FRESHWATER ASSESSMENT FOR THE PROPOSED NEW 132 KV POWER LINES FROM THE SEKGAME SWITCHING STATION TO THE EXISTING BULKOP AND SISHEN POWER LINES, NORTHERN CAPE

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Client project reference

APPROVED BY Mr Dana Grobler

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APPROVED by Client

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EXECUTIVE SUMMARY

Eskom proposes to construct two new 132kV power lines from the new Sekgame Switching Station to the existing Bulkop/Ferrum 132kV line and the existing Ferrum/Sishen 132kV line. A section of the existing 132kV Bulkop-Ferrum powerline line as well as a section of the existing Ferrum-Sishen power line will be decommissioned. This basic freshwater assessment report is intended to inform the initial scoping phase of the project in terms of the freshwater constraints, potential impacts and recommended mitigation measures for the project.

Aquatic features which occur within the study area consist of the Ga-Mogara River which flows to the north-west before discharging into the Kuruman River and then the Molopo River. The Molopo River has its confluence with the Orange River at Riemvasmaak. The river is located south of the study area. A few relatively small valley floor depressions or pans are located adjacent to the line to be decommissioned. All of these freshwater features tend to be ephemeral, mostly only carrying water for short periods of time during the rainy season (March-April). The streams in general have little to no riparian associated vegetation except for occasional trees and shrubs.

The Ga-Mogara River is still in a largely natural to moderately modified ecological state while the ecological importance and sensitivity of the river is deemed to be moderate. The depression wetland areas/pans in the study area are in general in a moderately modified state as a result of physical habitat modification with flow and water quality modification largely as a result of the surrounding farming activities and some mining activities. The pans provide some goods and services include some flood attenuation and sediment trapping functionality, as well as the provision of some habitat for aquatic life primarily during the rainy season. They are considered to be of a moderate ecological importance and sensitivity.

The proposed project will result in the decommissioning of the existing power line route within an Eskom servitude where a number of powerlines are present. The freshwater features within the servitude have been modified by these activities. The proposed decommissioning has the potential to reduce the disturbance of the freshwater features within the servitude. The potential impact of this proposed activity is thus of a low significance with mitigation that may result in a low positive impact over the longer term.

The new powerline that is proposed to be constructed will be along the N14 road where it will be easily accessible. Due to the activities associated with the road, the area adjacent to the road is already disturbed. Construction of the powerline is not likely to significantly alter the current ecological state. In addition, no freshwater features occur along the proposed route or its alternative. There are thus no potential short or longer term freshwater impacts associated with the proposed new powerlines. The preferred and the alternative routes would therefore also have the same potential impact (nil) on the freshwater features in the area.

In line with the above, the risk of the proposed activities resulting in any degradation to the freshwater ecosystems in the study area is low. The activities can thus potentially be authorised in terms of the General Authorisations for Section 21c&i water use. The water use aspects of the proposed activities would however need to be registered with the DWS.

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1. BACKGROUND TO FRESHWATER ASSESSMENT

A Switching Station named Sekgame Switching Station has been approved to address the need for a Switching Station close to Ferrum main transmission system (MTS) to meet the requirement of Direct Customers. There is however insufficient space to take any further 132kV power lines out from the Ferrum MTS. The proposal to construct the Ferrum Sishen Traction- and Bulkop 132kV lines deviation is the focus of this project. Eskom will be responsible for the Basic Assessment for the Loop out power lines (Bulkop and Sishen) from the proposed Sekgame Switching Station. The Sekgame Switching Station has already been obtained.

Eskom proposes to construct two new 132kV power lines from the new Sekgame Switching Station to the existing Bulkop/Ferrum 132kV line and the existing Ferrum/Sishen 132kV line. A section of the existing 132kV Bulkop-Ferrum powerline line as well as a section of the existing Ferrum-Sishen power line will be decommissioned. This basic freshwater assessment report is intended to inform the initial scoping phase of the project in terms of the freshwater constraints, potential impacts and recommended mitigation measures for the project.

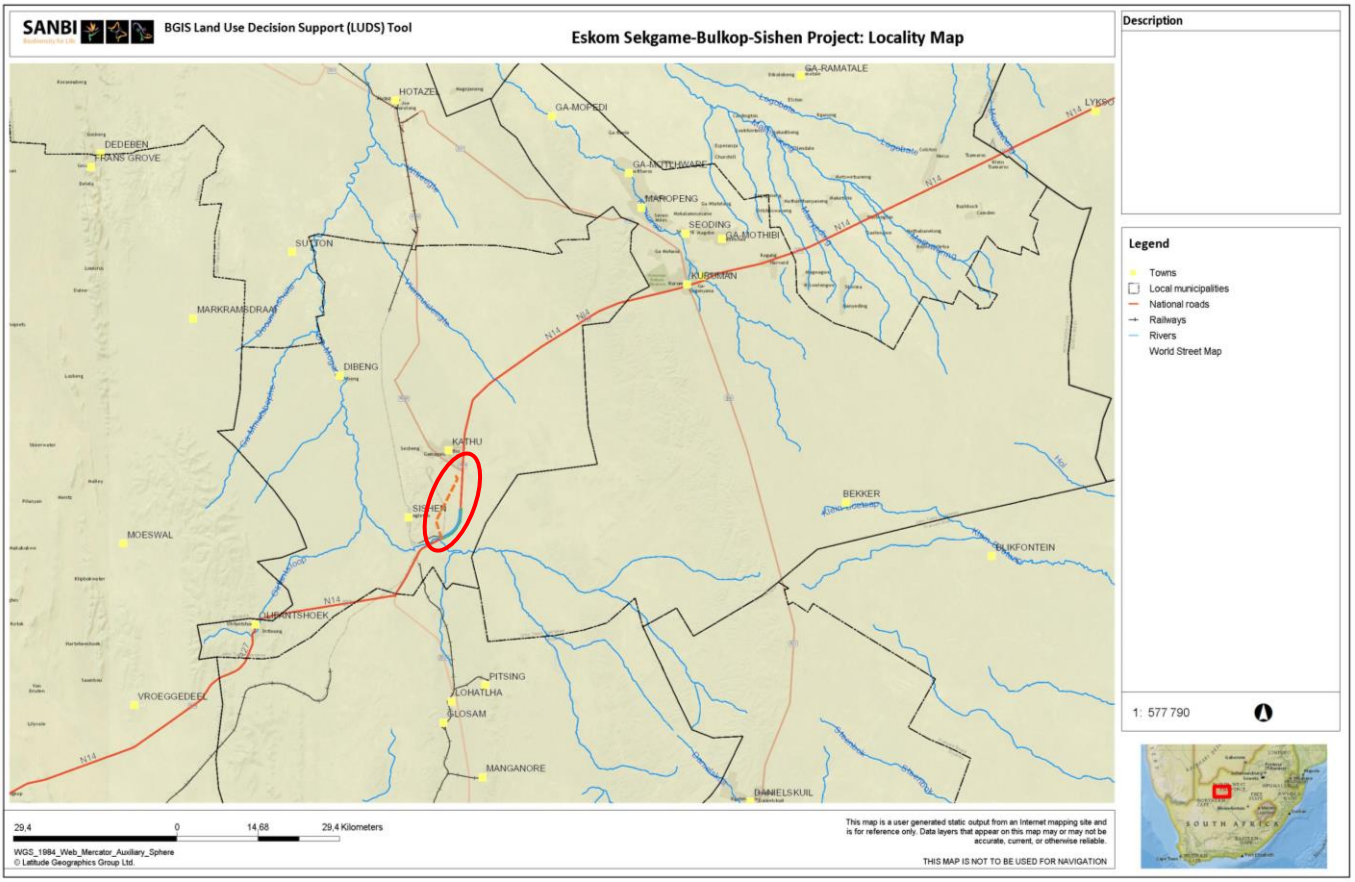


Figure 1: Locality map of the proposed project indicating the proposed routes for the construction and decommission of power lines (SANBI BiodiversityGIS, 2016)

2. TERMS OF REFERENCE

The terms of reference for this study were as follows:

- Wetland Delineation Study
    - Identify and delineate the wetlands.
    - Identify and apply buffers to the outer edges of the wetlands.
    - Assess impacts of the power line and suggest mitigation measures for minimising further impacts on wetlands.
    - Compile a Rehabilitation Plan for the wetlands in the case of any disturbance/construction.
    - Determine flood lines.
    - Compile report with maps.
- Water Use License Application
    - All specialist studies needed for the application process if not covered under the other specialist studies.

3. METHODOLOGY

Input into this report was informed by a combination of desktop assessments of existing aquatic ecosystem information for the study area and catchment, as well as by a more detailed assessment of the freshwater features at the site. The site was visited in September 2016. During the field visit, the characterisation and integrity assessments of the freshwater features were undertaken. The SANBI Biodiversity GIS website was also consulted to identify any constraints in terms of fine-scale biodiversity conservation mapping as well as possible freshwater features mapped in the Freshwater Ecosystem Priority Areas maps. This information/data was used to inform the resource protection related recommendations. The level of aquatic assessment undertaken was considered to be adequate for this study.

4. USE OF THIS REPORT

This report reflects the professional judgment of its authors. The full and unedited content of this should be presented to the client. Any summary of these findings should only be produced in consultation with the authors.

5. OVERVIEW OF THE PROJECT AND STUDY AREA

5.1. OVERVIEW OF THE STUDY AREA

The study area is located along the N14 near Kathu and within the Savanna Biome. The landscape consists of flat plains with red wind-blown sands. The general slope of the area is towards the west to south-west, towards the ephemeral Ga-Mogara River The vegetation is a mix of grassland dominated by *Stipagrostis amabilis* with closed shrub cover (*Lycium* spp.) and an open tree layer (*Acacia mellifera)*. In terms of freshwater features, the study area lies primarily in the catchment of the north-west flowing river Ga-Mogara River which discharges into the Kuruman and Molopo Rivers before it too reaches the Orange River at Riemvasmaak. A few valley floor depressions or pans occur near the line to be decommissioned. Table 1 provides a summary of the main features of the freshwater and hydrological features of the area.

Table 1: Key information related to the water resources which may be impacted by the proposed activities

Descriptor	Name / details	Notes
Water Management Area	Lower Vaal WMA	
Catchment Area	Ga-Mogara Tributary of the Molopo River	
Quaternary Catchment	D41J	
Present Ecological state	D (Largely modified)	DWA 2013 (Appendix C)
EISC – Ecological Importance and Sensitivity	Low/Very Low	
Type of water resource	River and depression wetlands	
Latitude	27°46'34"S	Northern extent of two proposed lines at Sekgame Switching Station
Longitude	23°03'59"E	

5.2. ACTIVITY DESCRIPTION

It is proposed to construct two chicadee lines, single-circuit Loop out power lines from the proposed Sekgame Switching Station to the Existing Ferrum-Bulkop and Ferrum-Sishen 132kV power lines.

