**Client**

ESKOM Holdings SOC Limited

**Main Environmental Consultants:**

SRK Consulting

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# Proposed Construction of the Romansrivier – Ceres 66/132kV DC powerline

## Basic Assessment Report – Freshwater Ecosystems

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**AUGUST 2017**

**Draft Report for I&AP Comment**

**Report by**


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**DECLARATION OF SPECIALIST INDEPENDENCE**

I, Elizabeth (Liz) Day as a consultant and founding partner of Freshwater Consulting cc (t/a The Freshwater Consulting Group / FCG), 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 SRK Consulting was appointed as the environmental assessment practitioner (EAP) 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 the proposed construction of the Eskom Romansrivier – Ceres powerline.

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**Full Name**: Elizabeth Day
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**Title / Position**: Dr
**Qualification(s)**: BA, BSc, BSc Hons, PhD
**Experience**: 21 years in freshwater ecosystems
**Relevant work experience in the study area**: Liz has worked for the past +20 years, primarily in the Western Cape, and has produced over 300 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 in past long-term monitoring of the Dwars River, Ceres (affected catchment of the present project) as well as in the Situation Assessment of the Doring / Olifants River system, starting just west of the present study area, and in the Central Breede Finescale Planning Assessments of wetlands (downstream of the study area).

She has contributed specialist assessments of several other power line and substation designs in the Western Cape, including the proposed Eskom Merino - Bon Chretien powerline and substation (2016), the Blue Downs powerlines in the City of Cape Town and the powerline alignments for each of three alternative sites for Eskom's the proposed Nuclear Power Stations (Koeberg, Bantamsklip and Thyspunt).

**Registration(s)**: Member of IAIA; Member of SAIEES; Registered Professional Natural Scientist by SACNASP (Reg No 400270/08) for fields of Biological Science, Ecological Science and Zoological Science

## EXECUTIVE SUMMARY

This study considered the effects from an aquatic ecosystem perspective of the proposed design, placement, construction and long-term operation of a new powerline between the existing Romansrivier and Ceres substations, including a number of support structures / poles and requirements for the use of various existing or new roads and tracks to allow access to poles and powerlines. 68 support structures were considered in this assessment, although it is understood that this number may be adjusted during the project detailed design phase.

The proposed powerlines and associated infrastructure would pass through and/or in the vicinity of a number of aquatic ecosystems, all of which form part of the Breede River catchment, and which include sections of the upper Breede River itself (known as the Dwars River). Of these, wetland seeps in the vicinity of the Romansrivier substation (poles 8-13) and on the Ceres Peak area (poles 59-66) are considered highly sensitive, and in near-natural condition (PES B and A/B respectively). Other watercourses including sensitive, least-impacted wetland seeps occur elsewhere along the proposed powerline and access road alignment, which would also cross the Dwars River.

Degradation of aquatic ecosystems as a result of pole and powerline installations was considered a concern in this assessment, but all impacts could be reduced to Low negative significance through avoidance and/or implementation of careful mitigation strategies.

Ironically, it is the proposed design, construction, and in particular the construction phase use of roads to access the poles that would be associated with the greatest levels of impacts to aquatic ecosystems, with road access to poles 64 and 65 on the Ceres Peak area being considered particularly problematic, and associated with Medium negative significance, even after implementation of mitigation measures including engineering designs for the crossing of the main seep channel with a small suspension bridge. Such impact significance reflects the high sensitivity of these near-pristine headwater seeps to even small changes.

One of the implications of this assignment of a Medium significance rating to access road construction in this area is that a DWS Risk Assessment would also be likely to assign a Risk rating that is at least Moderate for the same activities. This would thus probably require consideration of the Section 21c and i water uses of the project through a full water use license, although the DWS (in this case, the Breede Gouritz Catchment Management Agency) would need to provide comment on this aspect.

Mitigation measures generally focused on design and construction-phase risk reduction, with construction activities in sensitive areas being required to be undertaken outside of the wet season, and the design of all access roads through watercourses being required to include measures to prevent concentration of flows and minimize the risks of erosion.

Assuming full implementation of mitigation measures, none of the proposed support pole locations or access roads were considered fatal flaws from an aquatic ecosystem perspective, although the likely cumulative degradation of sensitive seeps in some areas was noted as a concern.

**Table E1** provides a summary of impact significance ratings as identified and assessed in this report. These have been assessed cumulatively, for the project as a whole, in its different phases.

**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 access road design and layout | High | Definite | **High** | High | Neg |
| **With mitigation** | Medium | Definite | Medium | Medium | Neg |
| **Construction phase aquatic ecosystem degradation** | High | Definite | High | High | Neg |
| **With mitigation** | Low | Definite | Low | Medium | Neg |
| **Operational phase aquatic ecosystem degradation** | High | Definite | High | High | Neg |
| **With mitigation** | Medium | Definite | Medium | Medium | Neg |

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# 1 INTRODUCTION

## 1.1 Background

The Witzenberg substation provides support for approximately 3 000 agricultural, commercial and residential customers, and is currently supplied by one 132 kV single circuit powerline only. This line runs over the Witzenberg Mountain Range from the Romansrivier substation to the south. 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 also runs from the Romansrivier substation to Ceres. A portion of this line recently burnt down, cutting the 66 kV electricity supply between Romansrivier and Ceres. Since this fire, the Ceres substation has been supplied by a 66 kV line from the Witzenberg substation to the north of Ceres (and consequently, by the 132 kV line between the Romansrivier and Witzenberg substations only). Given the importance of the 66 kV powerline in terms of maintaining surety of power supplies to both the Ceres and the Witzenberg substations, as well as their dependent networks (i.e. the towns of Prince Alfred Hamlet and Ceres), and the implications for planned future development in this area of uncertain power supplies, Eskom has proposed construction of a 66/132 kV double-circuit distribution powerline from Romansrivier to the Ceres substation.

Various activities included in the proposed project require authorization in terms of *inter alia* both the National Environmental Management Act (NEMA) (Act 107 of 1998), the National Water Act (NWA) (Act 36 of 1998), and the National Heritage Resources Act (NHRA) (Act 25 of 1999) and as a result SRK Consulting (South Africa) (Pty) Ltd (SRK) was appointed by Eskom Holdings SOC Limited (Eskom) to undertake a Basic Assessment and associated authorization processes for the above activities, through the relevant authorities.

Since the proposed new powerlines would pass over and in close proximity to several watercourses, Freshwater Consulting cc (t/a The Freshwater Consulting Group / FCG) was in turn appointed by SRK to provide specialist input into both the Basic Assessment process and the Water Use Licensing and/or Registration of Use processes, from a freshwater ecosystems perspective.

This document comprises the second draft of the specialist Basic Assessment Report, which has been revised since the first (August 2017) draft on the basis of comment from Eskom.

