

# **Aquatic Ecological Assessment Report**

**Groblershoop 132 kV Transmission  
Line Development, Northern Cape  
Province**

**October 2022**

**Compiled for:**



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## Table of Content

1.	Introduction .....	1
2.	Date of Ecological Site Assessment.....	2
3.	Assessment Rational.....	3
4.	Assumptions, Uncertainties and Gaps in Knowledge .....	4
5.	Assessment Area .....	7
5.1.	Climate .....	9
5.2.	Geology and Soils .....	9
5.3.	Vegetation Type and Conservation Status .....	9
6.	Details of the Specialist.....	13
7.	Objectives of the Assessment.....	23
8.	Methodology.....	24
9.	Results and Discussion .....	31
9.1.	Proposed Development Area Clearance .....	31
9.2.	Water Catchment and Drainage Information.....	32
9.3.	Watercourse Baseline Information.....	32
9.4.	Significant Watercourses .....	37
9.4.1.	Aquatic Feature Description and Current Existing Vegetation .....	37
9.4.2.	Present Ecological State (PES) and Ecological Importance and Sensitivity (EIS).....	41
9.5.	Preferential Water Flow paths/Drainage Lines .....	47
9.5.1.	Aquatic Feature Description and Current Existing Vegetation .....	47
9.5.2.	Present Ecological State (PES) and Ecological Importance and Sensitivity (EIS).....	49
9.6.	Aquatic Ecological Site Sensitivity Map .....	54
9.7.	Water Use License Application (WULA) Risk Assessment Matrix .....	56
10.	Aquatic Ecological Impact Assessment.....	72
10.1.	Construction Phase.....	72
10.2.	Operational Phase .....	79
10.3.	Cumulative Impacts .....	80
10.4.	Risk Ratings of Potential Aquatic Ecological Impacts .....	83
10.4.1.	Construction Phase .....	84
10.4.2.	Operational Phase.....	101
11.	Summary and Conclusion .....	103
12.	References.....	111

## Executive Summary

The project applicant, Orange River Solar Facility, proposes to construct a 132 kV electrical transmission line of approximately 3.9 km in length, outside the town of Groblershoop, Northern Cape Province. The proposed transmission line will commence from the proposed 50 MW Photovoltaic (PV) solar power generation facility of the applicant, which is currently in its Environmental Impact Assessment (EIA) process and will tie into the ESKOM grid/network at the existing Groblershoop high voltage substation.

Environmental Management Group (Pty) Ltd was appointed by the applicant as the independent Environmental Assessment Practitioner (EAP), to conduct the legally required Basic Assessment (BA) 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 Assessment.

A site assessment for the proposed linear development area was conducted on 13 October 2022. This date forms part of the commencement of the new growing season. At the time of the site assessment, the area had however not received any initial rainfall yet. It must therefore be noted that the timing of the assessment was not necessarily favourable for successful identification of all plant species individuals.

### **Assessment Area**

The proposed development will entail the formal construction of a 132 kV electrical transmission line of approximately 3.9 km in length and its associated access/service road. The proposed transmission line will mostly run parallel to an existing ESKOM line and will traverse the Orange River.

The proposed linear development area will commence from the proposed 50 MW Photovoltaic (PV) solar power generation facility of the applicant, which is located on Portion 18 of the Farm Rooi Sand No. 387 (SG 21 Digit Code: C02800000000038700018) and will tie into the ESKOM grid/network at the existing Groblershoop high voltage substation, which is located on the Remaining Extent of the Farm Boegoebergnedersetting No. 48 (SG 21 Digit Code: C03600000000004800000).

The proposed linear development area is located approximately 1.5 km and 4 km north of the town of Groblershoop. The town forms part of the !Kheis Local Municipality which in turn, forms part of the ZF Mgcau District Municipality, Northern Cape Province. Access to the assessment area is obtained by way of the N 8 national highway and subsequent dirt roads, from the east.

### **Methodology**

The proposed linear development area and the approximate 200 m corridor surrounding the proposed transmission line route, were assessed on foot.

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 aquatic species present.

Identified aquatic 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 Northern Cape Nature Conservation Act (Act No. 9 of 2009).

Any significant watercourses/wetlands and/or other ecologically sensitive/conservationally significant aquatic features/habitats which were found to be present within the proposed linear development area and the approximate 200 m corridor surrounding the proposed transmission line route, were identified, delineated and discussed.

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 aquatic species if encountered. This was done in order to indicate their specific locations in a Geographic Information System (GIS) mapping format.

Potential aquatic ecological impacts of the proposed development on the surrounding aquatic environment were identified, evaluated, rated and discussed. The Present Ecological State (PES) as well as the Ecological Importance and Sensitivity (EIS) of the identified aquatic features were also determined and discussed.

## **Results and Conclusion**

### **Proposed Development Area Clearance**

The proposed development will entail the formal construction of a 132 kV electrical transmission line of approximately 3.9 km in length and its associated access/service road. The proposed transmission line will mostly run parallel to an existing ESKOM line and will traverse the Orange River.

The proposed transmission line route mainly constitutes an undeveloped relatively natural landscape, although it will also traverse a portion of existing cultivated agricultural lands situated directly adjacent west of the Orange River.

The transmission line servitude will not be holistically cleared of vegetation. Only the pylon locations will be cleared, while woody tree and shrub individuals of  $\geq 2.5$  m in height will be cut or removed, if found to be present directly underneath the proposed transmission line or within a 3 m radius of a pylon location. It will also be maintained as such, over time.

A narrow linear farm track of approximately 4 m in width, will be cleared of vegetation underneath and all along the proposed transmission line, for the proposed access/service road. It will also be maintained as such, over time.

The mechanical clearance associated with the proposed development, will in all probability completely transform the majority of the existing surface vegetation within the narrow proposed linear development area. The size of the proposed linear development area is however negligible relative to the surrounding vast, continuous undeveloped natural landscape.

### **Vegetation Type and Conservation Status**

According to SANBI (2006-2019), the majority of the proposed linear development area traverses the Bushmanland Arid Grassland vegetation type (NKb 3). This vegetation type mainly consists of extensive to irregular plains on a slightly sloping plateau sparsely vegetated by grassland and mostly dominated by white grasses such as *Stipagrostis* species (SANBI, 2006-2019). The vegetation type has the characteristics of semi desert (SANBI, 2006-2019).

The central portion of the proposed transmission line route which traverses the Orange River, however forms part of the Lower Gariep Alluvial vegetation type (AZa 3) (SANBI, 2006-2019). This vegetation type mainly consists of flat alluvial terraces and riverine islands, supporting a complex of riparian thickets, reed beds as well as flooded grasslands and herblands, which populate sandbanks and terraces along the length of the river (SANBI, 2006-2019).

Both of these vegetation types are classified as Least Concerned (SANBI, 2006-2019).

The majority of the proposed linear development area falls within a Critical Biodiversity Area two (CBA 2), according to the Northern Cape Provincial Spatial Biodiversity Plan 2016 (NCPSBP). The central portion of the proposed transmission line route which traverses the Orange River, however falls within a Critical Biodiversity Area one (CBA 1), according to the Northern Cape Provincial Spatial Biodiversity Plan 2016 (NCPSBP).

From an aquatic perspective, the relevant CBA 1 & 2 are mainly associated with the important ecological corridor that runs along the Orange River.

### **Water Catchment and Drainage Information**

The proposed transmission line route falls within the Lower Orange Water Management Area (WMA 14) and the associated D73D quaternary surface water catchment- and drainage area.

### Watercourse Baseline Information

The central portion of the proposed transmission line route will traverse the Orange River, which flows in a north-westerly direction. The 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.

The portion of the Orange River which will be traversed by the proposed transmission line, possesses a distinct natural riparian zone with a well-defined high density woody tree and shrub thicket along the eastern bank. A further portion of thicket is present directly adjacent east of the natural riparian zone of the Orange River. This portion is however overwhelmingly dominated by the legally declared alien invasive species *Eucalyptus spp.* (Category 1b in riparian areas) and *Prosopis glandulosa* (Category 3 in the Northern Cape Province) and is therefore viewed as being transformed and not forming part of the natural riparian zone.

The riparian zone along the western bank of the portion of the Orange River to be traversed by the proposed transmission line, has been significantly transformed by the existing cultivated agricultural lands (see under heading 9.1). The remaining riparian zone does not possess a well-defined woody tree or shrub thicket, but rather constitutes a broad reed bed, which is mainly dominated by the hydrophytic graminoids species *Phragmites australis* and *Cyperus spp.*

The proposed transmission line route does not fall within any Important Bird Areas (IBA) as per the latest IBA map obtained from the Birdlife SA website (<https://www.birdlife.org.za/what-we-do/important-bird-and-biodiversity-areas/media-and-resources/#1553597171790-6f83422a-a731>). No conservationally significant or important waterbird species/nests or locally distinct avifaunal habitats were observed along the proposed transmission line route, during the site assessment or are expected to specifically utilise the proposed transmission line route as refuge or for breeding, foraging and/or persistence purposes. Only common local resident bird species/nests were observed in the local area.

Although this is the case, the high woody- and reed densities associated with the Orange River riparian zone highly likely provide important refuge and locally distinct habitat for common and habitat-specific waterbird-, amphibian-, small antelope- as well as other mammalian species. The riparian zone is therefore viewed as being of moderate to high conservational significance/value, from an aquatic ecological perspective.



### **Significant Watercourses**

The proposed transmission line will respectively traverse a single (1) and three (3) significant first- and second-order ephemeral watercourses on the western and eastern sides of the Orange River. These watercourses constitute the main surface water flow paths of the small local catchment towards the river. From a hydrological perspective, the watercourses therefore form an important part of the local surface water catchment and drainage.

Although the proposed transmission line route does not fall within any Important Bird Areas (IBA) (see under heading 9.3), the increased woody densities associated with the watercourses potentially provide important refuge and locally distinct habitat for common and habitat-specific bird-, reptilian-, small antelope- as well as other mammalian species. The watercourses are therefore viewed as being of low to moderate conservational significance/value, from a semi-aquatic ecological perspective.

### **Preferential Water Flow paths/Drainage Lines**

The proposed transmission line will respectively traverse a single (1) and five (5) small first-order ephemeral preferential water flow paths/drainage lines on the western and eastern sides of the Orange River. These flow paths/drainage lines assist with channelling and discharging surface water runoff into the significant watercourses associated with the proposed development. The flow paths/drainage lines therefore merely play an assisting role in the small local catchment towards the river and are not viewed as being of high conservational significance, from a hydrological perspective.

The flow paths/drainage lines are merely viewed as being of low conservational significance/value, from a semi-aquatic ecological perspective.

### **Buffer Zone- and Other Recommendations**

Vegetation clearance must be restricted to the pylon locations and the narrow linear route of the proposed transmission line access/service road, as far as practicably possible.

It is recommended that all individuals of the identified alien invasive species must be actively eradicated from the Orange River riparian zone and the relevant watercourse, in accordance with the requirements of the National Environmental Management: Biodiversity Act (Act 10 of 2004); Alien and Invasive Species Regulations, 2014. Removed materials must also be adequately and lawfully disposed of, in order to prevent potential further spreading/dispersal.

It is recommended that no pylons may be constructed within the Orange River riparian zone. This must be done in order to prevent significant disturbance of the riparian zone and its associated conservationally important and locally distinct faunal habitat and to subsequently maintain/ensure the ecological functionality and -integrity of the riparian zone, over time.

It is recommended that the pylons on the eastern and western sides of the Orange River to cross the river, be placed parallel with the existing pylon locations of the existing ESKOM line, as these have been constructed a suitable distance away from the riparian zone.

It is furthermore recommended that the transmission line be suspended as high as practicably possible across the Orange River and that adequate bird deflecting/deviation technologies be implemented along the transmission line. This must be done in order to attempt to prevent significant collision- and mortality risks to waterbirds and other avifauna that utilise the river.

It is recommended that no pylons may be constructed inside- or within 35 m of any significant watercourse. The development design layouts of the proposed transmission line must allow for continued flow through the watercourses. This must be done in order to maintain/ensure their ecological functionality and -integrity over time.

It is recommended that no pylons may be constructed inside- or within 20 m of any preferential water flow path/drainage line. The development design layouts of the proposed transmission line must allow for continued flow through the flow paths/drainage lines. This must be done in order to maintain/ensure their ecological functionality and -integrity over time.

It is recommended that the pylons be placed parallel with the existing pylon locations of the existing ESKOM line, as far as practicably possible, as these have been constructed a suitable distance away from the watercourses and flow paths/drainage lines.

Disturbed areas within and immediately surrounding the proposed Orange River-, watercourse- and flow path/drainage line crossings, must be adequately rehabilitated concurrently with the construction processes. A Rehabilitation Management Plan must be compiled by a suitably qualified and experienced ecologist.

An adequate Stormwater and Erosion Management Plan must also be implemented during the construction- and operational phases of the proposed development, in order to assist with and allow for continued flow within the local catchment. This must be done to sufficiently manage storm water runoff and clean/dirty water separation in order to attempt to maintain/ensure the ecological functionality and -integrity of the local and broader quaternary surface water catchment- and drainage area.

A Water Use License Application (WULA) must furthermore be submitted to the Department of Water and Sanitation (DWS), to request authorisation for the proposed development across the Orange River as well as through the four (4) watercourse- and six (6) flow path/drainage line crossings, associated with the proposed transmission line route, in accordance with the National Water Act (Act 36 of 1998).

From an aquatic ecological perspective, it is the opinion of the specialist that the proposed development does not warrant the requirement of a Biodiversity Offset area to be identified or assessed, for the proposed transformation of the relevant CBA 1 & 2, as part of the NEMA mitigation hierarchy. The Northern Cape Department: Agriculture, Environmental Affairs, Rural Development and Land Reform must however provide a final decision in this regard.

## Conclusion

The significant watercourses scored a moderate Ecological Importance and Sensitivity (EIS) value and are viewed as being of moderate conversational significance/value for habitat preservation and ecological functionality persistence in support of the surrounding ecosystem, Critical Biodiversity Area one and two (CBA 1 & 2) as well as the ecological functionality and -integrity of the local and broader quaternary surface water catchment- and drainage area.

The flow paths/drainage lines scored a moderate to low/marginal Ecological Importance and Sensitivity (EIS) value and are merely viewed as being of low conversational significance/value for habitat preservation and ecological functionality persistence in support of the surrounding ecosystem, Critical Biodiversity Area one and two (CBA 1 & 2) as well as the ecological functionality and -integrity of the local and broader quaternary surface water catchment- and drainage area.

Transformation of an aquatic Critical Biodiversity Area one and two (CBA 1 & 2), associated with the important ecological corridor that runs along the Orange River as well as terrestrial and aquatic alien invasive species establishment within the Orange River, were identified and addressed as significant potential long-term aquatic ecological impacts, associated with the construction phase of the proposed development.

Once the construction phase of the proposed development has been completed, the subsequent operational phase should not result in any significant additional potential aquatic ecological impacts, apart from the potential long-term aquatic ecological impacts, as discussed under heading 10.1.

The significant potential long-term aquatic ecological impacts identified for the proposed development, could potentially merely add low to moderate cumulative impact to existing negative impacts caused by the extensive existing agricultural cultivation transformation, along the local and broader length of the Orange River.

It is however the opinion of the specialist, by application of the NEMA Mitigation Hierarchy, that all the identified potential cumulative aquatic ecological impacts associated with the proposed development, can be suitably reduced and mitigated to within acceptable residual levels, by implementation of the recommended mitigation measures. It is therefore not anticipated that the proposed development will add any significant residual cumulative aquatic ecological impacts to the surrounding environment, if all recommended mitigation measures as per this aquatic ecological report are adequately implemented and managed, for both the construction- and operational phases of the proposed development.

**It is the opinion of the specialist from an aquatic ecological and hydrological perspective, that the proposed development of the assessment area should be considered by the competent authority for Environmental Authorisation and approval. All recommended mitigation measures as per this aquatic ecological report must however be adequately implemented and managed for both the construction and operational phases of the proposed development. All necessary authorisations, permits and licenses must also be obtained prior to the commencement of any construction.**

## List of Figures

Figure 1: Locality map illustrating the proposed linear development area/electrical transmission line route.....	8
Figure 2: Vegetation type map illustrating the vegetation types associated with the proposed linear development area/electrical transmission line route .....	11
Figure 3: Conservation status map illustrating the conservation statuses/categories associated with the proposed linear development area/electrical transmission line route.....	12
Figure 4: Image illustrating the distinct natural riparian zone associated with the eastern bank of the portion of the Orange River which will be traversed by the proposed transmission line; the well-defined high density woody tree and shrub thicket is also evident (red arrow indicates the water flow direction).....	35
Figure 5: Image illustrating the distinct natural riparian zone associated with the western bank of the portion of the Orange River which will be traversed by the proposed transmission line; the broad reed bed is also evident (red arrow indicates the water flow direction).....	36
Figure 6: Two images illustrating examples of the four (4) significant first- and second-order ephemeral watercourses, which will be traversed by the proposed transmission line; the moderate to high densities of woody shrub species are also evident, within- and along the edges of the watercourses (red arrows indicate the water flow directions) .....	39
Figure 7: Image illustrating the significant/dense infestation of the legally declared alien invasive species <i>Prosopis glandulosa</i> (Category 3 in the Northern Cape Province), throughout the single significant ephemeral watercourse situated on the western side of the Orange River (red arrow indicates the water flow direction).....	40
Figure 8: Image illustrating the artificially constructed channel, which traverses the existing cultivated agricultural lands and eventually discharges into the Orange River (red arrow indicates the water flow direction) .....	40
Figure 9: Image illustrating an example of the six (6) small first-order ephemeral preferential water flow paths/drainage lines, which will be traversed by the proposed transmission line (red arrow indicates the water flow direction).....	48
Figure 10: Site sensitivity map illustrating the identified four (4) significant first- and second-order ephemeral watercourses as well as the identified six (6) small first-order ephemeral preferential water flow paths/drainage lines, which will be traversed by the proposed transmission line; the artificially constructed channel as well as the natural riparian zone of the Orange River, are also illustrated .....	55

## List of Tables

Table 1: Criteria for PES calculations.....	26
Table 2: Criteria for EIS calculations.....	27
Table 3: Scale utilised for the evaluation of the Environmental Risk Ratings.....	28
Table 4: Scale used for the evaluation of the Environmental Significance Ratings .....	30
Table 5: PES table for the significant watercourses (0-5 indicates decrease in significance) .....	41
Table 6: EIS table for the significant watercourses (0-5 indicates increase in significance) .....	46
Table 7: PES table for the small preferential water flow paths/drainage lines (0-5 indicates decrease in significance).....	49
Table 8: EIS table for the small preferential water flow paths/drainage lines (0-5 indicates increase in significance) .....	53
Table 9: Water Use License Application (WULA) Risk Assessment Matrix .....	56
Table 10: Environmental Risk and Significance Ratings .....	84
Table 11: Environmental Risk and Significance Ratings .....	101

## Abbreviations

BA	Basic Assessment
CBA	Critical Biodiversity Area
DWS	Department of Water and Sanitation
EAP	Environmental Assessment Practitioner
EIA	Environmental Impact Assessment
EIS	Ecological Importance and Sensitivity
MAP	Mean Annual Precipitation
NCPSBP	Northern Cape Provincial Spatial Biodiversity Plan 2016
NEMBA	National Environmental Management: Biodiversity Act (Act 10 of 2004)
NEMA	National Environmental Management Act (Act 107 of 1998)
NWA	National Water Act (Act 36 of 1998)
PES	Present Ecological State
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), Environmental Management Group (Pty) Ltd, 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**

## 1. Introduction

The project applicant, Orange River Solar Facility, proposes to construct a 132 kV electrical transmission line of approximately 3.9 km in length, outside the town of Groblershoop, Northern Cape Province. The proposed transmission line will commence from the proposed 50 MW Photovoltaic (PV) solar power generation facility of the applicant, which is currently in its Environmental Impact Assessment (EIA) process and will tie into the ESKOM grid/network at the existing Groblershoop high voltage substation.

Environmental Management Group (Pty) Ltd was appointed by the applicant as the independent Environmental Assessment Practitioner (EAP), to conduct the legally required Basic Assessment (BA) 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 Assessment.

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

- Georeferenced spatial information was obtained of the proposed linear development area, in order to determine the direct impact footprint area.
- 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 linear development area.

## **2. Date of Ecological Site Assessment**

A site assessment for the proposed linear development area was conducted on 13 October 2022. This date forms part of the commencement of the new growing season. At the time of the site assessment, the area had however not received any initial rainfall yet. It must therefore be noted that the timing of the assessment was not necessarily favourable for successful identification of all plant species individuals.

### 3. Assessment Rational

South Africa is a country rich in natural resources and splendour and is rated as having some of the highest biodiversity in the world. Other than the pure aesthetic value which our biodiversity and natural resources provides, it also plays a significant positive role in our national economy. While continuous economic development and progress is a key national focus area, which forms a cornerstone in the socio-economic improvement of society and the livelihoods of communities and individuals, the preservation and management of the integrity and sustainability of our natural resources is also essential in achieving this objective.

Socio-economic development and progress can therefore not be completely inhibited for the sake of ensuring environmental conservation; solutions and compromises rather need to be explored in order to achieve the need for socio-economic development without unreasonably jeopardising the needs of environmental conservation. A sustainable and responsible balance needs to be maintained in order to accommodate the requirements of both.

Adequate, sustainable and responsible utilisation and management of our natural resources is crucial. Finding the required balance between socio-economic development and environmental conservation, should therefore always be a priority focus point during any proposed development process.

Various environmental legislation in South Africa makes provision for the protection of our natural resources and the functionality of ecological systems in order to ensure sustainability. Such acts include the National Environmental Management: Biodiversity Act (Act 10 of 2004), National Forests Act (Act 84 of 1998), Conservation of Agricultural Resources Act (Act 43 of 1983), National Water Act (Act 36 of 1998) and framework legislation such as the National Environmental Management Act (Act 10 of 2004).

An Aquatic Ecological Assessment of the proposed linear development area was therefore conducted in order to identify and quantify any potential aquatic ecological impacts, associated with the proposed development.

#### 4. 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 linear development area as provided by the EAP, is 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 Basic Assessment process, determined that the proposed linear development area represents a potentially suitable and technically acceptable location.
- 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 Basic 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 BA 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 BA involves prediction, the uncertainty factor forms part of the assessment process. Two types of uncertainty are associated with the BA 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 BA 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 and pylon locations for the proposed development, had not been finalised yet at the time of the aquatic ecological assessment.
- The potential for future transmission line developments in the same geographical area, which could lead to further cumulative impacts, cannot be meaningfully anticipated. It is however likely that further similar transmission line developments and associated transformation could take place within the local or broader area, over time.

- The local and broader region surrounding the proposed linear development area mainly constitutes a vast, continuous undeveloped natural landscape although extensive existing agricultural cultivation transformation is evident, along the local and broader length of the Orange River.
- An approximate 200 m corridor was assessed for the proposed transmission line route.

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.

## 5. Assessment Area

The proposed development will entail the formal construction of a 132 kV electrical transmission line of approximately 3.9 km in length and its associated access/service road. The proposed transmission line will mostly run parallel to an existing ESKOM line and will traverse the Orange River.

The transmission line servitude will not be holistically cleared of vegetation. Only the pylon locations will be cleared, while woody tree and shrub individuals of  $\geq 2.5$  m in height will be cut or removed, if found to be present directly underneath the proposed transmission line or within a 3 m radius of a pylon location. It will also be maintained as such, over time.

A narrow linear farm track of approximately 4 m in width, will be cleared of vegetation underneath and all along the proposed transmission line, for the proposed access/service road. It will also be maintained as such, over time.

The proposed linear development area will commence from the proposed 50 MW Photovoltaic (PV) solar power generation facility of the applicant, which is located on Portion 18 of the Farm Rooi Sand No. 387 (SG 21 Digit Code: C02800000000038700018) and will tie into the ESKOM grid/network at the existing Groblershoop high voltage substation, which is located on the Remaining Extent of the Farm Boegoebergnedersetting No. 48 (SG 21 Digit Code: C03600000000004800000).

The proposed linear development area is located approximately 1.5 km and 4 km north of the town of Groblershoop. The town forms part of the !Kheis Local Municipality which in turn, forms part of the ZF Mgqawu District Municipality, Northern Cape Province. Access to the assessment area is obtained by way of the N 8 national highway and subsequent dirt roads, from the east.

