

Botswana - South Africa (BOSA) Transmission Interconnection  
Project

**AQUATIC AND TERRESTRIAL ECOLOGICAL ASSESSMENT**  
SCOPING PHASE BASELINE

**DRAFT REPORT V2**

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**AURECON South Africa (Pty) Ltd**

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## SPECIALIST REPORT DETAILS

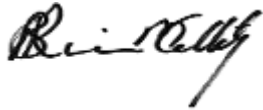
This report has been prepared as per the requirements of the Environmental Impact Assessment Regulations and the National Environmental Management Act (Act 107 of 1998), any subsequent amendments and any relevant National and / or Provincial Policies related to biodiversity assessments.

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I, **Dr. Brian Michael Colloty** declare that this report has been prepared independently of any influence or prejudice as may be specified by the National Department of Environmental Affairs (DEA)



Signed:...

..... Date: 7 June 2017.....

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## ACRONYMS

|       |   |
|-------|---|
| BOSA  | Botswana - South Africa (BOSA) Transmission Interconnection Project |
| BSAP  | Botswana Biodiversity Strategy and Action Plan                      |
| DWS   | South African Department of Water and Sanitation                    |
| EIA   | Environmental Impact Assessment                                     |
| GA    | General Authorisation   |
| GIS   | Geographic Information System                                       |
| NSBA  | South African - National Spatial Biodiversity Assessment            |
| NWBSP | North West Biodiversity Sector Plan                                 |
| SANBI | South African National Biodiversity Institute                       |
| SC&A  | Scherman Colloty & Associates                                       |
| WULA  | Water Use License   |

## 1 Introduction

Scherman Colloty & Associates cc (SC&A) was appointed by Aurecon South Africa (Pty) Ltd (Aurecon) as an independent specialist to evaluate the ecological (terrestrial and aquatic) importance and function of the proposed transmission line corridors to be selected for further investigation as part of the EIA application.

This document follows on results obtained during a literature survey and observations made during previous studies within the study area. A preliminary site visit was also conducted in October 2016, to assist in the characterisation of the main habitat units, current land use impacts and to visit selected areas with high importance.

The main objective of this report is to provide a series of alignment selection criteria to identify areas of potential developmental suitability from a terrestrial and aquatic ecological perspective. This will then be translated into selection criteria / constraints to determine several alignment alternatives for further analysis in the EIA phase.

Several important national and provincial conservation plans were also reviewed, with the results of those studies being included in this report. Most conservation plans are produced at a course scale so the actual status of the study area will then be determined during the detailed EIA phase site visits.

### 1.1 Terms of reference

The main aim of this report is to investigate the ecological attributes of the study area by means of a desktop analysis of all the latest literature and information at hand (See Section 1.2 below).

The terms of reference for this assessment were to:

- Conduct an assessment of available information pertinent to ecological and biophysical attributes of the proposed alignment corridors;
- Conduct an assessment of all information on a scoping level in order to present the following baseline results:
  - Typify the regional vegetation that will be affected by the proposed development;
  - Highlight areas of terrestrial and aquatic sensitivity;
  - Highlight gaps of information in terms of the ecological environment;
  - Recommend further studies to be conducted as part of the Environmental Impact Assessment (EIA) phase.

This information has also been used to identify and select together with information collected by other specialists and the technical constraints several alignment alternatives for assessment in the EIA phase.

### 1.2 Literature Consulted

- The occurrence and conservation status of mammal taxa were based on Friedmann & Daly (2004), while mammalian nomenclature was based on Skinner & Chimimba (2005);
- The occurrence of conservation important reptile taxa was based according to the dated assessment conducted by Branch (1988) and the South African Reptile Conservation Assessment (SARCA; [www.saherps.net/sarca/index.php](http://www.saherps.net/sarca/index.php));
- Red Data categories and listings of amphibian taxa follow Minter *et al.* (2004).
- National Spatial Biodiversity Assessment, National Wetland Inventory (Wetland Inventory III) and the VegMap (Mucina & Rutherford, 2006) all found in the SANBI BGIS database site of the South African National Biodiversity Institute; which database also includes the mapping layers and metadata contained in the North West Biodiversity Sector Plan (2015) maps (<http://bgis.sanbi.org>);
- IUCN Red Data Lists;
- Botswana National Spatial Plan (in development);
- Botswana Conservation Management Plan (2014); and
- Botswana Biodiversity Strategy and Action Plan (2004, revised 2007).
- 

Additional data or information was also obtained from past investigations conducted by the authors of this report.

### 1.3 Limitations

In order to obtain a comprehensive understanding of the dynamics of both the floral and faunal of both the terrestrial and aquatic communities within a study, as well as the status of endemic, rare or threatened species in any area, assessments should always consider investigations at different time scales (across seasons/years) and through replication. However, due to time constraints such long-term studies are not feasible and are mostly based on instantaneous sampling bouts.

Therefore, due to the scope of the work presented in this report, a detailed investigation of all, or part of, the proposed sites were not possible and are not perceived as part of the Terms of Reference for a screening/scoping phase. It should be emphasised that information, as presented in this document, only has reference to the study area(s) as indicated on the accompanying maps. Therefore, this information cannot be applied to any other area without detailed investigation.

Furthermore, additional information may come to light during a later stage of the process or development. This company, the consultants and/or specialist investigators do not accept any responsibility for conclusions, suggestions, limitations and recommendations made in good faith, based on the information presented to them, obtained from the surveys or requests made to them at the time of this report.

## 2 Project locality

The study area (scoping phase) is indicated in Figure 1 below, and includes a small cross border area between South Africa and Botswana. The proposed transmission lines will span from Isang (North of Mochudi) in the North, to the Proposed Watershed B substation near Tlapeng in the South.

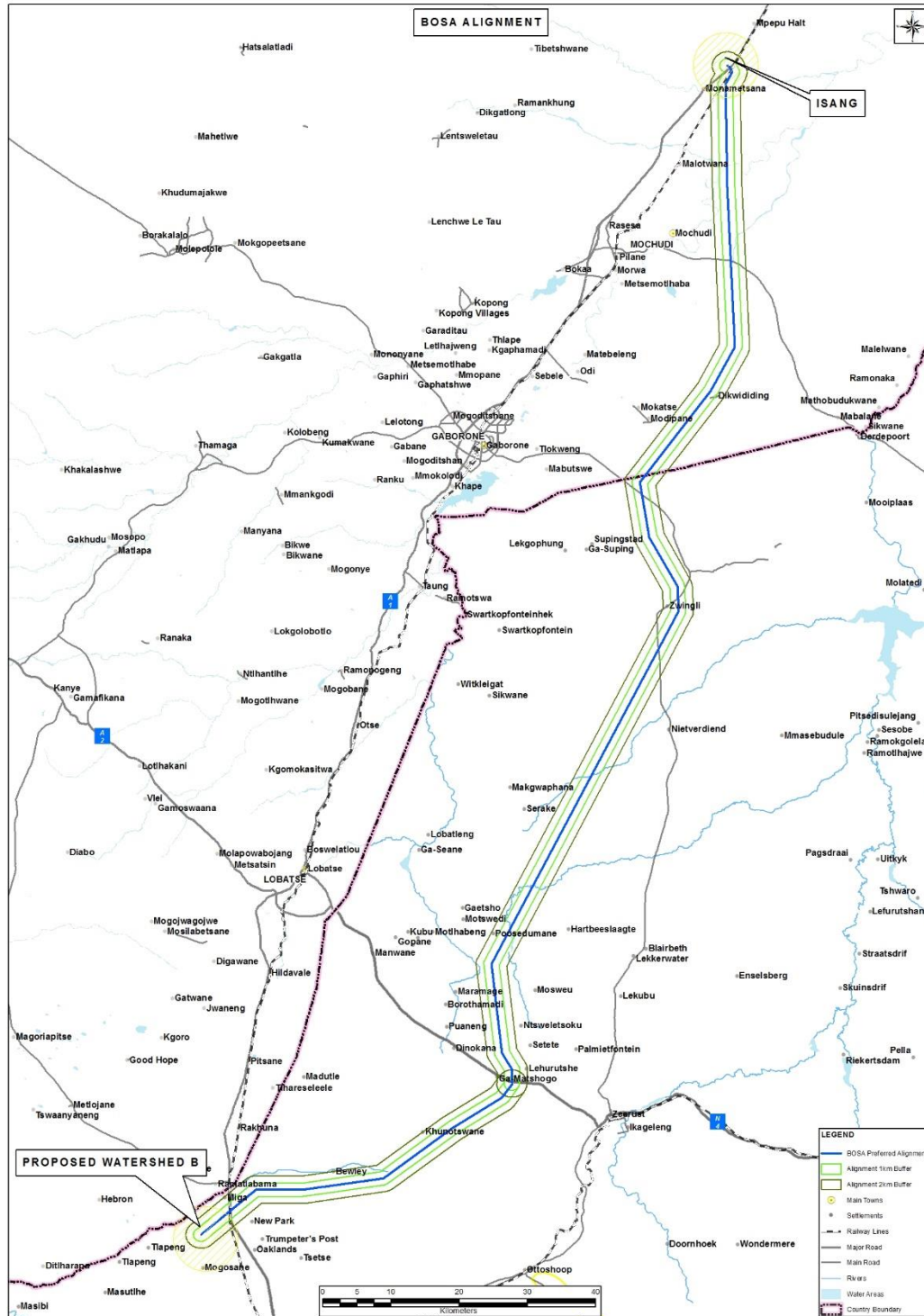


Figure 1: Study area including buffers showing the areas assessed in the Scoping Phase



### **3 Project description**

The Southern African Power Pool Coordination Centre (“SAPP CC”) has initiated the Botswana - South Africa (BOSA) Transmission Interconnection Project on behalf of two sponsors; Eskom of South Africa and Botswana Power Corporation of Botswana.