## 1.2 Terms of reference

FCG's input into the overall project was driven by the following Terms of Reference, which required the specialist to:

- Identify and describe freshwater ecosystems in the study area based on existing data and an on-site survey;
- Place freshwater ecosystems in a regional context and describe freshwater ecosystem-dependent fauna and flora species present;
- Classify, describe and map freshwater ecosystems in terms of their ecological sensitivity and functional value;
- Comment on and map freshwater ecosystem sensitivity in terms of ecologically important habitats, ecological corridors and linkages with other ecological systems;
- Provide SRK and Eskom with a draft baseline report;
- Undertake a site walk-down with other specialists, SRK and Eskom to determine the final location of infrastructure based on ecological, visual and cultural (archaeological and palaeontological) sensitivity of the study area;
- Identify potential impacts of the proposed project on freshwater ecosystems;

- Assess the direct, indirect and cumulative impacts (pre and post-mitigation) of the final location of infrastructure (and alternatives, if applicable) on freshwater ecosystems in the study area using the prescribed impact assessment methodology;
- Recommend practicable mitigation measures to avoid and/or minimise/reduce impacts and enhance benefits; and
- Recommend and draft a monitoring campaign to ensure the correct implementation and adequacy of recommenced mitigation and management measures, if applicable.

## 1.3 Assumptions and limitations

The outputs of this study are subject to the following limitations:

- Detailed delineations of wetlands (e.g. as prescribed by the (then) Department of Water Affairs and Forestry (DWAF) 2005) identified in the vicinity of the powerlines were not carried out – instead, the extents of such systems were delineated from aerial imagery, using information from the site visits to calibrate such efforts. In this regard it is noted that the mapped (buffered) Witzenberg Critical Biodiversity Area (CBA) delineations were found during ground-truthing activities to be highly accurate, and were used as the main tool to indicate the spatial distribution of aquatic ecosystems in the affected study area and its surrounds. This approach is considered adequate to inform this study;
- The entire route between Romansrivier and Ceres was not walked / driven – sections between poles 18 and 23 were assessed on the basis of aerial maps – this specialist has high confidence in the study findings for this section, which comprised mainly highly disturbed agricultural areas with seasonal watercourses passing through them;
- At the time of this assessment, only rough concept designs for the proposed river and seep crossings were available, and certain pole positions and the number of poles required may still be subject to change, pending input from various specialists and the technical design team;
- Pole numbers and positions were initially provided by Eskom to specialists for reference in their initial site assessments. Some of the proposed pole positions were subsequently changed, following input from specialists during the combined project team site walk-down in May 2017. As a result, the numbering of the poles was altered. This report references those pole numbers referenced as "new" in .kmz files provided to specialists by SRK Consulting, and dated 18 July 2017, and subsequently updated in part in .kmz files dated 7 September 2017.

## 1.4 Methodology

### 1.4.1 *Activities undertaken as part of this study*

Input into this report was informed by the following activities / information sources:

- A desktop assessment, including compilation of a sensitivity map of the study area, to use as a guide in site assessments – this was drawn from both the outputs of the National Freshwater Ecosystem Priority Area (NFEPA) project (Driver *et al*. 2011) and fine scale planning data;
- A 300 m wide pylon corridor was assessed;
- A three day specialist site visit (17-19 May 2017) in order to ground-truth the presence of mapped freshwater ecosystems, to identify additional systems and to assess wetland type, condition and Ecological Importance and Sensitivity (EIS);
- Liaison with the project botanical specialist (Mr Paul Emms, Bergwind Botanical Surveys & Tours CC) and consideration of the specialist Baseline Report (Ems 2017) and the specialist findings regarding botanical sensitivity in particular;
- A site walk-down in late May 2017 along much of the proposed line, accompanied by the botanical specialist, as well as representatives from Eskom and SRK, to discuss sections of particular concern and to develop feasible mitigation measures, in both design and alignment approaches;

- Liaison with members of the SRK project team (Mr Matthew Law and Ms Amy Hill) regarding the project details and proposed alignment amendments as well as suggested approaches for various river crossings.

The findings of the above activities were incorporated into the required Specialist Freshwater Assessment report for this project, and formed the basis against which the significance of impacts to aquatic ecosystems likely to be associated with the proposed activities was determined and effective mitigation measures recommended. The methodology followed in determining impact significance was as provided by SRK, and included in Appendix A of this report.

### 1.4.2 *Definitions*

Definitions of surface aquatic ecosystem types referred to in this report are taken from the National Water Act (Act 36 of 1998), as outlined below.

*Definitions of a water course*

The term "water course", as defined by the National Water Act, refers to

- *a river or spring;*
- *a natural channel in which water flows regularly or intermittently;*
- *a wetland, lake or dam into which or from which water flows; and*
- *any collection of water which the Minister may, by notice in the Gazette, declare to be a watercourse, and a reference to a watercourse includes, where relevant, its bed and banks.*

*Wetland definitions*

The National Water Act defines wetlands as:

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

### 1.4.3 *Assessment Methodologies*

*Approach to the assessment of river condition*

National River Health Programme (RHP 2011) and National Freshwater Ecosystem Priority Area (NFEPA) data (after Driver et al 2011) were 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). The methodology is based on a comparison of current attributes, which are scored against those of a desired baseline or reference condition, resulting in the assignment of a river to one of six PES categories, as defined in DWAF (1999) and described in **Table 1**.

Minor watercourses were also assessed in terms of their PES, in the approximate area at which crossings were proposed.

Where landuse was similar across minor watercourses of a similar type, condition was assessed generically, unless site-specific observations dictated otherwise.

**Table 1**
**Interpretation of PES score, using the DWAF (1999) methodology**

| PES Score | Wetland or river description | PES Category | Comment |
|---|---|---|---|
| > 4 | Unmodified or approximates natural condition | A | Acceptable Condition |
| > 3 <=4 | Largely natural with few modifications, minor loss of habitat | B | |
| > 2 <=3 | Moderately modified with some loss of habitat | C | |
| = 2 | Largely modified with loss of habitat and wetland / river functions | D | |
| > 0 < 2 | Seriously modified with extensive loss of habitat and wetland function. | E | Unacceptable Condition |
| 0 | Critically modified. Losses of habitat and function are almost total, and the wetland has been modified completely. | F | |

### *River and Wetland Ecological Importance and Sensitivity (EIS)*

This report utilised the Ecological Importance and Sensitivity (EIS) methodology developed by DWAF (1999) to derive EIS ratings for affected rivers and wetlands in the study area. DWAF (1999) defines the ecological **importance** of a river or wetland as an expression of its importance to the maintenance of ecological diversity and functioning on local and wider scales, while ecological **sensitivity** (or fragility) refers to the system's ability to resist disturbance and its capability to recover from disturbance once it has occurred (resilience). Both abiotic and biotic components of the system are taken into consideration in the assessment of ecological importance and sensitivity.

Importantly, it should be noted that EIS ratings are strongly biased towards the potential importance and sensitivity of particular system as would be expected under unimpaired conditions. This means that the present ecological status or condition (PES) is generally not considered in determining the ecological importance and sensitivity *per se* (DWAF 1999). The following components are considered in an EIS assessment, namely:

- The presence of rare and endangered species, unique species (i.e. endemic or isolated populations) and communities, intolerant species and species diversity should be taken into account for both the instream and riparian components of the river;
- Habitat diversity;
- Biodiversity in its general form;
- The importance of the particular wetland, river or stretch of river in providing connectivity between different sections of the river;
- The presence of conservation or relatively natural areas along the river section; and
- The sensitivity (or fragility) of the system and its resilience (i.e. the ability to recover following disturbance) to environmental changes.

