



forestry, fisheries & the environment

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

Private Bag X447, Pretoria, 0001, Environment House, 473 Steve Biko Road, Pretoria, 0002 Tel: +27 12 399 9000, Fax: +27 86 625 1042

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

Wetland Functional and Impact Assessment for the Proposed Construction of the 6 km Impala Zircon Temporary By-Pass 132kV Powerline with Associated Infrastructure and the Maintenance Management Plan of the Existing Impala Zircon 132kV Main Line

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	Wetland Functional and Impact Assessment for the Proposed Construction of the 6 km Impala Zircon Temporary By-Pass 132kV Powerline with Associated Infrastructure and the Maintenance Management Plan of the Existing Impala Zircon 132kV Main Line
Specialist Company Name	The Biodiversity Company
Specialist Name	Divan van Rooyen
Specialist Identity Number	9312205072085
Specialist Qualifications:	PhD Environmental Science
Professional affiliation/registration:	SACNASP Pr Sci Nat 151272
Physical address:	2 Selbourne Road, Fourways, 2191
Postal address:	2 Selbourne Road, Fourways, 2191
Postal address	2188
Telephone	N/A
Cell phone	083 265 8776
E-mail	divan@thebiodiversitycompany.com

SPECIALIST DECLARATION FORM – AUGUST 2023

2. DECLARATION BY THE SPECIALIST

I, Divan van Rooyen 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

The Biodiversity Company

Name of Company:

02 Jul 2026

Date

SPECIALIST DECLARATION FORM – AUGUST 2023

3. UNDERTAKING UNDER OATH/ AFFIRMATION

I, Divan van Rooyen, swear under oath / affirm that all the information submitted or to be submitted for the purposes of this application is true and correct.



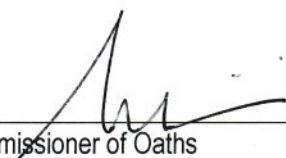
Signature of the Specialist

The Biodiversity Company

Name of Company

02/074/2026

Date

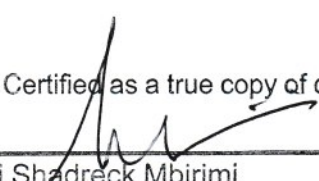


Signature of the Commissioner of Oaths

02 Jul 2026

Date

Certified as a true copy of original



Farai Shadreck Mbirimi BD52805
Minister of Religion / Commissioner of Oaths
391 11th Road, Erand, Midrand 1685

Date

02/07/2026



forestry, fisheries & the environment

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

Private Bag X447, Pretoria, 0001, Environment House, 473 Steve Biko Road, Pretoria, 0002 Tel: +27 12 399 9000, Fax: +27 86 625 1042

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

Wetland Functional and Impact Assessment for the Proposed Construction of the 6 km Impala Zircon Temporary By-Pass 132kV Powerline with Associated Infrastructure and the Maintenance Management Plan of the Existing Impala Zircon 132kV Main Line

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

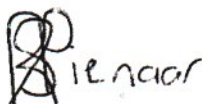
Title of Specialist Assessment	Wetland Functional and Impact Assessment for the Proposed Construction of the 6 km Impala Zircon Temporary By-Pass 132kV Powerline with Associated Infrastructure and the Maintenance Management Plan of the Existing Impala Zircon 132kV Main Line
Specialist Company Name	The Biodiversity Company
Specialist Name	Rian Pienaar
Specialist Identity Number	9405235011089
Specialist Qualifications:	MSc Environmental Sciences
Professional affiliation/registration:	SACNASP Pr Sci Nat 135544
Physical address:	2 Selbourne Road, Fourways, 2191
Postal address:	2 Selbourne Road, Fourways, 2191
Postal address	2188
Telephone	N/A
Cell phone	0785050201
E-mail	rian@thebiodiversitycompany.com

SPECIALIST DECLARATION FORM – AUGUST 2023

2. DECLARATION BY THE SPECIALIST

I, Rian Pienaar 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

The Biodiversity Company

Name of Company:

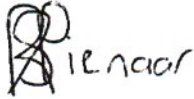
02 Jul 2026

Date

SPECIALIST DECLARATION FORM – AUGUST 2023

3. UNDERTAKING UNDER OATH/ AFFIRMATION

I, Rian Pienaar, swear under oath / affirm that all the information submitted or to be submitted for the purposes of this application is true and correct.


Rian Pienaar

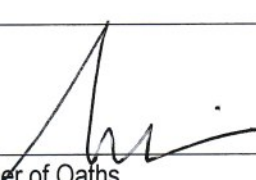
Signature of the Specialist

The Biodiversity Company

Name of Company

02/07/2026

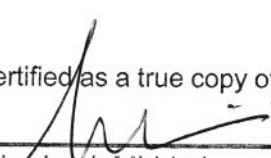
Date


Signature of the Commissioner of Oaths

02 Jul 2026

Date

Certified as a true copy of original


Farai Shadreck Mbirimi

BD52805

Minister of Religion / Commissioner of Oaths
391 11th Road, Erand, Midrand 1685

Date 02 / 07 / 2026



**Wetland Functional and Impact Assessment for the
Proposed Construction of the 6 km Impala Zircon
Temporary By-Pass 132kV Powerline with
Associated Infrastructure and the Maintenance
Management Plan of the Existing Impala Zircon
132kV Main Line**

**uMhlathuze Local Municipality, King Cetshwayo
District Municipality, KwaZulu-Natal Province,
South Africa**

4/28/2026

Prepared by:

The Biodiversity Company

Cell: +27 81 319 1225

Fax: +27 86 527 1965

info@thebiodiversitycompany.com

www.thebiodiversitycompany.com

Report Title	Wetland Functional and Impact Assessment for the Proposed Construction of the 6 km Impala Zircon Temporary By-Pass 132kV Powerline with Associated Infrastructure and the Maintenance Management Plan of the Existing Impala Zircon 132kV Main Line	
Specialist Theme	Aquatic Biodiversity Theme – Wetland Impact Assessment	
Project Reference	Impala Zircon	
Report Date	4/28/2026	
Technical Support	Matthew Farquharson (SACNASP Cand. Sci. Nat. 156226)	
Responsible Specialist	Rian Pienaar (Pr. Sci. Nat. 135544)	
Reviewer	Divan van Rooyen (Pri. Sci. Nat. 151272)	
Declaration	The Biodiversity Company and its associates act as independent consultants in accordance with the requirements of the South African Council for Natural Scientific Professions. We confirm that we have no affiliation with, or vested financial interest in, the proponent, other than remuneration for professional services rendered in terms of the Environmental Impact Assessment Regulations. We have no conflicting interest in the proposed activity or any secondary developments arising from the authorisation of the project, and our work has been undertaken objectively and in accordance with accepted scientific principles.	

Table of Contents

1	Introduction.....	7
1.1	Background	7
1.2	Scope of Work.....	8
1.3	Project Description	8
1.4	Assumptions and Limitations	10
1.5	Key Legislative Requirements.....	11
1.6	National Water Act (NWA, 1998)	11
1.7	National Environmental Management Act (NEMA, 1998).....	12
1.8	Legislative Framework	12
2	Fieldwork	14
2.1	Freshwater Biodiversity Field Assessment	14
3	Results & Discussion	14
3.1	Desktop Dataset Assessment	14
3.1.1	Climate.....	14
3.1.2	Soils and Geology.....	15
3.1.3	Hydrological Characteristics	16
3.1.4	Ecologically Important Landscape Features.....	17
3.2	Wetland Assessment.....	19
3.2.1	Delineation	19
3.2.2	Classification and Description	21
3.2.3	Wetland Area	24
3.2.4	Risk Screening.....	25
3.3	Wetland Functional and Ecological Assessment	25
3.3.1	Functional Assessment.....	25
3.4	Buffer Requirements	30
3.4.1	Regulation Zones.....	31
3.5	Site Sensitivity Verification	32
3.5.1	Desktop Ecological Sensitivity.....	32
3.5.2	Screening Tool Comparison	33
4	Risk Assessment.....	35
5	Mitigation Measures	37
6	Rehabilitation.....	38

6.1	Purpose	38
6.1.1	Objectives	39
6.2	Strategy and Planning	39
6.2.1	Authorisations	39
6.2.2	Budget.....	40
6.2.3	Personnel, Roles and Responsibilities	40
6.2.4	Contractor	40
6.2.5	Ecological /Environmental Control Officer	41
6.3	General Measures	41
6.4	Rehabilitation Measures	41
6.4.1	Site Demarcation	41
6.4.2	Infrastructure.....	42
6.4.3	Erosion and Sediment Control.....	43
6.4.4	Soil Management.....	44
6.4.5	Alien Invasive Plant Control.....	45
6.4.6	Revegetation.....	46
6.4.7	Water Resource Protection.....	48
6.4.8	Waste Management.....	49
6.4.9	Rehabilitation Action and Monitoring	49
7	Conclusion.....	55
7.1	Risk and Impact Statement	55
7.2	Specialist Opinion.....	55
8	References	56
9	Appendices.....	58
9.1	Appendix A – Methodology	58
9.1.1	Desktop Dataset Assessment	58
9.1.2	Wetland Field Survey.....	59
9.1.3	Wetland Functional and Ecological Assessment.....	60
9.1.4	Buffer Requirements.....	62
9.1.5	Site Sensitivity Verification.....	62
9.2	Appendix B – Risk and Impact Assessment	62
9.2.1	Risk Assessment	62
9.3	Appendix C – Specialist Declaration of Independence	63

9.4	Appendix D – Specialist CVs	64
-----	-----------------------------------	----

List of Tables

Table 1-1	A list of key legislative requirements	11
Table 1-2	Aquatic Biodiversity Specialist Assessment information requirements as per the relevant protocol, including the location of the information within this report	13
Table 3-1	Summary of relevance of the proposed project to ecologically important landscape features 17	
Table 3-2	Classification as per SANBI guideline (Ollis et al., 2013)	21
Table 3-3	Summary of natural wetland area within the project area of influence	25
Table 3-4	Risk status of the delineated wetlands.....	25
Table 3-5	Summary of the average ecosystem scores for the assessed systems	26
Table 3-6	Average Present Ecological State scores for the assessed wetlands	28
Table 3-7	Results of the instream habitat integrity assessment for the respective reach	28
Table 3-8	Summary of the Ecological Importance and Sensitivity assessment.....	30
Table 3-9	Recommended Ecological Category and Management Objective	30
Table 3-10	Recommended buffers for the proposed development	30
Table 3-11	Legislated zones of regulation.....	31
Table 3-12	Summary of the screening tool vs specialist assigned sensitivities	34
Table 4-1	Summative results of the DWS Risk Assessment for the proposed development	36
Table 5-1	Suggested mitigation measures for the proposed development.....	37
Table 6-1	Activities required to meet the three main elements for the project and the order in which they will take place	39
Table 6-2	The localised impacts identified for the assessed unit.....	41
Table 6-3	Recommended species for revegetation	48
Table 6-4	Monitoring plan for the proposed project	51
Table 9-1	Classes for determining the likely extent to which a benefit is being supplied	60
Table 9-2	The Present Ecological Status categories (Macfarlane et al., 2020)	61
Table 9-3	Description of Ecological Importance and Sensitivity categories.....	61
Table 9-4	Recommended Ecological Category and Recommended Management Objectives for water resources based on Present Ecological State and Ecological Importance and Sensitivity scores	62
Table 9-5	Significance ratings matrix	62

List of Figures

Figure 1-1	Location of the proposed project.....	8
Figure 1-2	Project site and project area of influence	10
Figure 3-1	Climate for the region based on the Maputaland Coastal Belt (Mucina and Rutherford, 2008)	15
Figure 3-2	Climate for the region based on the Subtropical Alluvial Vegetation (Mucina and Rutherford, 2008)	15
Figure 3-3	Catchment details for the project area of influence.....	16
Figure 3-4	Topographical river lines and inland water areas that intersect the project area of influence	17
Figure 3-5	Wetland features identified within the project area of influence according to the South African Inventory of Inland Aquatic Ecosystems dataset and National Freshwater Ecosystem Priority Areas dataset	18
Figure 3-6	Wetland features identified within the project area of influence according to the Strategic Water Source Areas dataset	19
Figure 3-7	Delineation of wetland features within the project area of influence	20
Figure 3-8	Representative photographs of A and B) Floodplain (HGM 2); C) Channelled Valley Bottom (HGM 1); and D) Seep (HGM 3).....	20
Figure 3-9	Amalgamated diagram of a typical channelled valley bottom, highlighting the dominant water inputs, throughputs and outputs, SANBI guidelines (Ollis et al. 2013)	21
Figure 3-10	Amalgamated diagram of a typical floodplain wetland, highlighting the dominant water inputs, throughputs and outputs, SANBI guidelines (Ollis et al. 2013)	22
Figure 3-11	Amalgamated diagram of a typical hillslope seep, highlighting the dominant water inputs, throughputs and outputs, SANBI guidelines (Ollis et al. 2013)	23
Figure 3-12	Amalgamated diagram of a typical wetland flat, highlighting the dominant water inputs, throughputs and outputs, SANBI guidelines (Ollis et al. 2013).....	23
Figure 3-13	The watercourse classifications (DWAF, 2005)	24
Figure 3-13	Recommended post-mitigation buffers for the wetlands.....	31
Figure 3-14	Recommended zones of regulation for the wetlands.....	32
Figure 3-15	Aquatic Biodiversity Theme Sensitivity of the Project Area of Influence.....	33
Figure 3-16	Sensitivity classification of the Project Area of Influence in relation to aquatic biodiversity	34
Figure 4-1	The mitigation hierarchy as described by the DEA (2013)	35
Figure 8-1	Cross section of a wetland, indicating how the soil wetness and vegetation indicators respond to changes in topography (Ollis et al. 2013)	60

1 Introduction

1.1 Background

The Biodiversity Company was commissioned to conduct a wetland baseline and impact assessment in support of a Water Use Authorisation (WUA) in accordance with the National Water Act (Act No. 36 of 1998) and Environmental Authorisation (EA) in accordance with the National Environmental Management Act (Act No. 107 of 1998) for the proposed construction of the 6km Impala Zircon Temporary By-Pass 132kV Powerline with Associated Infrastructure and the Maintenance Management Plan of the existing Impala Zircon 132kV Main Line. The project is located in uMhlathuze local Municipality, King Cetshwayo District Municipality, KwaZulu-Natal Province, South Africa (Figure 1-1). A 500 m radius has been demarcated for the project to facilitate the identification of wetlands, and this area is referred to as the Project Area of Influence (PAOI).

This assessment has been completed in accordance with the requirements of the published Government Notice (GN) 4167 by the Department of Water and Sanitation (DWS) (previously GN 509 of 2016 and GN 3139 of 2023). The said notice was published in the Government Gazette (no. 49833) under Section 39 of the National Water Act (Act no. 36 of 1998) in December 2023, for a Water Use Licence (WUL) in terms of Section 21(c) & (i) water uses. The GN 4167 process provides an allowance to apply for a WUL for Section 21(c) & (i) under a General Authorisation (GA), as opposed to a full Water Use Licence Application (WULA). A water use (or potential) qualifies for a GA under GN 4167 when the proposed water use/activity is subjected to analysis using the DWS Risk Assessment Matrix (RAM), provided the identified risks are all considered a low risk, and the applicant is listed under Appendix D1 or Appendix D2 of the same notice. This assessment will implement the RAM and provide a specialist opinion on the favourability for water use authorisation.

This report, after taking into consideration the findings and recommendation provided by the specialist herein, should inform and guide the Environmental Assessment Practitioner (EAP) and regulatory authorities, enabling informed decision making with regards to the ecological viability of the proposed development and related activities.

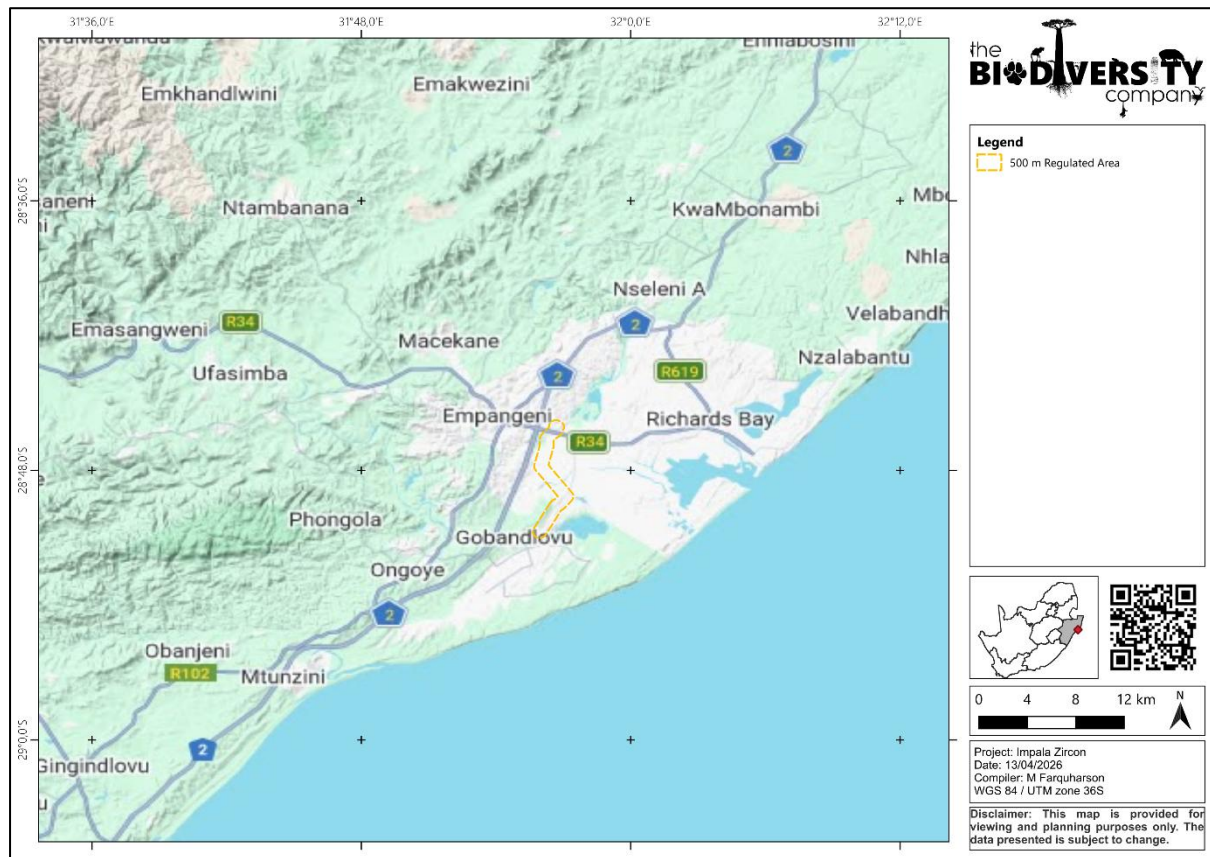


Figure 1-1 Location of the proposed project

1.2 Scope of Work

The following tasks were completed in fulfilment of the terms of reference for this assessment:

- A desktop assessment of available and related datasets to provide context of the freshwater biodiversity of the project area and to indicate potential wetland areas;
- The delineation, classification and assessment of wetlands within 500 m of the project area;
- An assessment of the related impacts through the use of the Risk Assessment (DWS, 2023);
- The provision of recommendations relevant to associated impacts; and
- Report compilation detailing the baseline findings.

1.3 Project Description

The following information pertains to the project details as provided by Selahle Consultancy:

The Applicant (Eskom) intends for the Maintenance and Refurbishment of the Impala Zircon 132kV powerline located in Empangeni, under Richards Bay. The existing 1 powerline spans approximately 10,582 km in length, but Eskom is only responsible for about 7.6 km of this line; the rest of the powerline belongs to the uMhlathuze Local Municipality. The Impala Zircon 132kV powerline is a radial line with no back-feeding capabilities and distributes electricity to approximately 6062 customers. It feeds Cygnus Substation, which supplies all the Esikhaweni networks, uMhlathuze Local Municipality and Lake Qube water pump (LPU).

The 10 km powerline is from the North coast of KwaZulu-Natal and is exposed to both industrial and coastal pollution. Therefore, due to the proximity to the coast, this powerline is experiencing severe corrosion and deterioration on tower foundations. Therefore, a temporary bypass powerline is required in order to continue with the Maintenance of the Main powerline.

The proposed temporary 132kV bypass powerline will be approximately 6.01 km in length and will be built on wooden poles as a temporary option, which will allow the Maintenance of the Main powerline. The temporary bypass powerline will be in use for a period of 3 years. The temporary bypass powerline will run parallel (within its servitude) to the existing Main powerline (approximately 15 m apart) and cross the uMhlathuze River, most of the powerline is traverses a sugarcane farm.