The objective of the project includes aspects such as:

- Alleviate congestion on the Matimba-Phokoje-Insukamini line,
- Complement other regional supply initiatives by increasing the power transfers within the SAPP network,
- Increase stability in the power pool through additional interconnection between the strong versus weak networks, which has been a source of SAPP grid instability,
- Improve system control, adequacy and reliability, and
- Deepen regional integration that will facilitate improved electricity trading.

The Project is sponsored by Eskom of South Africa, and Botswana Power Corporation and is coordinated by the Southern African Power Pool Coordination Centre (“SAPP CC”). The support funds, administered by the Development Bank of Southern Africa (DBSA), have been sourced from the Infrastructure Investment Programme for South Africa and Project Preparation and Development Fund.

## 4 Results

During the scoping phase, several alternative alignments and placements of the Proposed Watershed substation were analysed in terms of the possible constraints related to the aquatic and terrestrial environment. The constraints were the rated or ranked for each of the development options, allowing for the reduction / avoidance of any significant impacts prior the EIA phase. All additional constraints, such as agriculture, social, heritage technical and engineer were then analysed using the Multiple-criteria decision-making (MCDM) approach.

The Environmental Constraints (EN1 – Biodiversity) were determined as follows and are discussed in greater detail in the remainder of this report:

- Terrestrial;
  - Sensitive or irreplaceable habitat (NW BSP & BBSAP)
  - Critical Biodiversity areas still intact (CBA1 & 2)
  - NEM:BA Threatened Ecosystems
  - Current and Future protected areas
  - Areas with endemic, endangered or vulnerable plant species
  - Unique habitats (e.g. Quartzites)
  - Biodiversity priority areas (Botswana)
  
- Aquatic;
  - High value rivers or water resource areas
  - Wetlands and in particular wetland clusters
  - Alluvial floodplains
  - Critical Biodiversity Area and Ecological Support area, surrounding by intact habitat of vegetation

### 4.1 Generalised vegetation description & ecological perspective

#### 4.1.1 South Africa

The originally the proposed transmission line alignment with buffer areas would have spanned 30 Vegetation Types as described by Mucina & Rutherford (2006, and amended 2012). These span a variety of bioregions varying from Mesic (wet) grasslands in the East to drier Bushveld habitats to the west (Figure 1). After the constraints analysis, the alignment was refined and only 10 vegetation units will be affected (Table 1)

During the development of the North-West Province Biodiversity Sector Plan (2015), the Mucina & Rutherford vegetation type boundaries were revised and it was also determined that the Dwarsberg-Swartruggens Mountain Bushveld, Klerksdorp Thornveld and Zeerust Thornveld units are endemic to the Province (>80 % of the national extent occurs within the Province). These remained as such in the updated vegetation map contained in the NW BSP (Table 2).

Current land use has influenced these and the other vegetation types (Table 1), either transformation through agriculture (30% of the Province) or being poorly represent within the various protected areas within the Province.

In turn these varied vegetation types or habitats support a large variety of plant and animal species. Based on data contained in the South African Biodiversity Information Facility, Plants of South African database approximately, approximately 2216 flowering plant species are located within the study area.

**Table 1: A list of the expected vegetation types located within the study area (Mucina & Rutherford, 2006).**

| #  | SA veg Type Name                         | Biome     | M&R Conservation Status | Bioregion                |
|----|--|-----------|-------------------------|--------------------------|
| 1  | Carletonville Dolomite Grassland         | Grassland | Vulnerable              | Dry Highveld Grassland   |
| 2  | Dwaalboom Thornveld                      | Savanna   | Least Threatened        | Central Bushveld         |
| 3  | Dwarsberg-Swartruggens Mountain Bushveld | Savanna   | Least Threatened        | Central Bushveld         |
| 4  | Eastern Temperate Freshwater Wetlands    | Azonal    | Least Threatened        | Waterbodies              |
| 5  | Highveld Salt Pans                       | Azonal    | Least Threatened        | Inland Saline Vegetation |
| 6  | Klerksdorp Thornveld                     | Grassland | Vulnerable              | Dry Highveld Grassland   |
| 7  | Madikwe Dolomite Bushveld                | Savanna   | Least Threatened        | Central Bushveld         |
| 8  | Mafikeng Bushveld                        | Savanna   | Vulnerable              | Central Bushveld         |
| 9  | Subtropical Salt Pans                    | Savanna   | Least Threatened        | Central Bushveld         |
| 10 | Zeerust Thornveld                        | Savanna   | Least Threatened        | Central Bushveld         |

NWBSP (Table 2) indicates that vegetation units remain the same with the proposed alignment avoiding the expansive Highveld Alluvial Vegetation and Highveld Alluvial Vegetation – Peatland Wetlands (Schaller & Desmet, 2015) areas that would have been impossible to span. The latter is classified as Critically Endangered (Table 2).

The NWBSP also indicates an additional wetland vegetation type namely Subtropical Freshwater Wetlands (Table 2), not classified previously in the National Vegetation Map (Mucina & Rutherford, 2006), while 3 no longer fall within the Province once the boundaries had been redrawn. Therefore, a total of 11 vegetation units are anticipated within the South African portion of the study area, which covers a large portion of the North West Province (Figure 1). The updated vegetation units were based on the underlying geology, to better define the boundaries between grasslands and Thornveld.

**Table 2: Vegetation units as describe in the updated mapping assessment as contained in the NWBSP (2015)**

Where:

Ecosystem Threat Status: The “Best” Category includes Natural and Degraded vegetation as Natural, whilst the “Worst” Category has included the Degraded class within the Modified class. The “Predicted 2020” column is a prediction of what the ecosystem threat status will be at the current Rate of Change

CE = Critically Endangered

EN = Endangered

VU = Vulnerable

|    | SA Vegetation Type Name                  | NW Vegetation Type Name                  | Ecosystem Threat Status |       |                | ENDEMIC (Province Level) | Level of Protection  |
|----|--|--|-------------------------|-------|----------------|--------------------------|----------------------|
|    |  |  | BEST                    | WORST | PREDICTED 2020 |                          |                      |
| 1  | Carletonville Dolomite Grassland         | Carletonville Dolomite Grassland         |                         |       |                |                          | Poorly protected     |
| 2  | Dwaalboom Thornveld                      | Dwaalboom Thornveld                      |                         | VU    |                |                          | Poorly protected     |
| 3  | Dwarsberg-Swartruggens Mountain Bushveld | Dwarsberg-Swartruggens Mountain Bushveld |                         |       |                | Yes                      | Poorly protected     |
| 4  | Eastern Temperate Freshwater Wetlands    | Eastern Temperate Freshwater Wetlands    |                         |       |                |                          | Not protected        |
| 5  | Highveld Salt Pans                       | Highveld Salt Pans                       |                         |       |                |                          | Not protected        |
| 6  | Klerksdorp Thornveld                     | Klerksdorp Thornveld                     | VU                      | VU    | VU             | Yes                      | Not protected        |
| 7  | Madikwe Dolomite Bushveld                | Madikwe Dolomite Bushveld                |                         |       |                |                          | Moderately protected |
| 8  | Mafikeng Bushveld                        | Mafikeng Bushveld                        |                         | VU    |                |                          | Not protected        |
| 9  | Subtropical Freshwater Wetlands          | Subtropical Freshwater Wetlands          |                         | EN    |                |                          | Not protected        |
| 10 | Subtropical Salt Pans                    | Subtropical Salt Pans                    |                         | EN    |                |                          | Not protected        |
| 11 | Zeerust Thornveld                        | Zeerust Thornveld                        |                         | VU    | VU             | Yes                      | Not protected        |

Vegetation conservation importance and Species of Special Concern

Table 2 indicates the current Ecosystem Threat Status, as developed in the NWBSP (2015). This is an indicator of the Best, Worst and Predicted (2020) ecosystem status of each vegetation type, using present land cover (Figure 3). This is then coupled to degree of modification / degradation as a threat indicator, noting that approximately 33% of the Province is already transformed (cultivation) (Figure 2). The predicted class is based on the current rate of change related to rate of land cover modification (Table 2).

Thus 6 of the 11 vegetation units have some form of Ecosystem Threat Status, which include, Critically Endangered, Endangered and Vulnerable. The exact state of the vegetation units will be verified during the field surveys once the final alignment alternatives have been defined. However, the Threatened Ecosystems as defined by the National Environmental Management Biodiversity Act, remain relevant as these must be considered within the EIA listed activities, which are based on the Conservation Status of the vegetation units define in Table 1. Figure 4 indicates that one such Threatened Ecosystem (Mafikeng Bushveld) occurs within the study area.

