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BASIC ASSESSMENT OF THE PROPOSED ESKOM PRINCE ALFRED HAMLET SUBSTATION AND 132 kV TRANSMISSION LINE BETWEEN THE CERES AND WITZENBERG SUBSTATIONS

SPECIALIST AQUATIC ECOSYSTEMS REPORT

DRAFT

FEBRUARY 2024

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EXECUTIVE SUMMARY

E1 Introduction

This study considered the effects from an aquatic ecosystems perspective of the proposed design, alignment, construction and long-term operational management of a new 132kV power transmission line between the (existing) Ceres and Witzenberg substations, including new support structures, a possible track and turning area at one point, and a new substation at Prince Alfred Hamlet. The new transmission line would be aproximately ~17 km in length, with an additional link to the new substation to the east of ~1 km.

E2 Impact identification and assessment

The proposed transmission lines would cross over or in the vicinity of numerous watercourses (mostly seeps, but also the Modder and Koekedou River channels, as well as valley bottom wetlands, on- and off-channel dams and excavations and some artificial drains and channels. These watercourses were all rated in this report in terms of *inter alia* their ecological importance, which in the current project can be used as a surrogate measure of watercourse sensitivity to the impacts likely to be associated with the proposed project. During early iterative planning phases of the project, the proposed alignment of the transmission lines was adjusted, in order to avoid water courses identified as of Very High ecological importance. The proposed placement of the support structures was also adjusted, such that no support structures would be placed within any of the identified watercourses. The proposed new substation footprint would not impact directly on any of the identified watercourses, although the feeder line to it would cross over a few watercourses including a channeled valley bottom wetland.

Given the level of impact avoidance already incorporated into project planning and layout, it is not surprising that few impacts were identified as associated with project layout. The identified impacts were of Low and Medium negative significance without mitigation. They could be further reduced through Best Practice measures and, in the case of impacts associated with the position of the Alternative 1 turning circle, readily avoided through selection of Alternative 2.

Construction phase impacts were however identified as potentially more problematic, particularly in the event that watercourses of Very High, High or Medium importance were affected, although potential impacts to watercourses of Low or Very Low significance were not considered inconsequential. Mitigation measures were outlined for each importance group of watercourses, with the most stringent measures applied to activities in the vicinity of the Very High and High Importance watercourses. The significance rating was High and negative for construction, in the event that no mitigation measures were applied, and assuming that watercourses of High and Very High importance were degraded. However, this rating could be reduced to Low through implementation of mitigation measures. The recommended measures are all considered reasonable, with the most difficult probably relating to requirements for the manual stringing of transmission lines in some areas, and for low-growing indigenous vegetation (<1.5 m in height) to remain uncleared beneath the transmission lines.

Operational Phase impacts were assumed to be similar to Construction Phase impacts, although they have a lower significance rating, given that they would be unlikely to be applied to the whole route, but would impact on localised areas. Mitigation measures would be similar to those for the Construction Phase, although a particular challenge would be for information regarding acceptable laydown areas and access routes to remain relevant and available to technicians in the field.

Table E1 summarises the findings of the Impact Assessment – mitigation details are outlined fully in the main body of the report.

Table E1

Summary of assessed cumulative freshwater ecosystem impact ratings, as derived from assessments in this report. See report for detailed assessments informing cumulative ratings.

Nature of impact	Conseq.	Probability	Signif.	Confid.	Status
Aquatic ecosystem degradation as a result of the Alternative 1 turning circle	6 Medium	Probable	Medium (Neg.)	Medium	-ve
With mitigation	AVOIDANCE – Alternative 2				
Construction phase aquatic ecosystem degradation	7 High	Probable	High (Neg.)	Medium	-ve
With mitigation	5 Low	Probable	Low (Neg.)	Medium	-ve
Operational phase aquatic ecosystem degradation	6 Medium	Probable	Medium (Neg.)	Medium	-ve
With mitigation	3 Very Low	Probable	Very Low (Neg.)	Medium	-ve

E3 Risk assessment findings

A Risk Assessment was also undertaken, on a similar grouped basis to that used for the Impact Assessment. On the assumption that full mitigation / control measures would be applied, the Risks to the water resource of project construction and long-term operational management including repairs were all deemed to be Low. A WULA should not therefore be necessary for this project, which is considered Generally Authorised in terms of GN509 of 2016. Registration of Section 21c and i water uses would however be required.

E4 Conclusions

On the basis of the above assessments, the report concluded that, assuming full and rigorous implementation of all required mitigation measures, authorisation of the proposed project in full would be acceptable, from the perspective of its impact on aquatic ecosystems.

LIZ DAY
CONSULTING *Specialist River and Wetland Consultant*

20 February 2024

DECLARATION OF SPECIALIST INDEPENDENCE

I, Elizabeth (Liz) Day as a specialist river and wetland consultant, and Director of Liz Day Consulting (Pty) Ltd, hereby confirm my independence as a specialist and declare that I do not have any interest, be it business, financial, personal or other, in any proposed activity, application or appeal in respect of which I was appointed by SRK Consulting on behalf of ESKOM as the aquatic ecosystems specialist in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998), other than fair remuneration for work performed, specifically in connection with specialist input into the Specialist Basic Assessment Report for the proposed Ceres-Witzenberg pylons, and the Prince Alfred Hamlet substation and connection thereto.

Full Name: Dr Elizabeth (Liz) Day
Liz Day Consulting (Pty) Ltd (trading as LDC)
lizday@mweb.co.za

Title / Position: Director
Qualification(s): BA, BSc, BSc Hons, PhD
Experience: > 28 years working on freshwater ecosystems
Relevant Work Experience: Liz has worked for the past +28 years, primarily in the Western Cape, and has produced over 900 technical and Environmental Impact Assessment reports, requiring the assessment of rivers and/or wetlands. She has worked in the vicinity of the present study area, having been involved as the aquatic specialist in the (then proposed) Romansrivier to Ceres pylon upgrade; the Bon Chretien - Ceres substation and pylon development and the Maintenance and Management Plan (MMP) for watercourses along the R46 from Ceres to the N1.

Liz has experience in wetland delineation and has undertaken numerous Risk Assessments using the DWS (2015 and 2023) Risk Assessment Matrices. She has been involved in EIAs for numerous pylon assessment projects (see above).

Registrations: Member of IAIA; Member of SAIEES; member of WISA; member of the Wetland Society of South Africa; Registered Professional Natural Scientist by SACNASP (Reg No 400270/08) for fields of Aquatic Science, Biological Science, Ecological Science and Zoological Science.

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1 INTRODUCTION

1.1 Background

The Witzenberg substation, located some 17 km north of the town of Ceres in the Western Cape, is currently supplied by one 132 kV single circuit powerline. This line runs over the Witzenberg Mountain Range from the Romansrivier substation, south east of Ceres. Three 66kV feeders out of the Witzenberg substation supply the Ceres, Gydo and Slangboom substations from where Eskom's customers draw their electricity. A 66 kV powerline runs from Romansrivier to Witzenberg substations via Ceres. However, a portion of this line between Romansriver and Ceres burnt down, cutting the supply from Romansrivier to Ceres and Witzenberg, and thus reducing the reliability of supply to the area.

Since the fire, both the Ceres and the Witzenberg substations have been solely dependent on the 132 kV line between Romansriver and Witzenberg, making the towns of Prince Alfred Hamlet and Ceres vulnerable to extended periods without electricity supply if a fault should occur on the line. In April 2018, Eskom received Environmental Authorisation to construct a new double circuit powerline (132kV and 66kV) from the Romansrivier substation to the Ceres substation.

Eskom now proposes to replace the 66 kV line running between the Ceres and Witzenberg substations with a single circuit 132 kV line and construct a new Prince Alfred Hamlet substation, along with a tie-in to the new substation from the proposed new 132 kV line.

This development would require *inter alia* authorisation in terms of the National Environmental Management Act (NEMA) (Act 107 of 1998) as well as potentially authorisation in terms of the National Water Act (NWA) (Act 36 of 1998). SRK Consulting (South Africa) (SRK) was appointed to manage the necessary applications to these and other relevant authorities to consider development authorisation.

Since the proposed powerlines and substation run through or in the vicinity of a number of aquatic ecosystems (rivers and wetlands), Liz Day Consulting (Pty) Ltd (LDC) was in turn appointed by SRK to provide specialist aquatic ecosystems input into the Basic Assessment process for development consideration.

1.2 Terms of reference

The terms of reference for this project required that the aquatic ecosystems specialist:

- Describe the existing baseline characteristics of the study area and place this in a regional context;
- Identify and assess potential impacts of the project and the alternatives, including impacts associated with the construction and operation phases, using SRK's prescribed impact rating methodology;
- Indicate the acceptability of alternatives and recommend a preferred alternative;
- Identify and describe potential cumulative impacts of the proposed development in relation to proposed and existing developments in the surrounding area;
- Recommend mitigation measures to avoid and/or minimise impacts and/or optimise benefits associated with the proposed project; and
- Recommend and draft a monitoring campaign, if applicable.

1.3 Activities informing this input

The following activities were undertaken to inform the present input into this project, namely:

- A site walk-down in May 2017 accompanied by SRK and ESKOM project team members, as part of the Romansrivier – Ceres pylon project Environmental Impact Assessment (EIA) programme;

- A desk-top assessment to identify mapped aquatic ecosystems along the proposed powerline alignment;
- A visit to the study area in January 2020, during which the pylon alignment (100 m wide corridor) and substation footprints were driven / walked and the positions of areas of concern were marked, using a handheld GPS;
- Submission of a preliminary map to SRK, highlighting areas of concern and recommending where the (then) proposed alignment should be adjusted to address these concerns;
- Consideration of a revised pylon alignment, in light of the mapped aquatic ecosystems, and compilation of a formal Basic Assessment Report (this document) to assess its implications for aquatic ecosystems;
- Inclusion of a Risk Assessment (as required by the Department of Human Settlements Water and Sanitation (DHSWS)).

1.4 Content of Report

The Procedures for the Assessment and Minimum Report Content Requirements for Environmental Themes Government Notice (GN) 320, which came into effect 20 March 2020, prescribe the required content in an Aquatic Biodiversity Specialist Report. These requirements and the sections of this Aquatic Biodiversity Specialist Report in which they are addressed, are summarised in **Table 1.1.**

Table 1 1: Content of EIA Report as per EIA Regulations, 2014

GNR 320 of 2020, Ref.:	Item	Report Section:
2.7.1	Contact details of the specialist, their SACNASP registration number, their field of expertise and a curriculum vitae;	Appendix E
2.7.2	A signed statement of independence by the specialist;	Page iii
2.7.3	A statement on the duration, date and season of the site inspection and the relevance of the season to the outcome of the assessment;	1.3 - 1.5
2.7.4	The methodology used to undertake the site inspection and the specialist assessment, including equipment and modelling used, where relevant;	1.6.2-1.6.6
2.7.5	A description of the assumptions made any uncertainties or gaps in knowledge or data;	1.5
2.7.6	The location of areas not suitable for development, which are to be avoided during construction and operation, where relevant;	4.2
2.7.7	Additional environmental impacts expected from the proposed development;	4.1-4.3
2.7.8	Any direct, indirect and cumulative impacts of the prosed development on site;	4.4
2.7.9	The degree to which impacts, and risks can be mitigated;	4.1.2-4.3
2.7.10	The degree to which the impacts and risks can be reversed;	4.1.2-4.3
2.7.11	The degree to which the impacts and risk can cause loss of irreplaceable resources;	4.1.2-4.3
2.7.12	A suitable construction and operational buffer for the aquatic ecosystem, using the accepted methodologies;	4.2
2.7.13	Proposed impact management actions and impact management outcomes for inclusion in the Environmental Management Programme (EMPr);	4.1.2-4.2
2.7.14	A motivation must be provided if there were development footprints identified as having a "low" aquatic biodiversity sensitivity (as per paragraph 2.4 of Table 1: Assessment and Reporting of Impacts on Aquatic Biodiversity) and that were not considered appropriate;	N/A

GNR 320 of 2020, Ref.:	Item	Report Section:
2.7.15	A substantiated statement, based on the findings of the specialist assessment, regarding the acceptability or not of the proposed development and if the proposed development should receive approval or not;	6
2.7.16	Any conditions to which the statement is subjected;	4.1.2-4.3
2.8	The findings of the Aquatic Biodiversity Specialist Assessment must be incorporated into the Basic Assessment Report (BAR) or the EIA Report including the mitigation and monitoring measures as identified, that are to be included in the EMPr; and	See BAR
2.9	A signed copy of the assessment must be appended to the Basic Assessment Report or Environmental Impact Assessment Report.	See BAR

1.5 Limitations and assumptions

- The study area was assessed in mid-summer (late January) 2020, when most watercourses were generally dry, and identifiable mainly through vegetation indicators. Nevertheless, most aquatic ecosystems are believed to have been identified, and there is high confidence that all major and least-impacted watercourses have been identified;
- This report was compiled roughly 11 months after the last visit to the study area. It is (not unreasonably) assumed that there have been no significant changes likely to affect watercourse condition or importance ratings since that time;
- Detailed delineations of wetlands (e.g. as per (then) Department of Water Affairs and Forestry (DWAF) (2005 and 2008) wetland delineation methods) identified in the vicinity of the powerlines were not carried out – instead, the extents of such systems were delineated from aerial imagery, after initial spot marking on site. Note however that ground-truthing showed that in some areas, recent encroachment of orchards into wetland areas mapped off aerial imagery has occurred. Mapped wetland extent in these areas is likely to be inaccurate;
- Ground-truthed watercourses have been mapped primarily within the proposed corridor. Areas beyond the corridor may well include extents of wetland not indicated in the data provided as part of the current assessment – this would have implications if additional activities are proposed outside of the assessed corridor;
- Note that no detailed or measurement-driven assessment of aquatic or river / wetland associated fauna was carried out in this study. Instead, habitat quality and type was used as a surrogate measure for general ecosystem condition and importance. This might over-estimate aquatic ecosystem importance in the case of species that have been eliminated by broader land use impacts (e.g. wide scale agriculture) despite the retention of aquatic ecosystems in good condition. Alternatively, where taxa do not require a high quality of habitat, habitat importance may be under-estimated. This approach is however commonly used in aquatic ecosystem assessments spanning extensive areas – literature and data searches (including the WCBSP data) were used to reduce this issue;
- The botanical study was relied on for characterisation of vegetation types along and within watercourses.

1.6 Assessment Methodologies

1.6.1 Definitions

All reference to wetlands and water courses in this document were based on the following definitions of wetlands and water courses, as stipulated in the National Water Act (NWA) (Act 36 of 1998):

"**watercourse**'' means -

(a) a river or spring;

(b) a natural channel in which water flows regularly or intermittently;

(c) a wetland, lake or dam into which, or from which, water flows; and

(d) any collection of water which the Minister may, by notice in the Gazette, declare to be watercourse, and a reference to a watercourse includes, where relevant, its bed and banks;

"**wetland**'' means -

land which is transitional between terrestrial and aquatic systems where the water table is usually at or near the surface, or the land is periodically covered with shallow water, and which land in normal circumstances supports or would support vegetation typically adapted to life in saturated soil.

"**Extent of a watercourse**" (as defined in General Notice (GN) 509 of August 2016) means:

(a) The outer edge of the 1 in 100 year flood line and/or delineated riparian habitat, whichever is the greatest distance, measured from the middle of the watercourse of a river, spring, natural channel, lake or dam; and

(b) Wetlands and pans: the delineated boundary (outer temporary zone) of any wetland or pan.

1.6.2 Assessment of watercourse extent

Watercourses in the vicinity of the powerlines were delineated from aerial imagery, after initial spot marking on site.

1.6.3 Assignment of watercourse type

Watercourses were typed, using the Classification System for wetlands and other Aquatic ecosystems in South Africa, as developed by Ollis *et al* (2013).

1.6.4 Assessment of watercourse condition and Ecological Importance and Sensitivity

The Present Ecological State (PES) assessment methodology was used as a measure of watercourse condition, as outlined in Appendix A.

Note however that in this study, the National Freshwater Ecosystem Priority Area (NFEPA) data (after Driver et al 2011) were also considered in the derivation of River Condition Data for main watercourses in and through the study area. These were ground-truthed in the vicinity of the study area, and amended for the affected reach if appropriate, using the desk-top Present Ecological State (PES) methodology, adapted from DWAF (1999).

Assessment of **Ecological Importance and Sensitivity (EIS)** was carried out using a refinement of the Department of Human Settlement, Water and Sanitation (DHSWS)'s Resource Directed Measures for Water Resources: Wetland Ecosystems method (DWAF 1999). It includes an assessment of ecological (e.g. presence of rare and endangered fauna / flora), functional (e.g. groundwater storage / recharge) and socio-economic criteria (e.g. human use of the wetland). Scoring of these criteria places the wetland in a Wetland Importance Class (A-D) (see Appendix B).

1.6.5 Conservation Importance

Assessment of **Conservation Importance** was based on two different ratings, as follows:

1. Regional Biodiversity Conservation Planning data ratings (i.e. the WCBSP of Pool-

Stanvliet et al (2017)) for watercourses mapped in that dataset;

2. Conservation Importance assessments, using the methodology developed by Ractliffe and Ewart-Smith (2002) (see Appendix C) for the determination of conservation importance in a development context, for wetlands that may have been omitted from regional or national conservation planning datasets by accident or because of their small size or artificial nature, but which may still be important from a conservation perspective. Since most of the watercourses identified during ground-truthing were not included in the WCBSP dataset, the Ractliffe and Ewart-Smith assessment methodology was considered the most useful, and allowed inclusion of regional biodiversity importance ratings to be taken cognisance of where available.

   In order to provide specific guidance as to the degree to which different mapped watercourses should be taken into consideration in planning (or amending) the proposed footprints and alignments of transmission lines and substation, the Conservation Importance outputs were coded as follows:

   - YELLOW: Very Low ecological significance other than conveyance. Standard best practice construction measures to be applied to crossings through these areas
   - ORANGE: Disturbed natural and/or artificial systems that nevertheless do provide aquatic habitat as well as potential ecological and hydrological connectivity. Disturbance to be limited and best practice applied. Avoidance of excavation / construction / layover should be sought;
   - **RED**: Important areas which although disturbed in places support largely high quality wetland vegetation, sometimes occurring in mosaics with terrestrial vegetation. Avoidance of these areas to be sought unless this is technically unfeasible and then stringent mitigation measures must be applied
   - **PURPLE**: Very important areas which, although disturbed in places, support very high quality wetland vegetation, sometimes occurring in mosaics with terrestrial vegetation. These areas to be avoided – if this is unfeasible then stringent mitigation measures must be applied, but avoidance should be shown to have been sought;
   - **BLACK:** Extremely important reference area of very high quality wetland vegetation. New structures in this area must be avoided, although it is recognised that existing pylons do occur with the wetland. Diversion of the line into the (encroaching) orchards to the east or into the western lower mountain slopes must be considered. Note that orchards may encroach closer into the wetland today than shown in the 2019 GOOGLE imagery.

1.6.6 Ecoregion status

The National Ecoregional Classification (Kleynhans *et al*. 2005) was used as a broad mechanism to categorise watercourses at each site. This classification system divides the country's rivers into 31 distinct ecoregions, or groups of rivers which share similar physiography, climate, geology, soils and potential natural vegetation.

1.7 Location of the study area

The proposed new transmission line would run between the Eskom substation at Ceres, located at the foot of the mountains immediately west of Ceres town, accessed off Plantation Street, and the Witzenberg substation to the north, accessed off the Witzenberg Valley road, via the R303 (see **Figure 1.1**).

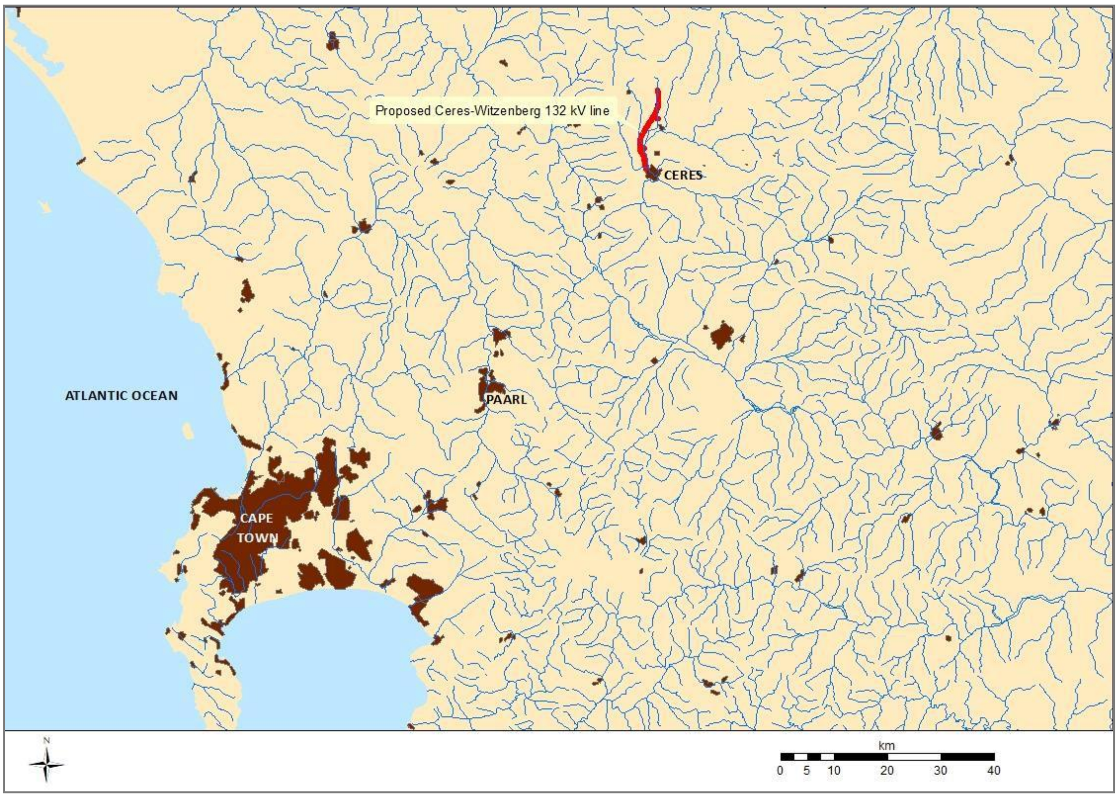

Figure 1.1
Alignment of proposed Ceres – Witzenberg 132 kV line (red line)

2 DEVELOPMENT DESCRIPTION

2.1 Overview

Key aspects of the project include:

- Construction of a single circuit (132kV) transmission line from Ceres to Witzenberg substation (~17km);
- Construction of the new Prince Alfred Hamlet substation; and
- Construction of a new tie-in to the proposed Prince Alfred Hamlet substation from the proposed new 132 kV line.

