RIETRUG WIND ENERGY FACILTY AND GRID CONNECTION, NORTHERN & WESTERN CAPE PROVICES

AQUATIC PRE-CONSTRUCTION WALKDOWN REPORT

FINAL

FOR

Nala Environmental (Pty) Ltd

BY

EnviroSci (Pty) Ltd

Dr Brian Colloty

1 Rossini Rd
Pari Park
Gqeberha
6070

DATE

30 November 2022

REVISION 1

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Report prepared by: Dr. Brian Colloty Pr.Sci.Nat. (Ecology) / Member SAEIES.

Expertise / Field of Study: BSc (Hons) Zoology, MSc Botany, Ph.D Botany Conservation Importance rating and interior wetland / riverine assessment consultant from 1996 to present. Brian has also been working in the study region for the last 10 years, with respect to various renewable projects in the greater region as well as mining and road upgrade related projects.

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

Signed:… …… Date:…30 November 2022……

Appendix 1 of this report contains a detailed CV

1. INTRODUCTION

Nala Environmental (Pty) Ltd appointed EnviroSci (Pty) Ltd to conduct the pre-commencement walkdown of the proposed final layout and alignment for the authorised Rietrug Wind Energy Facility (WEF) and grid connection to the Koring Main Transmission (MTS)(Figure 1).

This assessment was based on a 4-day walk-down of the current site layout and grid corridor provided, conducted in April 2022. The aim of this walk-down was to confirm any sensitive aquatic ecological features that may be affected by the revised layouts and provide the engineering team with additional information to further avoid and/or reduce the potential impacts on the aquatic environment. An additional site visit was also conducted in July 2022, due to additional changes to the MTS connection, that formed part of this assessment, and the Water Use License that has been submitted (October 2022).

Further, the layout/alignment will also be adjusted based on additional input provided by the Bat, Avifaunal and Heritage specialists, and this report should be read in conjunction with those reports to contextualise the overall constraints provided to the development team.

1.1 Aims and objectives

- Conduct a pre-commencement ecological (aquatic) walk-through survey / assessment of the development areas (including alignment for grid connection to Koring MTS):
  - Provide a professional opinion on ecological issues relating to the aquatic environment within the footprint areas to optimise the layout;
  - Report on the presence of potential wetlands that could be affected and where the relevant mitigation measures need to be implemented, if needed;
  - Serve as additional ecological information for the Proponent, contractors and Environmental Control Officers (ECOs) and/or Environmental Officers (EOs) involved in the development, i.e. demarcated no-go areas before construction starts.
- This is also to facilitate micro-siting of footprint areas, where possible and by taking cognisance of other constraints, with the aim to further reduce negative impacts of the development.
- Aid in future decisions and environmental management regarding the project.

1.2 Assumptions and Limitation

To obtain a comprehensive understanding of the dynamics of both the flora and fauna of the aquatic communities within a study site, as well as the status of endemic, rare or threatened species in any area, assessments should always consider investigations at different time scales (across seasons/years) and through replication. No long-term monitoring was undertaken as part of this assessment. However, a concerted effort was made to assess the entire site, as well as make use of any available literature, species distribution data and aerial photography. The EIA and walkdown assessments were also conducted in peak rainfall/flowering seasons, so the results of this assessment are provided with a high level of confidence.

It should be emphasised that information, as presented in this document, only has reference to the study area as indicated on the accompanying maps. Therefore, this information cannot be applied to any other area without detailed investigation.

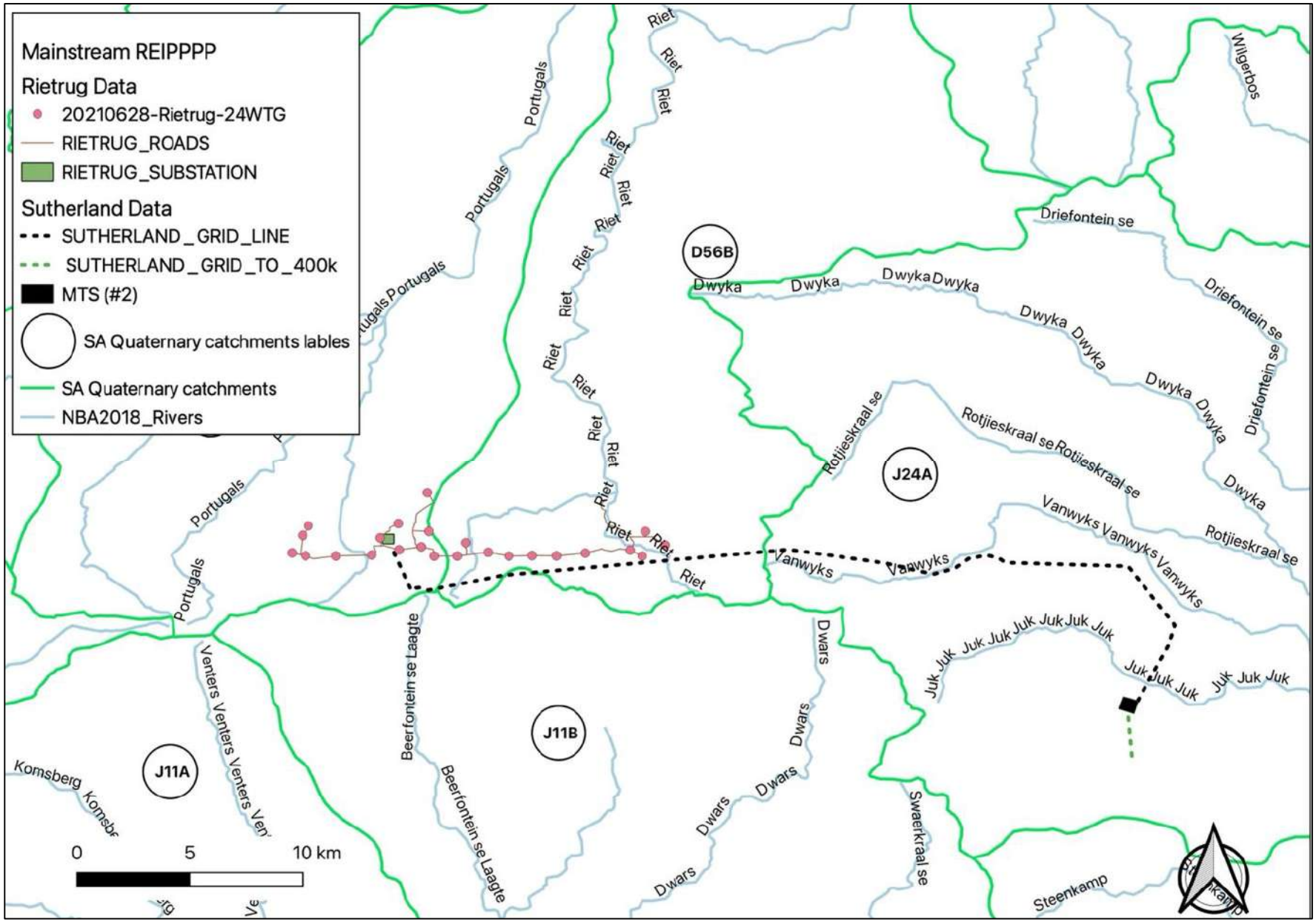

Figure 1: The proposed project layouts used in the walk-down assessment conducted in April 2022 and associated grid connections in relation to the respective quinary catchments and mainstem rivers

2. PROJECT DESCRIPTION

Rietrug Wind Farm (Pty) Ltd received an Environmental Authorisation (EA) (DFFE Ref: 12/12/20/1782/1), dated 10/11/2016, for the development of a 140MW Wind Energy Facility (WEF) and associated infrastructure near Sutherland, and located within the Komsberg Renewable Energy Development Zone (REDZ), in the Northern Cape Province, with further amendments to the EA as stated below:

- Replacement of the first issue EA Reference: 12/12/20/1782/1 issued on: 10 November 2016;
- First Amendment - Amendment of Listed activities on the EA Reference: 12/12/20/1782/1/AM1 issued on 25 November 2016;
- Second Amendment – Amendment of turbine specifications & change of technical details of the proposed facility EA Reference: 12/12/20/1782/2/AM2 issued on: 25 August 2017;
- Third Amendment - Change in contact details of the holder of the EA & selected project description changes EA Reference: 12/12/20/1782/1/AM3 Issued on: 10 March 2020;
- Fourth Amendment – Name correction EA Reference: 12/12/20/1782/1/AM4 issued on 27 July 2021; and
- Fifth Amendment - Amendment to the co-ordinates of the access road EA Reference: 12/12/20/1782/1/AM5 issued on 06 December 2021.