Scope of Work for Bulkop Feeder

- Build a new +-6km 132kV Single Circuit chicadee line from the new 132kV feeder bay at Sekgame Swiching Station back to the old Bulkop/Ferrum 1 132kV Overhead Line (coordinates 23° 2' 12.2"/-27° 48' 59.2").
- Break down and remove the existing 132kV Bulkop Ferrum line from Ferrum up to the new connection from Sekgame.

Scope of Work for Sishen Feeder

- Build a new +-6km 132kV Single Circuit chicadee line from the new 132kV feeder bay at Sekgame Switching Station back to the old Ferrum/Sishen 1 132kV Overhead Line (coordinates 23° 2' 12.2"/-27° 48' 59.2").
- Break down and remove the existing 132kV Ferrum Sishen Traction line from Ferrum up to the new connection from Sekgame.

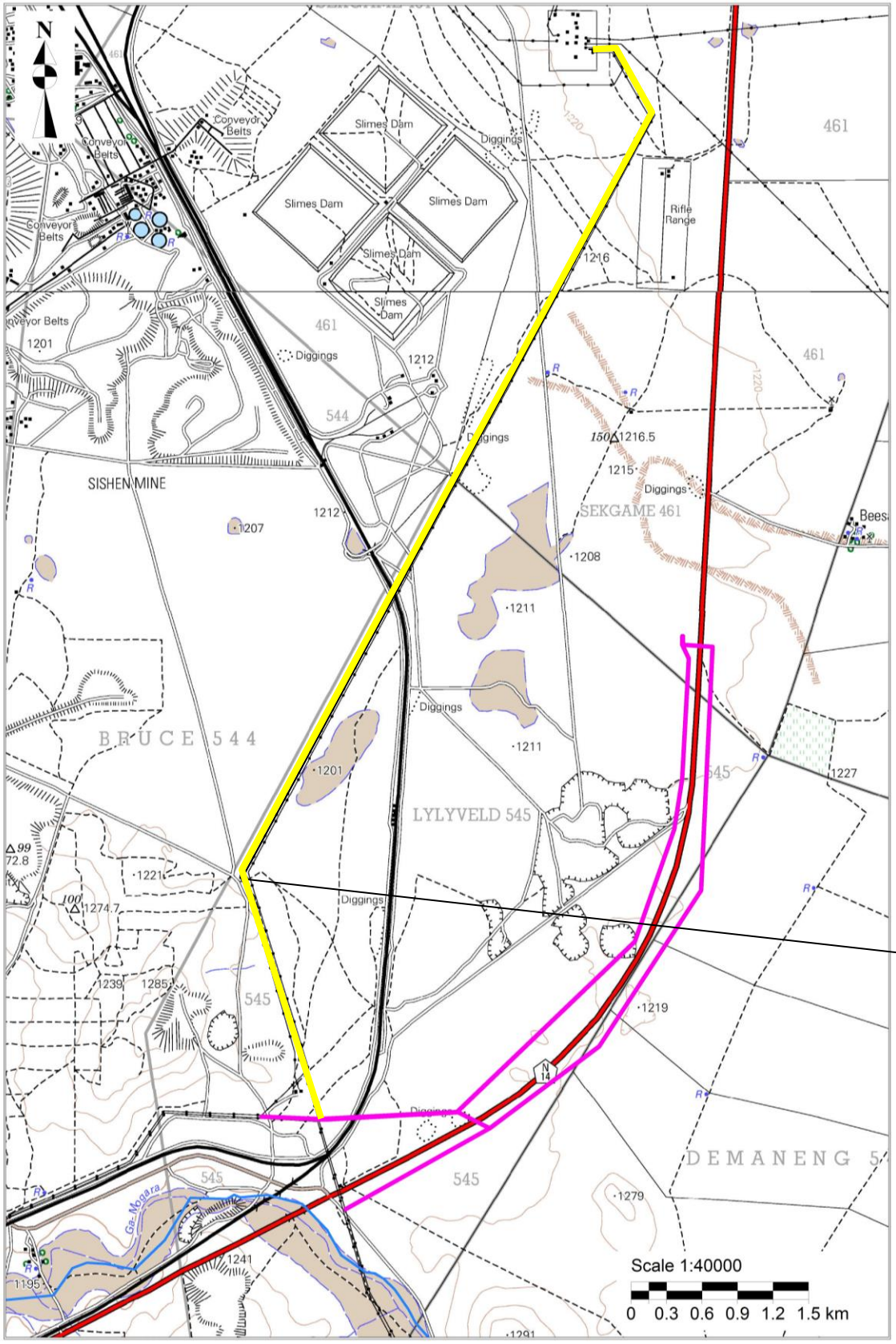


Figure 2: Topographical map for the study area (2723 CA&CC) where the pink lines indicate the alternative lines to be constructed and the yellow line the line to be decommissioned

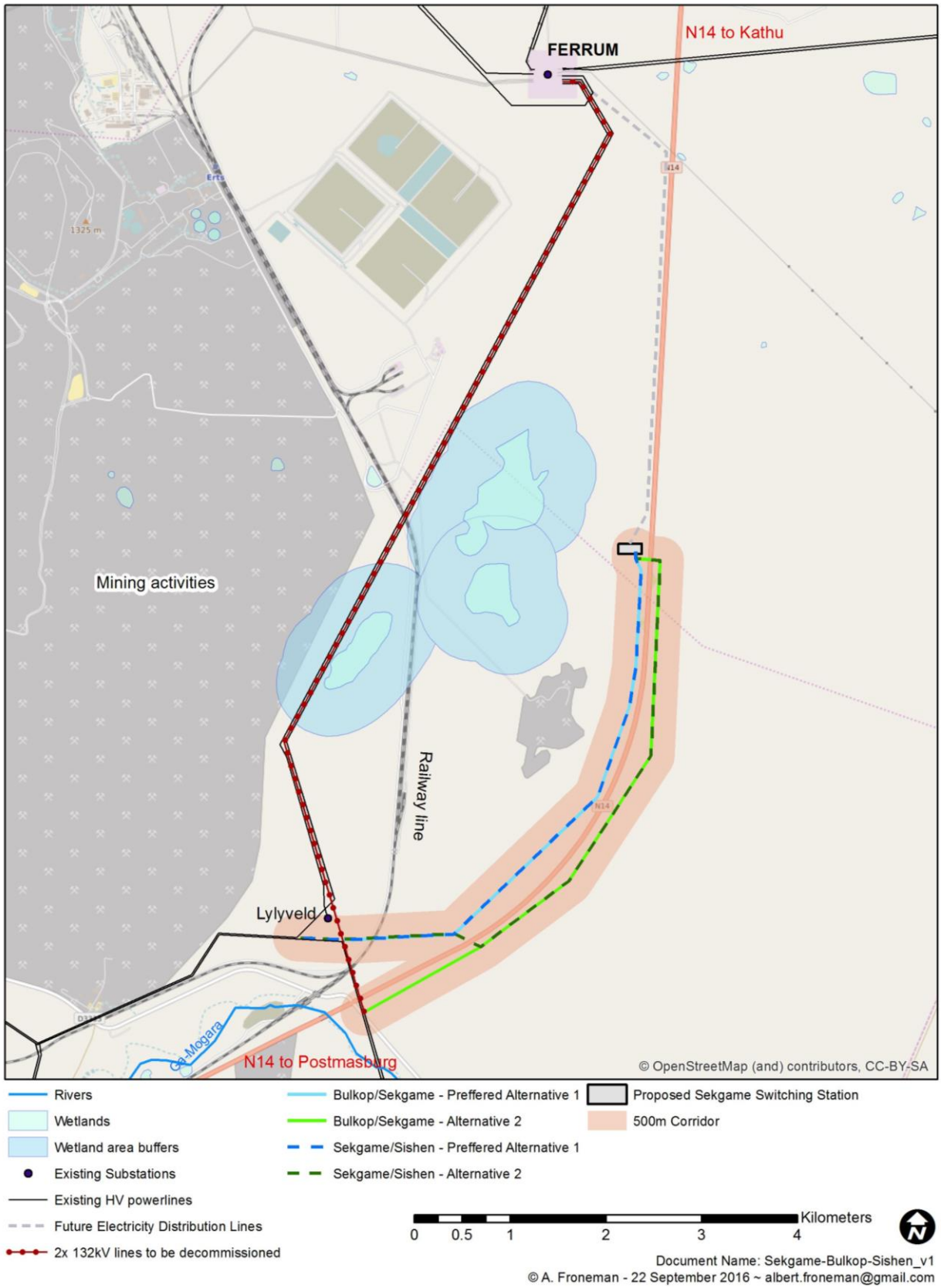


Figure 3: The alternative routes under consideration for the transmission line

6. DESCRIPTION OF THE STUDY AREA

6.1. VISUAL CHARACTERISTICS

The proposed area in which the power lines are to be constructed is located within the Gamogara Local Municipality. The proposed lines are proposed be placed adjacent to the N14 highway approximately 9 km south-east of Kathu. The majority of the landscape consists of slightly undulating plains. While the landscape along the proposed route is relatively undisturbed, much of the topography west of the study area around Sishen has been significantly altered by the mining activities, with large excavations and waste rock dumps. A railway line servicing the mining areas is located west of the site, near the line to be decommissioned. There are also a number of other powerlines crossing the landscape to the west of the site.

The vegetation cover consists of a bushveld and thornveld within the Eastern Kalahari Bushveld bioregion of the Savanna Biome. Kalahari salt pans also occur within the study area.

The Ga-Mogara River Valley occurs at the western extent of the study area. The river channel contains shallow pools for short periods of time during the rainy season (March-April) which provides some habitat for biota but are usually also usually subject to cycles of degradation and regeneration as a result of grazing of livestock.

Figure 4: View of the typical landscape within the study area

6.2. CLIMATE

The area receives about 480mm of rain per year, mostly during summer. On average, the lowest rainfall occurs in July and the highest in January. The average annual evaporation rate in the region is more than five times greater than the annual rainfall. The prevailing wind direction is from the northwest and southeast. The average midday temperatures for the area range from 19°C in June to 33°C in January. The region is the coldest during July when the mercury drops below 3°C on average during the night.