Selahle Consultancy and Projects (Pty) Ltd (herein referred to as SCP) has been appointed as the Environmental Assessment Practitioners (EAPs) to handle the BA, MMP and WULA processes. The team has approached this proposal with a great deal of experience in undertaking EIAs and all related Environmental Services. SCP has a team of specialists with the capacity and background to undertake the fieldwork and compile the reports within the required timeframes.

The proposed development requires authorisations under the EIA Regulations, 2014 (as amended) published under NEMA, and the Water Use License Application and Appeals Regulations, 2017 (amended) promulgated under the National Water Act (Act 36 of 1998) to ensure compliance with Environmental and Water legislation and regulations. The Competent Authorities that would be responsible for processing these applications are:

- Department of Forestry, Fisheries and Environment (DFFE) – for Basic Assessment Process and Maintenance Management Plan
- Department of Water and Sanitation (DWS) – Water Use License Application

The site under investigation for the assessment and the respective 500 m PAOI is displayed in Figure 1-2.

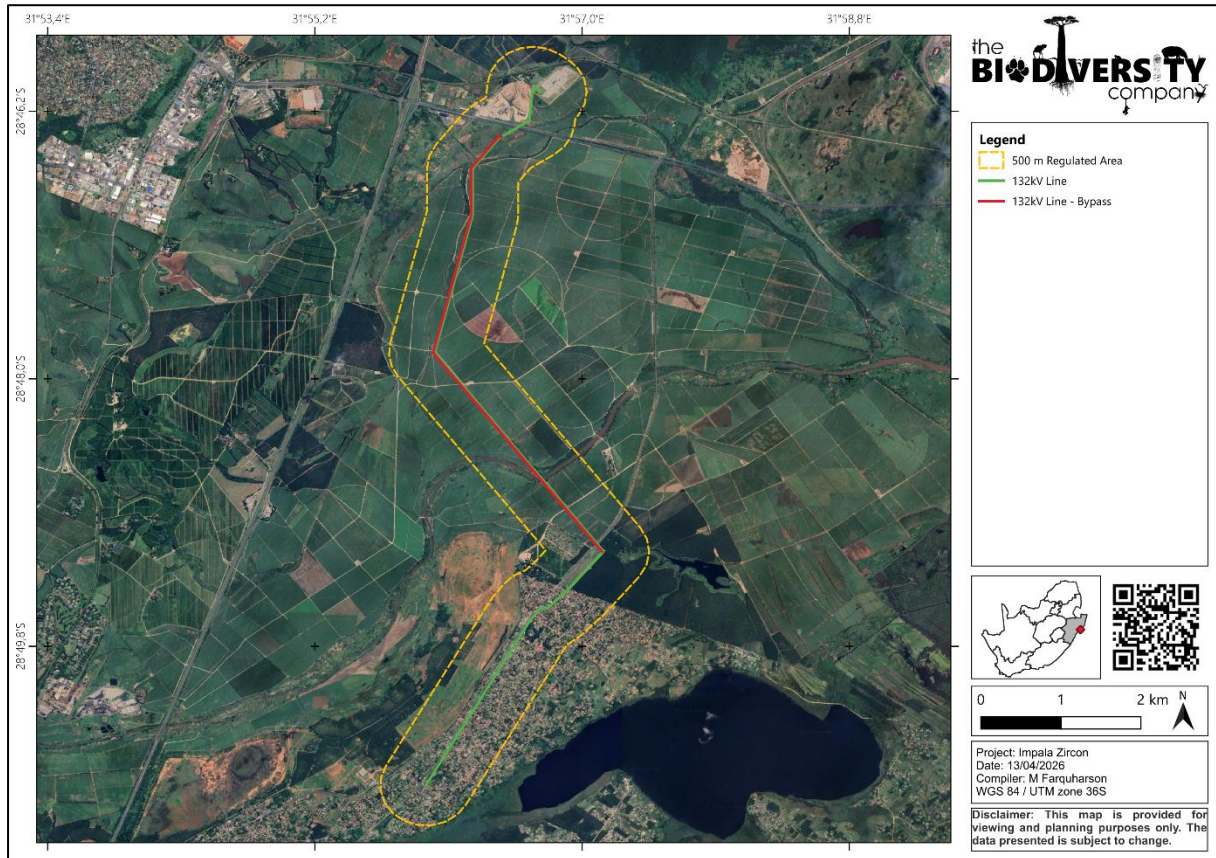


Figure 1-2 Project site and project area of influence

1.4 Assumptions and Limitations

The following aspects were considered as limitations:

- It has been assumed that the spatial files provided to the specialist are accurate;
- Apart from the Project Site indicated in Figure 1-2, no other spatial information was provided in relation to the layout of the proposed structures at the time of survey and report preparation;
- Freshwater features within the larger 500 m PAOI that were not considered to be an immediate surrounding of the proposed development were delineated and assessed via desktop wherever inaccessible;
- Representative sampling was conducted within the Project Site and PAOI and by its nature infers that not all areas were covered on foot. However, efforts were made to cover as much of the site as possible with the limitations of time and the results obtained are considered sufficient to derive a meaningful baseline for the Project Site;
- The results presented herein are an outcome of a rapid survey where areas characterised by external wetland attributes were the focus for assessment, where wetlands were therefore confirmed by soil form indicators; and
- The GPS used for water resource delineations is accurate to within five metres. Therefore, the wetland delineation plotted digitally may be offset by a maximum of five metres to either side.

1.5 Key Legislative Requirements

The legislation, policies and guidelines listed below in Table 1-1 are applicable to the current project. The list below, although extensive, may not be complete and other legislation, policies and guidelines may apply in addition to those listed below.

Table 1-1 A list of key legislative requirements

Region	Legislation / Guideline	Comment
National	National Environmental Management Act (Act No. 107 of 1998) (NEMA)	To provide for the effective protection and controlled utilisation of the environment and for matters incidental thereto.
	NEMA: Environmental Impact Assessment Regulations (2014), as amended, with cognisance of Appendix 6 requirements in GNR 326 (7 April 2017, as amended).	Minimum content for specialist reports.
	NEMA: Government Notices (GN) 320 (20 March 2020) and GN 1150 (30 October 2020)	The minimum criteria for reporting. Protocol for the specialist assessment and minimum report content requirements.
	The National Environmental Management: Biodiversity Act (Act No. 10 of 2004) (NEMBA), Threatened or Protected Species Regulations	The protection of species and ecosystems that warrant protection.
	National Environmental Management: Waste Act (Act No. 59 of 2008) (NEMWA)	The regulation of waste management to protect the environment.
	National Water Act (Act No. 36 of 1998) (NWA)	To provide for the regulation of water uses.
	NWA: GN 4167 (previously GN 509 of 2016 and GN 3139 of 2023)	Water Use Licence (WUL) in terms of Section 21(c) & (i) water uses and the provision to apply for a General Authorisation subject to usage and outcome of the Risk Assessment Matrix.
	NEMBA: Alien and Invasive Species Regulations (2014) (GN R598, 1 August 2014). NEMBA: Alien and Invasive Species Lists (2020) (GN 1003, September 2020)	The regulation and management of alien invasive species.
Provincial	Conservation of Agricultural Resources Act, 1983 (Act 43 of 1983) (CARA)	To provide for control over the utilisation of the natural agricultural resources, including the vegetation and the combating of weeds and invader plants.
	KwaZulu-Natal Nature Conservation Management Act (1997)	To provide for the management and conservation of the KZN Province's biophysical environment and protected areas, both inside and outside protected areas.

1.6 National Water Act (NWA, 1998)

The Department of Water and Sanitation (DWS) is the custodian of South Africa's water resources and therefore assumes public trusteeship of water resources, which includes watercourses, surface water, estuaries, or aquifers. The National Water Act (Act No. 36 of 1998) (NWA) allows for the protection of water resources, which includes:

- The maintenance of the quality of the water resource to the extent that the water resources may be used in an ecologically sustainable way;
- The prevention of the degradation of the water resource; and
- The rehabilitation of the water resource.

A watercourse means:

- 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.

The NWA recognises that the entire ecosystem, not just the water itself, constitutes a water resource and as such needs to be conserved. No activity may therefore take place within a watercourse unless it is authorised by the DWS. Any area within a wetland or riparian zone is therefore excluded from development unless authorisation is obtained from the DWS in terms of Section 21 (c) and (i).

1.7 National Environmental Management Act (NEMA, 1998)

The National Environmental Management Act (Act 107 of 1998) (NEMA) and the associated Regulations, as amended, states that prior to any development taking place within a wetland or riparian area, an environmental authorisation process needs to be followed. This could follow either the Basic Assessment Report (BAR) process or the Environmental Impact Assessment (EIA) process depending on the scale of the impact.

1.8 Legislative Framework

In line with the protocol for the specialist assessment and minimum report content requirements for environmental impacts on freshwater biodiversity, as per Government Notice 320 published in terms of NEMA, dated 20 March 2020: “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 National Environmental Management Act, 1998, when applying for Environmental Authorisation” – the following has been assumed:

- An applicant intending to undertake an activity identified in the scope of this protocol on a site identified on the screening tool as being of:
- “very high” for aquatic biodiversity, must submit an Aquatic Biodiversity Specialist Assessment;
- “low sensitivity” for aquatic biodiversity, must submit an Aquatic Biodiversity Compliance Statement;
- Where the information gathered from the site sensitivity verification differs from the screening tool designation of “very high” aquatic biodiversity sensitivity, and it is found to be of a “low” sensitivity, an Aquatic Biodiversity Compliance Statement must be submitted; and
- Similarly, where the information gathered from the site sensitivity verification differs from the screening tool designation of “low” aquatic biodiversity sensitivity, and it is found to be of a “very high” sensitivity, an Aquatic Biodiversity Specialist Assessment must be submitted.

An Aquatic / Freshwater Biodiversity Specialist Assessment Report must contain the information as presented in Table 1-1 below.

Table 1-2 *Aquatic Biodiversity Specialist Assessment information requirements as per the relevant protocol, including the location of the information within this report*

Information to be Included (as per GN 320, 20 March 2020)	Report Section
The assessment must be prepared by a specialist registered with the South African Council for Natural Scientific Professionals (SACNASP) with expertise in the field of aquatic sciences	9.4
Contact details of the specialist, their SACNASP registration number, their field of expertise and a curriculum vitae	9.4
A signed statement of independence by the specialist(s)	9.3
The assessment must be undertaken on the preferred site and within the proposed development footprint	1.3
A baseline description of the aquatic biodiversity and ecosystems on the site, including: aquatic ecosystem types; presence of aquatic species, and composition of aquatic species communities, their habitat, distribution and movement patterns.	3
The threat status of the ecosystem and species as identified by the screening tool	3.5.1
An indication of the national and provincial priority status of the aquatic ecosystem, including a description of the criteria for the given status (i.e. if the site includes a wetland or a river freshwater ecosystem priority area or sub catchment, a strategic water source area, a priority estuary, whether or not they are free-flowing rivers, wetland clusters, a critical biodiversity or ecologically sensitivity area)	3.1.4
A description of the ecological importance and sensitivity of the aquatic ecosystem including: (a) the description (spatially, if possible) of the ecosystem processes that operate in relation to the aquatic ecosystems on and immediately adjacent to the site (e.g., movement of surface and subsurface water, recharge, discharge, sediment transport, etc.); and (b) the historic ecological condition (reference) as well as present ecological state of rivers (in- stream, riparian and floodplain habitat), wetlands and/or estuaries in terms of possible changes to the channel and flow regime (surface and groundwater)	3.3.1.5
The assessment must identify alternative development footprints within the preferred site which would be of a "low" sensitivity as identified by the screening tool and verified through the site sensitivity verification and which were not considered appropriate	Not Applicable
Related to impacts, a detailed assessment of the potential impacts of the proposed development on the following aspects must be undertaken to answer the following questions: Is the proposed development consistent with maintaining the priority aquatic ecosystem in its current state and according to the stated goal? Is the proposed development consistent with maintaining the resource quality objectives for the aquatic ecosystems present? How will the proposed development impact on fixed and dynamic ecological processes that operate within or across the site? This must include: (a) impacts on hydrological functioning at a landscape level and across the site which can arise from changes to flood regimes (e.g. suppression of floods, loss of flood attenuation capacity, unseasonal flooding or destruction of floodplain processes); (b) will the proposed development change the sediment regime of the aquatic ecosystem and its sub-catchment (e.g. sand movement, meandering river mouth or estuary, flooding or sedimentation patterns); (c) what will the extent of the modification in relation to the overall aquatic ecosystem be (e.g. at the source, upstream or downstream portion, in the temporary / seasonal / permanent zone of a wetland, in the riparian zone or within the channel of a watercourse, etc.); and (d) to what extent will the risks associated with water uses and related activities change.	4
How will the proposed development impact on the functioning of the aquatic feature? This must include: (a) base flows (e.g., too little or too much water in terms of characteristics and requirements of the system); (b) quantity of water including change in the hydrological regime or hydroperiod of the aquatic ecosystem (e.g., seasonal to temporary or permanent; impact of over -abstraction or instream or off stream impoundment of a wetland or river); (c) change in the hydrogeomorphic typing of the aquatic ecosystem (e.g., change from an unchanneled valley-bottom wetland to a channelled valley -bottom wetland); (d) quality of water (e.g., due to increased sediment load, contamination by chemical and/or organic effluent, and/or eutrophication);	4

(e) fragmentation (e.g., road or pipeline crossing a wetland) and loss of ecological connectivity (lateral and longitudinal); and	
(f) the loss or degradation of all or part of any unique or important features associated with or within the aquatic ecosystem (e.g., waterfalls, springs, oxbow lakes, meandering or braided channels, peat soils, etc.)	
How will the proposed development impact on key ecosystems regulating and supporting services especially:	
(a) flood attenuation;	
(b) streamflow regulation;	
(c) sediment trapping;	
(d) phosphate assimilation;	
(e) nitrate assimilation;	
(f) toxicant assimilation;	
(g) erosion control; and	
(h) carbon storage?	
How will the proposed development impact community composition (numbers and density of species) and integrity (condition, viability, predator-prey ratios, dispersal rates, etc.) of the faunal and vegetation communities inhabiting the site?	Not Applicable
A statement on the duration, date and season of the site inspection and the relevance of the season to the outcome of the assessment	2.1
The methodology used to undertake the site inspection and the specialist assessment, including equipment and modelling used, where relevant	9.1
A description of the assumptions made, any uncertainties or gaps in knowledge or data	1.4
The location of areas not suitable for development, which are to be avoided during construction and operation, where relevant	3.4
Additional environmental impacts expected from the proposed development	4
Any direct, indirect and cumulative impacts of the proposed development on site	4
The degree to which impacts and risks can be mitigated	4
The degree to which the impacts and risks can be reversed	4
The degree to which the impacts and risks can cause loss of irreplaceable resources	4
A suitable construction and operational buffer for the aquatic ecosystem, using the accepted methodologies	3.4
Proposed impact management actions and impact management outcomes for inclusion in the Environmental Management Programme (EMPr)	5
A motivation must be provided if there were development footprints identified as having a "low" aquatic biodiversity sensitivity and that were not considered appropriate	Not Applicable
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; and	7.2
Any conditions to which this statement is subjected	7.2

2 Fieldwork

2.1 Freshwater Biodiversity Field Assessment

A field survey for the area was undertaken on the 7th and 8th of April 2026, which is a late wet-season survey at a regional context, to identify the presence of freshwater features (wetlands) and to delineate their spatial extents. The seasonality is not considered to be a limiting factor to the assessment, and the results of this assessment are conclusive in the opinion of the specialist.

3 Results & Discussion

3.1 Desktop Dataset Assessment

3.1.1 Climate

The dominant vegetation type within the 500 m Regulated Area, the Maputaland Coastal Belt and Subtropical Alluvial Vegetation was used to draw inferences on the climate of the region.

3.1.1.1 Maputaland Coastal Belt

Weak rainfall seasonality near the coast tending toward summer rainfall towards the interior. Relatively high precipitation attaining annual values up to 1 200 mm in coastal localities, decreasing rapidly to the interior. High humidity and temperature. Mean maximum and minimum monthly temperature for Lake St Lucia Research Centre are 35.3°C and 5.5°C (for January and June, respectively). No incidence of frost. See also climate diagram for CB 1 Maputaland Coastal Belt (Figure 3-1).

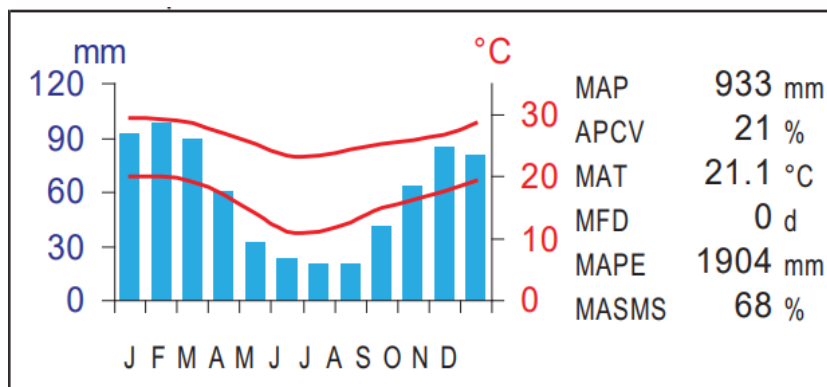


Figure 3-1 Climate for the region based on the Maputaland Coastal Belt (Mucina and Rutherford, 2008)

3.1.1.2 Subtropical Alluvial Vegetation

Subtropical, seasonal summer-rainfall climate with broad range of temperature (19.3°C in western Central Bushveld and 22.0°C in Mopane) and precipitation (MAP 311–672 mm for Limpopo Valley and Maputaland, respectively) due to large latitudinal and longitudinal ranges. See also climate diagram for AZa 7 Subtropical Alluvial Vegetation (Figure 3-2).

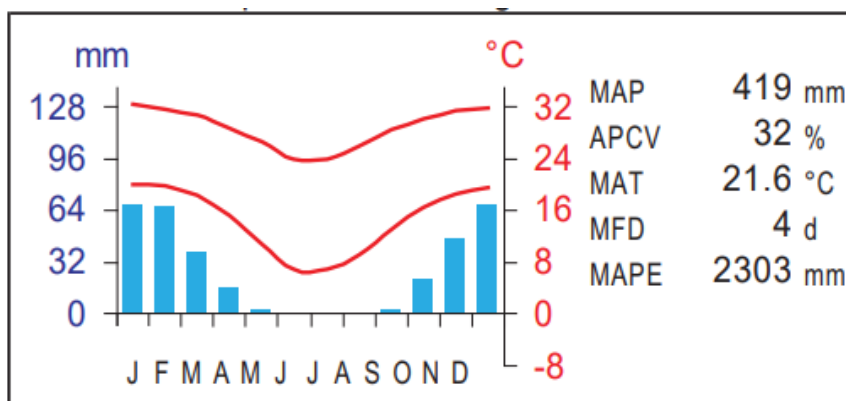


Figure 3-2 Climate for the region based on the Subtropical Alluvial Vegetation (Mucina and Rutherford, 2008)

3.1.2 Soils and Geology

3.1.2.1 Maputaland Coastal Belt

Up to about 18 000 yrs old Quaternary sediments of marine origin—mainly yellowish and argillaceous redistributed sands (Berea and Muzi Formations of the Maputaland Group, respectively). Soils nutritionally very poor and well leached, except in the interdune depressions where organic-rich soils are sometimes found. The dominant land types include Hb and Ha, with some contribution of Db land type.

3.1.2.2 Subtropical Alluvial Vegetation

Recent alluvial deposits with deep fine-structured sandy to loamy soils (Dundee, Estcourt, Valsrivier, Sterkspruit, Oakleaf forms), waterlogged as it is often exposed to floods (especially during the rainy summer season). Salt often accumulates in the alluvial soils (due to strong evaporation). Ia land type (Mucina and Rutherford, 2006).

According to the land type database (Land Type Survey Staff, 1972 - 2006), the 500 m Regulated Area is characterised by the Ab85, Ab86, Ha46, Hb76, Hb77, Ia73 and Ia75 land type. The Ab land type consists of red-yellow apedal, freely drained soils; with red, dystrophic and mesotrophic. The Ha land type consists of grey regic sands where regic soils are dominant. The Hb land type consists of grey regic sands where there are regic soils and other soils. The Ia land type consists of miscellaneous land classes with undifferentiated deep deposits.

3.1.3 Hydrological Characteristics

The PAOI falls within the North Eastern Uplands Ecoregion, within the Pongola-Mtamvuna Water Management Area (WMA). At a finer scale, within the W12F quaternary catchment (Figure 3-3).

