Wetland Baseline and Impact Assessment for the Zibulo Overhead line (OHL) Project

Ogies, Mpumalanga Province, South Africa

August 2023

CLIENT

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Report Name	**Wetland Baseline and Impact Assessment for the Zibulo Overhead line (OHL) Project**
Submitted to	EIMS ENVIRONMENTAL IMPACT MANAGEMENT SERVICES
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	Andrew Husted is Pr Sci Nat registered (400213/11) in the following fields of practice: Ecological Science, Environmental Science and Aquatic Science. Andrew is an Aquatic, Wetland and Biodiversity Specialist with more than 13 years' experience in the environmental consulting field. Andrew has completed numerous wetland training courses, and is an accredited wetland practitioner, recognised by the DWS, and also the Mondi Wetlands programme as a competent wetland consultant.
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Declaration	The Biodiversity Company and its associates operate as independent consultants under the auspice of the South African Council for Natural Scientific Professions. We declare that we have no affiliation with or vested financial interests in the proponent, other than for work performed under the Environmental Impact Assessment Regulations, 2017. We have no conflicting interests in the undertaking of this activity and have no interests in secondary developments resulting from the authorisation of this project. We have no vested interest in the project, other than to provide a professional service within the constraints of the project (timing, time and budget) based on the principals of science.

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Declaration

I, Khume Mtshweni 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.

Khume Mtshweni

Freshwater and Terrestrial Ecologist

The Biodiversity Company

July 2023

1 Introduction

The Biodiversity Company (TBC) was appointed to undertake a wetland baseline and risk assessment for the proposed Zibulo Overhead line (OHL) project. The proposed project involves the development of a 7km kingbird line that stretches from Cologne substation to Zibulo North Shaft substation and a 10.5 km (option 1) or 15 km (option 2) Kingbird 132KV line that stretches from Modiri substation to Zibulo North Shaft substation. The project area is located within the Mpumalanga province of South Africa. A 100 m buffer has been demarcated for the project area to identify wetlands within this area, and this area has been referred to as the Project Area of Influence (PAOI).

This report will aim to address all the wetlands within the affected footprint, but mainly focusing on risks associated with the development within the proposed footprint (including the 100m buffer).

One site visit was conducted from the 17th to the 18th of July 2023, and would constitute a dry season survey. Soil form and soil wetness were prioritised for the identification and delineation of wetlands to address the seasonal constraints regarding vegetation. According to the DWS (2005) guidelines soil wetness indicator tends to be the most important, and the other three indicators are used in a confirmatory role.

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 proposed activity.

This assessment has been completed in accordance with the requirements of the published General Notice (GN) 509 by the Department of Water and Sanitation (DWS). This notice was published in the Government Gazette (no. 40229) under Section 39 of the National Water Act (Act no. 36 of 1998) in August 2016, for a Water Use Licence (WUL) in terms of Section 21(c) & (i) water uses. The GN 509 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 509 when the proposed water use/activity is subjected to analysis using the DWS Risk Assessment Matrix (RAM). This assessment will implement the RAM and provide a specialist opinion on the appropriate water use authorisation.

1.1 Project Information

The following information is as provided by EIMS: Zibulo North Shaft requires a 20MVA electricity supply for the mining operations by 2025. The following assets will be established for the supply:

- A new Zibulo North Shaft 132/11kV 2x20MVA Substation for the Zibulo North Shaft Point of Supply (POS). 2x20MVA TRFR's will be installed in phase 1 with an open TRFR bay for the installation of the third TRFR in 2032 should it be required.
- Establish 132kV Feeder Bay at the existing Cologne Substation.
- Build 7km (option 1 & 2) Kingbird 132kV line from Cologne Substation to Zibulo North Shaft Substation.
- Establish 132kV Feeder Bay at the existing Modiri Substation.
- Build 10.5km (option 1) or 15km (option 2) Kingbird 132kV line from Modiri Substation to the Zibulo North Shaft Substation. The route options will be assessed during the course of this environmental application process

1.2 Terms of Reference

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

- The delineation, classification and assessment of wetlands within the regulated area;
- Conduct risk assessments relevant to the proposed activity;
- Recommendations relevant to associated impacts; and
- Report compilation detailing the baseline findings.

2 Project Area

The project area is located 12 to 20 km South of Ogies, Mpumalanga, South Africa (see Figure 2-1). The surrounding land-use includes agriculture, urban buildup and intense mining activities.

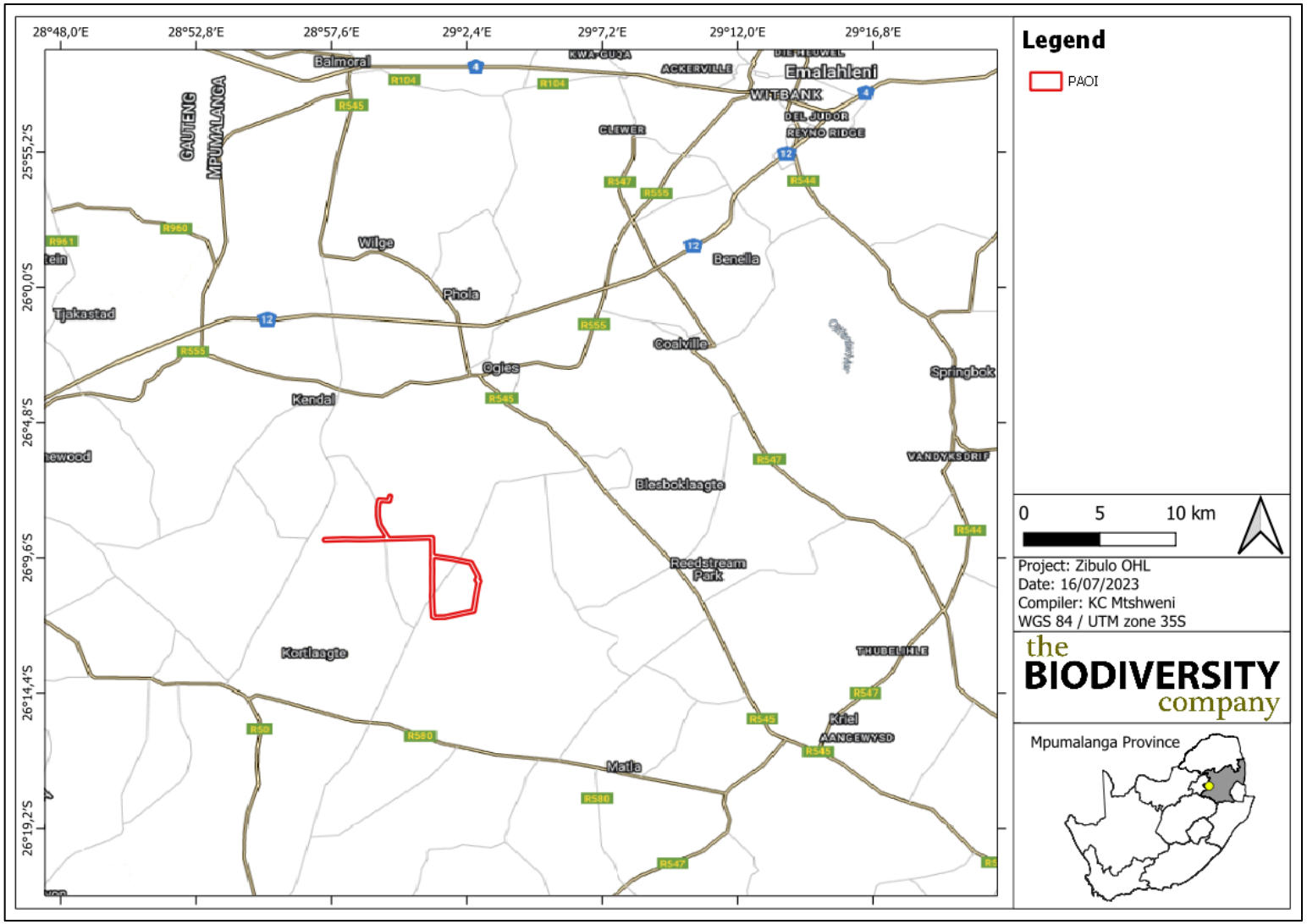


Figure 2-1 Locality of proposed Zibulo OHL project

2.1 Vegetation Type

The proposed area overlaps within the Grassland Biome (Mucina & Rutherford, 2006). Biomes are further divided into bioregions, which are spatial terrestrial units possessing similar biotic and physical features, and processes at a regional scale. The study site overlaps with the Mesic highveld Grassland Bioregion. The vegetation type associated with the study site is the Eastern Highveld Grassland (Gm 12) vegetation type.

The following species are important in the Eastern Highveld Grassland vegetation type:

Low Shrubs: *Anthospermum rigidum subsp. pumilum, Stoebe plumosa*.

Graminoids: *Aristida aequiglumis (d), A. congesta (d), A. junciformis subsp. galpinii (d),Brachiaria serrata (d), Cynodon dactylon (d), Digitaria monodactyla (d), D. tricholaenoides (d), Elionurus muticus (d), Eragrostis chloromelas (d), E. curvula (d), E. plana (d), E. racemosa (d), E. sclerantha (d), Heteropogon contortus (d), Loudetia simplex (d), Microchloa caffra (d), Monocymbium ceresiiforme (d), Setaria sphacelata (d), Sporobolus africanus (d), S. pectinatus (d), Themeda triandra (d), Trachypogon spicatus (d), Tristachya leucothrix (d), T. rehmannii (d), Alloteropsis semialata subsp. eckloniana, Andropogon appendiculatus, A. schirensis, Bewsia biflora, Ctenium concinnum, Diheteropogon amplectens, Eragrostis capensis, E. gummiflua, E. patentissima, Harpochloa falx, Panicum natalense, Rendlia altera, Schizachyrium sanguineum, Setaria nigrirostris, Urelytrum agropyroides*.