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



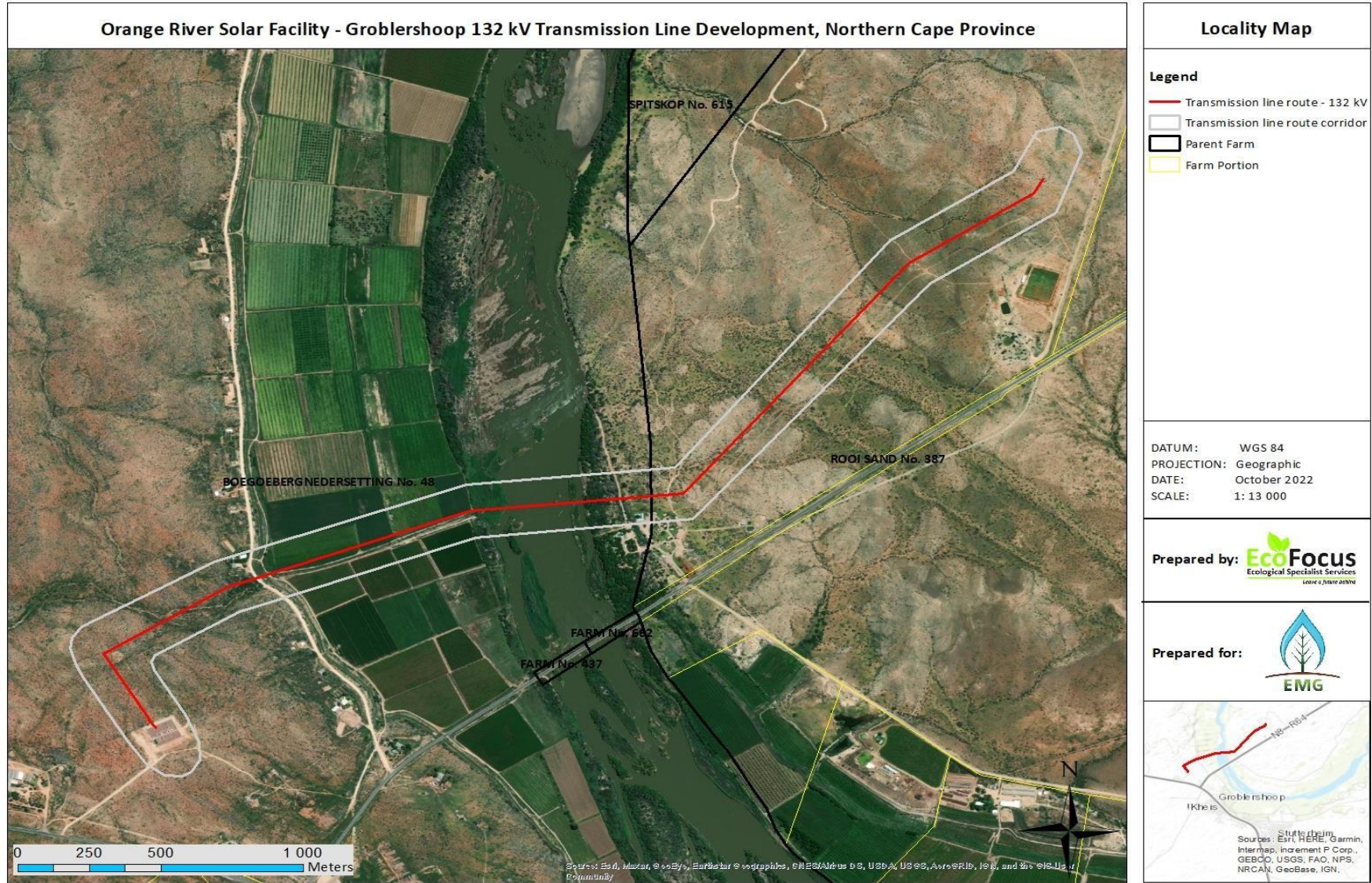


Figure 1: Locality map illustrating the proposed linear development area/electrical transmission line route

### 5.1. Climate

The rainfall of the region peaks during the summer months and the Mean Annual Precipitation (MAP) of the area is approximately 244 mm (www.climate-data.org). The maximum average monthly temperature is approximately 26.9°C in the summer months while the minimum average monthly temperature is approximately 9.8°C during the winter. Maximum daily temperatures can reach up to 34.6°C in the summer months and dip to as low as 1°C during the winter.

### 5.2. 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 majority of the proposed linear development area is mainly covered by recent alluvium and calcrete. Superficial deposits of the Kalahari Group are also present. Soils are mostly red-yellow apedal and free-draining, mainly of Ag and Ae land types.

The central portion of the proposed transmission line route which traverses the Orange River, is however covered by recent alluvial deposits from the river supporting soils forms such as Dundee and Oakleaf.

### 5.3. Vegetation Type and Conservation Status

#### Vegetation Type

According to SANBI (2006-2019), the majority of the proposed linear development area traverses the Bushmanland Arid Grassland vegetation type (NKb 3). This vegetation type mainly consists of extensive to irregular plains on a slightly sloping plateau sparsely vegetated by grassland and mostly dominated by white grasses such as *Stipagrostis* species (SANBI, 2006-2019). The vegetation type has the characteristics of semi desert (SANBI, 2006-2019).

The central portion of the proposed transmission line route which traverses the Orange River, however forms part of the Lower Gariep Alluvial vegetation type (AZa 3) (SANBI, 2006-2019). This vegetation type mainly consists of flat alluvial terraces and riverine islands, supporting a complex of riparian thickets, reed beds as well as flooded grasslands and herblands, which populate sandbanks and terraces along the length of the river (SANBI, 2006-2019).

Both of these vegetation types are classified as Least Concerned (SANBI, 2006-2019).

### **Aquatic Conservation Status**

The Northern Cape 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 Northern Cape Provincial Spatial Biodiversity Plan 2016 (NCPSBP).

The majority of the proposed linear development area falls within a Critical Biodiversity Area two (CBA 2), according to the Northern Cape Provincial Spatial Biodiversity Plan 2016 (NCPSBP). CBA 2 are areas that have been selected as the best option for meeting biodiversity targets based on complementarity, efficiency and/or avoidance of conflict with other land or resource uses (Collins, 2018).

The central portion of the proposed transmission line route which traverses the Orange River, however falls within a Critical Biodiversity Area one (CBA 1), according to the Northern Cape Provincial Spatial Biodiversity Plan 2016 (NCPSBP). 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).

From an aquatic perspective, the relevant CBA 1 & 2 are mainly associated with the important ecological corridor that runs along the Orange River.

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

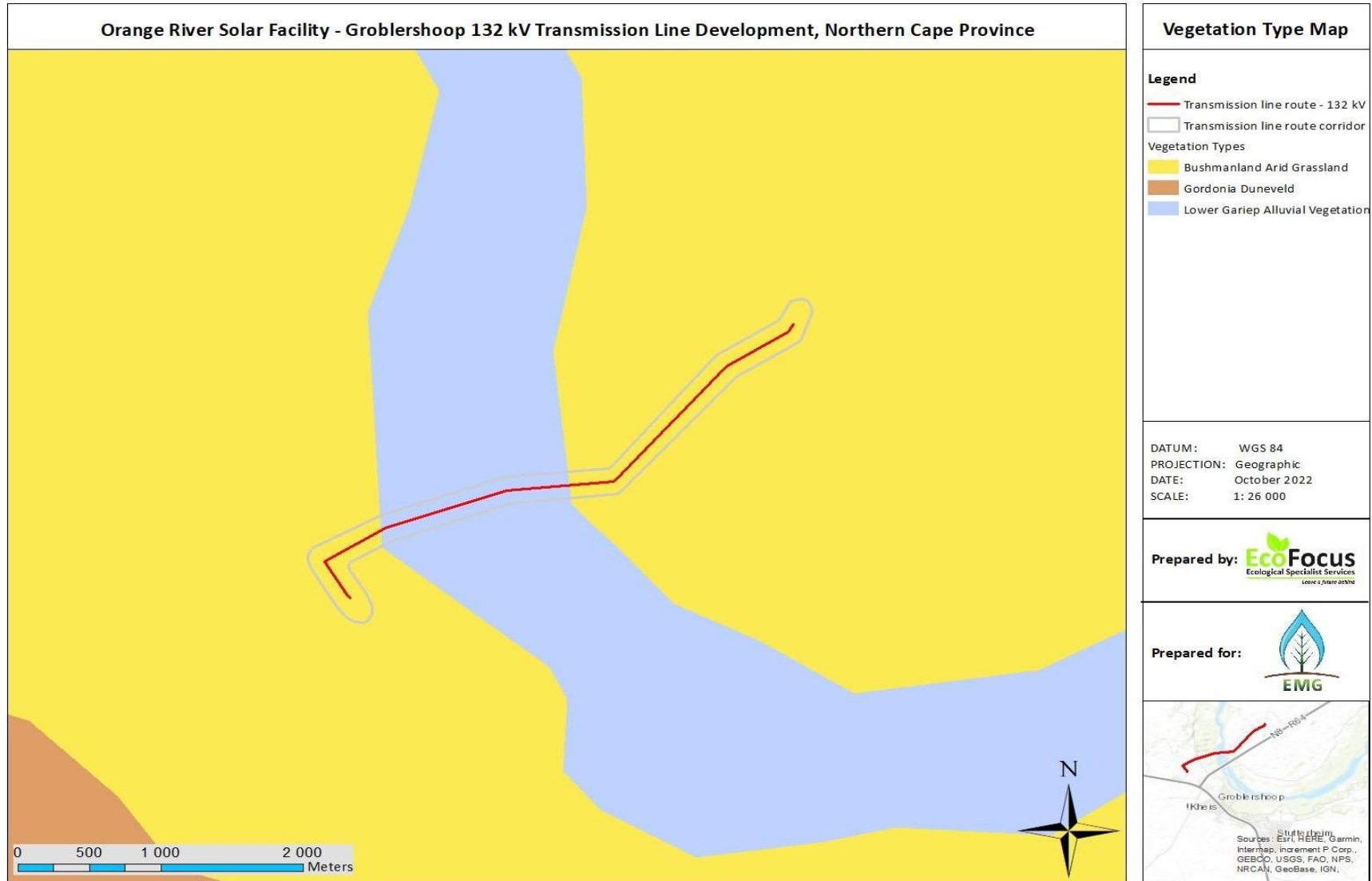


Figure 2: Vegetation type map illustrating the vegetation types associated with the proposed linear development area/electrical transmission line route



Figure 3: Conservation status map illustrating the conservation statuses/categories associated with the proposed linear development area/electrical transmission line route

## 6. Details of the Specialist

Adriaan Johannes Hendrikus Lamprecht (*Pr.Sci.Nat*)

M.Env.Sci. Ecological remediation and sustainable utilisation (NWU: Potchefstroom)

South African Council for Natural Scientific Professions (SACNASP): Professional Ecological Scientist  
(No 115601)

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Email Address: ajhlamprecht@gmail.com

## Abbreviated Curriculum Vitae

### Qualifications

- M.Env.Sci Ecological Remediation and Sustainable Utilisation/Vegetation Ecology
  - 2010 - North West University Potchefstroom
- B.Sc Botany and Zoology (Cum Laude)
  - 2008 - North West University Potchefstroom

### Accredited courses completed

- Implementing Environmental Management Systems ISO 14001
  - 2011 - North West University Potchefstroom
- Environmental Law for Environmental Managers
  - 2011 - North West University Potchefstroom
- SASS 5 Aquatic Biomonitoring Training Course
  - 2017 – GroundTruth Consulting

### Professional registrations

- South African Council for Natural Scientific Professions (**SACNASP**)
  - Professional Ecological Scientist Registration number 115601
- International Association for Impact Assessment (**IAIA**)
  - Registration number 5232
- South African Green Industries Council (**SAGIC**) Invasive Species training
  - Registration number 2405/2459
- South African Wetland Society (**SAWS**)
  - Membership number 220958

### Employment and Experience Background

Upon completion of his studies, Rikus started his career in 2011 as an **Environmental Professional in Training (PIT) at Anglo American Thermal Coal: Environmental Services**. He received environmental training and practical implementation experience in all environmental facets of the mining industry with the focus on: Environmental rehabilitation, land management (biodiversity and invasive species eradication), waste & water-, air quality-, game reserve-, environmental management and legislation, as well as corporate reporting. He was also appointed as the Biodiversity management custodian at Anglo American Thermal Coal collieries.

He was subsequently employed by **Fraser Alexander Tailings from October 2011 to the end of November 2015 as an Environmental Contracts Manager**, where he was responsible for the technical and operational management of all Fraser Alexander Tailings' mining environmental rehabilitation work. He was responsible for all facets of project management, as well as implementation of rehabilitation and environmental strategies, by planning activities, organising physical, financial and human resources, delegating task responsibilities, leading people, controlling risks and providing technical support.

He conducted a significant amount of quantitative and qualitative ecological vegetation monitoring during his employment period with the company. Such monitoring mainly included environmentally rehabilitated mining areas in the open-cast coal-, gold-, platinum- and chrome mining industries situated in the Free State, Gauteng, Mpumalanga, North West and Limpopo Provinces. He was involved with analysis, processing and interpretation of environmental monitoring data and compilation of high quality technical/scientific environmental monitoring reports for clients.

He was subsequently further involved with providing adequate ecological management and maintenance recommendations for rehabilitated areas. He also provided technical/scientific environmental rehabilitation support to mining clients, with regards to sufficient soil preparation and amelioration, grassing processes, as well as grass species mixtures and ratios.

He was then employed by **Enviroworks Consulting from January 2016 to the end of May 2017 as a Senior Ecological Specialist** where he was responsible for virtually all Ecological, Aquatic and Wetland specialist assessments and reporting related to Environmental Impact Assessment (EIA) and Basic Assessment (BA) projects. He also completed numerous EIA and BA projects as the main project Environmental Assessment Practitioner (EAP).

**Rikus then subsequently established the company EcoFocus Consulting (Pty) Ltd at the end of May 2017**, which provides high quality professional environmental and ecological specialist services and solutions to the industrial development-, construction-, mining-, agricultural and other sectors.

He possesses significant qualifications, vast knowledge, skills and practical experience in the specialist field of ecological and environmental management. This, coupled with his disciplined, determined and goal-driven approach, as well as his high level of personal standards, ensure high quality, timely and outcomes-based outputs and service delivery relating to any project.

#### **Ecological & Wetland Specialist Assessment & Report Completion for the last two years**

##### **2022**

- Aquatic Ecological Assessment for the proposed 178 ha A1 Groblershoop 50 MW PV Solar Plant Development, Northern Cape Province.
- Water Use License Application (WULA) Risk Assessment for the proposed 178 ha A1 Groblershoop 50 MW PV Solar Plant Development, Northern Cape Province.
- Proposed 14.3 ha North West Department of Education Ga-Maloka Primary School Expansion project in Ga-Maloka, North West Province.
- Aquatic Ecological Site Verification Report for the proposed 661 ha Khauta Solar PV Cluster Development, Riebeeckstad, Free State Province.
- Grazing and Invasive Species Assessment for the Farm Fourina No. 362 outside Fouriesburg, Free State Province.
- Desktop ecological assessment for the proposed 2.7 ha Muller Composting Abattoir and Composting Facility Development near Frankfort, Free State Province.
- Proposed 5.22 ha Equity Properties Midway Guesthouse Development in Bloemfontein, Free State Province.
- Proposed 1.5 ha Reeco Holdings (Pty) Ltd 15 Eco-villa Units Development near Ritchie, Northern Cape Province.



- Proposed 63.4 ha Kareeberg Local Municipality Carnarvon Residential Development, Northern Cape Province.
- Legal comments and responses for the Grazing and Invasive Species Assessment for the Farms Liebenbergsvlei No. 148 & Aasvogelkrans No. 96, outside Bethlehem, Free State Province.
- Legal comments and responses for the Grazing and Invasive Species Assessment for the Farm Erfenis No. 1014, outside Bethlehem, Free State Province.
- Proposed 16.8 ha Mafube Local Municipality Strasburg Mixed Land Use Development, Frankfort, Free State Province.
- Revision of the Basic Assessment process for a poultry broiler facility on the Farm Dwarsfontein 1 IQ, near Derby, North West Province.
- Aquatic Ecological Assessment for the proposed 101 ha 80 MW Khauta West Solar PV Facility Development, Riebeeckstad, Free State Province.
- Aquatic Ecological Assessment for the proposed 87 ha 50 MW Khauta e Nyane Solar PV Facility Development, Riebeeckstad, Free State Province.
- Aquatic Ecological Assessment for the proposed 168 ha 110 MW Khauta South Solar PV Facility Development, Riebeeckstad, Free State Province.
- Aquatic Ecological Assessment for the proposed 273 ha 165 MW Khauta North Solar PV Facility Development, Riebeeckstad, Free State Province.
- Proposed 224.4 MW Prieska Power Reserve Wind Power Facility Development outside Prieska, Northern Cape Province.
- Proposed 17.4 ha Dikgatlong Local Municipality Residential Development, Delportshoop, Northern Cape Province.
- Proposed 7.91 ha Dikgatlong Local Municipality Residential Development, Delportshoop, Northern Cape Province.
- Water Use License Application (WULA) Risk Assessment for the proposed 101 ha 80 MW Khauta West Solar PV Facility Development, Riebeeckstad, Free State Province.
- Water Use License Application (WULA) Risk Assessment for the proposed 87 ha 50 MW Khauta e Nyane Solar PV Facility Development, Riebeeckstad, Free State Province.
- Water Use License Application (WULA) Risk Assessment for the proposed 168 ha 110 MW Khauta South Solar PV Facility Development, Riebeeckstad, Free State Province.
- Water Use License Application (WULA) Risk Assessment for the proposed 273 ha 165 MW Khauta North Solar PV Facility Development, Riebeeckstad, Free State Province.
- Aquatic Ecological Assessment for the proposed 3000 m<sup>2</sup> Olympic Flame Filling Station Development, Welkom, Free State Province.

- Proposed 45.6 ha Farm Reliance No. 347 Agricultural Development, Griekwastad, Northern Cape Province.

## 2021

- Proposed 126.77 ha Orania Residential development project in Orania, Northern Cape Province.
- Grazing and Invasive Species Follow-up Assessment for the Farm Tweefontein no 3344, outside Newcastle, KwaZulu-Natal Province.
- Proposed 245.5 ha Kgatelopele Local Municipality Residential development project in Danielskuil, Northern Cape Province.
- Relocation of provincially protected plant species individuals for the proposed 30 ha Portion 30 of the Farm Lilyvale no 2313 Residential development project in Bloemfontein, Free State Province.
- Proposed 0.5 ha Mduwelanga Projects Agricultural development project outside Paul Roux, Free State Province.
- Proposed Moledi Gorge Watercourse Weir NEMA Section 24G development outside Derby, North West Province.
- Revision of a proposed 135 ha Farm Zulani no 167 agricultural development project outside Douglas, Northern Cape Province.
- Grazing and Invasive Species Assessment for the Farm Kuilenburg no 241, outside Reitz, Free State Province.
- Revision of the Biodiversity Offset Feasibility Report for a proposed 385 ha Idstone Farming agricultural development projects outside Douglas, Northern Cape Province.
- Erosion and Invasive Species Assessment for the Farms Nebo A no 957, Tevrede no 1088, Sarona no 1089 & Uitkyk no 1119, outside Reitz, Free State Province.
- Proposed 267.2 ha Tswaing Local Municipality residential development project in Ottosdal, North West Province.
- Proposed 10.2 ha PepsiCo Inc residential development project in Marchand, Northern Cape Province.
- Proposed 182 ha Farm Selosesha no 900 mixed land use development project in Thaba Nchu, Free State Province.
- Water Use License Application (WULA) Risk Assessment for a proposed 182 ha Farm Selosesha no 900 mixed land use development project in Thaba Nchu, Free State Province.

- Proposed 3.5 ha Itau Milling NEMA Section 24G Solar Power Development project in Bloemfontein, Free State Province.
- Grazing and Invasive Species Assessment for the Farm Brakfontein no 244, outside Verkykerskop, Free State Province.
- Wetland/watercourse Assessment for the proposed 250 ha Subsolar Energy Serurubele Solar Development project near Bloemfontein, Free State Province.
- Water Use License Application (WULA) Risk Assessment for a proposed 250 ha Subsolar Energy Serurubele Solar Development project near Bloemfontein, Free State Province.
- Wetland/watercourse Assessment for the proposed 171 ha Subsolar Energy Sonneblom Solar Development project near Bloemfontein, Free State Province.
- Water Use License Application (WULA) Risk Assessment for a proposed 171 ha Subsolar Energy Sonneblom Solar Development project near Bloemfontein, Free State Province.
- Proposed 13.6 ha Haldon Estate development project in Bloemfontein, Free State Province.
- Wetland/watercourse Assessment for the proposed 200 ha Subsolar Energy Delta Solar Development project near Bloemhof, North West Province.
- Water Use License Application (WULA) Risk Assessment for a proposed 200 ha Subsolar Energy Delta Solar Development project near Bloemhof, North West Province.
- Water Use License Application (WULA) Specialist Opinion and Recommendation Letter for the proposed three Subsolar Energy Solar Development projects.
- Grazing and Invasive Species Follow-up Assessment for the Farm Waterval West no 653, outside Steynsrus, Free State Province.
- Proposed 25 ha Letsemeng Local Municipality landfill site development project in Luckhof, Free State Province.
- *Vachellia erioloba* Counting Report for the proposed 286 ha Subsolar Energy Gamma Solar Development project near Vryburg, North West Province.
- *Vachellia erioloba* Counting Report for the proposed 243 ha Subsolar Energy Khubu Solar Development project near Vryburg, North West Province.
- *Vachellia erioloba* Counting Report for the proposed 224 ha Subsolar Energy Protea Solar Development project near Vryburg, North West Province.
- *Vachellia erioloba* Counting Report for the proposed 262 ha Subsolar Energy Impala Solar Development project near Vryburg, North West Province.
- *Vachellia erioloba* Counting Report for the proposed 265 ha Subsolar Energy Sonbesie Solar Development project near Vryburg, North West Province.

- Ecological site suitability assessments for three potential 583 ha, 300 ha and 227 ha Alt-e Developments Herbert Phase 2 Solar Power Facility development projects near Douglas, Northern Cape Province.
- Proposed 113 ha Danrika Boerdery Edms BPK Vineyard Development project near Prieska, Northern Cape Province.
- Water Use License Application (WULA) Risk Assessment for a proposed 120 ha Northern Cape Department Agriculture Agricultural Development outside Hopetown, Northern Cape Province.
- Ecological Rehabilitation and Alien Invasive Species Management Plan for a proposed 120 ha Northern Cape Department Agriculture Agricultural Development outside Hopetown, Northern Cape Province.
- Protected Plant Species Management Plan for a proposed 120 ha Northern Cape Department Agriculture Agricultural Development outside Hopetown, Northern Cape Province.
- Ecological Stormwater and Erosion Management Plan for a proposed 120 ha Northern Cape Department Agriculture Agricultural Development outside Hopetown, Northern Cape Province.
- GIS Master Layout Plan for a proposed 120 ha Northern Cape Department Agriculture Agricultural Development outside Hopetown, Northern Cape Province.
- Grazing and Invasive Species Follow-up Assessment for the Farm Klipfontein No 71 outside Lindley, Free State Province.
- Proposed 384.3 ha Prieska Power Reserve Solar Power Facility Development outside Prieska, Northern Cape Province.
- Aquatic Ecological Assessment for the proposed Farm Bullhoek Chicken Layer Houses and Evaporation Ponds Expansion near Swartruggens, North West Province.
- Water Use License Application (WULA) Risk Assessment for the proposed Farm Bullhoek Chicken Layer Houses and Evaporation Ponds Expansion near Swartruggens, North West Province.
- Grazing and Invasive Species Assessment for the Farm Kleine Fontein No 1160 outside Bergville, KwaZulu-Natal Province.
- Proposed 1.37 km Mantsopa Local Municipality Water Pipeline Development in Ladybrand, Free State Province.
- Water Use License Application (WULA) Risk Assessment for the proposed 1.37 km Mantsopa Local Municipality Water Pipeline Development in Ladybrand, Free State Province.

- Grazing and Invasive Species Assessment for the Farm Elizabeth No 220 outside Bethlehem, Free State Province.
- Grazing and Invasive Species Follow-up Assessment for the Farm Retiefs Nek No 123 outside Bethlehem, Free State Province.
- Grazing and Invasive Species Follow-up Assessment for the Farm Brakfontein No 244, outside Verkykerskop, Free State Province.
- Proposed 107.8 ha Danrika Boerdery Edms BPK NEMA Section 24G Development project near Prieska, Northern Cape Province.

## 2020

- Proposed 120 ha Northern Cape Department Agriculture Hopetown Agricultural Development outside Hopetown, Northern Cape Province.
- Proposed 3.27 ha Lynette Brand Ritchie NEMA Section 24G river lodge development project in Ritchie, Northern Cape Province.
- Water Use License Application (WULA) Risk Assessment for a proposed 3.27 ha Lynette Brand Ritchie NEMA Section 24G river lodge development project in Ritchie, Northern Cape Province.
- Rehabilitation and Alien Invasive Species Management Plan for a proposed 3.27 ha Lynette Brand Ritchie NEMA Section 24G river lodge development project in Ritchie, Northern Cape Province.
- Protected Species Relocation Management Plan for a proposed 3.27 ha Lynette Brand Ritchie NEMA Section 24G river lodge development project in Ritchie, Northern Cape Province.
- Stormwater Management Plan for a proposed 3.27 ha Lynette Brand Ritchie NEMA Section 24G river lodge development project in Ritchie, Northern Cape Province.
- GIS Master Layout Plan for a proposed 3.27 ha Lynette Brand Ritchie NEMA Section 24G river lodge development project in Ritchie, Northern Cape Province.
- Preliminary Ecological Specialist Findings and Opinion Letter for the proposed 294 ha Northern Cape Department Agriculture Bucklands Agricultural Development, Douglas Northern Cape Province.
- Proposed 1.58 km Dihlabeng Local Municipality Sewer Bridge and Pipeline Development, Paul Roux, Free State Province.
- Water Use License Application (WULA) Risk Assessment for a proposed 1.58 km Dihlabeng Local Municipality Sewer Bridge and Pipeline Development, Paul Roux, Free State Province.

