ASSESSMENT, IDENTIFICATION AND DELINEATION OF AQUATIC RESOURCES ASSOCIATED WITH PROPOSED NEW ESKOM KLIPKOP-LEHATING 132KV POWERLINE, NORTHERN CAPE

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SYNOPSIS :

The report contains the results of the aquatic assessment undertaken in July 2015 for aquatic resources associated with the construction of the Klipkop-Lehating 132KV powerline

KEY WORDS :

Klipkop-Lehating, Wetlands

QUALITY VERIFICATION

This report has been prepared under the controls established by a quality management system that meets the requirements of ISO9001: 2008 which has been independently certified by DEKRA Certification under certificate number 90906882

Verification	Capacity	Name	Signature	Date
By Author	Senior Aquatic Scientist	Martin Ferreira		
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It is the intention of Eskom Distributions, Northern Cape Operating Unit, to construct the new Klipkop-Lehating 132 kV Single Circuit Chickadee powerline (±14km in length), between the new Lehating Substation and the existing Klipkop Substation, in the Northern Cape Province. The Klipkop Substation is situated 12km North West of Hotazel, and the Lehating Substation will be situated approximately 14km North of the existing Klipkop Substation. In addition, the new Klipkop-Lehating Line will loop in and out of the existing Wessels Substation. These loop-in and loop-out lines also form part of this proposed project. Three (3) powerline route alternatives were assessed as part of the Environmental Authorisation Process.

Jeffares and Green (Pty) Ltd Engineering and Environmental Consultants have been appointed by Eskom Distributions, Northern Cape Operating Unit, as the independent Environmental Assessment Practitioner to undertake the Environmental Basic Assessment and Water Use License Application processes for this project. Jeffares and Green (Pty) Ltd were also appointed to undertake an assessment of water resources which may be potentially affected by the proposed project.

The study area is located near the town of Hotazel, in the Northern Cape. This project study area is located within the Lower Vaal Water Management Area (WMA) and within the D41M quaternary catchment. According to the NFEPA database, the study area is considered a River FEPA. River FEPAs achieve biodiversity targets for river ecosystems and threatened/near-threatened fish species, and were identified in rivers that are currently in a good condition (A or B ecological categories).

A desktop assessment undertaken for the proposed project indicates the possible presence of two wetlands. Both these wetlands were verified during a field survey and include a wetland flat (associated with the powerline construction) and a floodplain wetland.

The catchment associated with the various wetlands and rivers in the study area has already been transformed to a certain extent. The upper reaches of the Kuruman River have been altered by the increase in hardened surfaces due to the development of the town of Kuruman. Informal settlements such as Batlharo, Maruping and Mamoratwe with associated infrastructure (roads and bridges) contribute to alterations in hydrology and possibly water quality in the upper reaches. There is erosion within the larger catchment, due to several roads that have been constructed and livestock grazing. All the above contributed to changes in vegetation and sediment availability within the catchment.

As a result, the hydrology, geomorphology and vegetation have been altered when compared to reference conditions. In addition to these already impacting factors the water quality of the wetlands could also be potentially be altered during the construction and operation phases of

the project. The risk of the potential impacts is low or very low and impacts can be generally easily mitigated. Mitigation measures have been suggested in the report. The most important of which is the construction of the powerlines during the dry season, the spanning of wetlands where possible and the maintenance of buffer zones.

1 INTRODUCTION

It is the intention of Eskom Distributions, Northern Cape Operating Unit, to construct the new Klipkop-Lehating 132 kV Single Circuit Chickadee powerline (±14km in length) between the new Lehating Substation and the existing Klipkop Substation, in the Northern Cape Province. The Klipkop Substation is situated 12km North West of Hotazel, and the Lehating Substation will be situated approximately 14km North of the existing Klipkop Substation. In addition, the new Klipkop-Lehating Line will loop in and out of the existing Wessels Substation. These loop-in and loop-out lines also forms part of this proposed project. Three (3) powerline route alternatives were assessed as part of the Environmental Authorisation Process.

Jeffares and Green (Pty) Ltd Engineering and Environmental Consultants have been appointed by Eskom Distributions Northern Cape Operating Unit, as the independent Environmental Assessment Practitioner to undertake the Environmental Basic Assessment and Water Use License Application processes for this project. Jeffares and Green (Pty) Ltd were also appointed to undertake an assessment of water resources which may be potentially affected by the proposed project.

2 ASSUMPTIONS AND REQUIREMENTS

- This study has focused on the identification and delineation of wetlands within the proposed project area. A full delineation and mapping of all wetlands outside of the study area has not been undertaken.
- This report does not include any detailed analysis of water quality.
- This report does not include any data collection in terms of population dynamics or red data list flora.
- The survey was undertaken during the dry season.

3 PROJECT DESCRIPTION

3.1 Project Proponent and Overview

It is the intention of Eskom Distributions, Northern Cape Operating to construct the new Klipkop-Lehating 132 kV Single Circuit Chickadee powerline (±14km in length) between the new Lehating Substation and the existing Klipkop Substation, Northern Cape Province. The Klipkop substation is situated 12km North West of Hotazel, and the Lehating Substation will be situated approximately 14km north of the existing Klipkop Substation. In addition the new Klipkop-Lehating Line will loop in and out of the existing Wessels Substation. These loop-in and loop-out lines also forms part of this proposed project. Three (3) powerline route alternatives will be assessed as part of this Environmental Authorisation Process (Refer to Figure 4-1).

3.2 Project need and Desirability

Lehating Mining (Pty) Ltd appointed SLR Consulting to undertake an Environmental Authorisation process for the establishment of the Lehating Mine on Portion 1 of the Farm Lehating 741. The Northern Cape Department of Environment and Nature Conservation granted authorisation for the establishment of the mine on the 22nd of September 2014 (Ref No: NC/EIA/JIC/JOE/LEH2/2012). The construction of the Lehating Substation formed part of the application which was undertaken by SLR Consulting and authorisation was therefore obtained for the construction of the substation. Lehating Mining (Pty) Ltd approached Eskom Distributions, Northern Cape Operating Unit to assist with the supply of electricity to the new substation. The Klipkop Substation is ideally situated to provide electricity supply to the Lehating Substation.

4 STUDY AREA

The study area is located near the town of Hotazel, in the Northern Cape, with the Klipkop Substation situated at S 27.136391° E 22.844326°.

4.1 Background

This project study area is located within the Lower Vaal Water Management Area (WMA) and within the D41M quaternary catchment. The Lower Vaal WMA is dependent on water releases from the Middle Vaal WMA for meeting the bulk of the water requirements by the urban, mining and industrial sectors within its area of jurisdiction, with local resources mainly used for irrigation and in smaller towns. Water quality in the Lower Vaal is strongly influenced by usage and management practices in the Upper and Middle Vaal WMA. Climatic conditions are fairly uniform from east to west across the study area. The mean annual temperature (MAP) ranges between 18.3ºC in the East to 17.4ºC in the West. Maximum temperatures are experienced in January and minimum temperatures usually occur in July (DWAF, 2004). Rainfall is strongly seasonal with most rain occurring in the summer period (October to April). The peak rainfall months are December and January. Rainfall occurs generally as convective thunderstorms and is sometimes accompanied by hail. The overall range of the MAP for the entire WMA is 100 mm to 500 mm. Average gross potential mean annual evaporation ranges from 2 646 mm to 2 690 mm in the Lower Vaal WMA. The highest evaporation occurs in December and ranges between 300 mm and 380 mm (DWAF, 2004).