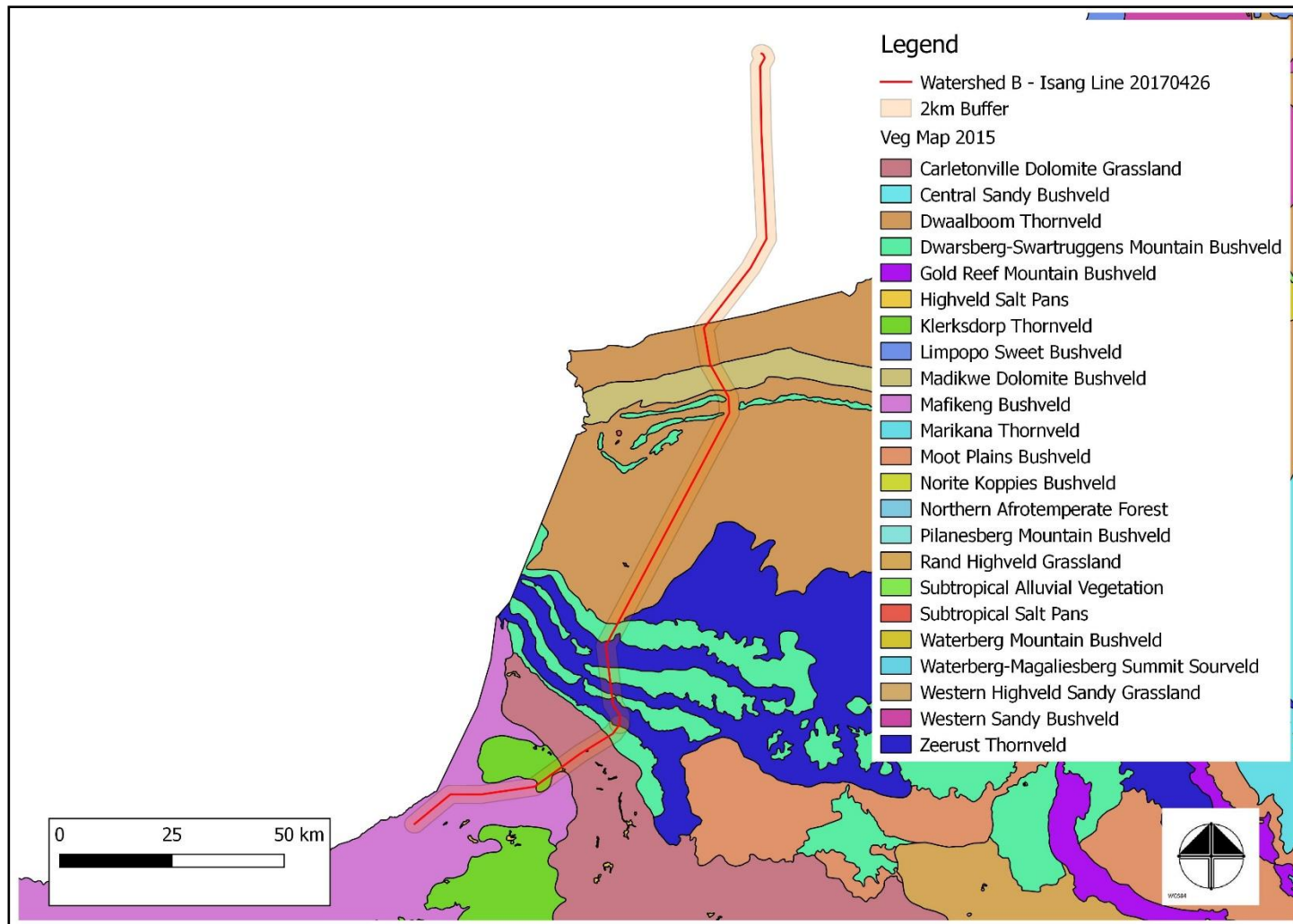


Figure 2: The vegetation types as defined by Mucina & Rutherford (2006) & Schaller & Desmet, 2015 for the North West Province

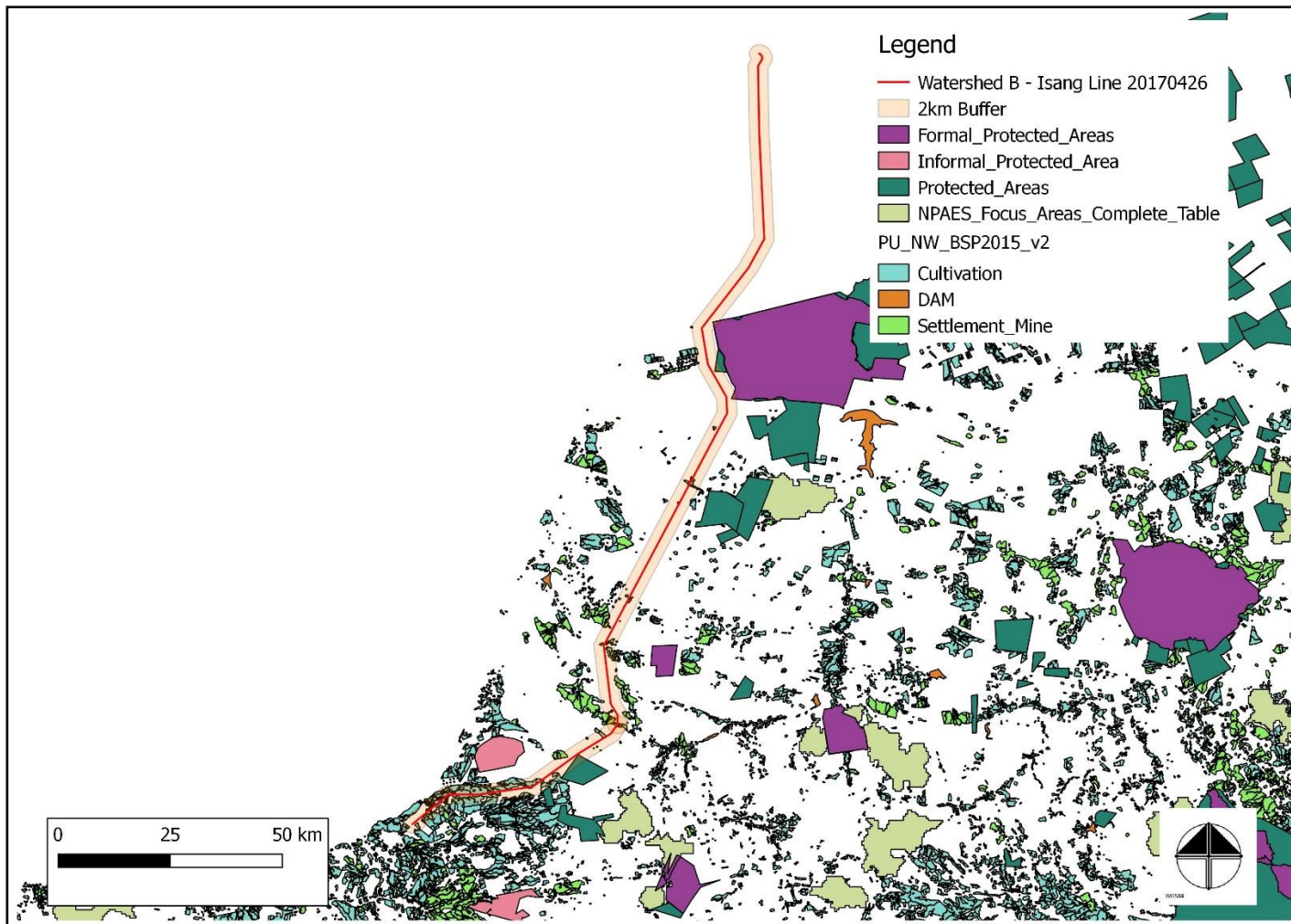
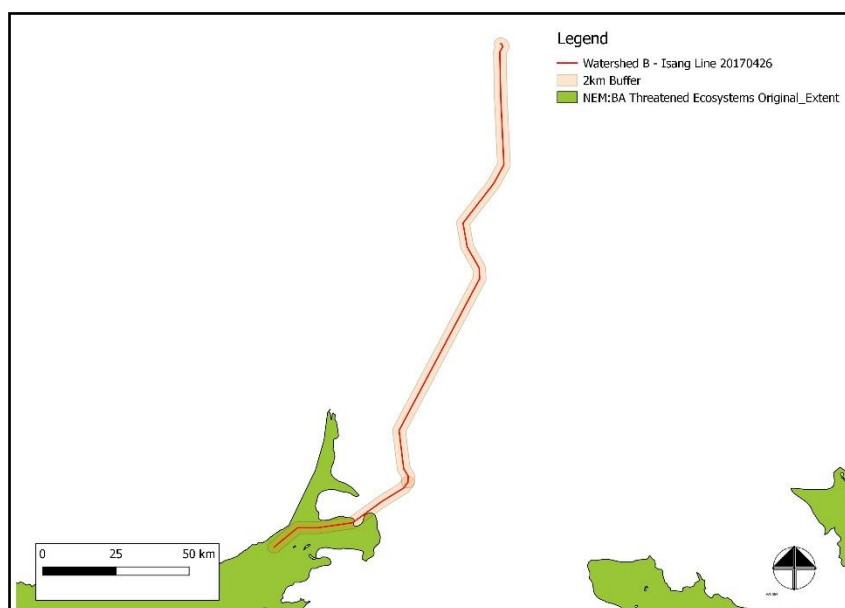
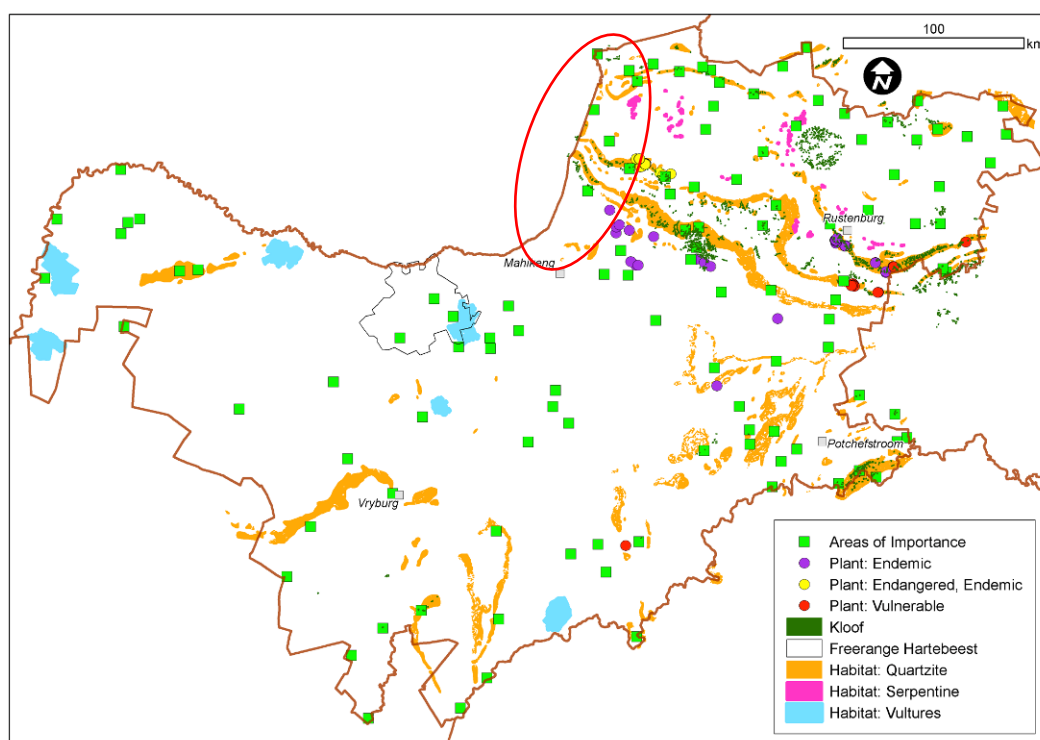