- Rehabilitation and Alien Invasive Species Management Plan for a proposed 1.58 km Dihlabeng Local Municipality Sewer Bridge and Pipeline Development, Paul Roux, Free State Province.
- Proposed 2064 ha Free State Strategic Solar Project Development outside Bethulie, Free State Province.
- Proposed 7.83 ha Carpe Diem Raisins NEMA Section 24G Evaporation Pond Development project outside Upington, Northern Cape Province.
- Water Use License Application (WULA) Risk Assessment for a proposed 7.83 ha Carpe Diem Raisins NEMA Section 24G Evaporation Pond Development project outside Upington, Northern Cape Province.
- Desktop Protected Species and Alien Invasive Species Management Plan for a proposed Northern Cape N 8 & N 10 highway maintenance project between Britstown, Prieska, Groblershoop and Upington, Northern Cape Province.
- Proposed 10.7 ha Dikgatlong Local Municipality NEMA Section 24G residential development in Barkly West, Northern Cape Province.
- Erosion and Rehabilitation Monitoring Report for the Farms Die Kranse no 1174 and De Rotsen no 52 outside Vrede, Free State Province.
- Grazing and Invasive Species Management Plan for the Farm Tweefontein no 3344, outside Newcastle, KwaZulu-Natal Province.
- Grazing and Invasive Species Management Plan for the Farm Malpha Noord no 1063, outside Senekal, Free State Province.
- Grazing and Invasive Species Management Plan for the Farm Mizpah no 706, outside Memel, Free State Province.
- Grazing and Invasive Species Management Plan for the Farm Welgelegen no 102, outside Clarens, Free State Province.
- Proposed 123 ha Slovo Park Residential development project in Brandfort, Free State Province.
- Proposed 2.43 ha Zeekoefontein Resort development project in Vaal Oewer, Gauteng Province.
- Grazing and Invasive Species Assessment for the Farm De Hoek no 1238, outside Bethlehem, Free State Province.
- Proposed 236 ha Northern Cape Department Agriculture Bucklands Agricultural Development outside Douglas, Northern Cape Province.
- Proposed 9.1 ha Motheo College Expansion NEMA Section 24G development in Bloemfontein, Free State Province.

- Proposed 84.7 ha Sol Plaatje Local Municipality Residential development project in Kimberley, Northern Cape Province.
- Proposed 201 ha Siyathemba Local Municipality Residential development project in Prieska, Northern Cape Province.
- Proposed 60.2 ha Siyancuma Local Municipality Residential development project in Douglas, Northern Cape Province.
- Proposed 58.9 ha Maremane Communal Property Association Residential development project in Maremane, Northern Cape Province.
- Proposed 15 ha Maketshemo Trading Filling Station and Truckstop development project in Winburg, Free State Province.
- Rehabilitation and Alien Invasive Species Management Plan for the Moledi Gorge Watercourse Weir decommissioning outside Derby, North West Province.
- GIS Master Layout Plan for a proposed 35 ha Gladium Boerdery Familietrust NEMA Section 24G agricultural development project outside Niekerkshoop, Northern Cape Province.
- Proposed 46.5 ha Siyathemba Local Municipality Residential development project in Niekerkshoop, Northern Cape Province.
- Proposed 475 m Setsoto Local Municipality Pipeline development and water treatment works upgrade project in Clocolan, Free State Province.

## 7. 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 proposed linear development area or the approximate 200 m corridor surrounding the proposed transmission line route.
  - The delineations do not include formal 1:100-year floodline calculations, as this is deemed to be an engineering function.
- Describe the vegetation within the identified watercourses/wetlands and/or aquatic features/habitats and identify and list conservationally significant aquatic species encountered.
  - List any nationally- and/or provincially protected- and/or Red Data Listed aquatic species.
- Assess and discuss the Present Ecological State (PES) of the identified watercourses/wetlands and/or aquatic features/habitats, in order to provide an indication of their current ecological condition as well as the extent and severity of degradation and/or transformation, if applicable.
- 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 proposed linear development area, for development purposes.
- A digital report (this document) as well as digital .KML files are also 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 proposed linear development area or the approximate 200 m corridor surrounding the proposed transmission line route.



## 8. Methodology

- The proposed linear development area and the approximate 200 m corridor surrounding the proposed transmission line route, were assessed on foot.
- 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 aquatic species present.
- Identified aquatic 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 Northern Cape Nature Conservation Act (Act No. 9 of 2009).
- Any significant watercourses/wetlands and/or other ecologically sensitive/conservationally significant aquatic features/habitats which were found to be present within the proposed linear development area and the approximate 200 m corridor surrounding the proposed transmission line route, were identified, delineated and discussed as per the accepted 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 aquatic species if encountered. This was done in order to indicate their specific locations in a Geographic Information System (GIS) mapping format.

The **Present Ecological State (PES)** of the identified watercourses/wetlands and/or aquatic features/habitats, was determined and discussed as per the table below.

- The Present Ecological State (PES) refers to the current state or condition of an area in terms of all its characteristics and reflects the change to the area from its reference condition. The value gives an indication of the alterations that have occurred in the ecosystem.

**Table 1: Criteria for PES calculations**

Ecological Category	Score	Description
<b>A</b>	> 90-100%	<b>Unmodified</b> , natural and pristine.
<b>B</b>	> 80-90%	<b>Largely natural</b> . A small change in natural habitats and biota may have taken place but the ecosystem functionality has remained essentially unchanged.
<b>C</b>	> 60-80%	<b>Moderately modified</b> . Moderate loss and transformation of natural habitat and biota have occurred, but the basic ecosystem functionality has still remained predominantly unchanged.
<b>D</b>	> 40-60%	<b>Largely modified</b> . A significant loss of natural habitat, biota and subsequent basic ecosystem functionality has occurred.
<b>E</b>	> 20-40%	<b>Seriously modified</b> . The loss of natural habitat, biota and basic ecosystem functionality is extensive.
<b>F</b>	0-20%	<b>Critically/Extremely modified</b> . Transformation has reached a critical level and the ecosystem has been modified completely with a virtually complete loss of natural habitat and biota. The basic ecosystem functionality has virtually been destroyed and the transformation is irreversible.

The **Ecological Importance and Sensitivity (EIS)** of the identified watercourses/wetlands and/or aquatic features/habitats, was determined 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 2: Criteria for EIS calculations**

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

Potential aquatic ecological impacts posed by the proposed development to the local aquatic ecosystem and -ecology, were identified, evaluated, rated and discussed as per the methodology described below. The tables below indicate and explain the methodology and criteria used for the evaluation of the Environmental Risk Ratings as well as the calculation of the final Environmental Significance Ratings of the identified potential aquatic ecological impacts. Each identified potential aquatic ecological impact is scored for each of the Evaluation Components, as per the table below.

**Table 3: Scale utilised for the evaluation of the Environmental Risk Ratings**

Evaluation Component	Rating Scale and Description/Criteria
Magnitude of Negative or Positive Impact	<p><b>10 - Very high:</b> Bio-physical features and/or ecological functionality/processes may be severely impacted upon.</p> <p><b>8 - High:</b> Bio-physical features and/or ecological functionality/processes may be significantly impacted upon.</p> <p><b>6 - Medium:</b> Bio-physical features and/or ecological functionality/processes may be moderately impacted upon.</p> <p><b>4 - Low:</b> Bio-physical features and/or ecological functionality/processes may be slightly impacted upon.</p> <p><b>2 - Very Low:</b> Bio-physical features and/or ecological functionality/processes may be slightly impacted upon.</p> <p><b>0 - Zero:</b> Bio-physical features and/or ecological functionality/processes will not be impacted upon.</p>
Duration of Negative or Positive Impact	<p><b>5 – Permanent:</b> Impact will continue on a permanent basis.</p> <p><b>4 - Long term:</b> Impact should cease a period (&gt; 40 years) after the operational phase/project life of the activity.</p> <p><b>3 - Medium term:</b> Impact may occur for the period of the operational phase/project life of the activity.</p> <p><b>2 - Short term:</b> Impact may only occur during the construction phase of the activity after which it will cease.</p> <p><b>1 - Immediate:</b> Impact may only occur as a once off during the construction phase of the activity.</p>
Extent of Positive or Negative Impact	<p><b>5 - International:</b> Impact will extend beyond National boundaries.</p> <p><b>4 - National:</b> Impact will extend beyond Provincial boundaries but remain within National boundaries.</p> <p><b>3 - Regional:</b> Impact will extend beyond 5 km of the development footprint but remain within Provincial boundaries.</p> <p><b>2 - Local:</b> Impact will not extend beyond 5 km of the development footprint.</p> <p><b>1 - Site-specific:</b> Impact will only occur on or within 200 m of the development footprint.</p> <p><b>0 – No impact.</b></p>
Irreplaceability of Natural Resources being impacted upon	<p><b>5 – Definite</b> loss of irreplaceable natural resources.</p> <p><b>4 – High</b> potential for loss of irreplaceable natural resources.</p> <p><b>3 – Moderate</b> potential for loss of irreplaceable natural resources.</p> <p><b>2 – Low</b> potential for loss of irreplaceable natural resources.</p> <p><b>1 – Very low</b> potential for loss of irreplaceable natural resources.</p> <p><b>0 – No impact.</b></p>

<b>Reversibility of Impact</b>	<p><b>5</b> – Impact <b>cannot</b> be reversed.</p> <p><b>4</b> – <b>Low</b> potential that impact may be reversed.</p> <p><b>3</b> – <b>Moderate</b> potential that impact may be reversed.</p> <p><b>2</b> – <b>High</b> potential that impact may be reversed.</p> <p><b>1</b> – Impact <b>will be</b> reversible.</p> <p><b>0</b> – No impact.</p>
<b>Probability of Impact Occurrence</b>	<p><b>5 - Definite:</b> Probability of impact occurring is &gt; 95 %.</p> <p><b>4 - High:</b> Probability of impact occurring is &gt; 75 %.</p> <p><b>3 - Medium:</b> Probability of impact occurring is between 25 % - 75 %.</p> <p><b>2 - Low:</b> Probability of impact occurring is between 5 % - 25 %.</p> <p><b>1 - Improbable:</b> Probability of impact occurring is &lt; 5 %.</p>
<b>Cumulative Impact</b>	<p><b>High:</b> Numerous similar historic, present or future development activities in the same geographical area, have taken or are anticipated to take place which may cumulatively contribute and increase the significance of the identified impacts.</p> <p><b>Medium:</b> Few similar historic, present or future development activities in the same geographical area, have taken or are anticipated to take place which may cumulatively contribute and increase the significance of the identified impacts.</p> <p><b>Low:</b> Virtually no similar historic, present or future development activities in the same geographical area, have taken or are anticipated to take place which may cumulatively contribute and increase the significance of the identified impacts. The development is anticipated to be an isolated occurrence and should therefore have a negligible cumulative impact.</p> <p><b>None:</b> No cumulative impact.</p>

Once the Environmental Risk Ratings have been evaluated for each identified potential aquatic ecological impact, the Significance Score of each impact is calculated by using the following formula:

- **SS (Significance Score) = (magnitude + duration + extent + irreplaceable + reversibility) x probability.**
- **The maximum Significance Score value is 150.**

The Significance Score is then used to rate the Environmental Significance of each identified potential aquatic ecological impact, as per Table 4 below. The Environmental Significance rating process is completed for all identified potential aquatic ecological impacts for the construction- and subsequent operational phases of the proposed development, both before and after implementation of the recommended mitigation measures.

**Table 4: Scale used for the evaluation of the Environmental Significance Ratings**

Environmental Significance Score	Environmental Significance Rating	Description/Criteria
125 – 150	Very High	An impact of very high significance after mitigation will mean that the development may not take place. The impact cannot be suitably reduced and mitigated to within acceptable levels.
100 – 124	High	An impact of high significance after mitigation should influence a decision about whether or not to proceed with the development. Additional, impact-specific mitigation measures must be implemented if the continuation of the development is to be considered.
75 – 99	Medium-High	Additional, impact-specific mitigation measures must be implemented for an impact of medium-high significance if the continuation of the development is to be considered.
50 – 74	Medium	An impact of medium significance after mitigation must be adequately managed in accordance with the mitigation measures provided by the specialist.
< 50	Low	If any mitigation measures are provided by the specialist for an impact of low significance after mitigation, the impact must be adequately managed in accordance with these measures.
+	Positive impact	A positive impact is likely to result in a beneficial consequence/effect and should therefore be viewed as a motivation for the development to proceed.

## 9. Results and Discussion

### 9.1. Proposed Development Area Clearance

The proposed development will entail the formal construction of a 132 kV electrical transmission line of approximately 3.9 km in length and its associated access/service road. The proposed transmission line will mostly run parallel to an existing Eskom line and will traverse the Orange River.

The proposed transmission line route mainly constitutes an undeveloped relatively natural landscape, although it will also traverse a portion of existing cultivated agricultural lands situated directly adjacent west of the Orange River.

The transmission line servitude will not be holistically cleared of vegetation. Only the pylon locations will be cleared, while woody tree and shrub individuals of  $\geq 2.5$  m in height will be cut or removed, if found to be present directly underneath the proposed transmission line or within a 3 m radius of a pylon location. It will also be maintained as such, over time.

A narrow linear farm track of approximately 4 m in width, will be cleared of vegetation underneath and all along the proposed transmission line, for the proposed access/service road. It will also be maintained as such, over time.

The mechanical clearance associated with the proposed development, will in all probability completely transform the majority of the existing surface vegetation within the narrow proposed linear development area. The size of the proposed linear development area is however negligible relative to the surrounding vast, continuous undeveloped natural landscape.

**Vegetation clearance must be restricted to the pylon locations and the narrow linear route of the proposed transmission line access/service road, as far as practicably possible.**



## 9.2. Water Catchment and Drainage Information

The proposed transmission line route falls within the Lower Orange Water Management Area (WMA 14) and the associated D73D quaternary surface water catchment- and drainage area.

## 9.3. Watercourse Baseline Information

The majority of the proposed transmission line route consists of a moderate to steeply sloping and undulating landscape and small hills. The proposed transmission line will therefore traverse numerous significant ephemeral watercourses and small preferential water flow paths/drainage lines, along its route. Virtually all of these watercourses and flow paths/drainage lines are situated on the eastern side of the Orange River and flow in a westerly direction, towards the river. A single significant ephemeral watercourse and a small preferential water flow path/drainage line are however also present on the western side of the Orange River, which flow in an easterly direction towards the river.

The central portion of the proposed transmission line route will traverse the Orange River, which flows in a north-westerly direction. The following baseline watercourse information and categorisation is applicable to the specific portion of the Orange River, which will be traversed by the proposed transmission line, according to the latest South African National Biodiversity Assessment of 2018 (Van Deventer et al., 2019):

• River order	=	Sixth-order river; ninth-order watercourse
• Mainstem	=	1 (quaternary mainstem)
• Flow	=	Permanent/perennial
• Geomorphic zone	=	Lowland river
• River condition	=	Moderately Modified
• Present Ecological State (PES), 2018	=	Class D (Largely 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 Orange River forms an important part of the local and broader quaternary surface water catchment- and drainage area, towards the north-west. The 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.

The portion of the Orange River which will be traversed by the proposed transmission line, possesses a distinct natural riparian zone with a well-defined high density woody tree and shrub thicket along the eastern bank. This thicket is mainly dominated by the species *Searsia leptodictya*, *Vachellia karroo* and the legally declared alien invasive species *Eucalyptus spp.* (Category 1b in riparian areas). The woody species *Salix mucronata*, *Searsia pendulina*, *Gymnosporia buxifolia* and the legally declared alien invasive species *Prosopis glandulosa* (Category 3 in the Northern Cape Province), were also found to be well-represented.

A further portion of thicket is present directly adjacent east of the natural riparian zone of the Orange River. This portion is however overwhelmingly dominated by the legally declared alien invasive species *Eucalyptus spp.* (Category 1b in riparian areas) and *Prosopis glandulosa* (Category 3 in the Northern Cape Province) and is therefore viewed as being transformed and not forming part of the natural riparian zone.

**It is recommended that all individuals of these identified alien invasive species must be actively eradicated from the Orange River riparian zone, in accordance with the requirements of the National Environmental Management: Biodiversity Act (Act 10 of 2004); Alien and Invasive Species Regulations, 2014. Removed materials must also be adequately and lawfully disposed of, in order to prevent potential further spreading/dispersal.**

The riparian zone along the western bank of the portion of the Orange River to be traversed by the proposed transmission line, has been significantly transformed by the existing cultivated agricultural lands (see under heading 9.1). The remaining riparian zone does not possess a well-defined woody tree or shrub thicket, but rather constitutes a broad reed bed, which is mainly dominated by the hydrophytic graminoids species *Phragmites australis* and *Cyperus spp.*

The proposed transmission line route does not fall within any Important Bird Areas (IBA) as per the latest IBA map obtained from the Birdlife SA website (<https://www.birdlife.org.za/what-we-do/important-bird-and-biodiversity-areas/media-and-resources/#1553597171790-6f83422a-a731>). No conservationally significant or important waterbird species/nests or locally distinct avifaunal habitats were observed along the proposed transmission line route, during the site assessment or are expected to specifically utilise the proposed transmission line route as refuge or for breeding, foraging and/or persistence purposes. Only common local resident bird species/nests were observed in the local area.

Although this is the case, the high woody- and reed densities associated with the Orange River riparian zone highly likely provide important refuge and locally distinct habitat for common and habitat-specific waterbird-, amphibian-, small antelope- as well as other mammalian species. The riparian zone is therefore viewed as being of moderate to high conservational significance/value, from an aquatic ecological perspective.

**It is recommended that no pylons may be constructed within the Orange River riparian zone. This must be done in order to prevent significant disturbance of the riparian zone and its associated conservationally important and locally distinct faunal habitat and to subsequently maintain/ensure the ecological functionality and -integrity of the riparian zone, over time.**

**It is recommended that the pylons on the eastern and western sides of the Orange River to cross the river, be placed parallel with the existing pylon locations of the existing ESKOM line, as these have been constructed a suitable distance away from the riparian zone.**

**It is furthermore recommended that the transmission line be suspended as high as practicably possible across the Orange River and that adequate bird deflecting/deviation technologies be implemented along the transmission line. This must be done in order to attempt to prevent significant collision- and mortality risks to waterbirds and other avifauna that utilise the river.**

**Disturbed areas within and immediately surrounding the proposed Orange River crossing, must be adequately rehabilitated concurrently with the construction processes. A Rehabilitation Management Plan must be compiled by a suitably qualified and experienced ecologist.**

**An adequate Stormwater and Erosion Management Plan must also be implemented during the construction- and operational phases of the proposed development, in order to assist with and allow for continued flow within the local catchment. This must be done to sufficiently manage storm water runoff and clean/dirty water separation in order to attempt to maintain/ensure the ecological functionality and -integrity of the local and broader quaternary surface water catchment- and drainage area.**

A Water Use License Application (WULA) must furthermore be submitted to the Department of Water and Sanitation (DWS), to request authorisation for the proposed development across the Orange River associated with the proposed transmission line route, in accordance with the National Water Act (Act 36 of 1998).

It is the opinion of the specialist that the recommended mitigation measures should be sufficient in preventing any potentially significant disturbance of the faunal and avifaunal habitats associated with the Orange River riparian zone. It is therefore not anticipated that the proposed development should pose any significant risk to the continued aquatic ecological or hydrological functionality and -integrity of the Orange River or associated quaternary surface water catchment- and drainage area.

From an aquatic ecological perspective, it is the opinion of the specialist that the proposed development does not warrant the requirement of a Biodiversity Offset area to be identified or assessed, for the proposed transformation of the relevant CBA 1 & 2, as part of the NEMA mitigation hierarchy. The Northern Cape Department: Agriculture, Environmental Affairs, Rural Development and Land Reform must however provide a final decision in this regard.



Figure 4: Image illustrating the distinct natural riparian zone associated with the eastern bank of the portion of the Orange River which will be traversed by the proposed transmission line; the well-defined high density woody tree and shrub thicket is also evident (red arrow indicates the water flow direction)



**Figure 5: Image illustrating the distinct natural riparian zone associated with the western bank of the portion of the Orange River which will be traversed by the proposed transmission line; the broad reed bed is also evident (red arrow indicates the water flow direction)**

#### 9.4. Significant Watercourses

##### 9.4.1. Aquatic Feature Description and Current Existing Vegetation

The proposed transmission line will respectively traverse a single (1) and three (3) significant first- and second-order ephemeral watercourses on the western and eastern sides of the Orange River. These watercourses constitute the main surface water flow paths of the small local catchment towards the river. From a hydrological perspective, the watercourses therefore form an important part of the local surface water catchment and drainage.

Due to the lack of continuous water flow through the local area, the watercourses do not possess any distinct riparian zones or significant variations in vegetation species composition or -structure, relative to the surrounding terrestrial landscape. A significant increase in densities of the woody shrub species *Senegalia mellifera* and *Phaeoptilum spinosum* and to a lesser extent, *Ziziphus mucronata* is however evident within- and along the edges of the watercourses, relative to the surrounding terrestrial landscape.

The single significant ephemeral watercourse situated on the western side of the Orange River, is however significantly/densely infested with the legally declared alien invasive species *Prosopis glandulosa* (Category 3 in the Northern Cape Province). This watercourse flows into an artificially constructed channel, which traverses the existing cultivated agricultural lands (see under heading 9.1) and eventually discharges into the river.

**It is recommended that all individuals of this identified alien invasive species must be actively eradicated from the relevant watercourse, in accordance with the requirements of the National Environmental Management: Biodiversity Act (Act 10 of 2004); Alien and Invasive Species Regulations, 2014. Removed materials must also be adequately and lawfully disposed of, in order to prevent potential further spreading/dispersal.**

Although the proposed transmission line route does not fall within any Important Bird Areas (IBA) (see under heading 9.3), the increased woody densities associated with the watercourses potentially provide important refuge and locally distinct habitat for common and habitat-specific bird-, reptilian-, small antelope- as well as other mammalian species. The watercourses are therefore viewed as being of low to moderate conservational significance/value, from a semi-aquatic ecological perspective.