Herbs: *Berkheya setifera (d), Haplocarpha scaposa (d), Justicia anagalloides (d), Pelargonium luridum (d), Acalypha angustata, Chamaecrista mimosoides, Dicoma anomala, Euryops gilfillanii, E. transvaalensis subsp. setilobus, Helichrysum aureonitens, H. caespititium, H. callicomum, H. oreophilum, H. rugulosum, Ipomoea crassipes, Pentanisia prunelloides subsp. latifolia, Selago densiflora, Senecio coronatus, Vernonia oligocephala, Wahlenbergia undulata*.

Geophytic Herbs: *Gladiolus crassifolius*, *Haemanthus humilis* subsp. *hirsutus*, *Hypoxis rigidula* var. *pilosissima*, *Ledebouria ovatifolia*

Succulent Herbs: *Aloe ecklonis*

Conservation Status

According to Mucina and Rutherford (2006) and the Government Gazette 47526 (Notice No.689) on 18 November 2022 in terms of the National Environmental Management: Biodiversity Act (NEMBA), this vegetation type is classified as Endangered, with a target of 24%. A small fraction is statutorily conserved in the Nooitgedcht Dam and Jericho Dam Nature Reserves. Cultivation, plantations, mines and urbanization has resulted in 44% of the area being transformed. Erosion is low with *Acacia mearnsii* dominant in most disturbed areas.

2.2 Climate

This vegetation type experiences summer rainfall with very dry winters. It is characterised by a Mean Annual Precipitation (MAP) of approximately 726 mm. Temperatures are high in summer and severe frosts occurs during the winter months (see Figure 2-2).

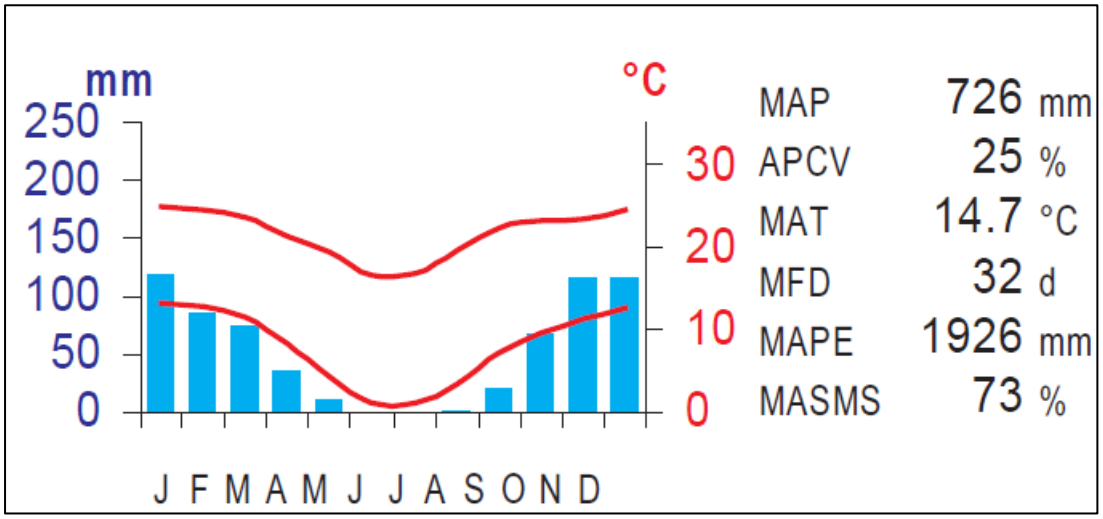


Figure 2-2 Summarised climate for the region (Mucina & Rutherford, 2006)

2.3 South African Inventory of Inland Aquatic Ecosystems

This spatial dataset is part of the South African Inventory of Inland Aquatic Ecosystems (SAIIAE) which was released as part of the National Biodiversity Assessment (NBA) 2018. National Wetland Map 5 (NWM5) includes inland wetlands and estuaries, associated with river line data and many other data sets within the South African Inventory of Inland Aquatic Ecosystems (SAIIAE) 2018.

According to the NWM5 dataset, two wetlands types are expected to overlap with the PAOI. These are channelled valley bottom and seep wetlands. According to the Inland water areas data, Perennial streams, non-perennial streams, marsh vleis and earth dams are expected to overlap with the PAOI (see

Figure 2-3). Two different wetland types, comprising six different units will are overlapped.

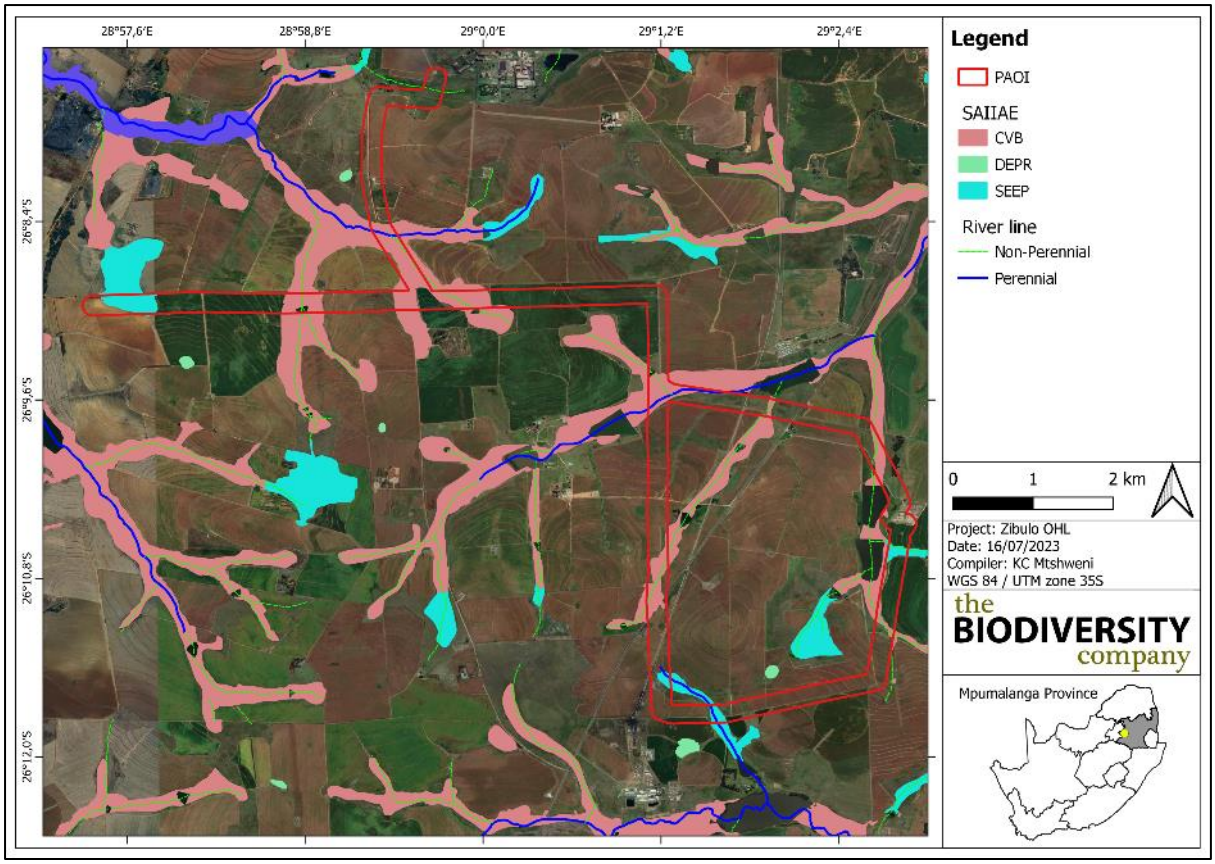


Figure 2-3 SAIIAE wetlands overlapping with the PAOI

2.4 National Freshwater Priority Areas

The National Freshwater Ecosystem Priority Areas (NFEPA) database forms part of a comprehensive approach for the sustainable and equitable development of South Africa's scarce water resources. This database provides guidance on how many rivers, wetlands and estuaries, and which ones, should remain in a natural or near-natural condition to support the water resource protection goals of the NWA. This directly applies to the NWA, which feeds into Catchment Management Strategies, water resource classification, reserve determination, and the setting and monitoring of resource quality objectives (Nel *et al*. 2011). The NFEPAs are intended to be conservation support tools and envisioned to guide the effective implementation of measures to achieve the National Environment Management Biodiversity Act's biodiversity goals (Act No.10 of 2004) (NEM:BA), informing both the listing of threatened freshwater ecosystems and the process of bioregional planning provided for by this Act (Nel *et al.,* 2011).

According to Nel *et al.* (2011), three wetland types are expected to overlap with the PAOI. These are channelled valley bottom, flat and seep wetlands (see

Figure 2-3). Three different wetland types, comprising six different units will are overlapped.