The above biotic and abiotic determinants are scored, and the median score is calculated to derive the ecological importance and sensitivity category. These categories are defined in **Table 2**. Note that where landuse was similar across minor watercourses of a similar type, condition was assessed generically, unless site-specific observations dictated otherwise.

**Table 2**
**Ecological importance and sensitivity categories (Table after DWAF 1999).**

| Ecological Importance And Sensitivity Categories | General Description |
|---|---|
| Very high | Quaternaries/delineations that are considered to be unique on a national or even international level based on unique biodiversity (habitat diversity, species diversity, unique species, rare and endangered species). These rivers (in terms of biota and habitat) are usually very sensitive to flow modifications and have no or only a small capacity for use. |
| High | Quaternaries/delineations that are considered to be unique on a national scale due to biodiversity (habitat diversity, species diversity, unique species, rare and endangered species). These rivers (in terms of biota and habitat) may be sensitive to flow modifications but in some cases, may have a substantial capacity for use. |
| Moderate | Quaternaries/delineations that are considered to be unique on a provincial or local scale due to biodiversity (habitat diversity, species diversity, unique species, rare and endangered species). These rivers (in terms of biota and habitat) are usually not very sensitive to flow modifications and often have a substantial capacity for use. |
| Low/marginal | Quaternaries/delineations that are not unique at any scale. These rivers (in terms of biota and habitat) are generally not very sensitive to flow modifications and usually have a substantial capacity for use. |

### 1.4.4 *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.

## 1.5 Study area

The broad location of the proposed Romansrivier to Ceres powerline alignment is shown in **Figure 1,** which also shows major rivers, for broad locational context. More detailed alignments are shown in the context of Critical Biodiversity Area (CBA) data for rivers and wetlands, in **Figures 2-6**, as provided by SRK**.**

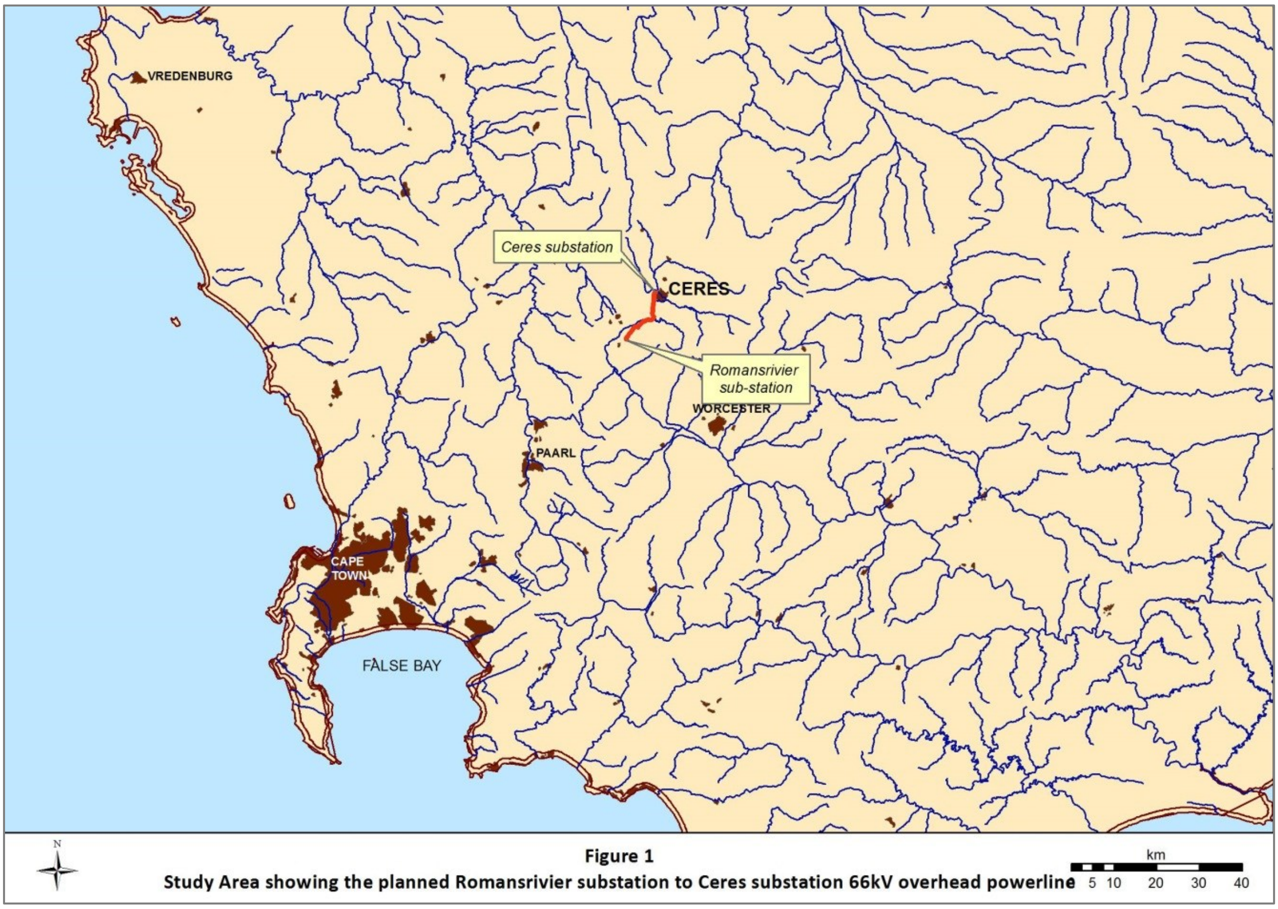


**Figure 1**
**Study Area showing the planned Romansrivier substation to Ceres substation 66kV overhead powerline**

# 2 DESCRIPTION OF THE PROPOSED PROJECT

The project considered in this study includes the following components, all of possible relevance to the freshwater ecosystems assessment, namely:

- Installation of [1]around 61 new electricity pylon support structures along a roughly 20km distance, aligned in proximity to the existing alignment of the (in places) damaged 66 kV woodpole transmission lines. Assumptions around pole structures are as follows, based on discussions with SRK as well as input from ESKOM:
    - The actual number of support structures may change during the detailed design phase of this project, subject to ecological input as specified in the BAR
    - Structures would be up to 40m in height;
    - Structures 2, 3 and 5-7 would comprise steel monopoles. The existing monopoles would be replaced with new steel monopoles;
    - Structures 1 and 4 would comprise (existing) steel gantries within the Romansrivier substation;
    - Structures 8 – 68 would predominantly comprise (new) steel lattice structures and limited steel monopoles, as follows:
        - Total (worst case) construction footprint per tower (including construction, stockpiles of soil, working space, vehicle space): 15m x 15m;
        - Worst-case foundation per pole (four per tower): 2.9m (width) x 2.9 (length) x 4.5m (depth);
- Support structures would require concrete for foundations and cement/sand mixture for finishing foundation. – this would be mixed on / near to each site and / or ready mix trucks could be used – concrete could be piped up to 200m to reach the towers;
- Laydown areas – these would need to be within 8-10m of each tower;
- Tools containers would be required close to certain (unspecified) towers, to service adjacent, less accessible towers;
- Site camps: – two teams of up to 80 workers are envisaged (email of Madre Delport (Eskom) to Amy Hill (SRK) of 28 July 2017). Site camps would include materials stores, waste, ablutions, offices – but would not include any accommodation of workers;
- Lay-down areas must be allowed for, and helicopter-assisted poles would require a high concentration of workers;
- It is assumed that workers would access helicopter-assisted poles on foot, during construction, from the nearest road access point;
- Construction of access roads for some of the proposed support tower locations – approximately 44 of the new structures currently proposed would require new access roads / upgrading of existing tracks. Based on discussions with Eskom, it is assumed that these roads would not be surfaced (that is, no tar or gravel lining etc.), and would comprise rough tracks, maintained over time to allow maintenance access. During the construction phase, they would generally need to allow access by trucks carrying heavy loads (mainly the support pole structures and concrete);

[1] Note that although 68 support structures are shown in Figures 2-6, the seven closest to the Romansrivier substation will not be replaced - existing mono poles would be used. **Moreover, the actual number of support structures may change during the detailed design phase of this project, subject to ecological input as specified in the BAR**.