The extent of the study area comprises a 100 m corridor spanning the full length of the proposed powerline route (~17 km), i.e. 50 m each side of the proposed pylon structures.

2.2 Powerline alignment

The proposed alignment of the new powerline has been adjusted during the course of this EIA in order to take cognisance of recommendations made during early baseline input into the project, regarding the need to avoid sensitive aquatic ecosystems of high ecological importance. These are described in Section 3.

Figures 2.1 and 2.2 show the extent of the new alignment, noting that the proposed 132kV line would be a new powerline and would not replace the existing 66kV line, but would generally be routed ~32 m from the existing 66kV line.

2.3 Powerline support structures

The proposed support structures would be braced double steel poles, guyed double steel poles and steel monopoles.

Assumptions around the support structure structures are as follows, based on information previously provided by ESKOM for the Romansrivier to Ceres 132kV line (Day 2017):

- Structures would be up to 30 m in height;
- Total (worst case) construction footprint per tower (including construction, stockpiles of soil, working space, vehicle space): 15 m x 15 m;
- Worst-case foundation per pole (two per braced and guyed double steel poles and one per monopole): 1 m (width) x 1.5 m (length) x 3.5 m (depth);
- Support structures would require cement for the foundations – this would be mixed on / near to each site;

2.4 Laydown areas and worker camps

Although no details have been provided as to laydown areas and worker camps, it is assumed that:

- Laydown areas would need to be within 8-10 m of each tower;
- Site camps would be located near to the proposed alignments – no specifications have been provided in this regard.

2.5 Access routes

- Existing farm roads only would be utilized;
- Where there are no existing access roads, access would be by helicopter and no new roads would be constructed – this applies between support structure 67 and 88;

- It is possible that the proximity of the existing substation to support structures 86 to 88 would preclude access by helicopter - two alternative new tracks to allow truck turning circles at 86 have thus been considered (see **Figure 2.2**). It is assumed that the turning circle would not be lined, and would comprise a rough track, maintained over time to allow maintenance access.

It is also assumed that no new bridges / culverts across any watercourses would be required, and that where watercourses intersect the lines, structures would be accessed from either side of the watercourse, and not along a continuous line.

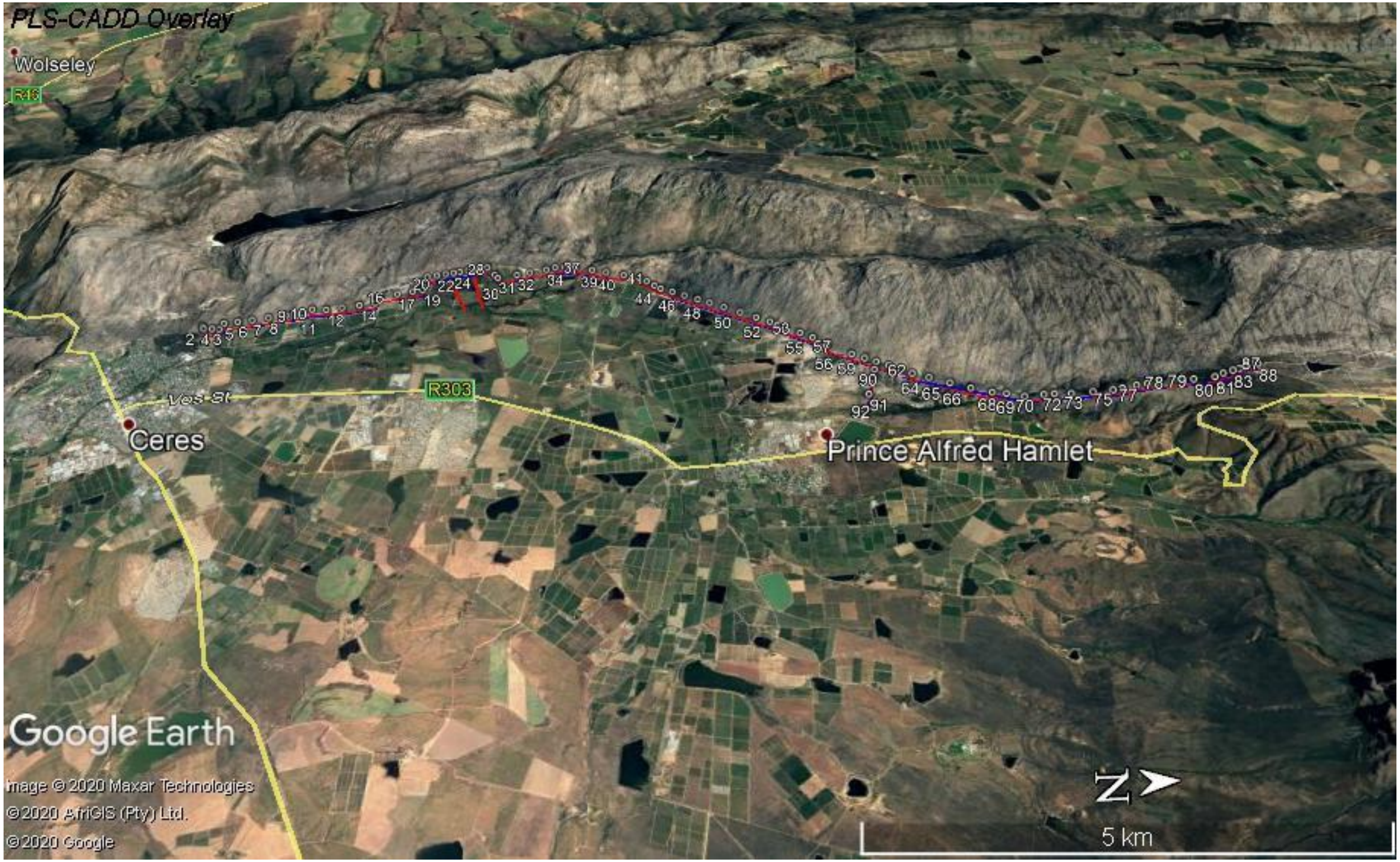

Figure 2.1
Proposed alignment of the 132 kV line between the Ceres and Witzenberg substations, showing numbered support structures.
Note that these are presented in more detail in Section 3

Figure 2.2
Alignment alternatives for a turning circle at the Witzenberg substation, to allow truck turning at proposed support structure 86.

3 DESCRIPTION OF AFFECTED AQUATIC ECOSYSTEMS

3.1 Catchment context

The 132kV transmission lines and support towers proposed for assessment in this study would be located in the **Upper Breede catchment** (Department of Human Settlements, Water and Sanitation (DHSWS) Primary Drainage Region H), within the **Breede-Gouritz Water Management Area (WMA)**. This WMA falls under the administration of the Breede-Gouritz Catchment Management Agency (BGCMA).

Figure 3.1 shows the major rivers within this catchment in the vicinity of the proposed transmission line alignment, using river data drawn from the national 1:500 000 rivers cover, as provided by the National Freshwater Ecosystems Priority Area (NFEPA) datasets. **Figure 3.2** shows a close-up view of the alignment, with regard to affected subcatchments, for ease of reference in Water Use License or Registration approaches for the DHSWS.

All sections of the proposed powerline would pass through quaternary catchment H10C (see **Figure 3.1)**, which is drained primarily by the Koekedou River, along with the Modder River and the lower reaches of its tributary the Skaap River, which confluences with the Modder River just east of the proposed powerline routing. The Koekedou River is joined by the Modder River south of Ceres and beyond the alignment of the proposed powerline, and the combined flow is known from this confluence as the Dwars River, which becomes the Breede River just south of Ceres town, after the confluence of the Titus River.

The proposed new powerline would cross over both the Modder River (upstream of the confluence with the Skaap River) and the Koekedou River.

3.2 Ecoregion context

Ecoregions, as defined by Kleynhans et al (2005) are groups of rivers which share similar physiography, climate, geology, soils and potential natural vegetation. The whole proposed powerline alignment would be located within the Western Folded Mountains Ecoregion (Ecoregion 23) (see **Figure 3.1**). The headwaters of both the Olifants and the Breede Rivers rise in this ecoregion, which is described by Kleynhans *et al.* (2005) as being characterized by:

- Mean annual precipitation that varies from moderate/high in the south to low in the north;
- Mostly high coefficients of variation of annual precipitation (thus prone to large differences in rainfall ranging from high to very low);
- Low to medium drainage density (thus relatively low numbers of water courses);
- Stream frequency that is mostly medium/high but low/medium in patches;
- Slopes <5% in <20% of the area and >80% in limited areas;
- Median annual simulated runoff: very high in the south to moderate/low in the north; and
- Mean annual temperature ranging from moderate/low to moderate high.

Drawing from the above, the watercourses in this ecoregion and thus in the present study area are likely to exhibit strong seasonal fluctuation, in an area prone to high runoff. Depending on soil and slope, they could be potentially vulnerable to erosion as a result of their hydrological characteristics.

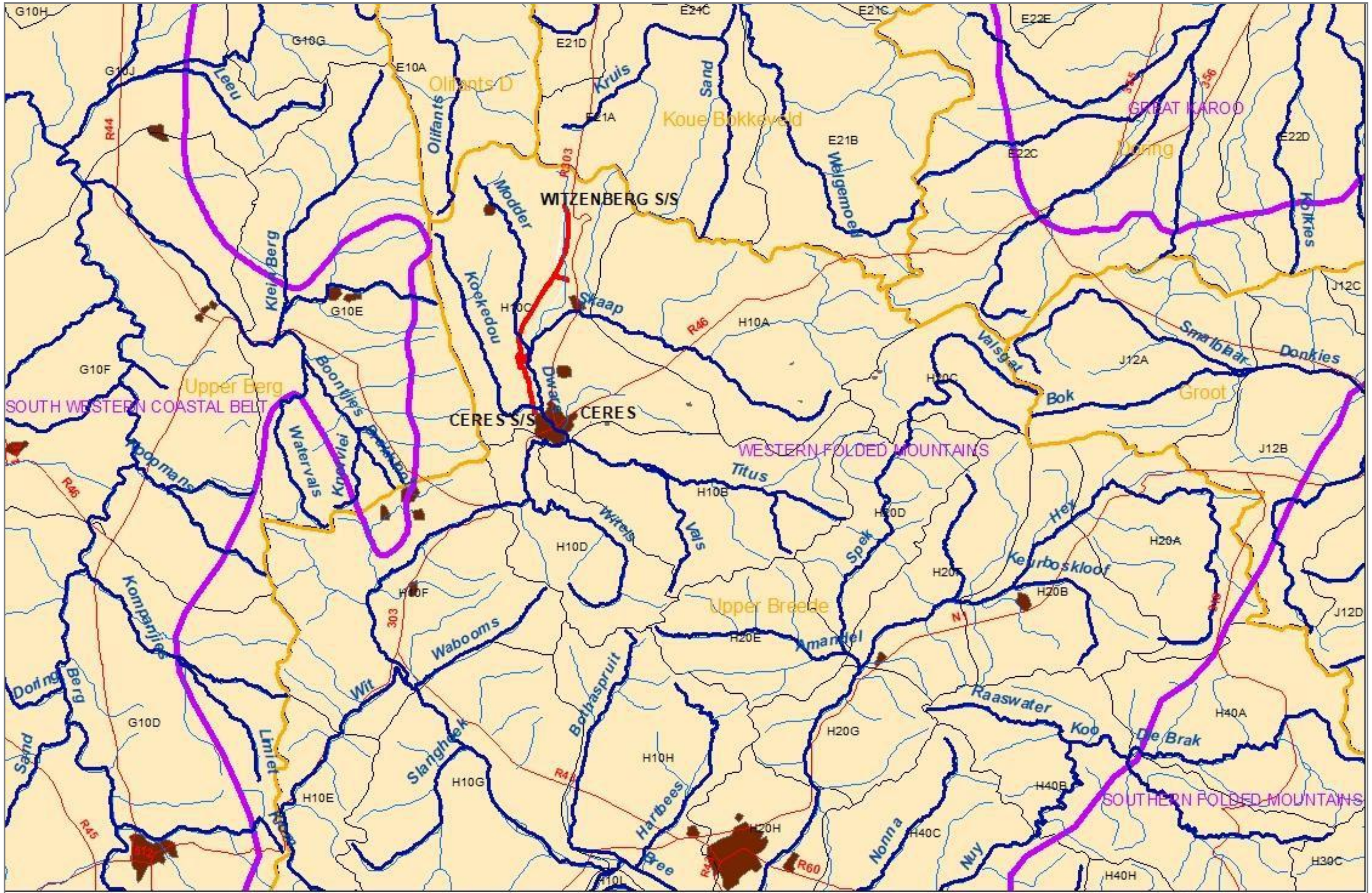

Figure 3.1
Catchment and Ecoregion context
Proposed 132 kV distribution line from Ceres to Witzenberg substations

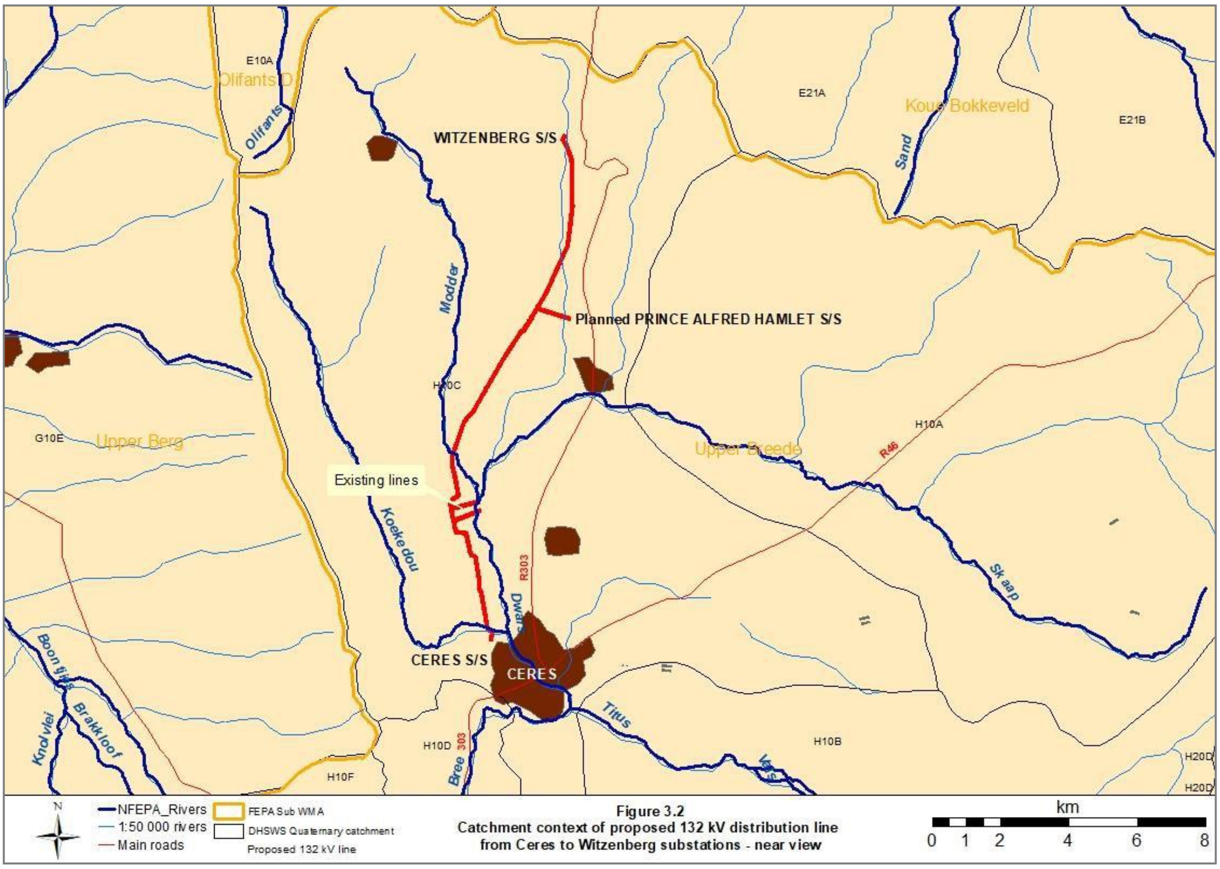

Figure 3.2
Catchment context of proposed 132 kV distribution line from Ceres to Witzenberg substations - near view

3.3 NFEPA context

Data from the NFEPA programme (Driver et al 2011), although outdated in some respects, provide information about important quaternary and sub-quaternary catchments in the context of ecosystem processes and key conservation issues, particularly relating to fish biodiversity conservation and management. The data include the identification of sub-quaternaries categorised as River Freshwater Ecosystem Priority Areas (River FEPAs), for various reasons including their importance as habitat or corridors for the movement of endemic fish. These data are shown in **Figure 3.3**, along with NFEPA wetland data, as mapped within the NFEPA programme, and categorised (in the data presented here) in terms of whether they are artificial or natural. The data in **Figure 3.3** indicate the following:

- The **Koekedou River** sub-quaternary catchment has been classified as a River FEPA – that is, a sub quaternary, the conservation of which is needed to achieve biodiversity targets for river ecosystems and threatened fish species (Driver et al 2011). These comprise “rivers that are in a good condition (A or B Present Ecological State (PES) ecological category. Their FEPA status indicates that they should remain in a good condition in order to contribute to national biodiversity goals and support sustainable use of water resources” (Driver et al 2011). The Koekedou sub-quaternary has been coded as 1, indicative of a Fish Sanctuary, supporting at least one vulnerable or near-threatened fish species. NFEPA data indicate that this species is *Pseudobarbus burchelli* cf. Breede (Breede River redfin), which though widespread in the Breede River catchment is largely confined to tributaries without alien fish species (Garrow and Marr 2012). The southern portion of the proposed transmission line would cross over the Koekedou River just norther of the Ceres substation;

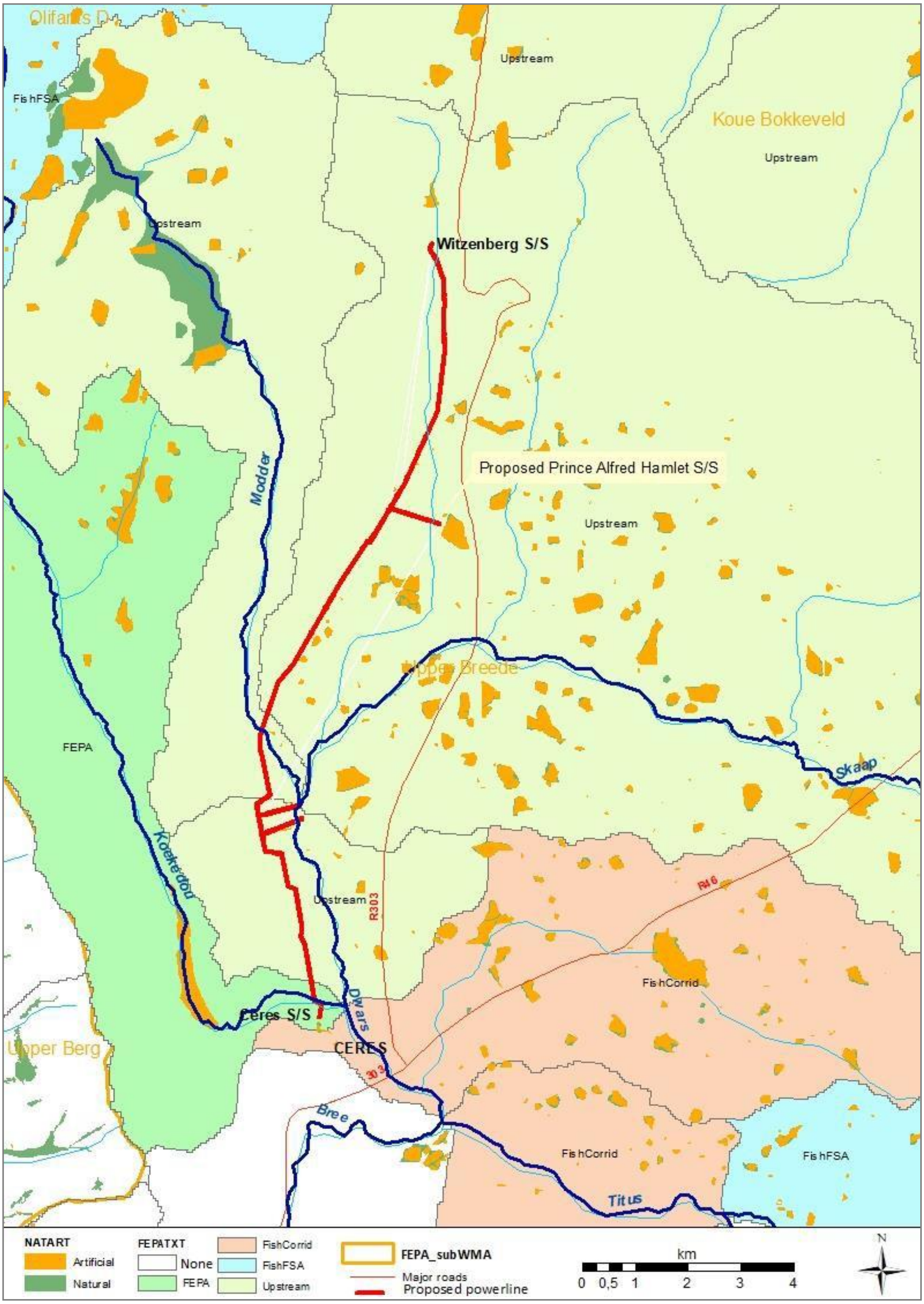

Figure 3.3
NFEPA context of the proposed 132kV Ceres to Witzenberg transmission lines and Prince Alfred Sub-station