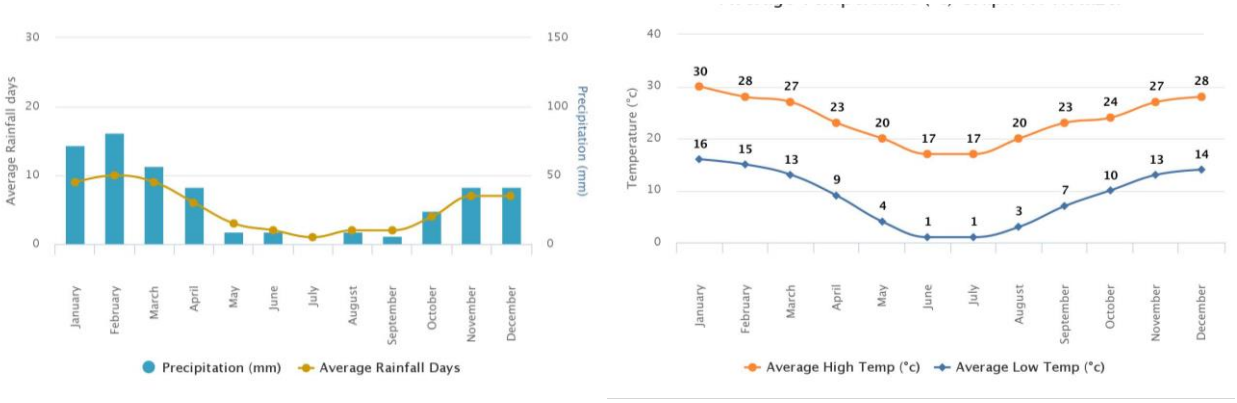


Figure 5: Average monthly rainfall and temperature graphs for the area (worldweatheronline.com, 2016)

6.3. GEOLOGY AND SOIL

The geology in the area consists of Aeolian sand underlain by superficial silcretes and calcretes of the Cenozoic Kalahari Group. In general the soils within the site are freely drained, structure-less red soils with a high base status that may have restricted soil depth, excessive drainage, high erodibility and low natural fertility. Along the river valley (cream in Figure 6) red, excessively drained sandy soils with high base status.

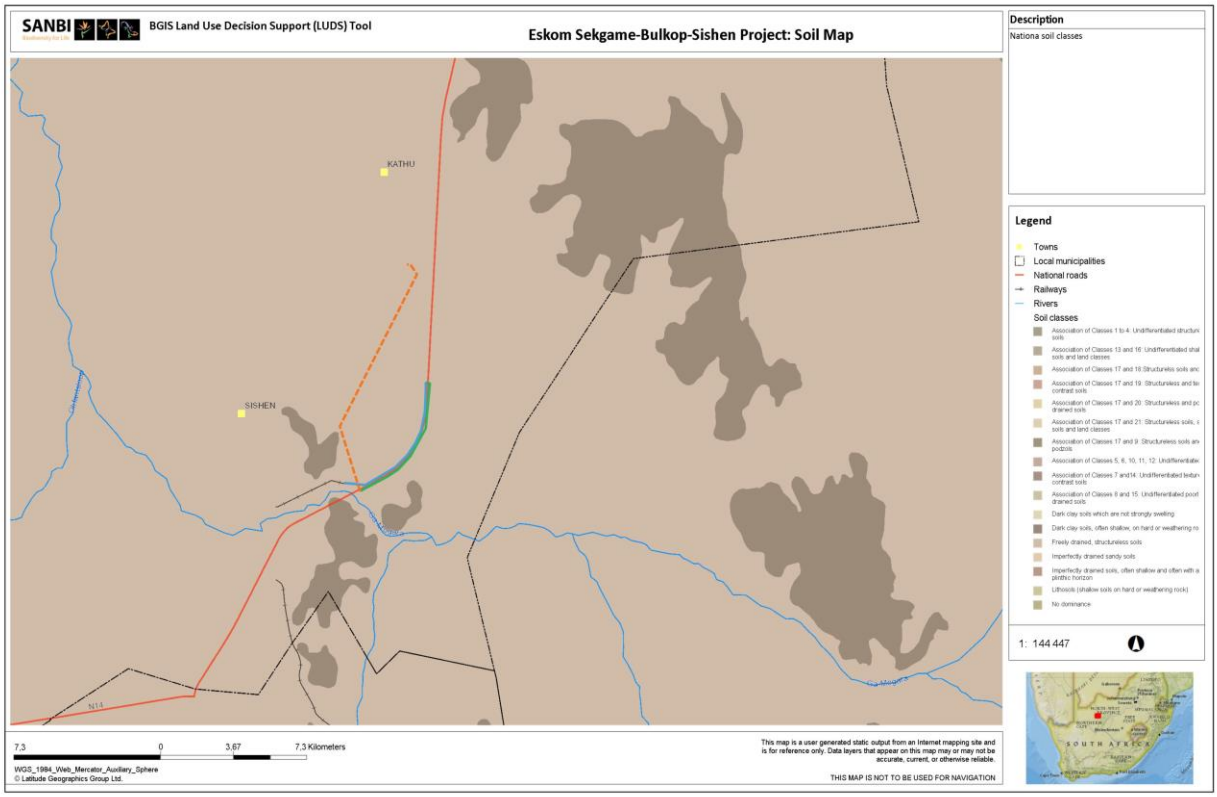


Figure 6: Soils map for the area and surroundings (SANBI Biodiversity GIS, 2016)

6.4. FLORA

The study area falls within the Savanna Biome. The natural vegetation types found in the area comprises Kuruman Thornveld (SVk9 - light brown in Figure 7), Kuruman Mountain Bushveld (cream in Figure 7) and Kathu Bushveld (SVk12 - light grey in Figure 7). Kathu Bushveld occurs for the northern portion of the site and the surrounding area while Kuruman Thornveld covers much of the southern portion. Large portions of these vegetation types still remain and as a result they are all considered to be Least Threatened vegetation types.

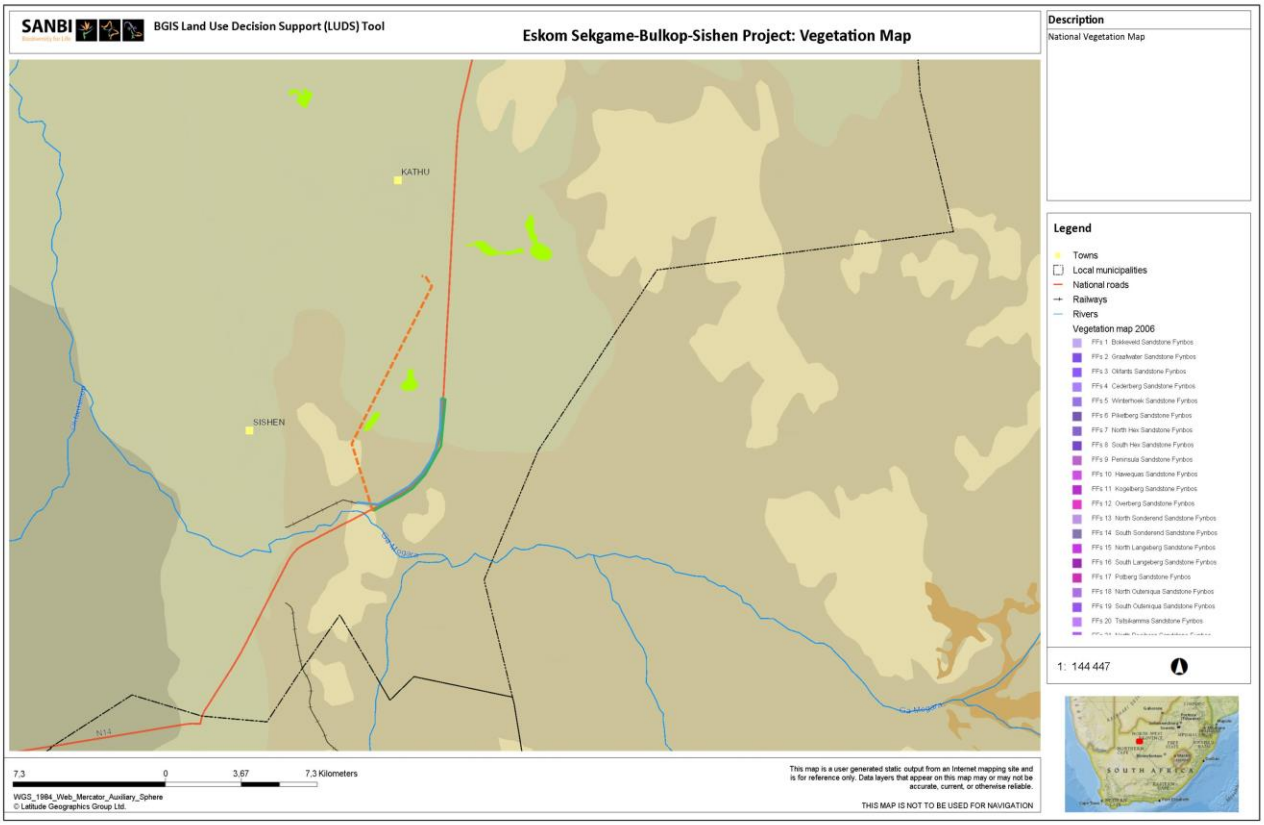


Figure 7: Vegetation map for the area (SANBI Biodiversity GIS)

Southern Kalahari Salt Pans vegetation occurs near the route of the line to be decommissioned. This vegetation type is also considered to be Least Threatened. This vegetation is associated with the endorheic pans of the southern Kalahari and consists of low grasslands on pan bottoms that are dominated by *Sporobolus* species. Low shrubs also occur on the outer edge of pans that are dominated by *Lycium* and *Rhigozum*. The riparian vegetation along the Ga-Mogara River within the study area is still in moderately modified condition as a result of the activities taking place along the river. More detail on the vegetation occurring associated with the freshwater features within the study area is provided in the following section.

6.5. AQUATIC FEATURES AND FAUNA

A few valley floor depressions or pans (green and brown areas in Figure 8) and their associated drainage features are the main aquatic features within the study area (Figure 9a). These features occur near the line that is to be decommissioned. The Ga-Mogara River (**Error! Reference source not**

found.b) occurs at the western extent of the study area. The river originates approximately 100 km to the south-east of the site near Danielskuil and flows in a north-westerly direction for about 150 km before discharging into the Kuruman and Molopo Rivers. The Molopo River has its confluence with the Orange River at Riemvasmaak. These freshwater features tend to be ephemeral, mostly only carrying water for short periods of time during the rainy season (March-April).

