associated facility infrastructure footprints. The assessment area could therefore likely be prone to significant potential surface soil erosion, due to the sloping landscape together with the loosening of surface materials and clearance of vegetation caused by construction activities, which usually binds the soil surface. Such soil erosion could potentially lead to a gradual, continual increase in sediment inputs and substantial contamination of aquatic features identified within the assessment area and subsequent downstream waterbodies, over time.

It is therefore recommended that vegetation clearance should be avoided or minimised as far as practicably/reasonably possible and should only occur within the PV grid-, internal access/services road- and other associated facility infrastructure footprints, if required. Existing vegetation in-between the main physical footprint areas, should not be cleared or damaged at all and should be left intact and adequately preserved, as far as practicably/reasonably possible. This must be done in order to sufficiently manage and prevent any significant soil erosion from occurring in and around the assessment area, which could potentially lead to an increase in sediment inputs and contamination of identified aquatic features and subsequent downstream waterbodies, over time.

7.2.1. Significant watercourse

A significant first-order seasonal watercourse/tributary associated with the commencement portion of the Sandspruit, flows past the assessment area, directly adjacent north and continues in a westerly direction. This watercourse discharges into the Sandspruit, approximately 400 m to the north of the assessment area. Surface water runoff from the central and northern portions of the assessment area situated north of the highpoint/ridge apex, consequently mainly drains towards this watercourse.

The north-western portion of the assessment area along with the broader area to the north-west associated with the watercourse, is also classified as a Critical Biodiversity Area one (CBA 1). The watercourse therefore forms an important part of the local and broader quaternary surface water catchment- and drainage area, towards the west.

Six artificially constructed earth dams are present within- and along the length of the watercourse. The watercourse and associated earth dams, house locally distinct and important aquatic and semi-aquatic habitats, which are visibly utilised by various common and habitat-specific waterbirds, amphibian species and aquatic invertebrates for breeding, foraging and/or persistence purposes.

The Ecological Importance and Sensitivity (EIS) of the watercourse is classified as Class C (moderate) as it is viewed as being ecologically important and sensitive on provincial scale. Due to the locally distinct and important nature of the aquatic and semi-aquatic habitat associated with the watercourse, the localised area is viewed as being of moderate to high conversational significance for habitat preservation and ecological functionality persistence in support of the surrounding aquatic ecosystem, the visible presence of habitat-specific waterbirds, amphibian species and aquatic invertebrates as well as the local and broader quaternary surface water catchment- and drainage area, towards the west. The presence of the Critical Biodiversity Area one (CBA 1), further substantiates the ecological importance of this area.

It is recommended that the watercourse as well as a portion of the surrounding natural undisturbed terrestrial grassland must be adequately buffered out of the proposed development footprint area. By implementing the relevant Department of Water and Sanitation (DWS) Watercourse buffer calculation tool, a minimum water quality buffer distance of approximately 60 m from the watercourse, was determined. Due to the extensive vegetation clearance and associated significantly increased sediment input into the watercourse, it is however highly recommended that the proposed buffer distance should be increased by a further approximately 20 m.

A minimum approximately 80 m water quality buffer distance is therefore recommended to be implemented on both sides of the watercourse edges. No current or future development is allowed to take place within this buffered zone.

From an aquatic ecological perspective, when taking the important aquatic and semi-aquatic habitat into account coupled with the significant visual impacts of a solar power generation facility, a minimum approximately 200 m biodiversity buffer distance is recommended to be implemented on both sides of the watercourse edges. No current or future development is allowed to take place within this buffered zone. It is however recommended that the appointed Avifaunal Specialist must provide final recommendations on suitable aquatic avifaunal species- and habitat buffer zones, after completion of his/her assessment.

This recommended buffer zone and associated recommendations must be implemented to attempt to maintain the hydrological and ecological functionality and -integrity of the watercourse and subsequent downstream waterbodies and their associated semi-aquatic habitats along with the Critical Biodiversity Area one (CBA 1), in order to prevent any significant increase in sediment inputs and contamination and ensure the persistence/livelihood of aquatic and semi-aquatic fauna in the area.

See photographs below.

Figure 5: Two images illustrating the presence of the significant first-order seasonal watercourse/tributary associated with the commencement portion of the Sandspruit, which flows past the assessment area, directly adjacent north; the presence of artificially constructed earth dams within the watercourse, is also evident

7.2.2. Preferential water flow paths/drainage lines

Three small preferential water flow paths/drainage lines are present within the central-northern portion of the assessment area. These flow paths/drainage lines traverse some old historically cultivated agricultural lands and merely assist with channelling surface water runoff from a very small portion of the assessment area, towards the significant watercourse to the north.

Due to the lack of continuous water flow through the assessment area, these flow paths/drainage lines also do not possess any ecologically/conservationally significant semi-aquatic habitat. They rather house a similar terrestrial grassland vegetation composition and -structure, relative to the surrounding landscape with merely slight variations in species representation. The flow paths/drainage lines are however densely established with- and overwhelming dominated by the grass species *Digitaria eriantha*. This establishment is most likely as a result of water runoff and subsequent seed transport and accumulation from the upstream old historically cultivated agricultural lands, which had been grassed with this species in the past in accordance with the information received from the land owner.

These flow paths/drainage lines therefore merely play an assisting role in the localised catchment and drainage and are not viewed as being of any conservational significance, from a hydrological or aquatic ecological perspective.

It is the opinion of the specialist that avoidance of the proposed development through these flow paths/drainage lines, is not necessarily required. It is however recommended that sufficient continued stormwater runoff within- and through the assessment area towards the north, must still be ensured and sufficiently managed. An adequate Stormwater and Erosion Management Plan must be implemented during the construction- and operational phases of the proposed development, in order to assist with this and allow for continued flow within the localised catchment. This must be done to attempt to maintain the ecological functionality and -integrity of the local and broader quaternary surface water catchment- and drainage area, towards the west. A Water Use License Application (WULA) must also be submitted to the Department of Water and Sanitation (DWS), to request authorisation for the proposed development through the flow paths/drainage lines, in accordance with the National Water Act (Act 36 of 1998).

See photographs below.

Figure 6: Image illustrating an example of the presence of the three small preferential water flow paths/drainage lines, which traverse the old historically cultivated agricultural lands, associated with the central-northern portion of the assessment area; the overwhelming dominance of the grass species *Digitaria eriantha* is also evident

7.2.3. Depression pans

The Commandants Pan constitutes a well-known significantly sized naturally occurring depression pan, which is situated approximately 150 m south-east of the assessment area. The pan is seasonally/temporarily inundated and the inflow of the pan mainly originates from a significantly sized unchanneled valley-bottom wetland, situated approximately 330 m north-east of the assessment area (see discussion under heading 7.2.5). A broad surface water outflow is also evident on the southern side of the pan. This outflow constitutes a water drainage plain/valley-bottom wetland, which flows in a south-westerly direction (see discussion under heading 7.2.5). The drainage plain/valley-bottom wetland eventually flows into a second smaller depression pan, located directly adjacent south-west of the assessment area. This second pan in turn, discharges into an artificially constructed earth dam, also located directly adjacent south-west of the assessment area (see discussion under heading 7.2.4), which finally discharges into a significantly sized depression pan, located approximately 700 m south-west of the assessment area (see discussion under heading 7.5.1).

It is therefore evident that these pans along with their associated in- and outflows, form an important part of the hydrological and aquatic ecological connectivity of the local and broader quaternary surface water catchment- and drainage area, towards the west.

The two pans also house locally distinct and important semi-aquatic habitats within their basins and around their edges, which are visibly utilised by various common and habitat-specific waterbirds, amphibian species and aquatic invertebrates for breeding, foraging and/or persistence purposes (the Commandants Pan in particular).

The Ecological Importance and Sensitivity (EIS) of the pans is classified as Class C (moderate) as they are viewed as being ecologically important and sensitive on local and possibly provincial scale. Due to the locally distinct and important nature of the semi-aquatic habitats along with the significant size of the Commandants Pan, the localised areas are viewed as being of moderate to high conversational significance for habitat preservation and ecological functionality persistence in support of the surrounding aquatic ecosystem, the visible presence of habitat-specific waterbirds, amphibian species and aquatic invertebrates as well as the local and broader quaternary surface water catchment- and drainage area, towards the west.