Figure 3: A map illustrating the land cover classes corresponding to the scoping phase study area for the North West Province, and where all other areas not shown in the map are natural



**Figure 4: Spatial extent of Threatened Ecosystems listed by the National Environmental Biodiversity Act for the study area**



**Figure 5: Species and habitats of special concern identified in the NWBSP (Source: Schaller & Desmet, 2015), where the final alignment will try and avoid all the areas shown within the red circle**

A review of the potential plant Species of Concern was also conducted in this phase of the study, but due to the size of the study area, a detailed assessment will be conducted during the EIA site visits, with a focus on sites as shown in Figure 5.

However, the following species as highlighted by the NWBSP (2015) are highlighted in Table 3, are of Conservation Concern and will form part of the detailed assessments based on the localities provided (Figure 5). Note these exclude other species listed under the National Forestry Act:

**Table 3: Plant species of conservation concern for the North West Province as the study area covers portions of all four Districts and based SANBI (redlist.sanbi.org) and Hahn (2013). (Where BP= Bojanala Platinum, NMM= Ngaka Modiri Molema, DKK= Dr Kenneth Kaunda and DRSM= Dr. Ruth Segomotsi Mompati). (Compiled by N. Hahn, Source Schaller & Desmet, 2015)**

| Taxon  | IUCN Status   | IUCN Criteria                 | NH2013 Status | NH2013 Criteria              | CITES | BP  | NMM | DKK | DRSM |
|--|---------------|-------------------------------|---------------|------------------------------|-------|-----|-----|-----|------|
| <i>Brachystelma canum</i> R.A.Dyer   | CR            | B1 ab(iii,v)                  | CR            | B1 ab(iii,v)                 |       |     | Yes |     |      |
| <i>Brachystelma gracillimum</i> R.A. Dyer  | CR            | B1 ab(iii,v)                  | CR            | B1 ab(iii,v)                 |       |     | Yes |     |      |
| <i>Aloe braamvanwykii</i> Gideon F. Sm. & Figueiredo   | EN            | A2c                           |               |                              |       |     | Yes | Yes | Yes  |
| <i>Aloe peglerae</i> Schönland   | EN            | A2d; B1 ab(ii,v)+2ab(ii,v)    | VU            | A2c, C1                      | 2     | Yes |     |     |      |
| <i>Euphorbia perangusta</i> R.A. Dyer = <i>E. knobelii</i> Letty                               | EN            | (A2ace; B1ab(ii,v)+2ab(iii,v) |               |                              |       |     | Yes |     |      |
| <i>Anacampseros dicapitata</i> P. Burgoyne & J. van Thiel                                      | VU            | D2                            | VU            | D2                           |       | Yes |     |     |      |
| <i>Brachystelma incanum</i> R.A.Dyer   | VU            | A2a                           | VU            | A2a                          |       |     | Yes | Yes |      |
| <i>Ceropegia stentiae</i> E.A. Bruce   | VU            | D2                            | VU            | D2                           |       |     |     | Yes |      |
| <i>Cullen holubii</i> (Burt Davy) C.H.Stirt. = <i>C. tomentosum</i> (Thunb.) J.W.Grimes        | VU            | B1ab(iii)                     | LC            |                              |       | Yes | Yes |     |      |
| <i>Dicliptera magaliesbergensis</i> K. Balkwill  | VU            | B1ab(iii)+2ab(iii)            | VU            | B1ab(iii)+2ab(iii)           |       | ?   |     |     |      |
| <i>Ledebouria atrobrunnea</i> S.Venter   | VU            | D2                            | LC            |                              |       | Yes |     |     |      |
| <i>Nerine gracilis</i> R.A. Dyer   | VU            | B1ab(ii,iii,v)                |               |                              |       |     |     | Yes |      |
| <i>Prunus africana</i> (Hook.f.) Kalkman   | VU            | A4acd; C1 + 2a(i)             | VU            | A4acd; C1 + 2a(i)            | 2     | Yes | Yes |     |      |
| <i>Rennera stellata</i> P.P.J. Herman  | VU            | D2                            | LC            |                              |       |     |     |     | Yes  |
| <i>Searsia maricoana</i> (Moffett) Moffett = <i>S. ciliata</i> (Licht. ex Schult.) A.J. Miller | VU            | D2                            | LC            |                              |       |     | Yes |     | Yes  |
| <i>Ceropegia turricula</i> E.A.Bruce   | NT            | A2c                           |               |                              |       |     | Yes |     |      |
| <i>Cineraria austrotransvaalensis</i> Cron   | NT            | B1ab(iii)                     |               |                              |       |     |     | Yes |      |
| <i>Cleome conrathii</i> Burt Davy  | NT            | D2                            |               |                              |       | Yes | Yes | Yes |      |
| <i>Delosperma leendertziae</i> N.E.Br.   | NT            | B1ab(iii)+2ab(iii)            | DDT           |                              |       | Yes | Yes |     |      |
| <i>Drimia sanguinea</i> (Schinz) Jessop  | NT            | A2d                           |               |                              |       | Yes | Yes | Yes |      |
| <i>Kniphofia typhoides</i> Codd  | NT            | A2ac                          |               |                              |       | Yes |     | Yes |      |
| <i>Lithops lesliei</i> (N.E.Br.) N.E.Br. subsp. <i>lesliei</i>                                 | NT            | A4acd                         |               |                              |       |     | Yes | Yes |      |
| <i>Stenostelma umbelluliferum</i> (Schltr.) Bester & Nicholas                                  | NT            | B1ab(ii,iii,iv,v)             |               |                              |       | Yes |     |     |      |
| <i>Gladiolus filiformis</i> Goldblatt & J.C.Manning  | Critical Rare |                               | LC            |                              |       |     | Yes |     |      |
| <i>Ceropegia insignis</i> R.A. Dyer  | Rare          |                               | EN            | B1 ab(i,ii,iii,iv)           |       |     | Yes |     |      |
| <i>Frithia pulchra</i> N.E.Br.   | Rare          |                               | Rare          |                              |       | Yes |     |     |      |
| <i>Gnaphalium nelsonii</i> Burt Davy   | Rare          |                               | Rare          |                              |       |     |     | Yes |      |
| <i>Miraglossum laeve</i> Kupicha   | Threatened    |                               | VU            | D2                           |       |     |     | Yes |      |
| <i>Cineraria exilis</i> DC.  | DDT           |                               | DDT-VU        | D2                           |       |     |     |     | Yes  |
| <i>Euphorbia knobelii</i> Letty  | DDT           |                               | EN            | A2ace; B1ab(ii,v)+2ab(iii,v) | 2     |     | Yes |     |      |
| <i>Lessertia phillipsiana</i> Burt Davy  | DDT           |                               | DDT-VU        | D2                           |       |     |     | Yes |      |
| <i>Senecio holubii</i> Hutch. & Burt Davy  | DDT           |                               | DDT-CR        | B1 ab(iii,v)                 |       |     | Yes |     |      |
| <i>Barleria media</i> C.B.Clarke   | LC            |                               | VU            | D2                           |       |     |     |     | Yes  |
| <i>Indigofera commixta</i> N.E.Br.   | LC            |                               | VU            | D2                           |       |     |     | Yes | Yes  |
| <i>Lobelia cuneifolia</i> Link & Otto var. <i>ananda</i> E. Wimm.                              | LC            |                               | VU            | D2                           |       | Yes |     |     |      |
| <i>Sporobolus oxyphyllus</i> L. Fish   | LC            |                               | LC            |                              |       |     | Yes |     |      |







**Plate 1: A view of the Threatened Ecosystem vegetation type Rand Highveld Grassland with a view of the Pilanesberg in the background**



**Plate 2: A view of the dry conditions observed in the Gaborone area, associated with the Hardveld vegetation type**

## 4.2 Fauna (Botswana & South Africa)

### 4.2.1 Mammals

The Southern African derived threatened status presented below follows the IUCN threatened status and where it differs for the North West Province portion of the study area (Power, 2013). A total of 24 threatened mammal species have been recorded to date by Friedmann and Daly (2004). This includes two (2) Critically Endangered species, four (4) Endangered species, four (4) Vulnerable species and 14 Near Threatened species and includes:

#### Critically Endangered:

- Black rhinoceros (*Diceros bicornis minor*) (IUCN Vulnerable),
- Short-eared trident bat (*Cloeotis percivali*) (IUCN Least Concern).