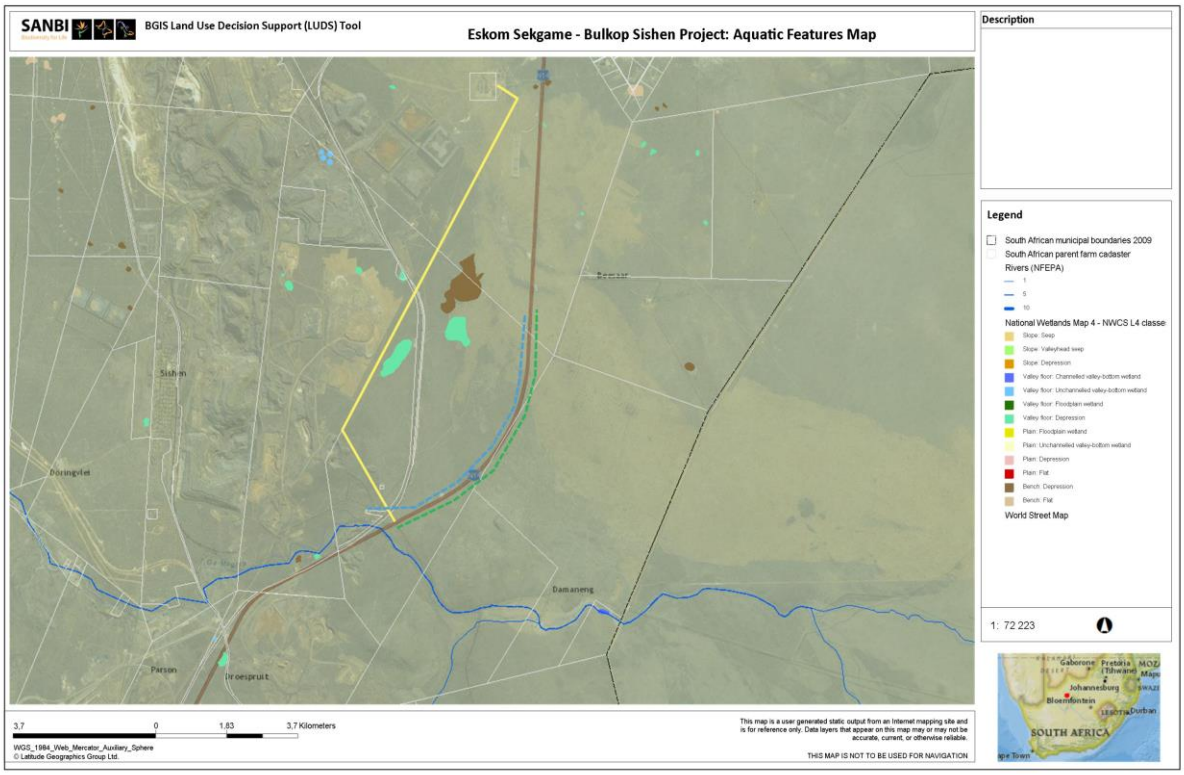


Figure 8: Wetland and river features within the study area

Figure 9a. View of a portion of the depression wetland area that occurs under the line to be decommissioned

Figure 9b. The Ga-Mogara River near the southern extent of the study area

6.6. PROTECTED AREAS

In South Africa two sets of mapping initiatives are available for the study area that are of relevance to the conservation and biodiversity importance of the aquatic ecosystems, that is, the Critical Biodiversity Areas (CBA) map and the Freshwater Ecosystem Priority Areas (FEPA) map. Currently no CBA map exists for the study area. Mapping of the threatened ecosystems has been utilized instead to identify conservation worthy areas. This mapping is however largely associated with terrestrial vegetation types. All of the vegetation types in the area are however considered to be least threatened vegetation types.

In terms of FEPAs (Figure 10), the Ga-Mogara River and its catchment have been mapped as an Upstream Catchment (light green areas in Figure 11) to the Kuruman River which has been identified as a FEPA river. Upstream Management Areas are catchments in which human activities need to be managed to prevent degradation of downstream river FEPAs and Fish Support Areas.

No wetland clusters occur within the study area, only the valley floor depression wetland areas near the line to be decomissioned (blue areas in Figure 11). Although wetland condition was a factor in selection of wetland FEPAs, wetlands selected were not necessary in a good condition (A or B ecological category) to be chosen as a FEPA. Wetland FEPAs currently in an A or B ecological condition should be managed to maintain their good condition. Those currently in a condition lower than A or B should be rehabilitated to the best attainable ecological condition.

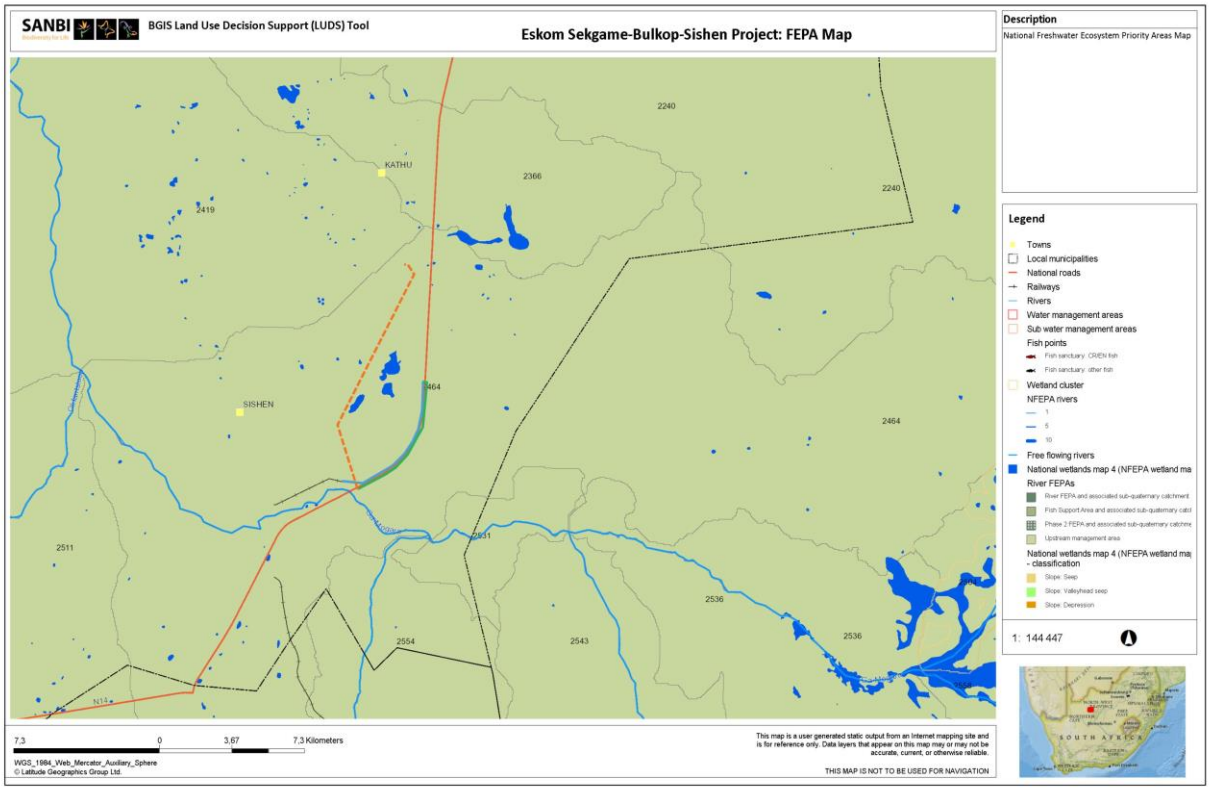


Figure 10: FEPA and threatened ecosystems map for the study area

6.7. LAND USE

Land use within the study area consists largely of natural areas (pale green areas in Figure 12). The town of Kathu (grey area in Figure 11) is located approximately 8 km north west of the site. Mining (dark brown areas in Figure 11) takes place mostly in the west of the study area. There surrounding areas are also mapped a degraded landscapes (light brown in Figure 11) with small patches of cultivated land (yellow areas). A number of Eskom power lines already transect the landscape. The pans in the area are mapped a blue areas in Figure 11.

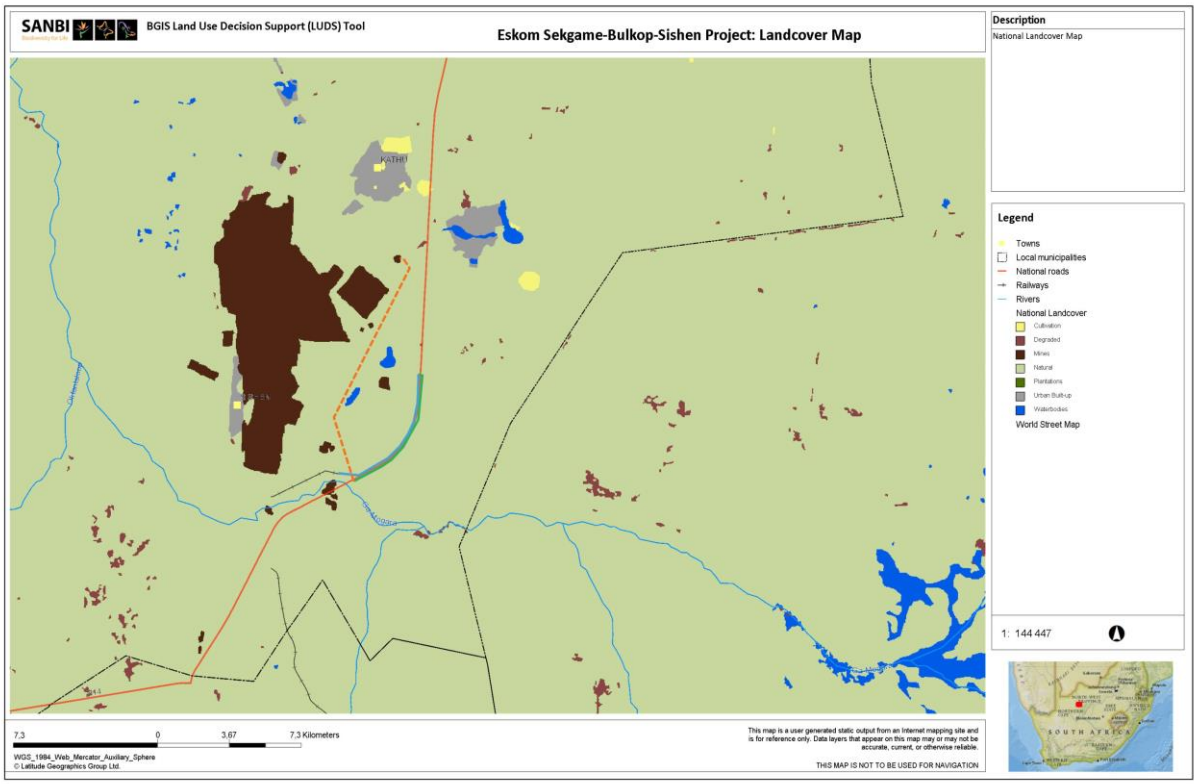


Figure 11: Land cover map for the area (SANBI Biodiversity GIS, 2016)

7. AQUATIC ASSESSMENT FOR THE STUDY AREA

The purpose of the freshwater assessment is to determine the relative importance, sensitivity and current condition (ecological state) of the significant freshwater features in order to assess the impact of the proposed powerlines on those freshwater resources. The assessment is also required to make recommendations in terms of mitigation measures that can be used to prevent or minimise the impact on the freshwater resources. This assessment of the Ga-Mogara River and the valley floor depression wetlands or salt pans within the study area is based on existing information as well as the field assessment.