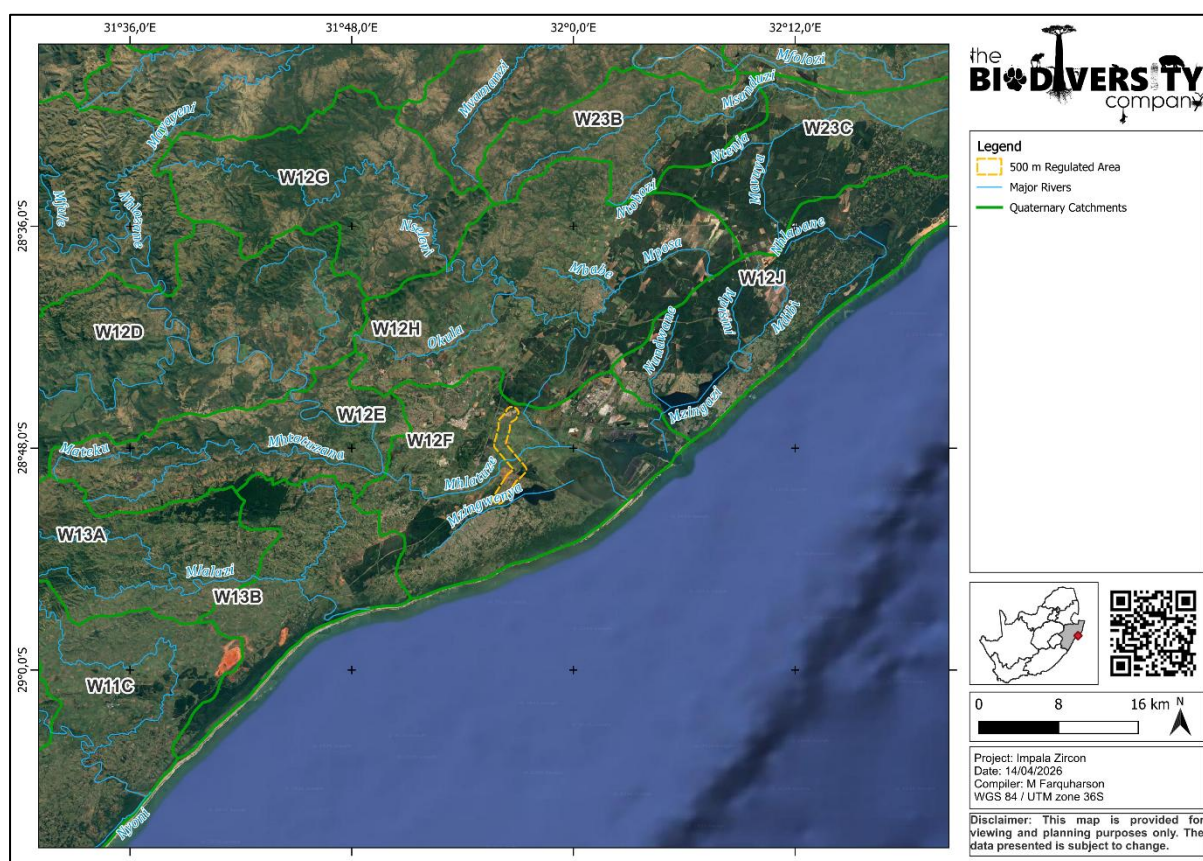


Figure 3-3 Catchment details for the project area of influence

3.1.3.1 Topographical River Lines and Inland Water Areas

The topographical inland and river line data for the “2831DD” quarter degree indicated the presence of two inland water areas classified as a dam and a sewerage works within the encompassing 500 m PAOI (Figure 3-4). Furthermore, non-perennial and perennial drainage features were identified within the PAOI (Figure 3-4). Some of the perennial drainage features are directly intersected by the 132kV line and bypass.

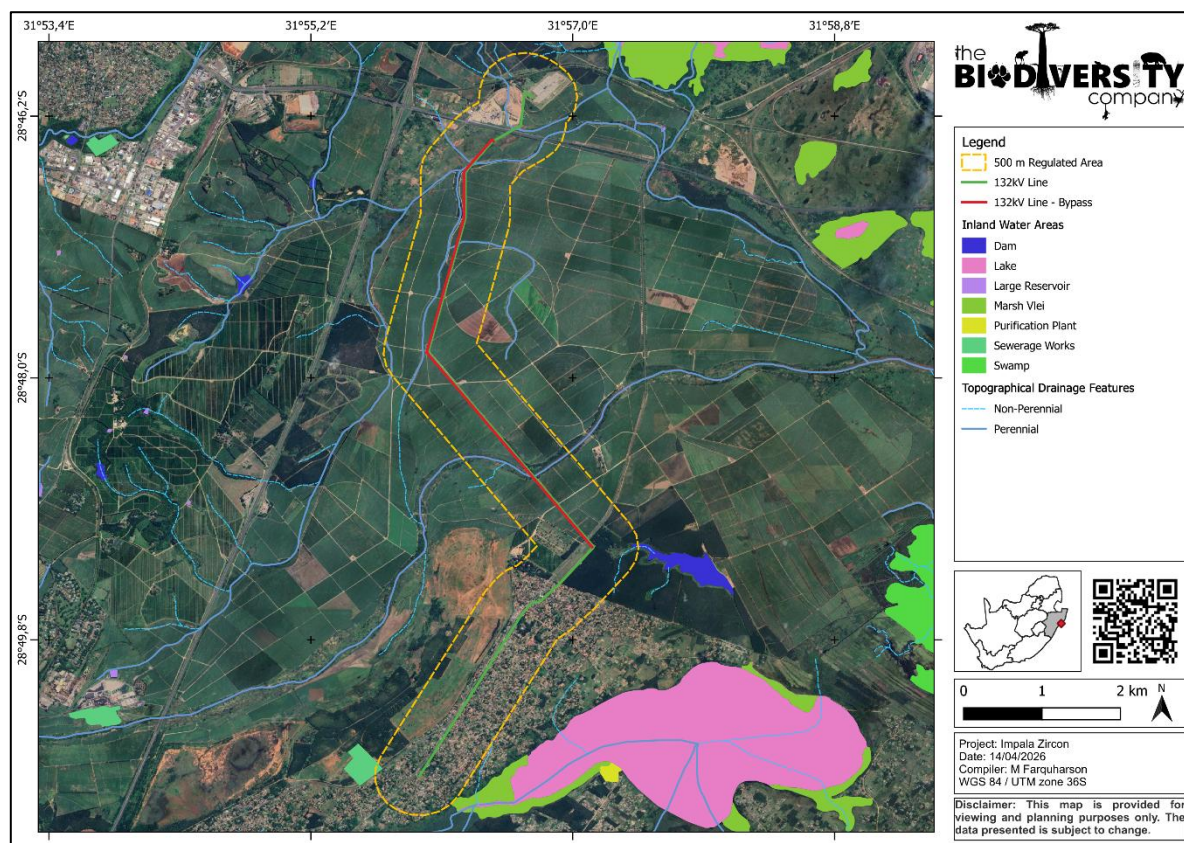


Figure 3-4 Topographical river lines and inland water areas that intersect the project area of influence

3.1.4 Ecologically Important Landscape Features

The GIS analysis pertaining to the relevance of the proposed project to ecologically important landscape features is summarised in Table 3-1. Only features that were identified to be relevant to the proposed project were further discussed.

Table 3-1 Summary of relevance of the proposed project to ecologically important landscape features

Desktop Information Considered	Relevant/Irrelevant	Section
South African Inventory of Inland Aquatic Ecosystems (SAIIAE)	Relevant – PAOI overlaps with SAIIAE wetlands.	3.1.4.1
National Freshwater Priority Area	Relevant – PAOI overlaps with NFEPA wetlands.	3.1.4.2
Strategic Water Source Areas	Relevant – The PAOI overlaps with a Groundwater SWSA.	3.1.4.3
Provincial Conservation Plan	Irrelevant – The PAOI does not overlap with any categories of the KZN BSP.	-

3.1.4.1 South African Inventory of Inland Aquatic Ecosystems

Four wetland types were identified within the PAOI by the use of the South African Inventory of Inland Aquatic Ecosystems (SAIIAE), which was classified as an estuary, floodplain wetland, a river and a seep wetland (Figure 3-5). The river and floodplain wetland features overlap the powerline itself. The floodplain and seep wetlands condition as per the dataset is “D/E/F - Largely/Seriously/Critically Modified”. The floodplain wetland and seep wetland are classified to be “Critically Endangered” with regard to Ecosystem Threat Status and the floodplain wetland “Poorly Protected” and the seep wetland “Not Protected” with regard to Ecosystem Protection Level; the estuary is classified to be “Endangered”

with regard to Ecosystem Threat Status and “Poorly Protected” with regard to Ecosystem Protection Level.

3.1.4.2 National Freshwater Ecosystem Priority Areas

The National Freshwater Ecosystem Priority Areas dataset identified seven wetlands within the PAOI, classified as a valleyhead seep, floodplain wetland, estuary, channelled valley bottom and unchannelled valley bottom (Figure 3-5). one of the features (floodplain wetland) overlaps with the powerline itself. The unchannelled valley bottom, channelled valley bottom, floodplain, and valleyhead seep were classified as a natural system according to the dataset. All the wetlands were classified as having a “Z1/Z2 – Heavily Modified” conditions according to the dataset. The wetlands were not identified to be priority systems.

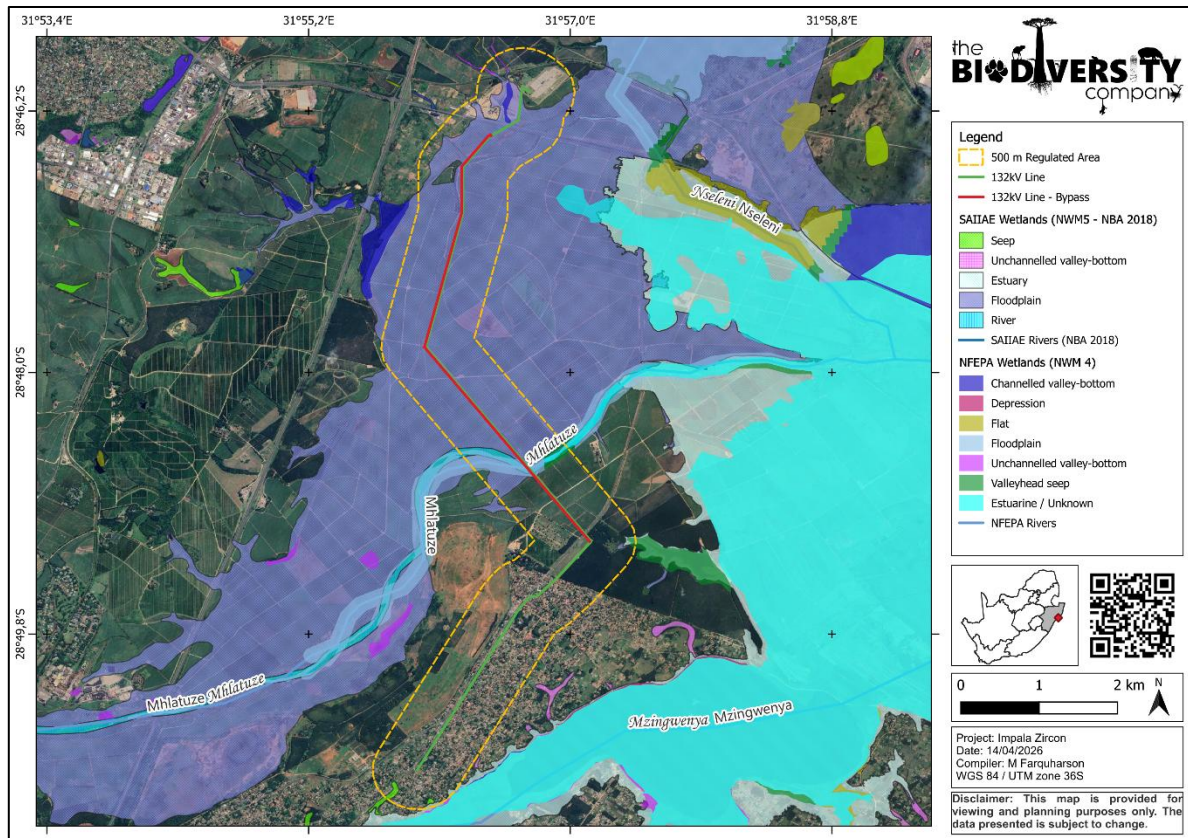


Figure 3-5 Wetland features identified within the project area of influence according to the South African Inventory of Inland Aquatic Ecosystems dataset and National Freshwater Ecosystem Priority Areas dataset

3.1.4.3 Strategic Water Source Area

The PAOI overlaps with a Groundwater Strategic Water Source Area known as the Richards Bay Groundwater Fed Estuary Strategic Water Source Area (Figure 3-6).

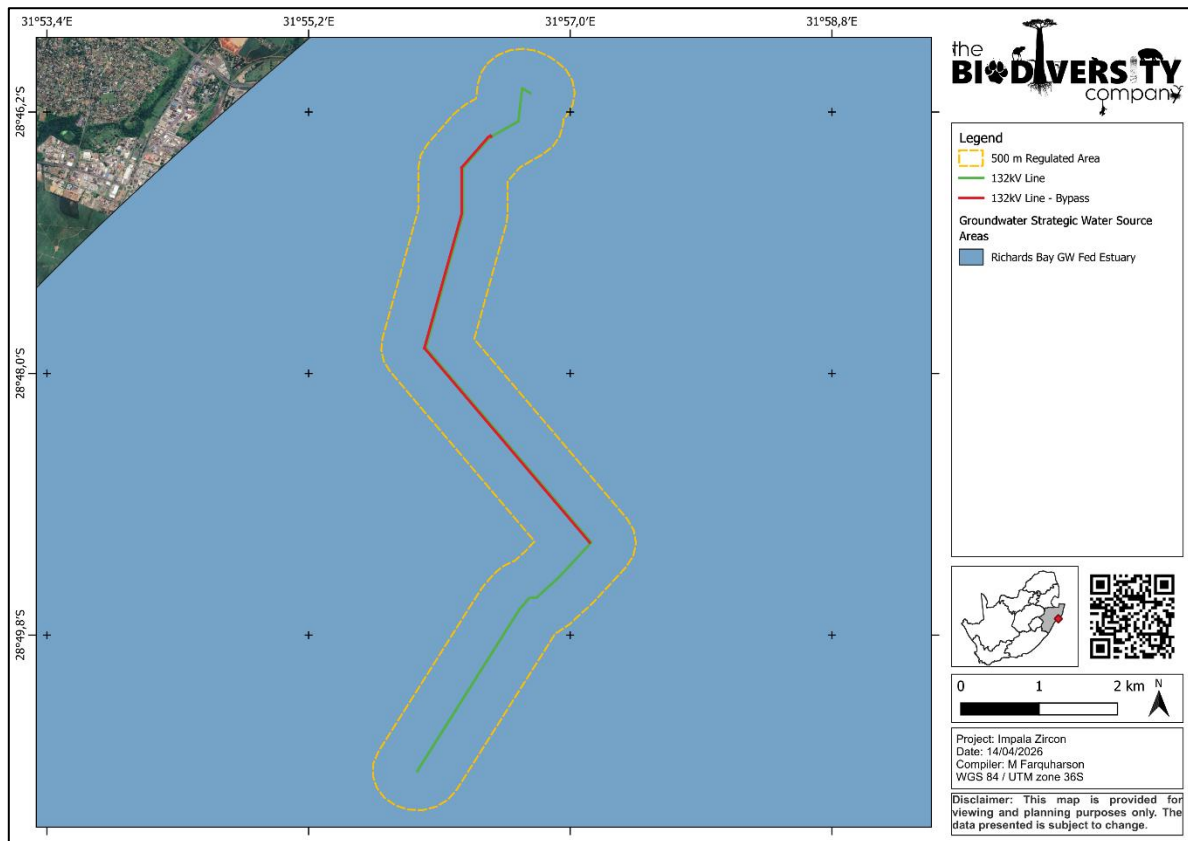


Figure 3-6 Wetland features identified within the project area of influence according to the Strategic Water Source Areas dataset

3.2 Wetland Assessment

3.2.1 Delineation

Five (5) Hydrogeomorphic (HGM) units were identified within the encompassing 500 m PAOI. These were classified as one channelled valley-bottom (HGM 1), one floodplain wetland (HGM 2) two seeps (HGM 3 and HGM 5), and one wetland flat (HGM 4) (Figure 3-7 and Figure 3-8). Additionally, artificial drainage channels, non-perennial drainage lines and the uMhlathuze River were identified within the PAOI. It must be noted that HGM 2 and the artificial channel partially overlaps with the Powerline.

It must be noted that the Project Area of Influence has experienced disturbance from previous activities, including the use of dirt roads, which has resulted in uneven surfaces where water tends to accumulate after rainfall. While some of these areas support the growth of facultative plant species typically associated with wetter conditions, detailed field assessment confirmed that the underlying soil profiles do not exhibit the hydromorphic characteristics required to classify them as wetlands. As such, these disturbed zones were not delineated as wetlands in this assessment.

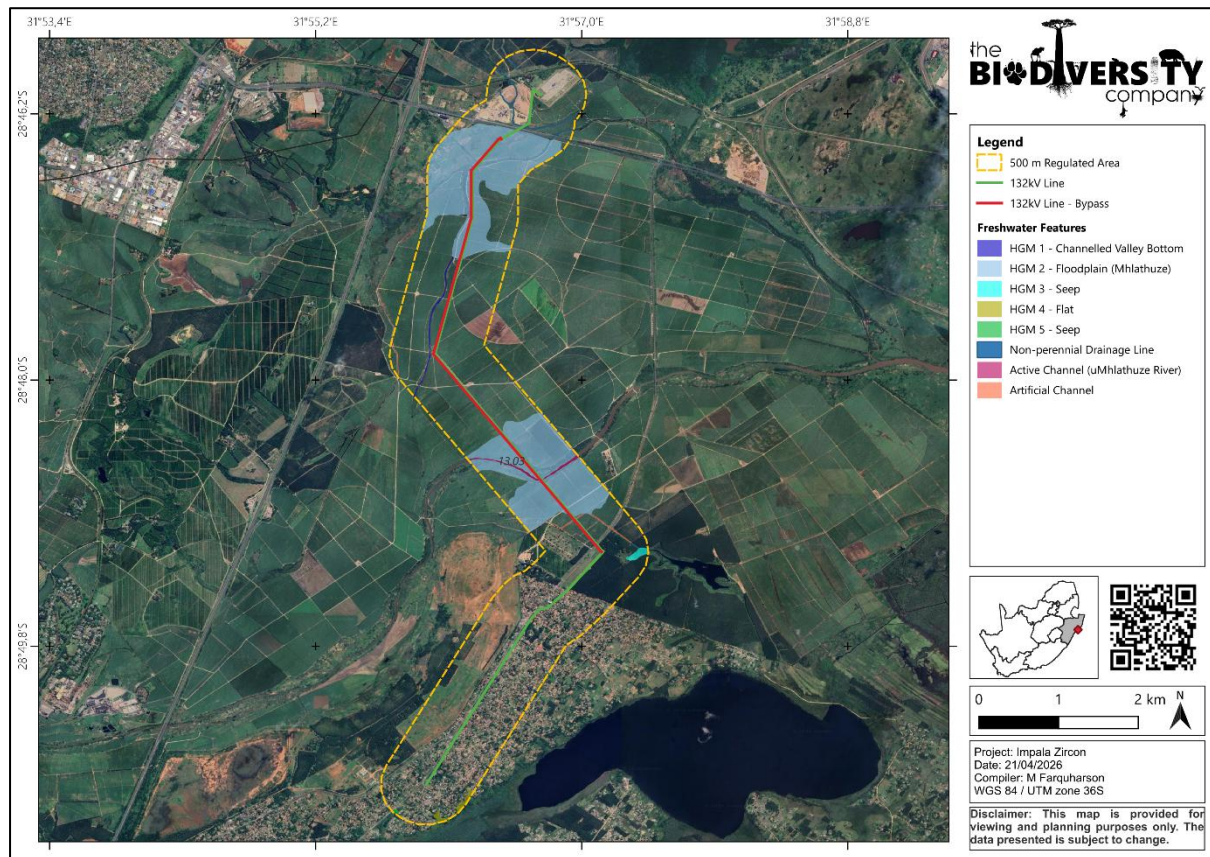


Figure 3-7 Delineation of wetland features within the project area of influence



Figure 3-8 Representative photographs of A and B) Floodplain (HGM 2); C) Channelled Valley Bottom (HGM 1); and D) Seep (HGM 3)

3.2.2 Classification and Description

The watercourse feature classification as per SANBI guidelines (Ollis *et al.*, 2013) is presented in Table 3-2.