**It is recommended that no pylons may be constructed inside- or within 35 m of any significant watercourse. The development design layouts of the proposed transmission line must allow for continued flow through the watercourses. This must be done in order to maintain/ensure their ecological functionality and -integrity over time.**

**It is recommended that the pylons be placed parallel with the existing pylon locations of the existing Eskom line, as far as practicably possible, as these have been constructed a suitable distance away from the watercourses.**

**Disturbed areas within and immediately surrounding the proposed watercourse crossings, must be adequately rehabilitated concurrently with the construction processes. A Rehabilitation Management Plan must be compiled by a suitably qualified and experienced ecologist.**

**An adequate Stormwater and Erosion Management Plan must also be implemented during the construction- and operational phases of the proposed development, in order to assist with and allow for continued flow within the local catchment. This must be done to sufficiently manage storm water runoff and clean/dirty water separation in order to attempt to maintain/ensure the ecological functionality and -integrity of the local and broader quaternary surface water catchment- and drainage area.**

**A Water Use License Application (WULA) must furthermore be submitted to the Department of Water and Sanitation (DWS), to request authorisation for the proposed development through the four (4) watercourse crossings associated with the proposed transmission line route, in accordance with the National Water Act (Act 36 of 1998).**

**It is the opinion of the specialist that the recommended mitigation measures should be sufficient in preventing any potentially significant disturbance of the identified watercourses. It is therefore not anticipated that the proposed development should significantly or continuously impede or impact on the flow regimes of the identified watercourses.**



Figure 6: Two images illustrating examples of the four (4) significant first- and second-order ephemeral watercourses, which will be traversed by the proposed transmission line; the moderate to high densities of woody shrub species are also evident, within- and along the edges of the watercourses (red arrows indicate the water flow directions)





Figure 7: Image illustrating the significant/dense infestation of the legally declared alien invasive species *Prosopis glandulosa* (Category 3 in the Northern Cape Province), throughout the single significant ephemeral watercourse situated on the western side of the Orange River (red arrow indicates the water flow direction)



Figure 8: Image illustrating the artificially constructed channel, which traverses the existing cultivated agricultural lands and eventually discharges into the Orange River (red arrow indicates the water flow direction)

## 9.4.2. Present Ecological State (PES) and Ecological Importance and Sensitivity (EIS)

**Present Ecological State (PES)****Table 5: PES table for the significant watercourses (0-5 indicates decrease in significance)**

Criteria & Attributes	Relevance	Score	Reasoning
Flow Modification	Consequence of abstraction, regulation by impoundments or increased runoff from human settlements or agricultural land. Changes in flow regime, volumes, velocity which affect inundation of wetland habitats resulting in floristic changes or incorrect cues to biota.	5/3	<p>The proposed transmission line route mainly constitutes an undeveloped relatively natural landscape, although it will also traverse a portion of existing cultivated agricultural lands situated directly adjacent west of the Orange River.</p> <p>The proposed transmission line will respectively traverse a single (1) and three (3) significant first- and second-order ephemeral watercourses on the western and eastern sides of the Orange River. These watercourses constitute the main surface water flow paths of the small local catchment towards the river. From a hydrological perspective, the watercourses therefore form an important part of the local surface water catchment and drainage.</p> <p>The single significant ephemeral watercourse situated on the western side of the Orange River, flows into an artificially constructed channel, which traverses the existing cultivated agricultural lands and eventually discharges into the river.</p>

Canalisation	Results in desiccation or changes to inundation patterns of wetland and thus changes in habitats. River diversions or drainage.	5/3	<p>The proposed transmission line route mainly constitutes an undeveloped relatively natural landscape, although it will also traverse a portion of existing cultivated agricultural lands situated directly adjacent west of the Orange River.</p> <p>The proposed transmission line will respectively traverse a single (1) and three (3) significant first- and second-order ephemeral watercourses on the western and eastern sides of the Orange River. These watercourses constitute the main surface water flow paths of the small local catchment towards the river. From a hydrological perspective, the watercourses therefore form an important part of the local surface water catchment and drainage.</p> <p>The single significant ephemeral watercourse situated on the western side of the Orange River, flows into an artificially constructed channel, which traverses the existing cultivated agricultural lands and eventually discharges into the river.</p>
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Topographic Alteration	Consequence of infilling, ploughing, dykes, trampling, bridges, roads, railway lines and other substrate disruptive activities which reduce or changes wetland habitat directly or through changes in inundation patterns.	5/3	<p>The proposed transmission line route mainly constitutes an undeveloped relatively natural landscape, although it will also traverse a portion of existing cultivated agricultural lands situated directly adjacent west of the Orange River.</p> <p>The proposed transmission line will respectively traverse a single (1) and three (3) significant first- and second-order ephemeral watercourses on the western and eastern sides of the Orange River. These watercourses constitute the main surface water flow paths of the small local catchment towards the river. From a hydrological perspective, the watercourses therefore form an important part of the local surface water catchment and drainage.</p> <p>The single significant ephemeral watercourse situated on the western side of the Orange River, flows into an artificially constructed channel, which traverses the existing cultivated agricultural lands and eventually discharges into the river.</p>
Terrestrial Encroachment	Consequence of desiccation of wetland and encroachment of terrestrial plant species due to changes in hydrology or geomorphology. Change from wetland to terrestrial habitat and loss of wetland functions.	4/3	Due to the lack of continuous water flow through the local area, the watercourses do not possess any distinct riparian zones or significant variations in vegetation species composition or -structure, relative to the surrounding terrestrial landscape. A significant increase in densities of woody shrub species is however evident within- and along the edges of the watercourses, relative to the surrounding terrestrial landscape.

			The single significant ephemeral watercourse situated on the western side of the Orange River, is however significantly/densely infested with the legally declared alien invasive species <i>Prosopis glandulosa</i> (Category 3 in the Northern Cape Province).
Indigenous Vegetation Removal	Direct destruction of habitat through any human activities affecting wildlife habitat and flow attenuation functions, organic matter inputs and increase potential for erosion.	4/3	<p>Due to the lack of continuous water flow through the local area, the watercourses do not possess any distinct riparian zones or significant variations in vegetation species composition or -structure, relative to the surrounding terrestrial landscape. A significant increase in densities of woody shrub species is however evident within- and along the edges of the watercourses, relative to the surrounding terrestrial landscape.</p> <p>The single significant ephemeral watercourse situated on the western side of the Orange River, is however significantly/densely infested with the legally declared alien invasive species <i>Prosopis glandulosa</i> (Category 3 in the Northern Cape Province).</p>
Alien Fauna	Presence of alien fauna affecting faunal community structure.	5/3	<p>At the time of the site assessment, no significant legally declared alien invasive species establishments were found to be present throughout the majority of the identified watercourses.</p> <p>The single significant ephemeral watercourse situated on the western side of the Orange River, is however significantly/densely infested with the legally declared alien invasive species <i>Prosopis glandulosa</i> (Category 3 in the Northern Cape Province).</p>

Over utilisation of biota	Over gazing, over fishing etc.	4	Grazing by livestock and game takes place within the local area.
<b>Total</b>		<b>32/35 &amp; 22/35</b>	
<b>Class</b>		<b>A &amp; C</b>	

The Present Ecological State (PES) of the majority of the significant watercourses is classified as Class A as they are unmodified, natural and pristine.

The Present Ecological State (PES) of the single significant ephemeral watercourse situated on the western side of the Orange River, is classified as Class C as it is moderately modified. Moderate loss and transformation of natural habitat and biota have occurred, mainly as a result of the significant/dense infestation of the legally declared alien invasive species *Prosopis glandulosa* (Category 3 in the Northern Cape Province), throughout the watercourse along with it flowing into an artificially constructed channel, which traverses the existing cultivated agricultural lands (see under heading 9.1) and eventually discharges into the Orange River. The basic ecosystem functionality has however remained predominantly unchanged.

## Ecological Importance and Sensitivity (EIS)

**Table 6: EIS table for the significant watercourses (0-5 indicates increase in significance)**

Determinant	Score
1. Rare and Endangered Species	1
2. Population of Unique Species	1
3. Species/taxon Richness	1
4. Diversity of Habitat Types or Features	2
5. Migration route/breeding and feeding site for wetland species.	1
6. Sensitivity to changes in Natural Hydrological Regime.	3
7. Sensitivity to water quality changes.	2
8. Flood Storage, Energy Dissipation & Particulate/Element Removal	3
9. Protected Status	3
10. Ecological Integrity	3
<b>Total</b>	<b>20/50</b>
<b>Overall Ecological Sensitivity and Importance</b>	<b>C</b>

The Ecological Importance and Sensitivity (EIS) of the significant watercourses is classified as Class C (moderate) as they are viewed as being ecologically important and sensitive on local or possibly provincial scale. The area forms part of a Critical Biodiversity Area one and two (CBA 1 & 2), which is mainly associated with the important ecological corridor that runs along the Orange River. From a hydrological perspective, the watercourses form an important part of the local surface water catchment and drainage. The increased woody densities associated with the watercourses potentially also provide important refuge and locally distinct habitat for common and habitat-specific bird-, reptilian-, small antelope- as well as other mammalian species. The watercourses are therefore viewed as being of low to moderate conservational significance/value, from a semi-aquatic ecological perspective.

**The identified four (4) significant watercourses which will be traversed by the proposed transmission line, are viewed as being of moderate conversational significance/value for habitat preservation and ecological functionality persistence in support of the surrounding ecosystem, Critical Biodiversity Area one and two (CBA 1 & 2) as well as the ecological functionality and - integrity of the local and broader quaternary surface water catchment- and drainage area.**

**It is the opinion of the specialist that the recommended mitigation measures should be sufficient in preventing any potentially significant disturbance of the identified watercourses. It is therefore not anticipated that the proposed development should significantly or continuously impede or impact on the flow regimes of the identified watercourses.**

## **9.5. Preferential Water Flow paths/Drainage Lines**

### **9.5.1. Aquatic Feature Description and Current Existing Vegetation**

The proposed transmission line will respectively traverse a single (1) and five (5) small first-order ephemeral preferential water flow paths/drainage lines on the western and eastern sides of the Orange River. These flow paths/drainage lines assist with channelling and discharging surface water runoff into the significant watercourses associated with the proposed development. The flow paths/drainage lines therefore merely play an assisting role in the small local catchment towards the river and are not viewed as being of high conservational significance, from a hydrological perspective.

Due to the lack of continuous water flow through the local area, the flow paths/drainage lines do not possess any distinct riparian zones or significant variations in vegetation species composition or -structure, relative to the surrounding terrestrial landscape. Merely a slight increase in densities of woody shrub species is however evident within- and along the edges of the flow paths/drainage lines, relative to the surrounding terrestrial landscape. The flow paths/drainage lines are therefore merely viewed as being of low conservational significance/value, from a semi-aquatic ecological perspective.

**It is recommended that no pylons may be constructed inside- or within 20 m of any preferential water flow path/drainage line. The development design layouts of the proposed transmission line must allow for continued flow through the flow paths/drainage lines. This must be done in order to maintain/ensure their ecological functionality and -integrity over time.**

**It is recommended that the pylons be placed parallel with the existing pylon locations of the existing ESKOM line, as far as practicably possible, as these have been constructed a suitable distance away from the flow paths/drainage lines.**

**Disturbed areas within and immediately surrounding the proposed flow path/drainage line crossings, must be adequately rehabilitated concurrently with the construction processes. A Rehabilitation Management Plan must be compiled by a suitably qualified and experienced ecologist.**



An adequate Stormwater and Erosion Management Plan must also be implemented during the construction- and operational phases of the proposed development, in order to assist with and allow for continued flow within the local catchment. This must be done to sufficiently manage storm water runoff and clean/dirty water separation in order to attempt to maintain/ensure the ecological functionality and -integrity of the local and broader quaternary surface water catchment- and drainage area.

A Water Use License Application (WULA) must furthermore be submitted to the Department of Water and Sanitation (DWS), to request authorisation for the proposed development through the six (6) flow path/drainage line crossings associated with the proposed transmission line route, in accordance with the National Water Act (Act 36 of 1998).

It is the opinion of the specialist that the recommended mitigation measures should be sufficient in preventing any potentially significant disturbance of the identified flow paths/drainage lines. It is therefore not anticipated that the proposed development should significantly or continuously impede or impact on the flow regimes of the identified flow paths/drainage lines.

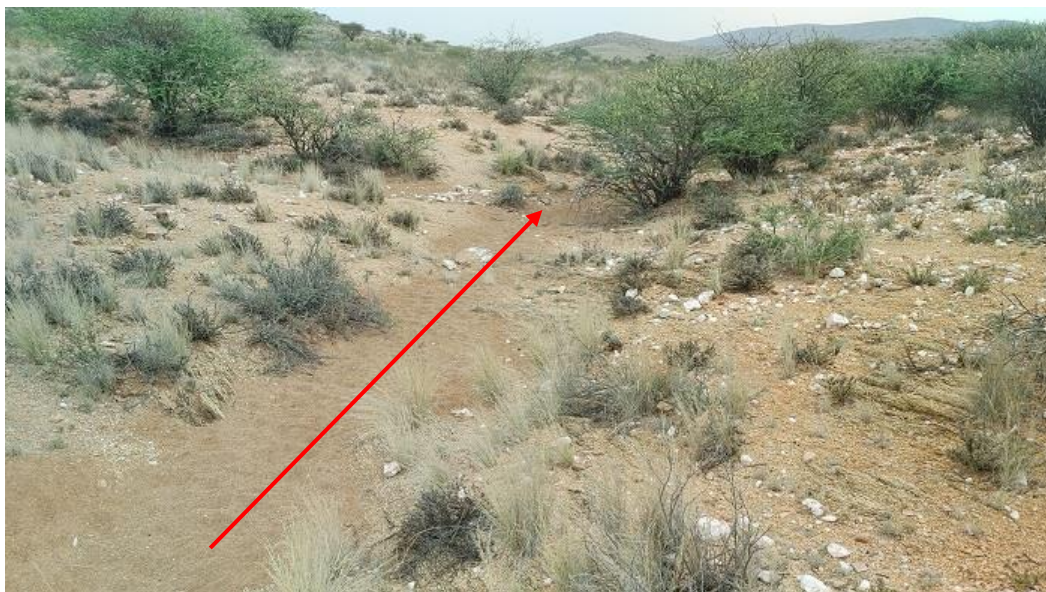


Figure 9: Image illustrating an example of the six (6) small first-order ephemeral preferential water flow paths/drainage lines, which will be traversed by the proposed transmission line (red arrow indicates the water flow direction)

## 9.5.2. Present Ecological State (PES) and Ecological Importance and Sensitivity (EIS)

**Present Ecological State (PES)****Table 7: PES table for the small preferential water flow paths/drainage lines (0-5 indicates decrease in significance)**

Criteria & Attributes	Relevance	Score	Reasoning
Flow Modification	Consequence of abstraction, regulation by impoundments or increased runoff from human settlements or agricultural land. Changes in flow regime, volumes, velocity which affect inundation of wetland habitats resulting in floristic changes or incorrect cues to biota.	5	<p>The proposed transmission line route mainly constitutes an undeveloped relatively natural landscape, although it will also traverse a portion of existing cultivated agricultural lands situated directly adjacent west of the Orange River.</p> <p>The proposed transmission line will respectively traverse a single (1) and five (5) small first-order ephemeral preferential water flow paths/drainage lines on the western and eastern sides of the Orange River. These flow paths/drainage lines assist with channelling and discharging surface water runoff into the significant watercourses associated with the proposed development. The flow paths/drainage lines therefore merely play an assisting role in the small local catchment towards the river and are not viewed as being of high conservational significance, from a hydrological perspective.</p>

Canalisation	Results in desiccation or changes to inundation patterns of wetland and thus changes in habitats. River diversions or drainage.	5	<p>The proposed transmission line route mainly constitutes an undeveloped relatively natural landscape, although it will also traverse a portion of existing cultivated agricultural lands situated directly adjacent west of the Orange River.</p> <p>The proposed transmission line will respectively traverse a single (1) and five (5) small first-order ephemeral preferential water flow paths/drainage lines on the western and eastern sides of the Orange River. These flow paths/drainage lines assist with channelling and discharging surface water runoff into the significant watercourses associated with the proposed development. The flow paths/drainage lines therefore merely play an assisting role in the small local catchment towards the river and are not viewed as being of high conservational significance, from a hydrological perspective.</p>
Topographic Alteration	Consequence of infilling, ploughing, dykes, trampling, bridges, roads, railway lines and other substrate disruptive activities which reduce or changes wetland habitat directly or through changes in inundation patterns.	5	<p>The proposed transmission line route mainly constitutes an undeveloped relatively natural landscape, although it will also traverse a portion of existing cultivated agricultural lands situated directly adjacent west of the Orange River.</p> <p>The proposed transmission line will respectively traverse a single (1) and five (5) small first-order ephemeral preferential water flow paths/drainage lines on the western and eastern sides of the Orange River.</p>

			These flow paths/drainage lines assist with channelling and discharging surface water runoff into the significant watercourses associated with the proposed development. The flow paths/drainage lines therefore merely play an assisting role in the small local catchment towards the river and are not viewed as being of high conservational significance, from a hydrological perspective.
Terrestrial Encroachment	Consequence of desiccation of wetland and encroachment of terrestrial plant species due to changes in hydrology or geomorphology. Change from wetland to terrestrial habitat and loss of wetland functions.	4	Due to the lack of continuous water flow through the local area, the flow paths/drainage lines do not possess any distinct riparian zones or significant variations in vegetation species composition or -structure, relative to the surrounding terrestrial landscape. Merely a slight increase in densities of woody shrub species is however evident within- and along the edges of the flow paths/drainage lines, relative to the surrounding terrestrial landscape.
Indigenous Vegetation Removal	Direct destruction of habitat through any human activities affecting wildlife habitat and flow attenuation functions, organic matter inputs and increase potential for erosion.	4	Due to the lack of continuous water flow through the local area, the flow paths/drainage lines do not possess any distinct riparian zones or significant variations in vegetation species composition or -structure, relative to the surrounding terrestrial landscape. Merely a slight increase in densities of woody shrub species is however evident within- and along the edges of the flow paths/drainage lines, relative to the surrounding terrestrial landscape.
Alien Fauna	Presence of alien fauna affecting faunal community structure.	5	At the time of the site assessment, no significant legally declared alien invasive species establishments were found to be present throughout the identified flow paths/drainage lines.

Over utilisation of biota	Over grazing, over fishing etc.	4	Grazing by livestock and game takes place within the local area.
<b>Total</b>		<b>32/35</b>	
<b>Class</b>		<b>A</b>	

The Present Ecological State (PES) of the small preferential water flow paths/drainage lines is classified as Class A as they are unmodified, natural and pristine.

### Ecological Importance and Sensitivity (EIS)

**Table 8: EIS table for the small preferential water flow paths/drainage lines (0-5 indicates increase in significance)**

Determinant	Score
1. Rare and Endangered Species	1
2. Population of Unique Species	1
3. Species/taxon Richness	1
4. Diversity of Habitat Types or Features	1
5. Migration route/breeding and feeding site for wetland species.	1
6. Sensitivity to changes in Natural Hydrological Regime.	2
7. Sensitivity to water quality changes.	1
8. Flood Storage, Energy Dissipation & Particulate/Element Removal	2
9. Protected Status	2
10. Ecological Integrity	3
<b>Total</b>	<b>15/50</b>
<b>Overall Ecological Sensitivity and Importance</b>	<b>C</b>

The Ecological Importance and Sensitivity (EIS) of the small preferential flow paths/drainage lines is classified as Class C (moderate), although it borders on Class D (low/marginal) as they are merely viewed as being ecologically important and sensitive on local scale. The area forms part of a Critical Biodiversity Area one and two (CBA 1 & 2), which is mainly associated with the important ecological corridor that runs along the Orange River. The flow paths/drainage lines merely play an assisting role in the small local catchment towards the river and are not viewed as being of high conservational significance, from a hydrological perspective. The flow paths/drainage lines are also merely viewed as being of low conservational significance/value, from an aquatic ecological perspective.

**The identified six (6) small preferential flow paths/drainage lines which will be traversed by the proposed transmission line, are merely viewed as being of low conversational significance/value for habitat preservation and ecological functionality persistence in support of the surrounding ecosystem, Critical Biodiversity Area one and two (CBA 1 & 2) as well as the ecological functionality and -integrity of the local and broader quaternary surface water catchment- and drainage area.**

**It is the opinion of the specialist that the recommended mitigation measures should be sufficient in preventing any potentially significant disturbance of the identified flow paths/drainage lines. It is therefore not anticipated that the proposed development should significantly or continuously impede or impact on the flow regimes of the identified flow paths/drainage lines.**

### 9.6. Aquatic Ecological Site Sensitivity Map

The site sensitivity map below (see A3 sized map in the Appendices) illustrates the identified four (4) significant first- and second-order ephemeral watercourses as well as the identified six (6) small first-order ephemeral preferential water flow paths/drainage lines, which will be traversed by the proposed transmission line. The artificially constructed channel as well as the natural riparian zone of the Orange River, are also illustrated.

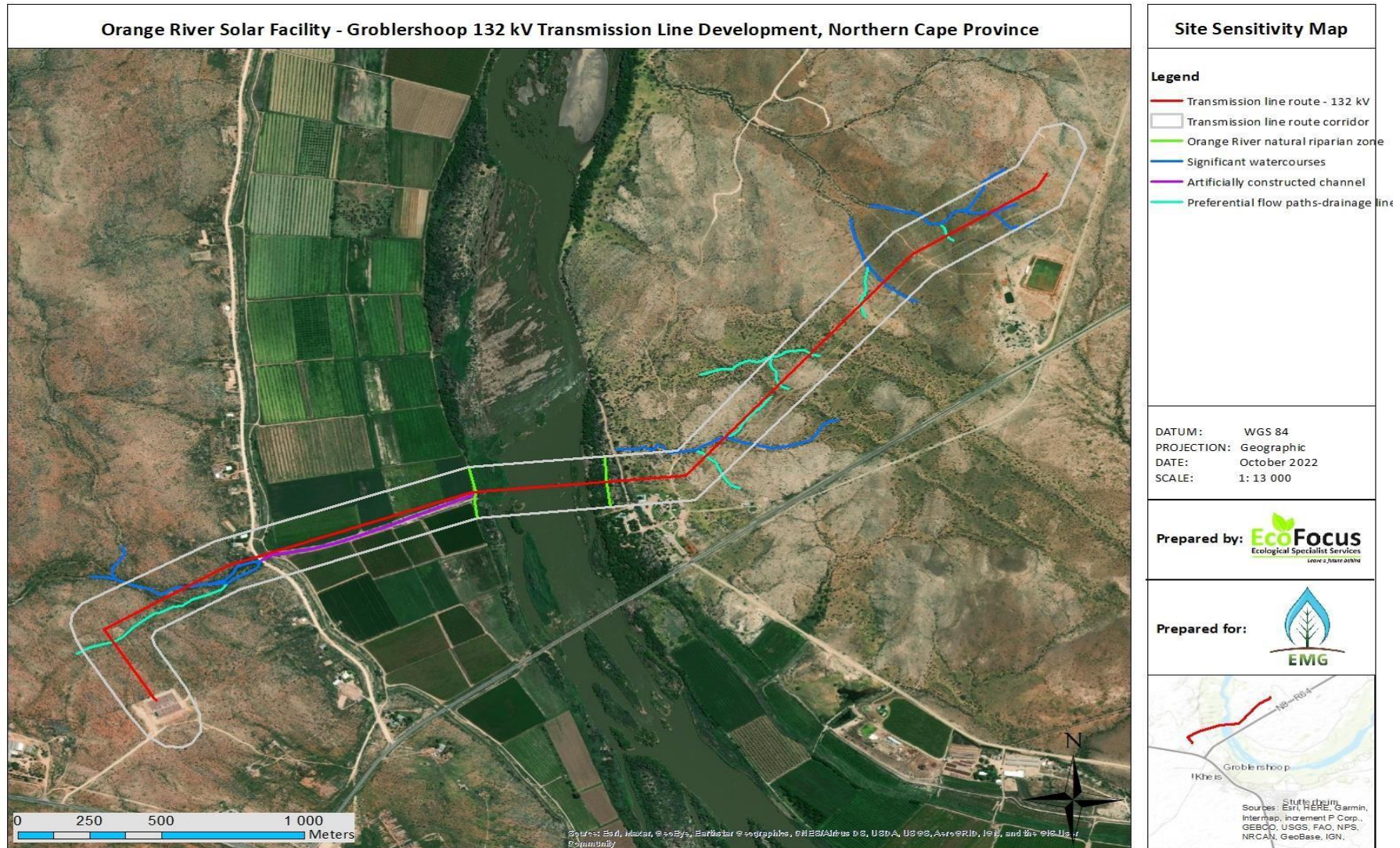


Figure 10: Site sensitivity map illustrating the identified four (4) significant first- and second-order ephemeral watercourses as well as the identified six (6) small first-order ephemeral preferential water flow paths/drainage lines, which will be traversed by the proposed transmission line; the artificially constructed channel as well as the natural riparian zone of the Orange River, are also illustrated



9.7. Water Use License Application (WULA) Risk Assessment Matrix

Table 9: Water Use License Application (WULA) Risk Assessment Matrix

No	Phase	Activity	Activity Continued	Aspect	Impact	Severity				
						Flow Regime	Physico & Chemical (Water quality)	Habitat (Geomorph + Vegetation)	Biota	Severity
1	Construction Phase	<p>The project applicant, Orange River Solar Facility, proposes to construct a 132 kV electrical transmission line of approximately 3.9 km in length, outside the town of Groblershoop, Northern Cape Province. The proposed transmission line will mostly run parallel to an existing ESKOM line and will traverse the Orange River. The proposed transmission line will commence from the proposed 50 MW Photovoltaic (PV) solar power generation facility of the applicant, which is currently in its Environmental Impact Assessment (EIA) process and will tie into the ESKOM grid/network at the existing Groblershoop high voltage substation. The town forms part of the !Kheis Local Municipality which in turn, forms part of the ZF Mgcawu District Municipality.</p> <p>The proposed transmission line route mainly constitutes an undeveloped relatively natural landscape, although it will also traverse a portion of existing cultivated agricultural lands situated directly adjacent west of the Orange River.</p> <p>The transmission line servitude will not be holistically cleared of vegetation. Only the pylon locations will be cleared, while woody tree and shrub individuals of ≥ 2.5 m in height will be cut or removed, if found to be present directly underneath the proposed transmission line or within a 3 m radius of a pylon location. It will also be maintained as such, over time.</p> <p>A narrow linear farm track of approximately 4 m in width, will be cleared of vegetation underneath and all along the proposed transmission line, for the proposed access/service road. It will also be maintained as such, over time.</p> <p>The mechanical clearance associated with the proposed development, will in all probability completely transform the majority of the existing surface vegetation within the narrow proposed linear development area. The size of the proposed linear development area is however negligible relative to the surrounding vast, continuous undeveloped natural landscape.</p>	<p>The central portion of the proposed transmission line route will traverse the Orange River, which flows in a north-westerly direction. The 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.</p> <p>The riparian zone is viewed as being of moderate to high conservational significance/value, from an aquatic ecological perspective</p> <p>The proposed transmission line will respectively traverse a single (1) and three (3) significant first- and second-order ephemeral watercourses on the western and eastern sides of the Orange River. These watercourses constitute the main surface water flow paths of the small local catchment towards the river. From a hydrological perspective, the watercourses therefore form an important part of the local surface water catchment and drainage.</p> <p>The watercourses are viewed as being of low to moderate conservational significance/value, from a semi-aquatic ecological perspective.</p> <p>The proposed transmission line will respectively traverse a single (1) and five (5) small first-order ephemeral preferential water flow paths/drainage lines on the western and eastern sides of the Orange River. These flow paths/drainage lines assist with channelling and discharging surface water runoff into the significant watercourses associated with the proposed development. The flow paths/drainage lines therefore merely play an assisting role in the small local catchment towards the river and are not viewed as being of high conservational significance, from a hydrological perspective.</p> <p>The flow paths/drainage lines are merely viewed as being of low conservational significance/value, from a semi-aquatic ecological perspective.</p>	Mechanical clearance of vegetation and excavation activities, associated with the construction of the proposed development.	<p><b>Transformation of an aquatic Critical Biodiversity Area one and two (CBA 1 &amp; 2), associated with the important ecological corridor that runs along the Orange River</b></p> <p>The mechanical clearance associated with the proposed development, will in all probability completely transform the majority of the existing surface vegetation within the narrow proposed linear development area. The size of the proposed linear development area is however negligible relative to the surrounding vast, continuous undeveloped natural landscape.</p> <p>The majority of the proposed linear development area falls within a Critical Biodiversity Area two (CBA 2), according to the Northern Cape Provincial Spatial Biodiversity Plan 2016 (NCPSBP). The central portion of the proposed transmission line route which traverses the Orange River, however falls within a Critical Biodiversity Area one (CBA 1), according to the Northern Cape Provincial Spatial Biodiversity Plan 2016 (NCPSBP).</p> <p>From an aquatic perspective, the relevant CBA 1 &amp; 2 are mainly associated with the important ecological corridor that runs along the Orange River.</p>	1	1	1	1	1.00