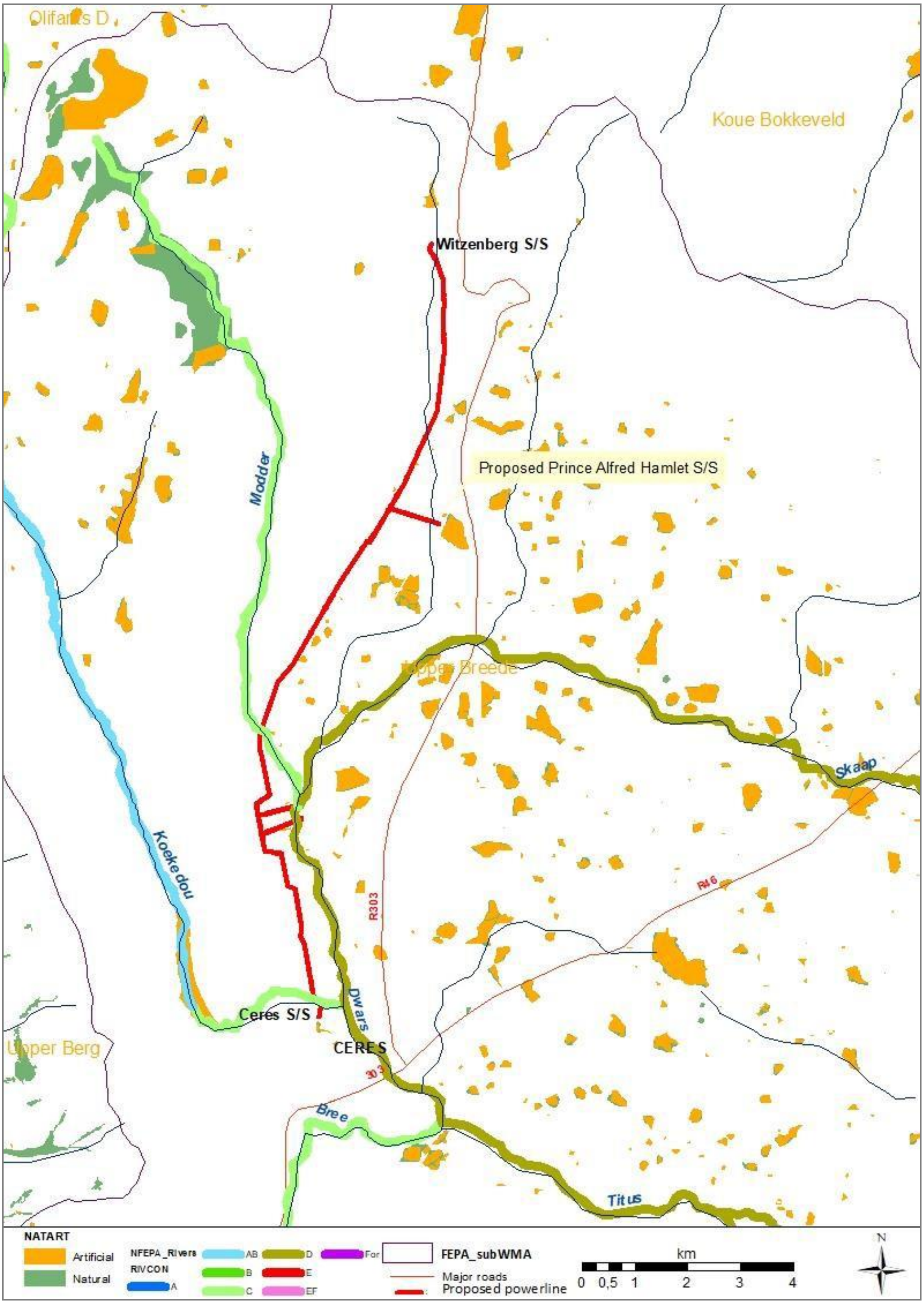

Figure 3.3

NFEPA context of the proposed 132kV Ceres to Witzenberg transmission lines and Prince Alfred Sub-station showing modelled (2011) River Present Ecological Status (PES) (NFEPA rivers only)

- The rest of the proposed transmission line would be aligned through sub-quaternaries classified as "Upstream" sub-quaternaries (see **Figure 3.3**), where management activities are intended to prevent the downstream degradation of FEPAs and Fish Support Areas coded as 1 - in the present case, these comprise the lower Dwars River as far as its confluence with the Titus River;
- NFEPA data for river condition (**Figure 3.4**), based on (2011) modelled landuse, suggest that the Koekedou and Modder Rivers (both to be crossed by the proposed transmission lines) are in moderately impacted condition (PES Category C) in their reaches closest to the proposed transmission line crossing points. Ground-truthing in the present study indicated that the rivers are both impacted by alien plant invasion in these reaches, with the Koekedou River in particular being affected by encroachment of agriculture into the river floodplain, and (in places) erosion, sedimentation, shading and other impacts associated with woody invasive alien encroachment and adjacent agricultural landuse. The Category C PES ratings are supported;
- NFEPA wetland data shown in **Figure 3.3** identify a number of artificial wetlands (i.e. dams) in the vicinity of the transmission line corridor and proposed new substation. No natural wetlands are indicated in the dataset. It should however be noted that ground truthing of the study area indicated the presence of significant areas of natural wetlands in the vicinity of parts of the assessed corridor, and the NFEPA wetland data are considered deficient in this regard.

3.4 Context in terms of the 2017 Western Cape Biodiversity Spatial Plan

Figure 3.4 illustrates the context of freshwater ecosystems in and in the vicinity of the proposed Ceres to Witzenberg transmission lines and new Prince Alfred Hamlet substation, using data from the 2017 Western Cape Biodiversity Spatial Plan (WCBSP) (Pool-Stanvliet et al 2017). In terms of this, the Koekedou River has been identified as a Critical Biodiversity Area (CBA) river. Aquatic CBAs are aquatic ecosystems that are considered critical for conserving biodiversity and maintaining ecosystem functioning in the long term, particularly in the face of climate change. In terms of surface freshwater ecosystems, aquatic CBAs include irreplaceable (in terms of meeting biodiversity pattern targets), and best condition (PES Category A and B) wetlands, estuaries and river reaches, representative of the full set of types in a region. They also include sub-catchments considered to be critical for achieving river or wetland targets, or containing rivers important as fish sanctuaries.

No other CBA wetlands or rivers in the vicinity of the proposed transmission lines or substation are included in the WCBSP. However, all of the minor watercourses draining into the Koekedou River have been identified as aquatic Ecological Support Areas (ESAs). ESAs included in the WCBSP comprise supporting areas required for preventing degradation of Critical Biodiversity Areas (CBAs) and protected areas, and are freshwater ecosystems required to meet ecological process targets, or which are required in order to meet persistence objectives. A number of wetlands classified as ESAs are indicated in **Figure 3.4** in places along or near to the proposed transmission alignment.

Note that the WCBSP largely excludes artificial water bodies such as dams, and thus many of the wetlands shown in **Figure 3.3** are not shown in **Figure 3.4**.

Figure 3.4 also shows a number of watercourses and their buffers that were previously identified in the Witzenberg Municipality Biodiversity Spatial Plan as "Other Ecological Support Areas" (OESAs), and included in the Western Cape Biodiversity Framework of 2014. Although these are not included in the 2017 WCBSP, they nevertheless indicate the presence of watercourses that might have sensitivity to the proposed transmission line and substation construction. They are thus included in the figure.

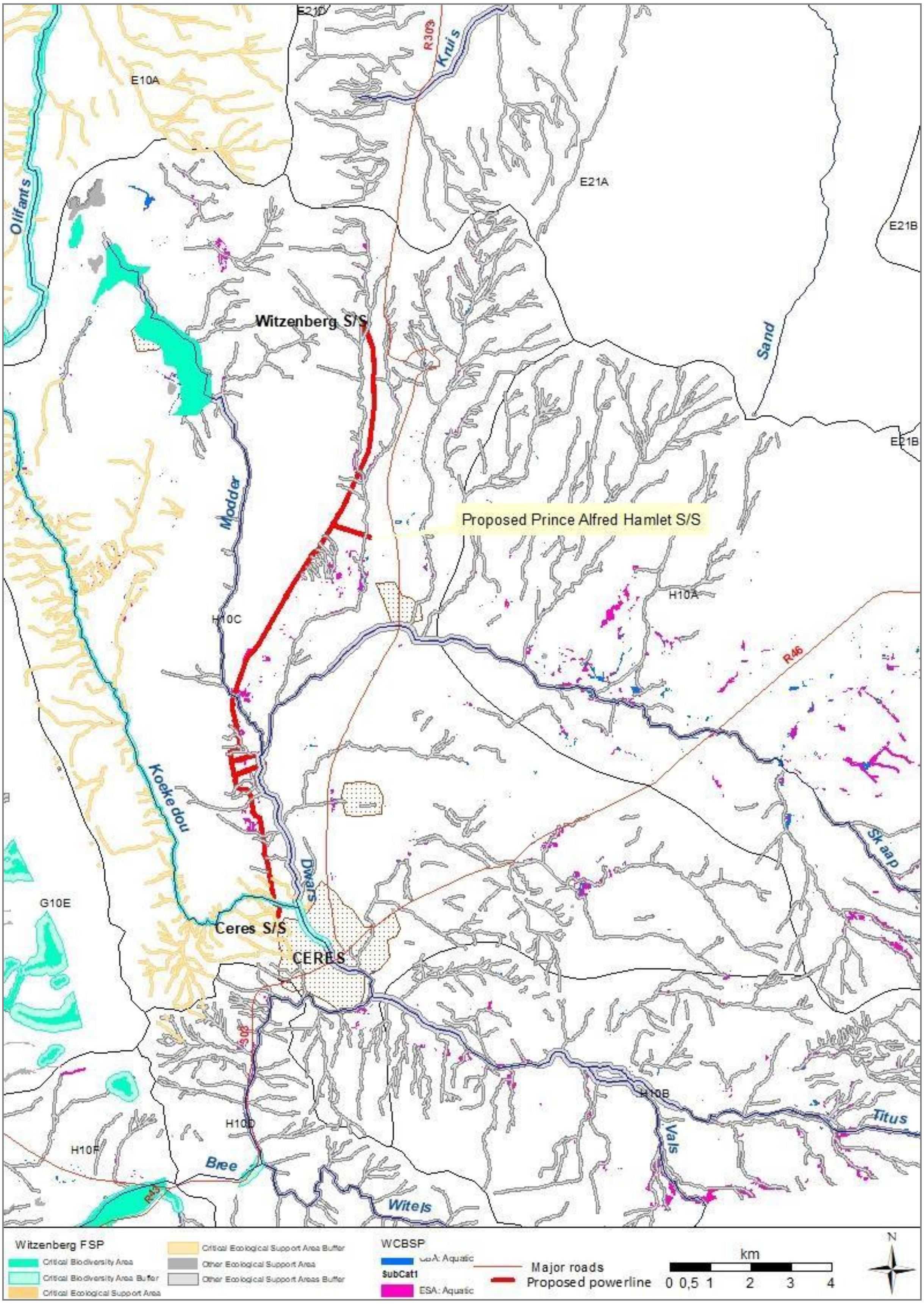

Figure 3.4
Proposed 132kV Ceres to Witzenberg transmission lines and Prince Alfred Sub-station in the context of the 2017 WCBSP (Pool-Stanvliet et al 2017) and the Witzenberg Municipality Biodiversity Spatial Plan (Western Cape Biodiversity Framework 2014)

3.5 River Ecological Importance and Sensitivity

Modelled Ecological Importance (EI) and Ecological Sensitivity (ES) data produced in DWAF (2014) rate the EI and ES of the Koekedou River in the vicinity of the Ceres substation; the Skaap; and the Modder River as far as its confluence with the Skaap River; as Moderate and Very High respectively. The Dwars River from the Koekedou River downstream is shown as Moderate EI and High ES.

3.6 Aquatic ecosystem vegetation types

All of the watercourses identified along the proposed transmission line route and substation footprint have been mapped in the NFEPA dataset as belonging to the **Northwest sandstone fynbos** wetland vegetation group, with the exception of vegetation between support structures 1-8 and 66-75, where watercourses fall within the **Western Fynbos-Renosterveld Shale Renosterveld** wetland vegetation group. Of these vegetation groups, which comprise broader groupings than assigned terrestrial vegetation groups, the former is classified in the National Biodiversity Assessment (NBA) (2011) as **Least Threatened**, while the latter is classified as **Critically Endangered**. Watercourse types within these groups are similarly classified, with the exception of Western Fynbos-Renosterveld Shale Renosterveld seeps (rated as Vulnerable - presumably because they are relatively abundant within this vegetation type and protected by slope) and, in the Northwest Sandstone Fynbos wetland vegetation group, Depressions (Critically Endangered) and Unchanneled Valley bottom wetlands (Endangered). The remaining types in this group are classified as Least Threatened.

3.7 Description of affected aquatic ecosystems

The previous sections outlined the broad context of the proposed transmission line alignment between the Ceres and Witzenberg substations, including the link to the new (proposed) Prince Alfred Hamlet substation, from the perspective of aquatic ecosystems included in national and regional datasets.

The present section presents the findings of more detailed ground-truthing of the study area, which highlighted a number of additional watercourses and allowed for a more detailed consideration of the importance and sensitivity of all of these in terms of the proposed project activities, and the ecological implications thereof. The locations of the ground-truthed watercourses are presented in **Figures 3.5** to **3.10.** They are described in the sub-sections below, as grouped by their assessed conservation importance rating, using the approach outlined in Section 1.5.5 and Appendix C.

3.7.1 Overview of the route

The proposed transmission lines would run for the most part along the foot of the steep slopes of the Skurweberg mountains, which extend in a roughly north-south direction, just west of Ceres town. The steep mountain slopes give way to the east to flatter slopes, in which extensive agriculture has developed – for the most part, fruit trees and vineyards. Numerous dams have been constructed both on- and off the channeled watercourses through the area, with the largest dam comprising the Koekedou Dam on the Koekedou River, high up in the river valley and well outside of the present study area. With the exception of the lines between support structures 13-15 and 22-34 (**Figures 3.5** and **3.6**) , the lines would run just outside of existing agricultural areas, along the base of the slope. The lines between support structures 13-15 and 22-34 would however cut across agricultural areas.

Support structures 67 – 84 would be located along the top of a high ridge, which forms the eastern watershed of an unnamed tributary of the Skaap River, which rises just north of the Witzenberg Valley Road crossing. The unnamed tributary is referred to in this report as the Witzenberg substation channel (**Figure 3.9**).

With a few exceptions, watercourses within the agricultural areas are generally disturbed, with high levels of alien invasion in places (including brambles, extensive *Acacia mearnsii, Acacia saligna,* pines and eucalypts); channelisation; diversion of upstream flows; and (possible) water quality impairment as a result of contamination with nutrients, pesticides and other chemical pollutants.

3.7.2 Watercourses of Very high importance

Only one watercourse was identified as of Very High Importance. This watercourse, shown in **Figure 3.6** and classified as a hillslope seep wetland, lies [1]approximately 110 m, 50 m and 36 m east of the proposed new support structures 23, 24 and 25 respectively, with the line itself never being closer than 30 m from the mapped wetland edge. This reflects an adjustment of the original pole positions by the design team, to accommodate concerns regarding the sensitivity of the watercourse, raised during project planning. Pole positions 97 and 98 (**Figure 3.6**) indicate <u>existing</u> support structures for a pylon across the wetland.

The wetland, which is presumed to be fed mainly by the daylighting of groundwater at the foot of the mountain where the slopes flatten out, and /or the passage of surface and shallow subsurface runoff from the mountain and upland areas, comprises a mosaic of mainly indigenous wetland plants, including patches of Palmiet reed (*Prionium serratum*) – a South African endemic species that occurs in the Western Cape, Eastern Cape and parts of kwaZulu Natal provinces only (Photos A and B). It establishes in wetlands where there is at least shallow flow, although once established can remain in wetlands after flows have reduced or the water table has dropped. In addition to the presence of Palmiet, the wetland is generally dominated by indigenous *Pennisetum macrourum* – a grass typical of hillslope seeps but also occurring in shallowly seasonally inundated wetlands (LDC unpublished data).

The wetland is considered of Very High Importance by virtue of its size (extent in January 2020 was measured as 6.62 ha from GOOGLE Earth imagery); its rarity (very few Palmiet hillslope seeps are known to occur in this area, although the wetland patch mapped is assumed to represent a relic of a much more extensive wetland, prior to farming and other activities); its habitat diversity (a mosaic of low seasonal pools, higher lying areas dominated by restios and other indigenous plants); and the role it plays in the subcatchment, in controlling runoff and, at least potentially, improving water quality and soil retention.

The wetland forms part of the Dwars River subcatchment.

Threats to the wetland include alien invasion (e.g. pines) as well as significant and ongoing agricultural encroachment. Habitat integrity in the wetland has been compromised both by fragmentation from other natural areas (it lies within an area dominated by agriculture) as well as a degree of cut-off of natural water sources as a result of upstream drains, and the negative impact of alien invasion on runoff. The existing support structures create (localised) areas of infill and disturbance.

Present Ecological State of the wetland was however nevertheless rated as Category B.

[1] As measured off Google Earth

	
Photo A ***Pennisetum macrourum* wetland gasses in Very High Importance wetland**	**Photo B** **Palmiet (*Prionium serratum*) mosaic in Very High Importance wetland**

3.7.3 Watercourses of High importance

Three wetland patches in the vicinity of the proposed transmission line were classified as of High Conservation Importance. These are located as follows:

- Two hillslope seep wetlands (areas of 2.59 ha and 0.32 ha) located between support structures 56 and 58 – these would be crossed by the proposed transmission lines, although the support structures themselves would be located (by design) outside of the wetland (see **Figure 3.8** and Photo C). The wetlands lie in close proximity to each other, separated by terrestrial fynbos vegetation and in places alien vegetation (mainly pines). They include a mosaic of indigenous fynbos plants, including various wetland Ericas (e.g. *Erica curvifolia*), restios and typical wetland species such as patchy *Psoralea aphylla*. The wetlands have been assessed as PES Category B;
- An extensive (13.08 ha) wetland lies between support structures 19 and 27 – the nearest support structure to the wetland would be approximately 26 m west of the mapped wetland, and the new transmission lines would not cross it (see **Figure 3.6** and Photo D). It comprises a seepage wetland, dominated by *Pennisetum macrourum* but with invasion along its margins by alien vegetation such as gums, and ongoing encroachment of orchards into the wetland. The reference condition of this wetland was probably as per the Very High Importance wetland described in Section 3.6.2, around which the wetland of High Importance is located. The wetland thus provides a degree of buffering of the remnant more intact Palmiet wetland, but is of itself still considered of High Importance as a rare, if impacted, relic of an important wetland type.

  The condition of this wetland has been rated as PES Category C, given its invasion by alien vegetation, likely changes in flow (reduction as a result of dams and channels), and localised disturbance in the form of dams, channels, berms and roads. Expansion of orchards into the wetland has occurred since the GOOGLE Earth image shown in **Figure 3.6**.