#### Endangered:

- African wild dog (*Lycaon pictus*),
- Oribi (*Ourebia ourebi*) (IUCN Least Concern),
- Tsessebe (*Damaliscus lunatus*) (IUCN Least concern) and
- White-tailed mouse (*Mystromys albicaudatus*).

#### Vulnerable:

- Cheetah (*Acinonyx jubatus*) (IUCN Vulnerable),
- Ground pangolin (*Smutsia temminckii*) (IUCN Least Concern),
- Roan antelope (*Hippotragus equinus*) (IUCN Least Concern) and
- Sable (*Hippotragus niger*) (IUCN Least Concern).

#### Near Threatened:

- African marsh rat (*Dasymys incomptus*) (IUCN Least Concern),
- Brown hyaena (*Hyaena brunnea*) (IUCN Near Threatened),
- Darling's horseshoe bat (*Rhinolophus darlingi*) (IUCN Least Concern),
- Dent's horseshoe bat (*Rhinolophus denti*) (IUCN Least Concern),
- Geoffroy's horseshoe bat (*Rhinolophus clivosus*) (IUCN Least Concern),
- Honey badger (*Mellivora capensis*) (IUCN Least Concern),
- Rusty pipistrelle (*Pipistrellus rusticus*) (IUCN Least Concern),
- Schreibers' long-fingered bat (*Miniopterus schreibersii*) (IUCN Least Concern),
- Serval (*Leptailurus serval*) (IUCN Least Concern),
- Southern African hedgehog (*Atelerix frontalis*) (IUCN Least Concern),
- Spotted hyaena (*Crocuta crocuta*) (IUCN Least Concern),
- Spotted-necked otter (*Lutra maculicollis*) (IUCN Least Concern),
- Straw-coloured fruit bat (*Eidolon helvum*) (IUCN Near Threatened) and
- Temminck's hairy bat (*Myotis tricolor*) (IUCN Least Concern).

The Southern African hedgehog is however considered to be worthy of a Vulnerable status (Power, 2013).

The following six (6) species were assessed by Friedmann and Daly (2004) as Least Concern but have an IUCN or globally threatened status (Power, 2013):

- African savanna elephant (*Loxodonta africana*) (IUCN Vulnerable),
- Black-footed cat (*Felis nigripes*) (IUCN Vulnerable),
- Hippopotamus (*Hippopotamus amphibius*) (IUCN Vulnerable),
- Leopard (*Panthera pardus*) (IUCN Near Threatened),
- Lion (*Panthera leo*) (IUCN Near Threatened) and
- White rhinoceros (*Ceratotherium simum*) (IUCN Near Threatened), of which the latter is under the threat of poaching, and is entirely conservation-dependent.

It should be noted that except for the meso-predators and bats, all of these species will only be found within protected areas within the study area.

#### 4.2.2 Amphibians

Little is known or has been documented on the frog distribution within the Botswanan portion of the study area, but it has been assumed that the approximately 19 amphibian species are likely to occur and include:

- *Amietia angolensis* (Common River Frog),
- *Amietia fuscigula* (Cape River Frog),
- *Cacosternum boettgeri* (Boettger's Caco),
- *Strongylopus fasciatus* (Striped Stream Frog),
- *Bufo garmani* (Eastern Olive Toad),
- *Bufo gutturalis* (Guttural Toad)
- *Amietophrynus rangeri* (Raucous Toad)
- *Schismaderma carens* (Red Toad)
- *Breviceps adspersus* (Bushveld Rain frog)
- *Phrynomantis bifasciatus* (Banded Rubber Frog)
- *Xenopus laevis* (Common Platanna)
- *Ptychadena anchietae* (Plain Grass frog)
- *Ptychadena mossambica* (Broad Banded Grass Frog)
- *Tomopterna cryptosis* (Tremolo Sand Frog)
- *Tomopterna krugerensis* (Knocking Sand Frog)
- *Tomopterna natalensis* (Natal Sand Frog)
- *Chiromantis xerampelina* (Southern Foam Nest Frog) and
- *Kassina senegalensis* (Bubbling Frog).

#### *Species of conservation concern*

Currently, none of these frog species under consideration are Red listed, however Minter *et al.*, 2004, indicate that the Giant Bullfrog (*Pyxicephalus adspersus*) is regionally listed as Near Threatened within South Africa.

#### 4.2.3 Reptiles

52 taxa (comprising of 23 snake and 29 tortoise and lizard species [scincids & gekkonids]; Table 2) have been recorded from the study area (information obtained from the South African Reptile Conservation Assessment (SARCA). Again, it is assumed that similar species will occur within the Botswanan portion of the study area, but will be assessed in more detail during the EIA phase.

The expected richness represents an underestimation of the reptile diversity likely to occur. Therefore, it is possible that many more species could exist on the study sites although current distributional data is lacking in this regard.

**Table 3: An inventory of reptile species known to occur within the study area**

| Scientific Name                    | Common Name                           | Conservation Status (IUCN Red List) – where not specifically indicated assessment is region |
|------------------------------------|---------------------------------------|---|
| <i>Pelomedusa subrufa</i>          | Marsh terrapin                        | Least Concern   |
| <i>Kinixys labatsiana</i>          | Lobatse hinged tortoise               | Least Concern – Near Endemic  |
| <i>Psammobates oculifer</i>        | Kalahari tent tortoise                | Least Concern   |
| <i>Stigmochelys pardalis</i>       | Leopard tortoise                      | Least Concern   |
| <i>Crocodilus niloticus</i>        | Nile Crocodile                        | Vulnerable (Regional)   |
| <i>Chondrodactylus ternerii</i>    | Turner's gecko                        | Least Concern   |
| <i>Hemidactylus mabouia</i>        | Common tropical house gecko           | Least Concern   |
| <i>Lygodactylus capensis</i>       | Common dwarf gecko                    | Least Concern   |
| <i>Lygodactylus nigropunctatus</i> | Black-spotted dwarf gecko             | Least Concern   |
| <i>Pachydactylus capensis</i>      | Cape gecko                            | Least Concern   |
| <i>Monopeltis capensis</i>         | Cape spade-snouted worm lizard        | Least Concern   |
| <i>Meroles squamulosus</i>         | Savanna lizard                        | Least Concern   |
| <i>Nucras hloubi</i>               | Holubs's sandveld lizard              | Least Concern   |
| <i>Chamaesaura aenea</i>           | Coppery grass lizard                  | Near Threatened (Global)  |
| <i>Cordylus vittifer</i>           | Transvaal girdled lizard              | Least Concern   |
| <i>Gerrhosaurus flavigularis</i>   | Yellow-throated plated lizard         | Least Concern   |
| <i>Acontias occidentalis</i>       | Savanna legless skink                 | Least Concern   |
| <i>Afroblepharus walhbergii</i>    | Wahlbergs's snake-eyed skink          | Least Concern   |
| <i>Trachylepis capensis</i>        | Cape skink                            | Least Concern   |
| <i>Trachylepis punctatissima</i>   | Montane speckled skink                | Least Concern   |
| <i>Trachylepis varia</i>           | Variable skink                        | Least Concern   |
| <i>Varanus albigularis</i>         | Southern rock monitor                 | Least Concern   |
| <i>Varanus niloticus</i>           | Nile monitor                          | Least Concern   |
| <i>Chamaeleo dilepis</i>           | Common flap-necked chameleon          | Least Concern   |
| <i>Agama aculeata</i>              | Eastern ground agama                  | Least Concern   |
| <i>Agama atra</i>                  | Southern rock agama                   | Least Concern   |
| <i>Acanthocercus atricollis</i>    | Southern tree agama                   | Least Concern   |
| <i>Afrotyphlops bibronii</i>       | Bibron's blind snake                  | Least Concern – Near Endemic  |
| <i>Rhinotyphlops lalandei</i>      | Delande;s beaked blind snake          | Least Concern   |
| <i>Bitis arietans arietans</i>     | Puff adder                            | Least Concern   |
| <i>Causus rhombeatus</i>           | Common night adder                    | Least Concern   |
| <i>Aparallactus capensis</i>       | Black-headed centipede-eater          | Least Concern   |
| <i>Atractaspis bibronii</i>        | Bibron's stiletto snake               | Least Concern   |
| <i>Boaedon capensis</i>            | Common house snake                    | Least Concern   |
| <i>Lamprophis aurora</i>           | Aurora house snake                    | Least Concern   |
| <i>Lycophidion capense</i>         | Cape wolf snake                       | Least Concern   |
| <i>Psammophis brevirotris</i>      | Short-snouted grass snake             | Least Concern   |
| <i>Psammophis subtaeniatus</i>     | Yellow-bellied grass snake            | Least Concern   |
| <i>Psammophis trinasalis</i>       | Kalahari sand snake                   | Least Concern   |
| <i>Psammophylax rhombeatus</i>     | Spotted grass snake                   | Least Concern   |
| <i>Psammophylax tritaeniatus</i>   | Striped grass snake                   | Least Concern   |
| <i>Pseudaspis cana</i>             | Mole snake                            | Least Concern   |
| <i>Dendroaspis polylepis</i>       | Black mamba (more likely in Botswana) | Least Concern   |
| <i>Hemachatus haemachatus</i>      | Rinkhals                              | Least Concern (Global)  |
| <i>Naja annulifera</i>             | Snouted cobra                         | Least Concern   |
| <i>Naja nivea</i>                  | Cape cobra                            | Least Concern   |
| <i>Crotaphopeltis hotamboeia</i>   | Herald snake                          | Least Concern   |
| <i>Dasypeltis scabra</i>           | Rhombic egg-eater                     | Least Concern   |
| <i>Dispholidus typus</i>           | Boomslang                             | Least Concern   |
| <i>Philothamnus semivariegatus</i> | Spotted bush snake                    | Least Concern   |