The project will include (as authorised):

- Up to 37 wind turbines with a height of up to 200m and rotor diameter of up to 200m;
- The wind turbines will be connected to another by means of medium voltage cable;
- An internal gravel road network will be constructed to facilitate movement between turbines on site; These roads will include drainage and cabling;
- A hard standing laydown area of a maximum of 10 000 m^2 will be constructed;
- A temporary site office will be constructed on site for all contractors, this would be approximately 5000m^2 in size; and
- A 10km portion of the existing access road will be upgraded and widened to a width of 7 m, to facilitate abnormal loads to the Sutherland WEF site.

The properties associated with the Rietrug WEF include:

- Portion 1 of Beeren Valley Farm 150;
- Remaining Extent of Beeren Valley Farm 150; and
- Remaining Extent of Nooitgedacht Farm 148.

Rietrug Wind Farm (Pty) Ltd will also share the on-site Acrux substation, located on the adjacent Sutherland WEF site.

Rietrug Wind Farm (Pty) Ltd also received EAs for a new proposed onsite substation and associated electrical grid infrastructure, issued on 14 March 2022, for the Sutherland WEF in the Northern Cape Province of South Africa. The EA for the onsite substation has been split into an Independent Power Producer (IPP) Portion (EA Reference: 14/12/16/3/3/1/2458), Switching Station Portion and 132kV powerline (EA Reference: 14/12/16/3/3/1/2457/AM1). Both will be included in the layout for the Rietrug WEF for completeness and to demonstrate its connection to the National Grid. The authorised Rietrug WEF and Sutherland WEF are located adjacent to each other and will operate as a cluster.

The infrastructure associated with the IPP Portion of the on-site substation (DFFE Ref: 14/12/16/3/3/1/2458) is located on Remaining Extent of Nooitgedacht Farm 148 and includes:

- IPP Portion of the on-site substation (Acrux);
- Laydown area;
- Operation & Maintenance Building;
- Fencing of the proposed on-site substation; and
- Battery Energy Storage Infrastructure (BESS).

The infrastructure associated with the Switching Station portion of the on-site substation and 132kV Powerline is located on Remaining Extent of Nooitgedacht Farm 148 (DFFE Ref: 14/12/16/3/3/1/2457/AM1) and includes:

- Switching Station portion of the on-site substation;
- Fencing;
- 132kV Powerline from the proposed Sutherland WEF on-site substation to the third party Koring MTS, including tower/pylon infrastructure and foundations;
- Connection to the Koring MTS third party substation;
- Service road below the powerline; and
- Switching Station portion of the on-site substation.

The Rietrug WEF will also consider the EA for Electrical Grid Infrastructure that supports the Sutherland, Sutherland 2 and Rietrug WEF projects, Northern & Western Cape Provinces (Ref; 14/12/16/3/3/1/2077/AM2), authorised within a 500m grid corridor.

The infrastructure associated with the electrical grid infrastructure project includes:

- Koring MTS, including O&M building and laydown area;
- Fencing of the proposed on-site substation
- Overhead 132kV powerline from the Sutherland WEF on-site substation to the Koring MTS;
- Overhead 400kV powerline connecting to the proposed 400kV Koring MTS and an existing 400kV Eskom powerline; and
- Service roads will be constructed below the powerline (jeep tracks).

The properties associated with the Electrical Grid Infrastructure to support the Rietrug WEF includes:

- Remaining extent of Hartebeeste Fontein Farm 147;
- Remaining Extent of Nooitgedacht Farm 148;
- Remaining Extent of Beeren Valley Farm 150;
- Portion 1 of Farm 219;
- Remaining extent of Farm 219;
- Remaining extent of Farm 280;
- Portion 1 of Rheebokkenfontein Farm 4;
- Portion 2 of Rheebokkenfontein Farm 4;
- Portion 2 of De Molen Farm 5;
- Portion 6 of Hamelkraal Farm 16;
- Portion 7 of Farm Hamelkraal 16; and
- Remainder of Spitzkop Farm 20

The Rietrug WEF has been awarded preferred bidder status in round 5 of the Renewable Energy IPP Procurement Programme (REIPPPP) and in order to meet financial close requirements and comply with the requirements of the EA (as amended), as per condition 16 and 18 which specifies that the applicant must submit a Final Layout plan and EMPr to DFFE for written approval prior to commencement of the activity.

Nala Environmental (Pty) Ltd has been commissioned to undertake the Final Layout plan and EMPr approval process associated with the authorised WEF and its authorised grid infrastructure. As per the conditions of the relevant EAs, various specialist pre-construction walk-downs have been undertaken to inform the placement of infrastructure for the Final Layout (including alignment for grid connection).

3. RESULTS

The study area (Figure 1) contained a variety of aquatic features, associated with systems found within the greater region and these were as follows:

1. Non perennial rivers with or without riparian vegetation. These ranged from narrow channels to broader flood plain areas in the lower valleys. However, broad riparian zones were only found within the lower valley areas, dominated by a small number of trees, while obligate instream vegetation is limited to a small number of sedges (nut grasses) and grasses. Several of these will need to be spanned by the proposed access and internal roads (Plate 1)
2. Minor drainage lines (Plate 2), with no obligate aquatic vegetation.
3. Dams with no wetland or aquatic features mostly used for watering of livestock.
4. Pans/Depressions wetlands (Plate 3)
5. Valley Bottom Wetlands (Plate 4)

The WEF project and grid connection span various Quinary Catchments that form the divide between the Nama Karoo and Great Karoo Ecoregions. The WEF components are all located within the Orange Water Management Area, while the later portion of the grid connection is located in the Breede Gouritz Catchment Management Agency.

Further, the study area was included in the National Freshwater Ecosystems Priority Areas (NFEPAs) as Upstream FEPAs. None of the proposed WEF and/or grid connection infrastructure / are located within a Groundwater Strategic Water Resource Areas, or a National Wetland Cluster (NSBA, 2018).

Figure 2 below indicates the available spatial data with regard to potential wetlands and/or riverine systems within the study area (van Deventer *et al.*, 2020). During the walk-down, the site was again ground-truthed, as well as compared to 1:50 000 topocadastral surveys mapping data and that which was observed on site (Figure 3). A baseline map was then refined using the 2022 walk-down survey data (Figure 4). This was also then compared to the associated Critical Biodiversity Areas (CBAs)_contained in the respective Northern and Western Biodiversity Spatial Maps (Figure 5), to ensure that, as far as possible, the proposed layouts (including grid connection alignment) have avoided any CBAs associated with the aquatic environment.

During the environmental assessment phase of the project, a proposed 50 m buffer was provided, and it was also determined in this walk-down assessment **that all of the proposed infrastructure for the WEF and grid connection development will avoid any of the delineated wetlands, including the 50m buffer**.

Several structures or portions of the facility and grid connection infrastructure are however located within the DWS 500m regulated zone, thus requiring a water use license. This process has been initiated by Rietrug Wind Farm (Pty) Ltd , and the attached Section 21 c & i Risk Assessment Matrix (RAM) (Appendix 2) indicates that all potential impacts would be low and that a **General Authorisation process could be followed**. However, during the process the final powerline towers / pylons located near the Koring MTS could not be moved outside an intact riparian system and the DWS RAM indicated a Medium impact rating, thus a Full WULA has been initiated for that portion of the grid connection alignment.