	
Photo C **Part of broad Erica dominated wetland seep – between poles 56 and 58) in High Importance wetland**	**Photo D** ***Pennisetum macrourum* mosaic in High Importance wetland between poles 19 and 27**

3.7.4 Watercourses of Moderate/ Medium importance

Watercourses of Moderate Importance comprise generally less rare and / or more impacted watercourses or watercourse types, which are still considered valuable aquatic ecosystems. The following have been identified:

- The Koekedou River, which would be crossed by the transmission lines, with support structures 4, 5 and 6 (**Figure 3.5** and Photo E) in close proximity to the river bank – the river in these reaches is channelised, with steep, bulldozed banks, infilled in places, and with patchy invasive alien vegetation, along with stands of indigenous riverine vegetation, including *Pennisetum macrourum*, *Calopsis cf. paniculata* and *Seersia crenata.* The channel itself has been bulldozed in places and was dominated by (indigenous) Palmiet. This plant is probably more extensive in the channel than under natural conditions, as a result of the significant impact of the Koekedou Dam upstream, which is assumed to reduce the natural channel disturbance / scour caused by low to medium sized floods, which are attenuated in the dam. Stands of alien *Acacia mearnsii* saplings (black wattle) had also established on sand bars / banks in the channel. Notwithstanding these impacts, the river as a whole has been classified as an aquatic CBA (see Section 3.4). Its PES was assessed as Category C (moderately disturbed) in its reaches past the proposed crossing point, with aspects such as water quality believed to be still relatively natural;
- A small channelised seep between support structures 13 and 14 (**Figure 3.5** and Photo **F**) – this watercourse has been channelised and now flows in a steep-sided channel, the banks of which are lined with dense (indigenous) *Cliffortia strobilifera,* bracken fern (*Pteridium aquilinum*), patchy Palmiet and various ericas and other fynbos elements. PES was assessed as Category D, given the extent of alteration of the watercourse from its assumed reference condition as a broad unchanneled seep to a deep, steep-sided narrow trench. Nevertheless, the watercourse does support indigenous wetland vegetation, albeit now associated with valley bottom rather than seep wetlands, and provides an aquatic corridor through otherwise ecologically sterile farmland, thus supporting its assignment to the grouped systems of Moderate Importance;
- The Modder River channel, crossed between support structures 37 and 38 (**Figure 3.7** and Photos G and H) – the river in these reaches comprises a narrow, vegetated channel at the base of a steep-sided relatively narrow valley. The riparian zone is clearly defined, with

dense *Cliffortia strobilifera* and Palmiet dominating the wetted bank and channel itself. Tall (alien) *Acacia mearnsii* occur along the channel in places – it is assumed that these might require clearing if the proposed transmission alignment across this section is authorised – the river has been assessed as a PES Category B/C in these reaches, with invasion by alien vegetation and its associated effects of shading and reduced low flows being the main impacts identified;

- A seep some 26 m east of where the transmission line would cross between support structures 35 and 36 (**Figure 3.7** and Photo I) – this seep lies at the foot of a low ridge, along which the existing transmission lines run. The seep was vegetated by indigenous sedges and grasses, and has value as a least-impacted, if small, system. It feeds into a channelised Low Importance seep to the south, which passes into dense pine forest to the east. The seep has been assessed as PES Category B, with probable loss of indigenous vegetation and fragmentation being its main impacts;
- Multiple seeps occurring in a mosaic from about 100 m south of support structure 58 to 64 (**Figure 3.8** and Photos J to K) – these are characterised by stands of *Erica curvifolia*, within extensive mixed wetland -associated restios. They are more disturbed than the High Importance seep described in Section 3.7.3, between support structures 56 and 58, with scattered and clustered pine trees contributing to habitat degradation, along with disturbance as a result of access tracks through the wetlands and the excavation of a number of small dams within and abutting the wetlands. Spoil from the excavations further adds to localised wetland degradation. The wetlands have been assessed as PES Category C;
- A wide valley bottom wetland (the so-called Witzenberg substation channel), which would be crossed between support structures 91 and 92, leading to the proposed new substation – the wetland lies well below the proposed substation near support structure 92 (**Figure 3.8** and Photo L), which looks down into the flat valley below. It was still flowing in mid-summer 2020, and comprised a broad vegetated wetland, with two discrete channels, that braided between banks dominated by dense indigenous *Cliffortia strobilifera* and occasional Palmiet, while lower-lying inundated pools were dominated by *Isolepis cf. prolifer* and *Juncus kraussii* sedges, with low levels of alien invasion (mainly *Acacia mearnsii*). Overall PES was rated as Category C in these reaches, reflecting impacts such as grazing by goats and cattle, and an unpaved road resulting in wetland fragmentation and localised constriction as a result of passage under the road by way of narrow culverts;
- A second crossing over the Witzenberg substation channel valley bottom wetland between support structures 67 and 66 (**Figure 3.9** and Photo M);
- The Witzenberg substation channel and a hillslope seep, which would be crossed again by transmission lines between support structures 84 and 85, and potentially by the proposed turning circle alternative from the road to support structure 87 (**Figure 3.10**). The watercourse in this area comprises a densely vegetated channel, dominated by restios such as *Calopsis paniculata* (Photo N). Activities that resulted in increased runoff or the concentration of flows through the channel could result in significant channel incision in this sensitive area. PES was rated as Category B, with upstream impoundment being the main impact affecting habitat integrity.

	
Photo E **View into Koekedou River channel in the vicinity of the proposed crossing**	**Photo F** **Channelised Moderate Importance seep at support structure 13, dominated by *Cliffortia strobilifera***
	
Photo G **The Modder River (background) at the proposed crossing point between support structures 37 and 38 – note dense riparian vegetation including tall *Acacia mearnsii***	**Photo H** **Modder River showing dense Palmiet and *Cliffortia strobilifera* within the channel**
	
Photo I **Seep east of transmission line between support structures 35 and 36**	**Photo J** **Mixed *Erica curvifolia* / restio seep between support structures 58 and 64. Note scattered pines.**

<table>
<tr><td></td><td></td></tr>
<tr><td>Photo K
Berms from excavated dams creating disturbance of Erica curvifolia seeps between support structures 58 and 64</td><td>Photo L
Witzenberg substation channel valley bottom wetland at the existing road crossing between support structures 91 and 92.</td></tr>
<tr><td></td><td></td></tr>
<tr><td>Photo M
Witzenberg substation channel valley bottom wetland downstream (east) of proposed transmission line crossing between support structures 66 and 67</td><td>Photo N
Edge of eastern channel of Witzenberg substation channel valley bottom wetland, just east of the Witzenberg substation</td></tr>
</table>

3.7.5 Watercourses of Low importance

These watercourses comprise disturbed natural and/or artificial systems that nevertheless provide aquatic habitat as well as potential ecological and hydrological connectivity. They have been marked in orange in **Figures 3.5 – 3.10,** and include the artificial dams constructed within some of the wetland seep areas, as well as degraded channelised seeps and valley bottom wetlands that occur through farmland. The watercourses are variously impacted by extensive alien invasion (mainly black wattle (*Acacia mearnsii* but also pines and in some areas gums), as well as, in many cases, channelisation, channel constriction and erosion. Photos O -R provide illustrations of some of these systems.

Although none of the proposed support structures would be located in these watercourses, the proposed transmission lines would cross over Low Importance watercourses in the sections between support structures 10-11; 12-13; 18-19; 28-29; 30-31; 31-33; 34-35; 42-43; 46-47; 49-50; 55-56; 65-66. The transmission lines would also pass in the vicinity of, but not over, Low Importance watercourses in the following locations: east of support structures 6-7 and 8-9; and west of support structures 39-40; 47-48; 50-51; 55-57; and 59-60.

These watercourses have generically been accorded PES ratings of Category D, noting however that these apply only to natural watercourses, while PES ratings do not apply to artificial watercourses such as dams.

Despite their relatively low importance as aquatic ecosystems, all of the watercourses included in this category do provide aquatic habitat, albeit usually degraded or limited in extent, and play some role in terms of conveyance of water through the catchment, or water storage, and impacts to such systems could affect downstream watercourses or trigger impacts such as erosion.

Photo O
Minor watercourse between support structures 65 and 66

Photo P
Artificial dam, west of support structure 62

Photo Q
Small *Pennisetum macrourum* wetland between support structures 90 and 91

Photo R
Channelised seep through farmland – channel still provides useful aquatic habitat

3.7.6 Watercourses of Very Low importance

Very Low ecological significance, other than conveyance of water through the landscape, was attributed to a number of watercourses, which comprised mainly artificial trenches, shallow excavations and cut-off drains, used to trap runoff from the steep mountain slopes and convey it to dams or into channels through agricultural areas (see examples in Photos S and T). These watercourses were often invaded by alien vegetation (mainly pines and wattles) and in some areas subject to dumping of litter and other waste. They are shown as yellow lines and polygons in **Figures 3.5 – 3.10**.

Rating of PES is not appropriate for artificial channels, and no assessment of condition was accorded these systems. However, since they convey water into downstream systems, the watercourses are not insignificant and impacts to their function and/or structure could affect downstream ecosystems or result in erosion and other impacts to natural or agricultural resources.

	
Photo S **West-east running artificial channel along farm boundary between support structures 54 and 55**	**Photo T** **Artificial cutoff channel along proposed transmission line route near support structure 50**

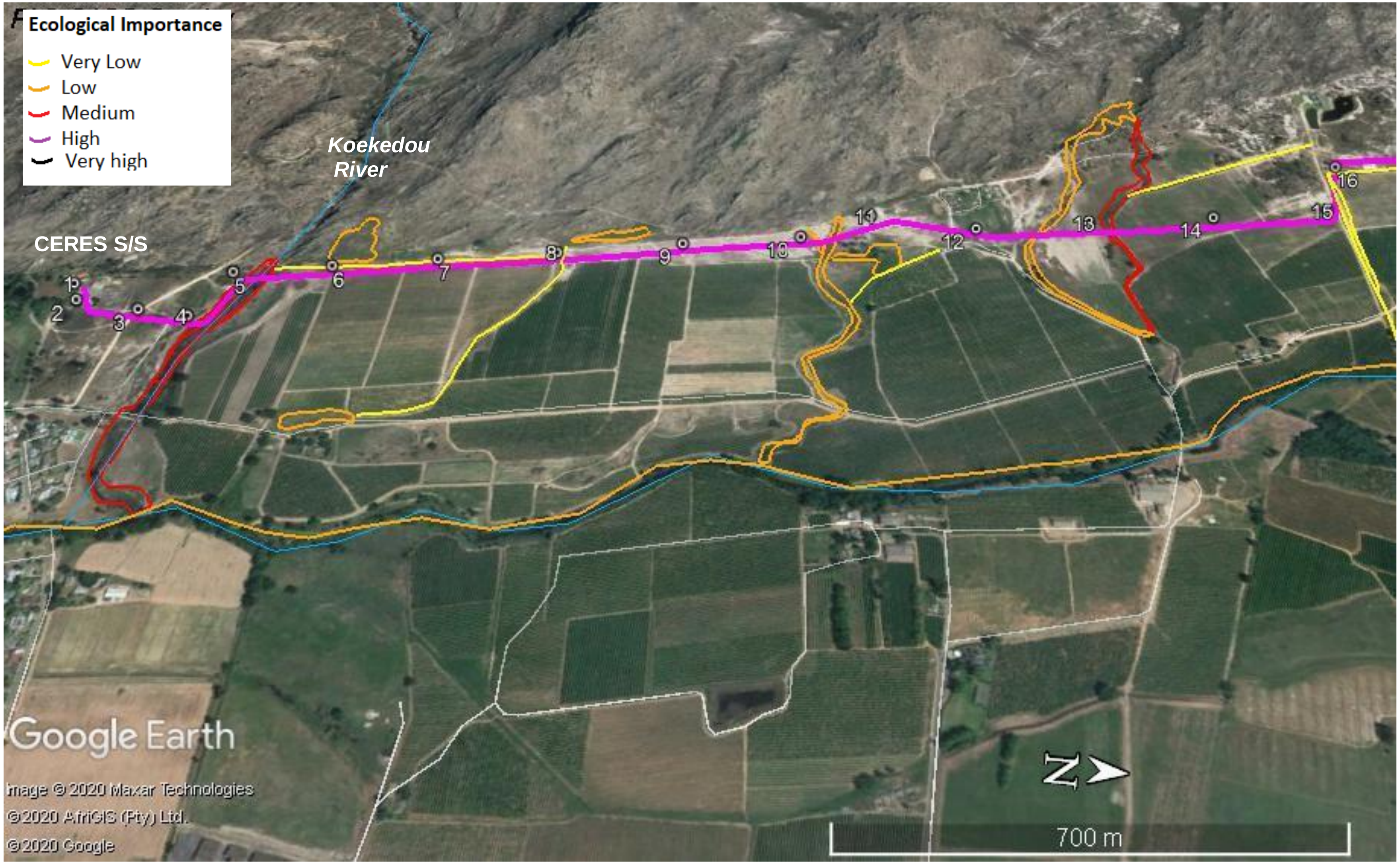

Figure 3.5

Mapped extents of wetlands as identified and assessed during ground-truthing of the study area: Support structure positions 1-16. Transmission line alignment shown in bright pink.

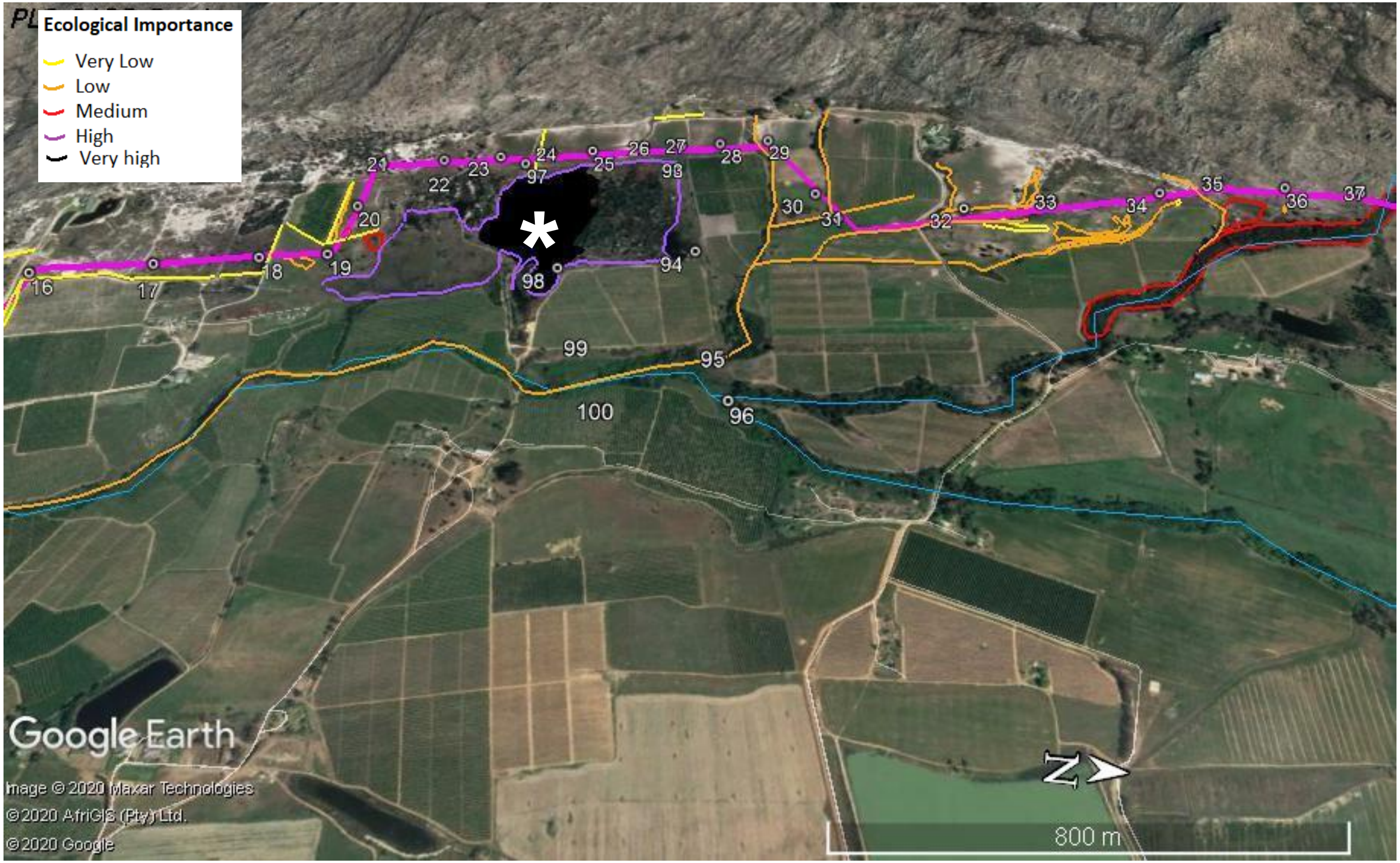

Figure 3.6

Mapped extents of wetlands as identified and assessed during ground-truthing of the study area: Support structure positions 16-37.
Transmission line alignment shown in bright pink. Asterisk highlights Very High Importance watercourse

Figure 3.7
Mapped extents of wetlands as identified and assessed during ground-truthing of the study area: Support structure positions 35-51.
Transmission line alignment shown in bright pink.

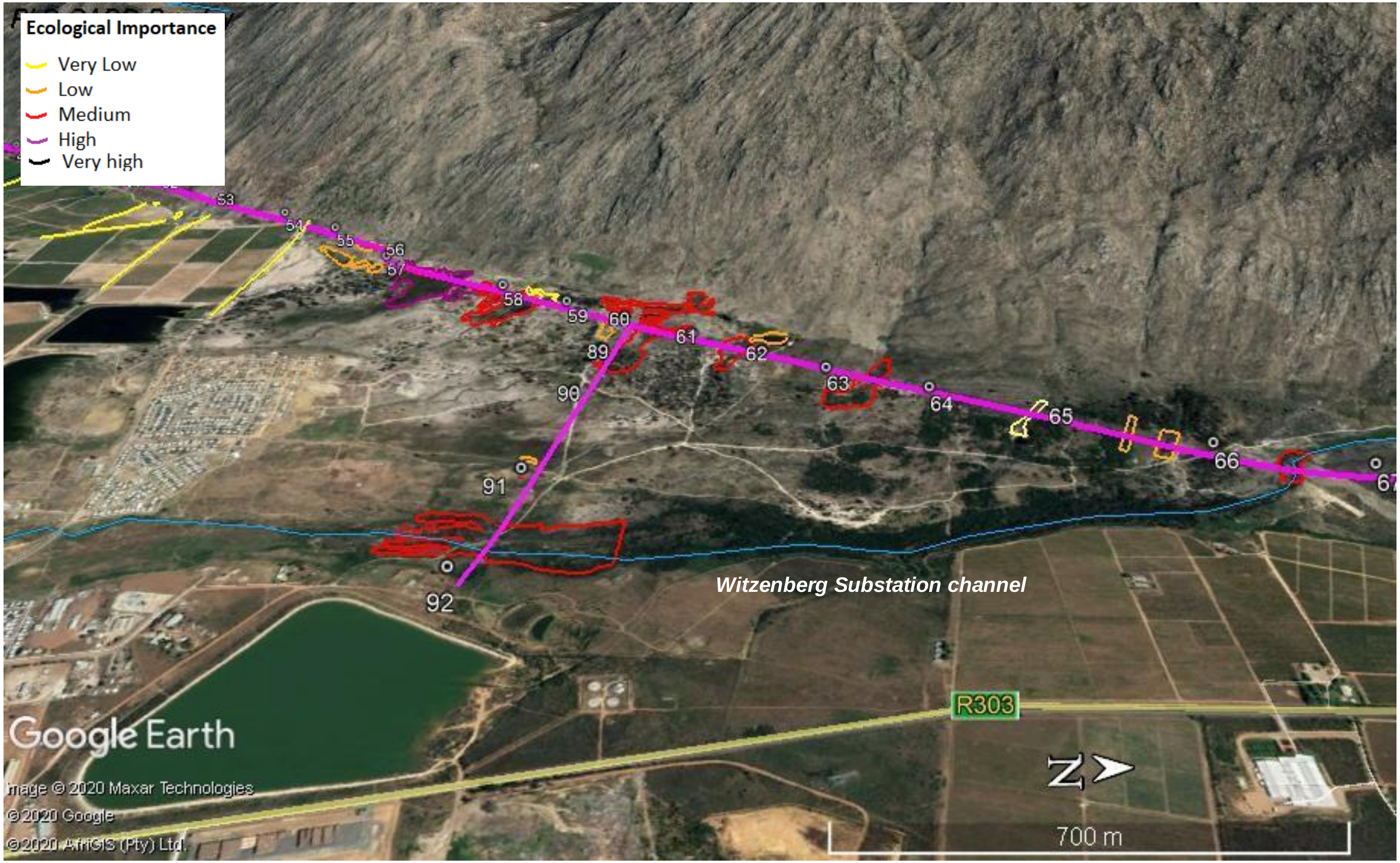

Figure 3.8
Mapped extents of wetlands as identified and assessed during ground-truthing of the study area: Support positions 50-66 and 89-91.
Transmission line alignment shown in bright pink.

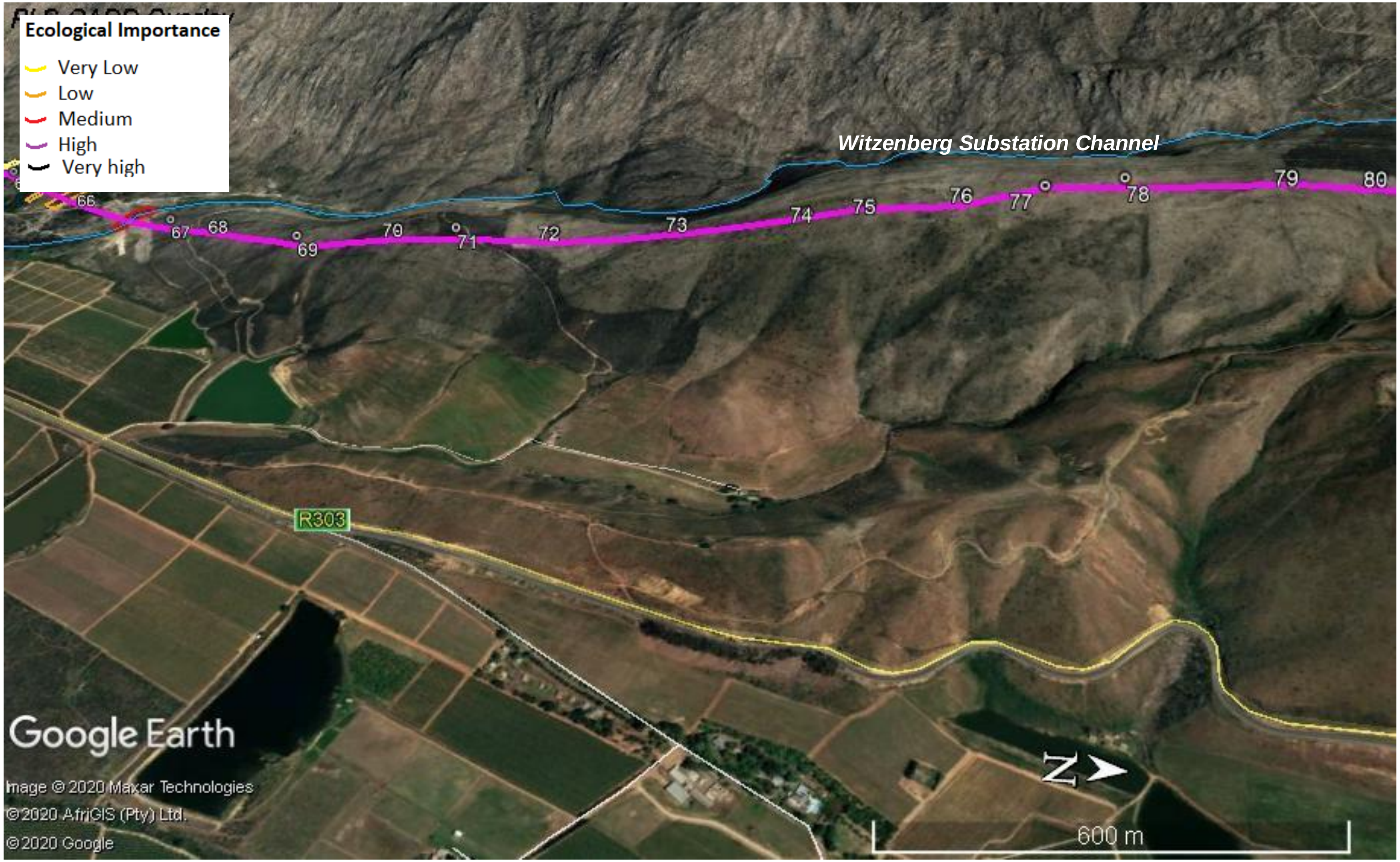

Figure 3.9
Mapped extents of wetlands as identified and assessed during ground-truthing of the study area: Support structure positions 65-80. Transmission line alignment shown in bright pink.