- Construction river crossings over the Dwars River main stem between proposed support structures 49 and 50[2] and over the Tierhokkloof River between structures 39 and 40 - Preliminary engineering designs provided by Element Engineers indicate that these would be low-level structures to convey minor river flows through pipes and allow for regular overtopping of the structures in significant flood events. The conceptual design for a typical river crossing of the service road would entail stormwater conduits perpendicular to the flow direction. These conduits/pipes should be encased in mass concrete with a reinforced concrete slab to cover them. Earth embankments on the river banks would follow the service road alignment to tie the low-level structure in with the vertical alignment of the service road. Typically, two 900 mm diameter stormwater pipes, centre-aligned with the main stream, with two 750 mm diameter stormwater pipes adjacent to 900mm diameter pipes would be required. The minimum width of the low-level structure, perpendicular to flow, would be approximately 5m. The minimum height would be approximately 1.3 m from the invert level of the pipes to the top of the cover slab. On either side of the structure, gabions and/or reno-mattresses would serve as erosion/scour protection for the approaches/embankments of the service road. These low-level structures cannot be constructed with stone pitching or rip-rap, as the available energy during flood events easily displaces individual components. Hence the use of gabions, reno-mattresses and concrete structures are proposed. The design concept document notes that although the size of structure can be optimised for specific sites and topographies, the underlying purpose of these low-level structures is to convey low flows (minor floods) through conduits/pipes and to allow safe overtopping during bigger flood events (photos A and B have been provided by the design engineers as examples);
- Construction of several new access road crossings over other smaller watercourses (excluding the seep crossing to access poles 64 and 65), using pipe culverts and/or rock fill with bidem and 3mm crush material or subbase (M.Hendrikse, Eskom , comment on 1st draft of this report). : The following crossings are currently envisaged:
  - Between structures 23 and 25;
  - Between structures 49 and 48;
  - Between structures 51 and 50;
- For the road to access structures 64 and 65 - The conceptual road design indicates crossing of the channeled portion of the watercourse with a "suspension bridge" up to 5m wide, which would comprise concrete blocks on either side of the channel, to which would be attached precast concrete beams, spread across the channel (email of M. Delport, Eskom, 19 July 2017 to M. Law, SRK) (see Photo C for rough illustration);
- Crossing of several watercourses along existing access routes – in some cases, construction of pipe culvert crossings or formalizing existing low-level crossings may be required (e.g. along the road between structures 9 and 10) and to access structure 20 (and adjacent structures) from the R43;
- Helicopter access to 6 of the proposed transmission towers for construction and maintenance;
- Stringing of transmission lines, necessitating crossing of several watercourses – note that clearing of vegetation would not be required for stringing along the proposed alignment (Eskom comment on the first draft of this report);
- Decommissioning of the existing 66 kV wood pole line; and

4

- Long-term maintenance of access roads, crossing points and vegetation to allow continued access to the transmission lines for maintenance and repairs.

Photo A
Example of low level crossing
(photo by Element Engineers)

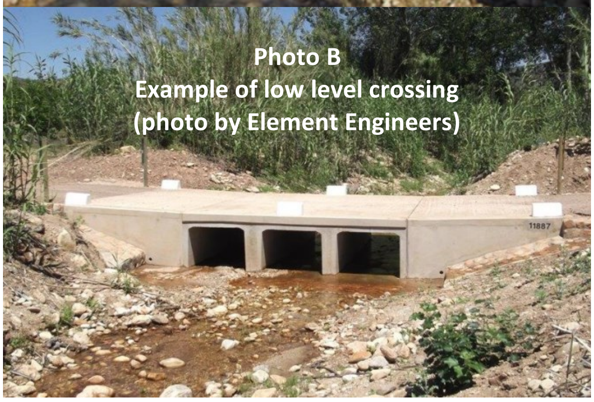

Photo B
Example of low level crossing
(photo by Element Engineers)

Photo C
Illustration of a suspension bridge (photo provided by Element Engineers)

**Figures 2 to 6** show the alignments of the proposed transmission lines and access roads, as well as the proposed locations of the various support structures. The figures show both the original locations of the support structures and those proposed for final consideration in the Basic Assessment, following iterative mitigation input into the project by various specialists including both specialists engaged on the Basic Assessment team, and Eskom's technical engineering and other specialists engaged in project design and development.