The established solar power generation infrastructure will result in the emission of significantly bright glare/shine into the surrounding landscape. This along with the significant noise generated by the construction activities, will likely cause substantial disturbance and subsequently impact negatively on the ecological integrity and -functionality of the semi-aquatic habitats of the pans and the localised surrounding terrestrial grassland landscape. The erection of permitter fencing and associated night illumination infrastructure around the proposed solar power generation facility footprint area, furthermore poses a significant collision and mortality risk to the relevant owl species that likely utilise the area.

It is therefore recommended that the pans as well as portions of the surrounding natural undisturbed terrestrial grassland must be adequately buffered out of the proposed development footprint area. By implementing the relevant Department of Water and Sanitation (DWS) Wetland buffer calculation tool, a minimum water quality buffer distance of approximately 60 m from the pans, was determined. Due to the extensive vegetation clearance and associated significantly increased sediment input into the pans, it is however highly recommended that the proposed buffer distance should be increased by a further approximately 20 m. A minimum approximately 80 m water quality buffer distance is therefore recommended to be implemented around the pans. No current or future development is allowed to take place within these buffered zones.

From an aquatic ecological perspective, when taking the important semi-aquatic habitat into account coupled with the significant visual impacts of a solar power generation facility, a minimum approximately 250 m biodiversity buffer distance is recommended to be implemented around the Commandants Pan and a minimum approximately 200 m buffer distance around the second pan. No current or future development is allowed to take place within these buffered zones. It is however recommended that the appointed Avifaunal Specialist must provide final recommendations on suitable aquatic avifaunal species- and habitat buffer zones, after completion of his/her assessment.

It is further recommended that no bright light from any spotlights or perimeter lights should be emitted into the surrounding landscape towards the pans during night time. As little light emissions as practicably/reasonably possible from the proposed development area, should occur during night time as this could lure owl and other nocturnal bird individuals towards the permitter fences and potentially result in collisions and mortality.

These recommended buffer zones and associated recommendations must be implemented to attempt to maintain the hydrological and ecological functionality and -integrity of the pans and their associated semi-aquatic habitats along with the localised surrounding terrestrial grassland landscape, in order to prevent any significant increase in sediment inputs and contamination and ensure the persistence/livelihood of semi-aquatic fauna in the area.

Furthermore, if the proposed biodiversity buffer zone and associated recommendations are adequately implemented, it should also place the majority of the solar power generation facility infrastructure 'behind' the highpoint/ridge apex, which would be expected to slightly reduce/alleviate the direct visibility between the facility and the Commandants Pan.
See photographs below.

Figure 7: Two images illustrating the presence of the significantly sized naturally occurring Commandants Pan, located approximately 150 m south-east of the assessment area

EcoFocus Consulting (Pty) Ltd
Registration : 2017/223847/07
7A AG Visser Street, Langenhovenpark, Bloemfontein, 9330
072 230 9598
ajhlamprecht@gmail.com

Figure 8: Two images illustrating the presence of the second smaller naturally occurring depression pan, located directly adjacent south-west of the assessment area

7.2.4. Artificially constructed earth dam

An artificially constructed earth dam is present directly adjacent south-west of the assessment area. The inflow of the dam mainly constitutes the depression pan, as discussed under heading 7.2.3 as well as the unchanneled valley-bottom wetlands (see discussion under heading 7.2.5). Also as discussed under heading 7.2.3, the outflow of this dam flows into the subsequent significantly sized depression pan located approximately 700 m south-west of the assessment area (see discussion under heading 7.5.1).

It is therefore evident that this dam along with its associated in- and outflows, form an important part of the hydrological and aquatic ecological connectivity of the local and broader quaternary surface water catchment- and drainage area, towards the west.

The dam also houses locally distinct and important semi-aquatic habitat within its basin and around its edges, which is visibly utilised by various common and habitat-specific waterbirds, amphibian species and aquatic invertebrates for breeding, foraging and/or persistence purposes.

The Ecological Importance and Sensitivity (EIS) of the dam is classified as Class C (moderate) as it is viewed as being ecologically important and sensitive on local scale. Due to the locally distinct and important nature of the semi-aquatic habitat along with the dam forming an important part of the hydrological and aquatic ecological connectivity associated with the local and broader quaternary surface water catchment- and drainage area, the localised area is viewed as being of moderate conversational significance for habitat preservation and ecological functionality persistence in support of the surrounding aquatic ecosystem and the visible presence of habitat-specific waterbirds, amphibian species and aquatic invertebrates.

It is therefore recommended that the dam as well as a portion of the surrounding natural undisturbed terrestrial grassland must be adequately buffered out of the proposed development footprint area. By implementing the relevant Department of Water and Sanitation (DWS) Wetland buffer calculation tool, a minimum water quality buffer distance of approximately 60 m from the dam, was determined. Due to the extensive vegetation clearance and associated significantly increased sediment input into the dam, it is however highly recommended that the proposed buffer distance should be increased by a further approximately 20 m. A minimum approximately 80 m water quality buffer distance is therefore recommended to be implemented around the dam. No current or future development is allowed to take place within this buffered zone.

From an aquatic ecological perspective, when taking the important semi-aquatic habitat into account coupled with the significant visual impacts of a solar power generation facility, a minimum approximately 200 m biodiversity buffer distance is recommended to be implemented around the dam. No current or future development is allowed to take place within this buffered zone. It is however recommended that the appointed Avifaunal Specialist must provide final recommendations on suitable aquatic avifaunal species- and habitat buffer zones, after completion of his/her assessment.

It is further recommended that no bright light from any spotlights or perimeter lights should be emitted into the surrounding landscape towards the dam during night time. As little light emissions as practicably/reasonably possible from the proposed development area, should occur during night time as this could lure owl and other nocturnal bird individuals towards the permitter fences and potentially result in collisions and mortality.

This recommended buffer zone and associated recommendations must be implemented to attempt to maintain the hydrological and ecological functionality and -integrity of the dam and its associated semi-aquatic habitat along with the localised surrounding terrestrial grassland landscape, in order to prevent any significant increase in sediment inputs and contamination and ensure the persistence/livelihood of semi-aquatic fauna in the area.

See photographs below.

Figure 9: Two images illustrating the presence of the artificially constructed earth dam, located directly adjacent south-west of the assessment area

7.2.5. Unchanneled valley-bottom wetlands

A substantial portion within the centre and south of the assessment area constitutes a broad naturally occurring unchanneled valley-bottom wetland. Surface water runoff from the central and southern portions of the assessment area situated south of the highpoint/ridge apex, consequently mainly channels and drains through this wetland, towards the south-west.

Another naturally occurring unchanneled valley-bottom wetland flows past the assessment area directly adjacent south, while a portion of the wetland also traverses the south-western corner of the assessment area. As discussed under heading 7.2.3, this wetland forms part of the downstream outflow of the Commandants Pan, situated approximately 150 m south-east of the assessment area. This wetland therefore channels and drains significant volumes of surface water runoff towards the west, into the smaller depression pan (see discussion under heading 7.2.3).

Due to the lack of continuous water flow through the assessment area, these two wetlands do not possess any ecologically/conservationally significant semi-aquatic habitat. They rather house similar terrestrial grassland vegetation compositions and -structures, relative to the surrounding landscape with merely slight variations in species representation. The wetlands are therefore not expected to be specifically utilised by any habitat-specific waterbirds, amphibian species and/or aquatic invertebrates for breeding, foraging and/or persistence purposes.

The first broad wetland gradually flows into a subsequent significantly sized naturally occurring unchanneled valley-bottom wetland, located within the southern portion of the assessment area. The localised topography flattens-out slightly in the vicinity of the subsequent wetland, which results in this subsequent wetland being seasonally/temporarily inundated. The outflow of the subsequent wetland further flows into the artificially constructed earth dam situated directly adjacent south-west of the assessment area (see discussion under heading 7.2.4). As discussed under headings 7.2.3 and 7.2.4, this dam in turn, finally discharges into the significantly sized depression pan, located approximately 700 m south-west of the assessment area (see under heading 7.5.1).