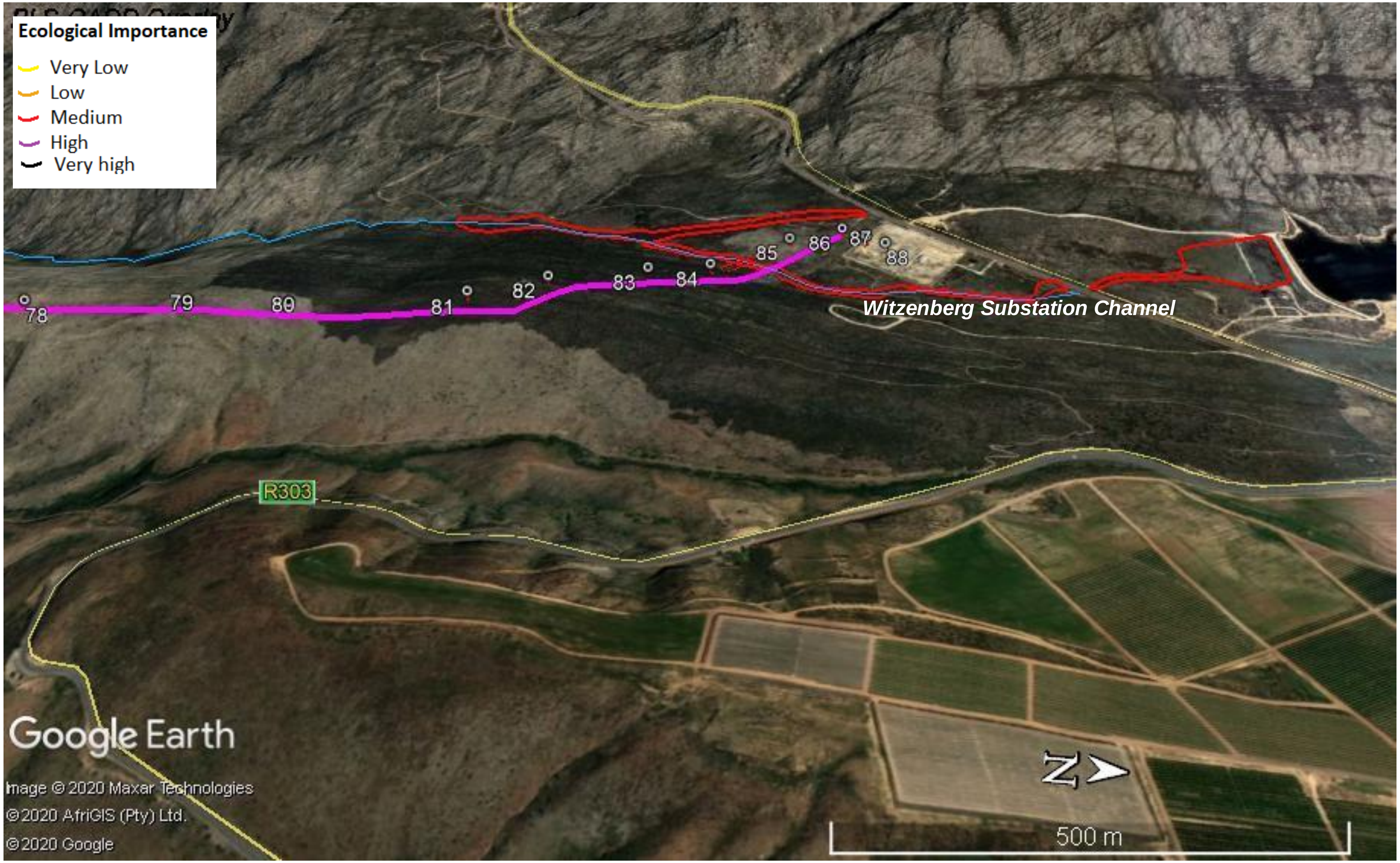

Figure 3.10

Mapped extents of wetlands as identified and assessed during ground-truthing of the study area: Support structure positions 78-88.
Transmission line alignment shown in bright pink.

4 IMPACTS OF THE PROPOSED DEVELOPMENT ON AQUATIC ECOSYSTEMS

This section provides an assessment of the likely impacts to aquatic ecosystems as a result of implementation of the proposed works, as outlined in Section 2.

Note that no aquatic ecosystems occur in the vicinity of, or are likely to be directly impacted by, the proposed Prince Alfred Hamlet substation. Indirect impacts associated with its location apply to the feeder line to it (support structures 91 and 92). Since these are assessed as part of the direct impacts of the transmission line, the substation is not considered further in this report.

4.1 Impacts associated with layout and design

4.1.1 Transmission line and support structure impacts

Impacts to aquatic ecosystems that could be associated with the layout (i.e. alignment) of the proposed transmission lines have already largely been addressed in the layout shown in **Figures 3.5 to 3.10**, which took cognisance of concerns raised from an aquatic ecosystem perspective during the baseline phase of this project. As a result, none of the proposed support structures would be located on any of the mapped watercourses.

The poles that would be located closest to any identified watercourses comprise support structure 8 (located immediately south of a Very Low Importance artificial drainage channel), and support structure 13 (within 30m of a watercourse of Moderate importance). Importantly, no new support structures would be located in the wetlands of Very High and High Importance, with the transmission lines themselves routed so as to avoid additional crossings through the wetlands between support structures 21 and 27. Numerous Moderate and High Importance wetlands occur between support structures 55 and 64 – again, the poles themselves would lie outside of these wetlands, although the lines would be routed across them.

Construction of support structure 8 on the edge of the artificial channel potentially increases the likelihood of localised destabilisation of the channel margins / banks in the vicinity of the structure. Given that the channel is artificial and of Very Low importance, this impact is considered of very low significance, but could be readily avoided by a slight adjustment in positioning of the support structure.

4.1.2 Turning circle alternatives

Of the two proposed turning circle alternatives at the Witzenberg substation (**Figure 2.2**), Alternative 1 would be aligned closer to the westerly valley bottom wetland (Moderate Importance) than Alternative 2. Selection of Alternative 1 could result in disturbance of the watercourse, including possible steepening of the channel slopes, damage to watercourse plants and potential ongoing compaction of the channel edges as a result of the periodic passage of trucks over this area. These impacts would be of up to Medium negative significance, but could be readily mitigated (avoided) by selection of Alternative 2.

Table 4.1 provides a summary assessment of the identified Layout-associated impact of watercourse disturbance, including mitigation specifications.

Table 4.1
Impacts to watercourses as a result of project layout:
Disturbance to watercourses as a result of proximity to support structures and /or turning circle roads
Impact assessment methodology as outlined in Appendix D.

<table>
<tr><th>Nature of impact</th><th>Extent of impact</th><th>Intensity</th><th>Duration of impact</th><th>Consequence</th><th>Probability of occurrence</th><th>Signif.</th><th>Confid.</th></tr>
<tr><td colspan="8">Impact 1: Disturbance to watercourses as a result of proximity to support structure 8</td></tr>
<tr><td><u>Without Mitigation</u></td><td>1
Local</td><td>1
Low</td><td>3
Long term (irreversible once constructed)</td><td>5
Low</td><td>Possible</td><td>Very Low (Neg.)</td><td>Medium</td></tr>
<tr><td colspan="8"><u>Essential mitigation measures:</u>
None required

<u>Best practice mitigation measures:</u>
Ideally, support structure 8 should be set back at least 10 m from the edge of the trench</td></tr>
<tr><td><u>With Mitigation</u></td><td colspan="7">Implementation of Best Practice measure would avoid impact</td></tr>
<tr><td colspan="8">Impact 2: Disturbance to watercourse as a result of the Alternative 1 turning circle</td></tr>
<tr><td><u>Without Mitigation</u></td><td>1
Local</td><td>2
Medium</td><td>3
Long term Irreversible</td><td>6
Medium</td><td>Probable</td><td>Medium (Neg.)</td><td>Medium</td></tr>
<tr><td colspan="8"><u>Essential mitigation measures:</u>

The Alternative 2 turning circle should be implemented</td></tr>
<tr><td><u>With Mitigation</u></td><td colspan="7">Implementation of the recommended mitigation measure would avoid this impact</td></tr>
</table>

4.2 Construction Phase Impacts

Activities associated with the Construction Phase would be most likely to impact on watercourses along and in the vicinity of the proposed transmission line corridor. The following generic impacts are considered most likely to occur. Note that although the probability of impact would vary, depending on watercourse proximity, for the purposes of impact ratings a conservative approach has been applied to pre-mitigation assessment, and it is assumed that the condition of all of the mapped watercourses along the proposed transmission line route could be degraded to some degree by the following:

- Physical disturbance in the vicinity of each support structure as a result of clearing, construction and laydown areas - although vegetation is likely to regrow into disturbed areas over time, existing structures show a tendency for weedy species to proliferate in these areas. Although none of the proposed support structures would be located within any watercourses, and with the exception of support structure 8 would all be located at least 20 m away from the structures, laydown areas for each pole could potentially extend the footprint of disturbance further, into watercourses;
- Clearing of vegetation to allow stringing of transmission lines – this would be assumed to include cutting of particularly tall vegetation along the transmission route – e.g. the riparian corridor at the Modder River as well as numerous pines, wattles and other tall trees that occur in places along the proposed alignment. In addition, shrubs and other vegetation along the transmission line corridor could also potentially be cut, particularly if mechanical stringing methods are used. While removal of alien vegetation such as pines and eucalypts would be ecologically beneficial if carried out carefully, unmanaged felling of vegetation could potentially result in additional

disturbance to aquatic ecosystems, including diversions of flow around accumulated debris and preferential flows along cleared areas; increased likelihood of log-jams and erosion in streams (e.g. the Modder River); compaction and trampling along the transmission line route, between support structures;

- Accidental spillage of cement and other construction material (e.g. sand as well as oil and other pollutants associated with vehicle access) is possible - if not controlled, such impacts could result in localized but permanent scarring of affected areas, and where these included wetlands or other watercourses, permanent degradation would occur, with indigenous wetland vegetation unlikely to re-establish in affected areas;
- The prolonged presence and passage of numerous personnel during construction – these would increase the likelihood of watercourse degradation as a result of litter and trampling;
- Infilling of sections of watercourses with rock as a result of blasting to create founding platforms – at the time of this assessment, no blasting areas had been identified, but it is assumed that in some of the rockier areas (e.g. with proximity to the Witzenberg substation and in places along the base of the Witzenberg mountains) this could affect localised seeps and their flows;
- Contamination of watercourse soils in laydown areas / areas where cement is mixed and/or where there is a likelihood of fuels or other hydrocarbon sources being leaked or spilled – such impacts would be likely to be permanent but localized.

The above impacts would be most likely to occur and/ or could occur with a greater magnitude and/or duration if they were undertaken during wet conditions, when physical disturbance of the ground surface is more likely and transport of contaminants into downstream systems would probably be faster.

Aquatic ecosystems mapped to the east (i.e. downstream of) the transmission line would be more likely to be disturbed by workers, transport and construction vehicles, worker camps and runoff than those to the west (usually upslope) – this is because, with the occasional exception of the section along the ridge in the vicinity of the Witzenberg substation, access would typically be from the low-lying areas to the east.

Degradation of aquatic ecosystems would be the net result of receipt of the above, and could include:

- Possible change (lowering) of PES Category;
- Increased vulnerability to invasion by weedy and/or invasive alien plants;
- Loss of indigenous plant diversity;
- Reduced habitat quality for indigenous fish - this would apply primarily to the Koekedou River;
- Localised erosion and a (probably limited) degree of downstream sedimentation as a result of localised upstream impacts.

Aquatic ecosystems along the proposed transmission line corridor (a 100 m width zone) vary considerably in terms of ecological importance, ranging from Very Low (mainly artificial drainage lines) to Very High, as described and mapped in Section 3. Although Sensitivity does not necessarily always correlate with Ecological Importance, the two have been linked in the current assessment. This is because the kinds of impacts that would be associated with the proposed construction phase would be likely to impact physically on aquatic ecosystems – and the most important of these ecosystems would be most likely to undergo change in species composition, structure and function as a result of physical impact. The consequences of such impacts would be greatest in the more important systems.

Since the construction of many sections of the transmission lines and associated support structures could potentially impact on different watercourses with a variety of importance ratings, the approach taken in this assessment has been to evaluate the above impacts as if they applied to the most sensitive watercourses (i.e. those of Very High Importance). This means that impact significance is over-rated for much of the proposed project. Essential mitigation measures do however distinguish between watercourses of differing importance. This means that the elevated significance ratings <u>without</u> mitigation can usually be addressed with relative ease for the systems that are of lowest importance, while more stringent measures are required to achieve the same level of impact mitigation for systems that are of greater importance. This is illustrated in **Table 4.2**, which provides a structured assessment of the likely significance of the above impacts for aquatic ecosystems.

<u>It should be noted that where line sections and support structures include watercourses of different rated importance, the mitigation measures outlined for the watercourses with the highest importance rating must be applied.</u>

Table 4.2
Construction Phase impacts to watercourses: watercourse degradation
Impact assessment methodology as outlined in Appendix D.

Nature of impact	*Extent of impact*	*Intensity*	*Duration of impact*	*Consequence*	*Probability of occurrence*	*Signif.*	*Confid.*
Impact 3: Degradation of watercourses as a result of Construction Phase impacts							
<u>Without Mitigation</u>	2 [2]Regional	2 Medium	3 Long term (partially irreversible)	7 High	Probable	High (Neg.)	Medium

<u>Essential mitigation measures:</u>

A. Generic measures

i. A detailed Construction Phase Environmental Management Programme (CEMPr) must be compiled that outlines control measures to prevent impacts associated with spillage or leakage of contaminants from vehicles and machinery and contamination of watercourses with cement. Such measures, the implementation of which must be overseen by a competent Environmental Control Officer (ECO) (or similar functional designation) must include:

   a. Construction disturbance areas to be minimized and tightly controlled – laydown areas including areas for the placement of cable drums must be identified outside of any watercourses (and ideally no closer than 20 m from watercourses) and their extent defined before use, with temporary fencing that will prevent the spread of equipment and construction material into other areas – the use of plastic danger tape is not recommended for this purpose, as it is likely to tear / blow away and add to pollution of natural areas and a more effective alternative demarcation method is recommended;

   b. Routes for workers between drop-off areas / access roads and working areas must also be clearly defined and controlled to limit the spread of disturbance;

   c. Litter collection and removal from each site at which construction is occurring must be allowed for on a daily basis;

[2] Note that this rating of extent takes cognisance of the fact that the proposed project extends across multiple watercourses, in a linear fashin, and cannot therefore be assessed as a localised impact, without significant mitigation

d. Cement mixing / batching may only take place in areas with temporary removable bunding, at least 20 m from any watercourse, and the processes must be managed to minimize spillage into natural areas;

e. No refueling areas may be located within 50 m of any watercourse (unless an existing designated refueling area, with adequate bunding is used);

f. The location of any site camps, laydown areas or other works areas associated with the proposed project in which disturbance of natural vegetation or soils is possible, and which lie outside of the assessed 100 m project corridor, must be approved by a botanist and aquatic ecologist. Additional mitigation measures may be required to address concerns around the sensitivity of such areas;

g. Adequate portable toilets to be provided along the route and maintained so that there is no reason for the use of open space areas for such purposes;

h. Where stringing activities require the clearing of alien vegetation, such vegetation must be cut and removed using approved methods, suitable for use near watercourses – cut material must be cleared away, to at least 50 m from any watercourse and outside of the 1:100 year floodline of the Koekedou River. Clearing must be by hand (mechanical clearing of a wide swathe must not take place as this will increase disturbance to watercourses) and must include, where relevant, the use of appropriate herbicides to prevent re-sprouting;

i. Clearing of indigenous vegetation for stringing activities across watercourses (rivers, riparian areas, channels, wetlands, sluits) may only entail cutting of surface material taller than 1.5 m (thus brush-cutting the whole transmission line route is not acceptable) and:

    i. Areas for indigenous vegetation clearing must be identified prior to this activity taking place and ground-truthed by the botanical and aquatic ecology specialists, to identify aspects of concern;

    ii. Cut vegetation should be removed and disposed of to the specifications of the above specialists;

j. Post-construction clear-up activities must ensure the removal of all waste and excess construction material;

k. Post-construction rehabilitation of any areas damaged / disturbed as a result of any construction-associated activity – this would include areas in which compaction and/or erosion has occurred, as well as areas subjected to cement spillage and other impacts, and would need to be to an aquatic ecologist's specifications. Rehabilitation measures might include requirements for re-shaping, replanting and establishment phase maintenance of rehabilitated areas, including weeding and irrigation;

B. Additional measures for sections including watercourses of Very High Importance

These measures apply to the mapped wetland asterisked in **Figure 3.6**, just east of the line between support structures 23 and 25 respectively.

i. This entire area plus a buffer area of minimum width 25 m must be regarded as a no-go area for all personnel, vehicles and activities associated with the proposed project – note that the wetland is in fact edged to the north and south by a High Importance wetland, and essential mitigation measures apply to this area as well;

ii. All workers must be acquainted with the importance of the wetland and its extent;

iii. The CEMPr must reflect the importance of this area with significant penalties for breach of these measures;

iv. After completion of construction, this section must be assessed by the botanical and wetland specialists and areas requiring rehabilitation or clearing of waste identified and addressed, with potential rehabilitation measures including manual measures to address compaction or erosion through reshaping and /or scarification;

C. Additional measures for sections including watercourses of High Importance

These measures apply to the two hillslope seep wetlands located between support structures 56 and 58 and the extensive wetland between support structures 19 and 27, just west of the proposed new transmission line (see **Figures 3.6 and 3.8**).

i. The western edge of the wetlands, with a 10 m buffer, must be fenced off during construction, and the entire wetlands managed strictly as "no go" areas for all personnel, vehicles and activities associated with the proposed project;

ii. All workers must be acquainted with the importance of these wetlands and their extent;

iii. The CEMPr must reflect the importance of these wetlands, with significant penalties for breach of these measures;

iv. Transport and storage of construction materials, stringing and installation activities between support poles 56 and 58 and 19-27 must take place outside of the wet season, to reduce impacts such as churning of soil surfaces by vehicles, runoff of sediments and contaminated water and generally increased disturbance – it should be assumed for planning purposes that the "wet season" includes the months May to September inclusive, but flexibility depending on actual conditions at the time of construction should be allowed, to accommodate wetter or drier periods – an aquatic ecologist should sign off any deviation from the above periods;

v. Stringing of transmission lines between support poles 56 and 58 and 19-27 must be undertaken manually and so as to minimise disturbance (trampling, compaction, damage to vegetation) – no new tracks or access paths along the transmission lines in these areas may be created, and the footprint of any existing tracks may not be widened;

vi. Clearing of pines / other tall vegetation must be undertaken with care, using manual labour and chain saws and felled trees should be removed from any sensitive areas including watercourses;

vii. Laydown areas along these areas must be located outside of any watercourse – this may present a challenge particularly between support structures 25 and 27 and 56 and 58, noting that the watercourses extend in places well outside of the 100 m assessment area that formed the focus of this study. Proposed laydown areas and the planned routing from laydown areas to each relevant proposed structure must be mapped and approved / adjusted by the aquatic ecologist and botanical specialist prior to commencement of their use;

viii. After completion of construction, these sections must be assessed by the botanical and wetland specialists and areas requiring rehabilitation or clearing of waste identified and addressed, with potential rehabilitation measures including manual measures to address compaction or erosion through reshaping and /or scarification;

ix. Post-construction rehabilitation of any areas damaged / disturbed as a result of any construction-associated activity must be allowed for – this would include areas in which compaction and/or erosion has occurred, as well as areas subjected to cement spillage and other impacts, and would need to be to an aquatic ecologist's specifications;

D. Additional measures for sections including watercourses of Medium Importance

These wetlands have been identified between (and including) support structures 4-6 (Koekedou River); 13-14; 37 -38 (Modder River); 35-36; 58 – 64; and 91-92; 66-67; 84-85 (Witzenberg substation channel crossings). The measures below apply to both the construction of support structures and the stringing of transmission lines, within these sections:

i. These watercourses must be clearly defined on site, ideally using temporary fencing, and treated strictly as no-go areas for all personnel, vehicles and activities associated with the proposed project, other than the fact that stringing will be required across identified watercourses (**Figures 3.5-3.10**);

ii. Access across any of the above watercourses may only be by way of existing road crossings – no new crossings may be created, and vehicles may not drive through / over / into any of the watercourses identified above, or through / across / into any watercourses or other sensitive areas outside of the assessment corridor, without written agreement by the botanical and aquatic specialists;

iii. Stringing of transmission lines must be undertaken manually, and so as to minimise disturbance (trampling, compaction, damage to vegetation) along the transmission line corridor – no new tracks or access paths along the transmission lines in these areas may be created, and the footprint of any existing tracks may not be widened;

iv. Transport and storage of construction materials, stringing and installation activities in the above sections must take place outside of the wet season, to reduce impacts such as churning of soil surfaces by vehicles, runoff of sediments and contaminated water and generally increased disturbance – it should be assumed for planning purposes that the "wet season" includes the months May to September inclusive, but flexibility depending on actual conditions at the time of construction should be allowed, to accommodate wetter or drier periods – an aquatic ecologist should sign off any deviation from the above periods;

v. Clearing of pines / other tall vegetation must be undertaken with care, using manual labour and chain saws and felled pines should be removed from any sensitive areas including watercourses;

vi. Laydown areas along these areas must be located outside of any watercourse – Proposed laydown areas and the planned routing from laydown areas to each relevant proposed structure must be mapped and approved / adjusted by the aquatic ecologist and botanical specialist prior to commencement of their use;

vii. After completion of construction, these sections must be assessed by the botanical and wetland specialists and areas requiring rehabilitation or clearing of waste identified and addressed, with potential rehabilitation measures including manual measures to address compaction or erosion through reshaping and /or scarification;

E. Additional measures for sections including watercourses of Low Importance

These measures apply to the watercourses (including dams, channelised seeps and other watercourses) of Low Importance, as illustrated in **Figures 3.5 -3.10** and described in Section 3.7.5.

i. All watercourses to be treated as no-go areas for all personnel, vehicles and activities associated with the proposed project, other than the fact that stringing will be required across identified watercourses;

ii. Stringing activities along or across mapped wetlands must be done manually – it may however be possible for mechanical stringing methods to be used, where it can be shown that the stringing vehicle can move around potentially affected watercourses;

iii. Efforts must be made to minimise damage through compaction, trampling and other activities along the transmission line route and at support structures;

F. Additional measures for sections including watercourses of Very Low Importance

These measures apply to the watercourses (including dams, channelised seeps and other watercourses) of Low Importance, as illustrated in **Figures 3.5 -3.10** and described in Section 3.7.5:

i. The generic mitigation measures outlined in Section A must be applied, and all activities should be planned and implemented so as to avoid or minimise as far as feasible impacts to aquatic ecosystems.