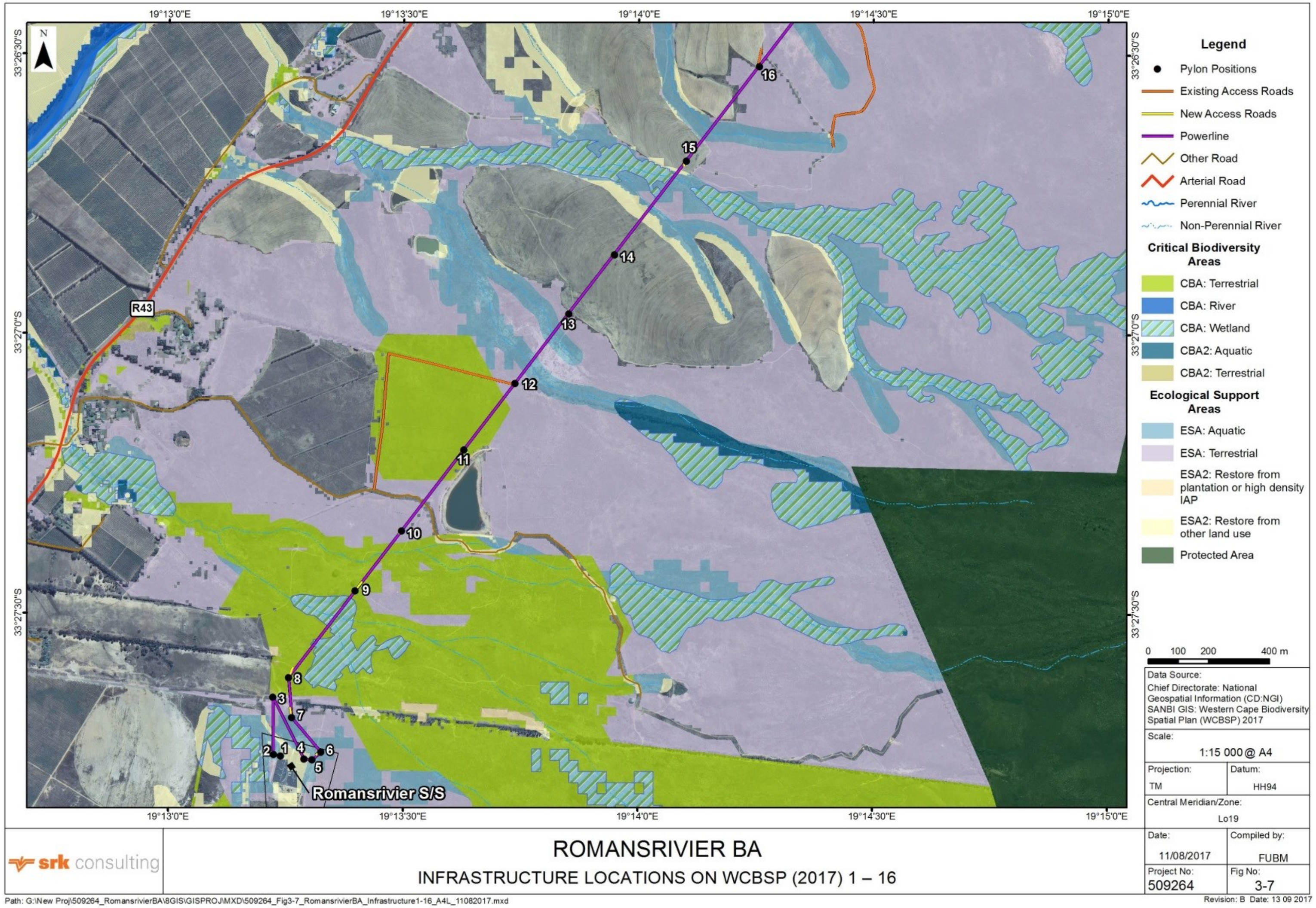


**Figure 2**

**Map showing the proposed alignment of the new 66 / 132 kV double circuit distribution line between Romansrivier and Ceres substations, with original ("old") and amended ("new") positions of support structures / poles. Figure courtesy of SRK Consulting. Critical Biodiversity Data as presented in the Witzenberg Municipality Biodiversity Plan. Structures 1-16**

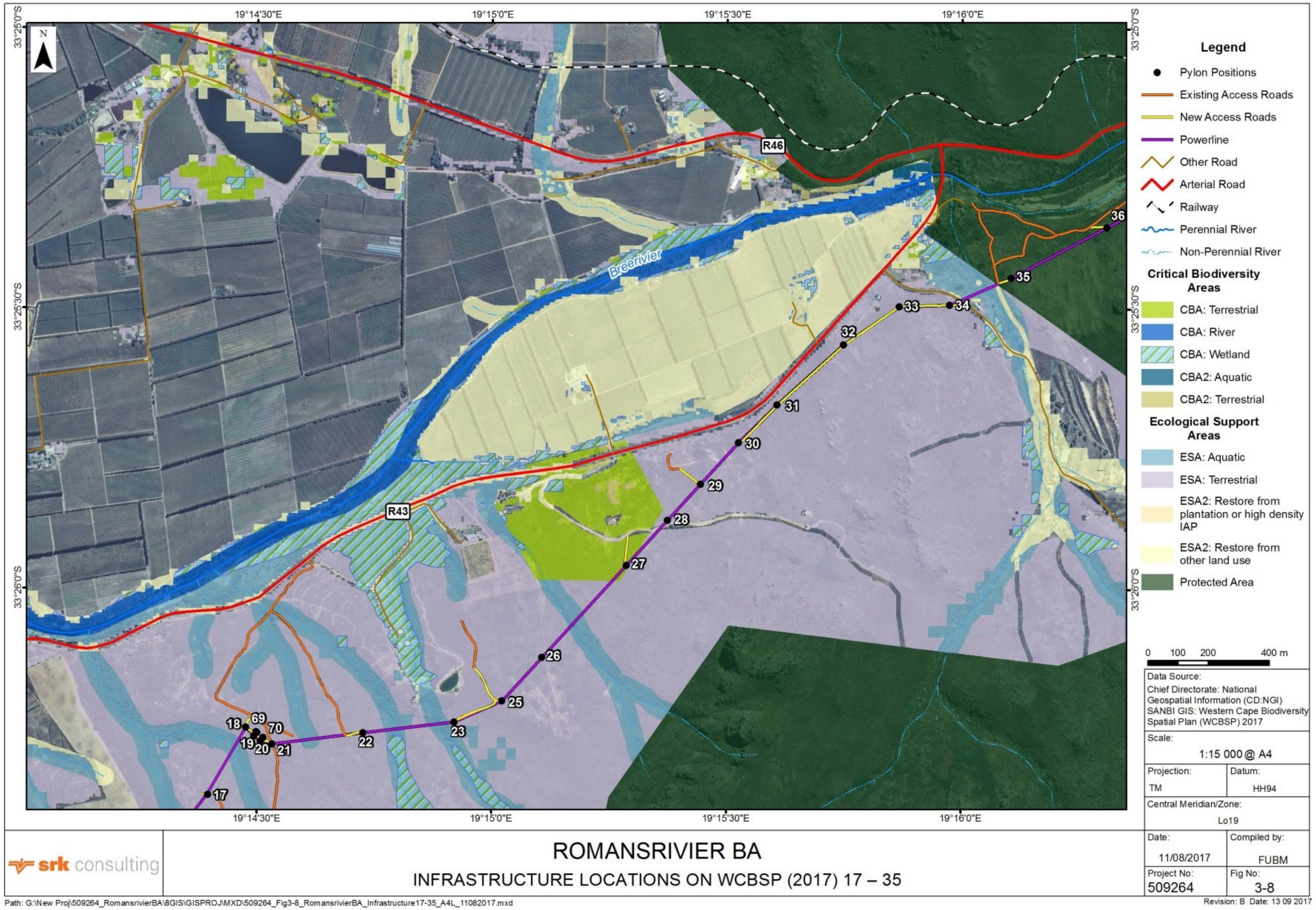


**Figure 3**

**Map showing the proposed alignment of the new 66 / 132 kV double circuit distribution line between Romansrivier and Ceres substations, with original ("old") and amended ("new") positions of support structures / poles. Figure courtesy of SRK Consulting. Critical Biodiversity Data as presented in the Witzenberg Municipality Biodiversity Plan. Structures 17-36**