7.1. RIVER TYPING AND CHARACTERISATION

The Index for Habitat Integrity (IHI) and Site Characterisation assessments were utilised to provide information on the ecological condition and physical characteristics of the freshwater features in the study area (Table 2).

River typing or classification involves the hierarchical grouping of rivers into ecologically similar units so that inter- and intra-river variation in factors that influence water chemistry, channel type, substratum composition and hydrology are best accounted for. Any comparative assessment of river/stream condition should only be done between rivers or streams that share similar physical and biological characteristics under natural conditions. Thus, the classification of rivers/streams

provides the basis for assessing their ecological condition and allows comparison between similar river/stream types. The primary classification of rivers and streams is a division into Ecoregions. Rivers within an ecoregion are further divided into sub-regions.

Ecoregions: groups of rivers and streams within South Africa, which share similar physiography, climate, geology, soils and potential natural vegetation (DWAF 1999). For the purposes of this study, the ecoregional classification presented in DWAF (1999), which divides the country's rivers into ecoregions, was used. The area lies within the Southern Kalahari Ecoregion.

***Characteristics of the Southern Kalahari Ecoregion**: Lowlands, open hills and mountains with moderate to high relief and plains with low relief. Altitude varies from 500 – 1700m amsl. The natural terrestrial vegetation is a mixture of bushveld types. Rainfall varies from 0 - 500 mm a^{-1} and mean annual temperature is between 14 - 22 °C.*

Sub-regions: sub-regions (or geomorphological zones) are groups of rivers, or segments of rivers, within an ecoregion, which share similar geomorphological features, of which gradient is the most important (Rowntree and Wadeson 1999). The use of geomorphological features is based on the assumption that these are a major factor in the determination of the distribution of the biota.

Table 2: Geomorphological and Physical features for the Ga-Mogara River within the study area

River	Ga-Mogara River
Geomorphological zone	Foothill river
Lateral mobility or entrenchment	Largely unconfined
Channel form	Simple channel
Channel pattern	Single thread: low sinuosity
Channel type	alluvium
Hydrological Type	Seasonal to ephemeral

7.2. HABITAT INTEGRITY OF THE GA-MOGARA RIVER

The evaluation of Habitat Integrity (HI) provides a measure of the degree to which a river or stream has been modified from its natural state. The methodology (DWAF, 1999) involves a qualitative assessment of the number and severity of anthropogenic perturbations on a river and the damage they potentially inflict upon the system. These disturbances include both abiotic and biotic factors, which are regarded as the primary causes of degradation of a river. The severity of each impact is ranked using a six-point scale from 0 (no impact) to 25 (critical impact).

The Habitat Integrity Assessment is based on assessment of the impacts of two components of the river, the riparian zone and the instream habitat. The total scores for the instream and riparian zone components are then used to place the habitat integrity of both in a specific habitat category (Table 3).

Table 3: Habitat Integrity categories (From DWAF, 1999)

Category	Description	Score (%)
A	Unmodified, natural.	90-100
B	Largely natural with few modifications. A small change in natural habitats and biota may have taken place but the ecosystem functions are essentially unchanged.	80-90
C	Moderately modified. A loss and change of natural habitat and biota have occurred but the basic ecosystem functions are still predominantly unchanged.	60-79
D	Largely modified. Large loss of natural habitat, biota and basic ecosystem functions has occurred.	40-59
E	The loss of natural habitat, biota and basic ecosystem functions is extensive.	20-39
F	Modifications have reached a critical level and the lotic system has been modified completely with an almost complete loss of natural habitat and biota. In worst instances, basic ecosystem functions have been destroyed and changes are irreversible.	0

Table 4: Instream and Riparian Habitat Integrity Assessment of the tributaries in the study area

Instream Habitat Integrity	Ga-Mogara River	Riparian Zone Habitat Integrity	Ga-Mogara River
Water Abstraction	6	Vegetation Removal	8
Flow Modification	5	Exotic Vegetation	3
Bed Modification	6	Bank Erosion	6
Channel Modification	7	Channel Modification	7
Water Quality	5	Water Abstraction	6
Inundation	4	Inundation	4
Exotic Macrophytes	0	Flow Modification	5
Exotic Fauna	0	Water Quality	5
Rubbish Dumping	5		
Integrity Class	**B/C**	**Integrity Class**	**B/C**

The Ga-Mogara River is considered to be in a largely natural to moderately modified state. The riparian habitat of the river tends to be more impacted by the surrounding land use activities.

7.3. ECOLOGICAL IMPORTANCE AND SENSITIVITY (EIS) OF THE GA-MOGARA RIVER

The EIS assessment considers a number of biotic and habitat determinants surmised to indicate either either importance or sensitivity. The determinants are rated according to a scale (Table 5). The median of the resultant score is calculated to derive the EIS category (

Table 6).

Table 5: Scale used to assess biotic and habitat determinants indicate either importance or sensitivity

Scale	Definition
1	One species/taxon judged as rare or endangered at a local scale.
2	More than one species/taxon judged to be rare or endangered on a local scale.
3	One or more species/taxon judged to be rare or endangered on a Provincial/regional scale.
4	One or more species/taxon judged as rare or endangered on a National scale (i.e. SA Red Data Books)

Table 6: Ecological importance and sensitivity categories (DWAF, 1999)

EISC	General description	Median
Very high	Quaternaries/delineations that are considered to be unique on a national and international level based on unique biodiversity (habitat diversity, species diversity, unique species, rare and endangered species). These rivers (in terms of biota and habitat) are usually very sensitive to flow modifications and have no or only a small capacity for use.	>3-4
High	Quaternaries/delineations that are considered to be unique on a national scale based on their biodiversity (habitat diversity, species diversity, unique species, rare and endangered species). These rivers (in terms of biota and habitat) may be sensitive to flow modifications but in some cases may have substantial capacity for use.	>2-≤3
Moderate	Quaternaries/delineations that are considered to be unique on a provincial or local scale due to biodiversity (habitat diversity, species diversity, unique species, rare and endangered species). These rivers (in terms of biota and habitat) are not usually very sensitive to flow modifications and often have substantial capacity for use.	>1-≤2
Low/ marginal	Quaternaries/delineations that are not unique on any scale. These rivers (in terms of biota and habitat) are generally not very sensitive to flow modifications and usually have substantial capacity for use.	≤1

Table 7: Results of the EIS assessment for the Ga-Mogara River within the study area

Biotic Determinants	Ga-Mogara River
Rare and endangered biota	1
Unique biota	1
Intolerant biota	1
Species/taxon richness	1
Aquatic Habitat Determinants	
Diversity of aquatic habitat types or features	2
Refuge value of habitat type	2
Sensitivity of habitat to flow changes	2
Sensitivity of flow related water quality changes	2
Migration route/corridor for instream and riparian biota	2
National parks, wilderness areas, Nature Reserves, Natural Heritage sites & areas, PNEs	2
Median	1.6
EIS CATEGORY	**Moderate**

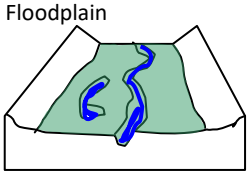
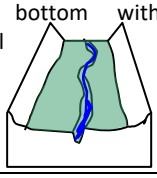
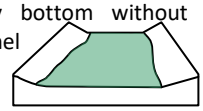
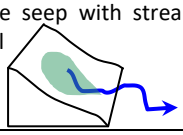
The ecological importance and sensitivity of the rivers within the study area is deemed to be moderate.

7.4. CLASSIFICATION OF THE VALLEY FLOOR DEPRESSIONS

The wetland assessment consists of the following aspects: Wetland classification; Wetland integrity; and Ecosystem services supplied by the wetland.

The classification of the wetlands in the study area into different wetland types was based on the WET-EcoServices technique (Kotze *et al*, 2005). The WET-EcoServices technique identifies seven main types of wetland based on hydro-geomorphic characteristics (Table 8).

Table 8. Wetland hydro-geomorphic types typically supporting inland wetlands in South Africa

Hydro-geomorphic types	Description	Source of water maintaining the wetland[1]	
		Surface	Sub-surface
Floodplain 	Valley bottom areas with a well-defined stream channel, gently sloped & characterized by floodplain features such as oxbow depressions and natural levees and the alluvial (by water) transport and deposition of sediment, usually leading to a net accumulation of sediment. Water inputs from main channel (when channel banks overspill) and from adjacent slopes.	***	*
Valley bottom with a channel 	Valley bottom areas with a well-defined stream channel but lacking characteristic floodplain features. May be gently sloped and characterized by the net accumulation of alluvial deposits or may have steeper slopes and be characterized by the net loss of sediment. Water inputs from main channel (when channel banks overspill) and from adjacent slopes.	***	*/ ***
Valley bottom without a channel 	Valley bottom areas with no clearly defined stream channel usually gently sloped and characterized by alluvial sediment deposition, generally leading to accumulation of sediment. Water inputs mainly from channel entering the wetland and also from adjacent slopes.	***	*/ ***
Hillslope seep with stream channel 	Slopes on hillsides, which are characterized by colluvial (transported by gravity) movement of materials. Water inputs are mainly from sub-surface flow and outflow is usually via a well-defined stream channel connecting the area directly to a stream channel.	*	***
Isolated Hillslope seepage 	Slopes on hillsides, which are characterized by the colluvial (transported by gravity) movement of materials. Water inputs mainly from sub-surface flow and outflow either very limited or through diffuse sub-surface and/or surface flow but with no direct surface water connection to a stream channel.	*	***
Depression (includes Pans) 	A basin shaped area with a closed elevation contour that allows for accumulation of surface water (i.e. it is inward draining). It may also receive sub-surface water. An outlet is usually absent, and therefore this type is usually isolated from the stream channel network.	*/ ***	*/ ***

[1] Precipitation is an important water source and evapotranspiration an important output

Water source: * Contribution usually small
*** Contribution usually large
*/ *** Contribution may be small or important depending on local circumstances

 Wetland

According to Table 8 the pans/wetland features within the study area can be classified as follows:

Table 9: Classification of wetland areas within study area

Name	Pans along the proposed line to be decommissioned
System	Inland
Ecoregion	Southern Kalahari Ecoregion
Landscape setting	Depression on the valley floor
Longitudinal zonation	Associated with the foothill reach of the Ga-Mogara River
Drainage	Endorheic (water mostly exists by means of infiltration and evaporation)
Seasonality	Ephemeral
Anthropogenic influence	Some disturbances due to surrounding activities
Geology	Tertiary to recent secondary deposits with carbonate rocks dominating together with surficial deposits, lavas and sub-ordinate shales and dolerites
Vegetation	Primarily within Kuruman Thornveld, immediate vegetation type South Kalahari Salt Pans Azonal Vegetation
Substrate	Sand/loam
Salinity	Fresh becoming saline through the season

7.5. WETLAND INTEGRITY OF THE VALLEY FLOOR DEPRESSIONS

The Present Ecological Status (PES) Method (DWAF 2005) was used to establish the integrity of the wetlands/pans in the study area and was based on the modified Habitat Integrity approach developed by Kleynhans (DWAF, 1999; Dickens *et al*, 2003). Table 10 shows the criteria and results from the assessment of the habitat integrity of the wetlands.