The total urban and rural population in this WMA is approximately 1,282,000 of which about 718,000 live in urban centres. The largest concentration of urban population is in Kimberley, with an estimated population of 204,000. There are large rural populations in the Lower Vaal, especially in the areas west of Mafikeng, around Kuruman, Pampierstad and Lichtenburg. Land use within the Lower Vaal WMA is dominated by stock farming (DWAF, 2004).

Table 4-1: Main characteristics of quaternary catchment B31B in which the study area is located.

Quaternary Catchment	D41M
Catchment size	2627 km^2
Mean Annual Precipitation	304.8 mm
Mean Annual Surface Runoff	3 mm
Potential Evaporation	2894.8 mm
Vegetation	Southern Kalahari Mekgacha and Kathu Bushveld
PES*	B (Largely Natural)
Ecological Importance	Moderate
Ecological Sensitivity	Very Low

*Based on DWS (2014)

4.2 Conservation Status

The conservation status of the aquatic resources (Figure 4-2) was assessed based on the National Freshwater Ecosystem Priority Areas (NFEPA). The NFEPA was completed during early 2011 and the goal of the project was to determine strategic spatial priorities for conserving freshwater ecosystems and supporting sustainable use of water resources. This does not mean that the rivers cannot be used for human needs, but that the rivers should be supported by good planning, decision-making and management, so that human use does not impact on the river ecosystem condition. The project outputs are in the form of numerous maps, indicating various different categories that each has different management implications. These categories include river FEPA's and associated sub-quaternary catchments, wetland FEPA's, wetland clusters, Fish Support Areas and associated sub-quaternary catchments, fish sanctuaries, Phase 2 FEPA's and associated sub-quaternary catchments and Upstream Management Areas (Driver et al., 2011).

According to the NFEPA database the study area is considered a River FEPA. River FEPAs achieve biodiversity targets for river ecosystems and threatened/near-threatened fish species, and were identified in rivers that are currently in a good condition (A or B ecological categories). Their FEPA status indicates that they should remain in a good condition in order to contribute to national biodiversity goals and support sustainable use of water resources. It is important to note that river FEPAs currently in an A or B ecological category may still require some rehabilitation effort, e.g. clearing of invasive alien plants and/or rehabilitation of river banks.

The vegetation within the study area is dominated by two vegetation units including the Southern Kalahari Mekgacha and the Kathu Bushveld (Figure 4-1). Both vegetation units are considered to be least threatened. The Kathu Bushveld vegetation type is conserved in statutory conservation area, but only approximately 1% has been transformed. Major activities that caused transformation include the iron ore mining locality at Sishen, one of the biggest open-cast mines in the world. The Southern Kalahari Mekgacha is also listed as least threatened. Approximately 18% is statutorily conserved in the Kgalagadi Transfrontier Park and Molopo Nature Reserve. The Mekgacha unit is under strong utilisation pressure, both from wildlife (to graze and for salt licks) and domestic animals (grazing, browsing and animal penning). The alien *Prosopis* species occur as invasive plants in places.

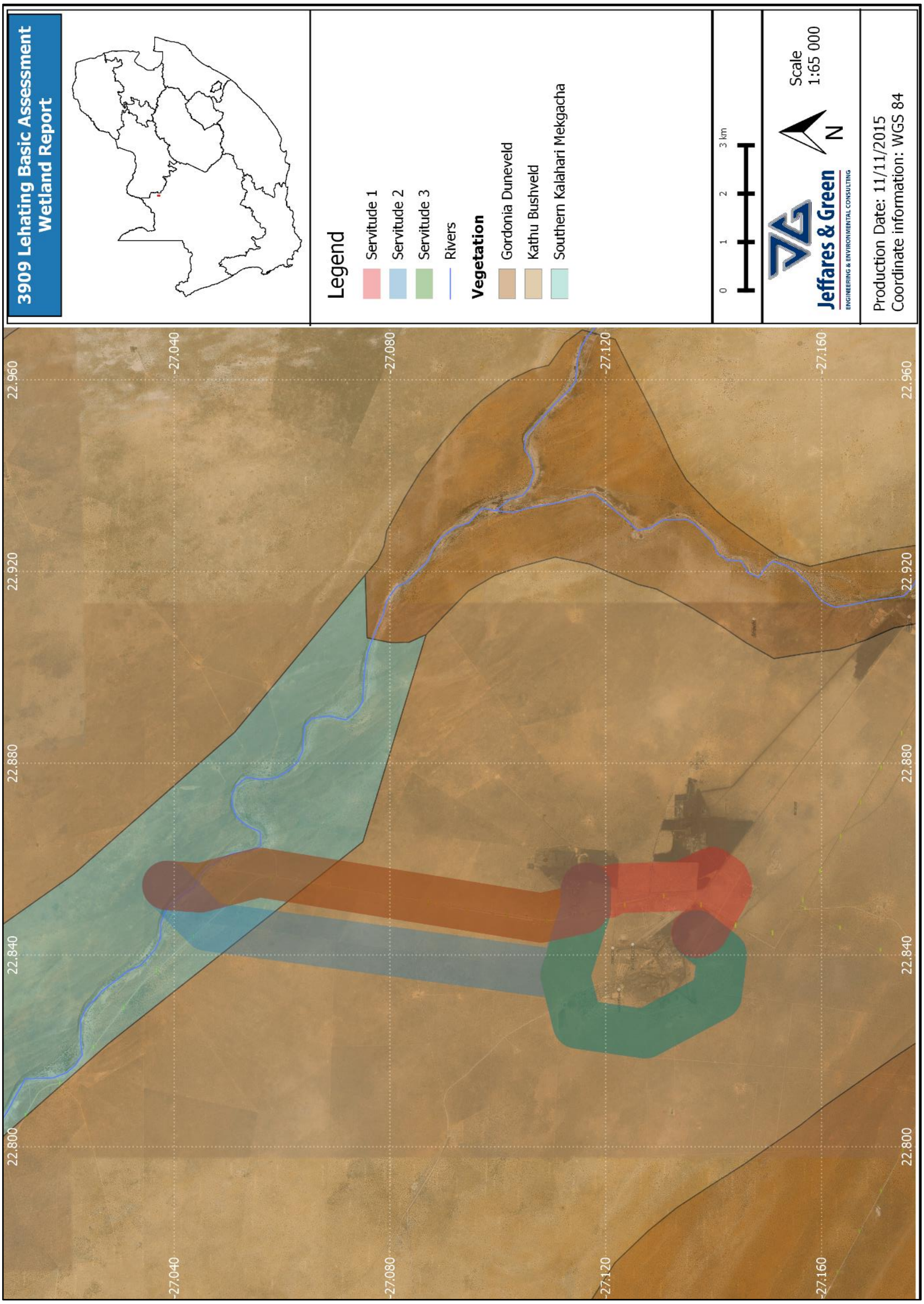

Figure 4-1 Map showing the dominant vegetation types within the study area according to Mucina and Rutherford (2006)