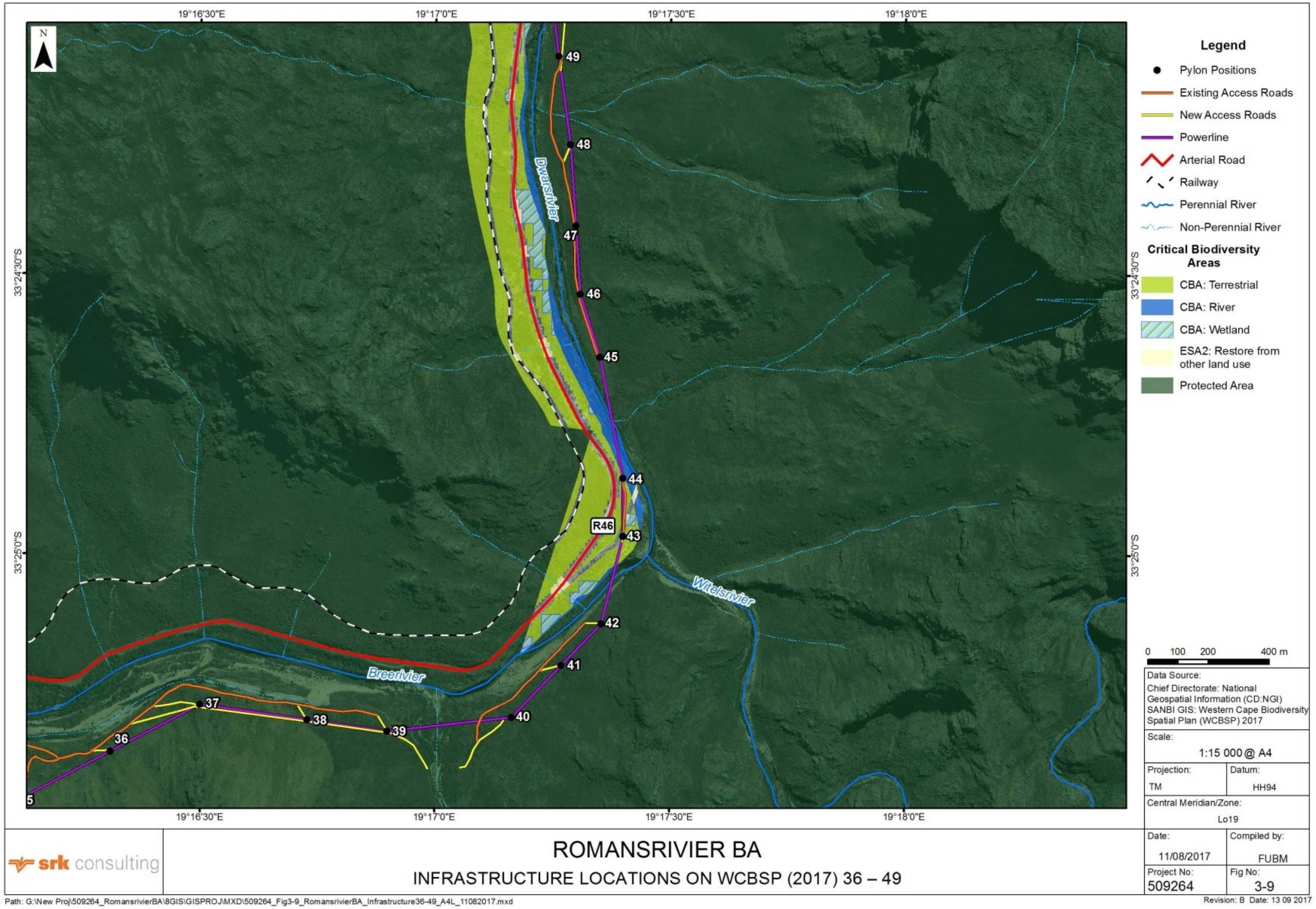


**Figure 4**

**Map showing the proposed alignment of the new 66 / 132 kV double circuit distribution line between Romansrivier and Ceres substations, with original ("old") and amended ("new") positions of support structures / poles. Figure courtesy of SRK Consulting. Critical Biodiversity Data as presented in the Witzenberg Municipality Biodiversity Plan. Structures 36-49**

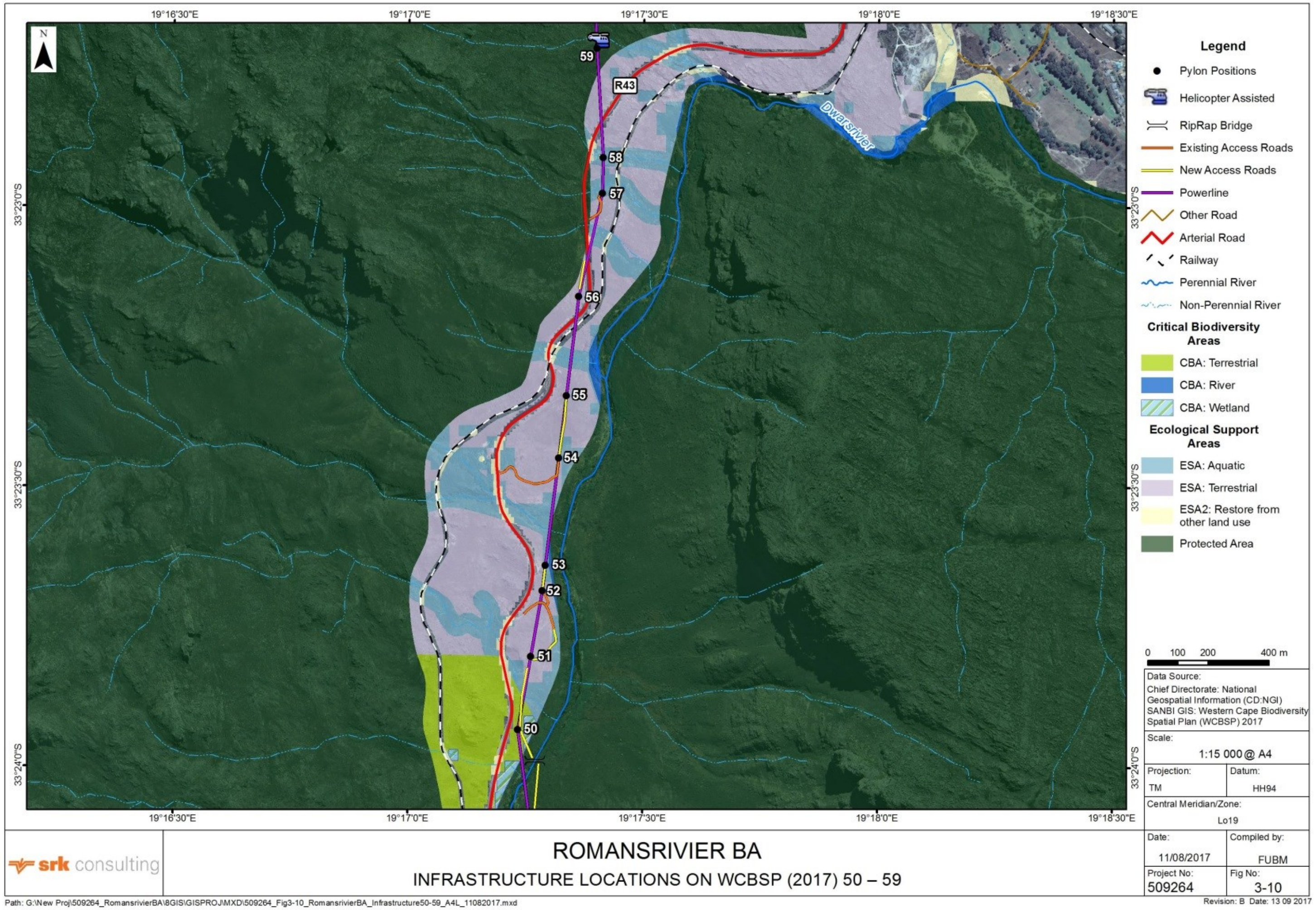


**Figure 5**

**Map showing the proposed alignment of the new 66 / 132 kV double circuit distribution line between Romansrivier and Ceres substations, with original ("old") and amended ("new") positions of support structures / poles. Figure courtesy of SRK Consulting. Critical Biodiversity Data as presented in the Witzenberg Municipality Biodiversity Plan. Structures 50-59**