It is therefore evident that these three unchanneled valley-bottom wetlands associated with the central and southern portions of the assessment area, form an important part of the hydrological and aquatic ecological connectivity of the local and broader quaternary surface water catchment- and drainage area, towards the west.

The Ecological Importance and Sensitivity (EIS) of the first broad wetland as well as the wetland which flows past the assessment area directly adjacent south, is classified as Class C (moderate) as they are viewed as being ecologically important and sensitive on local scale. Due to them forming an important part of the hydrological and aquatic ecological connectivity associated with the local and broader quaternary surface water catchment- and drainage area, the localised area is viewed as being of moderate conversational significance for habitat preservation and ecological functionality persistence, in support of the surrounding aquatic ecosystem.

By implementing the relevant Department of Water and Sanitation (DWS) Wetland buffer calculation tool, a minimum water quality and biodiversity buffer distance of approximately 60 m from the first broad wetland as well as the wetland which flows past the assessment area directly adjacent south, was determined. Due to the extensive vegetation clearance and associated significantly increased sediment input into the wetland, it is however highly recommended that the proposed buffer distance should be increased by a further approximately 20 m. A minimum approximately 80 m aquatic ecological buffer distance is therefore recommended to be implemented around the first wetland. No current or future development is allowed to take place within this buffered zone.

The subsequent wetland into which the first broad wetland gradually flows as well as the significantly sized naturally occurring unchanneled valley-bottom wetland situated approximately 330 m north-east of the assessment area, which constitutes the main inflow of the Commandants Pan (see discussion under heading 7.2.3), both house locally distinct and important semi-aquatic habitats, which are likely utilised by various common and habitat-specific waterbirds, amphibian species and aquatic invertebrates for breeding, foraging and/or persistence purposes. During the site assessments, a number of Marsh owl (*Asio capensis*) individuals were in fact found to be utilising the combined semi-aquatic habitats of the two wetlands as well as the surrounding terrestrial grassland landscapes. Although not specifically observed during the site assessment as the focus of the assessment was not on avifauna, the two wetlands and localised surrounding terrestrial grassland landscapes also provide very suitable habitat for Grass owls (*Tyto capensis*). It is therefore likely that the semi-aquatic habitats of the two wetlands and localised surrounding terrestrial grassland landscapes are also utilised by individuals and/or pairs of this species for breeding, foraging and/or persistence purposes. Both of these species are considered to be very habitat-specific and therefore range-limited. The latter species is nationally classified as a Vulnerable Red Data Listed bird species, due to extensive habitat degradation and loss.

The Ecological Importance and Sensitivity (EIS) of the subsequent wetland into which the first broad wetland gradually flows as well as the significantly sized wetland situated approximately 330 m north-east of the assessment area, is classified as Class C (moderate) as they are viewed as being ecologically important and sensitive on local and possibly provincial scale. Due to the locally distinct and important nature of the semi-aquatic habitats associated with the wetlands, the localised areas are viewed as being of moderate to high conversational significance for habitat preservation and ecological functionality persistence in support of the surrounding aquatic ecosystem and the confirmed presence of ecologically important, habitat-specific and range-limited bird species.

The established solar power generation infrastructure will result in the emission of significantly bright glare/shine into the surrounding landscape. This along with the significant noise generated by the construction activities, will likely cause substantial disturbance and subsequently impact negatively on the ecological integrity and -functionality of the semi-aquatic habitats and the localised surrounding terrestrial grassland landscape of the subsequent wetland into which the first broad wetland gradually flows as well as the significantly sized wetland situated approximately 330 m north-east of the assessment area. The erection of permitter fencing and associated night illumination infrastructure around the proposed solar power generation facility footprint area, furthermore poses a significant collision and mortality risk to the relevant owl species that is confirmed to utilise the area.

It is therefore recommended that the subsequent wetland into which the first broad wetland gradually flows as well as the significantly sized wetland situated approximately 330 m north-east of the assessment area, along with portions of the surrounding natural undisturbed terrestrial grassland must be adequately buffered out of the proposed development footprint area. By implementing the relevant Department of Water and Sanitation (DWS) Wetland buffer calculation tool, a minimum water quality buffer distance of approximately 60 m from the two wetlands, was determined. Due to the extensive vegetation clearance and associated significantly increased sediment input into the wetland, it is however highly recommended that the proposed buffer distance should be increased by a further approximately 20 m. A minimum approximately 80 m water quality buffer distance is therefore recommended to be implemented around the two wetlands. No current or future development is allowed to take place within this buffered zone.

After consultation with well-known and recognized avifaunal specialists and due to the actual confirmed presence of the owl species, it is however recommended that a minimum approximately 300 m biodiversity buffer distance be implemented around the two wetlands. No current or future development is allowed to take place within these buffered zones. It is however recommended that the appointed Avifaunal Specialist must provide final recommendations on suitable aquatic avifaunal species- and habitat buffer zones, after completion of his/her assessment.

It is further recommended that no bright light from any spotlights or perimeter lights should be emitted into the surrounding landscape towards the wetlands during night time. As little light emissions as practicably/reasonably possible from the proposed development area, should occur during night time as this could lure owl and other nocturnal bird individuals towards the permitter fences and potentially result in collisions and mortality.

These recommended buffer zones and associated recommendations must be implemented to attempt to maintain the hydrological and ecological functionality and -integrity of the wetlands and subsequent downstream waterbodies and their associated semi-aquatic habitats along with the localised surrounding terrestrial grassland landscapes, in order to prevent any significant increase in sediment inputs and contamination and ensure the persistence/livelihood of semi-aquatic fauna in the area.

The following wetland indicators were used to identify, classify and delineate the wetlands with a minimum 90 % confidence level:

- Terrain Unit Indicator (TUI)

The TUI takes into consideration the topography of the area to determine where it is most likely to support a wetland. The identified wetlands clearly form part of a broad, slow-moving surface water drainage area, which gradually gravitates towards the south-west. Due to the slightly sloping topography, standing water accumulation was also extensively evident.

- Soil Form Indicator (SFI)

The SFI relies on classifying soils according to the Soil Classification Working Group. It takes into account the identification of hydromorphic soils that display unique characteristics resulting from prolonged and repeated saturation. Prolonged periods of saturation results in the soil eventually becoming anaerobic and subsequently reduced. The soils within the identified wetlands are classified as a Willowbrook soil type, consisting of a Melanic A horizon (40 cm – 50 cm) on top of a G horizon (a G1 and G2 is also evident within the first wetland), which is indicative of water saturated soils and subsurface water movement.

- Soil Wetness Indicator (SWI)

The colours of various soil components are often the most diagnostic indicator of hydromorphic soils. Colours of these components are strongly influenced by the frequency and duration of soil saturation. The Melanic A horizon of the identified wetlands has a dark grey colour with high clay content while the G horizon possesses a moderate clay content. Coloured mottles are also clearly present.

See photographs below.

Figure 10: Two images illustrating the presence of the first naturally occurring broad unchanneled valley-bottom wetland, through which surface water runoff from the central and southern portions of the assessment area situated south of the highpoint/ridge apex, mainly channels and drains, towards the south-west

Figure 11: Two images illustrating the presence of the naturally occurring unchanneled valley-bottom wetland, which flows past the assessment area directly adjacent south while a portion of the wetland also traverses the south-western corner of the assessment area; the extensive inundation visible in the images was mainly as a result of the abnormally high rainfall received during that time period and a subsequent upstream dam wall failure

Figure 12: Two images illustrating the presence of the subsequent naturally occurring unchanneled valley-bottom wetland into which the first broad wetland gradually flows, located within the southern portion of the assessment area

Figure 13: Two images illustrating the presence of the significantly sized naturally occurring unchanneled valley-bottom wetland situated approximately 330 m north-east of the assessment area, which constitutes the main inflow of the Commandants Pan

Figure 14: Image illustrating from left to right, the Melanic A horizon, followed by the G 1 and G2 horizons of the wetland soils

7.2.6. Depression wetlands

One naturally occurring depression wetland is present within the central portion of the assessment area, while a further two naturally occurring depression wetlands are present within the approximate 500 m zone of influence surrounding the assessment area. The latter two wetlands are situated approximately 200 m east and 160 m west of the assessment area, respectively. The centrally- and easterly located two wetlands are situated north of the highpoint/ridge apex and their landscapes therefore mainly slope towards the north, while the westerly located wetland is rather situated south of the highpoint/ridge apex and its landscape therefore slopes towards the south.