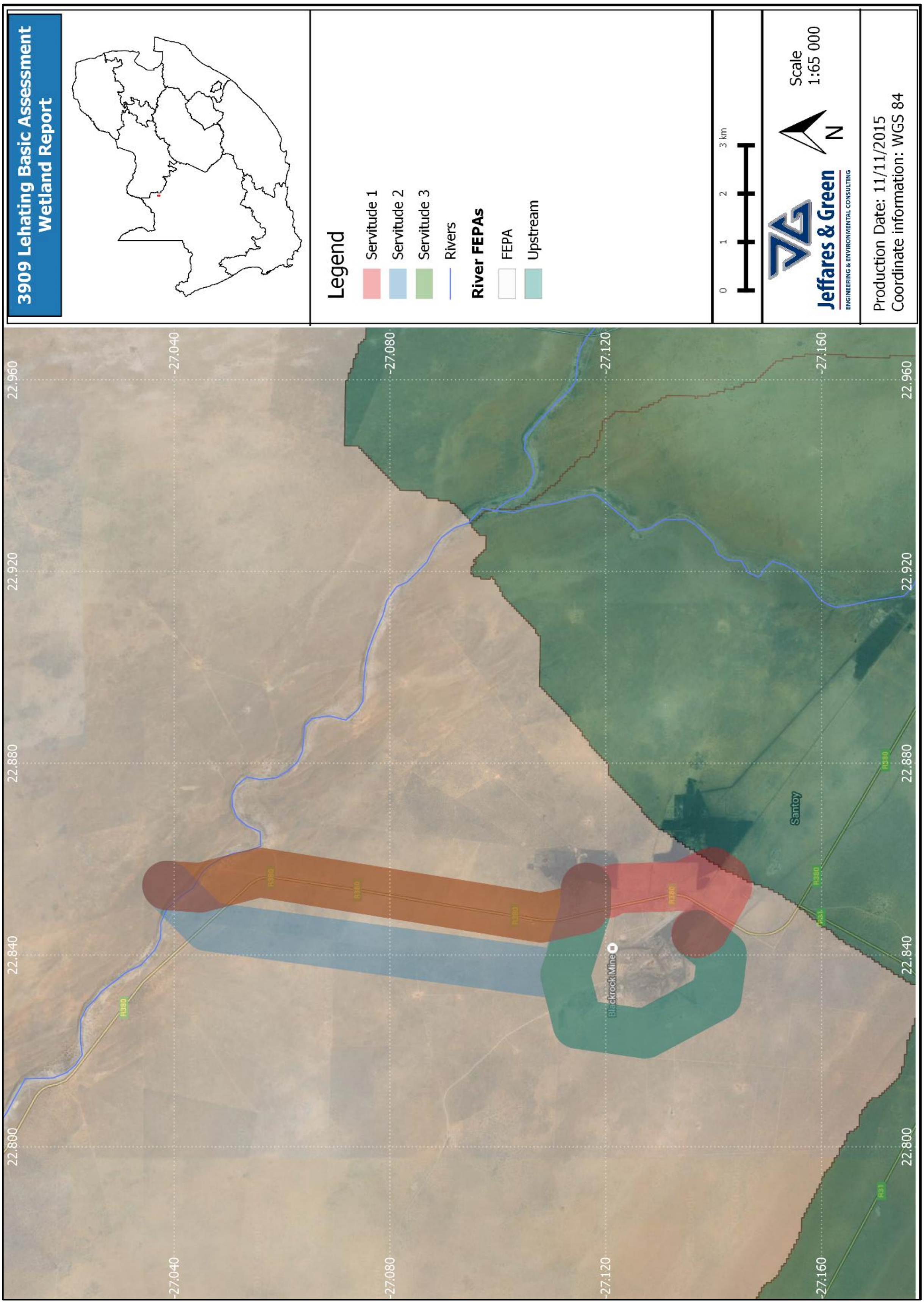

Figure 4-2 Map showing the conservation status according to the NFEPA database

5 METHODOLOGY

A field investigation was undertaken in July 2015, in order to confirm the presence of wetlands and rivers, to determine the wetland boundaries and the active riparian zones; to determine the extent of the study area and to gather information required for the assessment of potential impacts. Prior to the field survey, data was collected to determine the occurrence of possible wetlands. This included five metre contour lines, 1:10 000 orthophotos, 1:50 000 maps and Google Earth^{TM} imagery.

5.1 Wetland Classification and delineation

Wetland classification refers to the process of *typing* wetlands according to their biophysical characteristics and the way in which they function. For the purpose of the study, the wetland "type" identified using the classification system of Ollis et al. (2013) was used. The wetlands were classified up to Level 4 (hydrogeomorphic unit). At Level 1 (system level) a distinction is made between Marine, Estuarine and Inland systems. At Level 2 of the proposed classification system, the regional setting is categorised (Ecoregion). At Level 3 a distinction is made between four Landscape Units based on topography including: slope, valley floor, plain and bench. Level 4 distinguishes between the hydrogeomorphic type, the land form and the hydrodynamics within the wetland.

Table 5-1: Classification systems used for the wetlands within the study area (Adapted from Ollis et al., 2013)

Level 1: System	Level 2: Regional Setting	Level 3: Landscape unit	Level 4 : Hydrogeomorphic (HGM) unit
Inland	DWA Level 1 Ecoregion OR NPA WetVeg Groups OR Other spatial framework	Slope Valley Floor Plain Bench (hillslope/Saddle/Shelf)	River Floodplain Wetland Channelled Valley Bottom Wetland Unchannelled Valley Bottom Wetland Depression Seep Wetland Flat

Wetlands that were identified, were then delineated using the Department of Water Affairs Guidelines entitled: "*A practical guideline procedure for the identification and delineation of wetlands and riparian zones"* (DWA, 2005). The objective of the delineation guidelines is to provide a procedure to obtain the outer edge of the wetland. To achieve this, certain indicators are often used including:

- The Terrain Unit Indicator which helps to identify those parts of the landscape where wetlands are more likely to occur.
- The Soil Form Indicator which identifies the soil forms, as defined by the Soil Classification Working Group (DAD, 1991), which are associated with prolonged and frequent saturation.
- The Soil Wetness Indicator which identifies the morphological "signatures" developed in the soil profile as a result of prolonged and frequent saturation.
- The Vegetation Indicator which identifies hydrophilic vegetation associated with frequently saturated soils.

Wetlands must have one or more of the following attributes (see: Table 5-2)

- Wetland (hydromorphic) soils that displays characteristics resulting from prolonged saturation
- The presence, at least occasionally, of water loving plants (hydrophytes)
- A high water table that results in saturation at or near the surface, leading to anaerobic conditions developing in the top 50cm of the soil.

The wetland boundary is considered the area where these attributes are not present anymore.

Table 5-2: Attributes of soils and vegetation indicating the presence of wetland conditions.