Table 3-2 **Classification as per SANBI guideline (Ollis *et al.*, 2013)**

Wetland Unit	Level 1	Level 2		Level 3	Level 4		
	System	DWS Ecoregion/s	NFEPA Wet Veg Group/s	Landscape Unit	4A (HGM)	4B	4C
HGM 1				Valley Floor	Channelled valley-bottom	Not Applicable	Not Applicable
HGM 2				Valley Floor	Floodplain	Floodplain flat	Not Applicable
HGM 3	Inland	Natal Coastal Plain	Indian Ocean Coastal Belt Group 1	Slope	Seep	Without channelled outflow	Not Applicable
HGM 4				Valley Floor	Flat	Not Applicable	Not Applicable
HGM 5				Slope	Seep	Without channelled outflow	Not Applicable

A channelled valley-bottom wetland, is a wetland ecosystem located along a valley floor, characterized by the presence of a river channel running through it (Ollis *et al.*, 2013). These wetlands are distinct from floodplain wetlands due to the absence of characteristic floodplain features and the presence of a defined river channel. The landscape setting of a channelled valley-bottom wetland typically involves a valley floor where the wetland receives water inputs from the river channel, either as surface flow during flooding or as subsurface flow, and from adjacent valley side-slopes through overland flow or interflow. The hydrodynamics of these wetlands are influenced by the river channel, which provides a concentrated flow of water, contributing to the wetland's ecological functions such as sediment trapping, nutrient cycling, and habitat provision. This setting makes channelled valley-bottom wetlands crucial for maintaining the ecological integrity of riverine systems and supporting biodiversity. Figure 3-9 presents a diagram of a typical channelled valley bottom, showing the dominant movement of water into, through and out of the system.

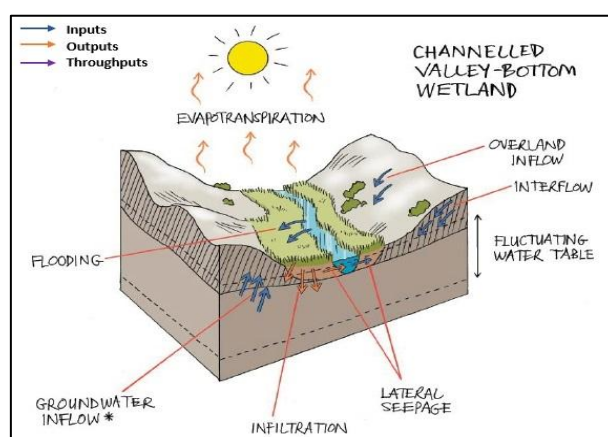


Figure 3-9 **Amalgamated diagram of a typical channelled valley bottom, highlighting the dominant water inputs, throughputs and outputs, SANBI guidelines (Ollis *et al.* 2013)**

A floodplain, is a wetland area situated on the mostly flat or gently-sloping land adjacent to and formed by an alluvial river channel (Ollis *et al.*, 2013). These areas are subject to periodic inundation by the

overtopping of the channel bank, which contributes to their dynamic nature. Floodplains are typically characterized by a suite of geomorphological features associated with river-derived depositional processes, such as point bars, scroll bars, oxbow lakes, and levees. The floodplain is formed under the current climate and sediment load, distinguishing it from terraces, which are remnants of previous climatic conditions. Water and sediment enter floodplain wetlands mainly as overspill from a major river channel during flooding, with water movement through the wetland being predominantly horizontal and bidirectional. This setting allows floodplains to play crucial roles in sediment deposition, nutrient cycling, and providing diverse habitats for various species, making them vital components of the riverine landscape. Figure 3-10 presents a diagram of the delineated floodplain, showing the dominant movement of water into, through and out of the system.

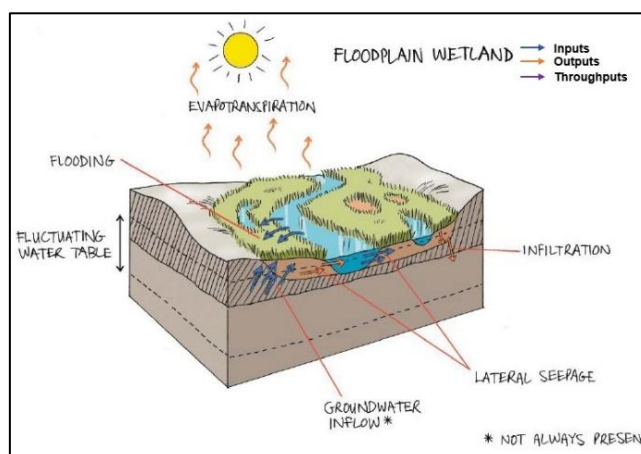


Figure 3-10 Amalgamated diagram of a typical floodplain wetland, highlighting the dominant water inputs, throughputs and outputs, SANBI guidelines (Ollis et al. 2013)

A seep wetland is typically located on gently to steeply sloping land and is characterised by the colluvial, unidirectional movement of water and material down-slope (Ollis et al., 2013). Seeps are often found on the side-slopes of a valley but do not usually extend onto the valley floor. The primary water inputs for seeps are subsurface flows from an up-slope direction, with water movement through the seep mainly occurring as interflow. During and after rainfall events, diffuse overland flow, known as sheetwash, can also be significant. Seeps are associated with geological formations and topographic positions that either cause groundwater to discharge to the land surface or rain-derived water to seep down-slope as subsurface interflow. This unique hydrological setting allows seeps to support specific vegetation adapted to these conditions, contributing to their ecological significance in the landscape. Figure 3-11 illustrates a diagram of the hillslope seeps, showing the dominant movement of water into, through and out of the system.

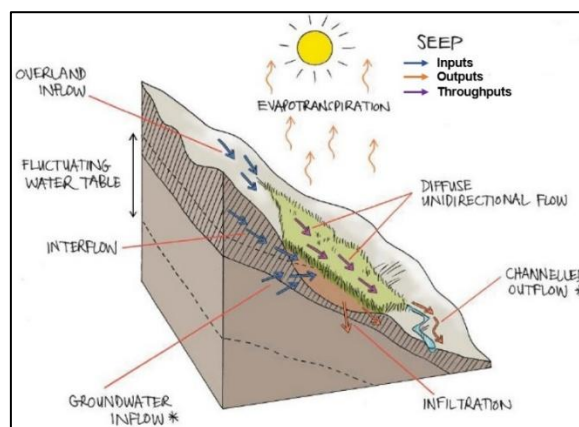


Figure 3-11 Amalgamated diagram of a typical hillslope seep, highlighting the dominant water inputs, throughputs and outputs, SANBI guidelines (Ollis et al. 2013)

A flat wetland, is characterized by its level or near-level topography, typically situated on a plain or a bench (Ollis et al., 2013). These wetlands are not fed by water from a river channel and are generally dominated by vertical water movements, such as precipitation and groundwater inflow, with horizontal water movements being weak and multi-directional, if present at all. Wetland flats are distinguished by the absence of closed elevation contours around their edges, which differentiates them from depressions. They are often found in extensive areas of low relief, where the gentle gradient does not facilitate significant lateral water flow. This setting allows wetland flats to function primarily through processes like infiltration and evapotranspiration, making them unique in their hydrological dynamics and ecological roles within the landscape. Figure 3-12 presents a diagram of a wetland flat, showing the dominant movement of water into, through and out of the system.

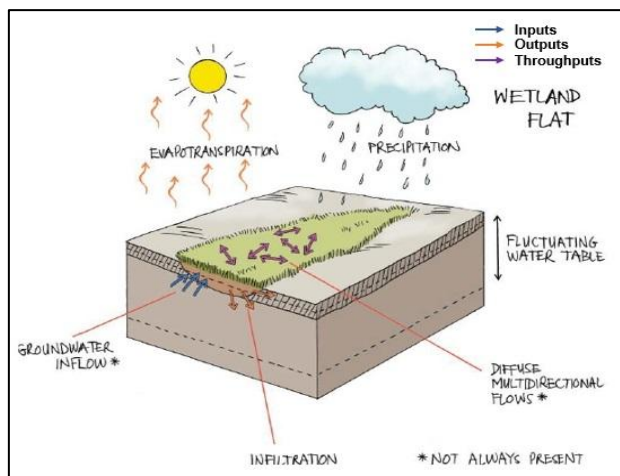


Figure 3-12 Amalgamated diagram of a typical wetland flat, highlighting the dominant water inputs, throughputs and outputs, SANBI guidelines (Ollis et al. 2013)

The DWAF (2005) manual separates the classification of watercourses into three (3) separate types of channels or sections defined by their position relative to the zone of saturation in the riparian area. The classification system separates channels into:

- those that do not have baseflow ('A' Sections);
- those that sometimes have baseflow ('B' Sections) or non-perennial; or
- those that always have baseflow ('C' Sections) or perennial.

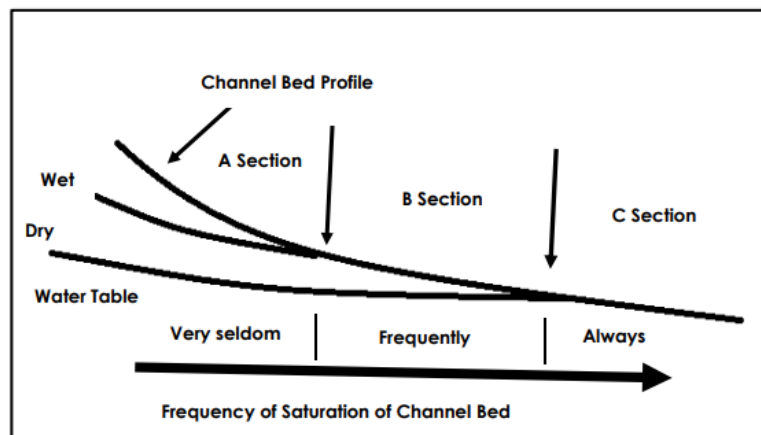


Figure 3-13 The watercourse classifications (DWAF, 2005)

3.2.3 Wetland Area

The total wetland area within the PAOI amounts to 252.93 ha (Table 3-3). It should be noted that approximately 13.65 ha of wetland amounting to 5.40 % of the total wetland area within the PAOI is directly overlapped by the powerline. The powerline has been buffered by 5 m to calculate the area overlapped by the powerline.

Table 3-3 Summary of natural wetland area within the project area of influence

Features	Delineated within 500m PAOI		Overlapped by Powerline (5m Buffer)
	Area (Ha)	Percentage of Wetland Area (%)	Area (Ha)
HGM 1	2.48	0.98	-
HGM 2	245.45	97.04	13.65
HGM 3	1.94	0.77	-
HGM 4	2.76	1.09	-
HGM 5	0.30	0.12	-
Total	252.93	100.00	13.65

3.2.4 Risk Screening

Table 3-4 provides the results of risk screening for the delineated wetlands and provides motivation for each of the determined categories. HGM 1 and HGM 2 were identified to be “At Risk” from the proposed development activities attributed to the proximity of the wetlands to the activities.

Table 3-4 Risk status of the delineated wetlands

HGM unit	Risk Status	Rationale
HGM 1 HGM 2	At Risk	These features were identified to be intersected, be in proximity or be located downslope of the proposed development activity areas. Therefore, the features have been determined as “At Risk”. It is anticipated that direct and indirect impacts to the wetland systems are potential.
HGM 3 HGM 4 HGM 5	Not At Risk	These wetlands are located a considerable distance away from the proposed activities and are not located in a position of the landscape where impacts will be potential and have therefore been determined as “Not at Risk”.

3.3 Wetland Functional and Ecological Assessment

It should be noted that only natural wetland features which are at risk from the proposed activities have been considered for the ecological assessments. Therefore, HGM 3, HGM 4, HGM 5, non-perennial drainage features and artificial channels were excluded from further assessment.

3.3.1 Functional Assessment

3.3.1.1 General Functional Description

Channelled valley-bottom wetlands are characterized by their location in valley bottoms with a well-defined stream channel. These wetlands play a crucial role in hydrological processes, particularly in flood attenuation and sediment trapping. The presence of a channel allows for the movement of water, which can contribute to the regulation of streamflow, especially during periods of low flow. The vegetation in these wetlands provides resistance to water flow, thereby slowing down the movement of water and allowing for the deposition of sediments. This process not only helps in maintaining water quality by trapping sediments and associated nutrients but also supports the wetland's role in flood attenuation by spreading out and slowing down floodwaters. Additionally, channelled valley-bottom wetlands can contribute to the removal of nitrates and toxicants from the water, enhancing the overall water quality in the catchment area. These wetlands are integral to maintaining the ecological balance and providing essential ecosystem services, such as water purification and habitat provision for various species (Kotze *et al.*, 2009).

Floodplains are vital wetland ecosystems located in valley bottom areas with well-defined stream channels. They are characterized by their ability to receive water primarily during high flow events when riverbanks overflow. Floodplains play a crucial role in flood attenuation due to their vegetation and topographic setting, which allow them to spread out and slow down floodwaters, thereby reducing the severity of floods downstream. This flood attenuation capacity is typically higher early in the season until the floodplain soils become saturated. Additionally, floodplains are significant in sediment trapping, as the decreased velocity of floodwaters allows for the deposition of sediment particles, effectively retaining phosphorous bound to these sediments. While floodplains may not significantly contribute to streamflow regulation due to the retention of water in their generally clayey soils, they can enhance groundwater recharge in areas with coarser sediments. Overall, floodplains are essential for maintaining water quality and providing diverse habitats, supporting a wide range of ecological functions and services (Kotze *et al.*, 2009).

It should be noted that these characteristics are representative of ideal wetland features and may not necessarily represent the characteristics of all wetlands. The functionality of wetlands and the provision of benefits is largely dependent on wetland size and influence from abiotic drivers.

3.3.1.2 Ecosystem Services

The ecosystem services provided by the relevant wetland units on site were assessed and rated using the WET-EcoServices method (Kotze *et al.*, 2009). The results of the assessment are presented in Table 3-5. The average ecosystem services score of HGM 1 and HGM 2 falls within the “Intermediate” class.

Table 3-5 Summary of the average ecosystem scores for the assessed systems

Wetland Unit				HGM 1	HGM 2		
Ecosystem Services Supplied by Wetlands	Indirect Benefits	Regulating and supporting benefits	Flood attenuation		2.0	1.8	
			Streamflow regulation		1.8	2.1	
			Water Quality enhancement benefits	Sediment trapping		2.1	2.0
				Phosphate assimilation		2.0	1.8
				Nitrate assimilation		2.8	2.0
				Toxicant assimilation		2.8	1.8
				Erosion control		1.7	1.5
			Carbon storage		1.0	1.8	
	Direct Benefits	Provisioning benefits	Biodiversity maintenance		2.0	2.0	
			Provisioning of water for human use		0.8	0.4	
			Food for livestock		2.0	0.8	
			Provisioning of harvestable resources		2.8	3.0	
			Provisioning of cultivated foods		2.0	3.0	
		Cultural benefits	Cultural heritage		2.0	2.0	
			Tourism and recreation		0.8	0.8	
			Education and research		0	0	
Class				Intermediate	Intermediate		

The assessment of ecosystem services for the two wetland units, HGM 1 (Channelled Valley Bottom) and HGM 2 (Floodplain), reflects their important roles in the rural landscape. Both wetlands are classified as "Intermediate" in terms of their overall ecosystem service provision. Both HGM 1 and HGM

2 provide moderate levels of regulating and supporting ecosystem services, including sediment trapping, nutrient assimilation (phosphate, nitrate, and toxicants), and flood attenuation. Their scores indicate that while these wetlands contribute to maintaining water quality and moderating hydrological flows, their capacity to do so is neither exceptionally high nor particularly limited. This intermediate level of service provision is important in the context of rural settlements, multiple crossings, and potential grey water inputs, as it suggests a balanced but not outstanding ability to buffer and support the surrounding landscape. Both wetland units also offer some direct benefits, such as supporting local biodiversity and cultural heritage values, but provisioning services such as water supply for human use and tourism remain limited. Food resources for livestock are available to a moderate extent, consistent with the presence of grazing cows, but do not represent a major contribution relative to higher-functioning wetlands.

3.3.1.3 Present Ecological State

The wetlands exhibited different degrees of modification resulting from natural physical changes as well as anthropogenically induced impacts at both the local and catchment level. Resultingly, the wetlands have scored an average Present Ecological State (PES) score within the “E – Seriously Modified” PES class. The results of the wetland health and integrity assessment is provided in the table below.

Table 3-6 Average Present Ecological State scores for the assessed wetlands

Unit	PES Assessment	Hydrology	Geomorphology	Water Quality	Vegetation
HGM 1	Ecological Category	E	D	E	C
	Combined Ecological Category	E – Seriously Modified			
HGM 2	Ecological Category	E	D	E	C
	Combined Ecological Category	E – Seriously Modified			

Impacts to the wetlands include:

- Loss of wetland area vegetation from historical land clearance;
- Altered overland flow from catchment modification;
- Erosion and sedimentation of watercourses from poor stormwater and runoff management from roads and housing settlements;
- Water quality degradation due to contaminated runoff entering the system;
- Reduced integrity of the system and subsequent decline in the provisioning of ecological benefits;
- Altered vegetation composition from overgrazing and direct disturbance from human influence (e.g. walking paths); and
- Altered geomorphological structure of the watercourse from infilling and excavations within the watercourse.

3.3.1.4 Intermediate Habitat Integrity Assessment

The result of the instream and riparian habitat integrity assessment for reach W12F-03494 is represented in Table 3-7.

Table 3-7 Results of the instream habitat integrity assessment for the respective reach

Instream Criteria	Mhlathuze River
Water abstraction	5
Flow modification	5
Bed modification	2
Channel modification	6
Phys-chem modification	6

Inundation	7
Alien macrophytes	8
Introduced aquatic fauna	2
Rubbish dumping	6
Instream Habitat Integrity Score	79
Instream Habitat Integrity Category	C
Riparian Criteria	Mhlathuze River
Vegetation removal	7
Exotic vegetation	9
Bank erosion	5
Channel modification	5
Water abstraction	2
Inundation	5
Flow modification	5
Phys-chem	6
Riparian Zone Integrity Score	78
Riparian Zone Integrity Category	C

According to the IHIA results, the instream and riparian habitat was rated as “C – Moderately Modified” indicating a large loss of natural habitat, biota and basic ecosystem function has occurred. Activities within the catchment that have contributed to the deteriorated state of the system includes agriculture and livestock activities, indigenous vegetation clearing and alien invasive vegetation encroachment, and forestry activities.

These activities have resulted in a deterioration of water quality, bank erosion, encroachment of alien vegetation into the riparian habitat, minor flow modification and impacts to the instream habitat.

3.3.1.5 Ecological Importance and Sensitivity

The Ecological Importance and Sensitivity (EIS) assessment was applied to the HGM units in conjunction with the ecosystem service scores in the preceding sections, to assess the levels of sensitivity and ecological importance of the wetland. The results indicate that the wetlands occur within the “Moderate” EIS class as noted in the table below.

Table 3-8 Summary of the Ecological Importance and Sensitivity assessment

HGM	NFEPA Wet Veg			NBA Wetlands			SWSA (Y/N)	CBA / ESA (Y/N)	EIS Rating
	Type	Ecosystem Threat Status	Ecosystem Protection Level	Wetland Condition	Ecosystem Threat Status 2018	Ecosystem Protection Level			
HGM 1	Indian Ocean Coastal Belt Group 1	Least Threatened	Well Protected	E (Field Visit)	Critically Endangered	Poorly Protected	Y	N	C - Moderate
HGM 2				E (Field Visit)			Y	N	C - Moderate

3.3.1.6 Recommended Ecological Category and Recommended Management Objective

The Recommended Ecological Category (REC) and Recommended Management Objective (RMO) for the wetland areas was determined from the results of the PES and EIS assessments. These assessments indicated that the wetland feature within the site, had underwent transformation as a result of historical and current impacts. Nevertheless, despite the altered ecological integrity of the systems, they are considered to provide ecological services.

The results of the assessment are presented in the table below, the objective for the wetlands is aimed at maintaining the current PES.

Table 3-9 Recommended Ecological Category and Management Objective

HGM No.	Recommended Ecological Category	Recommended Management Objective
HGM 1	E/F	Maintain
HGM 2	E/F	Maintain

3.4 Buffer Requirements

The buffer requirements for the wetland were calculated using the Site-Based Tool: Determination of buffer zone requirements for wetland ecosystems (Macfarlane *et al.*, 2014). The recommended buffer zones are presented in Table 3-10. The recommended post-mitigation buffers for the construction and operational phase of the development is 20 m for channelled valley-bottom and floodplain wetland (HGM 1 and HGM 2); 15 m for the two seeps and flat wetlands (HGM 2, HGM 3 and HGM 4) as well as the non-perennial drainage line and uMhlathuze River as presented in Figure 3-14.