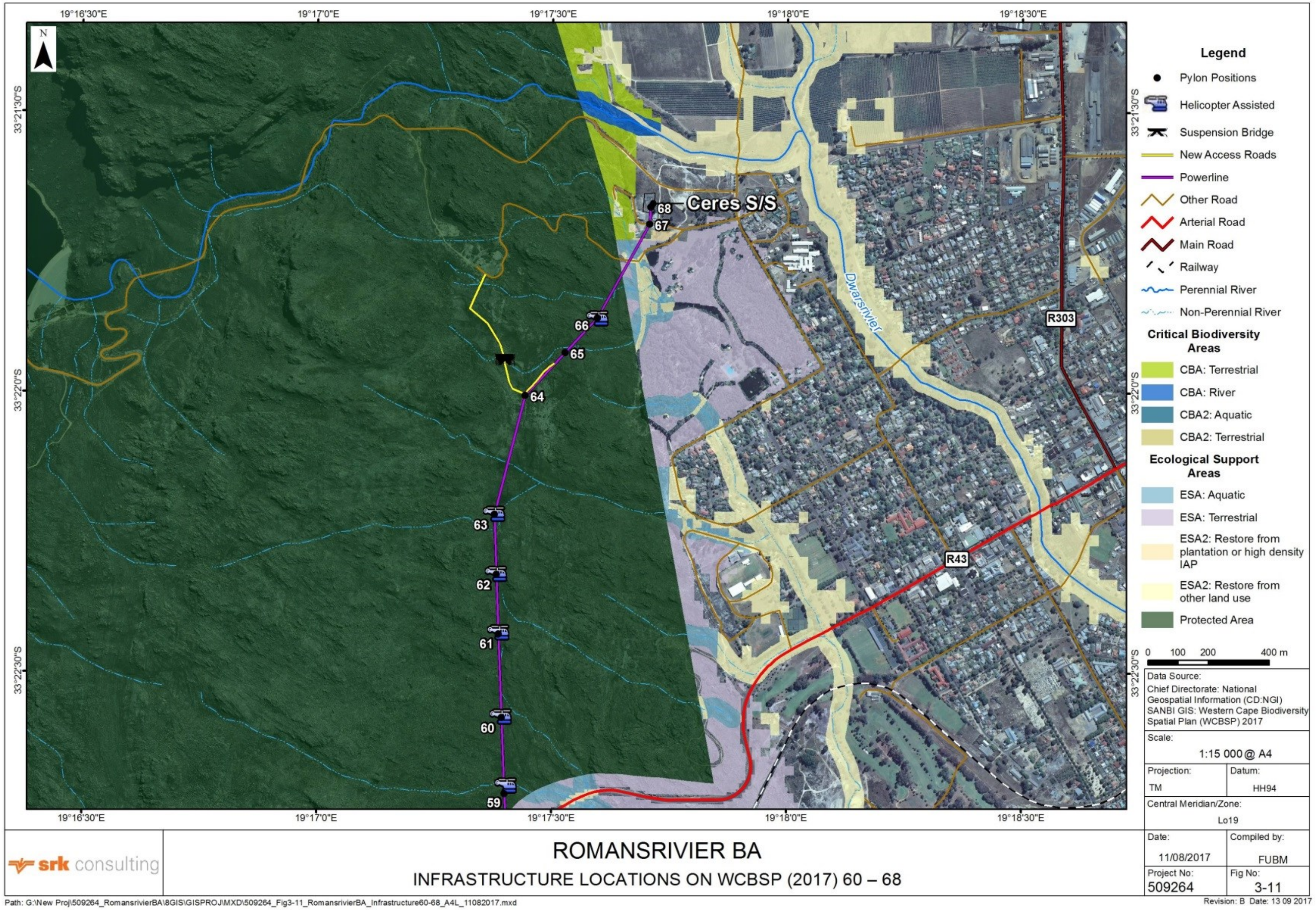


**Figure 6**

**Map showing the proposed alignment of the new 66 / 132 kV double circuit distribution line between Romansrivier and Ceres substations, with original ("old") and amended ("new") positions of support structures / poles. Figure courtesy of SRK Consulting. Critical Biodiversity Data as presented in the Witzenberg Municipality Biodiversity Plan. Structures 59-68**

# 3 DESCRIPTION OF THE AFFECTED ENVIRONMENT

## 3.1 Catchment context

The 66/132kV double-circuit line and support towers proposed for assessment in this study would be located in the **Upper Breede River catchment** (Department of Water and Sanitation (DWS) 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 7** shows the major rivers within this catchment in the vicinity of the proposed power line alignments, using river data drawn from the national 1:500 000 rivers cover, as provided by the National Freshwater Ecosystems Priority Area (NFEPA) datasets. **Figure 8** shows a close-up view of the alignment, with regard to affected sub-catchments, for ease of reference in Water Use License or Registration approaches for the Department of Water and Sanitation (DWS).

The proposed powerline would pass through sections of three quaternary catchments, shown in **Figures 7 and 8**, comprising H10F, H10D and H10C. Of these, H10C is drained primarily by the Koekedou River, which passes into Ceres town from the west, and joins the Dwars River within the town boundaries. H10D is drained primarily by the Witels River and its tributaries, which enter the Dwars River from the west, downstream of Ceres town. H10F is the quaternary in which the Romansrivier substation itself is located, and this quaternary is drained primarily by the Wabooms River from the south east and the Wit River from the north west, both of which also enter the Dwars River, which is however known as the **Breede River** downstream of the confluence of the major Witels River and Tierhokkloof River tributaries.

Support structures 35 - 58 (**Figures 3-5**) directly abut the main stem of the Dwars (Breede) River.

## 3.2 Ecoregion context

The whole proposed powerline alignment would be located within the Western Folded Mountains Ecoregion (Ecoregion 23) (see **Figure 7**). 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.