With Mitigation	2 Regional	1 Low	2 Medium term	5 Low	Probable	Low (Neg.)	Medium

4.3 Operational Phase Impacts

The Operational Phase of construction of the proposed Ceres to Witzenberg transmission line and associated support structures and Prince Alfred Hamlet substation would be likely to include the following kinds of activities, namely:

- Periodic repair and/or replacement of support structures, parts of support structures and/or transmission lines;
- Periodic clearing of vegetation along the transmission line corridor, when it exceeds an acceptable height;
- Periodic repairs to existing access roads.

Unlike the Construction Phase, the above activities would be generally unlikely to affect the whole alignment, with individual structures and short lengths of line (and thus fewer watercourses) being more likely to be affected. Thus maintenance impacts would tend to be localised (and ratings of extent of impact have thus been set as “Local” and not “ Regional”).

Operational phase impacts to aquatic ecosystems would again be likely to be degradation of watercourses, with the highest significance attached to degradation of Very High, High and Medium Importance watercourses (see Section 3.7), but with impacts to any watercourses being undesirable and preferably avoided.

Table 4.3 provides a structured assessment of the likely significance of the above impacts for aquatic ecosystems, and includes both essential mitigation measures (mainly drawn from Construction Phase mitigation measures) and best practice recommendations, differentiating between watercourses of different levels of ecological importance.

The table indicates that while worst-case unmitigated impacts that affected watercourses of Very High, High and Medium Importance would be of Medium negative significance, these impacts could be mitigated to levels of Very Low significance through rigorous implementation of the required measures.

Table 4.3
Operational Phase impacts to watercourses: watercourse degradation
Impact assessment methodology as outlined in Appendix D.

<table>
<tr><th>Nature of impact</th><th>Extent of impact</th><th>Intensity</th><th>Duration of impact</th><th>Consequence</th><th>Probability of occurrence</th><th>Signif.</th><th>Confid.</th></tr>
<tr><td colspan="8">Impact 4: Degradation of watercourses as a result of Operational Phase impacts</td></tr>
<tr><td><u>Without Mitigation</u></td><td>1
Local</td><td>2
Medium</td><td>3
Long term (partially irreversible)</td><td>6
Medium</td><td>Probable</td><td>Medium (Neg.)</td><td>Medium</td></tr>
<tr><td colspan="8"><u>Essential mitigation measures:</u>
i. The construction-phase mitigation measures outlined in Section 4.2 must be implemented variously, depending on the affected section of line and the proposed activity – cognisance must be taken of which sections of the line include watercourses of Very High, High, Medium, Low and Very Low Importance, and the measures applicable to each section ;
ii. Operational staff likely to be involved in on-site emergency or routine maintenance work must be familiar with the disturbance-mitigation measures for each section of the route, based on the sensitivity and importance of the watercourses. At least one person on any maintenance visit to this section must have been through such a training / information exercise;
iii. An Operational Phase Environmental Management Programme (OEMPr) must be compiled, that includes all of the specified mitigation measures, and a map showing which are applicable to what areas – Figures 3.5 to 3.10 provide the basis for this;
iv. Approved laydown areas, access roads and locations for cable drums during re-stringing (as per Construction Mitigation measures) must be shown in the map required in (ii) above;
v. An Environmental Control Officer or similar functional designation should inspect the route on an annual basis to ensure conformance to the OEMPr mitigation measures, and to ensure that approved laydown areas and access routes remain available and appropriate;
vi. Learning from the application of mitigation measures in the Construction Phase must be carried on into the Operational phase – where mitigation measures failed, were improved upon or were unnecessary, amendments to the CEMPr must be made, at the time of construction, and this should be taken forward as the implementation manual for operational phase maintenance measures (i.e. the OEMPr);
vii. Any watercourses that are damaged (e.g. by trampling, compaction) must be reinstated immediately after Maintenance activities have ceased, if considered necessary by an aquatic ecologist – the requirement for rehabilitation should be guided by mandatory before- and after- photographs of the affected structure and its laydown and working areas, which should be inspected by an aquatic ecologist and used as the basis on which to recommend active interventions;
viii. The transmission line within a 50m wide corridor must be maintained free of invasive alien vegetation (as listed in the National Environmental Management: Biodiversity Act (Act 10 of 2004) (NEMBA) (see Box 4.1).
<u>Best practice measures:</u>
Routine maintenance measures should ideally be scheduled for outside of the wet season (i.e. not between May and end of September) when issues such as churning up of wet soils are less likely to occur.</td></tr>
<tr><td><u>With Mitigation</u></td><td>1
Local</td><td>1
Low</td><td>1
Short term</td><td>3
Very Low</td><td>Probable</td><td>Very Low (Neg.)</td><td>Medium</td></tr>
</table>

Box 4.1

Legal classification and required treatment of invasive vegetation (after Day et al 2016)

The National Environmental Management: Biodiversity Act (Act 10 of 2004) (NEMBA) categorises invasive species into four categories of so-called "Listed Invasive Species", as published in August 2014 (GN 599 of 2014, Gazette No 37886). These categories comprise:

- Category 1a – invasive species requiring compulsory control, and all such plants are to be removed and destroyed;
- Category 1b - These invasive plants require control as part of an invasive species management programme, and no increase in their extent or density may take place;
- Category 2 – Such species may only be kept with a permit, and in a specified area of land; **except when they occur in aquatic and/or riparian areas, where they are considered as Category 1b species and need to be controlled;**
- Category 3 – these invasive species are exempt from the requirements for control. **However, where they occur in aquatic and/or riparian areas, they are considered as Category 1b species and need to be controlled.**

4.4 Cumulative Impacts

The proposed installation of a new 132 kV transmission line between the Ceres and Witzenberg substations would be in addition to the existing 66 kV line, which follows roughly the same alignment, with a section that cuts across the wetland of Very High Importance highlighted in this study. When considered cumulatively, the proposed development would add to existing impacts through the affected area, considerably widening the linear area of disturbance already caused by the existing line. Moreover, as net biodiversity is affected in the broader area through impacts such as fragmentation and linear disturbance, so aquatic ecosystem biodiversity would also be expected to decrease. Agricultural and other activities have already extended to the foot of the mountain in many cases, making remnant watercourses in good condition increasingly rare.

This said, the proposed alignment of the new transmission lines and the arrangement of support poles in particular have already taken cognisance of existing aquatic ecosystem sensitivity mapping. Thus assuming full implementation of the required mitigation measures, the cumulative impact from an aquatic ecosystems perspective of the additional lines would be low, as the new lines would avoid the most important aquatic ecosystems, and would cross over but not require construction within other aquatic ecosystems.

5 APPLICABILITY OF THE NATIONAL WATER ACT TO THE PROPOSEDDEVELOPMENT

5.1 Background and Identification of water uses

The National Water Act (NWA) (Act 36 of 1998) defines a number of water uses, which require licensing and/or registration through the regional or national Department of Human Settlements, Water and Sanitation (DHSWS). In the present case, the following water uses could apply, as defined in Section 21 of the NWA:

c. impeding or diverting the flow of water in a watercourse;

i. altering the bed, banks, course or characteristics of a watercourse;

Decisions as to whether Section 21c and/or i water uses would require authorization by DHSWS in terms of a formal water use license, or through the simpler registration of use, are determined largely by the Risk to the water resource as a result of the proposed use, where Risk is assessed using a Risk Assessment Matrix, as provided by the DHSWS (amended 2016 version).

The Risk Assessment Matrix assigns three categories of risk to activities likely to impact on water resources, namely Low, Moderate and High. Section 21c and i water uses that are assessed as associated with a Low Risk are considered Generally Authorised in terms of General Notice (GN) 509 of 2016. Those where Risk has been assessed as Moderate or High, even after implementation of control / mitigation measures, would however be required to seek authorization through submission of an application for a water use license.

A Risk Assessment Matrix was completed in the current project, to determine the level of risk posed by the proposed transmission lines and associated support structures.

5.2 Limitations of the Risk Assessment Matrix

The RAM methodology was originally developed as a tool for routine maintenance work affecting watercourses. Its use since the promulgation of GN509 for a wider range of Section 21c and i water uses associated with construction and long term operational phase impacts, in addition to maintenance, can be problematic. This is because the RAM calculator includes ratings for aspects such as Frequency of Impact, Frequency of Activity and Duration, which do not easily translate into activities such as Construction Phase activities, which may be repeated daily, over a short construction period, but with permanent implications (for example, the creation of a new structure).

Such issues have been noted by officials from the DHSWS, and it is recognized that revision of the RAM protocols is needed. In the interim, DHSWS has noted that specialists should use their discretion in the assignment of reasonable ratings for assessed impacts[3].

In the present case, areas of difficulty were experienced around the defined ratings for Frequency of Impact, Frequency of Activity and Duration. The approach taken was a reliance on the likelihood of impact included in the defined rating scales (e.g. definitely, possibly, seldom), rather than the frequencies included in the same ratings (e.g. daily, often, infrequent).

Appendix F presents the Risk Matrix rating rules, as used in the prescribed RAM.

3 See minutes of meeting of 15 November 2018: Collaborative meeting to discuss issues with the application and completion of the DWS Risk Matrix for Section 21 (c) and (i) water uses (DHSWS, Bellville)

5.3 Outcomes of the Risk Assessment

Table 5.1 presents the results of the Risk Assessment Matrix as applied to the identified water uses.

It is noted that for the most part, the project would avoid direct impacts to watercourses, and any incursions through or into identified watercourses are likely to be temporary and of low impact, assuming that the required mitigation measures outlined in Section 4 are all implemented.

None of the proposed support structures would be located in any watercourses, and none of the proposed new access roads would cross through or near any watercourse, assuming Alternative 2 of the turning circle is utilised, as per essential mitigation for Impact 2 (see Section 4.1.2 and **Table 4.1**).

Stringing of the transmission lines, and associated possible need for passage of personnel through watercourses, and for controlled clearing of alien and high-growing vegetation to allow stringing in some areas, might however result in Section i and possibly section c water uses.

Like the approach followed in Section 4 towards Impact Assessment ratings, the Risk Assessment Matrix took a generic approach to the rating of Risks to aquatic ecosystems, rather than the separate rating of each individual watercourse. This approach can be justified on the grounds that Risk is assessed after taking cognisance of the efficacy of recommended control measures (i.e. Mitigation measures). The control measures considered in the Risk Assessment are identical to the essential Mitigation measures outlined in the Impact Assessment, and vary depending on the Importance category of each watercourse. In this assessment, Importance and Sensitivity have been argued as correlating (see comments in Section 4.2), and the most important watercourses are assumed to have the highest level of sensitivity to potential impacts. Mitigation / Control measures vary, depending on the sensitivity / importance of each watercourse, with more stringent measures applied to the more important systems. Their implementation would be anticipated to avoid impacts altogether, or to reduce the likelihood, magnitude, extent or duration of impacts to these systems to Low to Very Low significance levels, for wetlands of all importance categories.

The outcomes of the Risk Assessment Matrix, shown in **Tables 5.1 and 5.2** for Construction and Operational Phases respectively, were Low Risks for all categories of wetland. This means that, assuming that the required mitigation or Control measures are fully implemented, the alignment, construction and operational phases of the proposed 132 kV transmission lines and associated support structures, access roads and Prince Alfred Hamlet substation should all be considered Generally Authorised in terms of GN509, and a Water Use License should not be required.

Table 5.1

Aspects and Impact Register/Risk Asssessment for Section 21 c and i activities associated with the proposed 132 kV transmission lines and associated support structures between the Ceres and Witzenberg substations, as well as the access roads and proposed Prince Alfred Hamlet substation. CONSTRUCTION PHASE

Assessment assumes control measures are fully implemented. Risk Matrix completed by Liz Day -SACNASP Reg no. 400270/08

Phases	Activity	Aspect	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	Type of Watercourse
				Severity																
CONSTRUCTION PHASE	Installation of support structures / poles and stringing	• Physical disturbance in the vicinity of each support structure as a result of clearing, construction and laydown areas - although vegetation is likely to regrow into disturbed areas over time, existing structures show a tendency for weedy species to proliferate in these areas. Although none of the proposed support structures would be located within any watercourses, and with the exception of support structure 8 would all be located at least 20m away from the structures, laydown areas for each pole would potentially extend the footprint of disturbance further; • Clearing of vegetation to allow stringing of transmission lines – this would be assumed to include cutting of particularly tall vegetation along the transmission route – e.g. the riparian corridor at the Modder River but including numerous pines, wattles and other tall trees that occur in places along the proposed alignment. In addition, shrubs and other vegetation along the transmission line corridor could also potentially be cut, particularly if mechanical stringing methods are used. While removal of alien vegetation such as pines and eucalypts would be ecologically beneficial if carried out carefully, felling of vegetation could potentially result in additional disturbance to aquatic ecosystems, including diversions of flow around accumulated debris and preferential flows along cleared areas; increased likelihood of log-jams and erosion in streams (e.g. the Modder River); compaction and trampling along the transmission line route, between support structures; • Accidental spillage of cement and other construction material (e.g. sand as well as oil and other pollutants associated with vehicle access) is possible - if not controlled, such impacts could result in localized but permanent scarring of affected areas, and where these included wetlands or other watercourses, permanent degradation would occur, with indigenous wetland vegetation unlikely to re-establish in affected areas; • The prolonged presence and passage of numerous personnel during construction – these would increase the likelihood of watercourse degradation as a result of litter and trampling; • Infilling of sections of watercourses with rock as a result of blasting to create founding platforms – at the time of this assessment, no blasting areas had been identified, but it is assumed that in some of the more rocky areas (e.g. with proximity to the Witzenberg substation and in places long the base of the Witzenberg mountains) this could affect localised seeps and their flows; • Contamination of watercourse soils in laydown areas / areas where cement is mixed and/or where there is a likelihood of fuels or other hydrocarbon sources being leaked or spilled – such impacts would be likely to be permanent but localized.	Degradation of aquatic ecosystems	1	2	2	1	2	2	1	5	2	3	5	2	12	54	LOW	**A. General measures** i. Alternative 2 turning circle to be implemented instead of Alternative 1; ii. A detailed Construction Phase Environmental Management Programme (CEMPr) must be compiled that outlines control measures to prevent impacts associated with spillage or leakage of contaminants from vehicles and machinery and contamination of watercourses with cement. Such measures, the implementation of which must be overseen by a competent Environmental Control Officer (ECO) (or similar functional designation) must include: a. Construction disturbance areas to be minimized and tightly controlled – laydown areas including areas for the placement of cable drums must be identified outside of any watercourses (and ideally no closer than 20 m from watercourses) and their extent defined before use, with temporary fencing that will prevent the spread of equipment and construction material into other areas – the use of plastic danger tape is not recommended for this purpose, as it is likely to tear / blow away and add to pollution of natural areas and a more effective alternative demarcation method is recommended; b. Routes for workers between drop-off areas / access roads and working areas must also be clearly defined and controlled to limit the spread of disturbance; c. Litter collection and removal from each site at which construction is occurring must be allowed for on a daily basis; d. Cement mixing / batching may only take place in areas with temporary removable bunding, at least 20 m from any watercourse, and the processes must be managed to minimize spillage into natural areas; e. No refueling areas may be located within 50 m of any watercourse (unless an existing designated refueling area, with adequate bunding is used); f. The location of any site camps, laydown areas or other works areas associated with the proposed project in which disturbance of natural vegetation or soils is possible, and which lie outside of the assessed 100 m project corridor, must be approved checked by a botanist and aquatic ecologist. Additional mitigation measures may be required to address concerns around the sensitivity of such areas; g. Adequate portable toilets to be provided along the route and maintained so that there is no reason for the use of open space areas for such purposes; h. Where stringing activities require the clearing of alien vegetation, such vegetation must be cut and removed using approved methods, suitable for use near watercourses – cut material must be cleared away, to at least 50 m from any watercourse and outside of the 1:100 year floodline of the Koekedou River. Clearing must be by hand (mechanical clearing of a wide swathe must not take place as this will increase disturbance to watercourses) and must include, where relevant, the use of appropriate herbicides to prevent re-sprouting; i. Clearing of indigenous vegetation for stringing activities across watercourses (rivers, riparian areas, channels, wetlands, sluits) may only entail cutting of surface material taller than 1.5 m (thus brush-cutting the whole transmission line route is not acceptable) and: - Areas for indigenous vegetation clearing must be identified prior to this activity taking place and ground-truthed by the botanical and aquatic ecology specialists, to identify aspects of concern; - Cut vegetation should be removed and disposed of to the specifications of the above specialists; j. Post-construction clear-up activities must ensure the removal of all waste and excess construction material; k.Post-construction rehabilitation of any areas damaged / disturbed as a result of any construction-associated activity – this would include areas in which compaction and/or erosion has occurred, as well as areas subjected to cement spillage and other impacts, and would need to be to an aquatic ecologist's specifications. Rehabilitation measures might include requirements for re-shaping, replanting and establishment phase maintenance of rehabilitated areas, including weeding and irrigation; **B. Additional measures for sections including watercourses of Very High Importance** These measures apply to the mapped wetland asterisked in Figure 3.6, just east of the line between support structures 23 and 25 respectively. i. This entire area plus a buffer area of minimum width 25 m must be regarded as a no-go area for all personnel, vehicles and activities associated with the proposed project – note that the wetland is in fact edged to the north and south by a High Importance wetland, and essential mitigation measures apply to this area as well; ii. All workers must be acquainted with the importance of the wetland and its extent; iii. The CEMPr must reflect the importance of this area with significant penalties for breach of these measures; iv. After completion of construction, this section must be assessed by the botanical and wetland specialists and areas requiring rehabilitation or clearing of waste identified and addressed, with potential rehabilitation measures including manual measures to address compaction or erosion through reshaping and /or scarification; **C. Additional measures for sections including watercourses of High Importance** These measures apply to the two hillslope seep wetlands located between support structures 56 and 58 and the extensive wetland between support structures 19 and 27, just west of the proposed new transmission line (see Figures 3.6 and 3.8). i. The western edge of the wetlands, with a 10 m buffer, must be fenced off during construction, and the entire wetlands managed strictly as "no go" areas for all personnel, vehicles and activities associated with the proposed project; ii. All workers must be acquainted with the importance of these wetlands and their extent; iii. The CEMPr must reflect the importance of these wetlands, with significant penalties for breach of these measures; iv. Transport and storage of construction materials, stringing and installation activities between support poles 56 and 58 and 19-27 must take place outside of the wet season, to reduce impacts such as churning of soil surfaces by vehicles, runoff of sediments and contaminated water and generally increased disturbance – it should be assumed for planning purposes that the "wet season" includes the months May to September inclusive, but flexibility depending on actual conditions at the time of construction should be allowed, to accommodate wetter or drier periods – an aquatic ecologist should sign off any deviation from the above periods; v. Stringing of transmission lines between support poles 56 and 58 and 19-27 must be undertaken manually and so as to minimise disturbance (trampling, compaction, damage to vegetation) – no new tracks or access paths along the transmission lines in these areas may be created, and the footprint of any existing tracks may not be widened; vi. Clearing of pines / other tall vegetation must be undertaken with care, using manual labour and chain saws and felled trees should be removed from any sensitive areas including watercourses; vii. Laydown areas along these areas must be located outside of any watercourse – this may present a challenge particularly between support structures 25 and 27 and 56 and 58, noting that the watercourses extend in places well outside of the 100 m assessment area that formed the focus of this study. Proposed laydown areas and the planned routing from laydown areas to each relevant proposed structure must be mapped and approved / adjusted by the aquatic ecologist and botanical specialist prior to commencement of their use; viii. After completion of construction, these sections must be assessed by the botanical and wetland specialists and areas requiring rehabilitation or clearing of waste identified and addressed, with potential rehabilitation measures including manual measures to address compaction or erosion through reshaping and /or scarification; ix. Post-construction rehabilitation of any areas damaged / disturbed as a result of any construction-associated activity must be allowed for – this would include areas in which compaction and/or erosion has occurred, as well as areas subjected to cement spillage and other impacts, and would need to be to an aquatic ecologist's specifications; **D. Additional measures for sections including watercourses of Medium Importance** These wetlands have been identified between (and including) support structures 4-6 (Koekedou River); 13-14; 37 -38 (Modder River); 35-36; 58 – 64; and 91-92; 66-67; 84-85 (Witzenberg substation channel crossings). The measures below apply to both the construction of support structures and the stringing of transmission lines, within these sections: i. These watercourses must be clearly defined on site, ideally using temporary fencing, and treated strictly as no-go areas for all personnel, vehicles and activities associated with the proposed project, other than the fact that stringing will be required across identified watercourses (Figures 3.5-3.10); ii. Access across any of the above watercourses may only be by way of existing road crossings – no new crossings may be created, and vehicles may not drive through / over / into any of the watercourses identified above, or through / across / into any watercourses or other sensitive areas outside of the assessment corridor, without written agreement by the botanical and aquatic specialists; iii. Stringing of transmission lines must be undertaken manually, and so as to minimise disturbance (trampling, compaction, damage to vegetation) along the transmission line corridor – no new tracks or access paths along the transmission lines in these areas may be created, and the footprint of any existing tracks may not be widened; iv. Transport and storage of construction materials, stringing and installation activities in the above sections must take place outside of the wet season, to reduce impacts such as churning of soil surfaces by vehicles, runoff of sediments and contaminated water and generally increased disturbance – it should be assumed for planning purposes that the "wet season" includes the months May to September inclusive, but flexibility depending on actual conditions at the time of construction should be allowed, to accommodate wetter or drier periods – an aquatic ecologist should sign off any deviation from the above periods; v. Clearing of pines / other tall vegetation must be undertaken with care, using manual labour and chain saws and felled pines should be removed from any sensitive areas including watercourses; vi. Laydown areas along these areas must be located outside of any watercourse – Proposed laydown areas and the planned routing from laydown areas to each relevant proposed structure must be mapped and approved / adjusted by the aquatic ecologist and botanical specialist prior to commencement of their use; vii. After completion of construction, these sections must be assessed by the botanical and wetland specialists and areas requiring rehabilitation or clearing of waste identified and addressed, with potential rehabilitation measures including manual measures to address compaction or erosion through reshaping and /or scarification; **E. Additional measures for sections including watercourses of Low Importance** These measures apply to the watercourses (including dams, channelised seeps and other watercourses) of Low Importance, as illustrated in Figures 3.5 -3.10 . i. All watercourses to be treated as no-go areas for all personnel, vehicles and activities associated with the proposed project, other than the fact that stringing will be required across identified watercourses; ii. Stringing activities along or across mapped wetlands must be done manually – it may however be possible for mechanical stringing methods to be used, where it can be shown that the stringing vehicle can move around potentially affected watercourses; iii. Efforts must be made to minimise damage through compaction, trampling and other activities along the transmission line route and at support structures; **F. Additional measures for sections including watercourses of Very Low Importance** These measures apply to the watercourses (including dams, channelised seeps and other watercourses) of Low Importance, as illustrated in Figures 3.5 -3.10: i. The generic mitigation measures outlined in Section A must be applied, and all activities should be planned and implemented so as to avoid or minimise as far as feasible impacts to aquatic ecosystems.	Seep wetlands, gravel foothill rivers (Koekedou and Modder Rivers); valley bottom wetlands - see Figures 3.5-3.10