It must be noted that the provincial guidelines have dictated that buffer zones for wetlands and rivers are set to a standard 30 m buffer width, irrespective of site-specific conditions and development type, with 200 m to 600 m buffer sizes required from wetlands where Red Data species have been identified (EKZNW, 2013).

Table 3-10 Recommended buffers for the proposed development

Feature	Phase	Pre-Mitigation	Post-Mitigation
HGM 1 and HGM 2	Construction Phase	30	20
	Operational Phase	25	20
HGM 2, HGM 3, HGM 4, Non-perennial Drainage Lines, and uMhlathuze River	Construction Phase	30	15
	Operational Phase	25	15

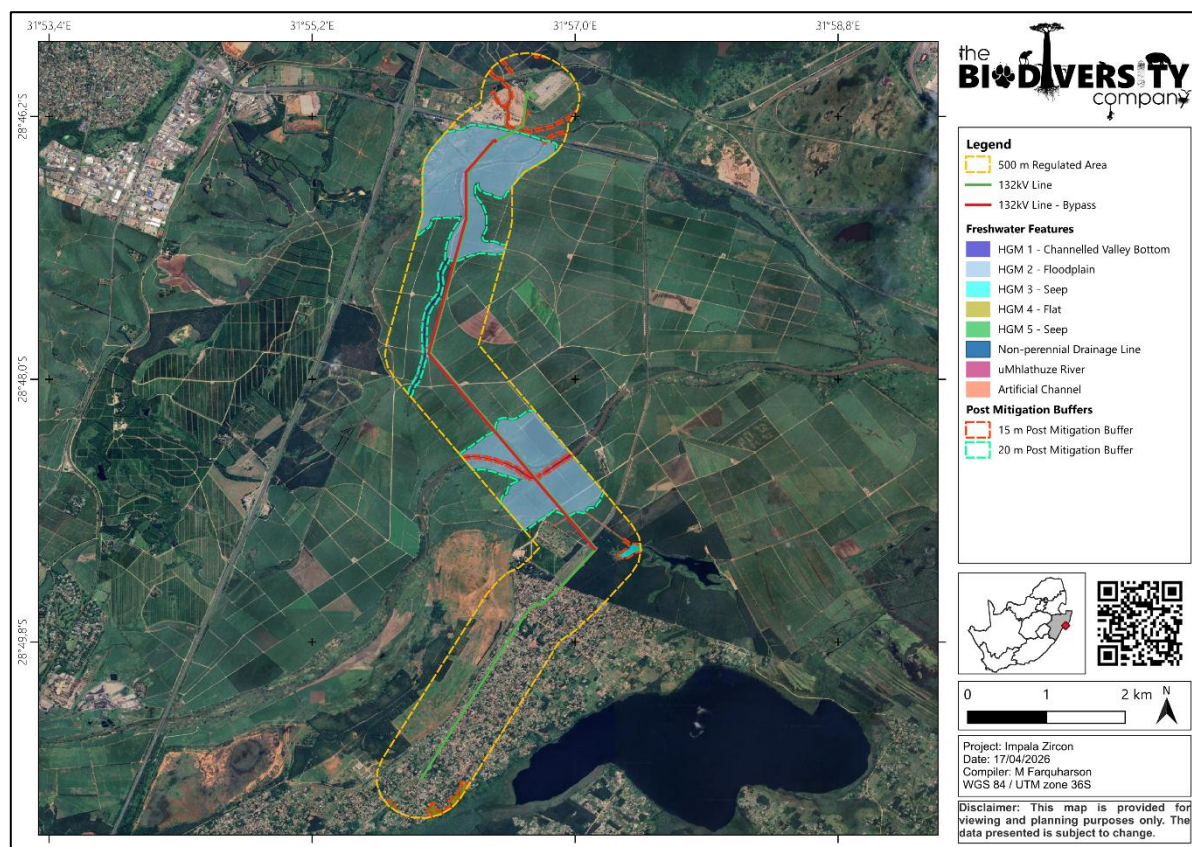


Figure 3-14 Recommended post-mitigation buffers for the wetlands

3.4.1 Regulation Zones

Table 3-11 and Figure 3-15 presents the legislated zones of regulation that would be applicable to the wetland and riparian areas.

In accordance with Government Notice (GN) 4167 of 2023 and GN 509 of 2016, as it relates to the NWA (1998), the regulated area of a watercourse for Section 21 (c) and 21 (i) of the NWA (1998) must be considered if the proposed development and associated infrastructure fall within the applicable zones of regulation as defined in the Act.

Additionally, listed activities in terms of the NEMA EIA Regulations, 2014, as amended, must be taken into consideration if any infrastructure is to be placed within the applicable zone of regulation.

Given the proximity of the proposed activities in relation to the wetlands, both types of authorisations are deemed applicable for the project.

Table 3-11 Legislated zones of regulation

Regulatory authorisation required	Zone of applicability
Water Use License Application in terms of the National Water Act, 1998 (Act No. 36 of 1998). GN 4167 as published in the Government Gazette 49833 of 2023. GN 509 as published in the Government Gazette 40229 of 2016.	In accordance with GN 4167 of 2023 and GN 509 of 2016, as it relates to the National Water Act, 1998 (Act 36 of 1998), a regulated area of a watercourse in terms of water uses as listed in Section 21c and 21i is defined as: - 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; - in the absence of a determined 1 in 100 year flood line or riparian area the area within 100 m from the edge of a watercourse where the edge of the watercourse is the first identifiable annual bank fill flood bench; or - a 500 m radius from the delineated boundary (extent) of any wetland or pan in terms of this regulation.

Activity 12 of Listing Notice 1 of the NEMA EIA regulations, 2014 (as amended) states that:

The development of:

Environmental Authorisation in terms of the Listed activities of the NEMA EIA Regulations 2014, as amended.

(xii) Infrastructure or structures with a physical footprint of 100 square metres or more; Where such development occurs—
Within a watercourse;
In front of a development setback; or

If no development setback has been adopted, within 32 metres of a watercourse, measured from the edge of a watercourse.

...

(dd) where such development occurs within an urban area...

Activity 19 of Listing Notice 1 (GN 327) of the NEMA EIA regulations, 2014 (as amended) states that:

“The infilling or depositing of any material of more than 10 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 10 cubic metres from a watercourse.”

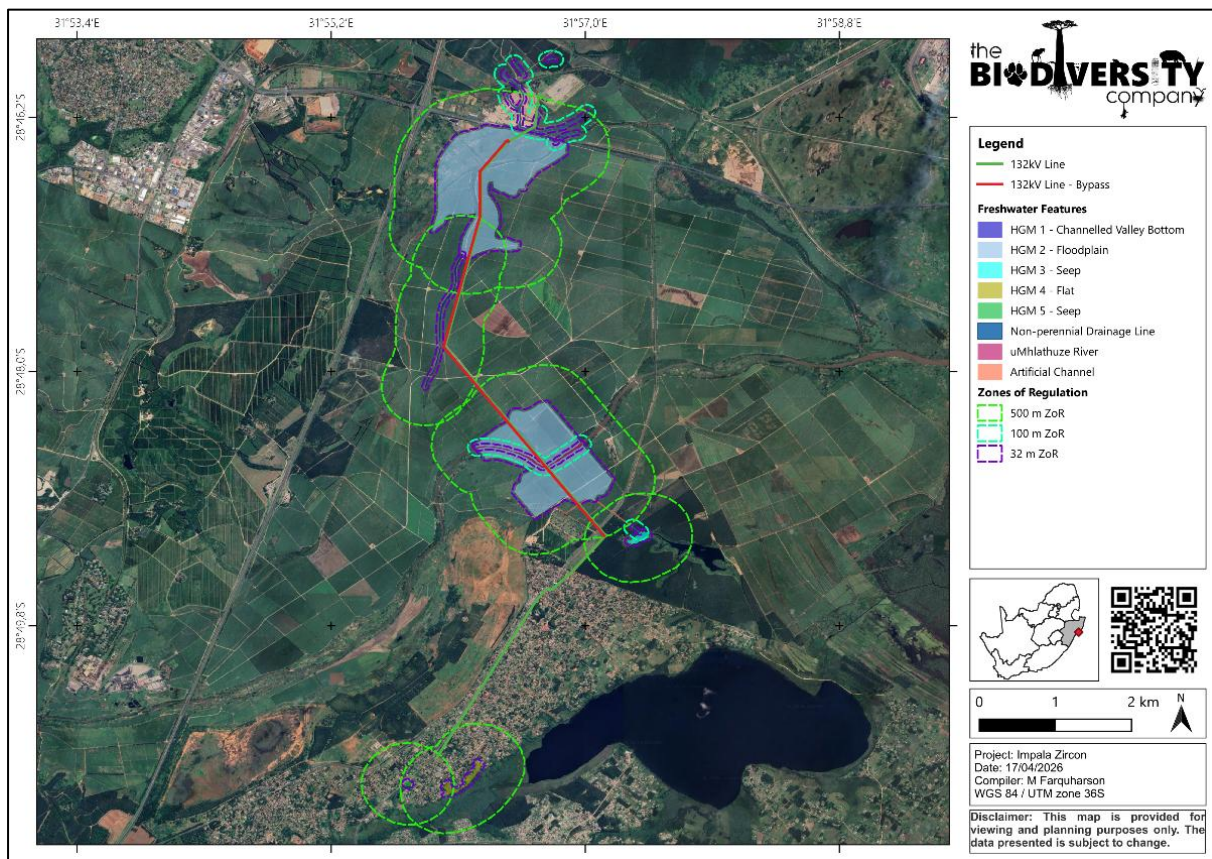


Figure 3-15 Recommended zones of regulation for the wetlands

3.5 Site Sensitivity Verification

3.5.1 Desktop Ecological Sensitivity

The following is deduced from the National Web-based Environmental Screening Tool (Regulation 16(1)(v) of the Environmental Impact Assessment Regulations 2014, as amended):

- Aquatic Biodiversity Theme sensitivity as “Very High” for the Project Area of Influence (Figure 3-16), attributed to the presence of Estuary, Floodplain wetlands, Seep wetlands, uMhlathuze estuary, and Rivers.

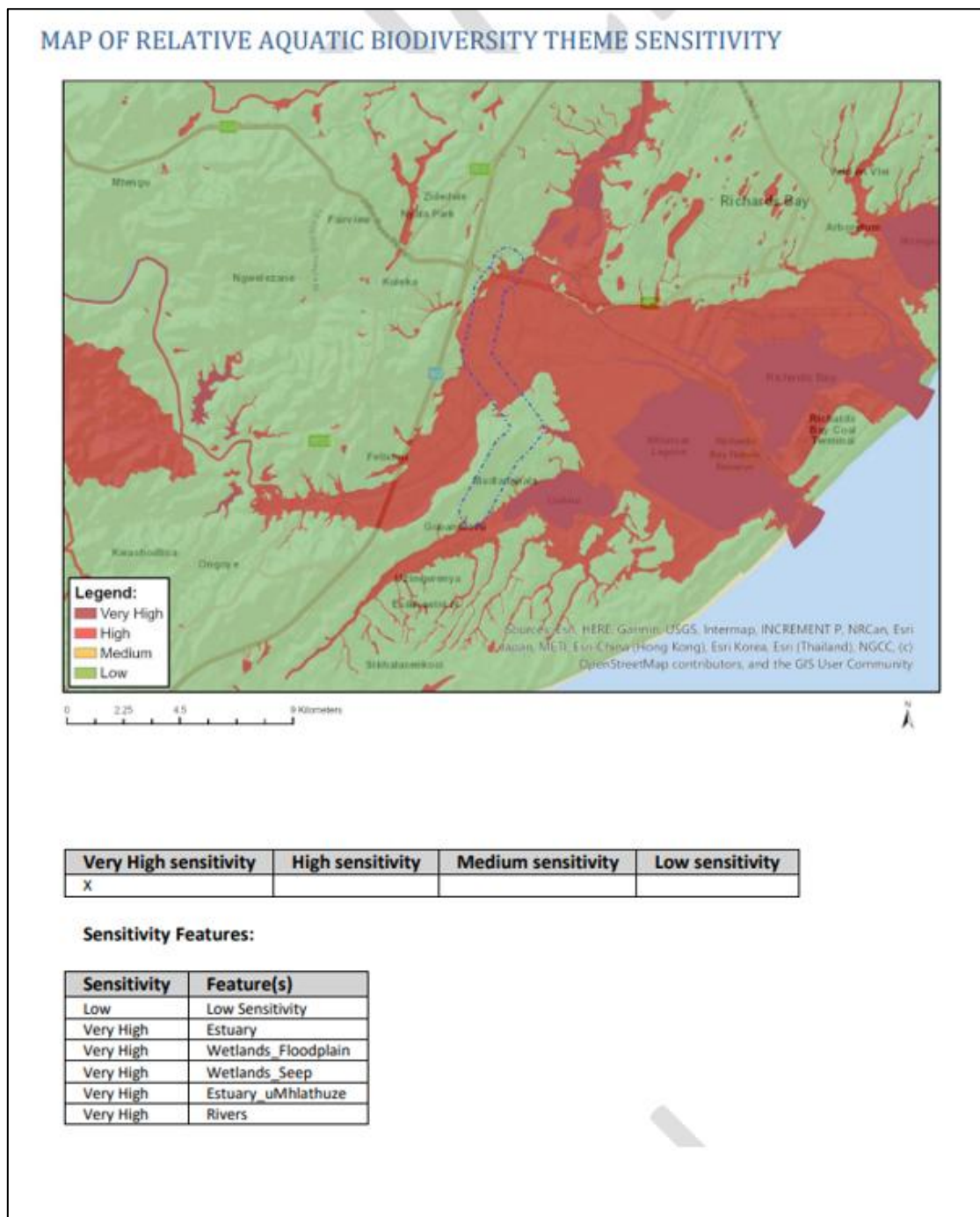


Figure 3-16 Aquatic Biodiversity Theme Sensitivity of the Project Area of Influence

3.5.2 Screening Tool Comparison

The allocated sensitivities for each of the relevant themes are either disputed or validated for the assessed areas as presented in Table 3-12 below and a sensitivity map showing the results of the sensitivity verification is presented in Figure 3-17. It should be noted that the National Web-based Environmental Screening Tool allocates sensitivities to freshwater resources identified through the available national freshwater datasets based on their presence (very high) or absence (low). The specialist-assigned sensitivity ratings presented herein consider the presence of features, their ecological characteristics as discussed in the previous sections, the observed biodiversity value and functionality and consideration is given to any observed or likely presence of sensitive fauna and flora.

Table 3-12 Summary of the screening tool vs specialist assigned sensitivities

Screening Tool Theme	Aspect	Environmental Screening Tool Sensitivity	Specialist Sensitivity	Tool Validated or Disputed by Specialist - Reasoning
Aquatic Biodiversity Theme	Wetlands	Very High	Medium	Disputed – These areas are representative of natural wetland area and have been modified resulting in a reduction of ecological integrity, altered hydrology, and a decline in habitat quality.
		Low		
	Buffers	Very High	Medium	Disputed – These areas are representative of the wetland area periphery and are of importance in terms of supporting intactness of the features they encompass.
		Low		
	uMhlathuze River and Non-perennial Drainage Lines	Low	Medium	Disputed – These areas are representative of natural non-perennial drainage lines and sections of the uMhlathuze River that have undergone modification, resulting in reduced ecological integrity, altered flow regimes, and a decline in habitat quality. The modifications have impacted the natural hydrology and connectivity of these systems, leading to changes in seasonal flow patterns and a reduction in the diversity and quality of habitats available for aquatic and riparian species.
	Artificial Channels	Low	Low	Validated – These areas are not representative of natural wetlands and lack typical wetland indicators.
	Remaining Area	Low	Low	Validated – These areas are not representative of natural wetlands and lack typical wetland indicators.

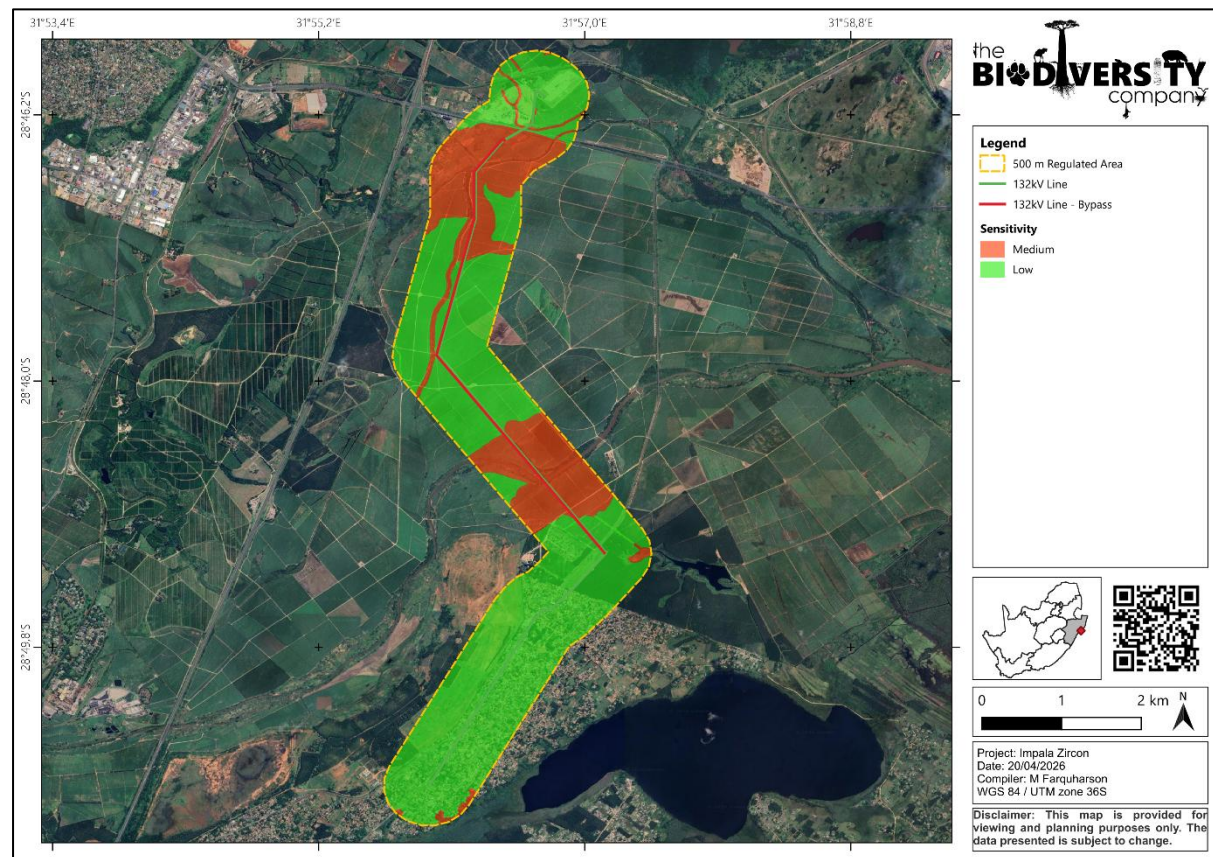


Figure 3-17 Sensitivity classification of the Project Area of Influence in relation to aquatic biodiversity

4 Risk Assessment

The Risk / Impact Assessment considered the direct and indirect impacts to the wetland systems. The mitigation hierarchy as discussed by the Department of Environmental Affairs (2013) will be considered for this component of the assessment (Figure 4-1). In accordance with the mitigation hierarchy, the preferred mitigatory measure is to avoid impacts by considering options in project location, sitting, scale, layout, technology and phasing to avoid impacts.

Given that no georeferenced development and infrastructure layouts were provided, the risk assessment (Table 4-1) focuses on the overarching construction aspects of proposed activity under the assumption that the wetlands and their respective buffers will be avoided and that mitigation measures will be implemented to address the potential impacts. The overarching aspects of the proposed activity includes site clearance and preparation, civil works, stormwater management, provision of temporary ablutions and waste management. This assessment must be updated once detailed infrastructure components and layouts are available. A decommissioning phase for the proposed development was considered 132kV bypass in the assessment, however, once established the main 132kV powerline is anticipated that the infrastructure will remain for more than 50 years.

Wetlands were identified within the 500 m PAOI, therefore impacts to the systems are potential. The focus for mitigation was thus placed on minimising potential impacts.