Table 10. Habitat integrity assessment criteria for palustrine wetlands (Dickens *et al*, 2003)

Criteria & Attributes	Relevance
Hydrologic	
Flow Modification	Consequence of abstraction, regulation by impoundments or increased runoff from human settlements or agricultural land. Changes in flow regime (timing, duration, frequency), volumes, velocity which affect inundation of wetland habitats resulting in floralistic changes or incorrect cues to biota. Abstraction of groundwater flows to the wetland.
Permanent Inundation	Consequence of impoundment resulting in destruction of natural wetland habitat and cues for wetland biota.
Water Quality	
Water Quality Modification	From point or diffuse sources. Measure directly by laboratory analysis or assessed indirectly from upstream agricultural activities, human settlements and industrial activities. Aggravated by volumetric decrease in flow delivered to the wetland.
Sediment Load Modification	Reduction due to entrapment by dams or increase due to land use practices such as overgrazing. Cause of unnatural rates of erosion, accretion or infilling of wetlands and change in habitats.
Hydraulic/Geomorphic	
Canalisation	Results in desiccation or changes to inundation patterns of wetland and thus changes in habitats. River diversions or drainage.
Topographic Alteration	Consequence of infilling, ploughing, dykes, trampling, bridges, roads, railway lines and other substrate disruptive activities that reduce or change wetland habitat directly in inundation patterns.
Biota	
Terrestrial Encroachment	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.
Indigenous Vegetation Removal	Direct destruction of habitat through farming activities, grazing or firewood collection affecting wildlife habitat and flow attenuation functions, organic matter inputs and increases potential for erosion.
Invasive Plant Encroachment	Affects habitat characteristics through changes in community structure and water quality changes (oxygen reduction and shading).
Alien Fauna	Presence of alien fauna affecting faunal community structure.
Over use of Biota	Overgrazing, over fishing, etc.

Table 11. Wetland habitat integrity assessment (score of 0=critically modified to 5=unmodified)

Criteria & Attributes	Valley floor depressions
Hydrologic	
Flow Modification	3.5
Permanent Inundation	3.5
Water Quality	
Water Quality Modification	3.0
Sediment Load Modification	2.5
Hydraulic/Geomorphic	
Canalisation	3.5
Topographic Alteration	3.0
Biota	
Terrestrial Encroachment	3.0
Indigenous Vegetation Removal	2.5
Invasive Plant Encroachment	3.5
Alien Fauna	3.5
Over utilisation of Biota	3.0
Total Mean	**3.1**
Category	**B/C (largely natural to moderately modified)**

The depression wetland areas/pans in the study area are in general in a largely natural to moderately modified state as a result of limited physical habitat modification with some flow and water quality modification largely as a result of the surrounding farming activities, as well as some mining activities.

Table 12. Relation between scores given and ecological categories

Scoring Guidelines Per Attribute*	Interpretation of Mean* of Scores for all Attributes: Rating of Present Ecological Status Category (PESC)
Natural, unmodified - score=5.	Within general acceptable range CATEGORY A >4; Unmodified, or approximates natural condition.
Largely natural - score=4.	CATEGORY B >3 and <4; Largely natural with few modifications, but with some loss of natural habitats.
Moderately modified- score=3.	CATEGORY C >2 and <3; moderately modified, but with some loss of natural habitats.
Largely modified - score=2.	CATEGORY D <2; largely modified. A large loss of natural habitats and basic ecosystem functions has occurred.
	OUTSIDE GENERALLY ACCEPTABLE RANGE
Seriously modified - rating=1.	CATEGORY E >0 and <2; seriously modified. The losses of natural habitats and basic ecosystem functions are extensive.
Critically modified - rating=0.	CLASS F 0; critically modified. Modifications have reached a critical level and the system has been modified completely with an almost complete loss of natural habitat.

7.6. ECOSYSTEM SERVICES SUPPLIED BY THE VALLEY FLOOR DEPRESSIONS

The assessment of the ecosystem services supplied by the valley floor depression wetlands / pan areas was conducted according to the guidelines as described by Kotze *et* al (2005). An assessment was undertaken that examines and rates the services listed in Table 13. The characteristics were scored according to the general levels of services provided. It is important to ensure that these pans and wetland areas can continue to provide the valued goods and services.

Table 13. Goods and services assessment results for wetland (high=4; low=0)

Goods and services	Valley floor depressions	Goods and services	Valley floor depressions
Flood attenuation	2.5	Carbon storage	1.5
Stream flow regulation	2.0	Maintenance of biodiversity	2.0
Sediment trapping	2.5	Water supply for human use	1.5
Phosphate trapping	1.5	Natural resources	2.0
Nitrate removal	2.0	Cultivated foods	0
Toxicant removal	1.5	Cultural significance	0
Erosion control	2.5	Education and research	1.0
Tourism and recreation	1.0		

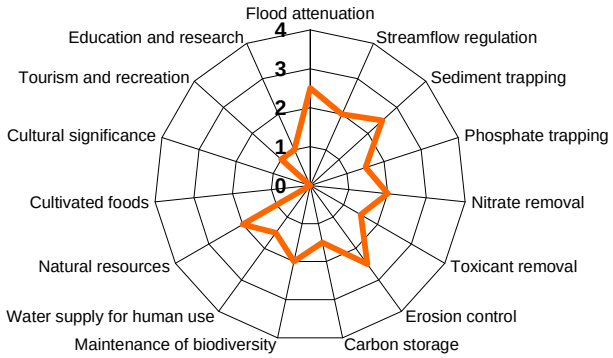


Figure 12. Ecosystem services provided by the pans in the study area

From Table 13 it can be seen that, in terms of goods and services, the pans provide some goods and services including some flood attenuation and sediment trapping functionality, as well as the provision of some habitat for aquatic life primarily during the rainy season.

7.7. ECOLOGICAL IMPORTANCE AND SENSITIVITY OF THE VALLEY FLOOR DEPRESSIONS

The EIS assessment follows the same methodology as that for rivers (See Section 7.3).

Table 14: Results of the EIS assessment for the tributaries within the study area

Biotic Determinants	Valley Floor Depressions
Rare and endangered biota	1
Unique biota	1.5
Intolerant biota	1
Species/taxon richness	1
Aquatic Habitat Determinants	
Diversity of aquatic habitat types or features	1
Refuge value of habitat type	1.5
Sensitivity of habitat to flow changes	2
Sensitivity of flow related water quality changes	2
Migration route/corridor for instream and riparian biota	1
National parks, wilderness areas, Nature Reserves, Natural Heritage sites & areas, PNEs	1
Median	1.3
EIS CATEGORY	**Moderate**

The ecological importance and sensitivity of the depression wetlands within the study area is deemed to be moderate.

8. LEGAL REQUIREMENTS

The following Acts, regulations and ordinances are applicable to the proposed development:

8.1. THE NATIONAL ENVIRONMENTAL MANAGEMENT ACT (ACT NO. 107 OF 1998)

Chapter Seven of the NEMA states that:

"Every person who causes, has caused or may cause significant pollution or degradation of the environment must take reasonable measures to prevent such pollution or degradation from occurring, continuing or recurring, or, in so far as such harm to the environment is authorised by law or cannot reasonably be avoided or stopped, to minimise and rectify such pollution or degradation of the environment".

The Act also clearly states that the landowner, or the person using or controlling the land, is responsible for taking measures to control and rectify any degradation. These may include measures to:

"(a) investigate, assess and evaluate the impact on the environment;

(b) inform and educate employees about the environmental risks of their work and the manner in which their tasks must be performed in order to avoid causing significant pollution or degradation of the environment:

(c) cease, modify or control any act, activity or process causing the pollution or degradation:

(d) contain or prevent the movement of pollutants or degradation: or

(e) eliminate any source of pollution or degradation: or

(f) remedy the effects of the pollution or degradation."

NEMA ENVIRONMENTAL IMPACT ASSESSMENT REGULATIONS

NEMA provides for the identification of activities which will impact the environment, in terms of Section 24. These activities were promulgated in terms of Government Notice No. R. 983, 984 and 985, dated 4 December 2014 and require environmental authorisation. The impacts of the listed activities must be investigated, assessed and reported to the competent authority before authorisation to commence with such listed activities can be granted.

8.2. NATIONAL WATER ACT, 1998 (ACT NO. 36 OF 1998)

The purpose of the National Water Act is to provide a framework for the equitable allocation and sustainable management of water resources. Both surface and groundwater sources are redefined by the Act as national resources which cannot be owned by any individual, and rights to which are not automatically coupled to land rights, but for which prospective users must apply for

authorisation and register as users. The National Water Act also provides for measures to prevent, control and remedy the pollution of surface and groundwater sources.

REGULATIONS REQUIRING THAT A WATER USER BE REGISTERED, GN R.1352 (1999)

Regulations requiring the registration of water users were promulgated by the Minister of the Department of Water Affairs (DWA) in terms of provision made in section 26(1)(c), read together with section 69 of the National Water Act, 1998. Section 26(1)(c) of the Act allows for registration of all water uses including existing lawful water use in terms of section 34(2). Section 29(1)(b)(vi) also states that in the case of a general authorisation, the responsible authority may attach a condition requiring the registration of such water use. The Regulations (Art. 3) oblige any water user as defined under section 21 of the Act to register such use with the responsible authority and effectively to apply for a Registration Certificate as contemplated under Art.7(1) of the Regulations.

GENERAL AUTHORISATION IN TERMS OF S. 39 OF THE NATIONAL WATER ACT, GN R 1199 OF 2009

According to the preamble to Part 6 of the NWA, "*This Part established a procedure to enable a responsible authority, after public consultation, to permit the use of water by publishing general authorisations in the Gazette…*" *"The use of water under a general authorisation does not require a licence until the general authorisation is revoked, in which case licensing will be necessary…"*

The General Authorisations for Section 21 (c) and (i) water uses (impeding or diverting flow or changing the bed, banks or characteristics of a watercourse) as defined under the NWA have recently been revised (Government Notice R509 of 2016). Determining if a water use licence is required for these water uses is now associated with the risk of degrading the ecological status of a watercourse. A low risk of impact could be authorised in terms of a General Authorisations (GA). It is likely that the proposed activities associated with the aquatic ecosystems in the area can be authorised in terms of the new GA.