*Species of conservation concern*

**Vulnerable:** The Nile crocodile (*Crocodilus niloticus*) is found throughout the bushveld region but is rare in the province. It is also unlikely that a transmission line which would span any permanent water courses / waterbodies would impact on this species.

**Near Threatened:** The coppery grass lizard (*Chamaesaura aenea*) occurs marginally in the province, inhabiting montane grasslands on the eastern Highveld of the country. It is thought to be found in the eastern grasslands of the Dr Kenneth Kaunda District.

Although the Southern African python (*Python natalensis*) is classified as Least Concern, it is evaluated as a species of special concern because it is used in the muti and pet trade industries; and is considered a problem species that necessitates removal. The species appears to be expanding its distribution range, which can only be to its benefit.

## **5 Aquatic Environment (South African & Botswana)**

As with the terrestrial environment, due to the spatial scale of the assessment, several different types of aquatic environments are known to occur within the study area (Figure 1).

These include:

1. Rivers and streams (Figure 7)
2. Open water bodies / lakes (Figure 8)
3. Wetlands and peatlands (Figure 8)
4. Endorheic pans / depressions (Figure 8)
5. Springs/eyes (Figure 8)
6. Artificial waterbodies (Figure 8)

*Conservation importance and sensitivity*

Due to the large number of waterbodies, the current state and importance of the affected wetlands will be assessed during the EIA phase. This will be based on national inventories as well as site specific assessments. For now, the Aquatic Critical Biodiversity Areas (NW BSP, 2015) and Botswana Spatial Biodiversity Plan will refer (Figure 10). However, it is evident from a preliminary assessment of the main river and wetland systems that these are under pressure from development and are at times the only natural functioning systems within the cultivated landscapes. This elevates the importance of these systems in their role as ecological support areas and corridors.