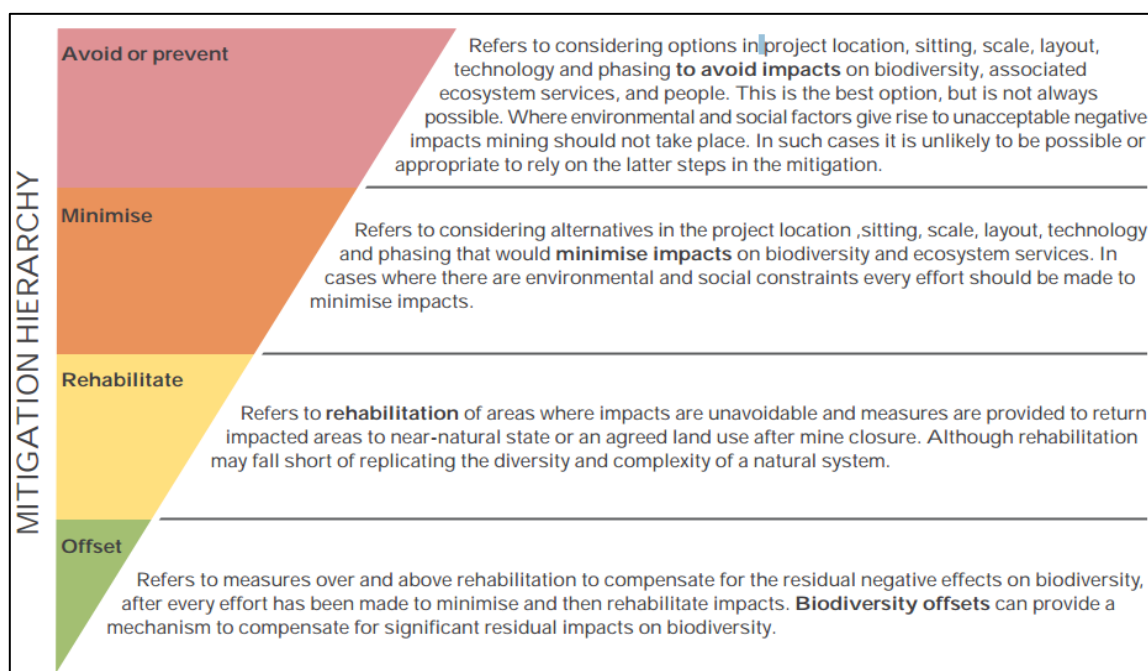


Figure 4-1 The mitigation hierarchy as described by the DEA (2013)

It is anticipated that the project will pose “Low” post-mitigation risks, provided that the suggested mitigations are implemented. Should the wetland areas and their respective post-mitigation buffers be avoided by the proposed development, the greatest risk to the wetlands is anticipated to result from activities that alter the hydrodynamics of the affected systems. However, the impact of this can still be mitigated to a large degree through the implementation of a stormwater management plan that incorporates erosion and sediment control structures.

Table 4-1 *Summative results of the DWS Risk Assessment for the proposed development*

Phase	Activity	Impact	Potentially affected watercourses	Significance (max = 100)	Risk Rating
CONSTRUCTION	Site clearing and preparation.	Loss of wetland/riparian vegetation	Mhlatuze River, HGM 1 and HGM 2	22,4	L
		Erosion and sedimentation	Mhlatuze River, HGM 1 and HGM 2	16,8	L
		Spread of alien invasive species	Mhlatuze River, HGM 1 and HGM 2	14,4	L
		Herbicide contamination of watercourses	Mhlatuze River, HGM 1 and HGM 3	14,4	L
	Machinery and laydown	Soil compaction and loss of infiltration	Mhlatuze River, HGM 1 and HGM 2	12,8	L
		Hydrocarbon/fuel spills	Mhlatuze River, HGM 1 and HGM 2	12,8	L
	Instream/near stream works	Direct disturbance of wetland soils and hydrology	Mhlatuze River, HGM 1 and HGM 2	12,8	L
		Increased sediment loads to watercourses	Mhlatuze River, HGM 1 and HGM 2	12,8	L
	Excavation, levelling and installation of structures	Soil disturbance and sedimentation	Mhlatuze River, HGM 1 and HGM 2	14,4	L
		Altered hydrology	Mhlatuze River, HGM 1 and HGM 2	14,4	L
		Accidental hydrocarbon/fuel spill	Mhlatuze River, HGM 1 and HGM 2	9,6	L
		Vegetation loss	Mhlatuze River, HGM 1 and HGM 2	14,4	L
OPERATIONAL	Routine operation and maintenance of the structures	Soil disturbance and compaction	Mhlatuze River, HGM 1 and HGM 2	9,6	L
		Minor spills	Mhlatuze River, HGM 1 and HGM 2	4,8	L
		Vegetation loss	Mhlatuze River, HGM 1 and HGM 3	11,2	L
DECOMMISSIONING	Removal of the structures	Soil and vegetation disturbance	Mhlatuze River, HGM 1 and HGM 2	21,6	L
		Hydrocarbon/fuel spills	Mhlatuze River, HGM 1 and HGM 2	9,6	L

5 Mitigation Measures

In light of the present and expected impacts from the activities, mitigation measures have been proposed to lower the intensity of the potential impacts on the ecological integrity of the wetland catchment and its downslope wetland features and are presented in Table 5-1.

The focus of mitigation measures should be to reduce the significance of potential environmental impacts associated with the development and thereby to:

- Prevent the unnecessary destruction and fragmentation of the vegetation community of the wetland areas and the wetlands catchment; and
- Limit the construction or working areas to the defined portions and only impact those areas where it is unavoidable to do so otherwise.

The wetlands and their associated buffers must be avoided the proposed development in order to prevent wetland loss, disturbance and significant changes to flow patterns which subsequently increase the risk to erosion and sedimentation.

Table 5-1 Suggested mitigation measures for the proposed development

Phase	Activity	Impact	Mitigation Measures
Construction	Site clearing and preparation	Loss of wetland/riparian vegetation	Clearly demarcate no-go zones and buffer areas; restrict clearing to minimum area; rehabilitate disturbed areas with indigenous vegetation post-construction.
		Erosion and sedimentation	Install silt fences, sediment traps, and erosion control blankets; schedule earthworks during dry periods; stabilize exposed soils promptly.
		Spread of alien invasive species	Clean machinery before entering the site; monitor and remove invasive species regularly; use only certified weed-free materials.
		Herbicide contamination of watercourses	Avoid herbicide use near watercourses; use manual or mechanical control where possible; apply herbicides only under suitable weather conditions and by trained personnel; store chemicals away from watercourses with secondary containment.
	Machinery and laydown	Soil compaction and loss of infiltration	Limit heavy machinery movement to designated tracks; use low-pressure tires or mats; rip and rehabilitate compacted soils after construction.
		Hydrocarbon/fuel spills	Refuel and maintain machinery in designated, bunded areas away from watercourses; keep spill kits on site and train staff in spill response; regularly inspect and maintain equipment to prevent leaks.
	Instream/near-stream works	Direct disturbance of wetland soils and hydrology	Schedule works during low-flow periods; use temporary platforms or matting to minimize soil disturbance; restore original contours and hydrology post-works.
		Increased sediment loads to watercourses	Install sediment barriers and check dams; minimize in-stream work duration; monitor turbidity and halt work if thresholds are exceeded.

	Excavation, levelling, installation of structures	Soil disturbance and sedimentation	Use sediment controls, stabilize soils, and limit exposed areas.
		Altered hydrology	Design structures to maintain natural flow regimes; avoid blocking or diverting natural watercourses; monitor hydrological changes and adapt as needed.
		Accidental hydrocarbon/fuel spills	Use bunded areas, spill kits, and regular equipment checks.
		Vegetation loss	Restrict clearing, rehabilitate with native species, and protect buffer zones.
Operational	Routine operation and maintenance of structures	Soil disturbance and compaction	Restrict vehicle access to established roads; use hand tools for maintenance where possible; periodically aerate compacted soils.
		Minor spills	Implement a spill response plan; regularly inspect and maintain equipment; store chemicals and fuels in secure, bunded areas.
		Vegetation loss	Maintain buffer zones and avoid unnecessary clearing; monitor vegetation health and replant as needed.
Decommissioning	Removal of structures	Soil and vegetation disturbance	Carefully plan removal to minimize disturbance; restore site contours and replant with indigenous species; monitor recovery and control erosion until vegetation is established.
		Hydrocarbon/fuel spills	Use spill kits, bunded storage, and trained personnel.

6 Rehabilitation

Rehabilitation is the process of returning areas disturbed by development to a self-sustaining and functional condition that is compatible with the approved post development land use. It focuses on restoring site integrity and reducing long-term environmental risk, so that disturbed areas do not remain sources of erosion, pollution, or ongoing degradation and can be sustainably managed overtime.

6.1 Purpose

To restore all areas disturbed by the proposed temporary by-pass powerline and associated maintenance activities to a stable, non-polluting and functional condition that approximates the pre-disturbance land capability and ecological functioning of the affected area, insofar this is reasonably achievable. Rehabilitation must ensure that temporary disturbance does not result in long-term deterioration of wetland and riverine habitat, altered hydrological functioning, persistent erosion, sedimentation, invasive species establishment or loss of vegetative cover.

Given the transformed nature of the receiving environment, the intent of rehabilitation is not full ecological restoration to an undisturbed reference condition, but rather the reinstatement of disturbed wetland, riparian and adjacent terrestrial areas in a manner that protects aquatic function, supports vegetation recovery, and prevents any additional decline in ecological condition.

6.1.1 Objectives

The following applies:

- Confine all construction, maintenance and decommissioning disturbance to the minimum area required for project implementation;
- Protect wetlands, drainage features, riparian areas and the uMhlathuze River through effective demarcation and buffer management;
- Restore all disturbed landforms, drainage patterns and hydrological connectivity;
- Stabilise soils, prevent erosion and sedimentation, and reuse topsoil to support rehabilitation;
- Re-establish indigenous vegetation and control alien invasive species in disturbed areas;
- Prevent pollution of aquatic features by hydrocarbons, chemicals, waste and sediment-laden runoff; and
- Rehabilitate all temporary disturbance associated with the by-pass line and implement monitoring and adaptive management to ensure rehabilitation success.

6.2 Strategy and Planning

To achieve the aim of the Rehabilitation Plan, three (3) main elements will need to be met: (1) plan rehabilitation activities appropriately, (2) manage implementation effectively, and (3) maintain the restored condition the long-term.

Table 6-1 *Activities required to meet the three main elements for the project and the order in which they will take place*

Element	Activity	Order
Plan	Legal framework and regulatory alignment	Planning
	Budget and financial provision	Planning
	Personnel, roles and responsibilities	Planning
	Authorisations	Planning
	Rehabilitation objectives	Planning
Manage	Site preparation and planning	1
	Erosion and sediment control	2
	Soil management	3
	Water resource protection	4
	Alien vegetation removal and control	5
	Revegetation and landscaping	6
Maintain	Monitoring and adaptive management	7

6.2.1 Authorisations

It is essential that all necessary permission, authorisations and licences be applied for before any in-field rehabilitation activities can be undertaken. However, the following points are considered particularly pertinent and relevant to this project. The Applicant will also have to practice the Duty of care, remediation of environmental damage and the polluter pays principle as stipulated in the Constitution, section 28 of NEMA and section 19 of the NWA. Under this principle the Applicant is

obliged, by law, to act responsibly and prevent and minimise harm to the environment and rectify it if / when it does occur.

6.2.2 Budget

Rehabilitation measures can be costly and there needs to be financial assurance that these costs will be met. It is the responsibility of the Applicant to ensure that an annual budget is compiled for the implementation of these measures and that these costs are adequately captured into the overall financial budget. Costs will be allocated across three main phases namely planning, rehabilitation efforts and ongoing monitoring. It is important that provision is made for, but not limited to the following:

- Relevant authorisations;
- Project planning and administrative costs;
- Equipment and materials;
- Appointment of contractors;
- Plans for engineered interventions; and
- Implementation of a monitoring and adaptive management program.

6.2.3 Personnel, Roles and Responsibilities

The main and overall responsibility for ensuring that rehabilitation efforts are effectively managed and implemented rests with the Applicant. The Applicant will:

- Will be accountable for implementing the Rehabilitation Plan and ensuring compliance with the Environmental Authorisation (EA) and permit conditions;
- Ensure financial provision for rehabilitation, maintenance, and monitoring until close-out; and
- Approve all related and applicable method statements pertaining to the project.

In addition to the Applicant, the following key personnel and roles will be involved in the rehabilitation project:

6.2.4 Contractor

The Contractor will:

- Implement the rehabilitation requirements in accordance with the approved rehabilitation Plan;
- Ensure that all staff and subcontractors comply with site environmental rules (including demarcated areas and restrictions);
- Provide labour, plant and materials to conduct rehabilitation and immediate repairs where required; and
- Prevent actions that may cause environmental harm and take steps to prevent pollution or unnecessary degradation to site.

6.2.5 Ecological /Environmental Control Officer

The ECO will:

- Provide independent oversight to verify that rehabilitation activities and earthworks comply with the rehabilitation plan requirements during construction;
- Monitor day-to-day implementation of the rehabilitation plan;
- Conduct regular site inspections, record non-compliance and implement corrective actions; and
- Maintain an environmental site file and compile environmental compliance reports as required.

6.3 General Measures

The following measures must be implemented to minimise environmental impacts during the construction phase of the project.

The following applies:

- The construction footprint must be kept as minimal as possible to minimise the impact and disturbance to the identified and delineated freshwater resources within the project area;
- All personnel and contractors must undergo environmental awareness training with reference to the project;
- Naturally occurring indigenous plant species must be preserved as practicable as possible;
- Materials and associated components must be stored in designated bunded areas. These are containment zones with raised barriers designed to prevent spills or leaks from spreading. Bunded areas must be appropriately sized to accommodate large structures and ensure effective containment; and
- A Stormwater Management Plan (SWMP) must be developed and implemented for the project.

6.4 Rehabilitation Measures

Table 6-2 The localised impacts identified for the assessed unit

Assessed Unit	Local Impacts	Rehabilitation Measures
Construction Footprint	• Clearing of vegetation for the development • Soil disturbance • Altered natural hydrology • Erosion and sedimentation • Degradation of wetland and riparian habitat • Alien vegetation	• Site demarcation • Infrastructure • Alien vegetation removal and control. • Erosion and Sediment control • Soil Management • Water resource protection • Revegetation • Monitoring

6.4.1 Site Demarcation

Demarcation of the approved disturbance footprint and no-go areas must be implemented by clearly defining the limits of construction and rehabilitation activities on site before any work commences. This will include the marking of work areas, access routes, stockpile areas, delineated wetlands, drainage lines, riparian zones, all environmentally sensitive areas to be avoided. Demarcation will be maintained

throughout the construction and rehabilitation phase to prevent unnecessary disturbance outside the approved footprint.

The following is recommended:

- Clearly demarcate the approved disturbance footprint before construction and maintain demarcation until all rehabilitation complete;
- Create a site map indicating:
 - The construction footprint;
 - Access routes;
 - Machinery and infrastructure components (i.e. poles);
 - Staging areas for the rehabilitation team(s);
 - Watercourses and their approved buffers;
 - Laydown areas
 - Designated stockpile areas;
 - Undisturbed indigenous vegetation; and
 - Erosion hotspots
- Keep laydown, parking, refuelling, batching, spoil stockpiles and material storage out of wetlands, drainage lines and their buffer areas;
- Apply all buffer requirements, including the recommended post-mitigation buffer where relevant to final construction footprint; and
- Limit vehicle and machinery movement to approved access routes only.

6.4.2 Infrastructure

Infrastructure management will be implemented to ensure that all temporary and permanent project-related infrastructure is planned, positioned, installed, maintained and, where applicable, removed in a manner that minimises disturbance to wetlands, drainage features, riparian habitat and the uMhlathuze River. This includes pole positions, stay-wire anchor points, access routes, laydown areas and other associated work areas. Infrastructure must remain within the approved disturbance footprint, avoid unnecessary encroachment into sensitive aquatic areas, and be designed and reinstated in a manner that does not impede natural drainage, destabilise soils or compromise rehabilitation outcomes.

The following is recommended:

- The contractor shall prepare a method statement for the siting, installation, maintenance and decommissioning of all project-related infrastructure, including the rehabilitation of associated disturbed areas.
- The approved infrastructure footprint, including pole positions, anchor points, access routes and temporary work areas, shall be clearly demarcated prior to the commencement of works.

- Infrastructure shall, as far as practicable, be located outside wetlands, drainage features, riparian areas and associated buffer zones, and unnecessary disturbance within these areas shall not be permitted.
- Where technically feasible, poles and associated support infrastructure should be sited immediately before or after a watercourse crossing, rather than within the watercourse, wetland or riparian area itself, in order to minimise direct disturbance to aquatic habitat and maintain natural hydrological function.
- Existing access routes and previously disturbed areas shall be used preferentially, where available, to limit expansion of the disturbance footprint.
- Temporary laydown, storage, parking and refuelling areas shall be located outside wetlands, drainage lines, riparian areas and designated no-go areas.
- Infrastructure installation shall be undertaken in a manner that does not obstruct, divert or concentrate surface water flow, or create preferential erosion pathways.
- Excavations associated with poles, anchors and related infrastructure shall be backfilled, re-profiled and stabilised as soon as practicable following installation and approval.
- Any infrastructure-related disturbance within or adjacent to wetland, drainage line or riparian areas shall be reinstated promptly, with original surface profiles restored as far as practicable.
- Temporary infrastructure not required for the operational phase shall be removed from site on completion of the relevant works, and all disturbed areas shall be rehabilitated in accordance with the rehabilitation plan.
- All infrastructure and associated work areas shall be inspected routinely during construction and rehabilitation, and any erosion, instability, drainage disruption or unauthorised disturbance shall be corrected without delay.

6.4.3 Erosion and Sediment Control

Erosion and sediment control must be prioritised and implemented from the onset of construction by ensuring earthworks associated with excavation do not generate uncontrolled runoff or sediment movement toward sensitive areas. Controls will be established, maintained throughout the construction phase, and adapted based on rainfall and observed site conditions to prevent scouring, sedimentation and downstream impacts.

The following is recommended:

- Identify active erosion features onsite (headcuts, gullies and incised channels);
- Compile a site-specific erosion management plan including:
 - Erosion control measures (structured, bioengineered or both);
 - Stormwater and runoff management (diversion berms, vegetated swales, ditches);
 - Sediment controls (silt traps/fences, sandbags, erosion control blankets, sediment basins); and
 - Monitoring, inspection and reporting programme.

Specific measures include:

- Temporary erosion and sediment control measures will be installed immediately following the backfilling of pole installation excavations, anchor points and reinstatement of disturbed surfaces, particularly along access routes, around pole positions, on exposed slopes, at drainage line crossings, and adjacent to wetland, riparian and riverine areas;
- Erosion protection measures will be selected according to site conditions and may include silt fences, sediment traps, berms, brush packing, mulch, sandbags, erosion control blankets or biodegradable erosion-control mats, particularly where disturbed soils are highly erodible or where works occur in close proximity to wetlands, drainage features and the uMhlathuze River;
- Where construction or maintenance activities have disturbed wetland margins, drainage line banks, riparian areas, excavation edges or embankments, these areas will be re-profiled to stable gradients that tie in with the surrounding landform and pre-construction surface profile, as far as practicable;
- Particular attention will be given to preventing runoff from concentrating around pole positions, along disturbed access routes, and across reinstated work areas, especially where the alignment traverses sloping ground or occurs near wetlands, drainage lines or the uMhlathuze River;
- All installed erosion and sediment control measures will be inspected after rainfall events and at regular intervals during the rehabilitation period, and any damaged, underperforming or displaced measures will be repaired, replaced or supplemented without delay; and
- Any rilling, scouring, slumping, bank instability or sediment mobilisation that develops within disturbed work areas, excavation points, access routes, stockpile areas or other rehabilitated portions of the servitude will be rectified promptly through reshaping, stabilisation, replacement of topsoil where necessary, and revegetation with suitable indigenous species.

6.4.4 Soil Management

Responsible soil management must be implemented by stripping, handling, and reusing soil resources in a manner that preserves soil structure and fertility and supports successful reinstatement. Topsoil will be managed separately from subsoil, protected from contamination, and reused for final revegetation. Traffic and plant movement will be controlled to prevent unnecessary compaction, and soils will not be worked under excessively wet conditions where this would cause structural damage.

The following is recommended:

- Stockpile areas must be pre-designated and controlled (level surface, clearly demarcated, and located to minimise runoff risk);
- Stockpiles must be:
 - Clearly labelled (stockpile ID, source block, date);
 - Kept to manageable heights (< 2 m) and on stable slopes;
 - Covered with erosion control materials (e.g. erosion mats, vegetation cover) when not actively being worked on to prevent erosion through water and wind;
 - Protected by silt fences to prevent runoff from exiting the stockpile footprint;

- Kept free of waste, oils, chemicals, and alien invasive plant species; and
- Watered during dry periods to retain soils moisture and prevent loss of microbial activity.
- Topsoil will be:
 - Stripped and stored separately from subsoil during site preparation;
 - Handled twice: once for stripping and stockpiling, once for laydown and once for rehabilitation;
 - Stored away from overburden, drainage lines, or slopes; and
 - Re-spread after backfill during progressive/final rehabilitation.