	Soil Characteristics	**Vegetation characteristics**
Temporary Zone	Minimal grey matrix (<10%) Few high chroma mottles Short periods of saturation	Predominantly grass species; mixture of species which occur extensively in non-wetland areas, and hydrophilic plant species which are restricted largely to wetland areas.
Seasonal Zone	Grey matrix (>10%) Many low chroma mottles present Significant periods of wetness (at least three months per annum)	Hydrophilic sedge and grass species which are restricted to wetland areas.
Permanent Zone	Prominent grey matrix Few to no high chroma mottles Wetness all year round Sulphuric odour (rotten egg smell)	Dominated by: (1) emergent plants, including reeds (*Phragmites australis*), a mixture of sedges and bulrushes (*Typha capensis*), usually >1m tall; or (2) floating or submerged aquatic plants.

5.2 Wetland PES and Ecosystem Services

The Present Ecological State of the Kuruman River floodplain areas was determined using the Wetland Habitat Integrity (WETLAND-IHI) model. The WETLAND-IHI is designed for the RAPID assessment of floodplain and channelled valley bottom wetland types, for the purposes of determining an index of WETLAND-IHI and for reporting on the Present Ecological state

(PES) of the wetland system in question. The WETLAND-IHI model is an MS Excel-based model, and the data required for the assessment are generated during a site visit in the field. Additional data may be obtained from remotely sensed imagery (aerial photo's; maps and/or satellite imagery) to assist with the assessment. The existing modules and methods to determine PES are not seen as adequate for assessing the PES of flats and isolated depressions (pans).

In addition, the WET-EcoServices (Kotze *et al*., 2007) tool was applied. The tool was used to determine site specific services that are provided by the wetland identified. During the application, selected services of the wetland or site in its current state were assessed. The potential for improvement in ecosystem services was also identified.

5.3 Ecological Importance and Sensitivity

Ecological Importance and Sensitivity scores were calculated using the Resource Directed Measures (RDM methods (Kleynhans, 1999)). Scoring guidelines are shown in Table 5-3 and

Table 5-4.

Table 5-3: Scoring guidelines for each attribute considered in determining the EIS (Kleynhans, 1999)

EIS Score	
Very high	4
High	3
Moderate	2
Marginal/low	1
Low	0
Confidence Score	
Very high confidence	*4*
High confidence	*3*
Moderate confidence	*2*
Marginal/low confidence	*1*

Table 5-4: Ecological Importance and Sensitivity categories and the interpretation of scores for biota and habitat determinants (Kleynhans, 1999)

Ecological Importance And Sensitivity Category	Range Of Median
Very high Wetlands that are considered ecologically important and sensitive on a national or even international level. The	>3 and <u><</u>4

Ecological Importance And Sensitivity Category	Range Of Median
biodiversity of these systems is usually very sensitive to flow and habitat modifications. They play a major role in moderating the quantity and quality of water of major rivers.	
High Wetlands that are considered to be ecologically important and sensitive. The biodiversity of these systems may be sensitive to flow and habitat modifications. They play a role in moderating the quantity and quality of water of major rivers.	>2 and <u><</u>3
Moderate Wetlands that are considered to be ecologically important and sensitive on a provincial or local scale. The biodiversity of these systems is not usually sensitive to flow and habitat modifications. They play a small role in moderating the quantity and quality of water of major rivers.	>1 and <u><</u>2
Low/marginal Wetlands that are not ecologically important and sensitive at any scale. The biodiversity of these systems is ubiquitous and not sensitive to flow and habitat modifications. They play an insignificant role in moderating the quantity and quality of water of major rivers.	>0 and <u><</u>1

5.4 Impact assessment

The methodology applied for assessing the proposed impacts on the wetland ecosystems is indicated in Appendix B.

6 RESULTS AND DISCUSSION

6.1 Wetland Classification and delineation

A desktop assessment indicated the presence of two wetlands within the immediate study area, including the Kuruman River and the associated floodplain wetlands and a wetland flat. This is based on the NFEPA database. The SANBI National Wetland Map 3, which maps the extent of some 100 000 wetland systems was originally used during the development of the NFEPA program to identify and delineate wetlands. The delineations are based largely on remotely-sensed imagery and therefore do not include historic wetlands lost through drainage, ploughing and concreting. Irreversible loss of wetlands is especially high in some areas, such as urban centres and intensively cultivated areas. The NFEPA programme, augmented the National Wetland Map 3 with finer scale wetland maps that were available from various sub-national biodiversity planning exercises.

Based on field observation the two wetlands identified during the desktop assessment were verified during the field survey (Figure 6-2).

Floral species commonly encountered within the northern area, North of the Kuruman River, where the Lehating Substation is proposed include *Vachellia haematoxylon* (protected species)*, Senegalia mellifera,* subsp *detinens, Lycium bosciifolium, Ziziphus mucronata, Searsia lancea, Grewia flava, Stipagrostis amabilis, Cynodon dactylon, Aristida adscensionis, Aristida congesta, Eragrostis echinochloidea* and various other annual grass species. The encroachment of *Prosopis glandulosa* within the watercourse area of the Kuruman River was also observed (Figure 6-1). The areas south of the Kuruman River was dominated by *Senegalia mellifera*, as a response to grazing pressure, with a high inclusion of *Grewia flava* and occasional inclusion of *Vachellia erioloba*.

Figure 6-1: *Prosopis glandulosa* was dominant within the watercourse of the Kuruman River.