Plate 1: One of the broader systems with riparian vegetation that will be spanned by the proposed roads

Plate 2: A minor with little to no aquatic habitat, typical of the region

Plate 3: The large depression to the north of the site, that will be avoided by any infrastructure

Plate 4: Valley Bottom Wetland (Channelled) observed to the south of the WEF area

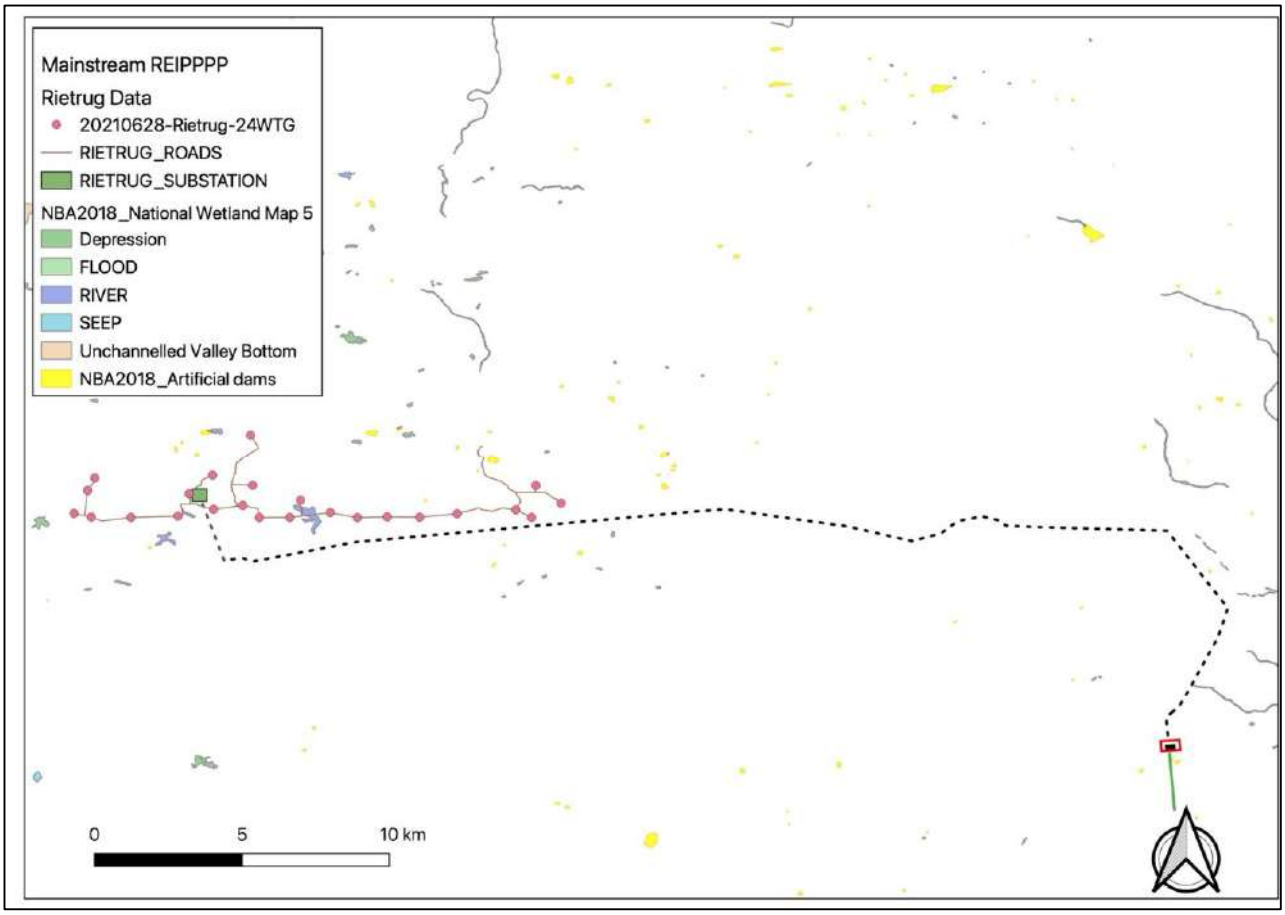

Figure 2: National Wetland Inventory wetlands and waterbodies (van Deventer *et al.*, 2020)

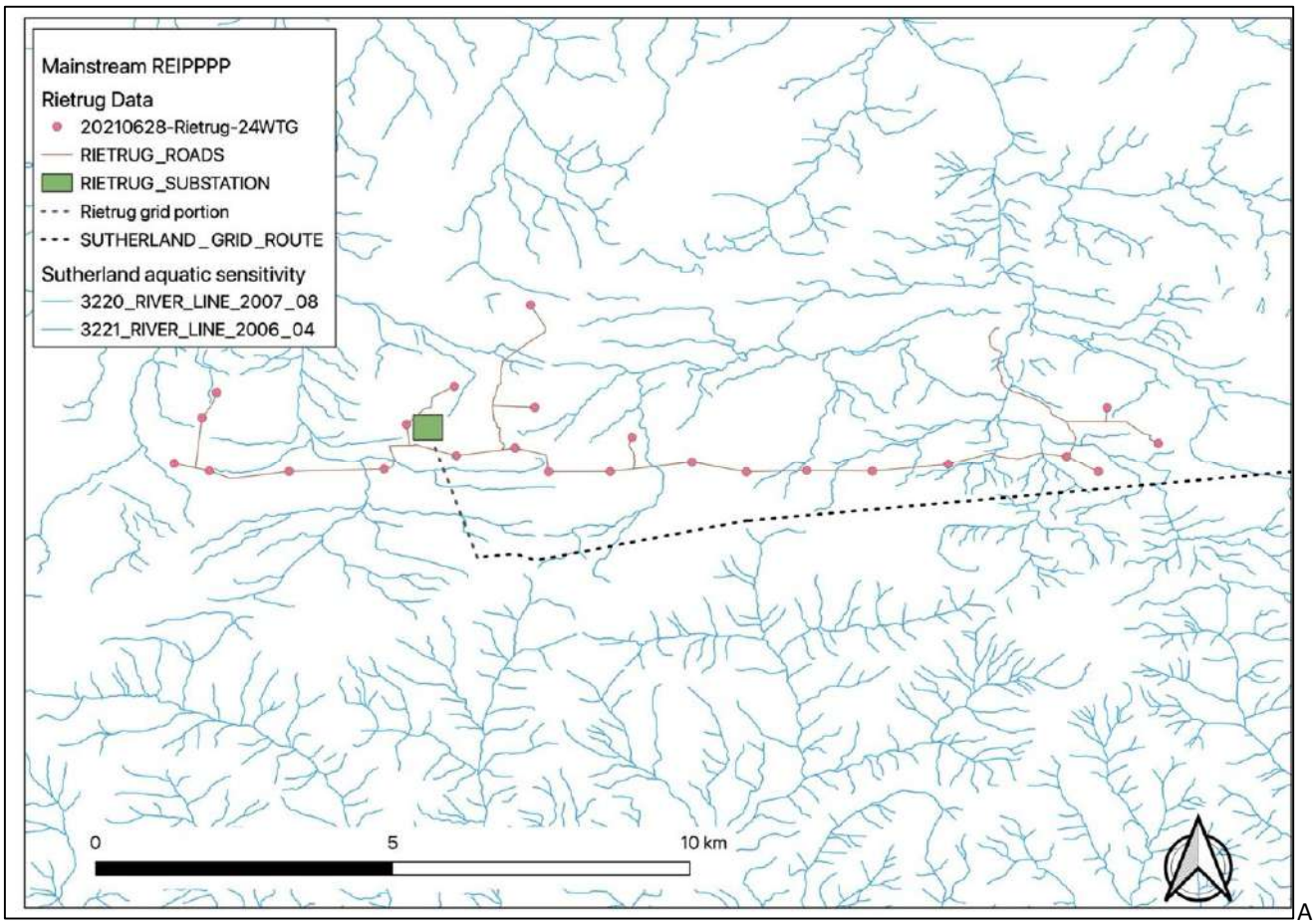

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Figure 3: Watercourses indicated by the 1:50 000 topocadastral NGI data