6.4.4.1 Backfill

The following applies:

- Excavations for pole installation, anchor points and related temporary works must be backfilled as soon as practicable after installation and approval;
- Backfill material must comprise of suitable excavated or approved imported material, free of waste, rubble, debris and contamination;
- Backfilling must be undertaken in layers and compacted to the required engineering standard to ensure stability and limit settlement;
- Final levels must be graded to match surrounding ground levels and natural surface profiles, with no depressions, berms or artificial drainages path remaining;
- In wetland, drainage line, riparian uMhlathuze River crossing areas, backfilling and re-profiling must be undertaken with particular care to restore the original surface profile and avoid erosion, ponding or preferential flow;
- Any surplus excavated material must be managed in accordance with the approved spoil handling and rehabilitation requirements; and
- All disturbed areas must be re-profiled, stabilised and rehabilitated, including topsoiling and revegetation where required.

6.4.5 Alien Invasive Plant Control

Alien vegetation removal and control must be implemented by identifying, removing, and managing invasive species within disturbed and rehabilitated areas for the duration of the rehabilitation and monitoring period. Initial clearing will be followed by routine inspections, and follow-up treatment to prevent regrowth and secondary invasion. Control methods will be selected according to site sensitivity, with manual or mechanical methods preferred in wetland and riparian areas.

The following is recommended:

- Map all alien invasive plants onsite, mapping should consist of:
 - Species location;
 - Density; and
 - Fixed point photographs.
- Compile a site-specific Alien Invasive Plant (AIP) Management Plan, the plan should include:
 - The identification and prioritisation of NEM:BA category 1b species;
 - The removal and control methods (mechanical handling, targeted herbicide where necessary and permissible);
 - The transport and safe disposal of AIPs at licenced disposal facilities;
 - Responsible personnel; and
 - Monitoring programme, frequencies and corrective actions.
- Implement alien invasive plant control in all disturbed areas before, during and after rehabilitation;
- Prioritise removal of specified invasive species and any identified in the terrestrial assessments as problematic in the corridor;
- Remove alien invasive plants manually or mechanically where possible, particularly close to wetlands and watercourses;
- Avoid herbicide use in or near wetlands, drainage lines and rivers unless specifically approved and applied under controlled conditions; and
- Conduct follow-up alien invasive plant clearing at defined intervals, such as quarterly during the first year and biannually thereafter, or as informed by monitoring results.

6.4.6 Revegetation

Revegetation will be implemented to re-establish vegetative cover and support long-term stability of disturbed areas associated with the project. Species selection will be aligned to the intended land-use and the local environment, with aftercare to ensure that vegetation cover develops sufficiently to reduce erosion, dust and invasion risk.

The following is recommended:

- Compile a list of revegetation objectives which are:
 - Stabilise exposed soils;
 - Limit AIP encroachment; and
 - Restore ecological integrity of the site over the long-term.

- Revegetate all disturbed areas using indigenous species appropriate to local habitat conditions. A minimum vegetation cover target and monitoring timeframe should be specified in the rehabilitation specifications;
- Apply a habitat-specific approach:
 - Wetlands and riparian zones: indigenous wetland sedges, grasses, and other hydrophilic species;
 - Forrest margins and disturbed areas: encourage natural regeneration first, with supplementary planting indigenous shrubs; and
 - Open disturbed terrestrial areas: indigenous grasses and forbs suited to the local vegetation type.
- Prioritise rapid stabilisation of bare areas through mulch, brush-packing, topsoil management, and/or revegetation to reduce erosion and suppress alien plant establishment. Monitoring should confirm that no active erosion is developing and that vegetation establishment is progressing satisfactorily;
- Use mulch or biodegradable erosion-control products on steep or highly exposed areas until vegetation is established;
- Replace any planted material that fails during the establishment period; and
- Schedule planting and seeding on the onset of the wet season.

6.4.6.1 Plant Species Plan

The project area is predominantly situated within the Indian Ocean Coastal Belt biome, with the dominant vegetation type identified as Maputaland Coastal Belt. It is characterised by a heterogeneous coastal plain vegetation mosaic that historically comprised subtropical forest patches interspersed with non-forest communities such as dry grasslands, hygrophilous grasslands, thicket groupings and palm veld, reflecting local variations in soils, moisture availability and microtopography. Within the project area, this vegetation has been substantially transformed by sugarcane cultivation and associated infrastructure; however, remnant wetland and riparian vegetation remain associated with the uMhlathuze River and adjacent aquatic features.

The following is recommended:

The area to be revegetated should follow an indigenous landscaping approach. Locally occurring indigenous vegetation will be sourced from nurseries and not from the natural landscape, this is apart from seeds that must be collected prior to the removal of vegetation. Before the revegetation can take place, the soil consistency of the disturbed areas must be improved and matched to adjacent areas and any erosional surfaces in the project area and drainage features must be addressed.

The establishment of this ground cover will minimise erosion of the cleared areas, stabilising soils for the establishment of vegetation. Seed-mix applications and phases include:

- First application – *Cynodon dactylon*, runner grasses; and
- Second application – (following wet season) - species listed under Table 6-3

Table 6-3 Recommended species for revegetation

Landscaped Areas	Disturbed Terrestrial Area	Saturated zones
<i>Syzygium cordatum</i>	<i>Cymbopogon pospischilii</i>	<i>Imperata cylindrica</i>
<i>Anastrebe integerrima</i>	<i>Alloterospis semialata</i>	<i>Cyperus sexangularis</i>
<i>Searsia natalensis</i>	<i>Themeda triandra</i>	<i>Leersia hexandra</i>
<i>Carissa bispinosa</i>	<i>Eragrostis curvula</i>	<i>Cyperus congestus</i>
<i>Euclea natalensis</i>	<i>Aristida junciformis subsp.</i>	<i>Schoenoplectus corymbosus</i>
	<i>Panicum maximum</i>	<i>Fuirena pubescens</i>
	<i>Setaria sphacelata</i>	
	<i>Digitaria eriantha</i>	

6.4.7 Water Resource Protection

Water resource protection measures must be implemented throughout the construction, maintenance, rehabilitation and, where applicable, decommissioning phases of the proposed temporary by-pass powerline to prevent direct and indirect impacts on aquatic resources associated with the development footprint. These measures shall specifically address the risks of pollution, sedimentation, erosion, altered surface runoff, and hydrological disturbance to wetlands, drainage lines, riparian habitat and associated watercourses traversed by or located adjacent to the alignment. Particular care shall be exercised where works occur within or in close proximity to the uMhlathuze River, associated non-perennial drainage features, and the delineated channelled valley-bottom wetland, floodplain wetland, seep systems and wetland flat, so as to maintain water quality, preserve natural flow paths, and avoid further degradation of aquatic habitat and function.

The following is recommended:

- The approved disturbance footprint shall be demarcated prior to construction, and all wetlands, drainage features, riparian areas, buffer zones and no-go areas shall be clearly identified and protected from unnecessary disturbance.
- Disturbance to aquatic features, including the uMhlathuze River, shall be limited to the minimum area and duration reasonably practicable, with disturbed areas reinstated as soon as possible following completion of the relevant works.
- Excavations associated with pole installation and related temporary works near water resources shall be backfilled, re-profiled and stabilised promptly to prevent erosion, washout and sediment mobilisation.
- Any dewatering effluent shall not be discharged directly into wetlands, drainage features or the uMhlathuze River, and shall first pass through appropriate sediment control measures prior to release.
- No spoil, excavated material, waste, rubble, contaminated material or surplus material shall be deposited within aquatic habitats or in areas where runoff may transport such material into water resources.
- Where wetland margins, drainage crossings, riparian areas or riverbank zones are disturbed, original surface profiles, bank form and drainage characteristics shall be reinstated as far as practicable, and measures shall be implemented to prevent disturbed areas from becoming preferential flow paths.

- Disturbed areas shall be revegetated with indigenous species as soon as practicable, and all water resource protection measures shall be routinely inspected and maintained, with any erosion, sedimentation, pollution or drainage failures rectified without delay.

6.4.8 Waste Management

Waste management must be implemented by preventing litter, spoil and hazardous substances from accumulating on site and from entering nearby watercourses. Waste will be separated where feasible, stored in designated areas, and removed regularly to approved licenced disposal facilities. Spill prevention and response will be enforced for fuels, oils, cement, and other pollutants, and housekeeping will be maintained to avoid secondary impacts on rehabilitated areas.

The following is recommended:

- The contractor shall provide a method statement with regard to waste management onsite;
- Refuse bins must be placed at strategic areas onsite to ensure that litter does not accumulate within the construction site;
- A certificate of disposal shall be obtained by the contractor and kept on file, if relevant;
- A housekeeping team should be appointed to regularly maintain the litter and rubble situation on the construction site;
- Where vegetation is cleared and suitable chipping and mulching can be considered;
- Littering by employees of the contractor shall not be allowed under any circumstances;
- Clearly mark areas for the separation and storage of general, recyclable and hazardous waste to prevent illegal dumping;
- All fuel, oil and chemical storage must be stored in bunded areas. Spill kits must be available on site, and personnel trained to respond to swiftly to incidents;
- Conduct daily and weekly clean-ups to remove litter, debris and rubble particularly in sensitive areas;
- Prohibit the burning and burying of waste on site to avoid soil and air pollution; and
- All waste must be disposed of at licenced disposal facilities.

6.4.9 Rehabilitation Action and Monitoring

Throughout the lifecycle of the rehabilitation plan, regular monitoring and adaptive management must be in place to detect any impacts to the environment and to remedy these as soon as detected. The ECO, Contractor, together with the Applicant, will be responsible for initiating and maintaining a suitable monitoring system. Monitoring personnel must be adequately trained in identifying both the impacts and causes of the impacts observed on site.

Rehabilitation: During rehabilitation, monitoring is essential to ensure that all recommended rehabilitation aspects are successfully applied. This monitoring must be undertaken by the Contractor and ECO appointed to oversee the rehabilitation process.

Post-rehabilitation: After completion of the rehabilitation phase rehabilitated areas must be monitored to evaluate the success of the rehabilitation efforts. In the unlikely event of potential “risks” to the

systems being identified, this inspection may allow for corrective measures to be applied. This monitoring must be undertaken by the appointed ECO.

Seasonal monitoring: The appointed ECO or similarly qualified environmental representative is to conduct seasonal (wet season) monitoring for a period of two years after the completion of the rehabilitation measures. The monitoring must be conducted during the wet season or shortly after the first summer rains, and then towards the end of the growing season. The monitoring must focus on:

- Vegetation establishment;
- Erosion and sedimentation;
- Alien invasive plant growth;
- Wetland/riparian stability;
- Drainage performance; and
- Success of planted material .

Table 6-4 **Monitoring plan for the proposed project**

Theme	KPI	Numeric Target	Monitoring Method	Frequency/Timing	Responsibility	Corrective Action Trigger	Corrective Action and Timeline
Vegetation establishment	Total vegetation cover on rehabilitated pole installation areas, access routes, laydown areas and other temporary disturbance areas	≥40% by 6 months; ≥70% by 18 months; ≥80% by 36 months	Fixed photo-points and representative quadrat cover surveys	Bi-weekly (first 3 months), monthly (to 24 months), quarterly (24–36 months)	Contractor (establishment); EO/ECO (verification)	Vegetation cover below target at any milestone	Investigate cause and implement re-seeding/replanting within 20 working days; adjust mulch, temporary watering where applicable, and weed control immediately
Vegetation composition	Habitat-appropriate indigenous species composition in terrestrial, riparian and wetland rehabilitation areas	≥60% of total cover by target indigenous species by 24 months; ≥70% by 36 months	Quadrat species composition surveys and species richness counts	Quarterly (years 1–2), biannually (year 3)	Botanist/Rehabilitation Specialist with ECO oversight	Target indigenous species cover below threshold or dominance by undesirable ruderal/alien species	Undertake supplementary seeding/planting in the next suitable planting window (within 3 months where seasonally feasible); review and adjust species mix and establishment method
Woody/shrub survival	Survival of planted shrubs and trees in outer buffer areas, riparian edges and other approved planted rehabilitation areas outside conductor clearance requirements	≥70% at 12 months; ≥60% at 24 months (excluding force majeure)	Tagged plant survival counts	Quarterly (years 1–2)	Contractor; EO/ECO	Survival below threshold	Replace failed plants in the next wet season/planting season; improve aftercare, protection and watering within 10 working days
Alien invasive plants (AIPs)	AIP cover within the powerline servitude, pole positions, access routes, laydown areas, wetland crossings and other rehabilitated areas	≤5% cover at 12 months; ≤1% cover at 24 months; zero seed set annually for listed Category 1b species	AIP mapping (GPS), density class and % cover estimates	Quarterly (construction and years 1–2), biannually (year 3)	Contractor/EO (control); ECO (audit)	AIP cover exceeds threshold or seed set detected	Implement control within 1 month; undertake follow-up treatment within 3 months; review control method (manual/mechanical/approved chemical)
Erosion control effectiveness	Active erosion features around pole positions, access routes, slopes, stockpile areas and	No untreated erosion features >300 mm depth or >1 m length by end of first wet season; no active	Erosion inspections, fixed photo-points and	Weekly (construction), monthly (first 6 months post-construction), after	Contractor; EO/ECO	Any erosion feature exceeds threshold or sediment is being mobilised toward a	Repair/reinstate within 5 working days; install supplementary controls (e.g. brush packing/check structures) within 10 working

Theme	KPI	Numeric Target	Monitoring Method	Frequency/Timing	Responsibility	Corrective Action Trigger	Corrective Action and Timeline
	wetland/drainage crossings	undercutting at pole bases or crossings	rainfall-triggered inspections	>10 mm/24 h rainfall, quarterly thereafter		wetland, drainage feature or the uMhlathuze River	days; re-seed/re-vegetate in next suitable planting window
Hydrological restoration	Reinstatement and flow conveyance at wetlands, non-perennial drainage lines, riparian areas and river-adjacent work areas	Disturbed areas reinstated to pre-construction/approved grade and profile and stable by end of first wet season; no preferential flow paths or ponding outside design intent around pole positions, access routes or reinstated work areas	Surveyed levels/cross-sections, post-rainfall inspections, fixed photo-points and GPS mapping of flow paths	Weekly during reshaping/reinstatement, after >10 mm/24 h rainfall, monthly during first wet season, quarterly thereafter to 36 months	Contractor (implementation); ECO and Wetland Specialist (verification)	Water bypassing, ponding, seepage, erosion or gully observed along reinstated drainage or disturbed work areas	Regrade to restore intended flow path within 5 working days; install check structures/energy dissipation within 10 working days where required; re-seed/re-vegetate in next suitable planting window
Backfill and excavation stability	Backfill stability and settlement of pole excavations, anchor points and associated temporary work areas	No settlement >150 mm in backfilled areas; no cracking, slumping or seepage through excavation interfaces; all backfilled sections stable through first wet season	Settlement markers/pegs, spot level surveys, visual inspections and fixed photo-points	Weekly during backfilling/compaction, monthly (first 6 months), after >10 mm/24 h rainfall, quarterly thereafter to 36 months	Contractor (implementation); EO/ECO/Engineer (verification)	Subsidence, cracking, seepage, erosion or instability observed in backfilled excavations	Rework affected area (excavate, re-backfill and compact) within 5 working days; stabilise interfaces and add erosion protection within 10 working days; re-seed/re-vegetate in next suitable planting window
Sediment control	Performance of silt fences, sediment traps, berms and other sediment controls adjacent to wetlands, drainage features and the uMhlathuze River	100% of specified controls installed and functional; sediment removed at 50% storage capacity; no bypass/underflow resulting in discharge to aquatic features	Visual inspection and photo logs	Weekly (construction), after >10 mm/24 h rainfall, monthly during establishment period	Contractor; EO	Bypass/underflow event, damaged control, or sediment accumulation at ≥50% capacity	Re-install/repair/trench in control within 3 working days; remove accumulated sediment within 2 working days
Topsoil management	Handling, storage and reuse of stripped topsoil from the pipeline servitude and ancillary work areas	Topsoil stockpiles ≤1.5 m high; 100% of suitable topsoil kept separate from subsoil and reused in rehabilitation areas where practicable	Visual inspections, stockpile measurements, spoil logs and photo records	Weekly during stripping, stockpiling and reinstatement	Contractor; EO/ECO	Stockpile height exceeded, mixing with subsoil, contamination or loss of suitable topsoil	Re-shape stockpile within 5 working days; isolate/remediate contaminated material immediately; respread suitable topsoil as soon as practicable following final grading

Theme	KPI	Numeric Target	Monitoring Method	Frequency/Timing	Responsibility	Corrective Action Trigger	Corrective Action and Timeline
Water resource protection	Pollution and sediment protection at wetlands, seeps, wetland flat, floodplain wetland, non-perennial drainage features and the uMhlathuze River	0 pollution incidents reaching water resources; 0 direct discharge of untreated sediment-laden or cement-contaminated water; no visible hydrocarbon sheen or waste deposition in aquatic areas	Daily site inspections in active work areas near water resources, spill logs, incident records and post-rainfall checks	Daily during watercourse-adjacent works; after rainfall; weekly environmental audits	Contractor; EO/ECO	Any spill, turbid discharge, hydrocarbon sheen, cement contamination, sewage leak or waste deposition affecting a water resource	Stop works immediately; contain and clean up same day; implement remediation within 24–48 hours; review method statement and controls prior to recommencing
Access/compaction	Traffic confinement to designated routes and decompaction of compacted rehabilitation areas	100% compliance with designated access routes; all compacted rehabilitation areas ripped/scarified to root zone depth before topsoil replacement/seeding	Route inspections, penetrometer or visual compaction checks, and pre-revegetation inspections	Weekly (construction); pre-seeding/revegetation checks	Contractor; EO/ECO	Off-route tracking, widened disturbance footprint, or unripped compacted areas identified	Install barricades/signage and correct access controls within 24 hours; rip/scarify affected area within 5 working days; rehabilitate disturbed off-route tracks
Infrastructure footprint compliance	Pole positions, anchor points, laydown areas and temporary works confined to the approved footprint, with structures sited outside aquatic features where technically feasible	100% of infrastructure within approved footprint; 0 unauthorised pole placement within delineated wetlands, drainage features or the uMhlathuze River; where feasible, poles sited immediately before or after crossings	Survey checks, as-built verification and EO/ECO inspections	Prior to installation, weekly during construction, and at as-built close-out	Contractor; EO/ECO/Engineer	Any encroachment beyond the approved footprint or unauthorised siting within an aquatic feature	Stop works immediately; review and, where required, relocate/re-design within 5 working days; rehabilitate unauthorised disturbance without delay
Waste management	Waste segregation, removal and lawful disposal from rehabilitation areas and construction footprint	100% segregation at source where applicable; 0 illegal dumping events; all waste removed to licensed facilities with supporting disposal records	Bin inspections, waste dockets/disposal slips and site inspections	Weekly and after major works/clean-up events	Contractor; EO/ECO (audit)	Non-segregation, missing disposal records, or waste left in rehabilitation areas	Undertake toolbox talk within 3 days; rectify bins/signage and remove waste within 2 working days; retrain crews where repeated non-compliance occurs

Theme	KPI	Numeric Target	Monitoring Method	Frequency/Timing	Responsibility	Corrective Action Trigger	Corrective Action and Timeline
Monitoring completeness	Implementation of rehabilitation monitoring plan and reporting programme	100% of scheduled monitoring events completed and logged; quarterly monitoring reports submitted for the monitoring period	Monitoring log, inspection records and data audit	Monthly (years 1–2), quarterly (year 3)	ECO/EO	Missed monitoring events >5% or overdue reporting	Complete catch-up monitoring within 10 working days and adjust resources/programme immediately to prevent recurrence

7 Conclusion

Five (5) Hydrogeomorphic (HGM) units were identified within the encompassing 500 m PAOI. These were classified as one channelled valley-bottom (HGM 1), one floodplain wetland (HGM 2) two seeps (HGM 3 and HGM 5), and one wetland flat (HGM 4). Additionally, artificial drainage channels, non-perennial drainage lines and the uMhlathuze River were identified within the PAOI. It must be noted that HGM 2 and the artificial channel partially overlaps with the Powerline.

HGMs 3 – 5 are not located in a position within the landscape where impacts from the development will be potential, therefore these systems were excluded from further assessment.