The western and north-western portions of the assessment area along with the broader areas to the west and north-west associated with centrally- and westerly located two wetlands, are also classified as a Critical Biodiversity Area one (CBA 1).

The wetlands are seasonally/temporarily inundated and no distinct surface water flow paths into or out of the wetlands are evident as they rather constitute slight surface depressions within the local landscapes. The wetlands therefore collect general surface waterflow from limited upstream catchment areas, as well as rainwater.

The wetlands house locally distinct and important semi-aquatic habitats within their basins and around their edges, which are likely utilised by various common and habitat-specific waterbirds, amphibian species and aquatic invertebrates for breeding, foraging and/or persistence purposes. Although not specifically observed during the site assessment as the focus of the assessment was not on avifauna, these wetlands and localised surrounding terrestrial grassland landscapes provide very suitable habitat for Marsh owls (*Asio capensis*) and Grass owls (*Tyto capensis*). Marsh owl individuals were in fact encountered within the two unchanneled valley-bottom wetlands located within the southern portion of the assessment area as well as approximately 330 m north-east of the assessment area (see under heading 7.2.5). It is therefore highly likely that the semi-aquatic habitats of the three depression wetlands and localised surrounding terrestrial grassland landscapes are utilised by individuals and/or pairs of one or both of these species for breeding, foraging and/or persistence purposes. Both of these species are considered to be very habitat-specific and therefore range-limited. The latter species is nationally classified as a Vulnerable Red Data Listed bird species, due to extensive habitat degradation and loss.

The Ecological Importance and Sensitivity (EIS) of the wetlands is classified as Class C (moderate) as they are viewed as being ecologically important and sensitive on local and possibly provincial scale. Due to the locally distinct and important nature of the semi-aquatic habitat associated with the wetlands, the localised areas are viewed as being of moderate to high conversational significance for habitat preservation and ecological functionality persistence in support of the surrounding aquatic ecosystem and the likely presence of ecologically important, habitat-specific and range-limited bird species. The presence of the Critical Biodiversity Area one (CBA 1) associated with centrally- and westerly located two wetlands, further substantiates the ecological importance of these areas.

The established solar power generation facility infrastructure will result in the emission of significantly bright glare/shine into the surrounding landscape. This along with the significant noise generated by the construction activities, will likely cause substantial disturbance and subsequently impact negatively on the ecological integrity and -functionality of the semi-aquatic habitats of the wetlands and the localised surrounding terrestrial grassland landscapes. The erection of permitter fencing and associated night illumination infrastructure around the proposed solar power generation facility footprint area, furthermore poses a significant collision and mortality risk to the relevant owl species that likely utilise the areas.

It is therefore recommended that the three depression wetlands as well as portions of the surrounding natural undisturbed terrestrial grassland must be adequately buffered out of the proposed development footprint area. By implementing the relevant Department of Water and Sanitation (DWS) Wetland buffer calculation tool, a minimum water quality buffer distance of approximately 60 m from the wetlands, was determined. Due to the extensive vegetation clearance and associated significantly increased sediment input into the wetlands, it is however highly recommended that the proposed buffer distance should be increased by a further approximately 20 m. A minimum approximately 80 m water quality buffer distance is therefore recommended to be implemented around the wetlands. No current or future development is allowed to take place within these buffered zones.

After consultation with well-known and recognized avifaunal specialists and although the presence of the two owl species was not necessarily physically/visually confirmed on site, it is however recommended that a minimum approximately 200 m biodiversity buffer distance be implemented around the wetlands. No current or future development is allowed to take place within these buffered zones. It is however recommended that the appointed Avifaunal Specialist must provide final recommendations on suitable aquatic avifaunal species- and habitat buffer zones, after completion of his/her assessment. The Terrestrial Ecologist must also provide final recommendations regarding the proposed development within the portions of the assessment area, which are classified as a Critical Biodiversity Area one (CBA 1).

It is further recommended that no bright light from any spotlights or perimeter lights should be emitted into the surrounding landscape towards the wetlands, during night time. As little light emissions as practicably/reasonably possible from the proposed development area, should occur during night time as this could lure owl and other nocturnal bird individuals towards the permitter fences and potentially result in collisions and mortality.

These recommended buffer zones and associated recommendations must be implemented to attempt to maintain the hydrological and ecological functionality and -integrity of the wetlands and their associated semi-aquatic habitats along with the localised surrounding terrestrial grassland landscapes and Critical Biodiversity Area one (CBA 1), in order to prevent any significant increase in sediment inputs and contamination and ensure the persistence/livelihood of semi-aquatic fauna in those areas.

Furthermore, if the proposed biodiversity buffer zone and associated recommendations are adequately implemented, it should also place the majority of the solar power generation facility infrastructure 'behind' the highpoint/ridge apex, which would be expected to slightly reduce/alleviate the direct visibility between the facility and the easterly located wetland.

The following wetland indicators were used to identify, classify and delineate the wetlands with a minimum 90 % confidence level:

- Terrain Unit Indicator (TUI)

The TUI takes into consideration the topography of the area to determine where it is most likely to support a wetland. The identified wetlands clearly form distinct topographic depressions in the landscapes where water accumulation occurs.

- Soil Form Indicator (SFI)

The SFI relies on classifying soils according to the Soil Classification Working Group. It takes into account the identification of hydromorphic soils that display unique characteristics resulting from prolonged and repeated saturation. Prolonged periods of saturation results in the soil eventually becoming anaerobic and subsequently reduced. The soils within the identified wetlands are classified as a Willowbrook soil type, consisting of a Melanic A horizon (40 cm – 50 cm) on top of a G horizon, which is indicative of water saturated soils and subsurface water movement.

- Soil Wetness Indicator (SWI)

The colours of various soil components are often the most diagnostic indicator of hydromorphic soils. Colours of these components are strongly influenced by the frequency and duration of soil saturation. The Melanic A horizon of the identified wetlands has a dark grey colour with high clay content while the G horizon possesses a moderate clay content. Coloured mottles are also clearly present.

- Vegetation Indicator (VI)

Vegetation species analysis is considered to be useful for finding the boundaries of wetlands. Plant communities undergo distinct changes in species composition along the moisture gradient from the centre of the wetland to the edge, and into adjacent terrestrial areas. This change in species composition provides valuable clues for determining the wetland boundary, and moisture zones. When using the vegetation indicator for delineation, emphasis is placed on the group of species that dominate the plant community, rather than on individual indicator species (DWS, 2008). The wetlands house locally distinct and important semi-aquatic habitats within their basins and around their edges.

See photographs below.

Figure 15: Two images illustrating the presence of the naturally occurring depression wetland, located within the central portion of the assessment area

Figure 16: Two images illustrating the presence of the naturally occurring depression wetland, situated approximately 200 m east of the assessment area

Figure 17: Two images illustrating the presence of the naturally occurring depression wetland, situated approximately 160 m west of the assessment area

7.3. Transmission line route option 1 - 132 kV

The proposed Transmission line route option 1 - 132 kV is approximately 12.4 km in length. The direct footprint impact of the proposed transmission line is very low relative to the proposed solar power generation facility footprint. The direct footprint impact will mainly be limited to the physical footprints of the pylons to be constructed as well as the narrow linear corridor associated with the access/service road.

7.3.1. Unchanneled valley-bottom wetland

The commencement portion of the proposed route traverses the unchanneled valley-bottom wetland, which flows past the assessment area directly adjacent south while a portion of the wetland also traverses the south-western corner of the assessment area (see discussion under heading 7.2.5).

It is recommended that the pylons be constructed as far apart as practicably/reasonably possible and that as few as practicably/reasonably possible pylons may be constructed through this portion. The design layouts of the transmission line and access/service road must also allow for continued water flow through this portion, in order to maintain the ecological functionality and -integrity of the wetland, over time.

Areas disturbed by construction activities must also be adequately concurrently rehabilitated as soon as practicably/reasonably possible after construction. A Rehabilitation Management Plan must be compiled by a suitably qualified and experienced ecologist.