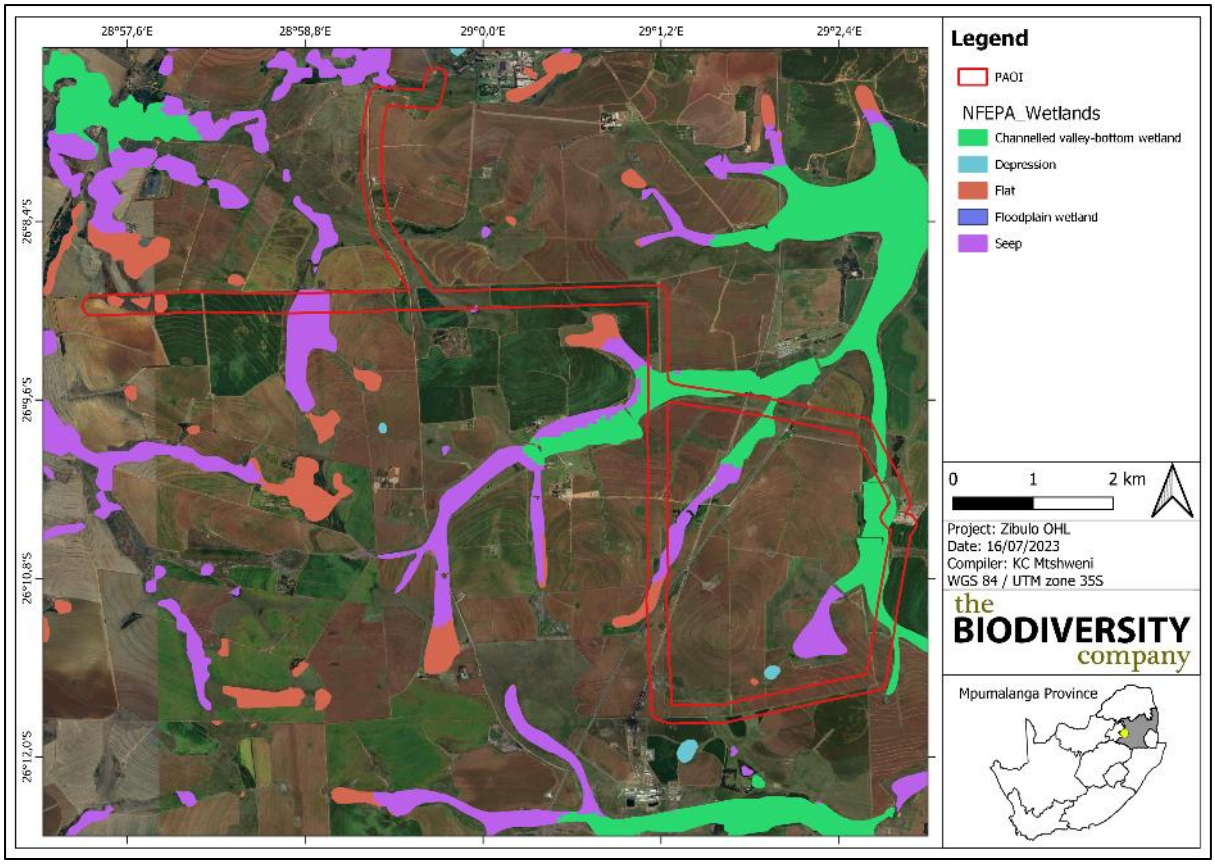
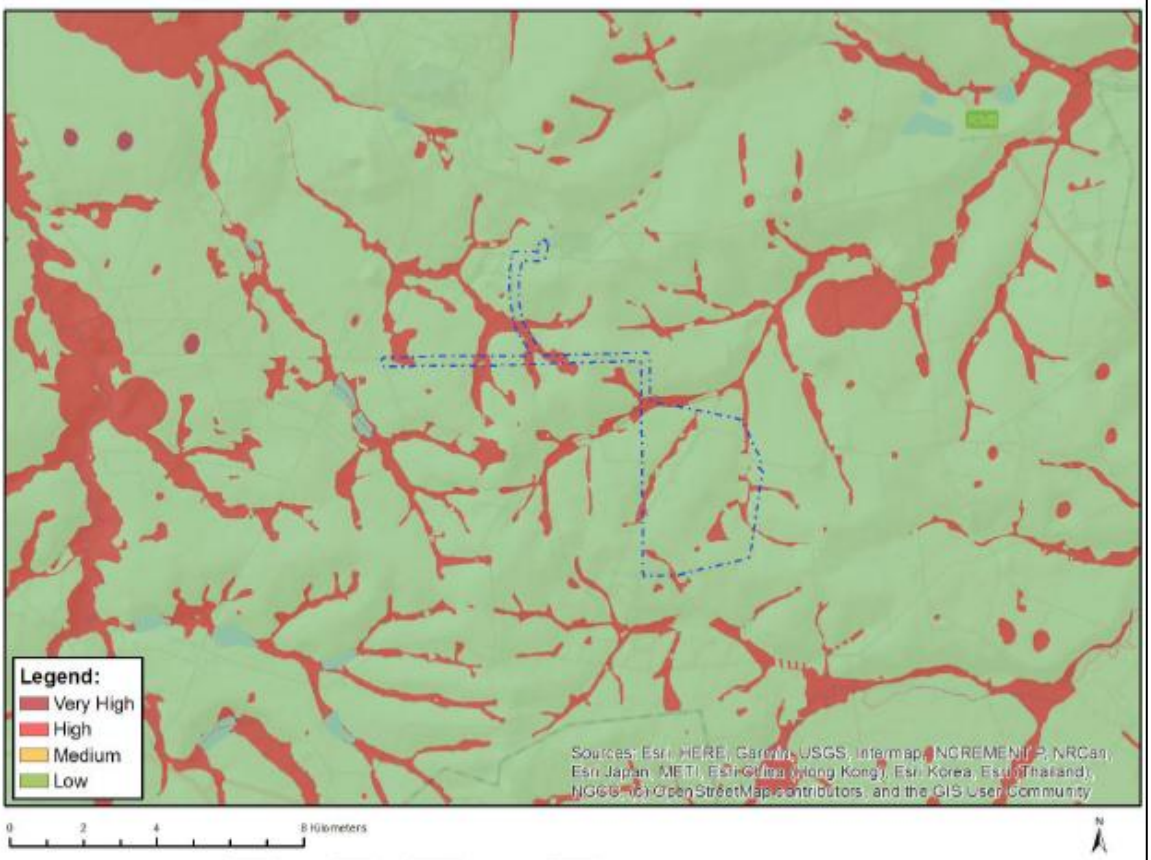


Figure 2-4 NFEPA wetlands overlapping with the PAOI

2.5 Sensitivity

This approach has also taken cognisance of the recently published Government Notice 320 in terms of NEMA dated 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” (DWS, 2020). The National Web-Based Environmental Screening Tool (NWBEST) has characterised the aquatic biodiversity theme sensitivity as “Very High” within the PAOI and surrounding catchment (Figure 2-5).

MAP OF RELATIVE AQUATIC BIODIVERSITY THEME SENSITIVITY



Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
X			

Sensitivity Features:

Sensitivity	Feature(s)
Low	Low sensitivity
Very High	CBA: Wetlands
Very High	ESA: Wetlands
Very High	Rivers_D
Very High	Rivers_Z
Very High	Wetlands_Mesic Highveld Grassland Bioregion (Depression)
Very High	Wetlands_Mesic Highveld Grassland Bioregion (Seep)
Very High	Wetlands_Mesic Highveld Grassland Bioregion (Valley-bottom)

Figure 2-5 Aquatic Biodiversity Theme Sensitivity, Screening Report

3 Key Legislative Requirements

3.1 National Water Act (NWA, 1998)

The 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 and not just the water itself, and any given water resource constitutes the 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).

3.2 National Environmental Management Act (NEMA, 1998)

The National Environmental Management Act (NEMA) (Act 107 of 1998) and the associated Regulations as amended in April 2017, 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 Scoping and Environmental Impact Assessment (EIA) process depending on the scale of the impact.

4 Methodology

The wetland assessment fieldwork was undertaken on the 17th and 18th of July 2023, which constituted a dry season survey.

4.1 Delineation

The wetland areas were delineated in accordance with the DWAF (2005) guidelines, a cross section is presented in **Error! Reference source not found.**. The outer edges of the wetland areas were i dentified 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.

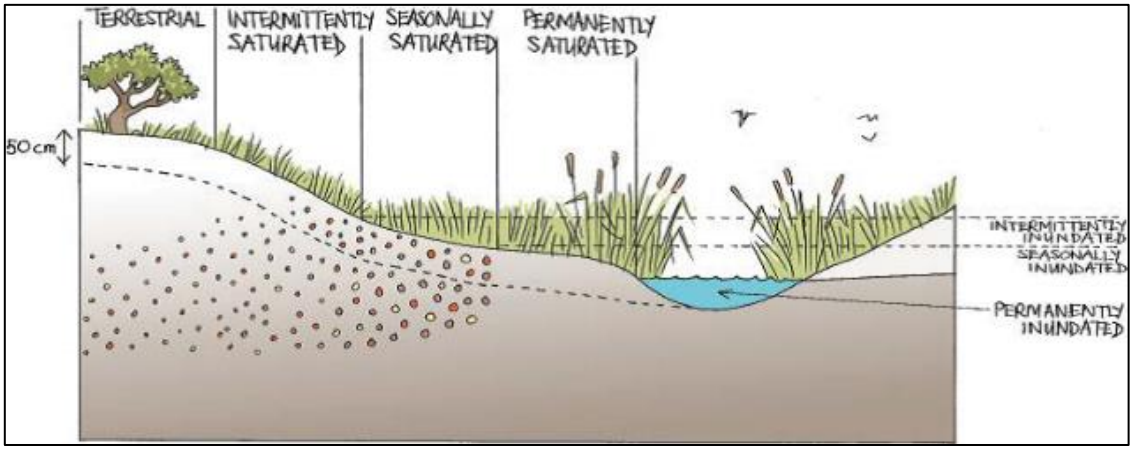


Figure 4-1 Cross section through a wetland, indicating how the soil wetness and vegetation indicators change (Ollis et al. 2013)

4.2 Ecological 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).

4.3 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. Eco 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*. 2008). 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 (**Error! Reference source not found.**).

Table 4-1 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

4.4 Present Ecological Status

The overall approach 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 **Error! Reference source not found.**.