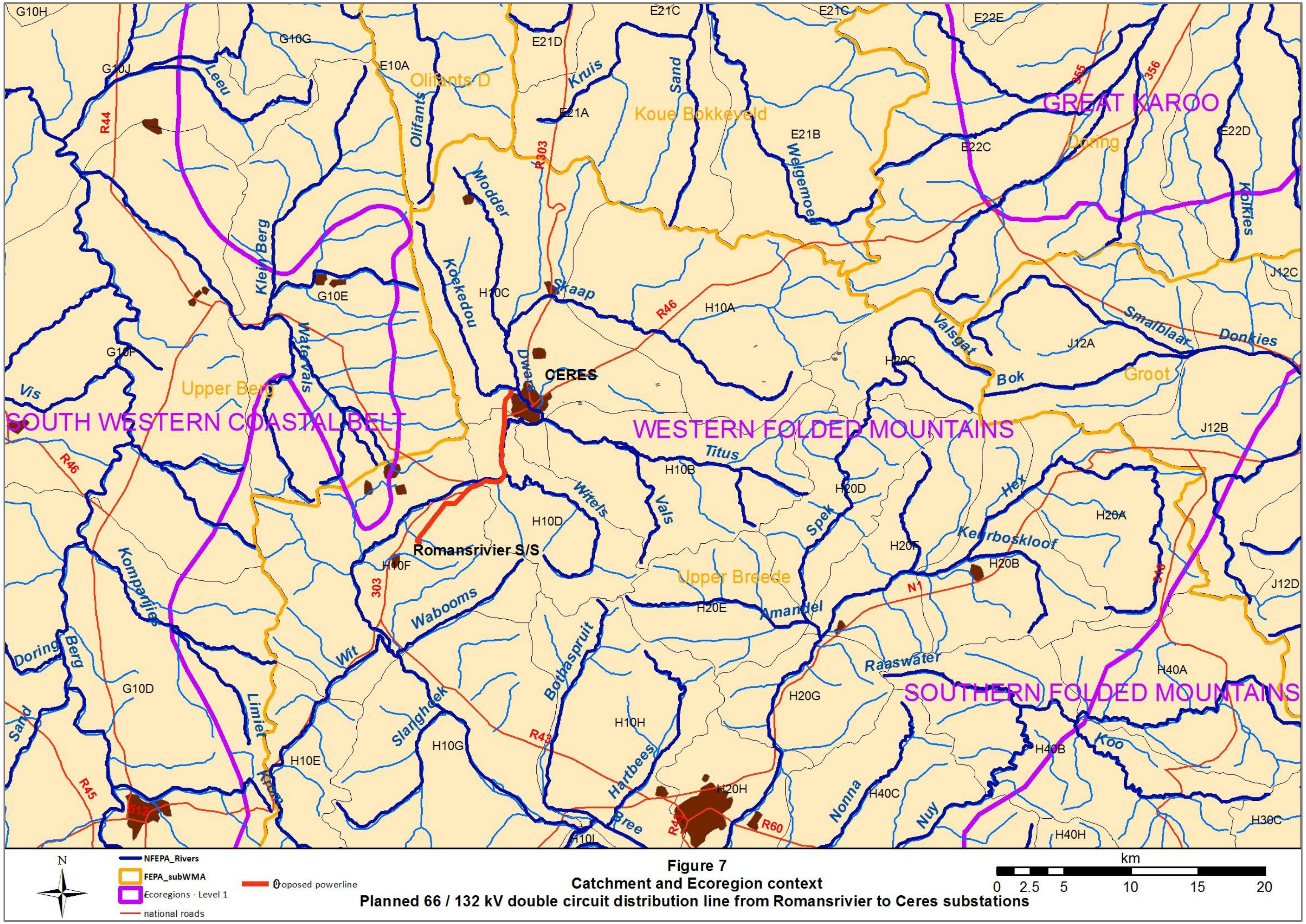


Figure 7
Catchment and Ecoregion context
Planned 66 / 132 kV double circuit distribution line from Romansrivier to Ceres substations

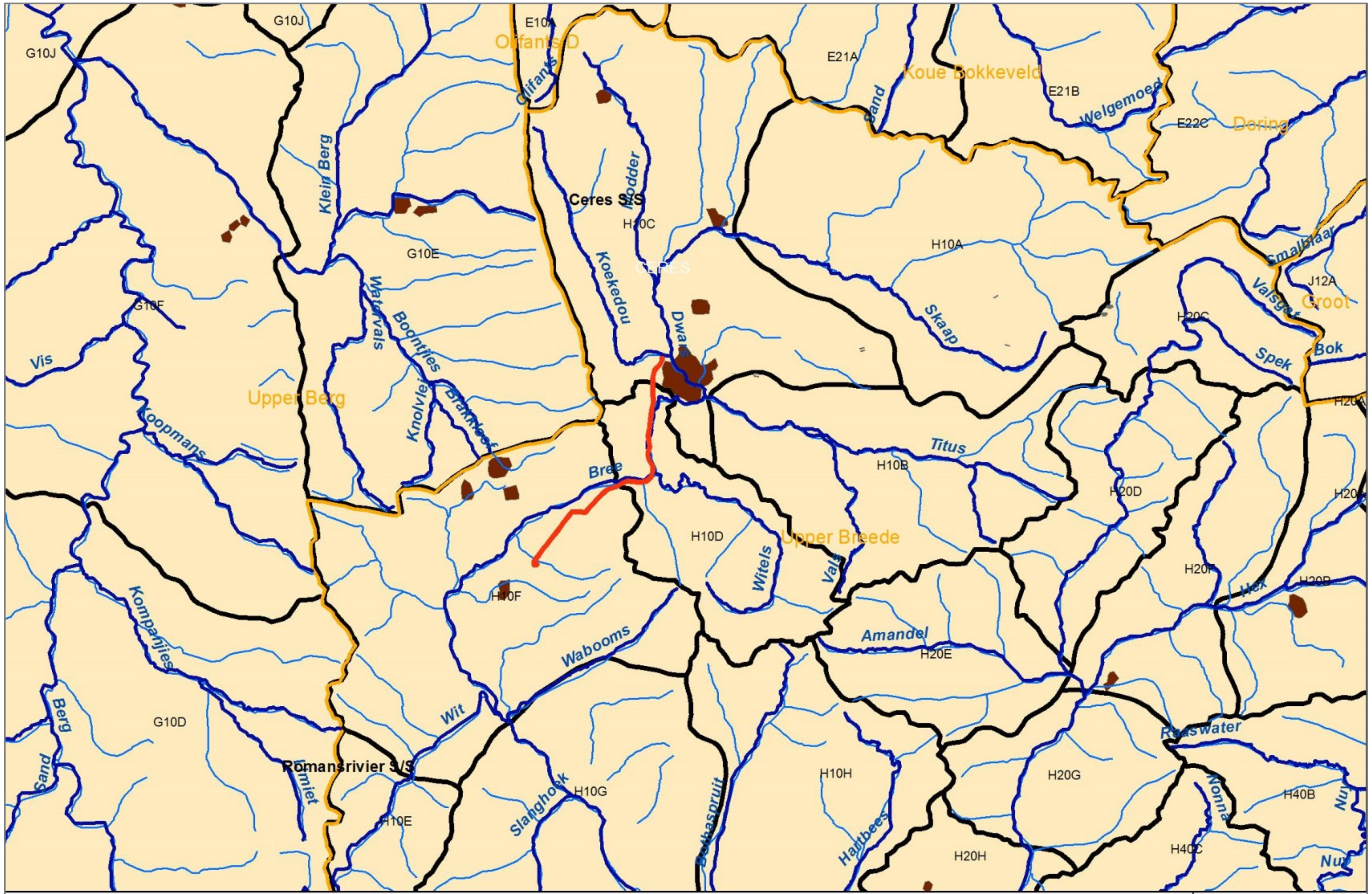


**Figure 8**
**Catchment Context**
**Planned 66/ 132 kV double circuit distribution line from Romansrivier to Ceres substations**