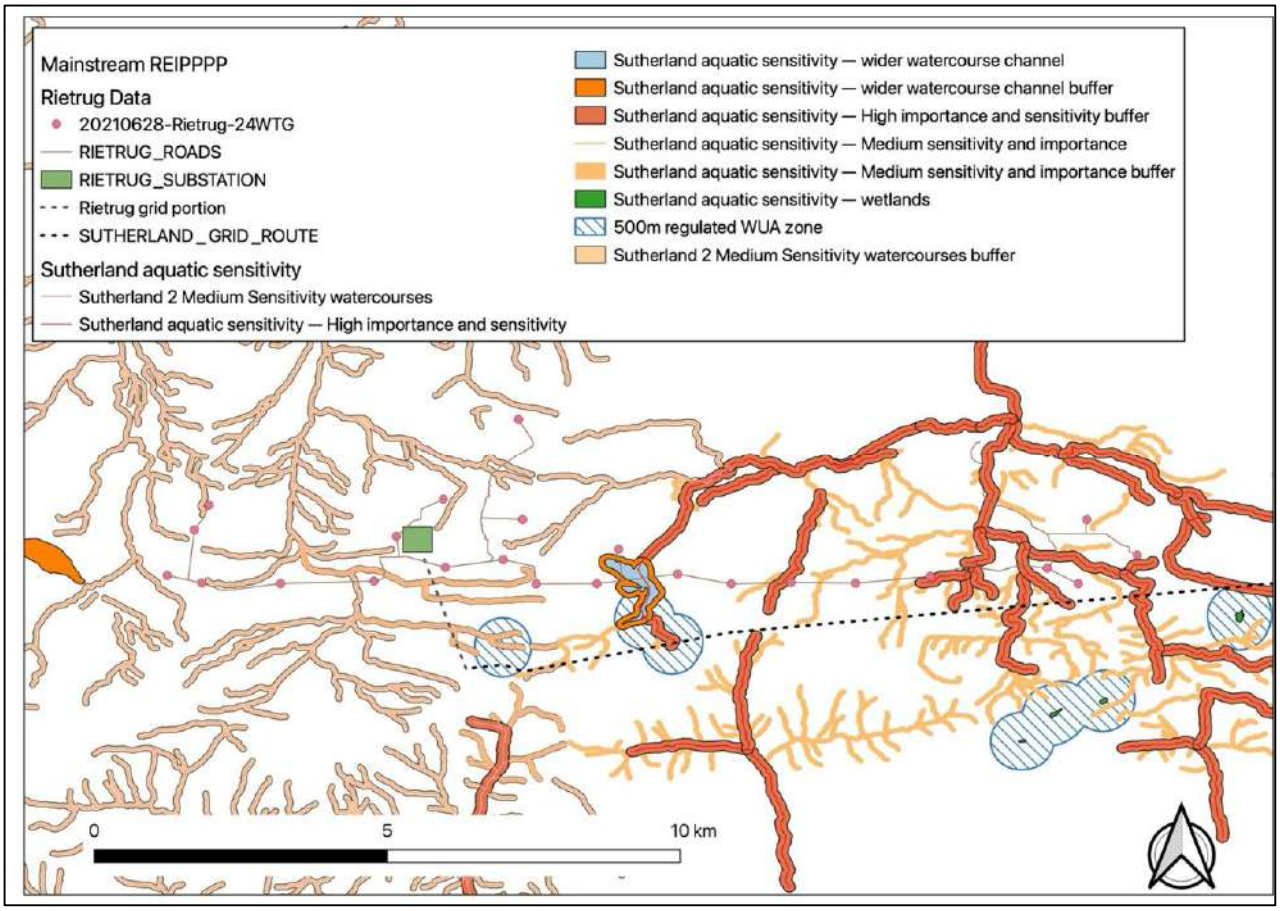


Figure 4: Confirmed and delineated waterbodies in relation to the proposed infrastructure as well as any of the regulated WUA areas

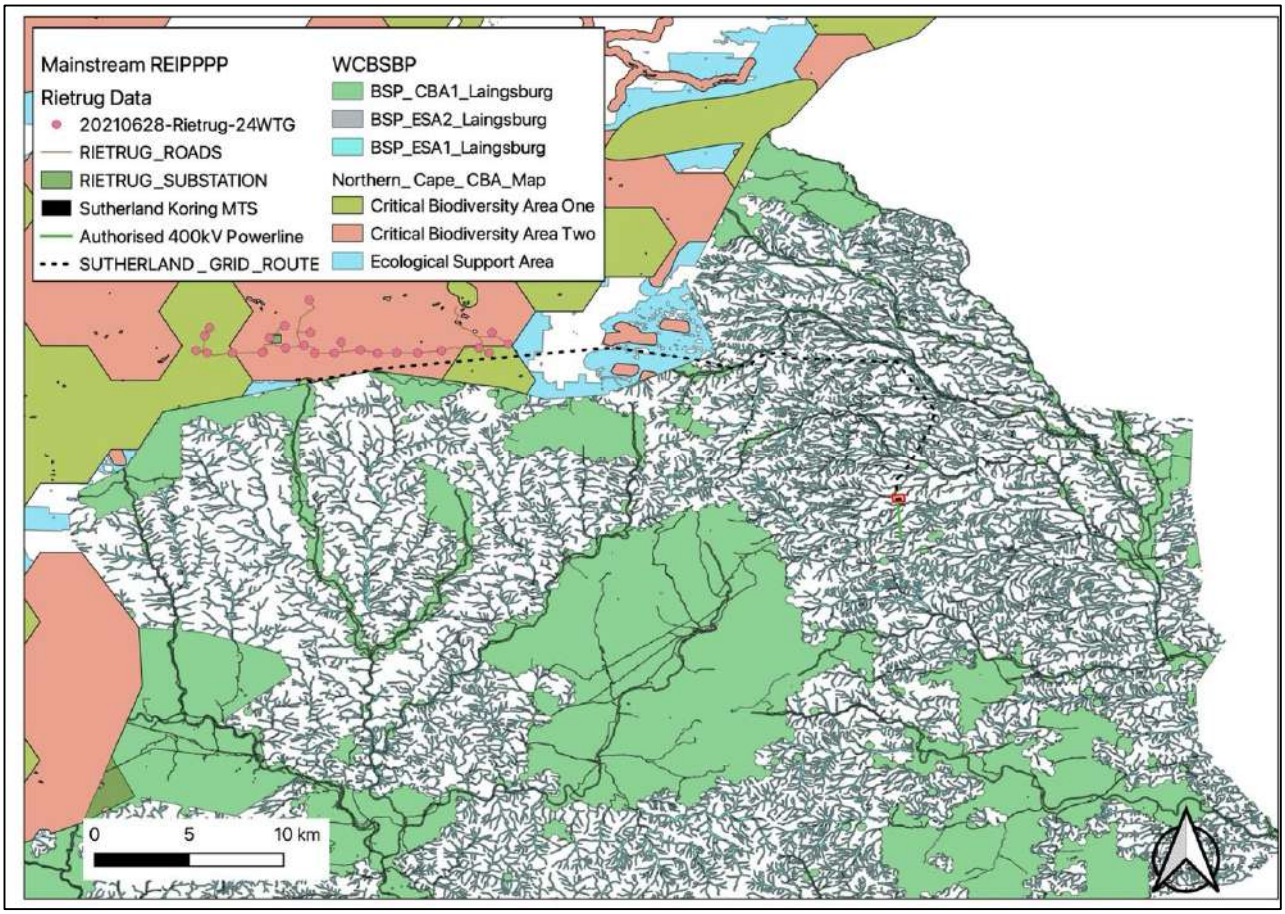


Figure 5: Northern and Western Cape Biodiversity Spatial Plans

The Present Ecological State (PES) of a river, watercourse or wetland represents the extent to which it has changed from the reference or near pristine condition (Category A) towards a highly impacted system where there has been an extensive loss of natural habit and biota, as well as ecosystem functioning (Category E).

The PES scores were revised for the country and based on newer models, aspects of functional importance as well as direct and indirect impacts have been included (DWS, 2014). The new PES system incorporates Ecological Importance (EI) and Ecological Sensitivity (ES) separately as opposed to Ecological Importance and Sensitivity (EIS) in the old model, although the new model is still heavily centred on rating rivers using broad fish, invertebrate, riparian vegetation and water quality indicators. The Recommended Ecological Category (REC) is still contained within the new models, with the default REC being B, when little or no information is available to assess the system or when only one of the above-mentioned parameters are assessed or the overall PES is rated between a C or D.

All the systems assessed by DWS (2014) on a Subquaternary level within the study area were rated as follows:

Subquaternary Catchment Number	Present Ecological Score (PES)	Ecological Importance (EI)	Ecological Sensitivity Score (ES)
7624	B	Medium	Low
7650	B	Medium	Very Low
7652	B	Medium	Very Low
7733	C	Low	Very Low
7720	A	Very High	Low
7778	A	Very High	Low

Where A = Natural, B = Largely Natural, C = Moderately Modified

Based on the information collected during the field investigations, these ratings are verified and upheld for the riverine systems. Overall, these catchment areas and subsequent rivers / watercourses are in a natural state with localised impacts in some areas, which include the following:

- Erosion and sedimentation associated with existing road crossings; and
- Impeded water flow due to several in channel farm dams or weirs.

The pans / depression and valley bottom wetlands, ranged from PES = B (Largely natural) to C (Moderately Modified), link to changes to their catchments being modified by agricultural encroachment.