Spatial scale	Duration	Consequence	Frequency of activity	Frequency of impact	Legal Issues	Detection	Likelihood	Significance	Risk Rating	Confidence level	Control Measures	Control Measures Continued	PES & EIS of Watercourse
2	2	5.00	3	1	5	1	10	50	Low	90	<p>Vegetation clearance must be restricted to the pylon locations and the narrow linear route of the proposed transmission line access/service road, as far as practicably possible.</p> <p>The proposed linear development construction footprint must be kept as small as practicably possible to reduce the surface impact on surrounding vegetation and no unnecessary/unauthorised footprint expansion into the local or broader natural landscape surrounding the proposed linear development area, may take place.</p> <p>No site construction basecamps may be established within the local or broader natural landscape surrounding the proposed linear development area.</p> <p>Adequately cordon off the proposed linear development construction footprint area and ensure that no construction activities, -machinery or -equipment operate or impact within the local or broader surrounding natural landscape outside the cordoned off area.</p> <p>Adequate operational procedures for construction machinery and equipment must be developed in order to strictly govern and restrict movement of machinery only within the proposed linear development construction footprint area and to ensure environmentally responsible construction practices and activities.</p>	<p>Existing roads and farm tracks in close proximity to the proposed linear development construction footprint area, must be used during the construction phase. No new temporary roads or tracks may be constructed or implemented through the local or broader natural landscape surrounding the proposed linear development area.</p> <p>Disturbed areas within and immediately surrounding the proposed Orange River, watercourse and flow path/drainage line crossings, must be adequately rehabilitated concurrently with the construction processes. A Rehabilitation Management Plan must be compiled by a suitably qualified and experienced ecologist.</p> <p>From an aquatic ecological perspective, it is the opinion of the specialist that the proposed development does not warrant the requirement of a Biodiversity Offset area to be identified or assessed, for the proposed transformation of the relevant CBA 1 &amp; 2, as part of the NEMA mitigation hierarchy. The Northern Cape Department: Agriculture, Environmental Affairs, Rural Development and Land Reform must however provide a final decision in this regardsate for the inevitable loss of terrestrial biodiversity.</p>	<p>PES (Majority of the significant watercourses and small preferential water flow paths/drainage lines) = Class A (unmodified, natural and pristine),</p> <p>PES (Single significant ephemeral watercourse situated on the western side of the Orange River) = Class C (moderately modified). Moderate loss and transformation of natural habitat and biota have occurred, mainly as a result of the significant/dense infestation of the legally declared alien invasive species <i>Prosopis glandulosa</i> (Category 3 in the Northern Cape Province), throughout the watercourse along with it flowing into an artificially constructed channel, which traverses the existing cultivated agricultural lands and eventually discharges into the Orange River. The basic ecosystem functionality has however remained predominantly unchanged.</p> <p>EIS (Significant watercourses) = C (moderate). Viewed as being ecologically important and sensitive on local or possibly provincial scale.</p> <p>EIS (Small preferential flow paths/drainage lines) = Class C (moderate), although it borders on Class D (low/marginal). Merely viewed as being ecologically important and sensitive on local scale.</p>

No	Phase	Activity	Activity Continued	Aspect	Impact	Severity				
						Flow Regime	Physico & Chemical (Water quality)	Habitat (Geomorph + Vegetation)	Biota	Severity
2	Construction Phase	<p>The project applicant, Orange River Solar Facility, proposes to construct a 132 kV electrical transmission line of approximately 3.9 km in length, outside the town of Groblershoop, Northern Cape Province. The proposed transmission line will mostly run parallel to an existing ESKOM line and will traverse the Orange River. The proposed transmission line will commence from the proposed 50 MW Photovoltaic (PV) solar power generation facility of the applicant, which is currently in its Environmental Impact Assessment (EIA) process and will tie into the ESKOM grid/network at the existing Groblershoop high voltage substation. The town forms part of the !Kheis Local Municipality which in turn, forms part of the ZF Mgcawu District Municipality.</p> <p>The proposed transmission line route mainly constitutes an undeveloped relatively natural landscape, although it will also traverse a portion of existing cultivated agricultural lands situated directly adjacent west of the Orange River.</p> <p>The transmission line servitude will not be holistically cleared of vegetation. Only the pylon locations will be cleared, while woody tree and shrub individuals of ≥ 2.5 m in height will be cut or removed, if found to be present directly underneath the proposed transmission line or within a 3 m radius of a pylon location. It will also be maintained as such, over time.</p> <p>A narrow linear farm track of approximately 4 m in width, will be cleared of vegetation underneath and all along the proposed transmission line, for the proposed access/service road. It will also be maintained as such, over time.</p> <p>The mechanical clearance associated with the proposed development, will in all probability completely transform the majority of the existing surface vegetation within the narrow proposed linear development area. The size of the proposed linear development area is however negligible relative to the surrounding vast, continuous undeveloped natural landscape.</p>	<p>The central portion of the proposed transmission line route will traverse the Orange River, which flows in a north-westerly direction. The 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 practically/ reasonably possible.</p> <p>The riparian zone is viewed as being of moderate to high conservational significance/value, from an aquatic ecological perspective</p> <p>The proposed transmission line will respectively traverse a single (1) and three (3) significant first- and second-order ephemeral watercourses on the western and eastern sides of the Orange River. These watercourses constitute the main surface water flow paths of the small local catchment towards the river. From a hydrological perspective, the watercourses therefore form an important part of the local surface water catchment and drainage.</p> <p>The watercourses are viewed as being of low to moderate conservational significance/value, from a semi-aquatic ecological perspective.</p> <p>The proposed transmission line will respectively traverse a single (1) and five (5) small first-order ephemeral preferential water flow paths/drainage lines on the western and eastern sides of the Orange River. These flow paths/drainage lines assist with channelling and discharging surface water runoff into the significant watercourses associated with the proposed development. The flow paths/drainage lines therefore merely play an assisting role in the small local catchment towards the river and are not viewed as being of high conservational significance, from a hydrological perspective.</p> <p>The flow paths/drainage lines are merely viewed as being of low conservational significance/value, from a semi-aquatic ecological perspective.</p>	<p>Mechanical clearance of vegetation and excavation activities, associated with the construction of the proposed development.</p>	<p><b>Disturbance of-/damage to aquatic and semi-aquatic faunal habitats, associated with the Orange River and identified watercourses</b></p> <p>The proposed transmission line route does not fall within any Important Bird Areas (IBA) as per the latest IBA map obtained from the Birdlife SA website (<a href="https://www.birdlife.org.za/what-we-do/important-bird-and-biodiversity-areas/media-and-resources/#1553597171790-6f83422a-a7311">https://www.birdlife.org.za/what-we-do/important-bird-and-biodiversity-areas/media-and-resources/#1553597171790-6f83422a-a7311</a>). No conservationally significant or important waterbird species/nests or locally distinct avifaunal habitats were observed along the proposed transmission line route, during the site assessment or are expected to specifically utilise the proposed transmission line route as refuge or for breeding, foraging and/or persistence purposes. Only common local resident bird species/nests were observed in the local area.</p> <p>Although this is the case, the high woody- and reed densities associated with the Orange River riparian zone highly likely provide important refuge and locally distinct habitat for common and habitat-specific waterbird-, amphibian-, small antelope- as well as other mammalian species. The riparian zone is therefore viewed as being of moderate to high conservational significance/value, from an aquatic ecological perspective.</p> <p>The increased woody densities associated with the watercourses potentially provide important refuge and locally distinct habitat for common and habitat-specific bird-, reptilian-, small antelope- as well as other mammalian species. The watercourses are therefore viewed as being of low to moderate conservational significance/value, from a semi-aquatic ecological perspective.</p>	1	1	1	1	1.00

Spatial scale	Duration	Consequence	Frequency of activity	Frequency of impact	Legal Issues	Detection	Likelihood	Significance	Risk Rating	Confidence level	Control Measures	Control Measures Continued	PES & EIS of Watercourse
1	2	4.00	3	1	5	1	10	40	Low	90	<p>Vegetation clearance must be restricted to the pylon locations and the narrow linear route of the proposed transmission line access/service road, as far as practicably possible.</p> <p>It is recommended that no pylons may be constructed within the Orange River riparian zone. This must be done in order to prevent significant disturbance of the riparian zone and its associated conservationally important and locally distinct faunal habitat and to subsequently maintain/ensure the ecological functionality and integrity of the riparian zone, over time.</p> <p>It is recommended that the pylons on the eastern and western sides of the Orange River to cross the river, be placed parallel with the existing pylon locations of the existing Eskom line, as these have been constructed a suitable distance away from the riparian zone.</p> <p>It is furthermore recommended that the transmission line be suspended as high as practicably possible across the Orange River and that adequate bird deflecting/deviation technologies be implemented along the transmission line. This must be done in order to attempt to prevent significant collision- and mortality risks to waterbirds and other avifauna that utilise the river.</p> <p>It is recommended that no pylons may be constructed inside or within 35 m of any significant watercourse. The development design layouts of the proposed transmission line must allow for continued flow through the watercourses. This must be done in order to maintain/ensure their ecological functionality and integrity over time.</p> <p>It is recommended that no pylons may be constructed inside or within 20 m of any preferential water flow path/drainage line. The development design layouts of the proposed transmission line must allow for continued flow through the flow paths/drainage lines. This must be done in order to maintain/ensure their ecological functionality and integrity over time.</p> <p>It is recommended that the pylons be placed parallel with the existing pylon locations of the existing Eskom line, as far as practicably possible, as these have been constructed a suitable distance away from the watercourses and flow paths/drainage lines.</p>	<p>The proposed linear development construction footprint must be kept as small as practicably possible to reduce the surface impact on surrounding vegetation and no unnecessary/unauthorised footprint expansion into the local or broader natural landscape surrounding the proposed linear development area, may take place.</p> <p>No site construction basecamps may be established within the local or broader natural landscape surrounding the proposed linear development area.</p> <p>Adequately cordon off the proposed linear development construction footprint area and ensure that no construction activities, -machinery or -equipment operate or impact within the local or broader surrounding natural landscape outside the cordoned off area.</p> <p>Adequate operational procedures for construction machinery and equipment must be developed in order to strictly govern and restrict movement of machinery only within the proposed linear development construction footprint area and to ensure environmentally responsible construction practices and activities.</p> <p>Existing roads and farm tracks in close proximity to the proposed linear development construction footprint area, must be used during the construction phase. No new temporary roads or tracks may be constructed or implemented through the local or broader natural landscape surrounding the proposed linear development area.</p> <p>Disturbed areas within and immediately surrounding the proposed Orange River, watercourse and flow path/drainage line crossings, must be adequately rehabilitated concurrently with the construction processes. A Rehabilitation Management Plan must be compiled by a suitably qualified and experienced ecologist.</p>	<p>PES (Majority of the significant watercourses and small preferential water flow paths/drainage lines) = Class A (unmodified, natural and pristine),</p> <p>PES (Single significant ephemeral watercourse situated on the western side of the Orange River) = Class C (moderately modified). Moderate loss and transformation of natural habitat and biota have occurred, mainly as a result of the significant/dense infestation of the legally declared alien invasive species <i>Prosopis glandulosa</i> (Category 3 in the Northern Cape Province), throughout the watercourse along with it flowing into an artificially constructed channel, which traverses the existing cultivated agricultural lands and eventually discharges into the Orange River. The basic ecosystem functionality has however remained predominantly unchanged.</p> <p>EIS (Significant watercourses) = C (moderate). Viewed as being ecologically important and sensitive on local or possibly provincial scale.</p> <p>EIS (Small preferential flow paths/drainage lines) = Class C (moderate), although it borders on Class D (low/marginal). Merely viewed as being ecologically important and sensitive on local scale.</p>

No	Phase	Activity	Activity Continued	Aspect	Impact	Severity				
						Flow Regime	Physico & Chemical (Water quality)	Habitat (Geomorph + Vegetation)	Biota	Severity
3	Construction Phase	<p>The project applicant, Orange River Solar Facility, proposes to construct a 132 kV electrical transmission line of approximately 3.9 km in length, outside the town of Groblershoop, Northern Cape Province. The proposed transmission line will mostly run parallel to an existing ESKOM line and will traverse the Orange River. The proposed transmission line will commence from the proposed 50 MW Photovoltaic (PV) solar power generation facility of the applicant, which is currently in its Environmental Impact Assessment (EIA) process and will tie into the ESKOM grid/network at the existing Groblershoop high voltage substation. The town forms part of the IKheis Local Municipality which in turn, forms part of the ZF Mgcawu District Municipality.</p> <p>The proposed transmission line route mainly constitutes an undeveloped relatively natural landscape, although it will also traverse a portion of existing cultivated agricultural lands situated directly adjacent west of the Orange River.</p> <p>The transmission line servitude will not be holistically cleared of vegetation. Only the pylon locations will be cleared, while woody tree and shrub individuals of ≥ 2.5 m in height will be cut or removed, if found to be present directly underneath the proposed transmission line or within a 3 m radius of a pylon location. It will also be maintained as such, over time.</p> <p>A narrow linear farm track of approximately 4 m in width, will be cleared of vegetation underneath and all along the proposed transmission line, for the proposed access/service road. It will also be maintained as such, over time.</p> <p>The mechanical clearance associated with the proposed development, will in all probability completely transform the majority of the existing surface vegetation within the narrow proposed linear development area. The size of the proposed linear development area is however negligible relative to the surrounding vast, continuous undeveloped natural landscape.</p>	<p>The central portion of the proposed transmission line route will traverse the Orange River, which flows in a north-westerly direction. The 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 practically/reasonably possible.</p> <p>The riparian zone is viewed as being of moderate to high conservational significance/value, from an aquatic ecological perspective</p> <p>The proposed transmission line will respectively traverse a single (1) and three (3) significant first- and second-order ephemeral watercourses on the western and eastern sides of the Orange River. These watercourses constitute the main surface water flow paths of the small local catchment towards the river. From a hydrological perspective, the watercourses therefore form an important part of the local surface water catchment and drainage.</p> <p>The watercourses are viewed as being of low to moderate conservational significance/value, from a semi-aquatic ecological perspective.</p> <p>The proposed transmission line will respectively traverse a single (1) and five (5) small first-order ephemeral preferential water flow paths/drainage lines on the western and eastern sides of the Orange River. These flow paths/drainage lines assist with channelling and discharging surface water runoff into the significant watercourses associated with the proposed development. The flow paths/drainage lines therefore merely play an assisting role in the small local catchment towards the river and are not viewed as being of high conservational significance, from a hydrological perspective.</p> <p>The flow paths/drainage lines are merely viewed as being of low conservational significance/value, from a semi-aquatic ecological perspective.</p>	<p>Mechanical clearance of vegetation and excavation activities, associated with the construction of the proposed development.</p>	<p><b>Terrestrial and aquatic alien invasive species establishment within the Orange River, identified watercourses and preferential water flow paths/drainage lines</b></p> <p>The portion of the Orange River natural riparian zone along the eastern bank, which will be traversed by the proposed transmission line, is mainly dominated by the species <i>Searsia leptodictya</i>, <i>Vachellia karroo</i> and the legally declared alien invasive species <i>Eucalyptus</i> spp. (Category 1b in riparian areas). The woody species <i>Salix mucronata</i>, <i>Searsia pendulina</i>, <i>Gymnosporia buxifolia</i> and the legally declared alien invasive species <i>Prosopis glandulosa</i> (Category 3 in the Northern Cape Province), were also found to be well-represented.</p> <p>A further portion of thicket is present directly adjacent east of the natural riparian zone of the Orange River. This portion is however overwhelmingly dominated by the legally declared alien invasive species <i>Eucalyptus</i> spp. (Category 1b in riparian areas) and <i>Prosopis glandulosa</i> (Category 3 in the Northern Cape Province) and is therefore viewed as being transformed and not forming part of the natural riparian zone.</p> <p>At the time of the site assessment, no significant legally declared alien invasive species establishments were found to be present throughout the majority of the identified watercourses or any of the flow paths/drainage lines.</p> <p>The single significant ephemeral watercourse situated on the western side of the Orange River, is however significantly/densely infested with the legally declared alien invasive species <i>Prosopis glandulosa</i> (Category 3 in the Northern Cape Province).</p> <p>The proposed linear development area could likely be prone to slight alien invasive species establishment, due to surface disturbance and vegetation clearance caused by construction activities. The presence of the Orange River, watercourses and flow paths/drainage lines could further also potentially act as significant transport/distribution vectors for numerous terrestrial and aquatic alien invasive species into the broader region.</p>	1	1	1	1	1.00

Spatial scale	Duration	Consequence	Frequency of activity	Frequency of impact	Legal Issues	Detection	Likelihood	Significance	Risk Rating	Confidence level	Control Measures	Control Measures Continued	PES & EIS of Watercourse
2	2	5.00	3	1	5	1	10	50	Low	90	<p>Implement an adequate Alien Invasive Species Management and Prevention Plan during the construction and operational phases. Such a Management Plan must be compiled by a suitably qualified and experienced ecologist.</p> <p>It is recommended that all individuals of the identified alien invasive species must be actively eradicated from the Orange River riparian zone and the relevant watercourse, in accordance with the requirements of the National Environmental Management: Biodiversity Act (Act 10 of 2004); Alien and Invasive Species Regulations, 2014. Removed materials must also be adequately and lawfully disposed of, in order to prevent potential further spreading/dispersal.</p> <p>Vegetation clearance must be restricted to the pylon locations and the narrow linear route of the proposed transmission line access/service road, as far as practicably possible.</p> <p>It is recommended that no pylons may be constructed within the Orange River riparian zone. This must be done in order to prevent significant disturbance of the riparian zone and its associated conservationally important and locally distinct faunal habitat and to subsequently maintain/ensure the ecological functionality and -integrity of the riparian zone, over time.</p> <p>It is recommended that the pylons on the eastern and western sides of the Orange River to cross the river, be placed parallel with the existing pylon locations of the existing ESKOM line, as these have been constructed a suitable distance away from the riparian zone.</p>	<p>It is recommended that the pylons on the eastern and western sides of the Orange River to cross the river, be placed parallel with the existing pylon locations of the existing ESKOM line, as these have been constructed a suitable distance away from the riparian zone.</p> <p>It is recommended that no pylons may be constructed inside- or within 35 m of any significant watercourse. The development design layouts of the proposed transmission line must allow for continued flow through the watercourses. This must be done in order to maintain/ensure their ecological functionality and -integrity over time.</p> <p>It is recommended that no pylons may be constructed inside- or within 20 m of any preferential water flow path/drainage line. The development design layouts of the proposed transmission line must allow for continued flow through the flow paths/drainage lines. This must be done in order to maintain/ensure their ecological functionality and -integrity over time.</p> <p>It is recommended that the pylons be placed parallel with the existing pylon locations of the existing ESKOM line, as far as practicably possible, as these have been constructed a suitable distance away from the watercourses and flow paths/drainage lines.</p> <p>Disturbed areas within and immediately surrounding the proposed Orange River, watercourse and flow path/drainage line crossings, must be adequately rehabilitated concurrently with the construction processes. A Rehabilitation Management Plan must be compiled by a suitably qualified and experienced ecologist.</p>	<p>PES (Majority of the significant watercourses and small preferential water flow paths/drainage lines) = Class A (unmodified, natural and pristine),</p> <p>PES (Single significant ephemeral watercourse situated on the western side of the Orange River) = Class C (moderately modified). Moderate loss and transformation of natural habitat and biota have occurred, mainly as a result of the significant/dense infestation of the legally declared alien invasive species <i>Prosopis glandulosa</i> (Category 3 in the Northern Cape Province), throughout the watercourse along with it flowing into an artificially constructed channel, which traverses the existing cultivated agricultural lands and eventually discharges into the Orange River. The basic ecosystem functionality has however remained predominantly unchanged.</p> <p>EIS (Significant watercourses) = C (moderate). Viewed as being ecologically important and sensitive on local or possibly provincial scale.</p> <p>EIS (Small preferential flow paths/drainage lines) = Class C (moderate), although it borders on Class D (low/marginal). Merely viewed as being ecologically important and sensitive on local scale.</p>

No	Phase	Activity	Activity Continued	Aspect	Impact	Severity				
						Flow Regime	Physico & Chemical (Water quality)	Habitat (Geomorph + Vegetation)	Biota	Severity
4	Construction Phase	<p>The project applicant, Orange River Solar Facility, proposes to construct a 132 kV electrical transmission line of approximately 3.9 km in length, outside the town of Groblershoop, Northern Cape Province. The proposed transmission line will mostly run parallel to an existing Eskom line and will traverse the Orange River. The proposed transmission line will commence from the proposed 50 MW Photovoltaic (PV) solar power generation facility of the applicant, which is currently in its Environmental Impact Assessment (EIA) process and will tie into the Eskom grid/network at the existing Groblershoop high voltage substation. The town forms part of the Ikheis Local Municipality which in turn, forms part of the ZF Mgcawu District Municipality.</p> <p>The proposed transmission line route mainly constitutes an undeveloped relatively natural landscape, although it will also traverse a portion of existing cultivated agricultural lands situated directly adjacent west of the Orange River.</p> <p>The transmission line servitude will not be holistically cleared of vegetation. Only the pylon locations will be cleared, while woody tree and shrub individuals of ≥ 2.5 m in height will be cut or removed, if found to be present directly underneath the proposed transmission line or within a 3 m radius of a pylon location. It will also be maintained as such, over time.</p> <p>A narrow linear farm track of approximately 4 m in width, will be cleared of vegetation underneath and all along the proposed transmission line, for the proposed access/service road. It will also be maintained as such, over time.</p> <p>The mechanical clearance associated with the proposed development, will in all probability completely transform the majority of the existing surface vegetation within the narrow proposed linear development area. The size of the proposed linear development area is however negligible relative to the surrounding vast, continuous undeveloped natural landscape.</p>	<p>The central portion of the proposed transmission line route will traverse the Orange River, which flows in a north-westerly direction. The 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 practicable/reasonably possible.</p> <p>The riparian zone is viewed as being of moderate to high conservational significance/value, from an aquatic ecological perspective</p> <p>The proposed transmission line will respectively traverse a single (1) and three (3) significant first- and second-order ephemeral watercourses on the western and eastern sides of the Orange River. These watercourses constitute the main surface water flow paths of the small local catchment towards the river. From a hydrological perspective, the watercourses therefore form an important part of the local surface water catchment and drainage.</p> <p>The watercourses are viewed as being of low to moderate conservational significance/value, from a semi-aquatic ecological perspective.</p> <p>The proposed transmission line will respectively traverse a single (1) and five (5) small first-order ephemeral preferential water flow paths/drainage lines on the western and eastern sides of the Orange River. These flow paths/drainage lines assist with channelling and discharging surface water runoff into the significant watercourses associated with the proposed development. The flow paths/drainage lines therefore merely play an assisting role in the small local catchment towards the river and are not viewed as being of high conservational significance, from a hydrological perspective.</p> <p>The flow paths/drainage lines are merely viewed as being of low conservational significance/value, from a semi-aquatic ecological perspective.</p>	<p>Mechanical clearance of vegetation and excavation activities, associated with the construction of the proposed development.</p>	<p><b>Contamination of the Orange River by surface material erosion</b></p> <p>The majority of the proposed transmission line route consists of a moderate to steeply sloping and undulating landscape and small hills.</p> <p>The proposed linear development area could likely be prone to slight 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 into- and slight contamination of the Orange River, over time.</p> <p>The Orange 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 practicable/reasonably possible.</p>	1	1	1	1	1.00