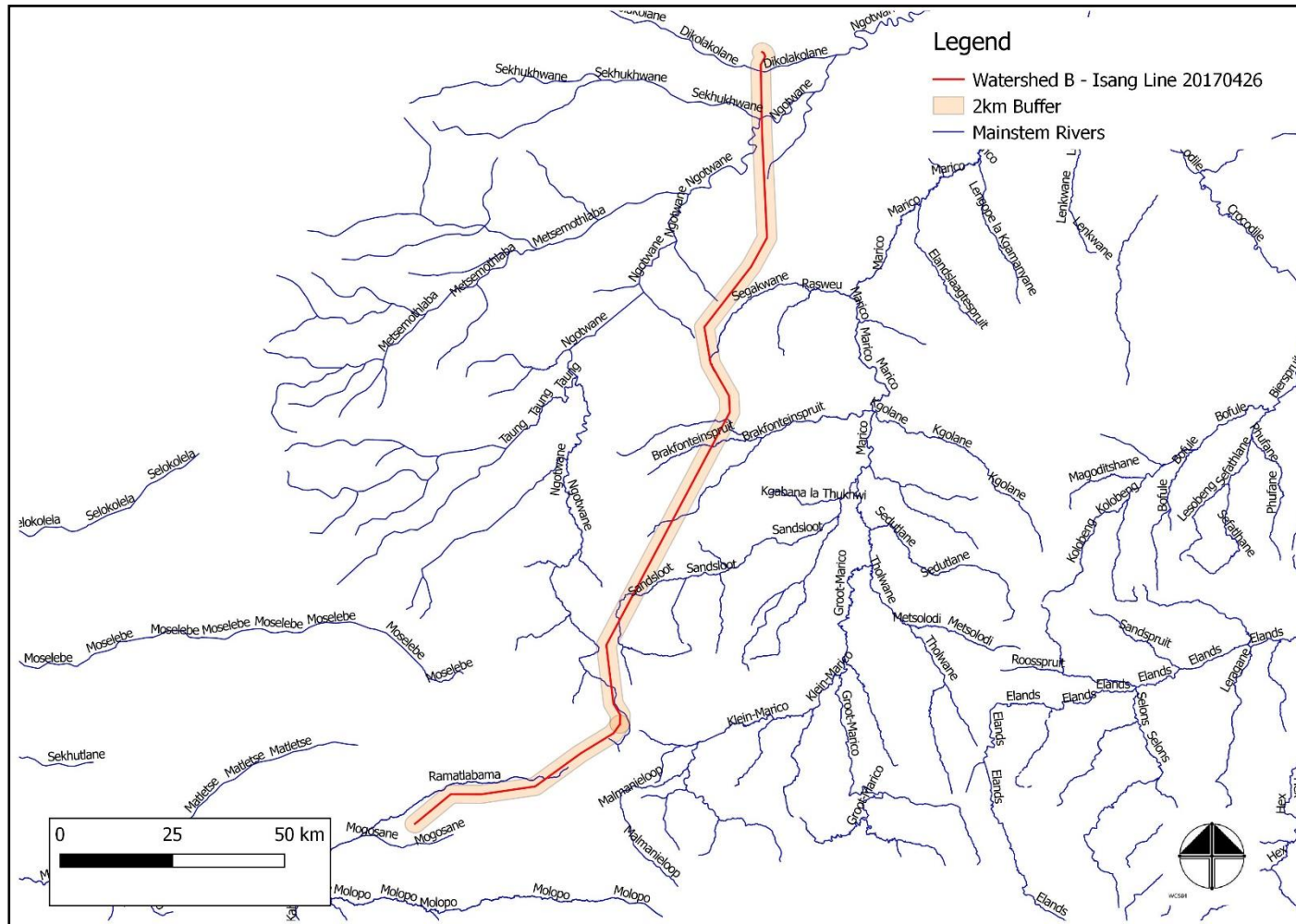


Figure 7: Mainstem rivers found within the study area

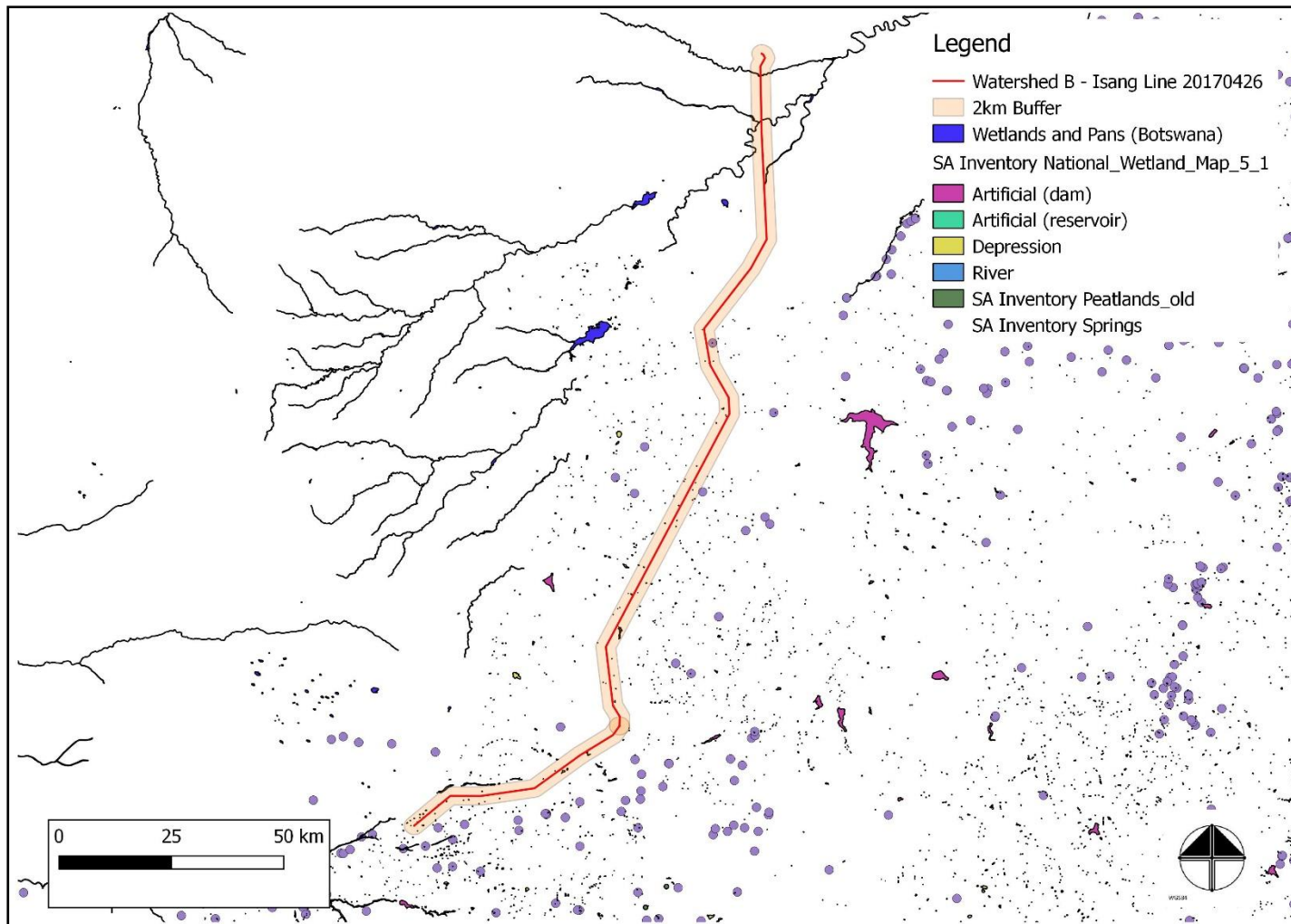


Figure 8: Known wetlands within the study area, consisting mostly of pans, riverine floodplains, alluvial systems and artificial dams



## 6 Biodiversity Conservation Plans

Biodiversity Conservation Plans or Biodiversity Sector Plans are spatial tools used to define and then manage (Land Use Management Guidelines) important terrestrial and aquatic ecosystems. The North West Province as indicated in this report has just completed a detailed assessment and produced Critical Biodiversity and Ecological Support Area maps for both the terrestrial (Figure 9) and aquatic environments (Figure 10). These will be used as best possible to assessment optimal alignments in the alternative analysis phase on the project

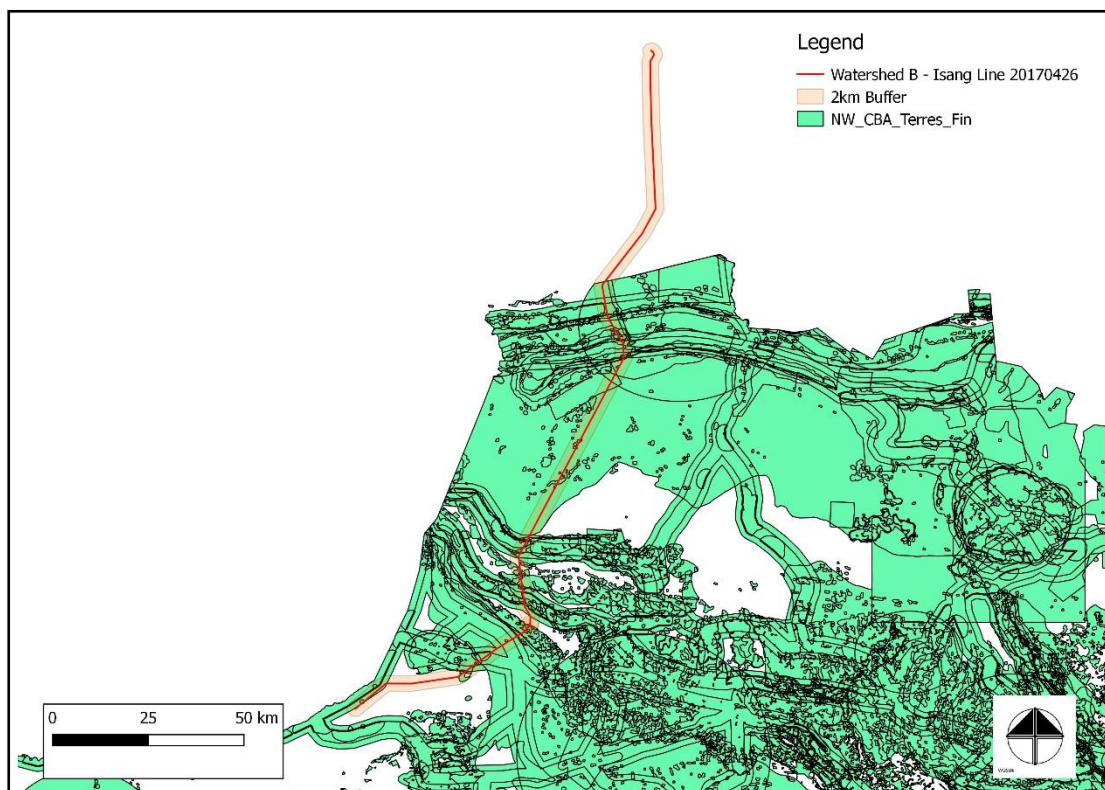
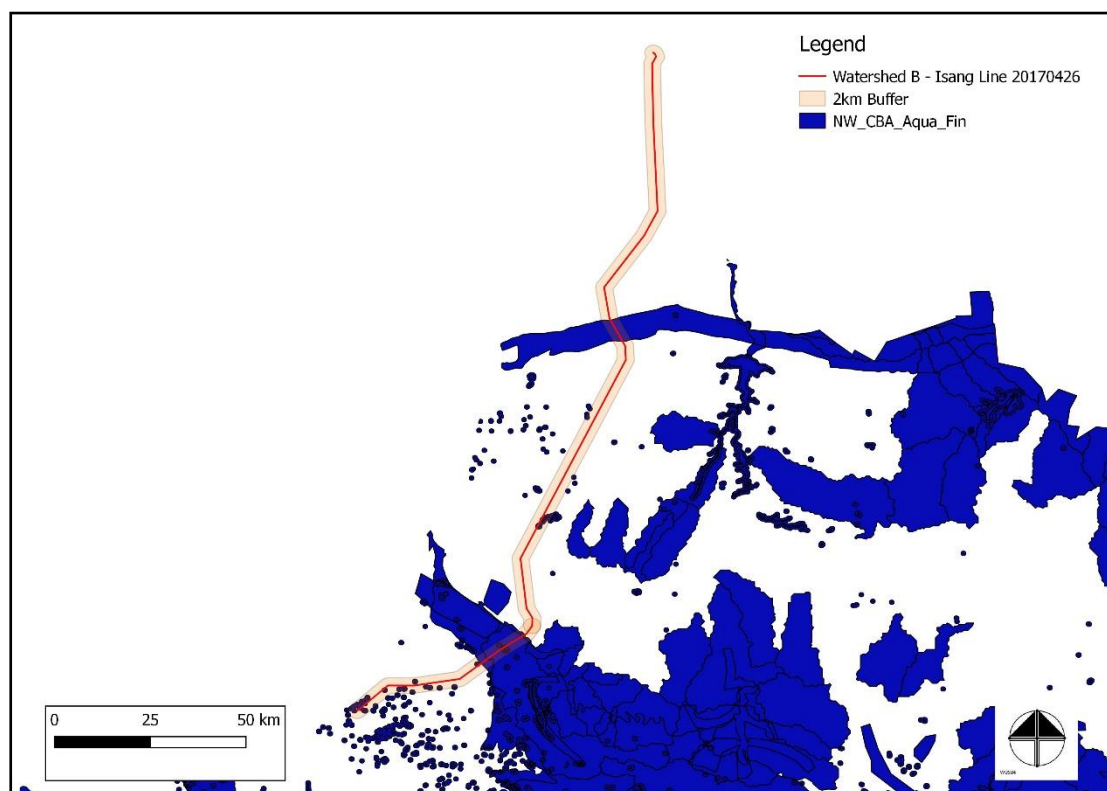


Figure 9: Terrestrial Critical Biodiversity and Support Areas as per the NWBSP (2015)



**Figure 10: Aquatic Critical Biodiversity and Support Areas as per the NWBSP (2015)**

The Botswanan Ministry of Wildlife and Tourism has developed two important a broad scale spatial management plans and includes the Botswana Conservation Plan (BCP) and the Botswana Biodiversity Strategy and Action Plan (BSAP) updated 2007). The BCP is a document / project that is largely still being develop and focuses on strategic conservation areas such as the Tuli and Okavango areas at present.

THE BSAP has identified several conservation objectives based on environmental status quos and threat levels. Areas, based on bioregions were then ranked in terms of biodiversity priorities coupled to potential threats. The study area (Figure 11) has be ranked as having a Low Biodiversity Priority with regard future conservation needs or objectives.