9. CONSTRAINTS MAP AND CONSIDERATION OF ALTERNATIVES

The only aquatic features within the study area are Ga-Mogara River which the lies in the southern extent of the study area and the valley floor depressions adjacent to the line to be decommissioned (Figure 13). The proposed activities are sufficiently distanced from the Ga-Mogara River to not pose any potential impact to the river. There are also no freshwater features occurring along the proposed new routes (both the preferred and the alternative routes). Within the line to be decommissioned, the portions of the depression wetlands that occur within close proximity to the line and that are likely to be impacted by the proposed decommissioning activities have already been modified by the existing activities within the servitude.

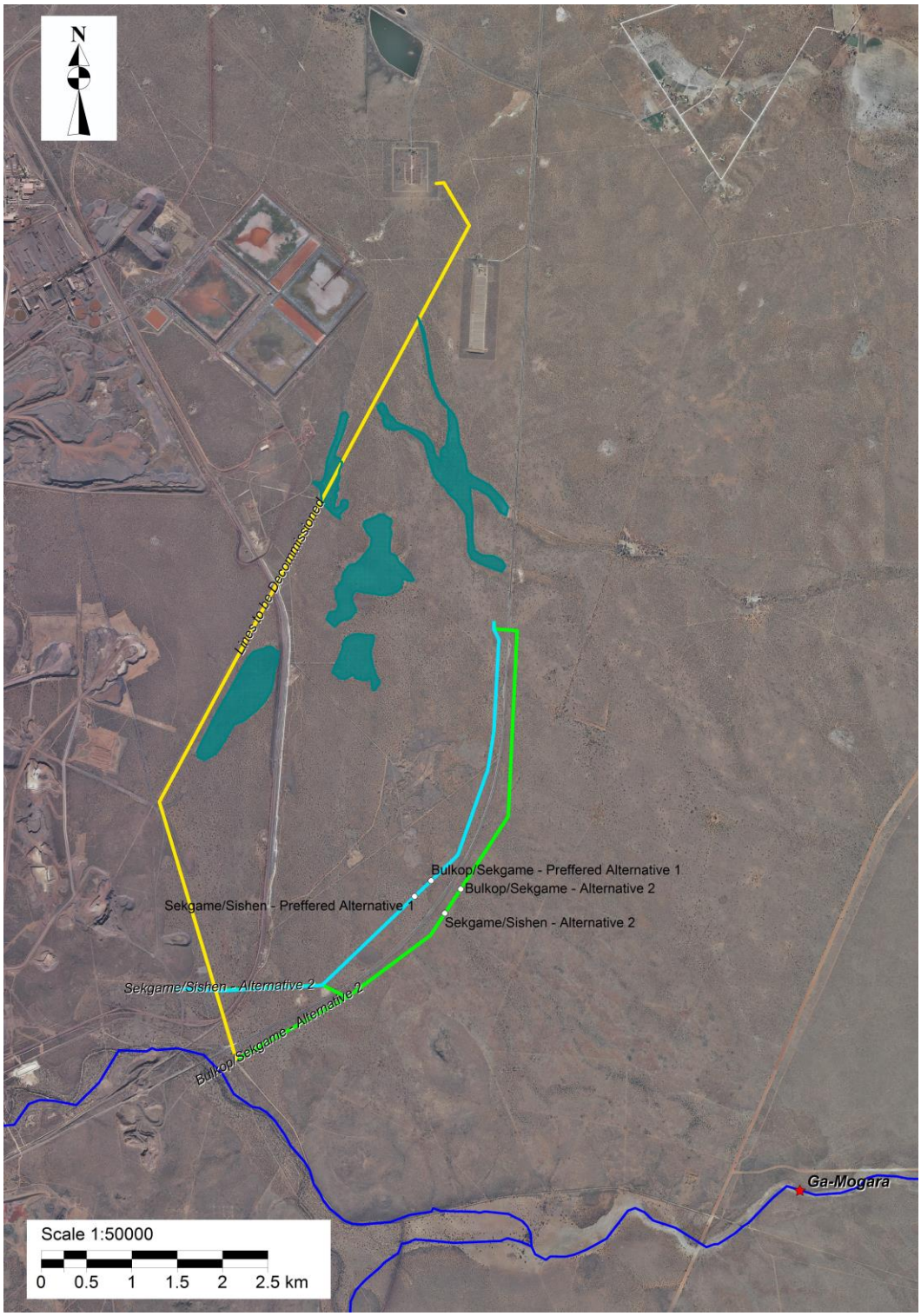


Figure 13: Mapped freshwater constraints for the proposed new powerline and the proposed project alternative as well as the aquatic features (green polygons indicated extent of depression wetlands) adjacent to the line to be decommissioned

10. DESCRIPTION OF POTENTIAL IMPACTS OF PROPOSED ACTIVITIES AND THE ALTERNATIVES

This section provides a generic description of the potential impacts to freshwater ecosystems that are likely to be associated with proposed power line development. The potential freshwater impacts of two activities are thus assessed, the impact of the construction of the new line (where two alternative routes are considered) and the impact of the decommissioning of the existing line within wetland areas. Due to the fact that the proposed new line will be constructed where there are no freshwater features, there are no potential short or longer term impacts associated with the proposed new powerlines. The preferred and the alternative routes would thus also have the same potential impact (nil) on the freshwater features in the area.

IMPACT OF THE PROPOSED DECOMMISSIONING OF EXISTING POWER LINE:

Nature of Impact: Activities that would be associated with the dismantling and the removal of the existing powerline will include the following:

- Access to all the existing pylon structures;
- Dismantling of structures; and
- Removal of the material from site.

Activities during the dismantling phase of the line could be expected to have a very limited aquatic ***habitat disturbance*** due to the fact that the existing line occurs within a servitude to the powerlines with an existing access road. A localised short term impact could be expected that would be associated with increased disturbance within the servitude with larger vehicles. The longer term impact could potentially be positive but of a very low significance if properly decommissioned and rehabilitated.

Significance of impacts without mitigation: A longer term impact of very low overall significance in terms of its impact on the identified aquatic ecosystems.

Proposed mitigation:

- The decommissioning activities should be limited as far as possible and should take place the in the dry season.
- Traffic (vehicular and pedestrian) between structures within the demarcated wetland areas must be kept to a minimum. These areas should be clearly marked with poles.
- Any top soil removed to re-fill the foundation area after construction should be stored outside of the demarcated areas. No material may be stored or dumped (temporarily or semi-permanent) in these depression wetland areas.
- If material needs to be filled or excavated within the demarcated wetlands for the removal of the pylons, the replaced soil should be returned such that the top soil layer is replaced

last. The filled area should resemble the surface height of the surrounding landscape. No ponding or new drains should be created.

- Cleared areas must be rehabilitated after dismantling is completed by re-vegetating with suitable indigenous plants that have been removed prior to the dismantling phase. An experienced botanist or horticulturalist should assist with this rehabilitation process.

- Invasive alien plants that currently exist within the immediate area of the existing servitude must be removed and any regrowth prevented and managed for a period of at least 5 years.

Significance of impacts after mitigation: A localized, short-term impact will occur during the decommission phase; however, the overall significance of the impact on the aquatic ecosystems is expected to be a very low positive impact.

CUMULATIVE IMPACT OF THE ACTIVITIES ON FRESHWATER ECOSYSTEMS:

The proposed project will result in the decommissioning of the existing power line route. This decommissioning will take place within an Eskom servitude where a number of powerlines are present and the freshwater features within the servitude have been modified by these activities. The proposed decommissioning has the potential to reduce the disturbance of the freshwater features within the servitude. A new power line will be constructed along the N14 road where it will be easily accessible. Due to the activities associated with the road, the area adjacent to the road is already disturbed. Construction of the powerline is not likely to significantly alter the current ecological state. In addition, no freshwater features occur along the proposed route or its alternative. As a result, it is expected that there will be short term and localised negative impacts that are of a very low significance, mostly occurring during the decommissioning of the existing line with no impacts during the construction phase of the new line. Over the longer term, a low positive impact can be expected.

Potential impact on freshwater features	Proposed Decommission of Existing Power Line
Nature of impact:	Disturbance of wetland habitats along the route of the existing line and access to that line
Extent and duration of impact:	Localised short term impacts
Intensity of Impact	Moderate
Probability of occurrence:	Possible
Degree to which impact can be reversed:	High
Irreplaceability of resources:	Medium to Low
Significance of impact pre-mitigation	Low (negative)
Cumulative impact prior to mitigation:	Low to very low
Degree of mitigation possible:	Medium
Proposed mitigation:	See previous section of this report
Significance after mitigation	Low positive
Cumulative impact post mitigation:	Low positive

11. RISK ASSESSMENT

The Risk Assessment Matrix has been developed to assist with the determination of risks associated various proposed water use activities. Based on the outcome of the Risk Assessment Matrix, LOW risk activities will be generally authorised with conditions, while moderate to high risk activities will be required to go through a Water Use Licence Application Process. Water use activities that are authorised in terms of the General Authorisations will still need to be registered with the DWS.

A summary of the Risk Assessment is provided below. A full Risk Assessment Matrix is attached in Appendix D. Only the decommissioning of the existing lines was considered as the no lines pose no risk to any aquatic features.

Table 15: Risk assessment of the proposed activities

Phases	Activity	Impact	Significance	Risk Rating
Decommission	Decommission of existing powerline	Aquatic habitat disturbance with potential to divert surface runoff	35	Low

*Low risk rating = Significance score of ≤55;

The risk associated with the decommissioning activities is deemed to be low provided that the mitigation measures as recommended in this freshwater report are implemented.

12. CONCLUSIONS AND RECOMMENDATIONS

Aquatic features which occur within the study area consist of the Ga-Mogara River which flows to the north-west before discharging into the Kuruman River and then the Molopo River. The Molopo River has its confluence with the Orange River at Riemvasmaak. The river is located south of the study area. A few relatively small valley floor depressions or pans are located adjacent to the line to be decommissioned. All of these freshwater features tend to be ephemeral, mostly only carrying water for short periods of time during the rainy season (March-April). The streams in general have little to no riparian associated vegetation except for occasional trees and shrubs.

The Ga-Mogara River is still in a largely natural to moderately modified ecological state while the ecological importance and sensitivity of the river is deemed to be moderate.The depression wetland areas/pans in the study area are in general in a moderately modified state as a result of physical habitat modification with flow and water quality modification largely as a result of the surrounding farming activities and some mining activities. The pans provide some goods and services include some flood attenuation and sediment trapping functionality, as well as the provision of some habitat for aquatic life primarily during the rainy season. They are considered to be of a moderate ecological importance and sensitivity.