Spatial scale	Duration	Consequence	Frequency of activity	Frequency of impact	Legal Issues	Detection	Likelihood	Significance	Risk Rating	Confidence level	Control Measures	Control Measures Continued	PES & EIS of Watercourse
1	2	4.00	3	1	5	1	10	40	Low	90	<p>Vegetation clearance must be restricted to the pylon locations and the narrow linear route of the proposed transmission line access/service road, as far as practicably possible.</p> <p>An adequate Stormwater and Erosion Management Plan must also be implemented during the construction- and operational phases of the proposed development, in order to assist with and allow for continued flow within the local catchment. This must be done to sufficiently manage storm water runoff and clean/dirty water separation in order to attempt to maintain/ensure the ecological functionality and - integrity of the local and broader quaternary surface water catchment- and drainage area.</p> <p>It is recommended that no pylons may be constructed within the Orange River riparian zone. This must be done in order to prevent significant disturbance of the riparian zone and its associated conservationally important and locally distinct faunal habitat and to subsequently maintain/ensure the ecological functionality and -integrity of the riparian zone, over time.</p> <p>It is recommended that the pylons on the eastern and western sides of the Orange River to cross the river, be placed parallel with the existing pylon locations of the existing ESKOM line, as these have been constructed a suitable distance away from the riparian zone.</p> <p>It is recommended that no pylons may be constructed inside- or within 35 m of any significant watercourse. The development design layouts of the proposed transmission line must allow for continued flow through the watercourses. This must be done in order to maintain/ensure their ecological functionality and - integrity over time.</p>	<p>It is recommended that no pylons may be constructed inside- or within 20 m of any preferential water flow path/drainage line. The development design layouts of the proposed transmission line must allow for continued flow through the flow paths/drainage lines. This must be done in order to maintain/ensure their ecological functionality and -integrity over time.</p> <p>It is recommended that the pylons be placed parallel with the existing pylon locations of the existing ESKOM line, as far as practicably possible, as these have been constructed a suitable distance away from the watercourses and flow paths/drainage lines.</p> <p>Disturbed areas within and immediately surrounding the proposed Orange River, watercourse and flow path/drainage line crossings, must be adequately rehabilitated concurrently with the construction processes. A Rehabilitation Management Plan must be compiled by a suitably qualified and experienced ecologist.</p>	<p>PES (Majority of the significant watercourses and small preferential water flow paths/drainage lines) = Class A (unmodified, natural and pristine),</p> <p>PES (Single significant ephemeral watercourse situated on the western side of the Orange River) = Class C (moderately modified). Moderate loss and transformation of natural habitat and biota have occurred, mainly as a result of the significant/dense infestation of the legally declared alien invasive species <i>Prosopis glandulosa</i> (Category 3 in the Northern Cape Province), throughout the watercourse along with it flowing into an artificially constructed channel, which traverses the existing cultivated agricultural lands and eventually discharges into the Orange River. The basic ecosystem functionality has however remained predominantly unchanged.</p> <p>EIS (Significant watercourses) = C (moderate). Viewed as being ecologically important and sensitive on local or possibly provincial scale.</p> <p>EIS (Small preferential flow paths/drainage lines) = Class C (moderate), although it borders on Class D (low/marginal). Merely viewed as being ecologically important and sensitive on local scale.</p>



No	Phase	Activity	Activity Continued	Aspect	Impact	Severity				
						Flow Regime	Physico & Chemical (Water quality)	Habitat (Geomorph + Vegetation)	Biota	Severity
5	Construction Phase	<p>The project applicant, Orange River Solar Facility, proposes to construct a 132 kV electrical transmission line of approximately 3.9 km in length, outside the town of Groblershoop, Northern Cape Province. The proposed transmission line will mostly run parallel to an existing Eskom line and will traverse the Orange River. The proposed transmission line will commence from the proposed 50 MW Photovoltaic (PV) solar power generation facility of the applicant, which is currently in its Environmental Impact Assessment (EIA) process and will tie into the Eskom grid/network at the existing Groblershoop high voltage substation. The town forms part of the Ikheis Local Municipality which in turn, forms part of the ZF Mgcawu District Municipality.</p> <p>The proposed transmission line route mainly constitutes an undeveloped relatively natural landscape, although it will also traverse a portion of existing cultivated agricultural lands situated directly adjacent west of the Orange River.</p> <p>The transmission line servitude will not be holistically cleared of vegetation. Only the pylon locations will be cleared, while woody tree and shrub individuals of ≥ 2.5 m in height will be cut or removed, if found to be present directly underneath the proposed transmission line or within a 3 m radius of a pylon location. It will also be maintained as such, over time.</p> <p>A narrow linear farm track of approximately 4 m in width, will be cleared of vegetation underneath and all along the proposed transmission line, for the proposed access/service road. It will also be maintained as such, over time.</p> <p>The mechanical clearance associated with the proposed development, will in all probability completely transform the majority of the existing surface vegetation within the narrow proposed linear development area. The size of the proposed linear development area is however negligible relative to the surrounding vast, continuous undeveloped natural landscape.</p>	<p>The central portion of the proposed transmission line route will traverse the Orange River, which flows in a north-westerly direction. The 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.</p> <p>The riparian zone is viewed as being of moderate to high conservational significance/value, from an aquatic ecological perspective</p> <p>The proposed transmission line will respectively traverse a single (1) and three (3) significant first- and second-order ephemeral watercourses on the western and eastern sides of the Orange River. These watercourses constitute the main surface water flow paths of the small local catchment towards the river. From a hydrological perspective, the watercourses therefore form an important part of the local surface water catchment and drainage.</p> <p>The watercourses are viewed as being of low to moderate conservational significance/value, from a semi-aquatic ecological perspective.</p> <p>The proposed transmission line will respectively traverse a single (1) and five (5) small first-order ephemeral preferential water flow paths/drainage lines on the western and eastern sides of the Orange River. These flow paths/drainage lines assist with channelling and discharging surface water runoff into the significant watercourses associated with the proposed development. The flow paths/drainage lines therefore merely play an assisting role in the small local catchment towards the river and are not viewed as being of high conservational significance, from a hydrological perspective.</p> <p>The flow paths/drainage lines are merely viewed as being of low conservational significance/value, from a semi-aquatic ecological perspective.</p>	Mechanical clearance of vegetation and excavation activities, associated with the construction of the proposed development.	<p><b>Contamination of the Orange River by dust generation and emissions</b></p> <p>The construction activities associated with the proposed development, could potentially result in slight fugitive dust emissions, due to vegetation clearance and movement of machinery and equipment. Generated dust could potentially spread into the surrounding undeveloped landscape and slightly contaminate the Orange River.</p> <p>The Orange 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.</p>	1	1	1	1	1.00

Spatial scale	Duration	Consequence	Frequency of activity	Frequency of impact	Legal Issues	Detection	Likelihood	Significance	Risk Rating	Confidence level	Control Measures	Control Measures Continued	PES & EIS of Watercourse
1	2	4.00	3	1	5	1	10	40	Low	90	<p>Implement suitable dust management and prevention measures during the construction phase of the proposed development.</p> <p>Construction areas and –roads to be sufficiently wetted down during the construction phase in order to prevent significant fugitive dust emissions.</p> <p>Adequate operational procedures for machinery and equipment must be developed to strictly govern and restrict movement of machinery, in order to avoid unnecessary fugitive dust emissions and ensure environmentally responsible construction practices and activities.</p> <p>Vegetation clearance must be restricted to the pylon locations and the narrow linear route of the proposed transmission line access/service road, as far as practicably possible.</p> <p>It is recommended that no pylons may be constructed within the Orange River riparian zone. This must be done in order to prevent significant disturbance of the riparian zone and its associated conservationally important and locally distinct faunal habitat and to subsequently maintain/ensure the ecological functionality and -integrity of the riparian zone, over time.</p> <p>It is recommended that the pylons on the eastern and western sides of the Orange River to cross the river, be placed parallel with the existing pylon locations of the existing ESKOM line, as these have been constructed a suitable distance away from the riparian zone.</p> <p>Disturbed areas within and immediately surrounding the proposed Orange River, watercourse and flow path/drainage line crossings, must be adequately rehabilitated concurrently with the construction processes. A Rehabilitation Management Plan must be compiled by a suitably qualified and experienced ecologist.</p>	N/A	<p>PES (Majority of the significant watercourses and small preferential water flow paths/drainage lines) = Class A (unmodified, natural and pristine),</p> <p>PES (Single significant ephemeral watercourse situated on the western side of the Orange River) = Class C (moderately modified). Moderate loss and transformation of natural habitat and biota have occurred, mainly as a result of the significant/dense infestation of the legally declared alien invasive species <i>Prosopis glandulosa</i> (Category 3 in the Northern Cape Province), throughout the watercourse along with it flowing into an artificially constructed channel, which traverses the existing cultivated agricultural lands and eventually discharges into the Orange River. The basic ecosystem functionality has however remained predominantly unchanged.</p> <p>EIS (Significant watercourses) = C (moderate). Viewed as being ecologically important and sensitive on local or possibly provincial scale.</p> <p>EIS (Small preferential flow paths/drainage lines) = Class C (moderate), although it borders on Class D (low/marginal). Merely viewed as being ecologically important and sensitive on local scale.</p>

No	Phase	Activity	Activity Continued	Aspect	Impact	Severity				
						Flow Regime	Physico & Chemical (Water quality)	Habitat (Geomorph + Vegetation)	Biota	Severity
6	Construction Phase	<p>The project applicant, Orange River Solar Facility, proposes to construct a 132 kV electrical transmission line of approximately 3.9 km in length, outside the town of Groblershoop, Northern Cape Province. The proposed transmission line will mostly run parallel to an existing Eskom line and will traverse the Orange River. The proposed transmission line will commence from the proposed 50 MW Photovoltaic (PV) solar power generation facility of the applicant, which is currently in its Environmental Impact Assessment (EIA) process and will tie into the Eskom grid/network at the existing Groblershoop high voltage substation. The town forms part of the Ikheis Local Municipality which in turn, forms part of the ZF Mgcawu District Municipality.</p> <p>The proposed transmission line route mainly constitutes an undeveloped relatively natural landscape, although it will also traverse a portion of existing cultivated agricultural lands situated directly adjacent west of the Orange River.</p> <p>The transmission line servitude will not be holistically cleared of vegetation. Only the pylon locations will be cleared, while woody tree and shrub individuals of ≥ 2.5 m in height will be cut or removed, if found to be present directly underneath the proposed transmission line or within a 3 m radius of a pylon location. It will also be maintained as such, over time.</p> <p>A narrow linear farm track of approximately 4 m in width, will be cleared of vegetation underneath and all along the proposed transmission line, for the proposed access/service road. It will also be maintained as such, over time.</p> <p>The mechanical clearance associated with the proposed development, will in all probability completely transform the majority of the existing surface vegetation within the narrow proposed linear development area. The size of the proposed linear development area is however negligible relative to the surrounding vast, continuous undeveloped natural landscape.</p>	<p>The central portion of the proposed transmission line route will traverse the Orange River, which flows in a north-westerly direction. The 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.</p> <p>The riparian zone is viewed as being of moderate to high conservational significance/value, from an aquatic ecological perspective</p> <p>The proposed transmission line will respectively traverse a single (1) and three (3) significant first- and second-order ephemeral watercourses on the western and eastern sides of the Orange River. These watercourses constitute the main surface water flow paths of the small local catchment towards the river. From a hydrological perspective, the watercourses therefore form an important part of the local surface water catchment and drainage.</p> <p>The watercourses are viewed as being of low to moderate conservational significance/value, from a semi-aquatic ecological perspective.</p> <p>The proposed transmission line will respectively traverse a single (1) and five (5) small first-order ephemeral preferential water flow paths/drainage lines on the western and eastern sides of the Orange River. These flow paths/drainage lines assist with channelling and discharging surface water runoff into the significant watercourses associated with the proposed development. The flow paths/drainage lines therefore merely play an assisting role in the small local catchment towards the river and are not viewed as being of high conservational significance, from a hydrological perspective.</p> <p>The flow paths/drainage lines are merely viewed as being of low conservational significance/value, from a semi-aquatic ecological perspective.</p>	Mechanical clearance of vegetation and excavation activities, associated with the construction of the proposed development.	<p><b>Impeding of the flow regimes of the identified watercourses and preferential water flow paths/drainage lines, within the associated local and broader quaternary surface water catchment- and drainage area</b></p> <p>The proposed transmission line route falls within the Lower Orange Water Management Area (WMA 14) and the associated D73D quaternary surface water catchment- and drainage area.</p> <p>The construction activities associated with the proposed development, could potentially result in slight impeding of natural surface water flow through the proposed linear development area towards the watercourses and flow paths/drainage lines, within the associated local and broader quaternary surface water catchment- and drainage area, due to artificial obstruction of flow during rainfall events.</p>	1	1	1	1	1.00

Spatial scale	Duration	Consequence	Frequency of activity	Frequency of impact	Legal Issues	Detection	Likelihood	Significance	Risk Rating	Confidence level	Control Measures	Control Measures Continued	PES & EIS of Watercourse
1	2	4.00	3	1	5	1	10	40	Low	90	<p>Vegetation clearance must be restricted to the pylon locations and the narrow linear route of the proposed transmission line access/service road, as far as practicably possible.</p> <p>An adequate Stormwater and Erosion Management Plan must also be implemented during the construction- and operational phases of the proposed development, in order to assist with and allow for continued flow within the local catchment. This must be done to sufficiently manage storm water runoff and clean/dirty water separation in order to attempt to maintain/ensure the ecological functionality and - integrity of the local and broader quaternary surface water catchment- and drainage area.</p> <p>It is recommended that no pylons may be constructed inside- or within 35 m of any significant watercourse. The development design layouts of the proposed transmission line must allow for continued flow through the watercourses. This must be done in order to maintain/ensure their ecological functionality and - integrity over time.</p> <p>It is recommended that no pylons may be constructed inside- or within 20 m of any preferential water flow path/drainage line. The development design layouts of the proposed transmission line must allow for continued flow through the flow paths/drainage lines. This must be done in order to maintain/ensure their ecological functionality and -integrity over time. It is recommended that the pylons be placed parallel with the existing pylon locations of the existing Eskom line, as far as practicably possible, as these have been constructed a suitable distance away from the watercourses and flow paths/drainage lines.</p>	<p>Disturbed areas within and immediately surrounding the proposed Orange River, watercourse and flow path/drainage line crossings, must be adequately rehabilitated concurrently with the construction processes. A Rehabilitation Management Plan must be compiled by a suitably qualified and experienced ecologist.</p>	<p>PES (Majority of the significant watercourses and small preferential water flow paths/drainage lines) = Class A (unmodified, natural and pristine),</p> <p>PES (Single significant ephemeral watercourse situated on the western side of the Orange River) = Class C (moderately modified). Moderate loss and transformation of natural habitat and biota have occurred, mainly as a result of the significant/dense infestation of the legally declared alien invasive species <i>Prosopis glandulosa</i> (Category 3 in the Northern Cape Province), throughout the watercourse along with it flowing into an artificially constructed channel, which traverses the existing cultivated agricultural lands and eventually discharges into the Orange River. The basic ecosystem functionality has however remained predominantly unchanged.</p> <p>EIS (Significant watercourses) = C (moderate). Viewed as being ecologically important and sensitive on local or possibly provincial scale.</p> <p>EIS (Small preferential flow paths/drainage lines) = Class C (moderate), although it borders on Class D (low/marginal). Merely viewed as being ecologically important and sensitive on local scale.</p>

No	Phase	Activity	Activity Continued	Aspect	Impact	Severity				
						Flow Regime	Physico & Chemical (Water quality)	Habitat (Geomorph + Vegetation)	Biota	Severity
7	Construction Phase	<p>The project applicant, Orange River Solar Facility, proposes to construct a 132 kV electrical transmission line of approximately 3.9 km in length, outside the town of Groblershoop, Northern Cape Province. The proposed transmission line will mostly run parallel to an existing ESKOM line and will traverse the Orange River. The proposed transmission line will commence from the proposed 50 MW Photovoltaic (PV) solar power generation facility of the applicant, which is currently in its Environmental Impact Assessment (EIA) process and will tie into the ESKOM grid/network at the existing Groblershoop high voltage substation. The town forms part of the IKheis Local Municipality which in turn, forms part of the ZF Mgcawu District Municipality.</p> <p>The proposed transmission line route mainly constitutes an undeveloped relatively natural landscape, although it will also traverse a portion of existing cultivated agricultural lands situated directly adjacent west of the Orange River.</p> <p>The transmission line servitude will not be holistically cleared of vegetation. Only the pylon locations will be cleared, while woody tree and shrub individuals of ≥ 2.5 m in height will be cut or removed, if found to be present directly underneath the proposed transmission line or within a 3 m radius of a pylon location. It will also be maintained as such, over time.</p> <p>A narrow linear farm track of approximately 4 m in width, will be cleared of vegetation underneath and all along the proposed transmission line, for the proposed access/service road. It will also be maintained as such, over time.</p> <p>The mechanical clearance associated with the proposed development, will in all probability completely transform the majority of the existing surface vegetation within the narrow proposed linear development area. The size of the proposed linear development area is however negligible relative to the surrounding vast, continuous undeveloped natural landscape.</p>	<p>The central portion of the proposed transmission line route will traverse the Orange River, which flows in a north-westerly direction. The 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.</p> <p>The riparian zone is viewed as being of moderate to high conservational significance/value, from an aquatic ecological perspective</p> <p>The proposed transmission line will respectively traverse a single (1) and three (3) significant first- and second-order ephemeral watercourses on the western and eastern sides of the Orange River. These watercourses constitute the main surface water flow paths of the small local catchment towards the river. From a hydrological perspective, the watercourses therefore form an important part of the local surface water catchment and drainage.</p> <p>The watercourses are viewed as being of low to moderate conservational significance/value, from a semi-aquatic ecological perspective.</p> <p>The proposed transmission line will respectively traverse a single (1) and five (5) small first-order ephemeral preferential water flow paths/drainage lines on the western and eastern sides of the Orange River. These flow paths/drainage lines assist with channelling and discharging surface water runoff into the significant watercourses associated with the proposed development. The flow paths/drainage lines therefore merely play an assisting role in the small local catchment towards the river and are not viewed as being of high conservational significance, from a hydrological perspective.</p> <p>The flow paths/drainage lines are merely viewed as being of low conservational significance/value, from a semi-aquatic ecological perspective.</p>	<p>Mechanical clearance of vegetation and excavation activities, associated with the construction of the proposed development.</p>	<p><b>Contamination of the flow regimes of the identified watercourses and preferential water flow paths/drainage lines, within the associated local and broader quaternary surface water catchment- and drainage area</b></p> <p>The construction phase could potentially result in slight contamination of natural surface water flow through the proposed linear development area towards the watercourses and flow paths/drainage lines, within the associated local and broader quaternary surface water catchment- and drainage area, due to hydrocarbon and/or other chemical spills by construction machinery and equipment.</p>	1	1	1	1	1.00

Spatial scale	Duration	Consequence	Frequency of activity	Frequency of impact	Legal Issues	Detection	Likelihood	Significance	Risk Rating	Confidence level	Control Measures	Control Measures Continued	PES & EIS of Watercourse
1	2	4.00	3	1	5	1	10	40	Low	90	<p>If hydrocarbons or other chemicals are to be stored on site during the construction phase, the storage areas must be situated as far away as practicably/feasibly possible from the Orange River, watercourses and flow paths/drainage lines.</p> <p>Hydrocarbon and other chemical storage areas must be adequately banded in order to be able to contain a minimum of 150 % of the capacity of storage tanks/units.</p> <p>Adequate hydrocarbon and other chemical storage, handling, usage and spillage clean-up procedures must be developed and all relevant construction personnel must be sufficiently trained on- and apply these procedures during the entire construction phase.</p> <p>Spill kits must be readily available on the construction site. All employees must be adequately trained on the correct procedure and use of the spill kits.</p>	N/A	<p>PES (Majority of the significant watercourses and small preferential water flow paths/drainage lines) = Class A (unmodified, natural and pristine),</p> <p>PES (Single significant ephemeral watercourse situated on the western side of the Orange River) = Class C (moderately modified). Moderate loss and transformation of natural habitat and biota have occurred, mainly as a result of the significant/dense infestation of the legally declared alien invasive species <i>Prosopis glandulosa</i> (Category 3 in the Northern Cape Province), throughout the watercourse along with it flowing into an artificially constructed channel, which traverses the existing cultivated agricultural lands and eventually discharges into the Orange River. The basic ecosystem functionality has however remained predominantly unchanged.</p> <p>EIS (Significant watercourses) = C (moderate). Viewed as being ecologically important and sensitive on local or possibly provincial scale.</p> <p>EIS (Small preferential flow paths/drainage lines) = Class C (moderate), although it borders on Class D (low/marginal). Merely viewed as being ecologically important and sensitive on local scale.</p>

No	Phase	Activity	Activity Continued	Aspect	Impact	Severity				
						Flow Regime	Physico & Chemical (Water quality)	Habitat (Geomorph + Vegetation)	Biota	Severity
8	Operational Phase	<p>The project applicant, Orange River Solar Facility, proposes to construct a 132 kV electrical transmission line of approximately 3.9 km in length, outside the town of Groblershoop, Northern Cape Province. The proposed transmission line will mostly run parallel to an existing ESKOM line and will traverse the Orange River. The proposed transmission line will commence from the proposed 50 MW Photovoltaic (PV) solar power generation facility of the applicant, which is currently in its Environmental Impact Assessment (EIA) process and will tie into the ESKOM grid/network at the existing Groblershoop high voltage substation. The town forms part of the Ikheis Local Municipality which in turn, forms part of the ZF Mgcawu District Municipality.</p> <p>The proposed transmission line route mainly constitutes an undeveloped relatively natural landscape, although it will also traverse a portion of existing cultivated agricultural lands situated directly adjacent west of the Orange River.</p> <p>The transmission line servitude will not be holistically cleared of vegetation. Only the pylon locations will be cleared, while woody tree and shrub individuals of <math>\geq 2.5</math> m in height will be cut or removed, if found to be present directly underneath the proposed transmission line or within a 3 m radius of a pylon location. It will also be maintained as such, over time.</p> <p>A narrow linear farm track of approximately 4 m in width, will be cleared of vegetation underneath and all along the proposed transmission line, for the proposed access/service road. It will also be maintained as such, over time.</p> <p>The mechanical clearance associated with the proposed development, will in all probability completely transform the majority of the existing surface vegetation within the narrow proposed linear development area. The size of the proposed linear development area is however negligible relative to the surrounding vast, continuous undeveloped natural landscape.</p>	<p>The central portion of the proposed transmission line route will traverse the Orange River, which flows in a north-westerly direction. The 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 practically/reasonably possible.</p> <p>The riparian zone is viewed as being of moderate to high conservational significance/value, from an aquatic ecological perspective</p> <p>The proposed transmission line will respectively traverse a single (1) and three (3) significant first- and second-order ephemeral watercourses on the western and eastern sides of the Orange River. These watercourses constitute the main surface water flow paths of the small local catchment towards the river. From a hydrological perspective, the watercourses therefore form an important part of the local surface water catchment and drainage.</p> <p>The watercourses are viewed as being of low to moderate conservational significance/value, from a semi-aquatic ecological perspective.</p> <p>The proposed transmission line will respectively traverse a single (1) and five (5) small first-order ephemeral preferential water flow paths/drainage lines on the western and eastern sides of the Orange River. These flow paths/drainage lines assist with channelling and discharging surface water runoff into the significant watercourses associated with the proposed development. The flow paths/drainage lines therefore merely play an assisting role in the small local catchment towards the river and are not viewed as being of high conservational significance, from a hydrological perspective.</p> <p>The flow paths/drainage lines are merely viewed as being of low conservational significance/value, from a semi-aquatic ecological perspective.</p>	Operation of the established electrical transmission line.	<p><b>Continued collisions and mortality of waterbirds and other avifauna that utilise the Orange River</b></p> <p>The proposed transmission line route does not fall within any Important Bird Areas (IBA) as per the latest IBA map obtained from the Birdlife SA website (<a href="https://www.birdlife.org.za/what-we-do/important-bird-and-biodiversity-areas/media-and-resources/#1553597171790-6f83422a-a731">https://www.birdlife.org.za/what-we-do/important-bird-and-biodiversity-areas/media-and-resources/#1553597171790-6f83422a-a731</a>). No conservationally significant or important waterbird species/nests or locally distinct avifaunal habitats were observed along the proposed transmission line route, during the site assessment or are expected to specifically utilise the proposed transmission line route as refuge or for breeding, foraging and/or persistence purposes. Only common local resident bird species/nests were observed in the local area.</p> <p>Although this is the case, the high woody- and reed densities associated with the Orange River riparian zone highly likely provide important refuge and locally distinct habitat for common and habitat-specific waterbird-, amphibian-, small antelope- as well as other mammalian species. Bird individuals that utilise the river, can continue to collide with the established transmission line over time. This could lead to serious injuries or even death of bird individuals.</p>	1	1	1	2	1.25

Spatial scale	Duration	Consequence	Frequency of activity	Frequency of impact	Legal Issues	Detection	Likelihood	Significance	Risk Rating	Confidence level	Control Measures	Control Measures Continued	PES & EIS of Watercourse
1	2	4.25	3	1	5	1	10	42.5	Low	90	<p>All the recommended mitigation measures for the construction phase must be adequately implemented and managed.</p> <p>The recommended bird deflecting/deviation technologies to be implemented along the transmission line, must be inspected on an annual basis and adequately maintained over time.</p>	N/A	<p>PES (Majority of the significant watercourses and small preferential water flow paths/drainage lines) = Class A (unmodified, natural and pristine),</p> <p>PES (Single significant ephemeral watercourse situated on the western side of the Orange River) = Class C (moderately modified). Moderate loss and transformation of natural habitat and biota have occurred, mainly as a result of the significant/dense infestation of the legally declared alien invasive species <i>Prosopis glandulosa</i> (Category 3 in the Northern Cape Province), throughout the watercourse along with it flowing into an artificially constructed channel, which traverses the existing cultivated agricultural lands and eventually discharges into the Orange River. The basic ecosystem functionality has however remained predominantly unchanged.</p> <p>EIS (Significant watercourses) = C (moderate). Viewed as being ecologically important and sensitive on local or possibly provincial scale.</p> <p>EIS (Small preferential flow paths/drainage lines) = Class C (moderate), although it borders on Class D (low/marginal). Merely viewed as being ecologically important and sensitive on local scale.</p>



## 10. Aquatic Ecological Impact Assessment

The following section identifies the potential aquatic ecological impacts (both positive and negative), which the proposed development will have on the surrounding environment.