Present Ecological State (PES) assessments indicate that the wetlands are “Seriously Modified”. The Ecological Importance and Sensitivity (EIS) assessment rates the wetlands as “High”. Functional assessments show that HGM 1 and HGM 2 provide “Intermediate” ecosystem services.

The recommended post-mitigation buffers for the construction and operational phase of the development is 15 m for seep wetlands and wetland flat (HGM 3 – HGM 5) and 20 m for the channelled valley bottom and floodplain wetlands (HGM 1 and HGM 2).

7.1 Risk and Impact Statement

Based on the results of the DWS Risk Assessment Matrix, all identified risks associated with the proposed activities have been calculated as “Low” and are acceptable, provided that the recommended mitigation measures are fully implemented.

7.2 Specialist Opinion

It is the opinion of the specialist that the project can be considered for authorisation, and the Competent Authority must consider the mitigation measures presented herein.

8 References

Department of Water Affairs and Forestry (DWAF). 2005a. A Practical Field Procedure for Identification and Delineation of Wetlands and Riparian Areas.

Department of Water and Sanitation (DWS). 2016. General Authorisation in Terms of Section 39 of the National Water Act, 1998 (Act No. 36 of 1998) for water uses as defined in Section 21(c) or section 21(i). Government Gazette Notice: 509 in Government Gazette 40229 of 26 August 2016.

Department of Water and Sanitation (DWS). 2023. General Authorisation in Terms of Section 39 of the National Water Act, 1998 (Act No. 36 of 1998) for water uses as defined in Section 21(c) or section 21(i). Government Gazette Notice: 4167 in Government Gazette 49833 of 08 December 2023.

Kotze, D.C., Marneweck, G.C., Batchelor, A.L., Lindley, D.C., and Collins, N.B. 2009. A Technique for rapidly assessing ecosystem services supplied by wetlands, Mondi Wetland Project.

Land Type Survey Staff. 1972 - 2006. Land Types of South Africa: Digital Map (1:250 000 Scale) and Soil Inventory Databases. Pretoria: ARC-Institute for Soil, Climate, and Water.

Lotter, M.C., Le Maitre, D. 2021. Fine-scale delineation of Strategic Water Source Areas for surface water in South Africa using Empirical Bayesian Kriging Regression Prediction: Technical report. Prepared for the South African National Biodiversity Institute (SANBI), Pretoria. 33p.

Macfarlane, D.M., Bredin, I.P., Adams, J.B., Zungu, M.M., Bate, G.C. and Dickens, C.W.S. 2014. Preliminary guideline for the determination of buffer zones for rivers, wetlands and estuaries. Final Consolidated Report. WRC Report No TT 610/14, Water Research Commission, Pretoria.

Macfarlane, D.M., Ollis, D.J. & Kotze, D.C. 2020. WET-Health Version 2: A refined suite of tools for assessing the present ecological state of wetland ecosystems. WRC Report No. TT 820/20, Water Research Commission, Pretoria.

Mucina, L., and Rutherford, M.C., 2010. The vegetation of South Africa, Lesotho and Swaziland. Strelizia 19. South African National Biodiversity Institute, Pretoria South African.

Nel, J. L., Driver, A., Strydom, W. F., Maherry, A. M., Petersen, C. P., Hill, L., Roux, D. J., Nienaber, S., van Deventer, H., Swartz, E. R. & Smith-Adao, L. B. (2011). Atlas of Freshwater Ecosystem Priority Areas in South Africa: Maps to support sustainable development of water resources, WRC Report No. TT 500/11. Water Research Commission, Pretoria.

Nel J.L., Murray K.M., Maherry A.M., Petersen C.P., Roux D.J., Driver A., Hill L., Van Deventer H., Funke N., Swartz E.R., Smith-Adao L.B., Mbona N., Downsborough L., and Nienaber S. 2011. Technical Report for the National Freshwater Ecosystem Priority Areas project. WRC Report No. K5/1801.

Ollis D.J., Snaddon C.D., Job N.M., and Mbona N. 2013. Classification System for Wetlands and other Aquatic Ecosystems in South Africa. User Manual: Inland Systems. SANBI Biodiversity Series 22. South African Biodiversity Institute, Pretoria.

Rountree, M. and Kotze, D. 2013. Ecological Importance and Sensitivity Assessment. In: Rountree, M., Malan, H. & Weston. ed., Manual for the Rapid Ecological Reserve Determination of Inland Wetlands. Report to the Water Research Commission and Department of Water Affairs. WRC Report No. 1788/1/12. Pretoria. p. 42-46.

Soil Classification Working Group. 2018. Soil Classification a Taxonomic system for South Africa. Pretoria: The Department of Agricultural Development.

Van Deventer, H., Smith-Adao, L., Mbona, N., Petersen, C., Skowno, A., Collins, N.B., Grenfell, M., Job, N., Lötter, M., Ollis, D., Scherman, P., Sieben, E., Snaddon, K. 2018. South African Inventory of Inland Aquatic Ecosystems. South African National Biodiversity Institute, Pretoria. Report Number: CSIR report

number	CSIR/NRE/ECOS/IR/2018/0001/A;	SANBI	report	number
http://hdl.handle.net/20.500.12143/5847 .				

9 Appendices

9.1 Appendix A – Methodology

9.1.1 Desktop Dataset Assessment

The desktop assessment was undertaken using Geographic Information System (GIS) to access, view and overlay the latest available related datasets with the project area. The information represented within the datasets was used to develop the relevant digital maps used to identify potentially environmentally sensitive areas. These datasets and their respective dates of publishing are provided below:

- Vegetation Types - Vegetation Map of South Africa, Lesotho and Swaziland (SANBI, 2018 & Mucina and Rutherford 2006);
- Soils and Geology - Land Types Database (Land Type Survey Staff, 1972 - 2006); and
- Topographical Inland Water Areas and River Lines (based on the 1994 1:500 000 topographic maps as per the Chief Directorate of the National Geo-spatial Information).

9.1.1.1 Vegetation Types - Vegetation Map of South Africa, Lesotho and Swaziland

The Vegetation Map of South Africa, Lesotho and Swaziland (SANBI, 2018) is the latest and updated version of the maps published in earlier time such as those presented by Mucina and Rutherford (2006) and those presented in the National Biodiversity Assessment (2011). The map provides spatial details on the representative vegetation of South Africa and is complemented in this report using information from Strelitzia (Mucina & Rutherford, 2006) to provide insight on the landscape features, biogeography, climate, geology, and soils of the project area.

9.1.1.2 Soils and Geology - Land Type Database

The Land Type Survey provides information on the soils, terrain, climate, and geology of areas within South Africa. The data includes the pedological classification of soils and is used in this report to provide insight on the common soil forms associated with aquatic or freshwater systems of a particular area.

9.1.1.3 Topographical River Lines and Inland Water Areas

Topographical Inland Water Areas and River Lines for South Africa are based on the topographic maps dated 1994 as per the National Geo-spatial Information. These datasets are used in this report to provide insight on potential wetland areas and serves to highlight the location and extent of drainage features, dams, wetlands, reservoirs and other relevant inland waterbodies.

9.1.1.4 Ecologically Important Landscape Features

The datasets listed below were incorporated to establish the relation between the project and ecologically important or sensitive freshwater entities. Emphasis was placed around the following spatial datasets:

- South African Inventory of Inland Aquatic Ecosystems (SAIIAE), NBA 2018 Rivers and Wetlands (Van Deventer *et al.*, 2019);
- National Freshwater Priority Areas, Rivers and Wetlands, 2011 (Nel *et al.*, 2011);
- North West Biodiversity Sector Plan (READ, 2015); and
- Strategic Water Source Areas, 2021 (Lötter & Le Maitre, 2021).

9.1.1.4.1 The South African Inventory of Inland Aquatic Ecosystems

The South African Inventory of Inland Aquatic Ecosystems (SAIIAE) was established during the 2018 NBA, the SAIIAE is a collection of spatial data layers that represent the extent of river and inland wetland ecosystem types as well as the pressures on these systems. The same two headline indicators, and their associated categorisations, are applied as with the terrestrial ecosystem NBA, namely Ecosystem Threat Status and Ecosystem Protection Level. The Ecosystem Threat Status of river and wetland ecosystem types are based on the extent to which each ecosystem type had been altered from its natural condition.

9.1.1.4.2 National Freshwater Ecosystem Priority Areas, Rivers and Wetlands

In an attempt to better conserve aquatic ecosystems, South Africa has categorised its inland aquatic systems according to set ecological criteria (i.e., ecosystem representation, water yield, connectivity, unique features, and threatened taxa) to identify Freshwater Ecosystem Priority Areas (FEPAs). The FEPAs are intended to be conservation support tools, and it is envisioned that they will guide the effective implementation of measures to achieve the National Environment Management: Biodiversity Act's biodiversity conservation goals (Nel *et al.*, 2011).

9.1.1.4.3 Strategic Water Source Areas

SWSAs are defined as areas of land that supply a disproportionate quantity of mean annual surface water runoff in relation to their size, and therefore contribute considerably to the overall water supply of the country, as well as national aquatic and terrestrial biodiversity resources. These are considered key ecological infrastructure assets and the effective protection of SWSAs is vital for national security because a lack of water security will compromise national security and human wellbeing on all levels.

9.1.2 Wetland Field Survey

9.1.2.1 Identification and Mapping

The wetland areas were delineated in accordance with the DWAF (2005) guidelines, a cross section is presented in Figure 9-1. The outer edges of the wetland areas were identified by considering the following four specific indicators:

- The Terrain Unit Indicator helps to identify those parts of the landscape where wetlands are more likely to occur;
- The Soil Form Indicator identifies the soil forms, as defined by the Soil Classification Working Group (1991), which are associated with prolonged and frequent saturation.
- The soil forms (types of soil) found in the landscape were identified using the South African soil classification system namely, Soil Classification: A Taxonomic System for South Africa (Soil Classification Working Group, 1991);
- The Soil Wetness Indicator identifies the morphological "signatures" developed in the soil profile as a result of prolonged and frequent saturation; and
- The Vegetation Indicator identifies hydrophilic vegetation associated with frequently saturated soils.

Vegetation is used as the primary wetland indicator. However, in practise the soil wetness indicator tends to be the most important, and the other three indicators are used in a confirmatory role.

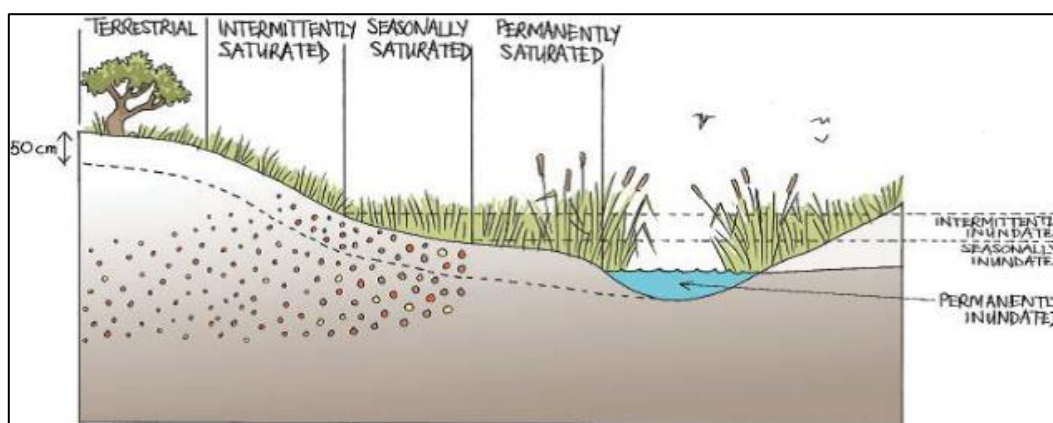


Figure 9-1 Cross section of a wetland, indicating how the soil wetness and vegetation indicators respond to changes in topography (Ollis *et al.* 2013)

9.1.2.2 Delineation

The wetland indicators described above are used to determine the boundaries of the wetlands within the project area. These delineations are then illustrated by means of maps accompanied by descriptions.

9.1.2.3 Classification and Description

The National Wetland Classification Systems (NWCS) developed by the South African National Biodiversity Institute (SANBI) will be considered for this study. This system comprises a hierarchical classification process of defining a wetland based on the principles of the hydrogeomorphic (HGM) approach at higher levels, and then also includes structural features at the lower levels of classification (Ollis *et al.*, 2013).

9.1.2.4 Risk Screening

A risk screening procedure which considers the general topography of the proposed area in conjunction with the spatial proximity of the natural wetlands to the proposed areas of development was used to determine the 'Risk Status' of the delineated wetlands. Two broad categories are included in the screening process which classify wetlands to be 'At Risk' or 'Not at Risk'.

9.1.3 Wetland Functional and Ecological Assessment

9.1.3.1 Functional Assessment

Wetland Functionality refers to the ability of wetlands to provide healthy conditions for the wide variety of organisms found in wetlands as well as humans. Ecosystem services serve as the main factor contributing to wetland functionality.

The assessment of the ecosystem services supplied by the identified wetlands was conducted per the guidelines as described in WET-EcoServices (Kotze *et al.*, 2009). An assessment was undertaken that examines and rates the following services according to their degree of importance and the degree to which the services are provided (Table 9-1).

Table 9-1 Classes for determining the likely extent to which a benefit is being supplied

Score	Rating of likely extent to which a benefit is being supplied
< 0.5	Low
0.6 - 1.2	Moderately Low
1.3 - 2.0	Intermediate
2.1 - 3.0	Moderately High

> 3.0	High
-------	------

9.1.3.2 Present Ecological Status

The overall approach as described by Macfarlane *et al.*, 2020, is to quantify the impacts of human activity or clearly visible impacts on wetland health, and then to convert the impact scores to a Present Ecological Status (PES) score. This takes the form of assessing the spatial extent of impact of individual activities/occurrences and then separately assessing the intensity of impact of each activity in the affected area. The extent and intensity are then combined to determine an overall magnitude of impact. The Present State categories are provided in Table 9-2.

Table 9-2 The Present Ecological Status categories (Macfarlane *et al.*, 2020)

Impact Category	Description	Impact Score Range	PES Score (%)	PES
None	Unmodified, natural	0 to 0.9	90-100	A
Small	Largely Natural with few modifications. A slight change in ecosystem processes is discernible and a small loss of natural habitats and biota may have taken place.	1.0 to 1.9	80-89	B
Moderate	Moderately Modified. A moderate change in ecosystem processes and loss of natural habitats has taken place, but the natural habitat remains predominantly intact.	2.0 to 3.9	60-79	C
Large	Largely Modified. A large change in ecosystem processes and loss of natural habitat and biota has occurred.	4.0 to 5.9	40-59	D
Serious	Seriously Modified. The change in ecosystem processes and loss of natural habitat and biota is great, but some remaining natural habitat features are still recognizable.	6.0 to 7.9	20-39	E
Critical	Critically Modified. The modifications have reached a critical level, and the ecosystem processes have been modified completely with an almost complete loss of natural habitat and biota.	8.0 to 10	0-19	F

9.1.3.3 Ecological Importance and Sensitivity

The importance and sensitivity of water resources is determined in order to establish resources that provide higher than average ecosystem services, biodiversity support functions or are particularly sensitive to impacts. The mean of the determinants as described by Rountree *et al.*, 2013, is used to assign the Ecological Importance and Sensitivity (EIS) category as listed in Table 9-3.

Table 9-3 Description of Ecological Importance and Sensitivity categories

EIS Category	Range of Mean	Recommended Ecological Management Class
Very High	3.1 to 4.0	A
High	2.1 to 3.0	B
Moderate	1.1 to 2.0	C
Low Marginal	< 1.0	D

9.1.3.4 Recommended Ecological Category and Recommended Management Objective

The Recommended Ecological Category (REC) and Recommended Management Objective (RMO) (Table 9-4) was determined based on the results obtained from the PES and EIS of the assessed wetlands, with the objective of recommending how a water resource should be managed. This is achieved by either maintaining or improving the ecological integrity of the wetland in order to ensure continued ecological functionality (DWA, 1999).

Table 9-4 Recommended Ecological Category and Recommended Management Objectives for water resources based on Present Ecological State and Ecological Importance and Sensitivity scores

		Ecological Importance and Sensitivity			
		Very High	High	Moderate	Low
PES	A (Pristine)	A Maintain	A Maintain	A Maintain	A Maintain
	B (Natural)	A Improve	A/B Improve	B Maintain	B Maintain
	C (Good)	A Improve	B/C Improve	C Maintain	C Maintain
	D (Fair)	C Improve	C/D Improve	D Maintain	D Maintain
	E/F (Poor)	D Improve	E/F Improve	E/F Maintain	E/F Maintain

9.1.4 Buffer Requirements

The “Preliminary Guideline for the Determination of Buffer Zones for Rivers, Wetlands and Estuaries” (Macfarlane *et al.*, 2014) was used to determine the appropriate buffer zone for the wetlands in relation to the proposed activity.

9.1.5 Site Sensitivity Verification

The baseline aquatic / freshwater sensitivity of the project area was obtained using the National Web-based Environmental Screening Tool (Regulation 16(1)(v) of the Environmental Impact Assessment Regulations 2014, as amended). The allocated sensitivities for each of the relevant themes are either disputed or validated for the assessed areas based on the specialist assigned ecological characteristics (where applicable), with consideration been given to the presence of observed or likely sensitive fauna and flora.

9.2 Appendix B – Risk and Impact Assessment

9.2.1 Risk Assessment

The Department of Water and Sanitation (DWS) risk matrix assesses impacts in terms of consequence and likelihood. The significance of the impact is rated according to the classes presented in Table 9-5.

Table 9-5 Significance ratings matrix

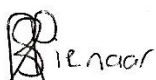
Rating	Class	Management Description
1 – 29	(L) Low Risk	Acceptable as is or with proposed mitigation measures. Impact to watercourses and resource quality small and easily mitigated, or positive.
30 – 60	(M) Moderate Risk	Risk and impact on watercourses are notable and require mitigation measures on a higher level, which costs more and require specialist input. Licence required.
61 – 100	(H) High Risk	Watercourse(s) impacts by the activity are such that they impose a long-term threat on a large scale and lowering of the Reserve. Licence required.

9.3 Appendix C – Specialist Declaration of Independence

Declaration

I, Rian Pienaar, declare that:

- I act as the independent specialist in this application;
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, regulations and all other applicable legislation;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing any decision to be taken with respect to the application by the competent authority; and the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- All the particulars furnished by me in this form are true and correct; and
- I realise that a false declaration is an offence in terms of Regulation 71 and is punishable in terms of Section 24F of the Act.



Rian Pienaar

Ecologist

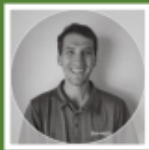
The Biodiversity Company

April 2026

9.4 Appendix D – Specialist CVs

Rian Pienaar

Pr Sci Nat 135544 +27 78 505 0201 rian@thebiodiversitycompany.com



PROFILE SUMMARY

Environmental scientist and Pri Sci Nat (SACNASP 135544) with ~5+ years' specialist consulting experience across Southern Africa. Specialist expertise in wetland delineation and ecological assessments, wetland offset strategy design, rehabilitation and monitoring plans, as well as soil classification and agricultural potential assessments. Experienced in delivering high-quality field surveys and technical reporting aligned with in-country legislative requirements and international lender standards, and currently manages the operations at TBC.

PERSONAL INFO

Nationality: South African
Date of birth: 23 May 1994

EXPERIENCE

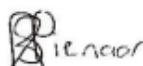
Environmental Impact Assessments (EIA)
Environmental Management Programmes (EMP)
Project Management
Logistics

SKILLS

- ✓ Wetland functional assessments
- ✓ Ecology
- ✓ Rehabilitation
- ✓ Monitoring & Management Plans

LANGUAGES

English – Proficient
Afrikaans – Proficient



Signed: Rian Pienaar

ACADEMIC QUALIFICATIONS

North-West University (2020): MASTER OF SCIENCE (MSc) – Environmental Sciences (Cum Lauda):

Title: The use *Clarias gariepinus* and associated helminthic parasites as bio-indicators of metal pollution in a subtropical ecosystem.

North-West University (2018): BACHELOR OF SCIENCE HONOURS IN ENVIRONMENTAL SCIENCE – Aquatic Ecosystem Health

North-West University (2018): BACHELOR OF SCIENCE IN ENVIRONMENTAL AND BIOLOGICAL SCIENCES – Zoology and Microbiology

PROFESSIONAL EXPERIENCE

Sept 2020 – **The Biodiversity Company**
Present Wetland Ecology

Jan 2018 – **National Aquatic Bioassay Facility (NABF)**
Dec 2018 Intern

INTERNATIONAL EXPERIENCE

South Africa, Mozambique,
Botswana, Eswatini