Table 4-2 The Present Ecological Status categories (Macfarlane, et al., 2008)

Impact Category	Description	Impact Score Range	PES
None	Unmodified, natural	0 to 0.9	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	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	C
Large	Largely Modified. A large change in ecosystem processes and loss of natural habitat and biota has occurred.	4.0 to 5.9	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	E
Critical	Critical Modification. 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	F

4.5 Importance and Sensitivity

The importance and sensitivity of water resources is determined in order establish resources that provide higher than average ecosystem services, biodiversity support functions or are particularly sensitive to impacts. The mean of the determinants is used to assign the Importance and Sensitivity (IS) category as listed in Table 4-3.

Table 4-3 Description of Ecological Importance and Sensitivity categories

IS 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**

4.6 Recommended Management Objective (RMO)

The RMO (Table 4-4) was determined based on the results obtained from the PES and IS of the assessed wetlands, with the objective of either maintaining, or improving the ecological integrity of the wetland in order to ensure continued ecological functionality (DWA, 1999).

Table 4-4 Recommended management objectives (RMO) for water resources based on PES & IS scores

PES	Ecological Importance and Sensitivity			
	Very High	*High*	*Moderate*	*Low*

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

4.7 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 proposed activity.

4.8 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 calculated according to **Error! Reference source not found.**.

Table 4-5 Significance ratings matrix

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

4.9 Assumptions, Limitations and Knowledge Gaps

- It is assumed that during the period between the site visit on the until compilation of this report, the site conditions and characteristics remain the same for the project;
- The results of this assessment are based on the outcomes of a rapid assessment. The risk assessment only included the proposed development area and the anticipated activities, no ancillary activities were considered;
- It has been assumed that the extent of the project area provided to the specialist is accurate;
- Only wetlands that were likely to be impacted by proposed development activities were assessed in the field. Wetlands located within a 100 m radius of the sites but not in a position within the landscape to be measurably affected by the developments were not considered as part of this assessment; and
- The GPS used for water resource delineations is accurate to within five meters. Therefore, the wetland delineation plotted digitally may be offset by at least five meters to either side.

5 Results and Discussion

5.1 Delineation and Description

The wetland areas were delineated in accordance with the DWAF (2005) guidelines. Two (2) HGM units were identified within the 100 m PAOI, namely, 14 seep (HGM1 – HGM 14) wetlands and four (4) unchannelled valley bottom (HGM15 – HGM18) wetlands (see Figure 5-1 & Figure 5-2).These systems differ from one another regarding ecological importance and sensitivity, modification, ecological state, impacts and the general setting.

HGM1 to HGM5 and HGM15 were noted to be part of the same catchment which flow Northwest into the perennial Wilge River west of Ogies. The wetlands were observed to be saturated, and located within extensively cultivated fields. Vegetation was mostly dominated by terrestrial graminoids. Considering that these systems were also located within cultivated fields, the wetlands were also dominated by alien plants and naturalized exotic weeds such as *Phragmites australis, Typha capensis, Verbena bonariensis Targeted minuta* and *Bidens Pilosa*.

HGM 6 to HGM14 and HGM 16 to HGM 18, similar to what was noted above, were part of their own catchment flowing North-eastwards into the Klippoortjiespruit, South of Ogies. These systems compared to those in the preceding paragraph, were observed to be inundated, owing to their relative location close to farm dams. Considering that impacts within the project area were similar, plant species composition was similar to what was mentioned above, with the exception of tall growing wetland plants such as *Typha capensis* and *Phragmites australis.*

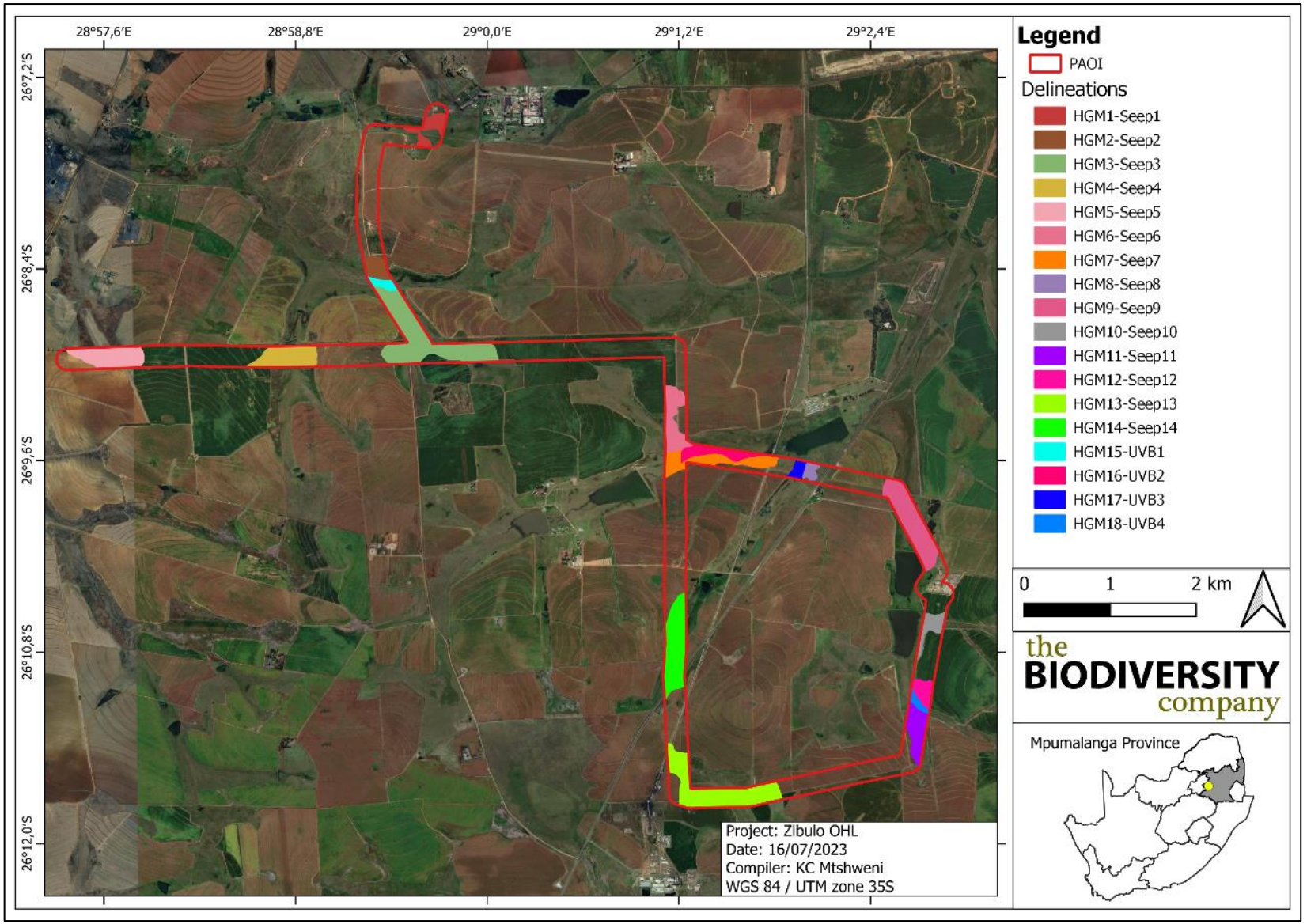


Figure 5-1 Delineation of watercourses within the PAOI.