Table 5.2

Aspects and Impact Register/Risk Asssessment for Section 21 c and i activities associated with the proposed 132 kV transmission lines and associated support structures between the Ceres and Witzenberg substations, as well as the access roads and proposed Prince Alfred Hamlet substation. OPERATIONAL PHASE

Assessment assumes control measures are fully implemented. Risk Matrix completed by Liz Day -SACNASP Reg no. 400270/08

				Severity																
Phases	Activity	Aspect	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	Type of Watercourse
OPERATIONAL PHASE	Maintenance of support structures / poles and stringing	• Periodic repair and/or replacement of support structures, parts of support structures and/or transmission lines; • Periodic clearing of vegetation along the transmission line corridor, when it exceeds an acceptable height; • Periodic repairs to existing access roads.	Degradation of aquatic ecosystems as a result of support tower and powerline maintenance activities	1	2	2	1	2	1	1	4	1	3	5	2	11	39	LOW	i. The construction-phase mitigation measures outlined above must be implemented variously, depending on the affected section of line and the proposed activity – cognisance must be taken of which sections of the line include watercourses of Very High, High, Medium, Low and Very Low Importance, and the measures applicable to each section ; ii. Operational staff likely to be involved in on-site emergency or routine maintenance work must be familiar with the disturbance-mitigation measures for each section of the route, based on the sensitivity and importance of the watercourses. At least one person on any maintenance visit to this section must have been through such a training / information exercise; iii. An Operational Phase Environmental Management Programme (OEMPr) must be compiled, that includes all of the specified mitigation measures, and a map showing which are applicable to what areas – Figures 3.5 to 3.10 provide the basis for this; iv. Approved laydown areas, access roads and locations for cable drums during re-stringing (as per Construction Mitigation measures) must be shown in the map required in (ii) above; v. An Environmental Control Officer or similar functional designation should inspect the route on an annual basis to ensure conformance to the OEMPr mitigation measures; vi. Learning from the application of mitigation measures in the Construction Phase must be carried on into the Operational phase – where mitigation measures failed, were improved upon or were unnecessary, amendments to the CEMPr must be made, at the time of construction, and this should be taken forward as the implementation manual for operational phase maintenance measures (i.e. the OEMPr); vii. Any watercourses that are damaged (e.g. by trampling, compaction) must be reinstated immediately after Maintenance activities have ceased, if considered necessary by an aquatic ecologist – the requirement for rehabilitation should be guided by mandatory before- and after- photographs of the affected structure and its laydown and working areas, which should be inspected by an aquatic ecologist and used as the basis on which to recommend active interventions; viii. The transmission line within a 50m wide corridor must be maintained free of invasive alien vegetation (as listed in the National Environmental Management: Biodiversity Act (Act 10 of 2004) (NEMBA).	Seep wetlands, gravel foothill rivers (Koekedou and Modder Rivers); valley bottom wetlands - see Figures 3.5-3.10

6 CONCLUSIONS

This study considered the effects from an aquatic ecosystem perspective of the proposed design, alignment, construction and long-term operational management of a new 132kV power transmission line between the (existing) Ceres and Witzenberg substations, including new support structures, access roads and tracks and a new substation at Prince Alfred Hamlet. The new transmission line would be aproximately ~17 km in length, with an additional link to the new substation to the east of ~1 km.

The proposed transmission lines would cross over or in the vicinity of numerous watercourses (mostly seeps, but also the Modder and Koekedou River channels, as well as valley bottom wetlands, on- and off-channel dams and excavations and some artificial drains and channels). These watercourses were all rated in this report in terms of *inter alia* their ecological importance, which in the current project can be used as a surrogate measure of watercourse sensitivity to the impacts likely to be associated with the proposed project. During early iterative planning phases of the project, the proposed alignment of the transmission lines was adjusted, in order to avoid water courses identified as of Very High ecological importance. The proposed placement of the support structures was also adjusted, such that no support structures would be placed within any of the identified watercourses. The proposed new substation footprint would not impact directly on any of the identified watercourses, although the feeder line to it would cross over a few watercourses including a channeled valley bottom wetland.

Given the level of impact avoidance already incorporated into project planning and layout, it is not surprising that few impacts were identified as associated with project layout. The identified impacts were of Low and Medium negative significance without mitigation, and further reduced through Best Practice measures and, in the case of impacts associated with the position of the Alternative 1 turning circle, readily avoided through selection of Alternative 2.

Construction phase impacts were however identified as potentially more problematic, particularly in the event that watercourses of Very High, High or Medium importance were affected, although potential impacts to watercourses of Low or Very Low significance were not considered inconsequential. Mitigation measures were outlined for each importance group of watercourses, with the most stringent measures applied to activities in the vicinity of the Very High and High Importance watercourses. The significance rating was High and negative for construction, in the event that no mitigation measures were applied, and assuming that watercourses of High and Very High importance were degraded. However, the rating could be reduced to Low in all cases through implementation of mitigation measures. The mitigation measures are all considered reasonable, with the most difficult probably relating to requirements for manual stringing of transmission lines in some areas, and for low-growing indigenous vegetation (<1.5 m in height) to remain uncleared beneath the transmission lines.

Operational Phase impacts were assumed to be similar to Construction Phase impacts, although they have a lower significance rating, given that they would be unlikely to be applied to the whole route, but would impact on localised areas. Mitigation measures would be similar to those for the Construction Phase, although a particular challenge would be for information regarding acceptable laydown areas and access routes to remain relevant and available to technicians in the field.

A Risk Assessment was also undertaken, on a similar grouped basis to that used for the Impact Assessment. On the assumption that full mitigation / control measures would be applied, the Risks of project construction and long-term operational management including repairs were all deemed to be Low. A WULA should not therefore be necessary for this project, which is considered Generally Authorised in terms of GN509 of 2016. Registration of Section 21c and i water uses would however be required.

On the basis of the above assessments, it is concluded that, assuming full and rigorous implementation of all required mitigation measures, authorisation of the proposed project in full would be acceptable, from the perspective of its impact on aquatic ecosystems.

7 REFERENCES

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APPENDIX A

RIVER AND WETLAND CONDITION ASSESSMENT PROTOCOLS

A1 Wetland condition

Wetland condition was assessed using the desk-top Present Ecological State (PES) methodology, adapted from DWAF (1999). The methodology is based on a comparison of current attributes of the wetland, which are scored against those of a desired baseline or reference condition, resulting in the assignment of a wetland to one of six PES categories, as defined in DWAF (1999) and described in Table A1. The methodology is applicable to natural wetlands only.

Table A1
Relationship between Present Ecological State (PES) and showing deviation from natural conditions, as defined in DWAF (2008). (Note: subcategories of DWAF 2008 have been excluded)

PES RATING/ VALUE	DEVIATION FROM REFERENCE CONDITIONS	SCORE (% SIMILARITY TO REFERENCE OR NATURAL CONDITION)	PES CATEGORY
0	No Change	≥92	A
1	Small Change	>82 To 92	B
2	Moderate Change	>62 To 82	C
3	Large Change	>42 To 62	D
4	Serious Change	> 22 To 42	E
5	Extreme Change	8 To 22	F

A2 Habitat integrity assessments of rivers

Habitat integrity is a measure of the degree of intactness of a system, and refers to the maintenance of the natural physico-chemical and habitat characteristics of a river, both spatially and temporally. Habitat integrity is considered greatest where these characteristics are most comparable to the natural riverine habitats of the region (Southern Waters 2001).

Habitat Integrity assessments involve the following procedures:

River classification: rivers, or reaches of a river are classified into broad categories, based primarily on their gradients, as outlined in Section 2.3. The categories (or geomorphological zones) are as follows:

- source zone
- mountain headwater stream
- mountain stream
- foothills (cobble bed)
- foothills (gravel bed)
- valley bottom wetlands (channeled and unchanneled)
- lowland floodplain.

Habitat integrity assessment: the assessment itself is based on a qualitative assessment of a number of pre-weighted criteria, with each criterion being scored between 1 and 25 and the final Habitat Integrity score being calculated as a percentage, as outlined in Southern Waters (2001). The criteria are listed below.

- water abstraction
- flow modification
- bed modification
- channel modification
- water quality
- inundation

- exotic macrophytes
- exotic fauna
- solid waste disposal
- indigenous vegetation removal
- encroachment of exotic vegetation
- bank erosion
- channel modification.

The assessment of the severity of impact of each modification is based on six descriptive categories with ratings ranging from 0 (no impact), 1 to 5 (small impact), 6 to 10 (moderate impact), 11 to 15 (large impact), 16 to 20 (serious impact) and 21 to 25 (critical impact).

The calculated overall habitat integrity scores for each geomorphological zone are grouped, to allow classification of subregions into Habitat Integrity categories. These are defined in Table A2, after Kleynhans (1996).

Table A2
Descriptions of Habitat Integrity categories (after Kleynhans 1996)

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. A 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 the worst instances the basic ecosystem functions have been destroyed and the changes are irreversible.	0

Note however that in this study, the National Freshwater Ecosystem Priority Area (NFEPA) data (after Driver et al 2011) were also considered in the derivation of River Condition Data for main watercourses in and through the study area. These were however ground-truthed in the vicinity of the study area, and amended for the affected reach if appropriate, using the desk-top Present Ecological State (PES) methodology, adapted from DWAF (1999).

APPENDIX B

METHODOLOGY FOR DETERMINING THE ECOLOGICAL IMPORTANCE AND SENSITIVITY (EIS) OF WETLANDS

B. Ecological Importance and Sensitivity (EIS) protocol for wetlands

The method used to assess the EIS of wetlands is a refinement of the DWA Resource Directed Measures for Water Resources: Wetland Ecosystems method (DWAF 1999). It includes an assessment of ecological (e.g. presence of rare and endangered fauna / flora), functional (e.g. groundwater storage / recharge) and socio-economic criteria (e.g. human use of the wetland).

Scoring of these criteria places the wetland in a Wetland Importance Class (A-D) (see Table B1).

Table B1
Wetland Importance Class integrating Ecological Importance and Sensitivity, and functional and socio-cultural importance modifiers

Importance class (one or more attributes may apply)	**Range of Median**	**Wetland Importance Class**
Very high Representative of wetlands that: • support key populations of rare or endangered species; • have a high level of habitat and species richness; • have a high degree of taxonomic uniqueness and/or intolerant taxa; • provide unique habitat (e.g. salt marsh or ephemeral pan; physiognomic features, spawning or nursery environments); • is a crucial avifaunal migratory node (e.g. RAMSAR wetlands); • may provide hydraulic buffering and sediment retention for large to major rivers that originate largely outside of urban conurbations; • have groundwater recharge/discharge comprising a major component of the hydrological regime of the wetland; • are highly sensitive to changes in hydrology, patterns of inundation, discharge rates, water quality and/or disturbance; and • are of extreme importance for conservation, research or education.	>3 <=4	A
High Representative of wetlands that: • support populations of rare or endangered species, or fragments of such populations that are present in other similar and geographically-adjacent wetlands; • contain areas of habitat and species richness; • contain elements of taxonomic uniqueness and/or intolerant taxa; • contain habitat suitable for specific species (e.g. physiognomic features); • provide unique habitat (e.g. salt marsh or ephemeral pan; spawning or nursery environments, heronries); • may provide hydraulic buffering and sediment retention for rivers that originate largely outside of urban conurbations, or within residential fringes of urban areas; • have groundwater recharge/discharge comprising a component of the hydrological regime of the wetland;	> 2 <= 3	B

• may be sensitive to changes in hydrology, patterns of inundation, discharge rates, water quality and/or human disturbance; and • are important for conservation, research, education or eco-tourism.		
Moderate Representative of wetlands that: • contain small areas of habitat and species richness; • provide limited elements of habitat that has become fragmented by development (e.g. salt marsh, ephemeral pan; roosting sites and heronries); • provide hydraulic buffering for rivers that originate in urban areas; • are moderately sensitive to changes in hydrology, patterns of inundation, discharge rates and/or human disturbance; • perform a moderate degree of water quality enhancement, but are insensitive to sustained eutrophication and/or pollution; and • are of importance for active and passive recreational activities.	>1 <= 2	C
Low/marginal Representative of wetlands that: • contain large areas of coarse (reeds) wetland vegetation with minimal floral and faunal diversity; • have a high urban watershed:wetland area ratio; • are important for active and passive recreation; • provide moderate to high levels of hydraulic buffering; • may be eutrophic and generally insensitive to further nutrient loading; • are generally insensitive to changes in hydrology, patterns of inundation, discharge rates and/or human disturbance; • have regulated water; and • contain large quantities of accumulated organic and inorganic sediments.	>0 <= 1	D

Rating	**Explanation**
None, Rating = 0	Rarely sensitive to changes in water quality/hydrological regime
Low, Rating =1	One or a few elements sensitive to changes in water quality/hydrological regime
Moderate, Rating =2	Some elements sensitive to changes in water quality/hydrological regime
High, Rating =3	Many elements sensitive to changes in water quality/ hydrological regime
Very high, Rating =4	Very many elements sensitive to changes in water quality/ hydrological regime

APPENDIX C

METHODOLOGY FOR DETERMINING THE CONSERVATION IMPORTANCE OF WETLANDS

C Wetland Conservation Importance

In order to provide a more specific guide to the relative conservation importance of individual wetland patches on the present site, a methodology developed by Ewart-Smith and Ractliffe (2002) was utilised. This methodology assigns low, medium and high conservation importance ratings to individual wetlands, on the basis of the following criteria (note that the highest category applicable to any wetland, based on any one criterion, is the one accorded the wetland as a whole):

- **Low conservation importance:**
    - does not provide ecologically or functionally significant wetland habitat, because of extremely small size or degree of degradation, and/or
    - of extremely limited importance as a corridor between systems that are themselves of low conservation importance.
- **Moderate conservation importance:**
    - provides ecologically significant wetland habitat (e.g. locally important wetland habitat types), and/or
    - fulfils some wetland functional roles within the catchment, and/or
    - acts as a corridor for fauna and/or flora between other wetlands or ecologically important habitat types, and/or
    - supports (or is likely to support) fauna or flora that are characteristic of the region and/or provides habitat to indigenous flora and fauna, and/or
    - is a degraded but threatened habitat type (e.g. seasonal wetlands), and/or
    - is degraded but has a high potential for rehabilitation, and/or
    - functions as a buffer area between terrestrial systems and more ecologically important wetland systems, and/or
    - is upstream of systems that are of high conservation importance.
- **High conservation importance:**
    - supports a high diversity of indigenous wetland species, and/or
    - supports, or is likely to support, red data species; supports relatively undisturbed wetland communities, and/or
    - forms an integral part of the habitat mosaic within a landscape, and/or
    - is representative of a regionally threatened / restricted habitat type, and/or
    - has a high functional importance (e.g. nutrient filtration; flood attenuation) in the catchment, and/or
    - is of a significant size (and therefore provide significant wetland habitat, albeit degraded or of low diversity).

APPENDIX D

METHODOLOGY FOR DETERMINING IMPACT SIGNIFICANCE

D METHODOLOGY FOR DETERMINING IMPACT SIGNIFICANCE – AFTER SRK

The significance of all potential impacts that would result from the proposed Project is determined in order to assist decision-makers. The significance rating of impacts is considered by decision-makers, as shown below.

- INSIGNIFICANT: the potential impact is negligible and will not have an influence on the decision regarding the proposed activity.
- VERY LOW: the potential impact is very small and should not have any meaningful influence on the decision regarding the proposed activity.
- LOW: the potential impact may not have any meaningful influence on the decision regarding the proposed activity.
- MEDIUM: the potential impact should influence the decision regarding the proposed activity.
- HIGH: the potential impact will affect a decision regarding the proposed activity.
- VERY HIGH: The proposed activity should only be approved under special circumstances.

The significance of an impact is defined as a combination of the consequence of the impact occurring and the probability that the impact will occur. The significance of each identified impact[4] must be rated according to the methodology set out below:

Step 1 – Determine the consequence rating for the impact by determining the score for each of the three criteria (A-C) listed below and then adding them[5]. The rationale for assigning a specific rating, and comments on the degree to which the impact may cause irreplaceable loss of resources and be irreversible, must be included in the narrative accompanying the impact rating:

Rating	Definition of Rating	Score
A. ***Extent***– *the area over which the impact will be experienced*		
Local	Confined to project or study area or part thereof (e.g. site)	1
Regional	The region, which may be defined in various ways, e.g. cadastral, catchment, topographic	2
(Inter) national	Nationally or beyond	3
B. ***Intensity***– *the magnitude of the impact in relation to the sensitivity of the receiving environment, taking into account the degree to which the impact may cause irreplaceable loss of resources*		
Low	Site-specific and wider natural and/or social functions and processes are negligibly altered	1
Medium	Site-specific and wider natural and/or social functions and processes continue albeit in a modified way	2
High	Site-specific and wider natural and/or social functions or processes are severely altered	3
C. ***Duration***– *the timeframe over which the impact will be experienced and its reversibility*		
Short-term	Up to 2 years (i.e. reversible impact)	1
Medium-term	2 to 15 years (i.e. reversible impact)	2
Long-term	More than 15 years (state whether impact is irreversible)	3

4 This does not apply to minor impacts which can be logically grouped into a single assessment.

5 Please note that specialists are welcome to discuss the rating definitions as they apply to their study with the EIA team.

The combined score of these three criteria corresponds to a Consequence Rating, as follows:

Combined Score (A+B+C)	3 – 4	5	6	7	8 – 9
Consequence Rating	Very low	Low	Medium	High	Very high

Example 1:

Extent	Intensity	Duration	**Consequence**
Regional 2	Medium 2	Long-term 3	**High** 7

Step 2 – Assess the **probability** of the impact occurring according to the following definitions:

Probability– the likelihood of the impact occurring	
Improbable	< 40% chance of occurring
Possible	40% - 70% chance of occurring
Probable	> 70% - 90% chance of occurring
Definite	> 90% chance of occurring

Example 2:

Extent	Intensity	Duration	**Consequence**	**Probability**
Regional 2	Medium 2	Long-term 3	**High** 7	Probable

Step 3 – Determine the overall **significance** of the impact as a combination of the **consequence** and **probability** ratings, as set out below:

		Probability			
		Improbable	Possible	Probable	Definite
Consequence	Very Low	**INSIGNIFICANT**	**INSIGNIFICANT**	**VERY LOW**	**VERY LOW**
	Low	**VERY LOW**	**VERY LOW**	**LOW**	**LOW**
	Medium	**LOW**	**LOW**	**MEDIUM**	**MEDIUM**
	High	**MEDIUM**	**MEDIUM**	**HIGH**	**HIGH**
	Very High	**HIGH**	**HIGH**	**VERY HIGH**	**VERY HIGH**

Example 3:

Extent	*Intensity*	*Duration*	***Consequence***	***Probability***	***Significance***
Regional 2	Medium 2	Long-term 3	**High** 7	Probable	**HIGH**

Step 4 – Note the **status** of the impact (i.e. will the effect of the impact be negative or positive?)