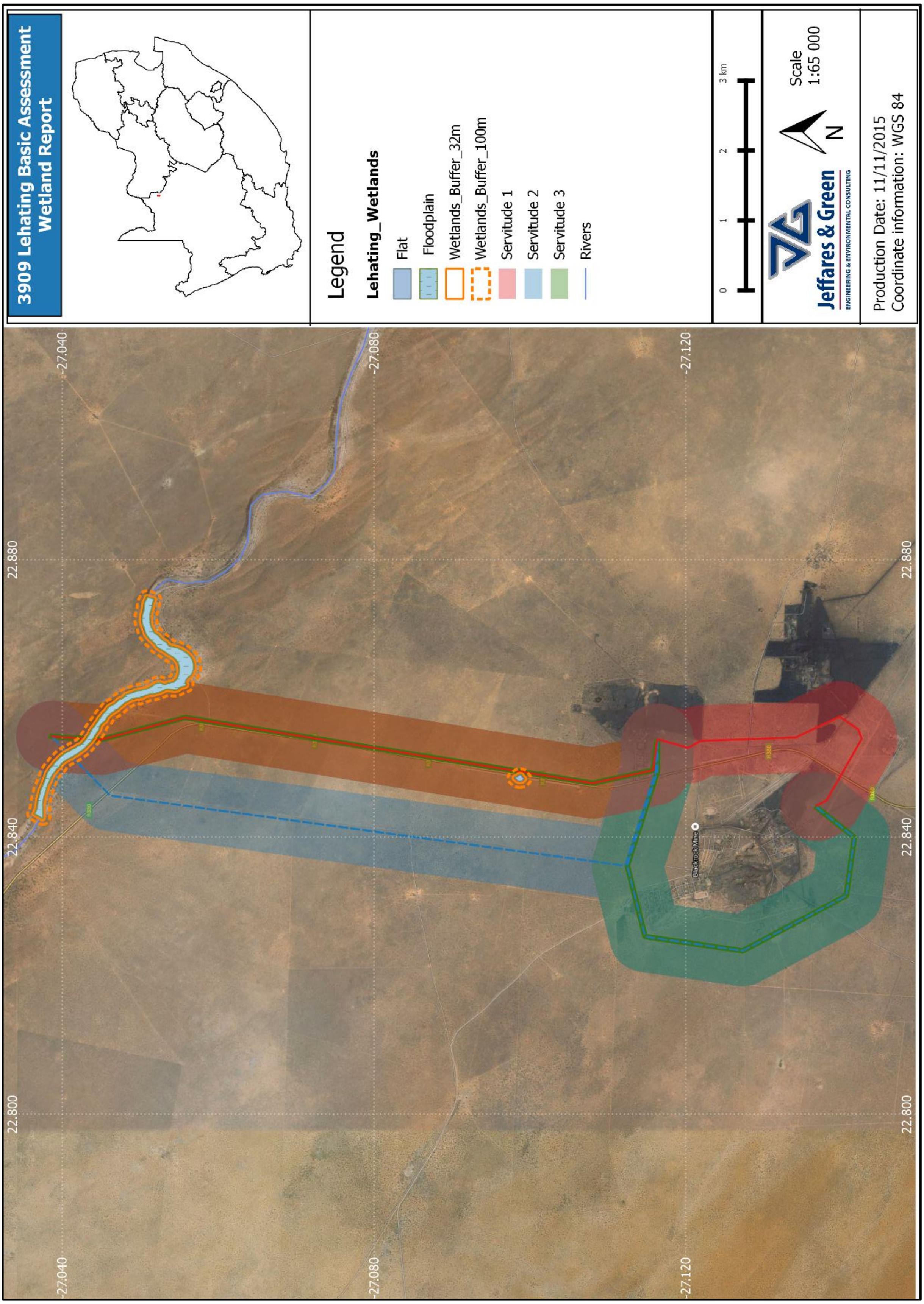

Figure 6-2: Map showing the location of the various types of water resources identified

6.2 Wetland PES and Ecosystem Services

The results of the wetland-IHI indicate that the floodplains associated with the Kuruman River is in a C state (modified state). Several activities have already caused changes to the ecological integrity of these wetlands, including changes to hydrology, geomorphology and to the vegetation communities. The water quality of the system appears to be least affected.

The biggest changes in hydrology have been caused by an increase in base flows due to discharges from the town of Kuruman. There has also been some erosion of the Kuruman River, which in turn has caused a decrease in the water retention time within the main channel. There is also evidence of increased erosion in the catchment and an increase in hardened surface. Both these factors have caused changes to the sediment transport and sediment inputs into the wetland. Finally, the vegetation community has been altered due to an increase in alien invasive communities and vegetation removal.

As a result of the changes in PES, and based on the catchment land use activities, the floodplain wetland associated with the proposed activities provides limited ecosystems services (Figure 6-3). There are some indirect benefits associated with the floodplain, including sediment trapping and erosion control. There are also limited direct benefits (such as water provision) due to the ephemeral nature of the system and due to the fact that the area isn't heavily populated.

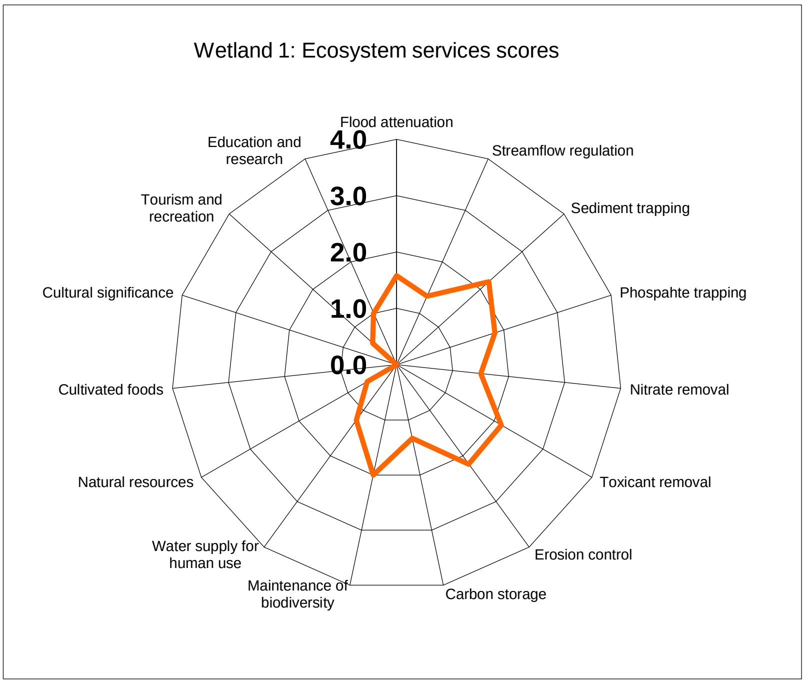

Figure 6-3: Spider-diagram showing the various ecosystem services potentially provided by the floodplain wetlands associated with the Kuruman River

Buffers are areas that surround a wetland or riparian area that are important in reducing adverse impacts to ecosystem functions and values from adjacent development. The literature indicates that buffers reduce impacts by moderating the effects of stormwater runoff, including stabilizing soil to prevent erosion; filtering suspended solids, nutrients, and harmful or toxic substances, and moderating water level fluctuations. The problem related to the proposed project is the fact that the current land use has encroached into the buffer zones. There are no minimum requirements for buffer zone in the Norther Cape Province that are promulgated. The Gauteng Department of Agriculture and Rural Development (GDARD) Minimum Requirements for Biodiversity Studies requires a delineation of a 100m buffer zone from the edge of the riparian zone for rivers/streams outside urban areas and a 30m buffer zone from the delineated edge of wetlands. Due to a lack of promulgated requirements the GDARD requirements were applied for the current study.

6.3 Ecological Importance and Sensitivity

The ecological importance of a wetland refers to the degree to which biological diversity and ecological functioning are maintained on a particular spatial scale. Ecological sensitivity provides a measure of the ability of a wetland to resist disturbance. Desktop information (DWS, 2015) indicates that the Ecological Importance of the study area is moderate and the Ecological Sensitivity is very low.

The results of the current assessment indicate that the EIS of all of the natural wetlands is moderate. The most important consideration is the fact that the wetlands occur within the FEPA area.

6.4 Impact Assessment

The catchment associated with the various wetlands and rivers in the study area has already been transformed to a certain extent. The upper reaches of the Kuruman River have been altered by the increase in hardened surfaces due to the development of the town of Kuruman. Informal infrastructure (road ad bridges) and settlements such as Batlharo, Maruping and Mamoratwe also contribute to alterations in hydrology and possibly water quality in the upper reaches. There is erosion within the larger catchment, due to several roads that have been constructed and livestock grazing. All these have contributed to changes in vegetation and sediment availability within the catchment.

6.4.1 Changes in hydrology

The hydrology of a wetlands refers to the movement of water into the wetland from the surrounding catchment and the movement of water through the catchment. As indicated in

Section 5.2, some changes have already occurred in the natural hydrology of the subsystem. These changes specific relate to the retention time of water within the wetland and increased base flows due to discharges in the upper reaches. The proposed development may also impact the hydrology of the wetlands associated with the development footprint. During construction, vegetation will be removed and in addition to the compaction of soils, this could increase the velocity of overland flows, which in turn can cause erosion of surface soils. The compaction of soils can also cause changes in the vertical drainage of water, potentially affecting groundwater inputs into water resources. It should be noted that the area has a very low mean annual rainfall and a very high evaporation rate. As a result, most of the wetlands and rivers in the catchment are largely ephemeral in nature, and should construction take place during the dry winter months, the impact on hydrology will be minimal. The construction of the powerline may potentially cause permanent loss of sediments within the wetland flat, but due to the small size of this wetland, this could be avoided by spanning the powerlines across the wetland.