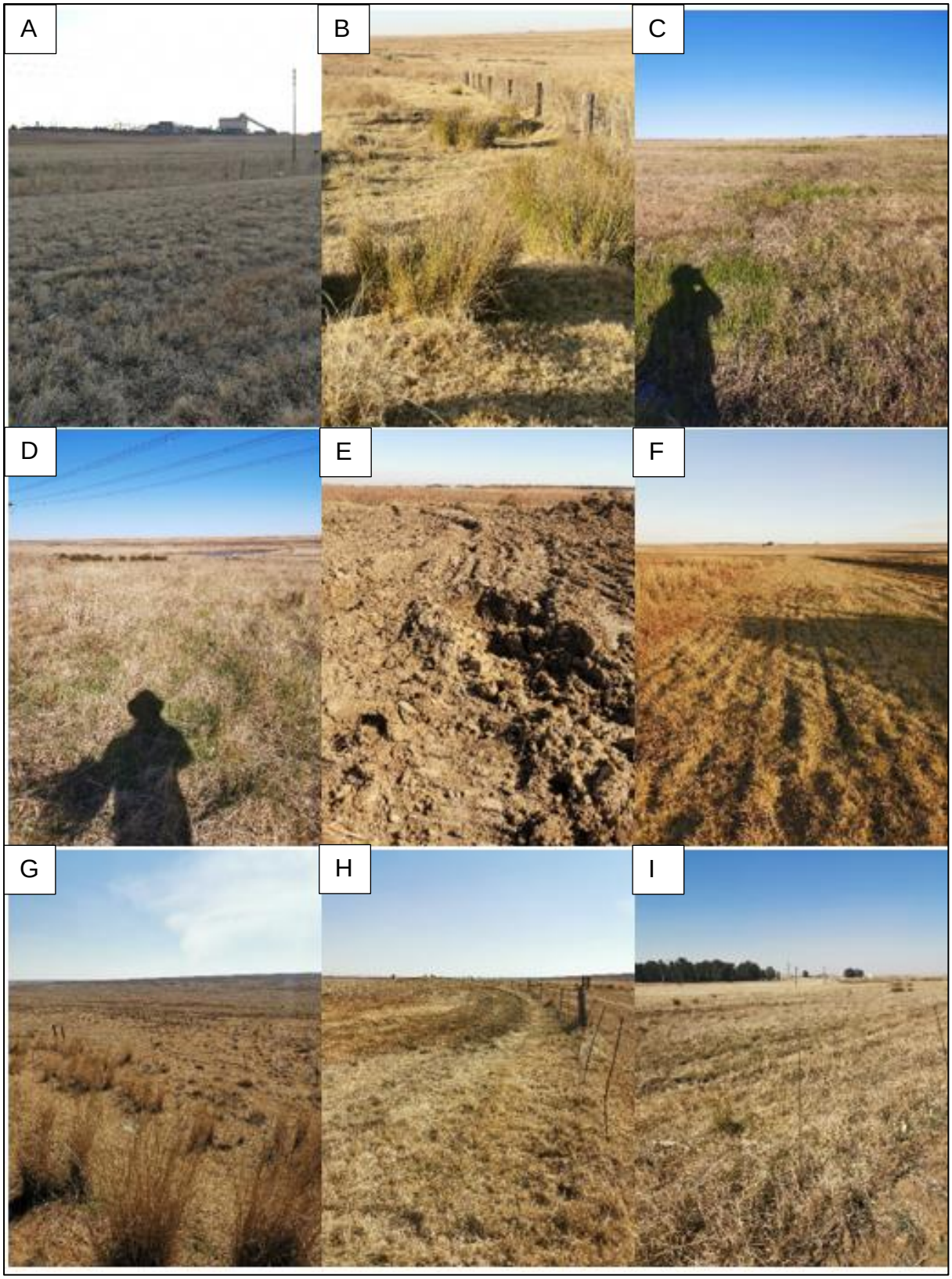


Figure 5-2A Illustration of wetlands identified during the in-situ assessment. A-I) Seep1 – Seep9

Figure 5-3B Illustration of wetlands identified during the in-situ assessment. J-N) Seep10 – Seep14, O-R) UVB1 – UVB4.

5.2 Unit Identification

The wetland classification as per SANBI guidelines (Ollis *et al.,* 2013) is presented in Table 5-1. All the assessed systems share the same level 1 and 2 classification, DWS ecoregion and NFEPA wet veg groups.

Table 5-1 Wetland classification as per SANBI guideline (Ollis et al. 2013)

Wetland System	Level 1	Level 2		Level 3	Level 4		
	System	DWS Ecoregion/s	NFEPA Wet Veg Group/s	Landscape Unit	4A (HGM)	4B	4C
HGM1-HGM14	Inland	Highveld	Eastern Highveld Grassland	Hillslope	Seep	With channelled outflow	N/A
HGM15-HGM18				Valley floor	Unchannelled Valley Bottom	N/A	N/A

5.3 Unit Setting

The hillslope seeps are located within slopes, as mentioned in Table 5-1. Hillslope seeps are characterised by colluvial movement of material. These systems are fed by very diffuse sub-surface flows which seep out at very slow rates, ultimately ensuring that no direct surface water connects this wetland with other water courses within the valleys. Figure 5-5 illustrates a diagram of a hillslope seep wetland, showing the dominant movement of water into, through and out of the system.

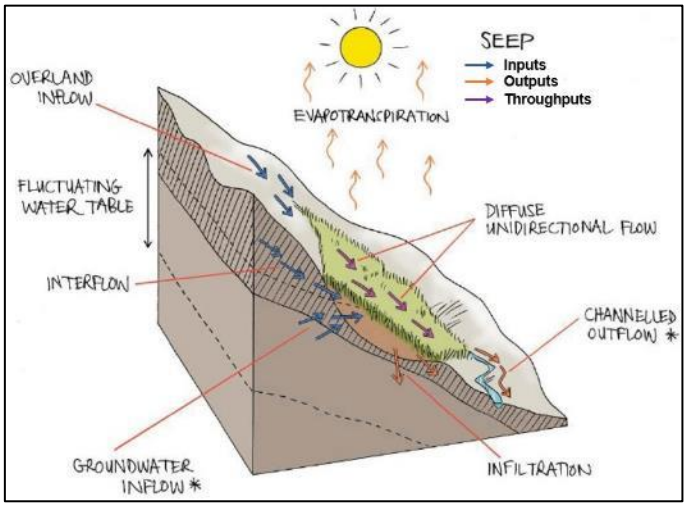


Figure 5-4 Amalgamated diagram of the HGM types, highlighting the dominant water inputs, throughputs and outputs, SANBI guidelines (Ollis et al. 2013)

Unchannelled valley bottom wetlands are typically found on valley floors where the landscape does not allow high energy flows. Figure 5-5 illustrates a diagram of an Unchannelled valley bottom wetland, showing the dominant movement of water into, through and out of the system.

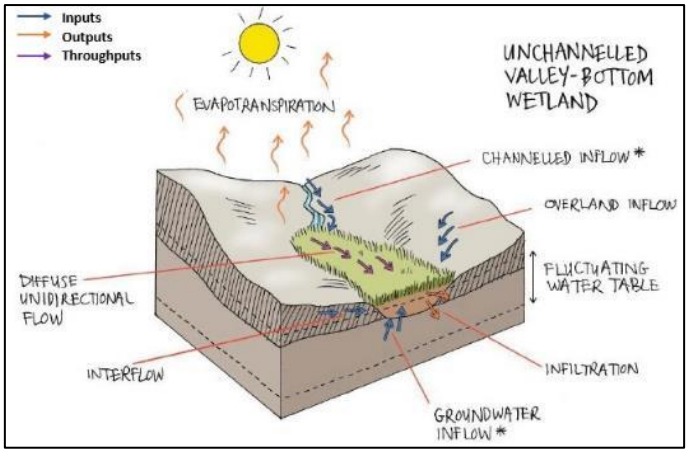


Figure 5-5 Amalgamated diagram of the HGM types, highlighting the dominant water inputs, throughputs and outputs, SANBI guidelines (Ollis et al. 2013)

5.4 Wetland Indicators

5.4.1 Hydromorphic Soils

According to (DWAF, 2005), soils are the most important characteristic used for the accurate identification and delineation of wetland areas. Two dominant soil forms were identified within the PAOI, namely the Dundee and Rustenburg soil forms (undocumented by the Soil Classification Working Group, 2018; Figure 5-6).

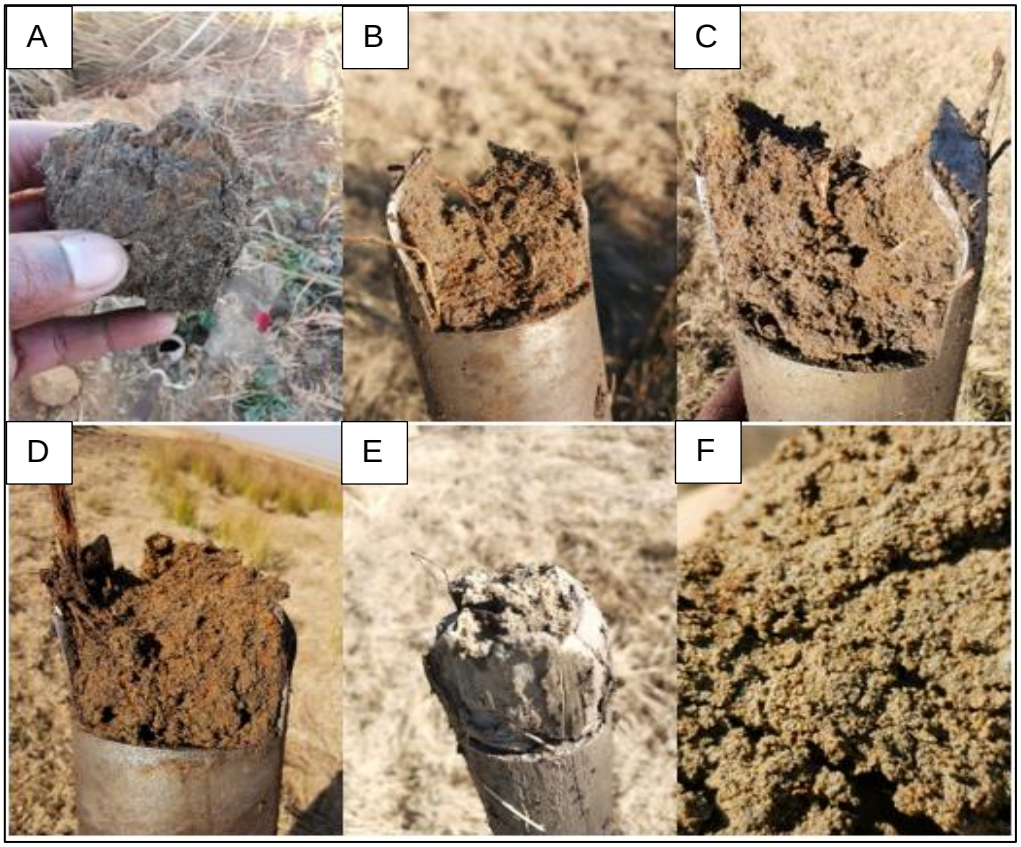


Figure 5-6 Soils identified within delineated watercourses. A) Vertic topsoil. B, C, D and F) Orthic soil. E) Gleysol soil.

5.4.2 Hydrophytes

Vegetation plays a considerable role in identifying, classifying and accurately delineating wetlands (DWAF, 2005). During the site visit, various hydrophytic species were identified (including facultative species; Figure 5-7).

Figure 5-7 Hydrophytic vegetation identified within delineated watercourses. A) Juncus effusus, C) Imperata cylindrica, E) Juncus torreyi. I) Typha capensis

Several Seepage and UVB wetland were identified on site and are dominated by moist grassland vegetation. These moist grasslands are known to provide essential ecosystem services and support agricultural activities but are poorly conserved. Many of the assessed wetlands showed a great loss in basal cover due to land use activities within the region. These include mining and mostly deliberate attempts by farmers to plant crops (maize and soyabean) and palatable graminoids (*Eragrostis spp*) for pasture purposes.