Once the potential aquatic ecological impacts are identified, they are assessed by rating their Environmental Risk after which the final Environmental Significance is calculated and rated for each identified aquatic ecological impact.

The same Environmental Risk rating process is then followed for each aquatic ecological impact to determine the Environmental Significance, if the recommended mitigation measures were to be implemented.

The objective of this section is therefore firstly to identify all the potential aquatic ecological impacts associated with the proposed development and secondly to determine the significance of the impacts and how effective the recommended mitigation measures will be able to reduce their significance. The potential aquatic ecological impacts which are still rated as highly significant, even after implementation of mitigations, can then be identified in order to specifically focus on implementation of effective management strategies for them.

### 10.1. Construction Phase

#### **Transformation of an aquatic Critical Biodiversity Area one and two (CBA 1 & 2), associated with the important ecological corridor that runs along the Orange River**

The proposed development will entail the formal construction of a 132 kV electrical transmission line of approximately 3.9 km in length and its associated access/service road. The proposed transmission line will mostly run parallel to an existing ESKOM line and will traverse the Orange River.

The proposed transmission line route mainly constitutes an undeveloped relatively natural landscape, although it will also traverse a portion of existing cultivated agricultural lands situated directly adjacent west of the Orange River.

The transmission line servitude will not be holistically cleared of vegetation. Only the pylon locations will be cleared, while woody tree and shrub individuals of  $\geq 2.5$  m in height will be cut or removed, if found to be present directly underneath the proposed transmission line or within a 3 m radius of a pylon location. It will also be maintained as such, over time.

A narrow linear farm track of approximately 4 m in width, will be cleared of vegetation underneath and all along the proposed transmission line, for the proposed access/service road. It will also be maintained as such, over time.

The mechanical clearance associated with the proposed development, will in all probability completely transform the majority of the existing surface vegetation within the narrow proposed linear development area. The size of the proposed linear development area is however negligible relative to the surrounding vast, continuous undeveloped natural landscape.

The majority of the proposed linear development area falls within a Critical Biodiversity Area two (CBA 2), according to the Northern Cape Provincial Spatial Biodiversity Plan 2016 (NCPSBP). The central portion of the proposed transmission line route which traverses the Orange River, however falls within a Critical Biodiversity Area one (CBA 1), according to the Northern Cape Provincial Spatial Biodiversity Plan 2016 (NCPSBP).

From an aquatic perspective, the relevant CBA 1 & 2 are mainly associated with the important ecological corridor that runs along the Orange River.

The significance of this potential impact will be **medium** prior to implementation of recommended mitigation measures, but will be reduced to **low** by the implementation.

Mitigation measures to reduce impacts are recommended under heading 10.4.

### **Disturbance of-/damage to aquatic and semi-aquatic faunal habitats, associated with the Orange River and identified watercourses**

The proposed development will entail the formal construction of a 132 kV electrical transmission line of approximately 3.9 km in length and its associated access/service road. The proposed transmission line will mostly run parallel to an existing ESKOM line and will traverse the Orange River.

The proposed transmission line route mainly constitutes an undeveloped relatively natural landscape, although it will also traverse a portion of existing cultivated agricultural lands situated directly adjacent west of the Orange River.

The transmission line servitude will not be holistically cleared of vegetation. Only the pylon locations will be cleared, while woody tree and shrub individuals of  $\geq 2.5$  m in height will be cut or removed, if found to be present directly underneath the proposed transmission line or within a 3 m radius of a pylon location. It will also be maintained as such, over time.

A narrow linear farm track of approximately 4 m in width, will be cleared of vegetation underneath and all along the proposed transmission line, for the proposed access/service road. It will also be maintained as such, over time.

The mechanical clearance associated with the proposed development, will in all probability completely transform the majority of the existing surface vegetation within the narrow proposed linear development area. The size of the proposed linear development area is however negligible relative to the surrounding vast, continuous undeveloped natural landscape.

The proposed transmission line route does not fall within any Important Bird Areas (IBA) as per the latest IBA map obtained from the Birdlife SA website (<https://www.birdlife.org.za/what-we-do/important-bird-and-biodiversity-areas/media-and-resources/#1553597171790-6f83422a-a731>). No conservationally significant or important waterbird species/nests or locally distinct avifaunal habitats were observed along the proposed transmission line route, during the site assessment or are expected to specifically utilise the proposed transmission line route as refuge or for breeding, foraging and/or persistence purposes. Only common local resident bird species/nests were observed in the local area.

Although this is the case, the high woody- and reed densities associated with the Orange River riparian zone highly likely provide important refuge and locally distinct habitat for common and habitat-specific waterbird-, amphibian-, small antelope- as well as other mammalian species. The riparian zone is therefore viewed as being of moderate to high conservational significance/value, from an aquatic ecological perspective.

The increased woody densities associated with the watercourses potentially provide important refuge and locally distinct habitat for common and habitat-specific bird-, reptilian-, small antelope- as well as other mammalian species. The watercourses are therefore viewed as being of low to moderate conservational significance/value, from a semi-aquatic ecological perspective.

The flow paths/drainage lines are merely viewed as being of low conservational significance/value, from a semi-aquatic ecological perspective.

The significance of this potential impact will be **medium** prior to implementation of recommended mitigation measures, but will be reduced to **low** by the implementation.

Mitigation measures to reduce impacts are recommended under heading 10.4.

#### **Terrestrial and aquatic alien invasive species establishment within the Orange River, identified watercourses and preferential water flow paths/drainage lines**

The portion of the Orange River natural riparian zone along the eastern bank, which will be traversed by the proposed transmission line, is mainly dominated by the species *Searsia leptodictya*, *Vachellia karroo* and the legally declared alien invasive species *Eucalyptus spp.* (Category 1b in riparian areas). The woody species *Salix mucronata*, *Searsia pendulina*, *Gymnosporia buxifolia* and the legally declared alien invasive species *Prosopis glandulosa* (Category 3 in the Northern Cape Province), were also found to be well-represented.

A further portion of thicket is present directly adjacent east of the natural riparian zone of the Orange River. This portion is however overwhelmingly dominated by the legally declared alien invasive species *Eucalyptus spp.* (Category 1b in riparian areas) and *Prosopis glandulosa* (Category 3 in the Northern Cape Province) and is therefore viewed as being transformed and not forming part of the natural riparian zone.

At the time of the site assessment, no significant legally declared alien invasive species establishments were found to be present throughout the majority of the identified watercourses or any of the flow paths/drainage lines.

The single significant ephemeral watercourse situated on the western side of the Orange River, is however significantly/densely infested with the legally declared alien invasive species *Prosopis glandulosa* (Category 3 in the Northern Cape Province).

The proposed linear development area could likely be prone to slight alien invasive species establishment, due to surface disturbance and vegetation clearance caused by construction activities. The presence of the Orange River, watercourses and flow paths/drainage lines could further also potentially act as significant transport/distribution vectors for numerous terrestrial and aquatic alien invasive species into the broader region.

The significance of this potential impact will be **medium-high** prior to implementation of recommended mitigation measures, but will be reduced to **low** by the implementation.

Mitigation measures to reduce impacts are recommended under heading 10.4.

#### **Contamination of the Orange River by surface material erosion**

The majority of the proposed transmission line route consists of a moderate to steeply sloping and undulating landscape and small hills.

The proposed linear development area could likely be prone to slight 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 into- and slight contamination of the Orange River, over time.

The Orange 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.

The significance of this potential impact will be **low** prior to- and after implementation of recommended mitigation measures.

Mitigation measures to reduce impacts are recommended under heading 10.4.

### **Contamination of the Orange River by dust generation and emissions**

The construction activities associated with the proposed development, could potentially result in slight fugitive dust emissions, due to vegetation clearance and movement of machinery and equipment. Generated dust could potentially spread into the surrounding undeveloped landscape and slightly contaminate the Orange River.

The Orange 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.

The significance of this potential impact will be **low** prior to- and after implementation of recommended mitigation measures.

Mitigation measures to reduce impacts are recommended under heading 10.4.

### **Impeding and contamination of the flow regimes of the identified watercourses and preferential water flow paths/drainage lines, within the associated local and broader quaternary surface water catchment- and drainage area**

The proposed transmission line route falls within the Lower Orange Water Management Area (WMA 14) and the associated D73D quaternary surface water catchment- and drainage area.

The proposed transmission line will respectively traverse a single (1) and three (3) significant first- and second-order ephemeral watercourses on the western and eastern sides of the Orange River. These watercourses constitute the main surface water flow paths of the small local catchment towards the river. From a hydrological perspective, the watercourses therefore form an important part of the local surface water catchment and drainage.

The proposed transmission line will respectively traverse a single (1) and five (5) small first-order ephemeral preferential water flow paths/drainage lines on the western and eastern sides of the Orange River. These flow paths/drainage lines assist with channelling and discharging surface water runoff into the significant watercourses associated with the proposed development. The flow paths/drainage lines therefore merely play an assisting role in the small local catchment towards the river and are not viewed as being of high conservational significance, from a hydrological perspective.

The construction activities associated with the proposed development, could potentially result in slight impeding of natural surface water flow through the proposed linear development area towards the watercourses and flow paths/drainage lines, within the associated local and broader quaternary surface water catchment- and drainage area, due to artificial obstruction of flow during rainfall events.

The construction phase could potentially also result in slight contamination of natural surface water flow through the proposed linear development area towards the watercourses and flow paths/drainage lines, within the associated local and broader quaternary surface water catchment- and drainage area, due to hydrocarbon and/or other chemical spills by construction machinery and equipment.

The significance of this potential impact will be **low** prior to- and after implementation of recommended mitigation measures.

Mitigation measures to reduce impacts are recommended under heading 10.4.

## 10.2. Operational Phase

Transformation of an aquatic Critical Biodiversity Area one and two (CBA 1 & 2), associated with the important ecological corridor that runs along the Orange River as well as terrestrial and aquatic alien invasive species establishment within the Orange River, were identified and addressed as significant potential long-term aquatic ecological impacts, associated with the construction phase of the proposed development.

Once the construction phase of the proposed development has been completed, the subsequent operational phase should not result in any significant additional potential aquatic ecological impacts, apart from the potential long-term aquatic ecological impacts, as discussed under heading 10.1.

The following additional slight potential aquatic ecological impact could take place during the operational phase.

### **Continued collisions and mortality of waterbirds and other avifauna that utilise the Orange River**

The proposed transmission line route does not fall within any Important Bird Areas (IBA) as per the latest IBA map obtained from the Birdlife SA website (<https://www.birdlife.org.za/what-we-do/important-bird-and-biodiversity-areas/media-and-resources/#1553597171790-6f83422a-a731>). No conservationally significant or important waterbird species/nests or locally distinct avifaunal habitats were observed along the proposed transmission line route, during the site assessment or are expected to specifically utilise the proposed transmission line route as refuge or for breeding, foraging and/or persistence purposes. Only common local resident bird species/nests were observed in the local area.

Although this is the case, the high woody- and reed densities associated with the Orange River riparian zone highly likely provide important refuge and locally distinct habitat for common and habitat-specific waterbird-, amphibian-, small antelope- as well as other mammalian species. Bird individuals that utilise the river, can continue to collide with the established transmission line over time. This could lead to serious injuries or even death of bird individuals.

The significance of this potential impact will be **low** prior to- and after implementation of recommended mitigation measures.

Mitigation measures to reduce impacts are recommended under heading 10.4.



### 10.3. Cumulative Impacts

The proposed development will entail the formal construction of a 132 kV electrical transmission line of approximately 3.9 km in length and its associated access/service road. The proposed transmission line will mostly run parallel to an existing ESKOM line and will traverse the Orange River.

The proposed transmission line route mainly constitutes an undeveloped relatively natural landscape, although it will also traverse a portion of existing cultivated agricultural lands situated directly adjacent west of the Orange River.

The transmission line servitude will not be holistically cleared of vegetation. Only the pylon locations will be cleared, while woody tree and shrub individuals of  $\geq 2.5$  m in height will be cut or removed, if found to be present directly underneath the proposed transmission line or within a 3 m radius of a pylon location. It will also be maintained as such, over time.

A narrow linear farm track of approximately 4 m in width, will be cleared of vegetation underneath and all along the proposed transmission line, for the proposed access/service road. It will also be maintained as such, over time.

The mechanical clearance associated with the proposed development, will in all probability completely transform the majority of the existing surface vegetation within the narrow proposed linear development area. The size of the proposed linear development area is however negligible relative to the surrounding vast, continuous undeveloped natural landscape.

The proposed transmission line route falls within the Lower Orange Water Management Area (WMA 14) and the associated D73D quaternary surface water catchment- and drainage area.

The central portion of the proposed transmission line route will traverse the Orange River, which flows in a north-westerly direction. The 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.

The proposed transmission line will respectively traverse a single (1) and three (3) significant first- and second-order ephemeral watercourses on the western and eastern sides of the Orange River. These watercourses constitute the main surface water flow paths of the small local catchment towards the river. From a hydrological perspective, the watercourses therefore form an important part of the local surface water catchment and drainage.

Although the proposed transmission line route does not fall within any Important Bird Areas (IBA) (see under heading 9.3), the increased woody densities associated with the watercourses potentially provide important refuge and locally distinct habitat for common and habitat-specific bird-, reptilian-, small antelope- as well as other mammalian species. The watercourses are therefore viewed as being of low to moderate conservational significance/value, from a semi-aquatic ecological perspective.

The significant watercourses scored a moderate Ecological Importance and Sensitivity (EIS) value and are viewed as being of moderate conversational significance/value for habitat preservation and ecological functionality persistence in support of the surrounding ecosystem, Critical Biodiversity Area one and two (CBA 1 & 2) as well as the ecological functionality and -integrity of the local and broader quaternary surface water catchment- and drainage area.

The proposed transmission line will respectively traverse a single (1) and five (5) small first-order ephemeral preferential water flow paths/drainage lines on the western and eastern sides of the Orange River. These flow paths/drainage lines assist with channelling and discharging surface water runoff into the significant watercourses associated with the proposed development. The flow paths/drainage lines therefore merely play an assisting role in the small local catchment towards the river and are not viewed as being of high conservational significance, from a hydrological perspective.

The flow paths/drainage lines are merely viewed as being of low conservational significance/value, from a semi-aquatic ecological perspective.

The flow paths/drainage lines scored a moderate to low/marginal Ecological Importance and Sensitivity (EIS) value and are merely viewed as being of low conversational significance/value for habitat preservation and ecological functionality persistence in support of the surrounding ecosystem, Critical Biodiversity Area one and two (CBA 1 & 2) as well as the ecological functionality and -integrity of the local and broader quaternary surface water catchment- and drainage area.

Transformation of an aquatic Critical Biodiversity Area one and two (CBA 1 & 2), associated with the important ecological corridor that runs along the Orange River as well as terrestrial and aquatic alien invasive species establishment within the Orange River, were identified and addressed as significant potential long-term aquatic ecological impacts, associated with the construction phase of the proposed development.

Once the construction phase of the proposed development has been completed, the subsequent operational phase should not result in any significant additional potential aquatic ecological impacts, apart from the potential long-term aquatic ecological impacts, as discussed under heading 10.1.

The significant potential long-term aquatic ecological impacts identified for the proposed development, could potentially merely add low to moderate cumulative impact to existing negative impacts caused by the extensive existing agricultural cultivation transformation, along the local and broader length of the Orange River.

It is however the opinion of the specialist, by application of the NEMA Mitigation Hierarchy, that all the identified potential cumulative aquatic ecological impacts associated with the proposed development, can be suitably reduced and mitigated to within acceptable residual levels, by implementation of the recommended mitigation measures. It is therefore not anticipated that the proposed development will add any significant residual cumulative aquatic ecological impacts to the surrounding environment, if all recommended mitigation measures as per this aquatic ecological report are adequately implemented and managed, for both the construction- and operational phases of the proposed development.

**It is the opinion of the specialist from an aquatic ecological and hydrological perspective, that the proposed development of the assessment area should be considered by the competent authority for Environmental Authorisation and approval. All recommended mitigation measures as per this aquatic ecological report must however be adequately implemented and managed for both the construction and operational phases of the proposed development. All necessary authorisations, permits and licenses must also be obtained prior to the commencement of any construction.**

#### **10.4. Risk Ratings of Potential Aquatic Ecological Impacts**

The following section provides the Environmental Risk as well as the Environmental Significance Ratings for the potential aquatic ecological impacts associated with the proposed development, both before and after implementation of the recommended mitigation measures.

## 10.4.1. Construction Phase

**Table 10: Environmental Risk and Significance Ratings**

	<b>Orange River</b>	<b>Significant watercourses</b>	<b>Preferential water flow paths/drainage lines</b>
<b>Identified Environmental Impact</b>	<b>Transformation of an aquatic Critical Biodiversity Area one and two (CBA 1 &amp; 2), associated with the important ecological corridor that runs along the Orange River</b>		
<b>Magnitude of Negative or Positive Impact</b>	Low (4)	Low (4)	Very low (2)
<b>Duration of Negative or Positive Impact</b>	Long term (4)	Long term (4)	Long term (4)
<b>Extent of Positive or Negative Impact</b>	Regional (3)	Regional (3)	Local (2)
<b>Irreplaceability of Natural Resources being impacted upon</b>	High (4)	Moderate (3)	Low (2)
<b>Reversibility of Impact</b>	Low (4)	Low (4)	Low (4)
<b>Probability of Impact Occurrence</b>	Medium (3)	Medium (3)	Low (2)
<b>Cumulative Impact Rating prior to mitigation</b>	Medium	Low	Low

<b>Environmental Significance Score and Rating prior to mitigation</b>	Medium (57)	Medium (54)	Low (28)
<b>Mitigation Measures to be implemented</b>	<p><b>Vegetation clearance must be restricted to the pylon locations and the narrow linear route of the proposed transmission line access/service road, as far as practicably possible.</b></p> <p>The proposed linear development construction footprint must be kept as small as practicably possible to reduce the surface impact on surrounding vegetation and no unnecessary/unauthorised footprint expansion into the local or broader natural landscape surrounding the proposed linear development area, may take place.</p> <p>No site construction basecamps may be established within the local or broader natural landscape surrounding the proposed linear development area.</p> <p>Adequately cordon off the proposed linear development construction footprint area and ensure that no construction activities, -machinery or -equipment operate or impact within the local or broader surrounding natural landscape outside the cordoned off area.</p> <p>Adequate operational procedures for construction machinery and equipment must be developed in order to strictly govern and restrict movement of machinery only within the proposed linear development construction footprint area and to ensure environmentally responsible construction practices and activities.</p>		

	<p>Existing roads and farm tracks in close proximity to the proposed linear development construction footprint area, must be used during the construction phase. No new temporary roads or tracks may be constructed or implemented through the local or broader natural landscape surrounding the proposed linear development area.</p> <p><b>Disturbed areas within and immediately surrounding the proposed Orange River, watercourse and flow path/drainage line crossings, must be adequately rehabilitated concurrently with the construction processes. A Rehabilitation Management Plan must be compiled by a suitably qualified and experienced ecologist.</b></p> <p><b>From an aquatic ecological perspective, it is the opinion of the specialist that the proposed development does not warrant the requirement of a Biodiversity Offset area to be identified or assessed, for the proposed transformation of the relevant CBA 1 &amp; 2, as part of the NEMA mitigation hierarchy. The Northern Cape Department: Agriculture, Environmental Affairs, Rural Development and Land Reform must however provide a final decision in this regard.</b></p>		
<b>Cumulative Impact Rating after mitigation implementation</b>	Low	Low	Low
<b>Environmental Significance Score and Rating after mitigation implementation</b>	Low (34)	Low (32)	Low (13)

	Orange River	Significant watercourses	Preferential water flow paths/drainage lines
Identified Environmental Impact	Disturbance of-/damage to aquatic and semi-aquatic faunal habitats, associated with the Orange River and identified watercourses		
Magnitude of Negative or Positive Impact	Low (4)	Low (4)	-
Duration of Negative or Positive Impact	Long term (4)	Long term (4)	-
Extent of Positive or Negative Impact	Local (2)	Local (2)	-
Irreplaceability of Natural Resources being impacted upon	High (4)	Moderate (3)	-
Reversibility of Impact	Low (4)	Low (4)	-
Probability of Impact Occurrence	Medium (3)	Medium (3)	-
Cumulative Impact Rating prior to mitigation	Low	Low	-
Environmental Significance Score and Rating prior to mitigation	Medium (54)	Medium (51)	-



<p>Mitigation Measures to be implemented</p>	<p>Vegetation clearance must be restricted to the pylon locations and the narrow linear route of the proposed transmission line access/service road, as far as practicably possible.</p> <p>It is recommended that no pylons may be constructed within the Orange River riparian zone. This must be done in order to prevent significant disturbance of the riparian zone and its associated conservationally important and locally distinct faunal habitat and to subsequently maintain/ensure the ecological functionality and -integrity of the riparian zone, over time.</p> <p>It is recommended that the pylons on the eastern and western sides of the Orange River to cross the river, be placed parallel with the existing pylon locations of the existing Eskom line, as these have been constructed a suitable distance away from the riparian zone.</p> <p>It is furthermore recommended that the transmission line be suspended as high as practicably possible across the Orange River and that adequate bird deflecting/deviation technologies be implemented along the transmission line. This must be done in order to attempt to prevent significant collision- and mortality risks to waterbirds and other avifauna that utilise the river.</p> <p>It is recommended that no pylons may be constructed inside- or within 35 m of any significant watercourse. The development design layouts of the proposed transmission line must allow for continued flow through the watercourses. This must be done in order to maintain/ensure their ecological functionality and -integrity over time.</p> <p>It is recommended that no pylons may be constructed inside- or within 20 m of any preferential water flow path/drainage line. The development design layouts of the proposed transmission line must allow for continued flow through the flow paths/drainage lines. This must be done in order to maintain/ensure their ecological functionality and -integrity over time.</p>
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**It is recommended that the pylons be placed parallel with the existing pylon locations of the existing Eskom line, as far as practicably possible, as these have been constructed a suitable distance away from the watercourses and flow paths/drainage lines.**

The proposed linear development construction footprint must be kept as small as practicably possible to reduce the surface impact on surrounding vegetation and no unnecessary/unauthorised footprint expansion into the local or broader natural landscape surrounding the proposed linear development area, may take place.

No site construction basecamps may be established within the local or broader natural landscape surrounding the proposed linear development area.

Adequately cordon off the proposed linear development construction footprint area and ensure that no construction activities, -machinery or -equipment operate or impact within the local or broader surrounding natural landscape outside the cordoned off area.

Adequate operational procedures for construction machinery and equipment must be developed in order to strictly govern and restrict movement of machinery only within the proposed linear development construction footprint area and to ensure environmentally responsible construction practices and activities.

Existing roads and farm tracks in close proximity to the proposed linear development construction footprint area, must be used during the construction phase. No new temporary roads or tracks may be constructed or implemented through the local or broader natural landscape surrounding the proposed linear development area.