A Water Use License Application (WULA) must also be submitted to the Department of Water and Sanitation (DWS), to request authorisation for the proposed development at this wetland crossing, in accordance with the National Water Act (Act 36 of 1998).

7.3.2. Depression wetland

A naturally occurring depression wetland is present along the proposed route directly south of the split between the Transmission line route options 1 & 2. The wetland is situated within an old historically cultivated agricultural land. Although this is the case, the wetland still houses semi-aquatic habitat within its basin and around its edges.

The wetland is seasonally/temporarily inundated and no distinct surface water flow paths into or out of the wetland are evident as it rather constitutes a slight surface depression within the local landscape. The wetland therefore collects general surface waterflow from a limited upstream catchment area, as well as rainwater.

The wetland houses locally distinct and important semi-aquatic habitat, which is likely utilised by various common and habitat-specific waterbirds, amphibian species and aquatic invertebrates for breeding, foraging and/or persistence purposes. Although not specifically observed during the site assessment as the focus of the assessment was not on avifauna, the wetland and localised surrounding terrestrial grassland landscape provide potentially suitable habitat for Marsh owls (*Asio capensis*) and Grass owls (*Tyto capensis*). It is therefore a possibility that the semi-aquatic habitat of the wetland and localised surrounding terrestrial grassland landscape is utilised by individuals and/or pairs of one or both of these species for breeding, foraging and/or persistence purposes. Both of these species are considered to be very habitat-specific and therefore range-limited. The latter species is nationally classified as a Vulnerable Red Data Listed bird species, due to extensive habitat degradation and loss.

The Ecological Importance and Sensitivity (EIS) of the wetland is classified as Class C (moderate) as it is viewed as being ecologically important and sensitive on local scale. Due to the locally distinct and important nature of the semi-aquatic habitat associated with the wetland, the localised area is viewed as being of moderate conversational significance for habitat preservation and ecological functionality persistence in support of the surrounding aquatic ecosystem and the likely presence of ecologically important, habitat-specific and range-limited bird species.

Although the established transmission line should not result in any significant disturbance or impact negatively on the ecological integrity and -functionality of the semi-aquatic habitat associated with the wetland and the localised surrounding terrestrial grassland landscape, it still poses a collision and mortality risk to the relevant owl species that possibly utilise the area.

It is therefore recommended that the wetland must be adequately buffered out of the proposed development footprint area. By implementing the relevant Department of Water and Sanitation (DWS) Wetland buffer calculation tool, a minimum water quality buffer distance of approximately 15 m from the wetland, was determined. Due to the vegetation clearance and associated increased sediment input into the wetland, it is however highly recommended that the proposed buffer distance should be increased by a further approximately 25 m. A minimum approximately 40 m water quality buffer distance is therefore recommended to be implemented around the wetland. No current or future development is allowed to take place within this buffered zone.

After consultation with well-known and recognized avifaunal specialists and although the presence of the two owl species was not necessarily physically/visually confirmed on site, it is however recommended that a minimum approximately 100 m biodiversity buffer distance be implemented around the wetland. No current or future development is allowed to take place within this buffered zone. It is however recommended that the appointed Avifaunal Specialist must provide final recommendations on suitable aquatic avifaunal species- and habitat buffer zones, after completion of his/her assessment.

It is also recommended that the pylons be constructed as far apart as practicably/reasonably possible and that as few as practicably/reasonably possible pylons may be constructed through this portion.

Areas disturbed by construction activities must also be adequately concurrently rehabilitated as soon as practicably/reasonably possible after construction. A Rehabilitation Management Plan must be compiled by a suitably qualified and experienced ecologist.

This recommended buffer zone and associated recommendations must be implemented to attempt to maintain the hydrological and ecological functionality and -integrity of the wetland and its associated semi-aquatic habitat, in order to prevent any significant increase in sediment inputs and contamination and ensure the persistence/livelihood of semi-aquatic fauna in the area.

The following wetland indicators were used to identify, classify and delineate the wetland with a minimum 90 % confidence level:

- Terrain Unit Indicator (TUI)

The TUI takes into consideration the topography of the area to determine where it is most likely to support a wetland. The identified wetland clearly forms a distinct topographic depression in the landscape where water accumulation occurs.

- Soil Form Indicator (SFI)

The SFI relies on classifying soils according to the Soil Classification Working Group. It takes into account the identification of hydromorphic soils that display unique characteristics resulting from prolonged and repeated saturation. Prolonged periods of saturation results in the soil eventually becoming anaerobic and subsequently reduced. The soils within the identified wetland are classified as a Willowbrook soil type, consisting of a Melanic A horizon (40 cm – 50 cm) on top of a G horizon, which is indicative of water saturated soils and subsurface water movement.

- Soil Wetness Indicator (SWI)

The colours of various soil components are often the most diagnostic indicator of hydromorphic soils. Colours of these components are strongly influenced by the frequency and duration of soil saturation. The Melanic A horizon of the identified wetland has a dark grey colour with high clay content while the G horizon possesses a moderate clay content. Coloured mottles are also clearly present.

- Vegetation Indicator (VI)

Vegetation species analysis is considered to be useful for finding the boundaries of wetlands. Plant communities undergo distinct changes in species composition along the moisture gradient from the centre of the wetland to the edge, and into adjacent terrestrial areas. This change in species composition provides valuable clues for determining the wetland boundary, and moisture zones. When using the vegetation indicator for delineation, emphasis is placed on the group of species that dominate the plant community, rather than on individual indicator species (DWS, 2008). The wetland houses locally distinct and important semi-aquatic habitat within its basin and around its edges.

See photographs below.

Figure 18: Two images illustrating the presence of the naturally occurring depression wetland, located along the proposed route directly south of the split between the proposed Transmission line route options 1 & 2

7.3.3. Inaccessible areas

Due to the inaccessibility of various portions of the assessment areas as a result of the abnormally high rainfall received during that time period as well as strict access control, the southern portion of the proposed Transmission line route option 1 - 132 kV could not be fully assessed.

In accordance with the initial desktop aquatic assessment, two watercourses traverse the southern portion of the proposed route, while a cluster of depression wetlands are also present approximately 2.5 km north of the finishing point. This could however not be verified on site, due to inaccessibility.

From the desktop information it can be deduced that the two watercourses appear to merely constitute very small first-order preferential water flow paths/drainage lines. These flow paths/drainage lines merely assist with channelling surface water runoff towards the south-west. It is assumed that these flow paths/drainage lines therefore merely play an assisting role in the localised catchment and drainage and are not viewed as being of any conservational significance, from a hydrological or aquatic ecological perspective.

It is however still recommended that the pylons be constructed as far apart as practicably/reasonably possible through these two portions. No pylons may be constructed inside- or within 20 m of these two watercourse crossings. The design layouts of the transmission line and access/service road must also allow for continued water flow through these two portions, in order to maintain their ecological functionality and -integrity over time.

Areas disturbed by construction activities must also be adequately concurrently rehabilitated as soon as practicably/reasonably possible after construction. A Rehabilitation Management Plan must be compiled by a suitably qualified and experienced ecologist.

A Water Use License Application (WULA) must also be submitted to the Department of Water and Sanitation (DWS), to request authorisation for the proposed development at these watercourse crossings, in accordance with the National Water Act (Act 36 of 1998).

It is also recommended that the wetland cluster must be adequately buffered out of the proposed development footprint area. After consultation with well-known and recognized avifaunal specialists and although the presence of the two owl species was not necessarily physically/visually confirmed on site, it is however recommended that a minimum approximately 100 m biodiversity buffer distance be implemented around the wetland. No current or future development is allowed to take place within this buffered zone. It is however recommended that the appointed Avifaunal Specialist must provide final recommendations on suitable aquatic avifaunal species- and habitat buffer zones, after completion of his/her assessment.

It is however recommended that the proposed Transmission line route option 2 - 132 kV rather be considered for the proposed development as opposed to the proposed Transmission line route option 1 - 132 kV. This will result in less transformation of natural undisturbed vegetation and subsequent lower negative impact from an aquatic ecological perspective.