4. SENSITIVITY MAPPING

Using the baseline description and field data while considering the current disturbances and site characteristics, the following features were identified, then categorized into one of number pre-determined sensitivity categories to provide protect and/or guide the layout planning and design processes of the corridor and a suitable alignment for the grid within. Aquatic sensitivity mapping categorizes feature or areas (with their buffers) into the following categories:

No Go	Legislated "no go" areas or setbacks and areas or features that are considered of such significance that impacting them may be regarded as fatal flaw or strongly influence the project impact significance profile
High	Areas or features that are considered to have a high sensitivity or where project infrastructure would be highly constrained and should be avoided as far as possible. Infrastructure located in these areas are likely to drive up impact significance ratings and mitigations
Medium	Buffer areas and or areas that are deemed to be of medium sensitivity
Low	Areas of low sensitivity or constraints
Neutral	Unconstrained areas (left blank in mapping)

Figure 6a & 6b below indicate the No-Go areas (pans and wetlands) and High sensitivity watercourses (broad watercourses) that have been avoided by the proposed layout options but discussed in further detail in Table 1 below:

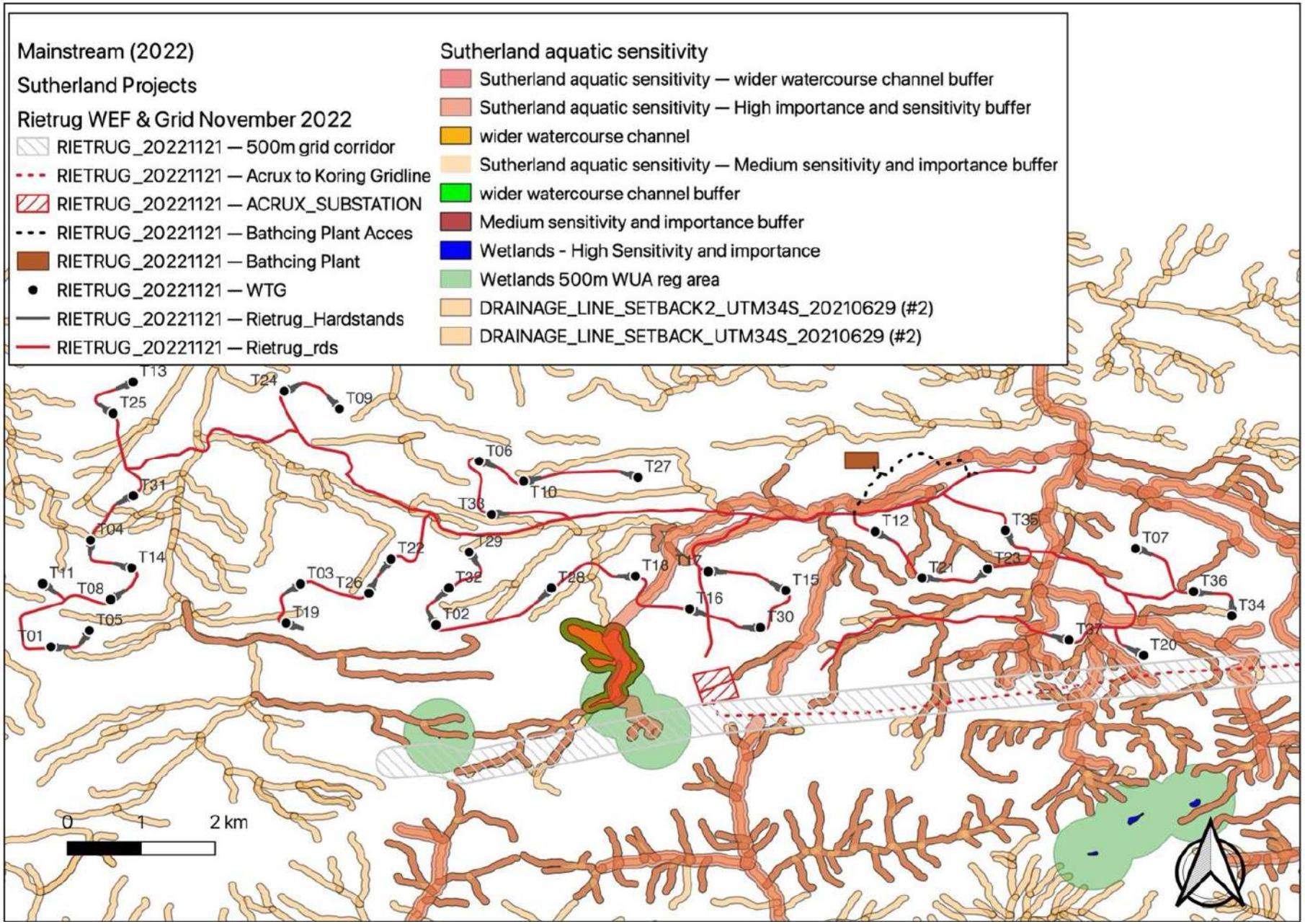


Figure 6a: Results of the sensitivity analysis for the WEF and Grid

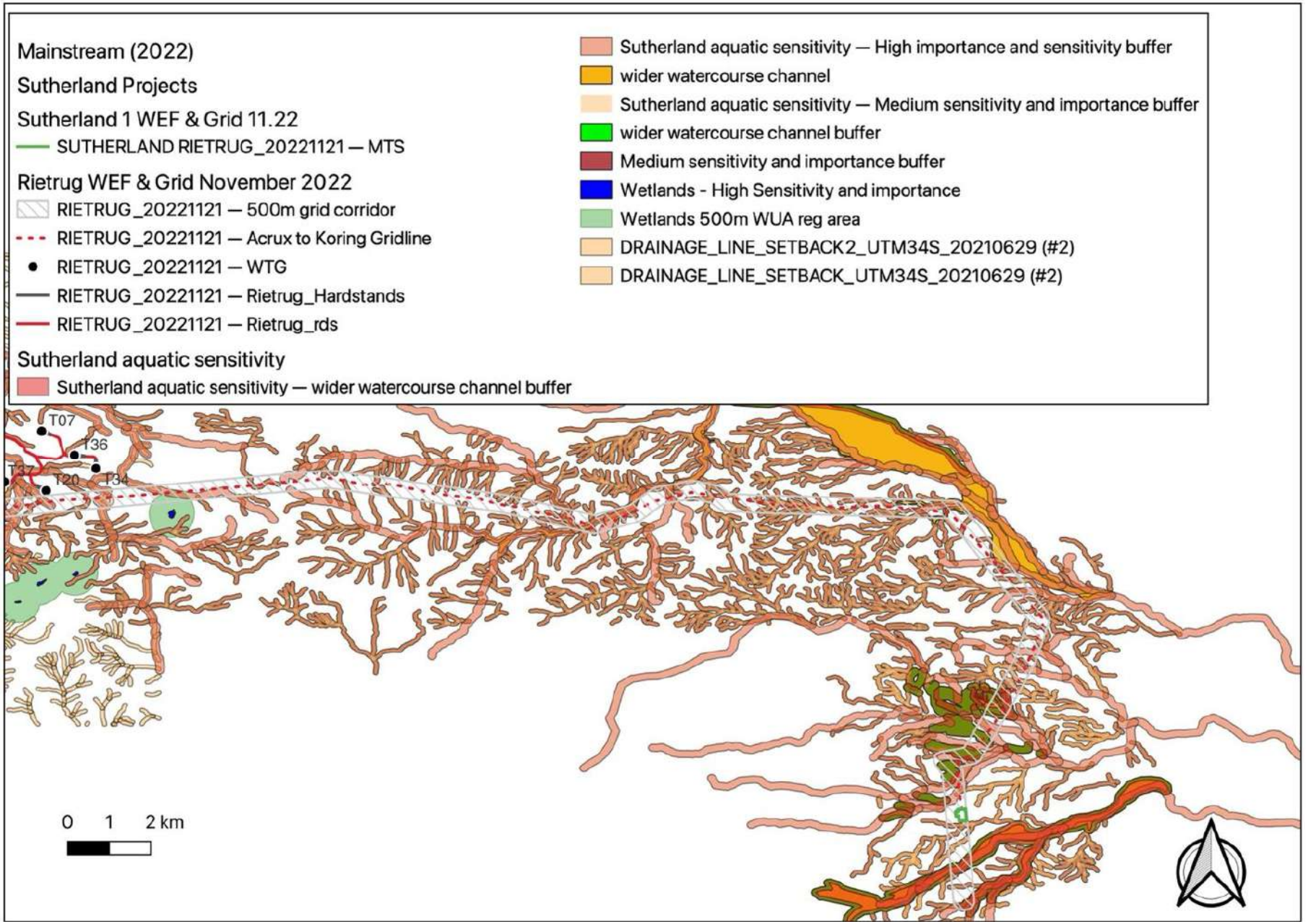
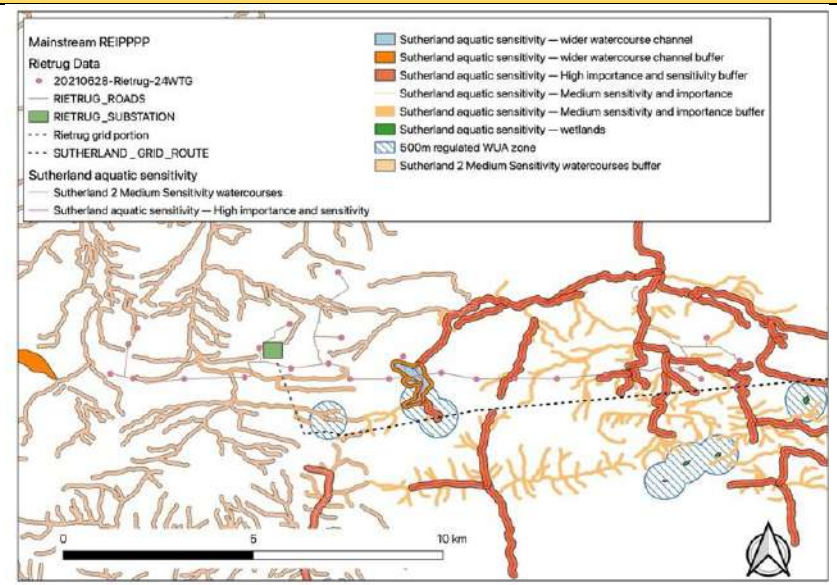
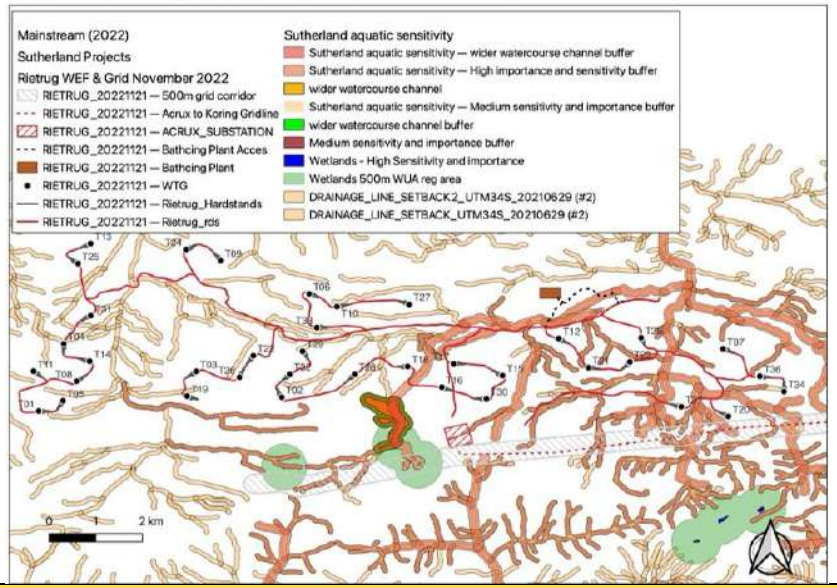
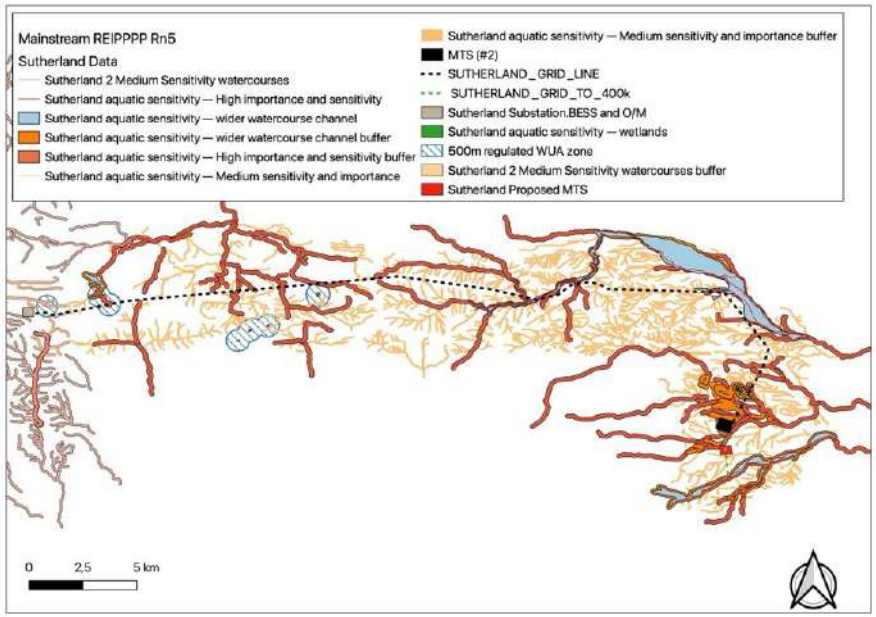
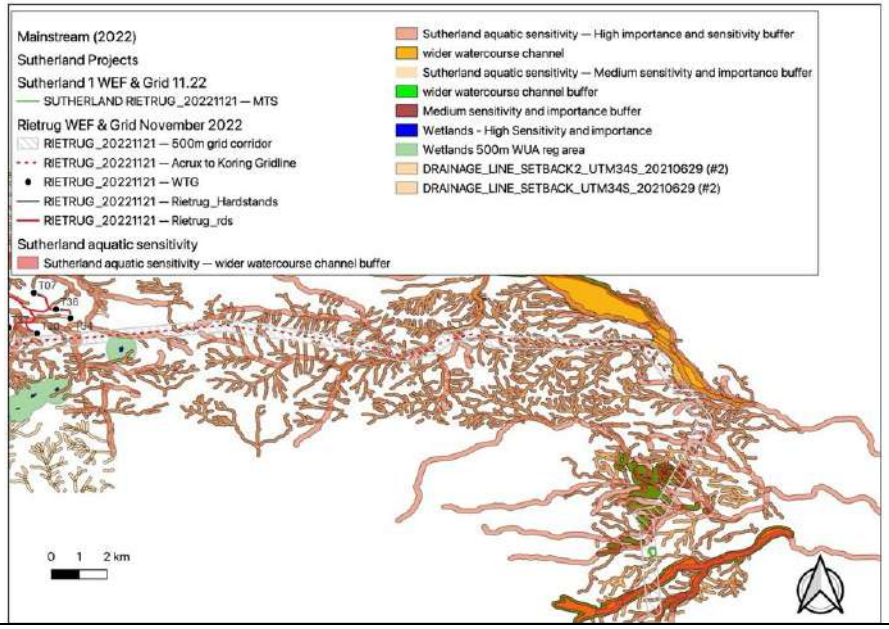


Figure 6b: Results of the sensitivity analysis for the WEF and Grid Connection