The proposed project will result in the decommissioning of the existing power line route within an Eskom servitude where a number of powerlines are present. The freshwater features within the servitude have been modified by these activities. The proposed decommissioning has the potential to reduce the disturbance of the freshwater features within the servitude. The potential impact of

this proposed activity is thus of a low significance with mitigation that may result in a low positive impact over the longer term.

The new powerline that is proposed to be constructed will be along the N14 road where it will be easily accessible. Due to the activities associated with the road, the area adjacent to the road is already disturbed. Construction of the powerline is not likely to significantly alter the current ecological state. In addition, no freshwater features occur along the proposed route or its alternative. There are thus no potential short or longer term freshwater impacts associated with the proposed new powerlines. The preferred and the alternative routes would therefore also have the same potential impact (nil) on the freshwater features in the area.

In line with the above, the risk of the proposed activities resulting in any degradation to the freshwater ecosystems in the study area is low. The activities can thus potentially be authorised in terms of the General Authorisations for Section 21c&i water use. The water use aspects of the proposed activities would however need to be registered with the DWS.

13. REFERENCES

Department of Water Affairs and Forestry. (1999). *Resource Directed Measures for Protection of Water Resources. Volume 3: River Ecosystems Version 1.0*. Resource Directed Measures for Protection of Water Resources, Pretoria, South Africa.

Department of Water Affairs and Forestry. (2005). A practical field procedure for identification and delineation of wetlands and riparian areas. Department of Water Affairs and Forestry, Pretoria.

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Kleynhans CJ, Louw MD, Graham M. (2008). *Module G: EcoClassification and EcoStatus determination in River EcoClassification: Index of Habitat Integrity (Section 1, Technical manual)* Joint Water Research Commission and Department of Water Affairs and Forestry report. WRC Report No. TT 377-08

Mucina, L. and M. Rutherford. *Eds.* (2006). Vegetation map of South Africa, Lesotho, and Swaziland. *Strelitzia 19*. South African National Biodiversity Institute, Pretoria.

SANBI Biodiversity GIS: http://bgis.sanbi.org/

APPENDIX A: QUALIFICATIONS OF SPECIALIST CONSULTANTS

Contact details: PO Box 455, Somerset Mall, 7137

Name: Ms Antonia Belcher

Profession: Ms Antonia Belcher (Aquatic Scientist *Pr. Sci. Nat.* 400040/10);

Fields of Expertise: Specialist in environmental water requirements, river and wetland monitoring and reporting.

Relevant work experience:

Due to Ms Belcher's involvement in the development and implementation of the River Health Programme as well as the Resource Directed Measures (RDM) directorate of the Department of Water Affairs in the Western Cape, she have been a key part of the team that has undertaken six catchment or area wide 'state-of-river' assessments as well as routine monitoring and specialised assessments of rivers and wetlands in all the major catchments in the Western Cape. Ms Belcher and Mr Grobler have also undertaken the River Health Monitoring for the Free State Region in 2011 and 2012.

Relevant publications:

- Freshwater Assessment for the proposed Eskom Kimberley Strengthening Phase 4 Project: Beta to Boundary; Boundary to Ulco; Ulco to Manganore; and Manganore to Ferrum, 2014.
- Desktop Freshwater Assessment: Proposed Garob Wind Energy Facility, Located near Copperton in the Northern Cape Province. 2014.
- Freshwater Review of the Proposed Augrabies Photovoltaic Power Project at Farm Rooipad 15 Portion 9, Augrabies, Northern Cape Province, 2012.
- Freshwater Assessment for the Proposed Mulilo Photovoltaic and Wind Energy Facilities near De Aar. 2012.
- Freshwater Assessment for the Proposed construction of two 132kV transmission lines from the Maanhaarberg and Damfontein Wind Energy Facilities (De Aar 1) near De Aar, Northern Cape, 2012.
- Freshwater Assessment for the Proposed construction of two 132kV transmission lines from the South & North Wind Energy Facilities on the Eastern Plateau (De Aar 2) near De Aar, Northern Cape, 2012.
- Freshwater Review of the Proposed Augrabies Photovoltaic Power Project at Farm Rooipad 15 Portion 9, Augrabies, Northern Cape Province. 2012.
- Freshwater Assessment for the Proposed Wind and Solar Energy Facilities near Springbok. 2012.

APPENDIX B: DECLARATION OF INDEPENDENCE (MS ANTONIA BELCHER)

environmental affairs
Department:
Environmental Affairs
REPUBLIC OF SOUTH AFRICA

DETAILS OF SPECIALIST AND DECLARATION OF INTEREST

	(For official use only)
File Reference Number:	12/12/20/ or 12/9/11/L
NEAS Reference Number:	DEA/EIA
Date Received:	

Application for integrated environmental authorisation and waste management licence in terms of the-

(1) National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended and the Environmental Impact Assessment Regulations, 2014; and

(2) National Environmental Management Act: Waste Act, 2008 (Act No. 59 of 2008) and Government Notice 921, 2013

PROJECT TITLE

ESKOM SEKGAME – BULKOP – SISHEN PROJECT

Specialist:	BLUESCIENCE		
Contact person:	TONI BELCHER		
Postal address:	PO BOX 455, SOMERSET MALL		
Postal code:	7137	Cell:	0828838055
Telephone:	021851055	Fax:	-
E-mail:	toni@bluescience.co.za		
Professional affiliation(s) (if any)	SACNASP 400040/10		

Project Consultant:	LANDSCAPE DYNAMICS		
Contact person:	SUSANNA NEL		
Postal address:	PO Box 947, Groenkloof, Pretoria		
Postal code:	0027	Cell:	0828884060
Telephone:	0218550912	Fax:	0213462356
E-mail:	susanna@landscapedynamics.co.za		

4.2 The specialist appointed in terms of the Regulations_

I, Antonia Belcher, declare that -- General declaration:

I act as the independent specialist in this application;
I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
I declare that there are no circumstances that may compromise my objectivity in performing such work;
I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity;
I will comply with the Act, Regulations and all other applicable legislation;
I have no, and will not engage in, conflicting interests in the undertaking of the activity;
I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
all the particulars furnished by me in this form are true and correct; and
I realise that a false declaration is an offence in terms of regulation 48 and is punishable in terms of section 24F of the Act.

Signature of the specialist:

BlueScience (Pty) Ltd
Name of company (if applicable):

24 October 2016
Date:

APPENDIX C: PES AND EIS OF THE GA-MOGARA RIVER (DWA, 2013)

SELECT SQ REACH	SQR NAME	LENGTH km	STREAM ORDER	PES ASSESSED BY XPERTS? (IF TRUE="Y")	REASONS NOT ASSESSED	PES CATEGORY DESCRIPTION	PES CATEGORY BASED ON MEDIAN OF METRICS
D41K-02068	Ga-Mogara	21.28	3	y		MODERATELY MODIFIED	C
MEAN EI CLASS	**MEAN ES CLASS**	**DEFAULT ECOLOGICAL CATEGORY (EC)**	**RECOMMENDED ECOLOGICAL CATEGORY (REC)**				
MODERATE	VERY LOW	C					

PRESENT ECOLOGICAL STATE		ECOLOGICAL IMPORTANCE				ECOLOGICAL SENSITIVITY	
INSTREAM HABITAT CONTINUITY MOD	NONE	FISH SPP/SQ		INVERT TAXA/SQ		FISH PHYS-CHEM SENS DESCRIPTION	
RIP/WETLAND ZONE CONTINUITY MOD	MODERATE	FISH: AVERAGE CONFIDENCE		INVERT AVERAGE CONFIDENCE		FISH NO-FLOW SENSITIVITY DESCRIPTION	
POTENTIAL INSTREAM HABITAT MOD ACT.	NONE	FISH REPRESENTIVITY PER SECONDARY:		INVERT REPRESENTIVITY PER SECONDARY,		INVERT PHYS-CHEM SENS DESCRIPTION	
RIPARIAN-WETLAND ZONE MOD	MODERATE	FISH REPRESENTIVITY PER SECONDARY: CLASS		INVERT RARITY PER SECONDARY: CLASS		INVERTS VELOCITY SENSITIVITY	
POTENTIAL FLOW MOD ACT.	SMALL	FISH RARITY PER SECONDARY: CLASS		ECOLOGICAL IMPORTANCE: RIPARIAN-WETLAND-INSTREAM VERTEBRATES (EX FISH) RATING	LOW	RIPARIAN-WETLAND-INSTREAM VERTEBRATES (EX FISH) INTOLERANCE WATER LEVEL/FLOW CHANGES DESCRIPTION	VERY LOW
POTENTIAL PHYSICO-CHEMICAL MOD ACTIVITIES	SMALL	ECOLOGICAL IMPORTANCE: RIPARIAN-WETLAND-INSTREAM VERTEBRATES (EX	LOW	HABITAT DIVERSITY CLASS	VERY LOW	STREAM SIZE SENSITIVITY TO MODIFIED FLOW/WATER LEVEL CHANGES DESCRIPTION	LOW
		RIPARIAN-WETLAND NATURAL VEG RATING BASED ON % NATURAL VEG IN 500m (100%=5)	VERY HIGH	HABITAT SIZE (LENGTH) CLASS	VERY LOW	RIPARIAN-WETLAND VEG INTOLERANCE TO WATER LEVEL CHANGES DESCRIPTION	**VERY LOW**
		RIPARIAN-WETLAND NATURAL VEG IMPORTANCE BASED ON EXPERT RATING	VERY LOW	INSTREAM MIGRATION LINK CLASS			
				RIPARIAN-WETLAND ZONE MIGRATION LINK	HIGH		
				RIPARIAN-WETLAND ZONE HABITAT INTEGRITY CLASS	HIGH		
				INSTREAM HABITAT INTEGRITY CLASS			

APPENDIX D: RISK ASSESSMENT

ASPECTS AND IMPACT REGISTER/RISK ASSSESSMENT FOR WATERCOURSES INCLUDING RIVERS, PANS, WETLANDS, SPRINGS, DRAINAGE LINES
Eskom Sekgame

COMPILED BY: Toni Belcher (SACNASP 400040/10), BlueScience

				Severity																
Nr.	Phases	Activity	Impact	Flow Regime	Physico & Chemical (Water Quality)	Habitat (Geomorph +Vegetation)	Biota	Severity	Spatial scale	Duration	Consequence	Frequency of activity	Frequency of impact	Legal Issues	Detection	Likelihood	Significance	Risk Rating	Control Measures	Confidence	Type Watercourse (PES; EIS)
	Decommission	Decommission of existing powerline	Aquatic habitat disturbance with potential to divert surface runoff	2	1	2	1	1.5	1	1	**3.5**	1	2	5	2	**10**	**35**	**L**	See freshwater report	High	Valley floor wetlands (moderately modified and of moderate EIS)