Example 4:

Extent	*Intensity*	*Duration*	***Consequence***	***Probability***	***Significance***	***Status***
Regional 2	Medium 2	Long-term 3	**High** 7	Probable	**HIGH**	**– ve**

Step 5 – State your level of **confidence** in the assessment of the impact (high, medium or low).

Depending on the data available, you may feel more confident in the assessment of some impact than others. For example, if you are basing your assessment on extrapolated data, you may reduce the confidence level to low, noting that further groundtruthing is required to improve this.

Example 5:

Extent	*Intensity*	*Duration*	***Consequence***	***Probability***	***Significance***	***Status***	***Confidence***
Regional 2	Medium 2	Long-term 3	**High** 7	Probable	**HIGH**	**– ve**	High

Step 6 – Identify and describe practical **mitigation** and **optimisation** measures that can be implemented effectively to reduce or enhance the significance of the impact. Mitigation and optimisation measures must be described as either:

- **Essential**: best practice measures which must be implemented and are non-negotiable; and.
- **Best Practice**: recommended to comply with best practice, with adoption dependent on the proponent's risk profile and commitment to adhere to best practice, and which must be shown to have been considered and sound reasons provided by the proponent if not implemented.

Essential mitigation and optimisation measures must be inserted into the completed impact assessment table. The impact should be re-assessed with mitigation, by following Steps 1-5 again to demonstrate how the extent, intensity, duration and/or probability change after implementation of the proposed mitigation measures. *Best practice* measures must also be inserted into the impact assessment table, but not considered in the "with mitigation" impact significance rating.

Example 6: A completed impact assessment table

	Extent	***Intensity***	***Duration***	***Consequence***	***Probability***	***Significance***	***Status***	***Confidence***
Without mitigation	Regional 2	Medium 2	Long-term 3	**High** 7	Probable	**HIGH**	**– ve**	High
Essential mitigation measures: • Xxx1 • Xxx2 • Xxx3 **Best practice mitigation measures:** • Yyy1 • Yyy2								
With mitigation	Local 1	Low 1	Long-term 3	**Low** 5	Improbable	**VERY LOW**	**– ve**	High

Step 7 – Summarise all impact significance ratings as follows in your executive summary:

Impact	***Consequence***	***Probability***	***Significance***	***Status***	***Confidence***
Impact 1: XXXX	Medium	Improbable	**LOW**	–ve	High
With Mitigation	Low	Improbable	**VERY LOW**		High
Impact 2: XXXX	Very Low	Definite	**VERY LOW**	–ve	Medium
With Mitigation:	*Not applicable*				

APPENDIX E

SPECIALIST CURRICULUM VITAE

LIZ DAY'S CURRICULUM VITAE

SUMMARY DOCUMENT (2024)

Name	Dr Elizabeth (Liz) Day (née Reynolds)
Address	6 Flamingo Crescent, Zeekoevlei, 7941, Cape Town, South Africa
Cell number	083 454 2309
Email	liz@lizdayconsulting.co.za
Date of birth	3 May 1968
Place of birth	Zimbabwe
Nationality	South African
Current Position	Director: Liz Day Consulting (Pty) Ltd

Liz Day is a Freshwater Ecologist who provides specialist input into river and wetland ecosystems management and rehabilitation, water quality, baseline assessments, impact assessments, wetland offset determinations, strategic planning and review and other aspects of aquatic ecosystem consulting. She has particular experience in working in urban and agricultural areas, across a wide range of socio economic conditions.

KEY WORK EXPERIENCE

2019 -	Specialist consultant on freshwater ecosystems (rivers and wetlands) – Liz Day Consulting (Pty) Ltd
1999- 2019	Specialist consultant on freshwater ecosystems; co-founder of Freshwater Consulting (FCG)
1997 - 1999	Senior Consultant for Southern Waters Ecological Research and Consulting cc
1994 - 1996	Scientific Officer on Water Research Commission Project, Freshwater Research Unit, UCT.

SUMMARY OF RELEVANT EXPERIENCE

> 28 years' experience in aspects of aquatic ecology, specialising in:

- Water quality - river, vlei and wetland water quality monitoring, data analysis and interpretation as well as urban stormwater quality, pollution tracking and pollution abatement assessments;
- Urban river and wetland management and rehabilitation;
- Urban stormwater design with respect to freshwater ecosystems and water quality amelioration;
- Specialist input into environmental impact assessments; baseline and situation assessments
- DWS Risk Assessments;
- Wetland Offset calculations and agreements;
- Catchment and River Management Plans;
- River corridor plans;
- Inputs into Ecological Reserve Determinations;
- River and wetland Maintenance and Management Plans;
- River and wetland mapping and biodiversity planning;
- Wetland delineation;
- SASS5 bioassessments.

Liz has compiled over 1000 specialist riverine ecology technical reports, 12 scientific papers (6 in international literature); 20 popular biological articles published in local environmental magazines, scripts for several environmental documentaries; *ad hoc* lecturer in freshwater ecology at UCT; co-author on 4 Water Research Commission reports; lead author on chapter in UNESCO Sustainable Management of Urban Aquatic Ecosystems handbook; lead author on chapter in Fynbos Ecosystem Management book; project leader and author of WRC Technical Manual for River Rehabilitation in South Africa (2016). She has also sat on the Reference Groups / Steering Committees of numerous Water Research projects, including those relating to wetland ecological infrastructure, wetland rehabilitation monitoring protocols, Sustainable Urban Drainage Systems (SUDS) and Water Sensitive Urban Design (WSUD) in the City of Cape Town and eThekwini Municipalities.

KEY QUALIFICATIONS

- Bachelor of Arts (English), University of Cape Town, 1989
- Bachelor of Science (Zoology and Environmental and Geographical Science); University of Cape Town; 1992
- Bachelor of Science (honours- Zoology, first class); University of Cape Town, 1993
- PhD (Zoology / Marine Biology); University of Cape Town, 1998

PROFESSIONAL AFFILIATIONS

- Member of WISA, IAIA-SA and Society for Ecological Restoration (SER) (African Chapter)
- Registered Professional Natural Scientist by SACNASP (Reg No 400270/08)
- Member of Western Cape Wetlands Forum and Wetland Society of South Africa
- Member of False Bay Nature Reserve Protected Area Advisory Committee
- Member – Mayoral Advisory Committee on Water Quality in Wetlands and Waterways.

Signed (25 January 2024)

APPENDIX F

RISK ASSESSMENT RATING TABLE (DWS 2016)

RISK ASSESSMENT KEY (Referenced from DWA RISK-BASED WATER USE AUTHORISATION APPROACH AND DELEGATION GUIDELINES)

Negative Rating

TABLE 1- SEVERITY

How severe does the aspects impact on the environment and resource quality characterisitics (flow regime, water quality, geomorfology, biota, habitat) ?

Insignificant / non-harmful	1
Small / potentially harmful	2
Significant / slightly harmful	3
Great / harmful	4
Disastrous / extremely harmful and/or wetland(s) involved	5
Where "or wetland(s) are involved" it means	

TABLE 2 – SPATIAL SCALE

How big is the area that the aspect is impacting on?

Area specific	1
Whole site	2
Regional / neighbouring areas	3
National	4
Global	5

TABLE 3 – DURATION

How long does the aspect impact on the environment and resource quality?

One day to one month, PES, EIS and/or REC not impacted	1
One month to one year, PES, EIS and/or REC impacted but no change in status	2
One year to 10 years, PES, EIS and/or REC impacted to a lower status but can be improved over this period through mitigation	3
Life of the activity, PES, EIS and/or REC permanently lowered	4
More than life of the organisation/facility, PES and EIS scores, a E or F	5

TABLE 4 – FREQUENCY OF THE ACTIVITY

How often do you do the specific activity?

Annually or less	1
6 monthly	2
Monthly	3
Weekly	4
Daily	5

TABLE 5 – FREQUENCY OF THE INCIDENT/IMPACT

How often does the activity impact on the environment?

Almost never / almost impossible / >20%	1
Very seldom / highly unlikely / >40%	2
Infrequent / unlikely / seldom / >60%	3
Often / regularly / likely / possible / >80%	4
Daily / highly likely / definitely / >100%	5

TABLE 6 – LEGAL ISSUES

How is the activity governed by legislation?

No legislation	1
Fully covered by legislation (wetlands are legally governed)	5
Located within the regulated areas	

TABLE 7 – DETECTION

How quickly can the impacts/risks of the activity be observed on the environment (water resource quality characteristics), people and property?

Immediately	1
Without much effort	2
Need some effort	3
Remote and difficult to observe	4
Covered	5

TABLE 8: RATING CLASSES

RATING	CLASS	MANAGEMENT DESCRIPTION
1 – 55	(L) Low Risk	Acceptable as is or consider requirement for mitigation. Impact to watercourses and resource quality small and easily mitigated. Wetlands may be excluded.
56 – 169	M) Moderate Risk	Risk and impact on watercourses are notably and require mitigation measures on a higher level, which costs more and require specialist input.
170 – 300	(H) High Risk	Always involves wetlands. Watercourse(s) impacts by the activity are such that they impose a long-term threat on a large scale

A low risk class must be obtained for all activities to be considered for a GA

TABLE 9: CALCULATIONS

Consequence = Severity + Spatial Scale + Duration
Likelihood=Frequence of Activity + Frequency of Incident +Legal Issues + Detection
Significance \Risk= Consequence X Likelihood

CLIENT
ESKOM

MAIN ENVIRONMENTAL CONSULTANT
SRK CONSULTING

Ceres-Witzenberg 132kV Powerline and Prince Alfred Hamlet Substation, Western Cape:

Aquatic Biodiversity Site Sensitivity Verification Report

DRAFT

FEBRUARY 2024

PREPARED BY
Liz Day (PhD; Pr Nat Sci.)
lizday@mweb.co.za

LIZ DAY
CONSULTING

Specialist River and Wetland Consultant

1 Introduction

Eskom Holdings SOC Limited, Western Cape Operating Unit: Distribution Division (Eskom) seeks to extend the 132kV line from Ceres to the Witzenberg Substation, build a new substation at Prince Alfred Hamlet, and integrate this extension with the new substation and therein enhance the power distribution network.

SRK Consulting (South Africa) (Pty) Ltd (SRK) has been appointed by Eskom to undertake the Basic Assessment (BA) process, required in terms of the National Environmental Management Act 107 of 1998 (NEMA), and the Environmental Impact Assessment (EIA) Regulations, 2014 (GN R982, as amended by GN R326) in support of the application for an Environmental Authorization.

Due to the aquatic sensitivity of the proposed site, SRK appointed Liz Day Consulting (Pty) Ltd (LDC) to undertake an Aquatic Biodiversity Site Sensitivity Verification exercise and corresponding Freshwater Ecology specialist study for the project, to inform the BA process. The project area is located within the Witzenberg Municipality, in the Western Cape Province. The study area covers comprises a 100 m corridor spanning the ~17 km proposed powerline route.

2 Purpose of this Report

As per the Procedures for the Assessment and Minimum Report Content Requirements for Environmental Themes (GN 320 and 1150 of 2020, as amended – the Specialist Protocols), a site sensitivity verification exercise was undertaken by Liz Day in order to confirm the current land use and environmental sensitivity of the proposed site as identified by the National Web-Based Environmental Screening Tool (Screening Tool).

Table 2-1 outlines the requirements for site sensitivity verification and the required content for a Site Sensitivity Verification Report (SSVR), indicating also where the relevant components have been addressed in this SSVR

Table 2-1: Content of specialist report as per Specialist Protocols

GN 320 and 1150 of 2020:	Requirement	Section Ref.:
1.1.	The site sensitivity verification must be undertaken by an environmental assessment practitioner or a specialist.	Table 3-1
1.2.	The site sensitivity verification must be undertaken through the use of: (a) a desk top analysis, using satellite imagery; (b) a preliminary on-site inspection; and (c) any other available and relevant information.	Section 3 and 4
1.3.	The outcome of the site sensitivity verification must be recorded in the form of a report that--	
	(a) confirms or disputes the current use of the land and the environmental sensitivity as identified by the screening tool, such as new developments or infrastructure, the change in vegetation cover or status etc.;	Section 5

GN 320 and 1150 of 2020:	Requirement	Section Ref.:
	(b) contains a motivation and evidence (e.g. photographs) of either the verified or different use of the land and environmental sensitivity; and	
	(c) is submitted together with the relevant assessment report prepared in accordance with the requirements of the Environmental Impact Assessment (EIA) Regulations.	See BA Report

3 Methodology

Watercourses were classified / typed using the Classification System for wetlands and other Aquatic Ecosystems in South Africa developed by Ollis et al. (2013).The Present Ecological State (PES) assessment methodology and the National Freshwater Ecosystem Priority Area (NFEPA) data was used to assess watercourse conditions. Ecological Importance and Sensitivity (EIS) evaluations followed the Department of Water and Sanitation (DWS)'s Wetland Ecosystems method, which considers ecological, functional, and socio-economic factors to assign a Wetland Importance Class (A-D).

Conservation importance was determined using the following two approaches:

1. Regional Biodiversity Conservation Planning data; and
2. Ractliffe and Ewart-Smith (2002)'s methodology for wetlands not in conservation datasets, allowing for the inclusion of regional biodiversity considerations.

Additionally, the National Ecoregional Classification (Kleynhans *et al*. 2005) provided a broader categorization of watercourses into 31 ecoregions based on shared environmental characteristics.

Further to the assessment methodologies and datasets utilised, a site visit was undertaken in January 2020 to ground-truth the watercourse conditions and locations, which allowed for a nuanced understanding of the conservation importance and sensitivity of the ecosystems within the project area. After the site visit, the identified watercourses were then delineated using aerial imagery, informed by GPS co-ordinates collected during the site visit. The details of the site visit and the specialist's SACNASP registration details are listed in **Table 3-1** below.

Table 3-1: The details of the site visit and specialist

Date of Site Visit	January 2020
Supervising Specialist Name	Dr Elizabeth (Liz) Day
Professional Registration Number	SACNASP (Reg No 400270/08)
Specialist Affiliation / Company	Liz Day Consulting (Pty) Ltd

4 Site Sensitivity

The project area falls within the Western Folded Mountains Ecoregion, known for variable precipitation, moderate runoff, and a mix of river types. The study area is situated in the Upper

Breede catchment, within the Breede-Gouritz Water Management Area and characterised by diverse aquatic ecosystems, including the Koekedou and Modder Rivers (which the powerline will cross) (see Photo 3 and Photo 4), which are moderately impacted by alien plant invasion and agricultural encroachment.

The project area comprises varying degrees of ecological importance and conservation priority, as the region's aquatic vegetation ranges from Least Threatened to Critically Endangered. The presence of numerous mapped Critical Biodiversity Areas (CBAs) and Ecological Support Areas (ESAs) indicate a landscape with significant ecological value.

Only one wetland located near to the proposed pylons and powerline route was identified to be of *Very High Sensitivity*. This wetland hosts unique flora such as Palmiet (*Prionium serratum*) (see Palmiet (*Prionium serratum*) mosaic in Very High Importance wetlandPhoto 2), which is important for runoff control and water quality.

The Koekedou River itself is considered an area of *High Sensitivity* as the river is identified as a River Freshwater Ecosystem Priority Area (FEPA) and a Fish Sanctuary (in terms of the National Freshwater Ecosystems Priority Areas (NFEPA) data, and is further rated as a Critical Biodiversity Area (CBA) river, in terms of the Western Cape Biodiversity Spatial Plan (Pool-Stanvliet et al 2017). River FEPAs are *inter alia* considered important habitats and / or corridors for the movement of endemic fish. The Koekedou River supports at least one vulnerable or threatened fish species *(i.e. Pseudobarbus burchelli* cf. Breede [Breede River redfin]).

River CBAs are considered of critical importance for conserving biodiversity and maintaining ecosystem functioning in the long term, and therefore river CBAs are considered to be irreplaceable (in terms of meeting biodiversity pattern targets). They usually comprise aquatic ecosystems in the best condition (PES Category A and B).

Three wetlands, located near to the proposed pylons and powerline route were classified as of *High Sensitivity*, as they host a mosaic of indigenous fynbos plants. These wetlands were accorded Present Ecological State (PES) scores respectively of Category B and C (see Photo 1, Photo 2, and Photo 5).

Numerous watercourses, including hillslope seep wetlands and the Modder River were classified as being of *Moderate to High Sensitivity* due to their ecological importance, the presence of extensive indigenous vegetation, and their role in biodiversity conservation.

Disturbed natural and artificial systems considered to be areas of *Low and Very Low Sensitivity*, and generally rated as PES Category D, were also identified near the proposed pylons and the powerline route.

Photo 1: *Pennisetum macrourum* wetland gasses in Very High Importance wetland

Photo 2: Palmiet (*Prionium serratum*) mosaic in Very High Importance wetland

Photo 3: Channelised seep through farmland

Photo 4: Modder River, showing dense Palmiet and *Cliffortia strobilifera* within the channel

Photo 5: *Pennisetum macrourum* mosaic in High Importance wetland

Photo 6: Witzenberg substation channel valley wetland, east of a proposed transmission line crossing

Figure 1:Photos from the site inspection

5 Verified Site Sensitivity and Site Sensitivity Statement

The site sensitivity verification exercise identified additional watercourses and natural wetlands not captured in existing datasets.

The National Web-based Screening Tool characterised the Aquatic Biodiversity Theme sensitivity of the proposed site as “Very High”. The site visit confirmed the presence of CBAs, ESAs and the FEPA on the proposed site. Based on the findings presented in this report, the proposed site for the Witzenberg-Ceres 132 kV powerline and Prince Alfred Hamlet substation is considered to be of *Very High Sensitivity,* as per the Specialist Protocols. An Aquatic Biodiversity Specialist Assessment is therefore required, in terms of the Specialist Protocols (GN 320 and 1150 of 2020, as amended).

6 REFERENCES

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

Department of Environment, Forestry and Fisheries (South Africa). (2020, October 30). Protocol for the specialist assessment and minimum report content requirements for environmental impacts on terrestrial animal species. *Government Gazette No. 43855*, pp. 21-26.

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Pool-Stanvliet, R. D.-C. (2017). The Western Cape Biodiversity Spatial Plan Handbook. . Stellenbosch., Western Cape : Cape Nature, .

forestry, fisheries
& the environment

Department:
Forestry, Fisheries and the Environment
REPUBLIC OF SOUTH AFRICA

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SPECIALIST DECLARATION FORM – AUGUST 2023

Specialist Declaration form for assessments undertaken for application for authorisation in terms of the National Environmental Management Act, Act No. 107 of 1998, as amended and the Environmental Impact Assessment (EIA) Regulations, 2014, as amended (the Regulations)

REPORT TITLE

Click or tap here to enter text.

Kindly note the following:

1. This form must always be used for assessment that are in support of applications that must be subjected to Basic Assessment or Scoping & Environmental Impact Reporting, where this Department is the Competent Authority.
2. This form is current as of August 2023. It is the responsibility of the Applicant / Environmental Assessment Practitioner (EAP) to ascertain whether subsequent versions of the form have been published or produced by the Competent Authority. The latest available Departmental templates are available at https://www.dffe.gov.za/documents/forms.
3. An electronic copy of the signed declaration form must be appended to all Draft and Final Reports submitted to the department for consideration.
4. The specialist must be aware of and comply with '*the Procedures for the assessment and minimum criteria for reporting on identified environmental themes in terms of sections 24(5)(a) and (h) and 44 of the act, when applying for environmental authorisation - GN 320/2020)*', where applicable.

1. SPECIALIST INFORMATION

Title of Specialist Assessment	Basic Assessment of the proposed Eskom Prince Alfred Hamlet Substation and 132 Kv Transmission Line between the Ceres and Witzenberg substations: Specialist Aquatic Ecosystems Report
Specialist Company Name	Liz Day Consulting (Pty) Ltd.
Specialist Name	Dr Elizabeth (Liz) Day
Specialist Identity Number	6805030876086
Specialist Qualifications:	BSc; BSc (Honours); PhD
Professional affiliation/registration:	SACNASP (Reg No 400270/08)
Physical address:	6 Flamingo Crescent, Zeekoevlei, 7941
Postal address:	6 Flamingo Crescent, Zeekoevlei, 7941
Postal address	
Telephone	+27 83 454 2309
Cell phone	+27 83 454 2309
E-mail	lizday@mweb.co.za

2. DECLARATION BY THE SPECIALIST

I, Elizabeth (Liz) Day declare that –

- I act as the independent specialist in this application;
- I am aware of the procedures and requirements for the assessment and minimum criteria for reporting on identified environmental themes in terms of sections 24(5)(a) and (h) and 44 of the National Environmental Management Act (NEMA), 1998, as amended, when applying for environmental authorisation which were promulgated in Government Notice No. 320 of 20 March 2020 (i.e. "the Protocols") and in Government Notice No. 1150 of 30 October 2020.
- 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 NEMA Act.

Signature of the Specialist

Liz Day Consulting (Pty) Ltd

Name of Company:

4 March 2024

Date

3. UNDERTAKING UNDER OATH/ AFFIRMATION

I, Elizabeth (Liz) Day, swear under oath / affirm that all the information submitted or to be submitted for the purposes of this application is true and correct.

Signature of the Specialist

Liz Day Consulting (Pty) Ltd

Name of Company

14 March 2024

Date

Signature of the Commissioner of Oaths

Click or tap to enter a date.

Date

SOUTH AFRICAN POLICE SERVICE
STATION COMMANDER
14 MAR 2024
GRASSY PARK