	Disturbed areas within and immediately surrounding the proposed Orange River, watercourse and flow path/drainage line crossings, must be adequately rehabilitated concurrently with the construction processes. A Rehabilitation Management Plan must be compiled by a suitably qualified and experienced ecologist.		
<b>Cumulative Impact Rating after mitigation implementation</b>	Low	Low	-
<b>Environmental Significance Score and Rating after mitigation implementation</b>	Low (15)	Low (14)	-
	<b>Orange River</b>	<b>Significant watercourses</b>	<b>Preferential water flow paths/drainage lines</b>
<b>Identified Environmental Impact</b>	Terrestrial and aquatic alien invasive species establishment within the Orange River, identified watercourses and preferential water flow paths/drainage lines		
<b>Magnitude of Negative or Positive Impact</b>	Medium (6)	Low (4)	Very low (2)
<b>Duration of Negative or Positive Impact</b>	Long term (4)	Long term (4)	Long term (4)
<b>Extent of Positive or Negative Impact</b>	Regional (3)	Regional (3)	Local (2)

<b>Irreplaceability of Natural Resources being impacted upon</b>	High (4)	Moderate (3)	Low (2)
<b>Reversibility of Impact</b>	Moderate (3)	High (2)	High (2)
<b>Probability of Impact Occurrence</b>	High (4)	Medium (3)	Low (2)
<b>Cumulative Impact Rating prior to mitigation</b>	Medium	Low	Low
<b>Environmental Significance Score and Rating prior to mitigation</b>	Medium-High (80)	Low (48)	Low (24)
<b>Mitigation Measures to be implemented</b>	<p>Implement an adequate Alien Invasive Species Management and Prevention Plan during the construction and operational phases. Such a Management Plan must be compiled by a suitably qualified and experienced ecologist.</p> <p><b>It is recommended that all individuals of the identified alien invasive species must be actively eradicated from the Orange River riparian zone and the relevant watercourse, in accordance with the requirements of the National Environmental Management: Biodiversity Act (Act 10 of 2004); Alien and Invasive Species Regulations, 2014. Removed materials must also be adequately and lawfully disposed of, in order to prevent potential further spreading/dispersal.</b></p> <p><b>Vegetation clearance must be restricted to the pylon locations and the narrow linear route of the proposed transmission line access/service road, as far as practicably possible.</b></p>		

It is recommended that no pylons may be constructed within the Orange River riparian zone. This must be done in order to prevent significant disturbance of the riparian zone and its associated conservationally important and locally distinct faunal habitat and to subsequently maintain/ensure the ecological functionality and -integrity of the riparian zone, over time.

It is recommended that the pylons on the eastern and western sides of the Orange River to cross the river, be placed parallel with the existing pylon locations of the existing ESKOM line, as these have been constructed a suitable distance away from the riparian zone.

It is recommended that no pylons may be constructed inside- or within 35 m of any significant watercourse. The development design layouts of the proposed transmission line must allow for continued flow through the watercourses. This must be done in order to maintain/ensure their ecological functionality and -integrity over time.

It is recommended that no pylons may be constructed inside- or within 20 m of any preferential water flow path/drainage line. The development design layouts of the proposed transmission line must allow for continued flow through the flow paths/drainage lines. This must be done in order to maintain/ensure their ecological functionality and -integrity over time.

It is recommended that the pylons be placed parallel with the existing pylon locations of the existing ESKOM line, as far as practicably possible, as these have been constructed a suitable distance away from the watercourses and flow paths/drainage lines.

Disturbed areas within and immediately surrounding the proposed Orange River, watercourse and flow path/drainage line crossings, must be adequately rehabilitated concurrently with the construction processes. A Rehabilitation Management Plan must be compiled by a suitably qualified and experienced ecologist.

<b>Cumulative Impact Rating after mitigation implementation</b>	Low	Low	Low
<b>Environmental Significance Score and Rating after mitigation implementation</b>	Low (34)	Low (24)	Low (11)
	<b>Orange River</b>	<b>Significant watercourses</b>	<b>Preferential water flow paths/drainage lines</b>
<b>Identified Environmental Impact</b>	<b>Contamination of the Orange River by surface material erosion</b>		
<b>Magnitude of Negative or Positive Impact</b>	Very low (2)	-	-
<b>Duration of Negative or Positive Impact</b>	Short term (2)	-	-
<b>Extent of Positive or Negative Impact</b>	Regional (3)	-	-
<b>Irreplaceability of Natural Resources being impacted upon</b>	High (4)	-	-
<b>Reversibility of Impact</b>	Moderate (3)	-	-

<b>Probability of Impact Occurrence</b>	Low (2)	-	-
<b>Cumulative Impact Rating prior to mitigation</b>	Low	-	-
<b>Environmental Significance Score and Rating prior to mitigation</b>	Low (28)	-	-
<b>Mitigation Measures to be implemented</b>	<p>Vegetation clearance must be restricted to the pylon locations and the narrow linear route of the proposed transmission line access/service road, as far as practicably possible.</p> <p>An adequate Stormwater and Erosion Management Plan must also be implemented during the construction- and operational phases of the proposed development, in order to assist with and allow for continued flow within the local catchment. This must be done to sufficiently manage storm water runoff and clean/dirty water separation in order to attempt to maintain/ensure the ecological functionality and -integrity of the local and broader quaternary surface water catchment- and drainage area.</p> <p>It is recommended that no pylons may be constructed within the Orange River riparian zone. This must be done in order to prevent significant disturbance of the riparian zone and its associated conservationally important and locally distinct faunal habitat and to subsequently maintain/ensure the ecological functionality and -integrity of the riparian zone, over time.</p> <p>It is recommended that the pylons on the eastern and western sides of the Orange River to cross the river, be placed parallel with the existing pylon locations of the existing ESKOM line, as these have been constructed a suitable distance away from the riparian zone.</p>		

	<p>It is recommended that no pylons may be constructed inside- or within 35 m of any significant watercourse. The development design layouts of the proposed transmission line must allow for continued flow through the watercourses. This must be done in order to maintain/ensure their ecological functionality and -integrity over time.</p> <p>It is recommended that no pylons may be constructed inside- or within 20 m of any preferential water flow path/drainage line. The development design layouts of the proposed transmission line must allow for continued flow through the flow paths/drainage lines. This must be done in order to maintain/ensure their ecological functionality and -integrity over time.</p> <p>It is recommended that the pylons be placed parallel with the existing pylon locations of the existing Eskom line, as far as practicably possible, as these have been constructed a suitable distance away from the watercourses and flow paths/drainage lines.</p> <p>Disturbed areas within and immediately surrounding the proposed Orange River, watercourse and flow path/drainage line crossings, must be adequately rehabilitated concurrently with the construction processes. A Rehabilitation Management Plan must be compiled by a suitably qualified and experienced ecologist.</p>		
<p><b>Cumulative Impact Rating after mitigation implementation</b></p>	<p>Low</p>	<p>-</p>	<p>-</p>
<p><b>Environmental Significance Score and Rating after mitigation implementation</b></p>	<p>Low (12)</p>	<p>-</p>	<p>-</p>



	Orange River	Significant watercourses	Preferential water flow paths/drainage lines
<b>Identified Environmental Impact</b>	<b>Contamination of the Orange River by dust generation and emissions</b>		
<b>Magnitude of Negative or Positive Impact</b>	Very low (2)	-	-
<b>Duration of Negative or Positive Impact</b>	Short term (2)	-	-
<b>Extent of Positive or Negative Impact</b>	Regional (3)	-	-
<b>Irreplaceability of Natural Resources being impacted upon</b>	High (4)	-	-
<b>Reversibility of Impact</b>	Moderate (3)	-	-
<b>Probability of Impact Occurrence</b>	Low (2)	-	-
<b>Cumulative Impact Rating prior to mitigation</b>	Low	-	-
<b>Environmental Significance Score and Rating prior to mitigation</b>	Low (28)	-	-

<p style="text-align: center;"><b>Mitigation Measures to be implemented</b></p>	<p>Implement suitable dust management and prevention measures during the construction phase of the proposed development.</p> <p>Construction areas and –roads to be sufficiently wetted down during the construction phase in order to prevent significant fugitive dust emissions.</p> <p>Adequate operational procedures for machinery and equipment must be developed to strictly govern and restrict movement of machinery, in order to avoid unnecessary fugitive dust emissions and ensure environmentally responsible construction practices and activities.</p> <p><b>Vegetation clearance must be restricted to the pylon locations and the narrow linear route of the proposed transmission line access/service road, as far as practicably possible.</b></p> <p><b>It is recommended that no pylons may be constructed within the Orange River riparian zone. This must be done in order to prevent significant disturbance of the riparian zone and its associated conservationally important and locally distinct faunal habitat and to subsequently maintain/ensure the ecological functionality and -integrity of the riparian zone, over time.</b></p> <p><b>It is recommended that the pylons on the eastern and western sides of the Orange River to cross the river, be placed parallel with the existing pylon locations of the existing Eskom line, as these have been constructed a suitable distance away from the riparian zone.</b></p> <p><b>Disturbed areas within and immediately surrounding the proposed Orange River, watercourse and flow path/drainage line crossings, must be adequately rehabilitated concurrently with the construction processes. A Rehabilitation Management Plan must be compiled by a suitably qualified and experienced ecologist.</b></p>
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<b>Cumulative Impact Rating after mitigation implementation</b>	Low	-	-
<b>Environmental Significance Score and Rating after mitigation implementation</b>	Low (12)	-	-
	<b>Orange River</b>	<b>Significant watercourses</b>	<b>Preferential water flow paths/drainage lines</b>
<b>Identified Environmental Impact</b>	<b>Impeding and contamination of the flow regimes of the identified watercourses and preferential water flow paths/drainage lines, within the associated local and broader quaternary surface water catchment- and drainage area</b>		
<b>Magnitude of Negative or Positive Impact</b>	-	Low (4)	Very low (2)
<b>Duration of Negative or Positive Impact</b>	-	Short term (2)	Short term (2)
<b>Extent of Positive or Negative Impact</b>	-	Regional (3)	Local (2)
<b>Irreplaceability of Natural Resources being impacted upon</b>	-	Moderate (3)	Low (2)
<b>Reversibility of Impact</b>	-	Low (4)	Low (4)

<b>Probability of Impact Occurrence</b>	-	Medium (3)	Low (2)
<b>Cumulative Impact Rating prior to mitigation</b>	-	Low	Low
<b>Environmental Significance Score and Rating prior to mitigation</b>	-	Low (48)	Low (24)
<b>Mitigation Measures to be implemented</b>	<p><b>Vegetation clearance must be restricted to the pylon locations and the narrow linear route of the proposed transmission line access/service road, as far as practicably possible.</b></p> <p><b>An adequate Stormwater and Erosion Management Plan must also be implemented during the construction- and operational phases of the proposed development, in order to assist with and allow for continued flow within the local catchment. This must be done to sufficiently manage storm water runoff and clean/dirty water separation in order to attempt to maintain/ensure the ecological functionality and -integrity of the local and broader quaternary surface water catchment- and drainage area.</b></p> <p><b>It is recommended that no pylons may be constructed inside- or within 35 m of any significant watercourse. The development design layouts of the proposed transmission line must allow for continued flow through the watercourses. This must be done in order to maintain/ensure their ecological functionality and -integrity over time.</b></p> <p><b>It is recommended that no pylons may be constructed inside- or within 20 m of any preferential water flow path/drainage line. The development design layouts of the proposed transmission line must allow for continued flow through the flow paths/drainage lines. This must be done in order to maintain/ensure their ecological functionality and -integrity over time.</b></p>		

	<p>It is recommended that the pylons be placed parallel with the existing pylon locations of the existing Eskom line, as far as practicably possible, as these have been constructed a suitable distance away from the watercourses and flow paths/drainage lines.</p> <p>Disturbed areas within and immediately surrounding the proposed Orange River, watercourse and flow path/drainage line crossings, must be adequately rehabilitated concurrently with the construction processes. A Rehabilitation Management Plan must be compiled by a suitably qualified and experienced ecologist.</p> <p>If hydrocarbons or other chemicals are to be stored on site during the construction phase, the storage areas must be situated as far away as practicably/feasibly possible from the Orange River, watercourses and flow paths/drainage lines.</p> <p>Hydrocarbon and other chemical storage areas must be adequately bunded in order to be able to contain a minimum of 150 % of the capacity of storage tanks/units.</p> <p>Adequate hydrocarbon and other chemical storage, handling, usage and spillage clean-up procedures must be developed and all relevant construction personnel must be sufficiently trained on- and apply these procedures during the entire construction phase.</p> <p>Spill kits must be readily available on the construction site. All employees must be adequately trained on the correct procedure and use of the spill kits.</p>		
<p><b>Cumulative Impact Rating after mitigation implementation</b></p>	<p>-</p>	<p>Low</p>	<p>Low</p>
<p><b>Environmental Significance Score and Rating after mitigation implementation</b></p>	<p>-</p>	<p>Low (12)</p>	<p>Low (11)</p>

## 10.4.2. Operational Phase

**Table 11: Environmental Risk and Significance Ratings**

	<b>Orange River</b>	<b>Significant watercourses</b>	<b>Preferential water flow paths/drainage lines</b>
<b>Identified Environmental Impact</b>	<b>Continued collisions and mortality of waterbirds and other avifauna that utilise the Orange River</b>		
<b>Magnitude of Negative or Positive Impact</b>	Low (4)	Very low (2)	-
<b>Duration of Negative or Positive Impact</b>	Medium term (3)	Medium term (3)	-
<b>Extent of Positive or Negative Impact</b>	Local (2)	Local (2)	-
<b>Irreplaceability of Natural Resources being impacted upon</b>	Moderate (3)	Moderate (3)	-
<b>Reversibility of Impact</b>	Low (4)	Low (4)	-
<b>Probability of Impact Occurrence</b>	Medium (3)	Medium (3)	-
<b>Cumulative Impact Rating prior to mitigation</b>	Low	Low	-

Environmental Significance Score and Rating prior to mitigation	Low (48)	Low (42)	-
Mitigation Measures to be implemented	<p>All the recommended mitigation measures for the construction phase must be adequately implemented and managed.</p> <p><b>The recommended bird deflecting/deviation technologies to be implemented along the transmission line, must be inspected on an annual basis and adequately maintained over time.</b></p>		
Cumulative Impact Rating after mitigation implementation	Low	Low	-
Environmental Significance Score and Rating after mitigation implementation	Low (30)	Low (13)	-

## 11. Summary and Conclusion

### Proposed Development Area Clearance

The proposed development will entail the formal construction of a 132 kV electrical transmission line of approximately 3.9 km in length and its associated access/service road. The proposed transmission line will mostly run parallel to an existing ESKOM line and will traverse the Orange River.

The proposed transmission line route mainly constitutes an undeveloped relatively natural landscape, although it will also traverse a portion of existing cultivated agricultural lands situated directly adjacent west of the Orange River.

The transmission line servitude will not be holistically cleared of vegetation. Only the pylon locations will be cleared, while woody tree and shrub individuals of  $\geq 2.5$  m in height will be cut or removed, if found to be present directly underneath the proposed transmission line or within a 3 m radius of a pylon location. It will also be maintained as such, over time.

A narrow linear farm track of approximately 4 m in width, will be cleared of vegetation underneath and all along the proposed transmission line, for the proposed access/service road. It will also be maintained as such, over time.

The mechanical clearance associated with the proposed development, will in all probability completely transform the majority of the existing surface vegetation within the narrow proposed linear development area. The size of the proposed linear development area is however negligible relative to the surrounding vast, continuous undeveloped natural landscape.



### **Vegetation Type and Conservation Status**

According to SANBI (2006-2019), the majority of the proposed linear development area traverses the Bushmanland Arid Grassland vegetation type (NKb 3). This vegetation type mainly consists of extensive to irregular plains on a slightly sloping plateau sparsely vegetated by grassland and mostly dominated by white grasses such as *Stipagrostis* species (SANBI, 2006-2019). The vegetation type has the characteristics of semi desert (SANBI, 2006-2019).

The central portion of the proposed transmission line route which traverses the Orange River, however forms part of the Lower Gariep Alluvial vegetation type (AZa 3) (SANBI, 2006-2019). This vegetation type mainly consists of flat alluvial terraces and riverine islands, supporting a complex of riparian thickets, reed beds as well as flooded grasslands and herblands, which populate sandbanks and terraces along the length of the river (SANBI, 2006-2019).

Both of these vegetation types are classified as Least Concerned (SANBI, 2006-2019).

The majority of the proposed linear development area falls within a Critical Biodiversity Area two (CBA 2), according to the Northern Cape Provincial Spatial Biodiversity Plan 2016 (NCPSBP). The central portion of the proposed transmission line route which traverses the Orange River, however falls within a Critical Biodiversity Area one (CBA 1), according to the Northern Cape Provincial Spatial Biodiversity Plan 2016 (NCPSBP).

From an aquatic perspective, the relevant CBA 1 & 2 are mainly associated with the important ecological corridor that runs along the Orange River.

### **Water Catchment and Drainage Information**

The proposed transmission line route falls within the Lower Orange Water Management Area (WMA 14) and the associated D73D quaternary surface water catchment- and drainage area.

### Watercourse Baseline Information

The central portion of the proposed transmission line route will traverse the Orange River, which flows in a north-westerly direction. The 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.

The portion of the Orange River which will be traversed by the proposed transmission line, possesses a distinct natural riparian zone with a well-defined high density woody tree and shrub thicket along the eastern bank. A further portion of thicket is present directly adjacent east of the natural riparian zone of the Orange River. This portion is however overwhelmingly dominated by the legally declared alien invasive species *Eucalyptus spp.* (Category 1b in riparian areas) and *Prosopis glandulosa* (Category 3 in the Northern Cape Province) and is therefore viewed as being transformed and not forming part of the natural riparian zone.

The riparian zone along the western bank of the portion of the Orange River to be traversed by the proposed transmission line, has been significantly transformed by the existing cultivated agricultural lands (see under heading 9.1). The remaining riparian zone does not possess a well-defined woody tree or shrub thicket, but rather constitutes a broad reed bed, which is mainly dominated by the hydrophytic graminoids species *Phragmites australis* and *Cyperus spp.*

The proposed transmission line route does not fall within any Important Bird Areas (IBA) as per the latest IBA map obtained from the Birdlife SA website (<https://www.birdlife.org.za/what-we-do/important-bird-and-biodiversity-areas/media-and-resources/#1553597171790-6f83422a-a731>). No conservationally significant or important waterbird species/nests or locally distinct avifaunal habitats were observed along the proposed transmission line route, during the site assessment or are expected to specifically utilise the proposed transmission line route as refuge or for breeding, foraging and/or persistence purposes. Only common local resident bird species/nests were observed in the local area.

Although this is the case, the high woody- and reed densities associated with the Orange River riparian zone highly likely provide important refuge and locally distinct habitat for common and habitat-specific waterbird-, amphibian-, small antelope- as well as other mammalian species. The riparian zone is therefore viewed as being of moderate to high conservational significance/value, from an aquatic ecological perspective.

### **Significant Watercourses**

The proposed transmission line will respectively traverse a single (1) and three (3) significant first- and second-order ephemeral watercourses on the western and eastern sides of the Orange River. These watercourses constitute the main surface water flow paths of the small local catchment towards the river. From a hydrological perspective, the watercourses therefore form an important part of the local surface water catchment and drainage.

Although the proposed transmission line route does not fall within any Important Bird Areas (IBA) (see under heading 9.3), the increased woody densities associated with the watercourses potentially provide important refuge and locally distinct habitat for common and habitat-specific bird-, reptilian-, small antelope- as well as other mammalian species. The watercourses are therefore viewed as being of low to moderate conservational significance/value, from a semi-aquatic ecological perspective.

### **Preferential Water Flow paths/Drainage Lines**

The proposed transmission line will respectively traverse a single (1) and five (5) small first-order ephemeral preferential water flow paths/drainage lines on the western and eastern sides of the Orange River. These flow paths/drainage lines assist with channelling and discharging surface water runoff into the significant watercourses associated with the proposed development. The flow paths/drainage lines therefore merely play an assisting role in the small local catchment towards the river and are not viewed as being of high conservational significance, from a hydrological perspective.

The flow paths/drainage lines are merely viewed as being of low conservational significance/value, from a semi-aquatic ecological perspective.

### **Buffer Zone- and Other Recommendations**

Vegetation clearance must be restricted to the pylon locations and the narrow linear route of the proposed transmission line access/service road, as far as practicably possible.

It is recommended that all individuals of the identified alien invasive species must be actively eradicated from the Orange River riparian zone and the relevant watercourse, in accordance with the requirements of the National Environmental Management: Biodiversity Act (Act 10 of 2004); Alien and Invasive Species Regulations, 2014. Removed materials must also be adequately and lawfully disposed of, in order to prevent potential further spreading/dispersal.

It is recommended that no pylons may be constructed within the Orange River riparian zone. This must be done in order to prevent significant disturbance of the riparian zone and its associated conservationally important and locally distinct faunal habitat and to subsequently maintain/ensure the ecological functionality and -integrity of the riparian zone, over time.

It is recommended that the pylons on the eastern and western sides of the Orange River to cross the river, be placed parallel with the existing pylon locations of the existing ESKOM line, as these have been constructed a suitable distance away from the riparian zone.

It is furthermore recommended that the transmission line be suspended as high as practicably possible across the Orange River and that adequate bird deflecting/deviation technologies be implemented along the transmission line. This must be done in order to attempt to prevent significant collision- and mortality risks to waterbirds and other avifauna that utilise the river.

It is recommended that no pylons may be constructed inside- or within 35 m of any significant watercourse. The development design layouts of the proposed transmission line must allow for continued flow through the watercourses. This must be done in order to maintain/ensure their ecological functionality and -integrity over time.

It is recommended that no pylons may be constructed inside- or within 20 m of any preferential water flow path/drainage line. The development design layouts of the proposed transmission line must allow for continued flow through the flow paths/drainage lines. This must be done in order to maintain/ensure their ecological functionality and -integrity over time.

It is recommended that the pylons be placed parallel with the existing pylon locations of the existing ESKOM line, as far as practicably possible, as these have been constructed a suitable distance away from the watercourses and flow paths/drainage lines.

Disturbed areas within and immediately surrounding the proposed Orange River-, watercourse- and flow path/drainage line crossings, must be adequately rehabilitated concurrently with the construction processes. A Rehabilitation Management Plan must be compiled by a suitably qualified and experienced ecologist.

An adequate Stormwater and Erosion Management Plan must also be implemented during the construction- and operational phases of the proposed development, in order to assist with and allow for continued flow within the local catchment. This must be done to sufficiently manage storm water runoff and clean/dirty water separation in order to attempt to maintain/ensure the ecological functionality and -integrity of the local and broader quaternary surface water catchment- and drainage area.

A Water Use License Application (WULA) must furthermore be submitted to the Department of Water and Sanitation (DWS), to request authorisation for the proposed development across the Orange River as well as through the four (4) watercourse- and six (6) flow path/drainage line crossings, associated with the proposed transmission line route, in accordance with the National Water Act (Act 36 of 1998).

From an aquatic ecological perspective, it is the opinion of the specialist that the proposed development does not warrant the requirement of a Biodiversity Offset area to be identified or assessed, for the proposed transformation of the relevant CBA 1 & 2, as part of the NEMA mitigation hierarchy. The Northern Cape Department: Agriculture, Environmental Affairs, Rural Development and Land Reform must however provide a final decision in this regard.

## Conclusion

The significant watercourses scored a moderate Ecological Importance and Sensitivity (EIS) value and are viewed as being of moderate conversational significance/value for habitat preservation and ecological functionality persistence in support of the surrounding ecosystem, Critical Biodiversity Area one and two (CBA 1 & 2) as well as the ecological functionality and -integrity of the local and broader quaternary surface water catchment- and drainage area.

The flow paths/drainage lines scored a moderate to low/marginal Ecological Importance and Sensitivity (EIS) value and are merely viewed as being of low conversational significance/value for habitat preservation and ecological functionality persistence in support of the surrounding ecosystem, Critical Biodiversity Area one and two (CBA 1 & 2) as well as the ecological functionality and -integrity of the local and broader quaternary surface water catchment- and drainage area.

Transformation of an aquatic Critical Biodiversity Area one and two (CBA 1 & 2), associated with the important ecological corridor that runs along the Orange River as well as terrestrial and aquatic alien invasive species establishment within the Orange River, were identified and addressed as significant potential long-term aquatic ecological impacts, associated with the construction phase of the proposed development.

Once the construction phase of the proposed development has been completed, the subsequent operational phase should not result in any significant additional potential aquatic ecological impacts, apart from the potential long-term aquatic ecological impacts, as discussed under heading 10.1.

The significant potential long-term aquatic ecological impacts identified for the proposed development, could potentially merely add low to moderate cumulative impact to existing negative impacts caused by the extensive existing agricultural cultivation transformation, along the local and broader length of the Orange River.

It is however the opinion of the specialist, by application of the NEMA Mitigation Hierarchy, that all the identified potential cumulative aquatic ecological impacts associated with the proposed development, can be suitably reduced and mitigated to within acceptable residual levels, by implementation of the recommended mitigation measures. It is therefore not anticipated that the proposed development will add any significant residual cumulative aquatic ecological impacts to the surrounding environment, if all recommended mitigation measures as per this aquatic ecological report are adequately implemented and managed, for both the construction- and operational phases of the proposed development.

**It is the opinion of the specialist from an aquatic ecological and hydrological perspective, that the proposed development of the assessment area should be considered by the competent authority for Environmental Authorisation and approval. All recommended mitigation measures as per this aquatic ecological report must however be adequately implemented and managed for both the construction and operational phases of the proposed development. All necessary authorisations, permits and licenses must also be obtained prior to the commencement of any construction.**

## 12. References

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