With the above being taken into consideration, wetland plants were dominated by terrestrial graminoids (*Eragrostis spp*), naturalised exotic (*Erigeron canadensis*), pioneer and rudimentary (*Verbena bonariensis*) species, particularly within and around crop fields. Some of the true wetland hydrophytes identified within the permanent zones are illustrated in Figure 5-7 above. This include *Juncus effusus, Imperata cylindrica*, *Juncus torreyi, Typha capensis* and *Cortaderia selloana.*

5.5 General Functional Description

Unchanneled valley-bottoms are characterised by sediment deposition, a gentle gradient with streamflow generally being spread diffusely across the wetland, ultimately ensuring prolonged saturation levels and high levels of organic matter. The assimilation of toxicants, nitrates and phosphates are usually high for unchanneled valley-bottom wetlands, especially in cases where the valley is fed by sub-surface interflow from slopes. The shallow depths of surface water within this system adds to the degradation of toxic contaminants by means of sunlight penetration.

Hillslope seeps are well documented by Kotze *et al.,* (2009) to be associated with sub-surface ground water flows. These systems tend to contribute to flood attenuation given their diffuse nature. This attenuation only occurs while the soil within the wetland is not yet fully saturated. The accumulation of organic material and sediment contributes to prolonged levels of saturation due to this deposition slowing down the sub-surface movement of water. Water typically accumulates in the upper slope (above the seep). The accumulation of organic matter additionally is essential in the denitrification process involved with nitrate assimilation. Seeps generally also improve the quality of water by removing excess nutrient and inorganic pollutants originating from agriculture, industrial or mine activities. The diffuse nature of flows ensures the assimilation of nitrates, toxicants and phosphates with erosion control being one of the Eco Services provided very little by the wetland given the nature of a typical seep's position on slopes.

It is however important to note that the descriptions of the above-mentioned functions are merely typical expectations. All wetland systems are unique and therefore, the ecosystem services rated high for these systems on site might differ slightly to those expectations.

5.6 Present Ecological Status

Three modules, namely hydrology, geomorphology and vegetation, were assessed as a single unit for the HGM Units and subsequently an area weighted score was obtained for the HGM Units. The potential impacts of activities such as agriculture, drought, prospecting, mining, altered hydrological functions and clearing of natural vegetation within the greater catchment were taken into consideration during the assessment. The results are illustrated in **Error! Reference source not found.**);

The overall PES Category for HGM1, 3, 4, 9, 15, and 16 was determined to be a C which means that the functionality of the wetlands is Moderately modified, with some loss of natural habitats. Moderate change in ecosystem processes and loss of natural habitat has occurred but the natural habitat remains intact. Major impacts within the wetlands result from agricultural activities (cultivation and cattle grazing) within the wetland area. A decrease in the PES is likely to occur over the next few years if the proposed activities occur within the exclusion zones, further road construction takes place, and if degradation occurs due to human activities.

The overall PES Category for HGM2, 6, 7, 8, 13, 14 and 17 was determined to be D which means that the functionality of the wetlands is Largely modified, a large loss of natural habitat and basic ecosystem function has occurred. Major impacts within these systems were observed to be similar to those determined to be moderate. These wetlands presented a lower PES score due to the impacts occurring over larger portions of the wetlands as compared to those mentioned above. A decrease in the PES is likely to occur over the next few years if the proposed activities occur within the exclusion zones, further road construction takes place, and if degradation occurs due to human activities.

The overall PES Category for HGM5, 10, 11 and 12 was determined to be E, which means that the functionality of the wetlands is Seriously modified, and that the change in ecosystem processes and loss of natural habitat and biota is great, but some remaining natural habitat features are still recognizable. This PES score is attributed to the existing impacts observed during the sight assessment. Road construction, substrate disturbance and construction has resulted in the disconnection of historically linked systems, and the proliferation of non-wetland alien plant species. Due to the existing impacts and their degree of wetland disturbance, the proposed activity will not result in a decrease of the determined PES score.

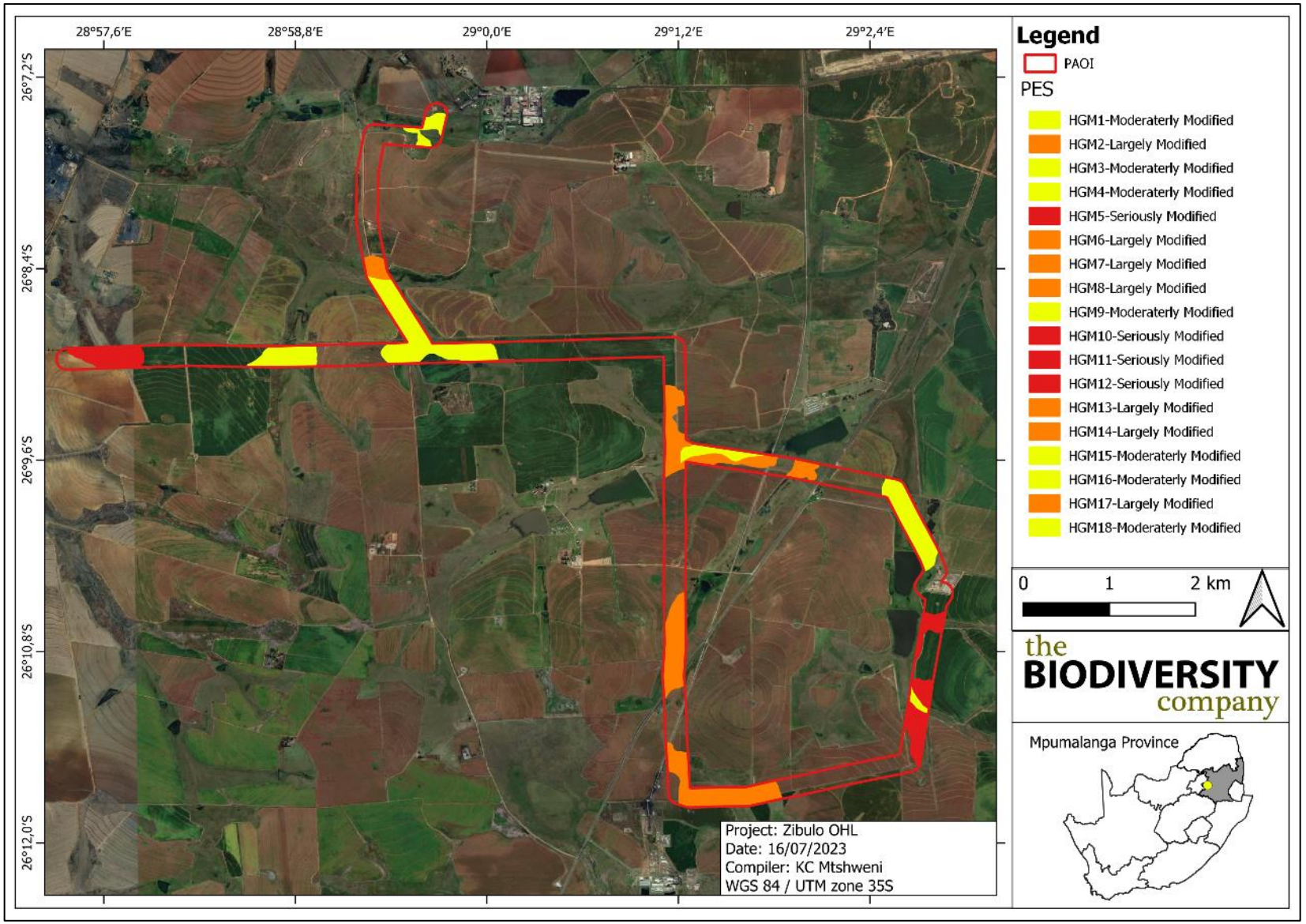


Figure 5-8 Overall present ecological state of delineated wetlands

5.7 Functional Assessment

Physical and hydrological features allow hydro-geomorphic units to perform specific ecosystems services. A WET-EcoServices (Rountree *et al.,* 2013) evaluation was conducted for the wetland and riparian areas assessed on site to determine the sensitivity and ecological importance of the identified wetlands. The degree of disturbance and modification of wetlands results in a decrease in the ability to which they can perform these ecosystem services. The findings of the WET-Ecoservices assessment conducted are presented in Figure 5-10.

Ecosystem services contributing to scores expected for the seep wetlands (HGM1 to HGM14), include Streamflow regulation, Cultivated foods (subsistence farming), Food for livestock, Harvestable resources, and Nitrate removal. Seep wetlands are known to supply several water quality enrichment benefits, for example, removing excess nutrients and inorganic pollutants produced by agriculture, industry and domestic waste (Rogers et al., 1985 and Postel, 1997). Hillslope seepage wetlands generally would be expected to have a relatively high nitrogen removal potential. During the site assessment it was noted that the seep wetlands, complemented by the dams, contributed to biodiversity through functioning as a biodiversity corridor for breeding and feeding species. The seep wetlands were also observed to be heavily utilised for grazing and cultivation of soyabean and maize. These factors significantly increased services provided for crop production but lowered their contribution to biodiversity.

Ecosystem services contributing to scores expected for the UVB wetlands (HGM15 to HGM18), include flood attenuation, sediment trapping, erosion control, maintenance of biodiversity, carbon storage and the provision of natural resources. The UVB wetlands occupied wide areas with relaxed gradients that would have played a significant role in flood attenuation, sediment trapping and provision for natural resources (particularly HGM16 and HGM18). The wetlands are primarily supported by subsurface water flows lateral seepage from the adjacent seep wetlands mentioned above. The UVB wetlands, including flood attenuation and biodiversity maintenance, were observed to provide similar ecosystem services as compared to the seep wetlands due to their linkage and sharing of similar anthropogenic impacts.