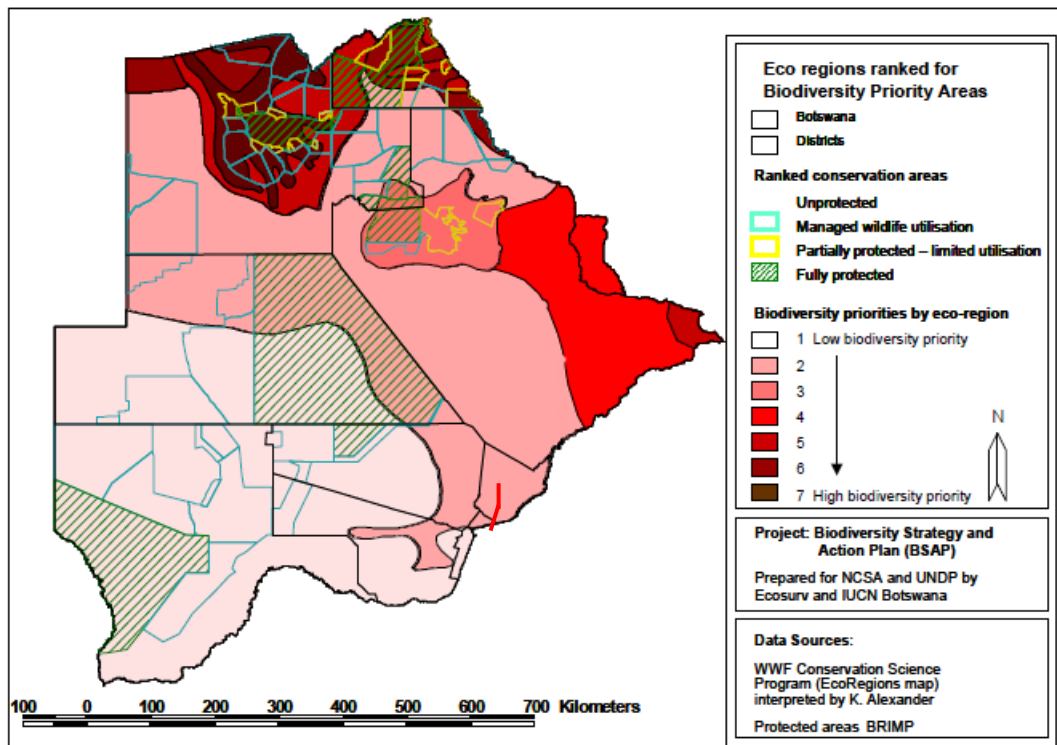


Figure 11: Results of the Botswana Biodiversity Strategy and Action Plan priority ranking exercise (SOURCE BSAP, 2007), with study area indicated by red line

## 7 Preliminary ecological importance assessment

The scale of the study area has prevented the detailed analyses of the all the ecological important or sensitive habitats, however the following have been used as indicators of such habitats in the development of the alternative alignments that will be assessed in the EIA phase (Figure 12 – example of environmental constraints):

### High Sensitivity (strongly avoid these areas)

- Protected areas and nature reserves
- Ridges and large rock outcrops
- Threatened Ecosystems (where still intact)
- Known sensitive habitats with high Species of Special Concern / Endemic
- Wetland clusters, i.e. difficult to span these expansive areas
- Alluvial floodplains
- Critical Biodiversity Areas still in near natural conditions

### Moderate Sensitivity

- Wetlands and rivers
- Near natural remaining areas
- Areas with isolated Species of Special Concern

### Low Sensitivity

- All remaining areas that have been transformed or developed in the past

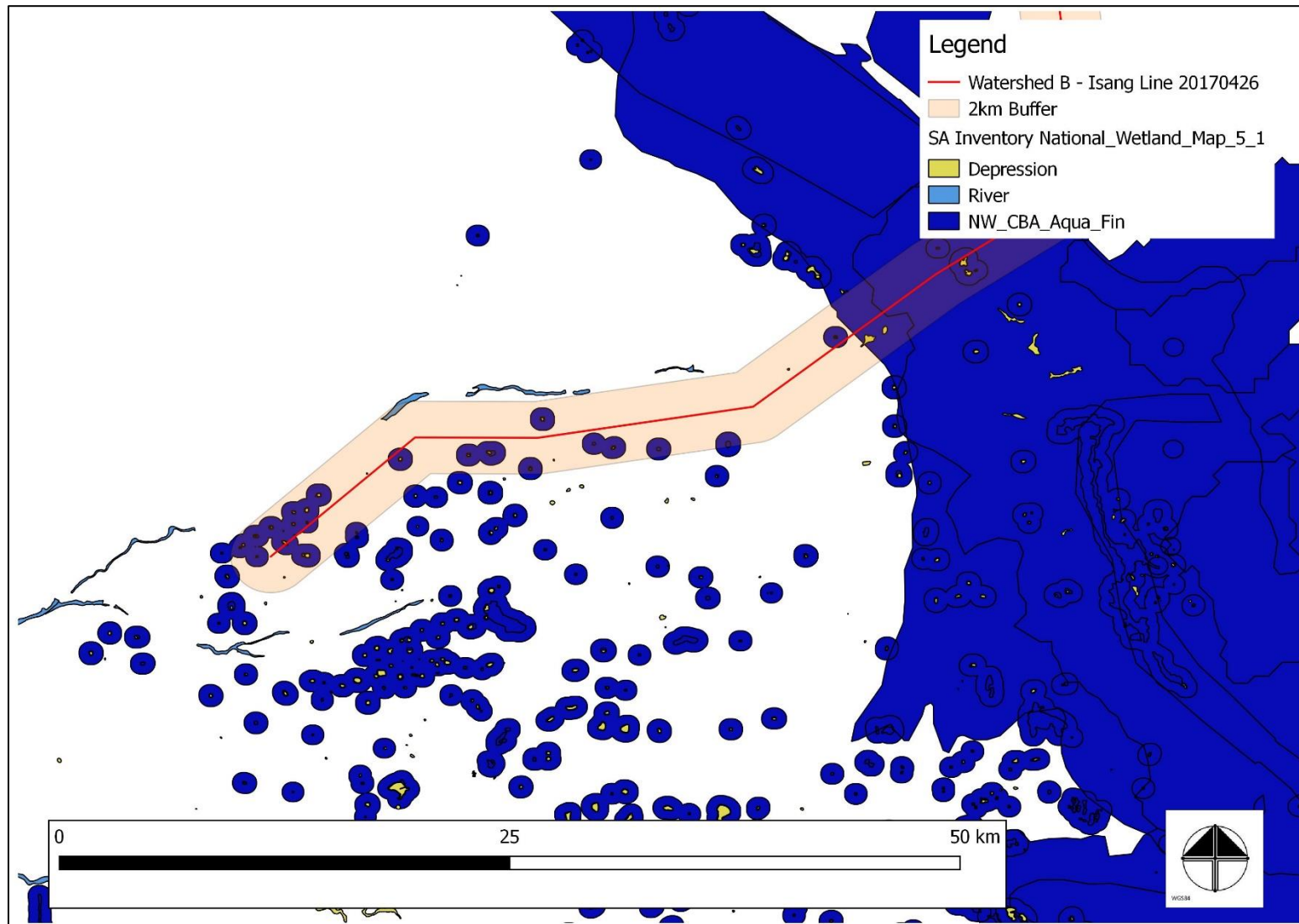


Figure 12: A preliminary sensitivity map illustrating some of the the biodiversity and ecosystem features that were used in the alternative alignment constraints analyses (South African portion)

## 8 Conclusion and recommendations

A diverse range of habitats, which range from important to transformed have been identified in this assessment as will require further study once the alternative alignments have been selected.

Therefore, the following is proposed:

### Plan of Study for EIA

It is considered imperative to conduct detailed ecological (flora and fauna) investigations on the alternative alignments. This would include, but not necessarily be limited to:

Flora:

- Provide a description of the general floristic species diversity and community composition;
- Evaluating the occurrence of potential Red Data taxa;
- Demarcating physiognomic units based on floristic relevés; and
- Provide an indication on the ecological condition (successional stage) of the predetermined physiognomic units, which will also be related to any ecosystem services / habitat function.

Fauna:

- A detailed faunal assessment including a small mammal trapping session and nocturnal surveys based on strategically placed wildlife cameras;
- An evaluation of the occurrence of any important vertebrates and invertebrates.

Wetlands and rivers:

As highlighted in the above sections a large proportion of the available habitat related to sensitive or important taxa, are associated with the wetland / riverine habitats. The EIA phase will thus focus on critical assessment of the wetland / riverine systems in the following way:

- Delineation of the wetland and river boundaries using the requisite techniques based upon the latest Wetland Classification systems (Ollis *et al.* 2013);
- Identification of relevant ecosystem services provided by and of the rivers or wetlands
- Indicate suitable buffer zones as prescribed by the relevant provincial policies / conservation plans
- Assess the status of the observed faunal and floral populations observed;

These will then be evaluated against potential impacts such as the following:

- Loss of habitat and ecosystem function / ecosystem services
- Loss of species of special concern
- Increase in habitat fragmentation
- Loss of wetland and aquatic habitat.
- Changes to the hydrological regime
- Changes to water quality
- Impacts such as erosion and sedimentation
- Impact on Critical Biodiversity Areas or impacts on present / future protected areas

Due to the nature of a transmission line, the overall impacts are anticipated to be low to moderate with mitigation for most, however the impacts on wetlands, (due to the high number of pans) and the loss of species of special concern, will need specific consideration during the EIA phase site visit and impact assessment. This will allow for the development of specific mitigation and design recommendations, to avoid or minimise these impacts, and thus provide critical input in relation to the final tower positions.

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