6.4.2 Sedimentation and erosion

The geomorphology of the wetlands could potentially be altered by the proposed development. The geomorphology of the wetlands refer to the movement of sediment into and out of the wetlands. Naturally all wetlands accumulate soils and export is usually slower than the input of sediments. The construction of the powerline will cause an increased availability of sediments in the immediate catchment of the wetlands. The wetland flat appears to be endorehic (inward draining) and isolated. Increased sediments load will have a larger impact on this system when compared to the floodplain wetlands of the Kuruman River, as the sediments will not be removed during wetter periods.

6.4.3 Water quality

The proposed development may cause direct changes to water quality. As indicated, the wetlands in the area are highly ephemeral and as a result this potential impact is of very low risk. The changes in water quality will relate to changes caused during both the construction and operational phase. During construction, the increase movement of contractors may lead to littering or spillages which could pollute surface waters.

6.4.4 Loss of biodiversity

Habitat quality and quantity are drivers and support aquatic, riparian and terrestrial life. Habitat destruction not only harms the system, but the removal of vegetation also changes the soil quality and structure therefore altering the biota. The loss in diversity can be detrimental for water-course systems and further allows the introduction of alien invasive vegetation. Alien invasive vegetation are already found in high densities in the catchment and the exposure of topsoils, the import of soils for building purposes and the removal of indigenous vegetation could all contribute to the changes in the natural vegetation community.

6.4.5 Mitigation and Management Measures

The potential impacts on the receiving environment can be alleviated by applying certain mitigation measures. The functioning of any aquatic ecosystem is not depended on a single component and changes to one aspect (such as hydrology) may ultimately cause changes in another (such as vegetation). Most importantly will be the construction of the powerlines during the dry winter months when runoff will be minimal. In addition wetlands must be spanned where possible and buffers should be maintained next to the construction activities.

The mitigation and/or management measures include the following approaches:

- Construction should be undertaken in the dry season to minimise all of the impacts mentioned above,
- The powerline should span the wetland as far as practical;
- Hazardous material and chemicals should not be kept or handled within wetland areas. Hazardous substances must be kept in a demarcated area on an impervious surface. Any spillages from hazardous material should be cleaned immediately and transported to a landfill site that accepts hazardous material,
- Cement and other material must be mixed in a demarcated area and not in wetland or buffer zones,
- Buffer zones must be maintained at all time to ensure the protection of the aquatic resources,
- Movement of contractors and vehicles within wetland and riparian areas should be avoided to ensure that compaction of sediment and water pollution will not take place,
- Contractors should not be allowed to collect water or fish from the wetlands,
- Waste bins should be provided to ensure that litter isn't dumped in the wetlands or riparian zones,
- Vehicles should be serviced on a regular basis to avoid leaks and spills,
- Where possible, existing roads and access points should be utilised,
- Solid waste should be removed on a regular basis and chemical toilets should be provided and should be serviced on a regular basis,

- Any contractor's camps should not be placed within or near any wetlands and associated buffer zones,
- Topsoil and excavated soil must not be placed within the wetland or buffer areas,
- The removal of vegetation must be kept to a minimum where possible. The time that soil is exposed must be limited and re-vegetation or another covering method must be applied during the construction and post construction phase,
- Re-vegetation must be completed using the appropriate endemic plants. Where possible, the vegetation must be removed intact to ensure that it can be replanted again during rehabilitation,
- Where vegetation is removed, the compaction of wetland soils must be minimised to avoid an increase in surface runoff speeds,
- The establishment of exotic plants must be avoided,
- Where possible the area where construction will take place should be demarcated. Demarcation of the construction areas will ensure that only the required area is cleared of vegetation,
- Erosion protection must be used in all areas where erosion may occur,
- Should an access road be constructed a stormwater management plan must be developed for both the construction phase and the operational phase,
- Stormwater must not be concentrated at a single outlet and should be allowed to diffuse over a large area.
- A rehabilitation plan should be developed; only if the construction of the powerline will cause the removal of vegetation and soils in the wetland flat, and
- A monitoring plan must be developed and implemented for the wetlands. Ideally this plan must cover the site laydown, construction and post-construction periods.

6.4.6 Summary

The study area has already been altered due to several land use activities. The proposed activities could potentially have a cumulative impact on the receiving environment. The impacts and associated risks are summarised in Table 6-1 and Table 6-2 below.

Table 6-1: Summary of impacts related to the construction activities

	Impact Description	Impact Ratings Before Mitigation					Impact Ratings After Mitigation					Degree of Mitigation
		S	E	D	P	Risk	S	E	D	P	Risk	
Change in hydrology	Increase in hardened surfaces through soil compaction	2	1	2	3	Very Low	2	1	2	3	Very Low	Medium
	Decrease in surface roughness	2	1	2	3	Very Low	2	1	1	3	Very Low	Medium
Change in geomorphology	Increase deposition	2	1	2	4	Low	2	1	2	3	Very Low	Medium

	Change in soil permeability	2	1	2	4	Low	2	1	2	3	Very Low	Medium
	Wetland soil removal and compaction	2	1	2	4	Low	2	1	2	3	Very Low	Medium
	Increase in exposed areas due to vegetation stripping	2	1	2	4	Low	2	1	2	3	Very Low	Medium
	Formation of erosion gullies	2	1	2	4	Low	1	1	2	3	Very Low	Medium
Change in vegetation	Loss of vegetation through removal during laydown and construction period	2	1	2	4	Low	2	1	1	3	Very Low	High
	Increase in exotic taxa	2	1	2	4	Low	2	1	2	3	Very Low	High
	Loss off vegetation through hydrological and geomorphological changes	2	1	2	4	Low	2	1	2	3	Very Low	High
Change in Water Quality	Pollution due to spills and leaks	2	1	1	3	Very Low	2	1	2	3	Very Low	High
	Pollution due to littering	2	1	1	3	Very Low	2	1	2	3	Very Low	High

Table 6-2: Summary of impacts related to the operation of the powerlines

	Impact Description	Impact Ratings Before Mitigation					Impact Ratings After Mitigation					Degree of Mitigation
		S	E	D	P	Risk	S	E	D	P	Risk	
Change in hydrology	Increase in hardened surfaces through soil compaction	2	1	2	4	Low	2	1	2	3	Very Low	High
	Decrease in surface roughness	2	1	2	3	Very Low	2	1	1	3	Very Low	High
Change in geomorphology	Change in soil permeability	2	1	4	4	Low	2	1	2	3	Very Low	Low
	Wetland soil removal and compaction	2	1	4	4	Low	2	1	2	3	Very Low	Medium
	Formation of erosion gullies	2	1	4	4	Low	2	1	2	3	Very Low	High
Change in vegetation	Loss off vegetation through hydrological and geomorphological changes	2	1	4	4	Low	2	1	2	3	Very Low	High

6.4.7 Alternatives

Three alternative study corridors have been considered for the proposed alignment of the overhead power lines. These alternative corridors are indicated in Figure 4-1. Of these alternatives, corridor alternative 3 will be the preferred route from an aquatic resource perspective. The line can be placed anywhere within this study corridor. Alternative 2 will potentially only affect the Kuruman River and the associated floodplains, while alternative 1 and 3 will potentially affect both the wetland flat and the Kuruman River and the associated floodplains. Alternative 2 however, will not be associated with any current infrastructure and all impacts related to this route will be fairly new. The impacts related to alternative 1 and 3 will largely be cumulative in nature as the route will follow existing infrastructure. As a result, both alternative 1 and 3 could be considered for the proposed project.