7.4. Transmission line route option 2 - 132 kV

The proposed Transmission line route option 2 - 132 kV is approximately 10.6 km in length. The direct footprint impact of the proposed transmission line is very low relative to the proposed solar power generation facility footprints. The direct footprint impact will mainly be limited to the physical footprints of the pylons to be constructed as well as the narrow linear corridor associated with the access/service road.

7.4.1. Unchanneled- and channelled valley-bottom wetlands

As is the case for the proposed Transmission line route option 1 - 132 kV, the commencement portion of the proposed route traverses the unchanneled valley-bottom wetland (see discussion under heading 7.2.5).

It is recommended that the pylons be constructed as far apart as practicably/reasonably possible and that as few as practicably/reasonably possible pylons may be constructed through this portion. The design layouts of the transmission line and access/service road must also allow for continued water flow through this portion, in order to maintain the ecological functionality and -integrity of the wetland, over time.

Areas disturbed by construction activities must also be adequately concurrently rehabilitated as soon as practicably/reasonably possible after construction. A Rehabilitation Management Plan must be compiled by a suitably qualified and experienced ecologist.

A Water Use License Application (WULA) must also be submitted to the Department of Water and Sanitation (DWS), to request authorisation for the proposed development at this wetland crossing, in accordance with the National Water Act (Act 36 of 1998).

The central portion of the proposed route traverses two adjacently located first-order seasonal watercourses and associated small channelled valley-bottom wetlands. These wetlands have however been historically fragmented by the construction of the M 4 provincial road as well as a small artificially constructed earth dam directly adjacent south of the road. Numerous existing high voltage transmission lines also already traverse the wetlands in the same area. The wetlands are therefore in a moderately disturbed and transformed state and the construction of an additional transmission line crossing should not result in any significant additional negative impacts on the wetlands.

Although this is the case, the wetlands still provide locally distinct and important aquatic and semi-aquatic habitat, which is visibly utilised by various common and habitat-specific waterbirds, amphibian species and aquatic invertebrates for breeding, foraging and/or persistence purposes.

The Ecological Importance and Sensitivity (EIS) of the wetlands is classified as Class D (low/marginal) as they are not viewed as being ecologically important and/or sensitive on any scale. The localised area is therefore merely viewed as being of low conversational significance for habitat preservation and ecological functionality persistence in support of the surrounding aquatic ecosystem as well as the local and broader quaternary surface water catchment- and drainage area, towards the west.

Due to the presence of numerous existing high voltage transmission lines in the same area, the newly established transmission line should not result in any significant additional disturbance or impact negatively on the ecological integrity and -functionality of the aquatic and semi-aquatic habitat associated with the wetlands and the localised surrounding terrestrial grassland landscape.

It is recommended that the pylons be constructed as far apart as practicably/reasonably possible and that as few as practicably/reasonably possible pylons may be constructed through these portions. The design layouts of the transmission line and access/service road must also allow for continued water flow through these portions, in order to maintain the ecological functionality and -integrity of the wetlands, over time.

Areas disturbed by construction activities must also be adequately concurrently rehabilitated as soon as practicably/reasonably possible after construction. A Rehabilitation Management Plan must be compiled by a suitably qualified and experienced ecologist.
A Water Use License Application (WULA) must also be submitted to the Department of Water and Sanitation (DWS), to request authorisation for the proposed development at these wetland crossings, in accordance with the National Water Act (Act 36 of 1998).

The following wetland indicators were used to identify, classify and delineate the wetlands with a minimum 90 % confidence level:

- Terrain Unit Indicator (TUI)

The TUI takes into consideration the topography of the area to determine where it is most likely to support a wetland. The identified wetlands clearly form part of a surface water drainage area, which flows towards the south-west. Due to the slightly sloping topography as well as the presence of the M 4 provincial road and small artificially constructed earth dam, standing water accumulation was also extensively evident.

- Soil Form Indicator (SFI)

The SFI relies on classifying soils according to the Soil Classification Working Group. It takes into account the identification of hydromorphic soils that display unique characteristics resulting from prolonged and repeated saturation. Prolonged periods of saturation results in the soil eventually becoming anaerobic and subsequently reduced. The soils within the identified wetlands are classified as a Willowbrook soil type, consisting of a Melanic A horizon (40 cm – 50 cm) on top of a G horizon, which is indicative of water saturated soils and subsurface water movement.

- Soil Wetness Indicator (SWI)

The colours of various soil components are often the most diagnostic indicator of hydromorphic soils. Colours of these components are strongly influenced by the frequency and duration of soil saturation. The Melanic A horizon of the identified wetland has a dark grey colour with high clay content while the G horizon possesses a moderate clay content. Coloured mottles are also clearly present.

- Vegetation Indicator (VI)

Vegetation species analysis is considered to be useful for finding the boundaries of wetlands. Plant communities undergo distinct changes in species composition along the moisture gradient from the centre of the wetland to the edge, and into adjacent terrestrial areas. This change in species composition provides valuable clues for determining the wetland boundary, and moisture zones. When using the vegetation indicator for delineation, emphasis is placed on the group of species that dominate the plant community, rather than on individual indicator species (DWS, 2008). The wetlands house locally distinct and important aquatic and semi-aquatic habitat.

See photographs below.

Figure 19: Two images illustrating the presence of the two adjacently located first-order seasonal watercourses and associated small channelled valley-bottom wetlands, located within the central portion of the proposed Transmission line route option 2; the presence of numerous existing high voltage transmission lines in the same area, is also evident

The western portion of the proposed route which runs through the existing township, also traverses a small remaining portion of what likely used to form part of a valley-bottom wetland. The assumed historic wetland has however virtually been completely fragmented and transformed by the presence of the township. The small remaining wetland portion is isolated and completely degraded and is therefore not viewed as being of any conversational significance for habitat preservation and ecological functionality persistence in support of the surrounding aquatic ecosystem or the local and broader quaternary surface water catchment- and drainage area, towards the west.

See photograph below.

Figure 20: Image illustrating the presence of the small remaining portion of what likely used to form part of a valley-bottom wetland, which is traversed by the western portion of the proposed Transmission line route option 2

7.4.2. Depression wetland

A naturally occurring depression wetland is present along the proposed route directly west of the split between the Transmission line route options 1 & 2. The wetland is situated within an old historically cultivated agricultural land.

No distinct surface water flow paths into or out of the wetland are evident as it rather constitutes a slight surface depression within the local landscape. The wetland therefore collects general surface waterflow from a limited upstream catchment area, as well as rainwater.

As opposed to the other depression wetlands which have been discussed in this report, this wetland does not house any locally distinct or important semi-aquatic habitat within its basin or around its edges. It rather houses a similar terrestrial grassland vegetation composition and -structure, relative to the surrounding landscape with merely slight variations in species representation. The wetland is therefore not expected to be specifically utilised by any habitat-specific waterbirds, amphibian species and/or aquatic invertebrates for breeding, foraging and/or persistence purposes.

The Ecological Importance and Sensitivity (EIS) of the wetland is classified as Class D (low/marginal) as it is not viewed as being ecologically important and/or sensitive on any scale. The localised area is therefore not viewed as being of any conservational significance, from a hydrological or aquatic ecological perspective.

It is the opinion of the specialist that it is not necessary to buffer the wetland out of the proposed development area.

It is again recommended that the proposed Transmission line route option 2 - 132 kV rather be considered for the proposed development as opposed to the proposed Transmission line route option 1 - 132 kV. This will result in less transformation of natural undisturbed vegetation and subsequent lower negative impact from an aquatic ecological perspective.

See photograph below.

Figure 21: Image illustrating the presence of the naturally occurring depression wetland, along the proposed route directly west of the split between the proposed Transmission line route options 1 & 2

7.5. Transmission line route – 44 kV

The proposed Transmission line route - 44 kV is approximately 9.95 km in length. The direct footprint impact of the proposed transmission line is very low relative to the proposed solar power generation facility footprints. The direct footprint impact will mainly be limited to the physical footprints of the pylons to be constructed as well as the narrow linear corridor associated with the access/service road.

7.5.1. Depression pan

The significantly sized naturally occurring depression pan, which is located approximately 700 m south-west of the assessment area (see discussions under headings 7.2.3, 7.2.4 & 7.2.5), is situated to the east of a very small section of the proposed route. The pan along with the broader area to the north and west, is also classified as a Critical Biodiversity Area one (CBA 1).