Table 1: Findings of the walk-down surveys for structures shown in Figure 6a & 6b, with specific reference to habitats observed within the development layout only

Project Layout & Comments	Observation / Issues	Recommendations
RIETRUG WEF AND COLLECTOR SUBSTATION		
 	The proposed turbine localities have avoided any of the aquatic systems delineated, regardless of the sensitivity. Similarly, the proposed roads have also avoided as many of the watercourses and wetlands as far as possible, and/or used areas with existing impacts (roads and tracks).	The final design has taken cognisance of the recommendations that any laydowns, temporary construction areas as well as the crane pads / hardstands also be located outside of any of the delineated systems. This included a slight readjustment of the substation / O&M Building site to avoid the observed watercourse. Stormwater from any access or internal roads must be managed so that this does not interfere with the regional hydrology and/or create the potential for any erosion.
RIETRUG GRID & MTS		

Project Layout & Comments	Observation / Issues	Recommendations
 	No direct impacts on the aquatic environment will occur if no significant tracks are created along the grid alignment, and the **powerline towers / pylons are located outside of the delineated aquatic zones**.	The portion of the grid where tower positions are known have been evaluated and with the exception of a few towers within buffers, **these were found acceptable**, however, the **developer must ensure that the wetland areas shown are spanned and the powerline towers / pylons located outside of the buffers indicated**. Stormwater from any access or internal roads must be managed so that this does not interfere with the regional hydrology and or create the potential for any erosion.