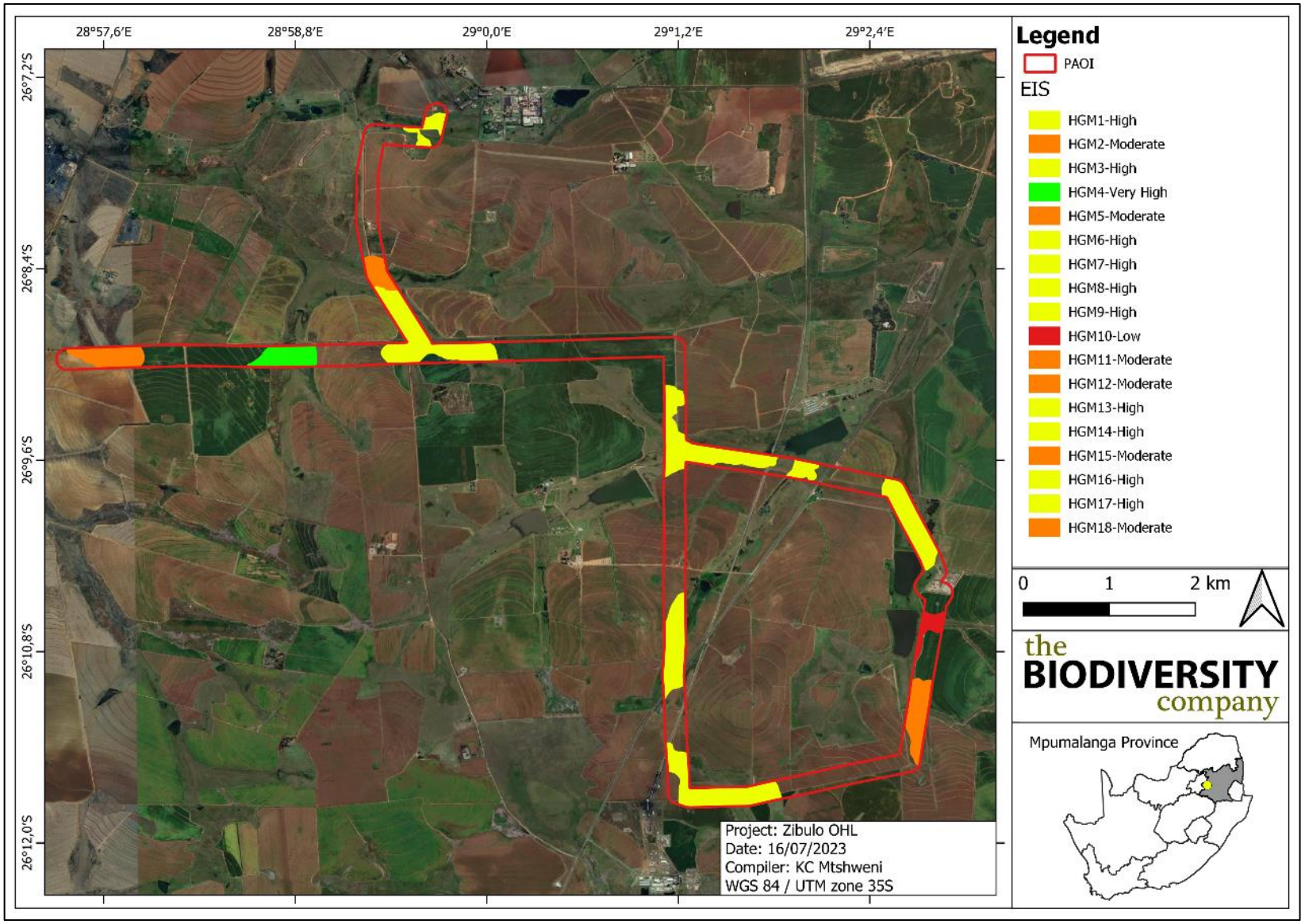


Figure 5-9 Ecosystem services provided by each assessed wetland.

5.8 Importance and Sensitivity

The EIS assessment was applied to all wetland features within the PAOI in order to ascertain the levels of sensitivity and ecological importance of the features, as well as to assist in informing a suitable Recommended Management Objective (RMO) for each. The results of these assessments are summarised in the table below.

Table 5-2 The EIS results for the delineated HGM types

Very High (A)	High (B)	Moderate (C)	Low (D)
HGM4	HGM1	HGM2	HGM10
	HGM3	HGM5	
	HGM6	HGM11	
	HGM7	HGM12	
	HGM8	HGM15	
	HGM9	HGM18	
	HGM13		
	HGM14		
	HGM16		
	HGM17		

The results indicate that the seep (HGM1) wetland was calculated to fall within EIS Category A – Very High. It is an indication that this system, at different levels, presents ecological importance and sensitivity on a provincial and/or local scale. The importance of services supplied by this system is Very High relative to that supplied by other wetlands. This is attributed the fact that this system presented the greatest intact natural buffer with the least agricultural impacts, compared to the other assessed HGM units. This was also noted in the diversity of hydrophytes and birds noted within this HGM unit.

The results indicate that HGM1, 3, 6, 7, 8, 9, 13, 14, 16 and 17 were calculated to fall within EIS Category B – High. It is an indication that this system, at different levels, presents ecological importance and sensitivity on a provincial and/or local scale. The importance of services supplied by this system is High relative to that supplied by other wetlands. The biodiversity of these wetlands may be sensitive to substrate and habitat modifications. The *in-situ* analysis presented all the wetlands to be affected by cultivation and cattle grazing. These activities have resulted in the encroachment of alien invasive plant species such as *Bidens pilosa* and *Tagetes minuta.* The preservation and improvement of the assessment unit is of great importance, due to the potential ecological services provided.

HGM2, 5, 11, 12, 15 and 18 were calculated to fall within EIS Category C – Moderate. It is an indication that this system presents moderate ecological importance and sensitivity on a provincial and/or local scale. The importance of services supplied by this system is Moderate relative to that supplied by other wetlands. The moderate EIS category is attributed to the fact that these systems are used, to their entirety, as cultivated fields and therefore making them sensitive to substrate disturbance.

HGM10 wetland was calculated to fall within EIS Category D – Low. It is an indication that this system presents low ecological importance and sensitivity on a provincial and/or local scale. The importance of services supplied by this system is low relative to that supplied by other wetlands. The biodiversity of the wetland is potentially sensitive to substrate modifications and erosion due to the occurrence of small gullies and collapsing road crossings. The wetland was observed to be a historically cultivated area dominated by alien plant species.

5.9 Recommended Management Objective

The Recommended Management Objective (RMO) for the features of the wetland areas was determined from the results of the functionality and IS assessments. These assessments indicated that all wetland features within the site, had to an extent, underwent transformation as a result of historical and current impacts, disruption of the hydrological cycle and prospecting/mining activities. Nevertheless, despite the altered ecological integrity of these systems, they are considered to provide important ecological services. The RMO estimated appropriate for the wetland areas is presented in Table 5-4 below

Table 5-3 Summary of the RMO categories assigned to all wetland features assessed on site

Feature	Recommended Management Objective (RMO)
HGM4	A-Improve
HGM1, HGM3, HGM9 and HGM6	B/C-Improve
HGM15 and HGM18	C-Maintain
HGM6, HGM7, HGM8, HGM13, HGM14 and HGM17	C/D-Improve
HGM2	D-Maintain
HGM5, HGM10, HGM11 and HGM12	E/F-Maintain

5.10 Buffer Requirements

The buffer requirements (Figure 5-10) for the wetlands were based on service infrastructure (above-ground communication/power infrastructure) and were calculated using the Site-Based Tool: Determination of buffer zone requirements for wetland ecosystems (Macfarlane *et al.,* 2014*)*. Provided that mitigation measures suggested will be adhered to, the recommended/exclusion buffer zones were calculated and are presented in Table 5-4 below

Table 5-4 Post-mitigation buffer requirements

Aspect	Post Mitigation Buffer Size (m)
HGM2, HGM5, HGM10, HGM11, HGM12, HGM15 and HGM18	22 m
HGM1, HGM3, HGM4, HGM6, HGM7, HGM8, HGM9, HGM13, HGM14, HGM16 and HGM17	30 m

The project area of influence of the overhead line project; the delineated wetlands, and the post mitigation buffers are illustrated in Figure 5-10.