The pan is seasonally/temporarily inundated and the inflow of the pan mainly constitutes the artificially constructed earth dam (see discussion under heading 7.2.4). It is therefore evident that the pan along with its associated inflow, form an important part of the hydrological and aquatic ecological connectivity of the local and broader quaternary surface water catchment- and drainage area, towards the west.

The pan also houses locally distinct and important semi-aquatic habitat within its basin and around its edges, which is visibly utilised by various common and habitat-specific waterbirds, amphibian species and aquatic invertebrates for breeding, foraging and/or persistence purposes.

The Ecological Importance and Sensitivity (EIS) of the pan is classified as Class C (moderate) as it is viewed as being ecologically important and sensitive on provincial scale. Due to the locally distinct and important nature of the semi-aquatic habitat along with the significant size of the pan, the localised area is viewed as being of moderate to high conversational significance for habitat preservation and ecological functionality persistence in support of the surrounding aquatic ecosystem, the visible presence of habitat-specific waterbirds, amphibian species and aquatic invertebrates as well as the local and broader quaternary surface water catchment- and drainage area, towards the west. The presence of the Critical Biodiversity Area one (CBA 1), further substantiates the ecological importance of this area.

Although the established transmission line should not result in any significant disturbance or impact negatively on the ecological integrity and -functionality of the semi-aquatic habitat and the localised surrounding terrestrial grassland landscape associated with the very small applicable section of the pan, it still poses a slight collision and mortality risk to the relevant habitat-specific waterbirds that visibly utilise the area.

It is therefore recommended that the very small applicable section of the pan as well as a portion of the surrounding natural undisturbed terrestrial grassland must be adequately buffered out of the proposed development footprint area. By implementing the relevant Department of Water and Sanitation (DWS) Wetland buffer calculation tool, a minimum water quality buffer distance of approximately 15 m from the pan, was determined. Due to the vegetation clearance and associated increased sediment input into the pan, it is however highly recommended that the proposed buffer distance should be increased by a further approximately 25 m. A minimum approximately 40 m water quality buffer distance is therefore recommended to be implemented around the very small applicable section of the pan. No current or future development is allowed to take place within this buffered zone.

From an aquatic ecological perspective, when taking the important semi-aquatic habitat into account, a minimum approximately 150 m biodiversity buffer distance is recommended to be implemented around the very small applicable section of the pan. No current or future development is allowed to take place within this buffered zone. It is however recommended that the appointed Avifaunal Specialist must provide final recommendations on suitable aquatic avifaunal species- and habitat buffer zones, after completion of his/her assessment. The Terrestrial Ecologist must also provide final recommendations regarding the proposed development within the portion of the assessment area, which is classified as a Critical Biodiversity Area one (CBA 1).

See photographs below.

Figure 22: Two images illustrating the presence of the significantly sized naturally occurring depression pan, which is located approximately 700 m south-west of the assessment area and is situated to the east of a very small section of the proposed route located to the south of the proposed Transmission line route – 44 kV

7.6. Aquatic Ecological Site Sensitivity Map

The site sensitivity maps below (see A3 sized maps in the Appendices) illustrate the approximate delineations of the identified significant watercourses, wetlands and pans which are present throughout the assessment area and along the proposed three transmission line route alternatives. The recommended buffer zones to be implemented around the various aquatic features, are also illustrated.

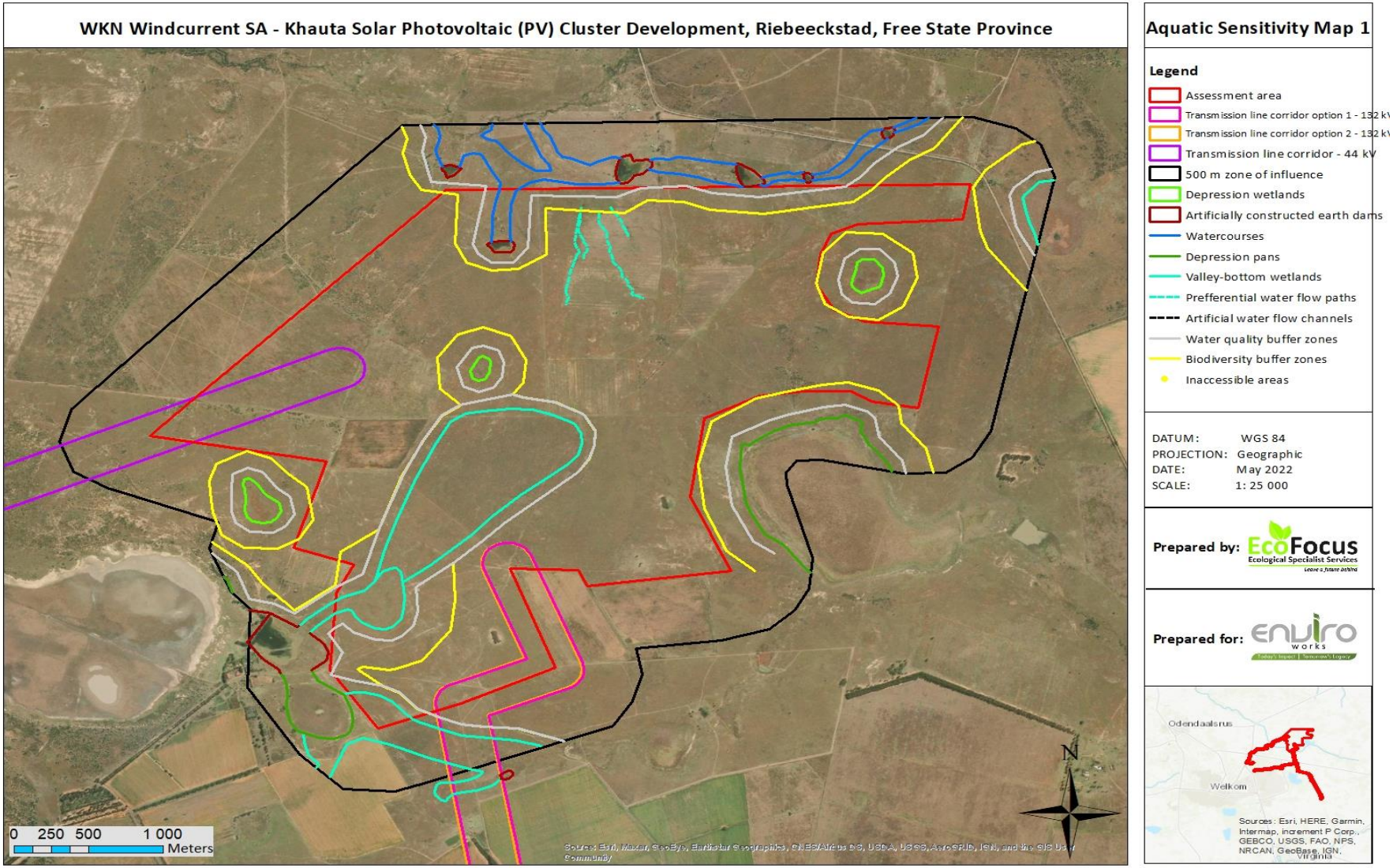

Figure 23: Aquatic site sensitivity map 1 illustrating the approximate delineations of the identified significant watercourses, wetlands and pans which are present throughout the assessment area; the recommended buffer zones to be implemented around the various aquatic features, are also illustrated