5. CONCLUSIONS AND RECOMMENDATIONS

Based on the results of the walk-down, several sensitive areas are present within the region. The **final layouts and grid connection alignments will however be located within disturbed or less sensitive areas**. Furthermore, **no important aquatic riparian habitats and/or wetlands will be disturbed by the proposed WEF and grid connection layout**. This is however based on the assumption that any access along the grid corridors will also not be located in any of the No-go areas shown in Figure 6a & 6b.

The following recommendations are reiterated:

- Vegetation clearing should occur in in a phased manner, in accordance with the construction programme, to minimise erosion and/or run-off.
- All construction materials, including fuels and oil, should be stored in demarcated areas that are contained within berms / bunds to avoid spread of any contamination. Washing and cleaning of equipment should also be done in berms or bunds, in order to trap any cement and prevent excessive soil erosion. Mechanical plant and bowsers must not be re-fuelled or serviced within or directly adjacent to any channel. It is therefore suggested that all construction camps, lay down areas, batching plants or areas and any stores should be outside of any demarcated watercourses.
- All cleared areas must be re-vegetated after construction has been completed.
- All alien plant re-growth (mostly forbs) must be monitored, and should it occur, these plants should be eradicated. The scale of the operation does however not warrant the use of a Landscape Architect and/or Landscape Contractor.

6. APPENDIX 1 – SPECIALIST CV

CURRICULUM VITAE

- **Dr Brian Michael Colloty**
- **7212215031083**

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Port Elizabeth, 6070

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083 498 3299

Profession: Ecologist (Pr. Sci. Nat. 400268/07)

Member of the South African Wetland Society

Specialisation: Ecology and conservation importance rating of inland habitats, wetlands, rivers & estuaries

Years experience: 25 years

SKILLS BASE AND CORE COMPETENCIES

- 25 years experience in environmental sensitivity and conservation assessment of aquatic and terrestrial systems inclusive throughout Africa. Experience also includes biodiversity and ecological assessments with regard sensitive fauna and flora, within the marine, coastal and inland environments. Countries include Mozambique, Kenya, Namibia, Central African Republic, Zambia, Eritrea, Mauritius, Madagascar, Angola, Ghana, Guinea-Bissau and Sierra Leone. Current projects also span all nine provinces in South Africa.
- 15 years experience in the coordination and management of multi-disciplinary teams, such as specialist teams for small to large scale EIAs and environmental monitoring programmes, throughout Africa and inclusive of marine, coastal and inland systems. This includes project and budget management, specialist team management, client and stakeholder engagement and project reporting.
- GIS mapping and sensitivity analysis

TERTIARY EDUCATION

- 1994: B Sc Degree (Botany & Zoology) - NMU
- 1995: B Sc Hon (Zoology) - NMU
- 1996: M Sc (Botany - Rivers) - NMU
- 2000: Ph D (Botany – Conservation Rating Systems (wetlands) – NMU

EMPLOYMENT HISTORY

- 1996 – 2000: Researcher at Nelson Mandela University – SAB institute for Coastal Research & Management. Funded by the WRC to develop estuarine importance rating methods for South African Estuaries
- 2001 – January 2003: Training development officer AVK SA (reason for leaving – sought work back in the environmental field rather than engineering sector)
- February 2003 - June 2005: Project manager & Ecologist for Strategic Environmental Focus (Pretoria) – (reason for leaving – sought work related more to experience in the coastal environment)
- July 2005 – June 2009: Principal Environmental Consultant Coastal & Environmental Services (reason for leaving – company restructuring)

- June 2009 – August 2018: Owner / Ecologist of Scherman Colloty & Associates cc
- August 2018: Owner / Ecologist - EnviroSci (Pty) Ltd

SELECTED RELEVANT PROJECT EXPERIENCE

World Bank IFC Standards

- Botswana South Africa 400kv transmission line (400km) biodiversity assessment on behalf of Aurecon - current
- Farim phosphate mine and port development, Guinea Bissau – biodiversity and estuarine assessment on behalf of Knight Piesold Canada – 2016.
- Tema LNG offshore pipeline EIA – marine and estuarine assessment for Quantum Power (2015).
- Colluli Potash South Boulder, Eritrea, SEIA marine baseline and hydrodynamic surveys co-ordinator and coastal vegetation specialist (coastal lagoon and marine) (on-going).
- Wetland, estuarine and riverine assessment for Addax Biofeuls Sierra Leone, Makeni for Coastal & Environmental Services: 2009
- ESHIA Project manager and long-term marine monitoring phase coordinator with regards the dredge works required in Luanda bay, Angola. Monitoring included water quality and biological changes in the bay and at the offshore disposal outfall site, 2005-2011

South African

- Plant search and rescue, for NMBM (Driftsands sewer, Glen Hurd Drive), Department of Social Development (Military veterans housing, Despatch) and Nxuba Wind Farm, - current
- Wetland specialist appointed to update the Eastern Cape Biodiversity Conservation Plan, for the Province on behalf of EOH CES appointment by SANBI – current. This includes updating the National Wetland Inventory for the province, submitting the new data to CSIR/SANBI.
- CDC IDZ Alien eradication plans for three renewable projects Coega Wind Farm, Sonop Wind Farm and Coega PV, on behalf of JG Afrika (2016 – 2017).
- Nelson Mandela Bay Municipality Baakens River Integrated Wetland Assessment (Inclusive of Rehabilitation and Monitoring Plans) for CEN IEM Unit - Current
- Rangers Biomass Gasification Project (Uitenhage), biodiversity and wetland assessment and wetland rehabilitation / monitoring plans for CEM IEM Unit – current.
- Gibson Bay Wind Farm implementation of the wetland management plan during the construction and operation of the wind farm (includes surface / groundwater as well wetland rehabilitation & monitoring plan) on behalf of Enel Green Power - current
- Gibson Bay Wind Farm 133kV Transmission Line wetland management plan during the construction of the transmission line (includes wetland rehabilitation & monitoring plan) on behalf of Eskom – 2016.
- Tsitsikamma Community Wind Farm implementation of the wetland management plan during the construction of the wind farm (includes surface / biomonitoring, as well wetland rehabilitation & monitoring plan) on behalf of Cennergi – completed May 2016.
- Alicedale bulk sewer pipeline for Cacadu District, wetland and water quality assessment, 2016
- Mogalakwena 33kv transmission line in the Limpopo Province, on behlaf of Aurecon, 2016
- Cape St Francis WWTW expansion wetland and passive treatment system for the Kouga Municipality, 2015
- Macindane bulk water and sewer pipelines wetland and wetland rehabilitation plan 2015
- Eskom Prieska to Copperton 132kV transmission line aquatic assessment, Northern Cape on behalf of Savannah Environmental 2015.
- Joe Slovo sewer pipeline upgrade wetland assessment for Nelson Mandela Bay Municipality 2014
- Cape Recife Waste Water Treatment Works expansion and pipeline aquatic assessment for Nelson Mandela Bay Municipality 2013
- Pola park bulk sewer line upgrade aquatic assessment for Nelson Mandela Bay Municipality 2013

- Transnet Freight Rail – Swazi Rail Link (Current) wetland and ecological assessment on behalf of Aurecon for the proposed rail upgrade from Ermelo to Richards Bay
- Eskom Transmission wetland and ecological assessment for the proposed transmission line between Pietermaritzburg and Richards Bay on behalf of Aurecon (2012).
- Port Durnford Exarro Sands biodiversity assessment for the proposed mineral sands mine on behalf of Exxaro (2009)
- Fairbreeze Mine Exxaro (Mtunzini) wetland assessment on behalf of Strategic Environmental Services (2007).
- Wetland assessment for Richards Bay Minerals (2013) – Zulti North haul road on behalf of RBM.
- Biodiversity and aquatic assessments for 125 renewable projects in the past 9 years in the Western, Eastern, Northern Cape, KwaZulu-Natal and Free State provinces. Clients included RES-SA, RedCap, ACED Renewables, Mainstream Renewable, GDF Suez, Globeleq, ENEL, Abengoa amongst others. Particular aquatic sensitivity assessment and Water Use License Applications on behalf of Mainstream Renewable Energy (8 wind farms and 3 PV facilities.), Cennergi / Exxaro (2 Wind farm), WKN Wind current (2 wind farms & 2 PV facilities), ACED (6 wind farms) and Windlab (3 Wind farms) were also conducted. Several of these projects also required the assessment of the proposed transmission lines and switching stations, which were conducted on behalf of Eskom.
- Vegetation assessments on the Great Brak rivers for Department of Water and Sanitation, 2006 and the Gouritz Water Management Area (2014)
- Proposed FibreCo fibre optic cable vegetation assessment along the PE to George, George to Graaf Reinet, PE to Colesburg, and East London to Bloemfontein on behalf of SRK (2013-2015).