7 LEGISLATIVE REVIEW

Section 21 of the National Water Act (NWA) (Act 36 of 1998) defines a list of activities which require a Water Use Authorisation (WUA). Listed activities in terms of Section 21 include the following:

- 21(a) taking water from a water resource;
- 21(b) storing water;
- 21(c) impeding or diverting the flow of water in a watercourse;
- 21(d) engaging in a stream flow reduction activity contemplated in Section 36 of the Act;
- 21(e) engaging in a controlled activity identified as such in section 37(1) or declared under section 38(1);
- 21(f) discharging waste or water containing waste into a water resource through a pipe, canal, sewer, sea outfall or other conduit;
- 21(g) disposing of waste in a manner which may detrimentally impact on a water resource;
- 21(h) disposing in any manner of water which contains waste from, or which has been heated in, any industrial or power generation process;
- 21(i) altering the bed, banks, course or characteristics of a watercourse;
- 21(j) removing, discharging or disposing of water found underground if it is necessary for the efficient continuation of an activity or for the safety of people; and
- 21(k) using water for recreational purposes.

The purpose of the National Water Act (Act 36 of 1998) is to provide for fundamental reform of the law relating to water resources; to repeal certain laws; and to provide for matters connected therewith. The term "*water resource*" includes a watercourse, surface water, estuary, or aquifer. The focus of the current WUA application will be surface water including:

- Watercourses which according to the NWA means –
  - (a) a river or spring;
  - (b) a natural channel in which water flows regularly or intermittently;
  - (c) a wetland, lake or dam into which, or from which, water flows; and
  - (d) any collection of water which the Minister may, by notice in the Gazette, declare to be a watercourse, and a reference to a watercourse includes, where relevant, its bed and banks

Of particular importance based on the current activities are wetlands and riparian habitats, which are defined by the NWA as follows:

- **Wetlands:** "*land which is transitional between terrestrial and aquatic systems where the water table is usually at or near the surface, or the land is periodically covered with shallow water, and which land in normal circumstances supports or would support vegetation typically adapted to life in saturated soil*".
- **Riparian habitat:** *"includes the physical structure and associated vegetation of the areas associated with a watercourse which are commonly characterised by alluvial soils, and which are inundated or flooded to an extent and with a frequency sufficient to support vegetation of species with a composition and physical structure distinct from those of adjacent land areas".*

In addition to the National Water Act the following legislation and guidelines should also considered:

- National Environmental Management: Protected Areas Act (Act 57 of 2003)
- National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004)
- National Environmental Management Act (NEMA), Act 107 of 1998
- Conservation of Agricultural Resources Act (Cara), Act No. 43 of 1983

8 CONCLUSION

A desktop assessment associated with the proposed Klipkop Substation and Klipkop-Lehating loop in and out lines project indicates the possible presence of two wetlands. Both these wetlands were verified during a field survey and include a wetland flat (associated with the powerline construction) and a floodplain wetland. The latter is associated with the Kuruman River and the construction of the new Lehating Substation which has already been authorised.

The catchment associated with the various wetlands and rivers in the study area has already been transformed to a certain extent. The upper reaches of the Kuruman River have been altered by the increase in hardened surfaces due to the development of the town of Kuruman. Informal settlements such as Batlharo, Maruping and Mamoratwe contribute to alterations in hydrology and possibly water quality in the upper reaches. There is erosion within the larger catchment, and several roads and bridges that have been constructed and livestock grazing have all contributed to changes in vegetation and sediment availability within the catchment.

As a result the hydrology, geomorphology, and vegetation have already been altered when compared to reference conditions. In addition to these components the water quality of the wetlands could potentially be altered during the construction and operation phases of the project. The risk of the potential impacts are low or very low and are generally easily mitigated.

Mitigation measures have been suggested in the report. The most important measures of alleviating the impact of the project are that construction of the powerlines during the dry season, and that the powerline spans the identified wetlands wherever possible.

9 REFERENCES

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APPENDIX A: IMPACT ASSESSMENT METHODOLOGY

The Environmental Impact Assessment Regulations, 2010, promulgated in terms of Section 24(5) of the National Environmental Management Act (Act 107 of 1998) prescribes requirements to be adhered to when undertaking impact assessments. Requirements for undertaking impact assessments for Basic Assessments and full Environmental Impact Assessments are outlined in the EIA Regulations.

In terms of these Regulations, the following should be considered when undertaking an impact assessment:

- A description and assessment of the significance of any environmental impacts, including –
  a. Cumulative impacts, that may occur as a result of the undertaking of the activity during project life cycle;
  b. Nature of the impact;
  c. Extent and Duration of Impact;
  d. The Probability of Impact Occurring;
  e. The degree to which the impact can be reversed;
  f. The degree to which the impact may cause irreplaceable loss of resources; and
  g. The degree to which the impact can be mitigated.

In terms of the above legislated requirements a standard impact assessment methodology was compiled. In order to compile the impact assessment methodology a review of existing impact assessment methodologies utilised by consultants in the field was undertaken. Furthermore, the following document as compiled by the former Department of Environmental Affairs and Tourism (DEAT) was utilised during the compilation for the impact assessment methodology:

- *DEAT (2004) Cumulative Effects Assessment, Integrated Environmental Management, Information Series 7, Department of Environmental Affairs and Tourism (DEAT), Pretoria*.

A description of the method for assessing the above criteria as well as the method for determining impact risks are provided in Sections A to I below.

Cumulative Impacts

Cumulative impacts can occur over different temporal and spatial scales by interacting, combining and compounding so that the overall effect often exceeds the simple sum of previous effects. The spatial scale can be local, regional or global, whilst the frequency or temporal scale includes past, present and future impacts on a specific environment or region.

Cumulative effects can simply be defined as the total impact that a series of developments, either present, past or future, will have on the environment within a specific region over a particular period of time.

Potential cumulative impacts on all elements of the receiving environment are addressed for all project phases (pre-construction, construction, operational and decommissioning), before and after implementation of mitigation measures.

Significance/Magnitude/Nature of Impacts

The significance or magnitude of an impact refers to the importance of an impact. When rating the extent of an impact, it is important to also rate the significance of an impact in order to determine the actual importance of an impact. For example, the size of an area affected by atmospheric pollution may be extremely large, but the significance of this effect is dependent on the concentration or level of pollution. If the concentration is great, the significance of the impact would be High or Very High, but if it is dilute it would be Very Low or Low.