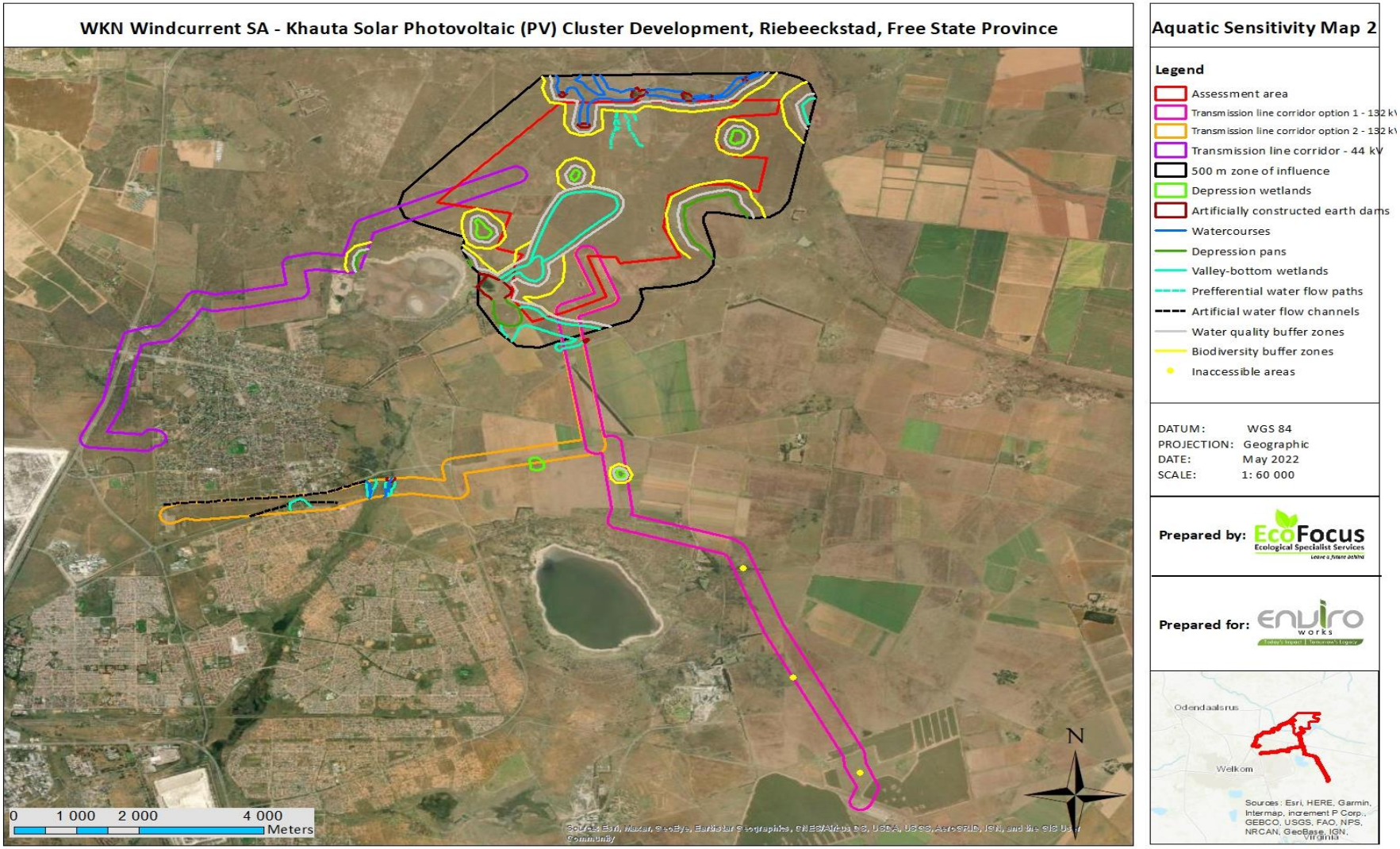

Figure 24: Aquatic site sensitivity map 2 illustrating the approximate delineations of the identified significant watercourses, wetlands and pans which are present throughout the assessment area and along the proposed three transmission line route alternatives; the recommended buffer zones to be implemented around the various aquatic features, are also illustrated

8. Conclusion

The following aquatic ecologically/conservationally significant and sensitive watercourses, wetlands and pans were found to be present throughout the assessment area and along the proposed three transmission line route alternatives:

- 3 x first-order seasonal watercourses
- 5 x depression wetlands
- 3 x depression pans
- 5 x unchanneled and 2 x channelled valley-bottom wetlands
- 9 x artificially constructed earth dams

This report provides delineations and descriptive summaries of all these identified significant aquatic features. The following wetland indicators were mainly used to identify, classify and delineate the significant wetlands with a minimum 90 % confidence level:

- Terrain Unit Indicator (TUI)

The TUI takes into consideration the topography of the area to determine where it is most likely to support a wetland.

- Soil Form Indicator (SFI)

The SFI relies on classifying soils according to the Soil Classification Working Group. It takes into account the identification of hydromorphic soils that display unique characteristics resulting from prolonged and repeated saturation. Prolonged periods of saturation results in the soil eventually becoming anaerobic and subsequently reduced.

- Soil Wetness Indicator (SWI)

The colours of various soil components are often the most diagnostic indicator of hydromorphic soils. Colours of these components are strongly influenced by the frequency and duration of soil saturation.

- Vegetation Indicator (VI)

Vegetation species analysis is considered to be useful for finding the boundaries of wetlands. Plant communities undergo distinct changes in species composition along the moisture gradient from the centre of the wetland to the edge, and into adjacent terrestrial areas. This change in species composition provides valuable clues for determining the wetland boundary, and moisture zones. When using the vegetation indicator for delineation, emphasis is placed on the group of species that dominate the plant community, rather than on individual indicator species (DWS, 2008).

It is essential that the collective flow regime associated with surface water drainage of the local and broader landscape, not be significantly impeded, contaminated or otherwise negatively impacted upon by the proposed development, as this could subsequently pose a substantial risk to the hydrological and aquatic ecological integrity and -functionality of the area. Natural surface water runoff and flow must be allowed to adequately continue unimpededly through the local and broader landscape and may also not be significantly contaminated by potentially increased sediment inputs and/or other anthropogenically generated pollutants, which could arise mainly from substantial vegetation clearance.

Through this, the aquatic ecological integrity and -functionality of identified locally distinct and important aquatic and semi-aquatic habitats throughout the local and broader landscape, must also be adequately preserved, in order to ensure the persistence/livelihood of important, habitat-specific and therefore often range-limited aquatic and semi-aquatic fauna in the area.

Recommended buffer zones and basic initial mitigation measures are provided in this report, in order to assist and guide the applicant with initial design layout planning. A distinction is made between calculated water quality buffers, which are deemed sufficient in preventing significant flow impediment and/or contamination of the identified aquatic features, and recommended biodiversity buffers, which are deemed necessary to preserve the aquatic ecological integrity and -functionality of identified locally distinct and important aquatic and semi-aquatic habitats. It is however again recommended that the appointed Avifaunal Specialist must provide final recommendations on suitable aquatic avifaunal species- and habitat buffer zones, after completion of his/her assessment. The full Aquatic Ecological Assessment Reports will furthermore, also provide more detailed recommendations regarding comprehensive mitigation measures.

It is the opinion of the specialist, by application of the NEMA: Mitigation Hierarchy, that all potentially significant aquatic ecological impacts associated with the proposed developments, can be suitably reduced and mitigated to within acceptable residual levels, by implementation of the recommended buffer zones and comprehensive mitigation measures to be provided in the full Aquatic Ecological Assessment Reports. It is therefore not anticipated that the proposed solar power generation facilities will necessarily add any significant residual cumulative aquatic ecological impacts to the surrounding aquatic environment, if all recommended buffer zones and mitigation measures as per this report and the full Aquatic Ecological Assessment Reports are adequately implemented and managed, for both the construction- and operational phases of the proposed developments. All necessary authorisations, permits and licenses must also be obtained prior to the commencement of any construction.

9. References

Collins, N.B. 2018. Free State Province Biodiversity Plan: CBA map. Free State Department of Economic, Small Business Development, Tourism and Environmental Affairs. Internal Report.

Collins, N.B. 2018. Free State Province Biodiversity Plan: Technical Report v1.0. Free State Department of Economic, Small Business Development, Tourism and Environmental Affairs. Internal Report.

Mucina, L. & Rutherford, M.C. (eds.) 2006. The Vegetation of South Africa, Lesotho and Swaziland. Strelitzia 19. South African National Biodiversity Institute, Pretoria.

National Environmental Management Act (Act No. 107 of 1998)

National Water Act (Act No. 36 of 1998)

National Water Act (Act No. 36 of 1998): Regulations regarding the procedural requirements for Water Use License Applications and Appeals

South African National Biodiversity Institute (2006-2019). The Vegetation Map of South Africa, Lesotho and Swaziland, Mucina, L., Rutherford, M.C. and Powrie, L.W. (Editors).

www.climate-data.org