Risk to be scored for construction and operational phases of the project. MUST BE COMPLETED BY SACNASP PROFESSIONAL MEMBER REGISTERED IN AN APPROPRIATE FIELD OF EXPERTISE.

					Severity																		
No.	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	Confidence level	Control Measures	Borderline LOW/ MODERATE Rating Classes	PES AND EIS OF WATERCOURSE
1	Construction phase	Placement of transmission line towers requiring disturbance of riparian vegetation	Physical disturbance at crossing point within any of the watercourse observed	Loss / disturbance of habitat	1	1	2	2	1,5	1	1	3,5	1	1	5	2	9	31,5	LOW	90-100	• A comprehensive rehabilitation / monitoring plan must be implemented from the project onset i.e. during the detailed design phase prior to construction, to ensure a net benefit to the environment within all areas that will remain undisturbed; • Vegetation clearing should occur in a phased manner in accordance with the construction programme to minimise erosion and/or run-off; • Removal of vegetation must be avoided until such time as soil stripping is required and similarly exposed surfaces shall be re-vegetated or stabilised as soon as is practically possible		The PES for all of the relevant systems was rated as B-/Largely Natural to C/Moderately modified (watercourse). EIS for watercourses is HIGH
			Loss / removal of topsoil from beds and banks, resulting in areas extending at least the footprint of the crossing in which weedy and/or alien plants species are likely to establish	Increased propensity for alien vegetation	1	1	2	2	1,5	1	1	3,5	1	1	5	2	9	31,5	LOW	90-100	All alien plant re-growth must be monitored and should these alien plants reoccur these plants should be reeradicated.		The PES for all of the relevant systems was rated as B-/Largely Natural to C/Moderately modified (watercourse). EIS for watercourses is HIGH
			Accidental passage of construction-associated contaminants and litter into watercourses	Impact on localised surface water quality	1	2	2	1	1,5	1	1	3,5	1	1	5	2	9	31,5	LOW	90-100	• Strict use and management of all hazardous materials used on site; • Strict management of potential sources of pollution (e.g. litter, hydrocarbons from vehicles & machinery, cement during construction, etc.) within demarcated / bunded areas; • Containment of all contaminated water by means of careful run-off management on site; • Appropriate ablution facilities should be provided for construction workers during construction and on-site staff during the operation of the facility. These must be situated outside of any delineated water courses or the buffers shown; • Strict control of the behaviour of construction workers; • Appropriate waste management; • Working protocols incorporating pollution control measures (including approved method statements by the contractor) should be clearly set out in the Construction Environmental Management Plan (CEMP) for the project and strictly enforced.		The PES for all of the relevant systems was rated as B-/Largely Natural to C/Moderately modified (watercourse). EIS for watercourses is HIGH
2	Construction phase	Construction including: • Construction of a new (unpaved) access road and minor upgrades to existing (unpaved) access roads; • Installation of grid infrastructure (including a new substation); and	Physical disturbance at structure point as a result of clearing, compaction, construction and the use of laydown areas.	Loss / disturbance of riparian habitat	1	1	2	2	1,5	1	1	3,5	1	2	5	2	10	35	LOW	90-100	• A comprehensive rehabilitation / monitoring plan must be implemented from the project onset i.e. during the detailed design phase prior to construction, to ensure a net benefit to the environment within all areas that will remain undisturbed; • Vegetation clearing should occur in a phased manner in accordance with the construction programme to minimise erosion and/or run-off; • Removal of vegetation must be avoided until such time as soil stripping is required and similarly exposed surfaces shall be re-vegetated or stabilised as soon as is practically possible		The PES for all of the relevant systems was rated as B-/Largely Natural to C/Moderately modified (watercourse). EIS for watercourses is HIGH
			Loss / removal of topsoil from beds and banks, resulting in areas extending at least the footprint of the structure and possibly beyond, in which weedy and/or alien plants species are likely to establish	Increased propensity for alien vegetation	1	1	2	2	1,5	1	1	3,5	1	2	5	2	10	35	LOW	90-100	All alien plant re-growth must be monitored and should these alien plants reoccur these plants should be reeradicated.		The PES for all of the relevant systems was rated as B-/Largely Natural to C/Moderately modified (watercourse). EIS for watercourses is HIGH
			Passage of chemical pollutants (e.g. hydrocarbons, cleaning fluids, cement powder, wet cement, shutter-oil, etc.) from vehicles and/or machinery into downslope watercourses via ephemeral systems	Impact on localised surface water quality	1	2	2	2	1,75	1	1	3,75	1	2	5	2	10	37,5	LOW	90-100	• Strict use and management of all hazardous materials used on site; • Strict management of potential sources of pollution (e.g. litter, hydrocarbons from vehicles & machinery, cement during construction, etc.) within demarcated / bunded areas; • Containment of all contaminated water by means of careful run-off management on site; • Appropriate ablution facilities should be provided for construction workers during construction and on-site staff during the operation of the facility. These must be situated outside of any delineated water courses or the buffers shown; • Strict control of the behaviour of construction workers; • Appropriate waste management; • Working protocols incorporating pollution control measures (including approved method statements by the contractor) should be clearly set out in the Construction Environmental Management Plan (CEMP) for the project and strictly enforced.		The PES for all of the relevant systems was rated as B-/Largely Natural to C/Moderately modified (watercourse). EIS for watercourses is HIGH
3	Construction and operational phase	Stormwater Diversion	The increase in hardened surfaces couple with the use of stormwater diversion infrastructure during the construction and operation phase of the project will result in increased volumes and velocities of surface water flows.	Changes to localised flow velocities, increase in erosion and sedimentation downstream	2	1	1	1	1,25	1	1	3,25	2	2	5	3	12	39	LOW	90-100	• Stormwater within the development area must be handled in a suitable manner, i.e. separate clean and dirty water streams around the plant, and install silting basins to capture large volumes of run-off, trap sediments, and reduce flow velocities (e.g. water used when washing the panels); • The project should also try to capture and recycle any form of run-off created by the daily operations. This would minimise the amount of water required by the project, but also serve to limit the downstream impacts on the riparian systems through an increase in run-off, a situation that these systems are currently unaccustomed too. • Suitable stormwater management features with erosion control measures (gations) should also be installed in areas where concentrated flows are anticipated as indicated in the Storm Water Management Plan (SWMP).		The PES for all of the relevant systems was rated as B-/Largely Natural to C/Moderately modified (watercourse). EIS for watercourses is HIGH
4	Operational phase	Maintenance of the infrastructure	Physical disturbance at structure point as a result of clearing, compaction, construction associated with maintenance activities.	Loss / disturbance of riparian habitat	1	1	2	2	1,5	1	1	3,5	1	1	5	2	9	31,5	LOW	90-100	• Vegetation clearing should occur in a phased manner in accordance with the construction programme to minimise erosion and/or run-off; • Removal of vegetation must be avoided until such time as soil stripping is required and similarly exposed surfaces shall be re-vegetated or stabilised as soon as is practically possible		The PES for all of the relevant systems was rated as B-/Largely Natural to C/Moderately modified (watercourse). EIS for watercourses is HIGH
5	Operational phase	Movement of vehicles and machinery	Accidental hazardous substances spillage during site establishment	Impact on localised surface water quality	1	2	2	1	1,5	1	1	3,5	1	1	5	2	9	31,5	LOW	90-100	• Strict use and management of all hazardous materials used on site; • Strict management of potential sources of pollution (e.g. litter, hydrocarbons from vehicles & machinery, cement during construction, etc.) within demarcated / bunded areas; • Containment of all contaminated water by means of careful run-off management on site; • Appropriate waste management;		The PES for all of the relevant systems was rated as B-/Largely Natural to C/Moderately modified (watercourse). EIS for watercourses is HIGH