The significance of impacts has been grouped into five classes, as outlined in the Table below

RATING		DESCRIPTION
5	VERY HIGH	Of the highest order possible within the bounds of impacts which could occur. In the case of adverse impacts: there is no possible mitigation and/or remedial activity which could offset the impact. In the case of beneficial impacts, there is no real alternative to achieving this benefit.
4	HIGH	Impact is of substantial order within the bounds of impacts, which could occur. In the case of adverse impacts: mitigation and/or remedial activity is feasible but difficult, expensive, time-consuming or some combination of these. In the case of beneficial impacts, other means of achieving this benefit are feasible but they are more difficult, expensive, time-consuming or some combination of these.
3	MODERATE	Impact is real but not substantial in relation to other impacts, which might take effect within the bounds of those which could occur. In the case of adverse impacts: mitigation and/or remedial activity are both feasible and fairly easily possible. In the case of beneficial impacts: other means of achieving this benefit are about equal in time, cost, effort, etc.
2	LOW	Impact is of a low order and therefore likely to have little real effect. In the case of adverse impacts: mitigation and/or remedial activity is either easily achieved or little will be required, or both. In the case of beneficial impacts, alternative means for achieving this benefit are likely to be easier, cheaper, more effective, less time consuming, or some combination of these.

RATING		DESCRIPTION
1	VERY LOW	Impact is negligible within the bounds of impacts which could occur. In the case of adverse impacts, almost no mitigation and/or remedial activity is needed, and any minor steps which might be needed are easy, cheap, and simple. In the case of beneficial impacts, alternative means are almost all likely to be better, in one or a number of ways, than this means of achieving the benefit. Three additional categories must also be used where relevant. They are in addition to the category represented on the scale, and if used, will replace the scale.
0	NO IMPACT	There is no impact at all - not even a very low impact on a party or system.

Extent of Impacts

The extent or spatial scale of an impact refers to whether an impact will occur at a local, regional, or global scale. The extent of impacts has been grouped into five classes, as outlined in the Table below.

RATING		DESCRIPTION
5	Global/National	The impact could/will occur on a national or global scale.
4	Regional/Provincial	The impact could/will occur at a Regional/Provincial Level
3	Local	The impact will affect an area up to 5 km from the proposed site.
2	Study Area	The impact will affect an area not exceeding the Boundary of the study site
1	Isolated Sites / proposed site	The impact will affect an area no bigger than the development footprint.

Duration of Impacts and Degree to which impacts can be reversed

The duration or temporal scale of an impact refers to actual impact timeframe, i.e. how long will impacts to the environment last. The reversibility of impacts is directly linked to the duration of impacts. For e.g. permanent impacts are irreversible impacts, whereas, incidental impacts are immediately reversible. The duration and reversibility of impacts has been grouped into five classes, as outlined in the Table below.

RATING		DESCRIPTION	REVERSIBILITY
1	Incidental	The impact will be limited to isolated incidences that are expected to occur very sporadically.	Immediately reversible
2	Short-term	The environmental impact identified will operate for the duration of the construction phase or a period of less than 5 years, whichever is the greater.	Quickly reversible
3	Medium term	The environmental impact identified will operate for the duration of life of the project.	Reversible over time
4	Long term	The environmental impact identified will operate beyond the life of the project.	Reversible over the long term
5	Permanent	The environmental impact will be permanent.	Irreversible, impact is permanent

Probability of Impact Occurring

The probability of an impact refers to the likelihood of an impact occurring. The probability of impacts has been grouped into five classes, as outlined in the Table below.

RATING	DESCRIPTION
1	Practically impossible that impact will occur
2	Unlikely that impact will occur
3	Impact could occur
4	Very Likely that impact will occur
5	Impact will occur or has already occurred

Degree to which the impact may cause irreplaceable loss of resources (Intensity or Severity of an Impact)

The degrees to which an impact may cause irreplaceable loss of resources are determined based on the outcome of the impact risk assessment. High risk impacts in sensitive areas are more likely to result in irreplaceable loss of resources compared to low risk impacts.

RATING	DESCRIPTION
High	Disturbance or pristine areas that have important conservation value. Destruction of rare or endangered species.
Medium	Disturbance of areas that have potential conservation value or rare of use as resources. Complete change in species occurrence or variety.
Low	Disturbance of degraded areas, which have little conservation value. Minor change is species occurrence or variety.

The degree to which the impact can be mitigated

The degree to which an impact can be mitigated are determined by comparing the impact risk class prior to implementation of mitigation measures to the impact risk class after implementation of mitigation measures. If for e.g. an impact risk class can be reduced from a high to very low, then it is likely that there is a high potential that an impact can be mitigated.

RATING	DESCRIPTION
High	High Potential to mitigate negative impacts to the level of insignificant effects.
Medium	Potential to mitigate negative impacts. However, the implementation of mitigation measures may still not prevent some negative effects.
Low	Little or no mechanism to mitigate negative impacts.

Degree of Certainty

As it is not possible to be 100% certain of all facts, a standard "degree of certainty" has been incorporated into this Impact Assessment Methodology to indicate the degree of the EAP's certainty regarding impact ratings.

As with all studies it is not possible to be 100% certain of all facts, and for this reason a standard "degree of certainty" scale will be used as outlined in the Table below. When very detailed specialist studies are available or have been undertaken as part of a project, impacts can be more accurately determined.

RATING	DESCRIPTION
Definite	More than 90% sure of a particular fact.
Probable	Between 70 and 90% sure of a particular fact, or of the likelihood of that impact occurring.
Possible	Between 40 and 70% sure of a particular fact or of the likelihood of an impact occurring.
Unsure	Less than 40% sure of a particular fact or the likelihood of an impact occurring.
Can't know	The consultant believes an assessment is not possible even with additional research.
Don't know	The consultant cannot, or is unwilling, to make an assessment given available information.

Quantitative Description of Impacts

In order to describe impacts in a quantitative manner in addition to the qualitative description given above, a rating scale of between 1 and 5 have been used for each of the assessment criteria. Thus the total value of the impact is described as the function of significance, spatial and duration scale as described below:

$$\text{Impact Risk} = \frac{(\text{Significance} + \text{Spatial} + \text{Duration})}{3} \times \frac{\text{Probability}}{5}$$

An example of how this rating scale is applied is shown below:

Impact	Significance	Spatial Scale	Duration Scale	Probability	Risk Rating
Impact to air quality - For e.g. construction vehicles travelling on areas where vegetation has been cleared could result in dust impact.	Low	Local	Medium-Term	Could Happen	1.6
	2	3	3	3	

Note: The significance, spatial and temporal scales are added to give a total of 8, that is divided by 3 to give a criteria rating of 2,67. The probability (3) is divided by 5 to give a probability rating of 0,6. The criteria rating of 2,67 is then multiplied by the probability rating (0,6) to give the final rating of 1,6.

The impact risk is classified according to 5 classes as described in the table below.

Impact Risk Classes:

Rating	Impact Class	Description
0.1-1.0	1	Very Low
1.1-2.0	2	Low
2.1-3.0	3	Moderate
3.1-4.0	4	High
4.1-5.0	5	Very High

Therefore with reference to the example used for air quality above, an impact rating of 1.6 will fall in the Impact Class 2, which will be considered to be a low impact.