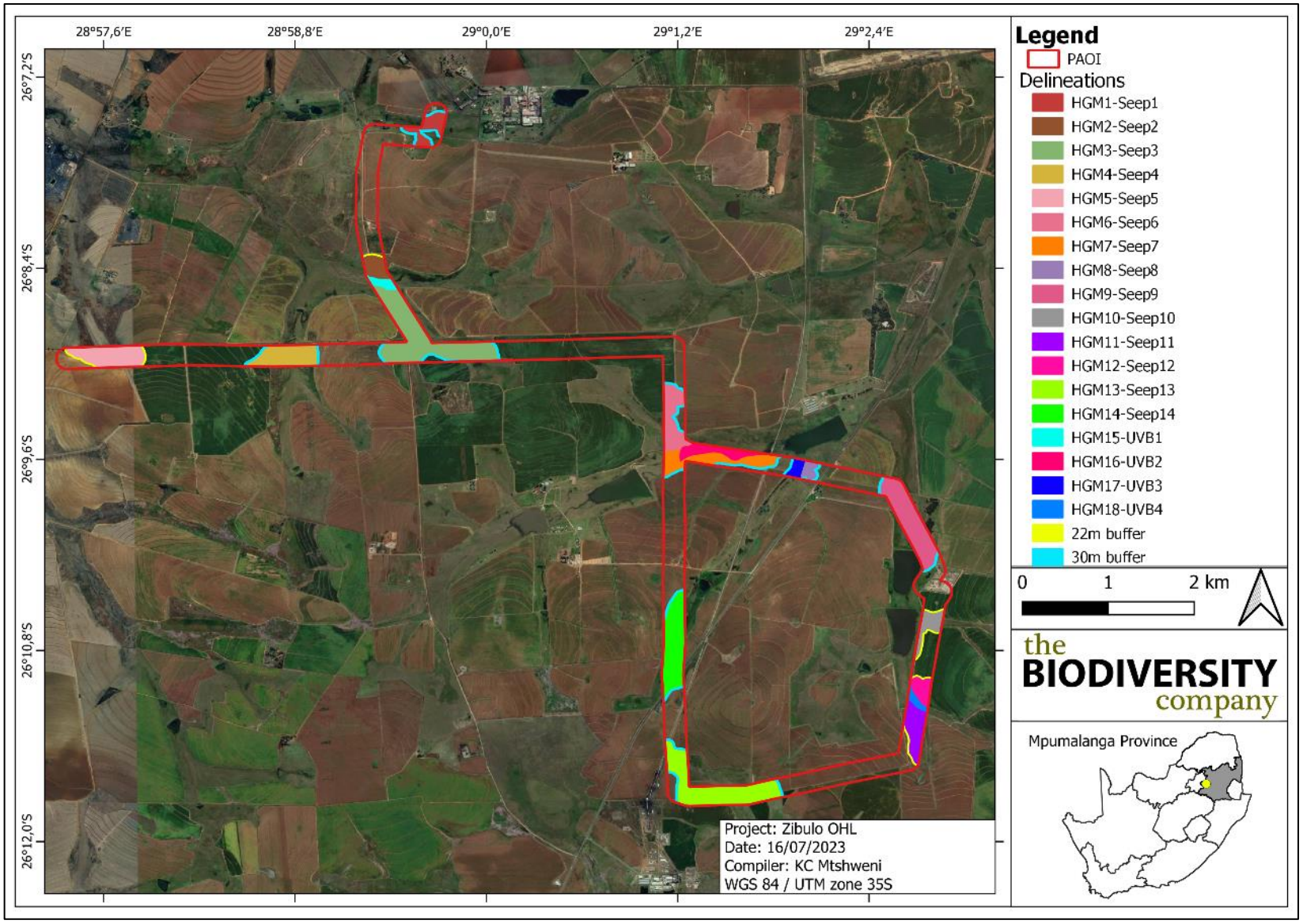


Figure 5-10 Project area and the wetland buffer requirements

5.11 Summary of Results

The results recorded for the wetlands potentially affected by the proposed activities are summarised in the table below.

Table 5-5 Summary of Results

HGM	Present Ecological Status (PES)	Ecological Importance and Sensitivity (EIS)	Recommended Management Objective (RMO)	Buffer Requirements
HGM 1	C - Moderately Modified	B – High	B/C - Improve	30m
HGM 2	D – Largely Modified	C - Moderate	D - Maintain	22m
HGM 3	C - Moderately Modified	B – High	B/C - Improve	30m
HGM 4	C - Moderately Modified	A – Very High	A - Improve	30m
HGM 5	E - Seriously Modified	C - Moderate	E/F - Maintain	22m
HGM 6	D – Largely Modified	B – High	C/D - Improve	30m
HGM 7	D – Largely Modified	B – High	C/D - Improve	30m
HGM 8	D – Largely Modified	B – High	C/D - Improve	30m
HGM 9	C - Moderately Modified	B – High	B/C - Improve	30m
HGM 10	E - Seriously Modified	D - Low	E/F - Maintain	22m
HGM 11	E - Seriously Modified	C - Moderate	E/F - Maintain	22m
HGM 12	E - Seriously Modified	C - Moderate	E/F - Maintain	22m
HGM 13	D – Largely Modified	B – High	C/D - Improve	30m
HGM 14	D – Largely Modified	B – High	C/D - Improve	30m
HGM 15	C - Moderately Modified	C - Moderate	C - Maintain	22m
HGM 16	C - Moderately Modified	B – High	B/C - Improve	30m
HGM 17	D – Largely Modified	B – High	C/D - Improve	30m
HGM 18	C - Moderately Modified	C - Moderate	C - Maintain	22m

6 Risk Assessment

The impact assessment considered both direct and indirect impacts, if any, 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 (**Error! Reference source not found.**). In accordance with the m itigation hierarchy, the preferred mitigatory measure is to avoid impacts by considering options in project location, sitting, scale, layout, technology and phasing to avoid impacts. The project area falls within the Strategic Transmission Corridors (EGI) corridor which has been gazetted as identified geographical areas in Government Notice No. 113 published under Government Gazette No. 41445 of 16 February 2018 and Government Notice No. 1637 published under Government Gazette No. 45690 of 24 December 2021.

A risk assessment was conducted in line with Section 21 (c) and (i) of the National Water Act, 1998, (Act 36 of 1998) to investigate the level of risk posed by proposed project, namely the powerline. One risk assessment was conducted for the project (Table 6-1), which only considers the proposed overhead line. The risks posed by the proposed development to wetlands within the project areas are provided for scenarios with and without mitigation. The installation of the powerline is permanent, and no decommissioning phase has been considered for the risk assessment.

A total of 41 towers will be located within the delineated wetlands, posing direct risks to the systems (Figure 5-10). It was noted that all the wetlands were at risk within the PAOI. Three levels of risk have

been considered and determined for the overall risk assessment, these include low, moderate and high risk. No high risks are expected because the placement of powerline towers within a wetland is expected to pose limited impacts to the hydrology of the systems. A total of 123 towers are planned for the powerline, with 41 (33%) towers posing a direct risk to the wetlands. Further to this, planning and spacing of the towers can achieve minimisation of direct risks of the delineated watercourses. In the event a tower is required to be placed in a watercourse of buffer, the impact is expected to be local and isolated. Moderate risk refers to watercourses that will be directly affected by the placement of infrastructure within these systems, or in close (< 30 m) proximity and also pose an indirect risk. Low risks are systems more than 30 m from infrastructure (excluding the cables) that would be avoided, or systems that could be avoided if feasible. The medium risks were the priority for the risk assessment, focussing on the expected potential for these indirect risks. The significance of all post-mitigation risks was determined to be low.

Powerline construction must follow the measures outlined in the “Generic Environmental Management Programme Relevant to an Application for Substation and Overhead Electricity Transmission and Distribution Infrastructure”, outlined in Government Gazette No. 42323 of 22 March 2019, must be adopted. Where required, additional supporting mitigation measures have been presented in the risk matrix provided.

The risk assessment for the overhead line route is expected to be moderate (pre-mitigation) due to the overhead line traversing the some of the wetland areas. However, avoidance is possible by using existing roads that are present throughout the study area, and considering where the pylons of the overhead lines will be located. Although the risks will be minimised with the placement of the pylons outside of the wetland buffers the lines will still need to be pulled through some of the wetlands and some direct impacts will occur within the wetlands.

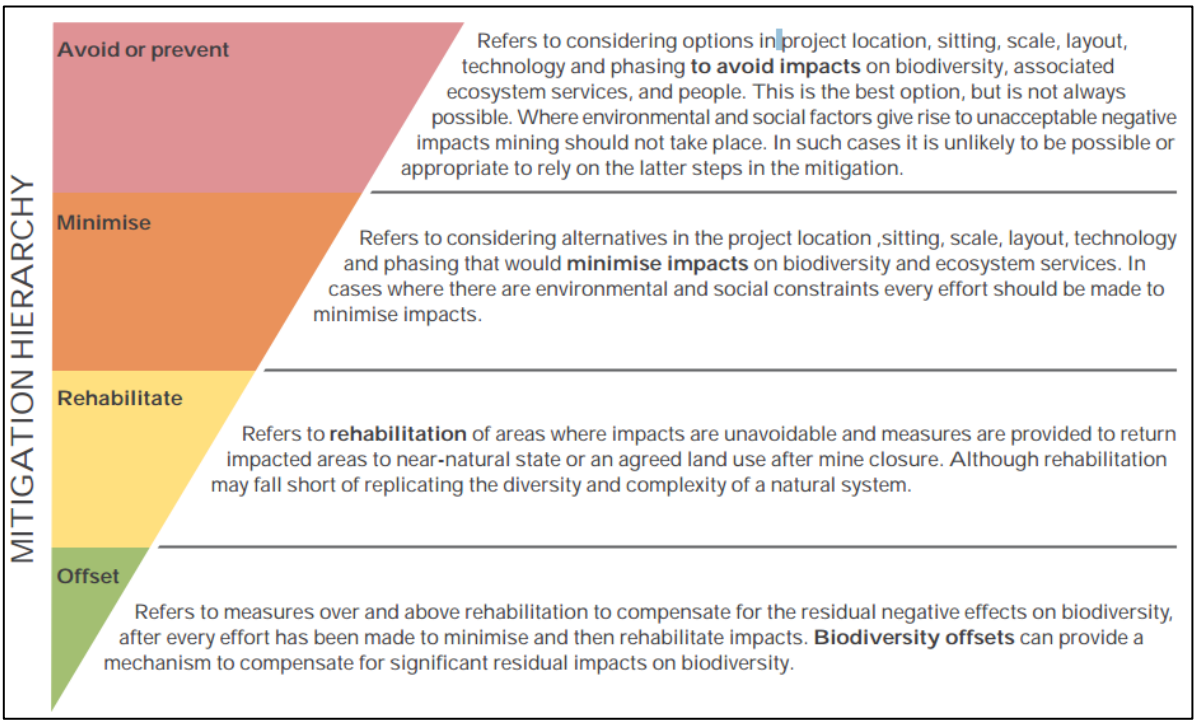


Figure 6-1 The mitigation hierarchy as described by the DEA (2013)

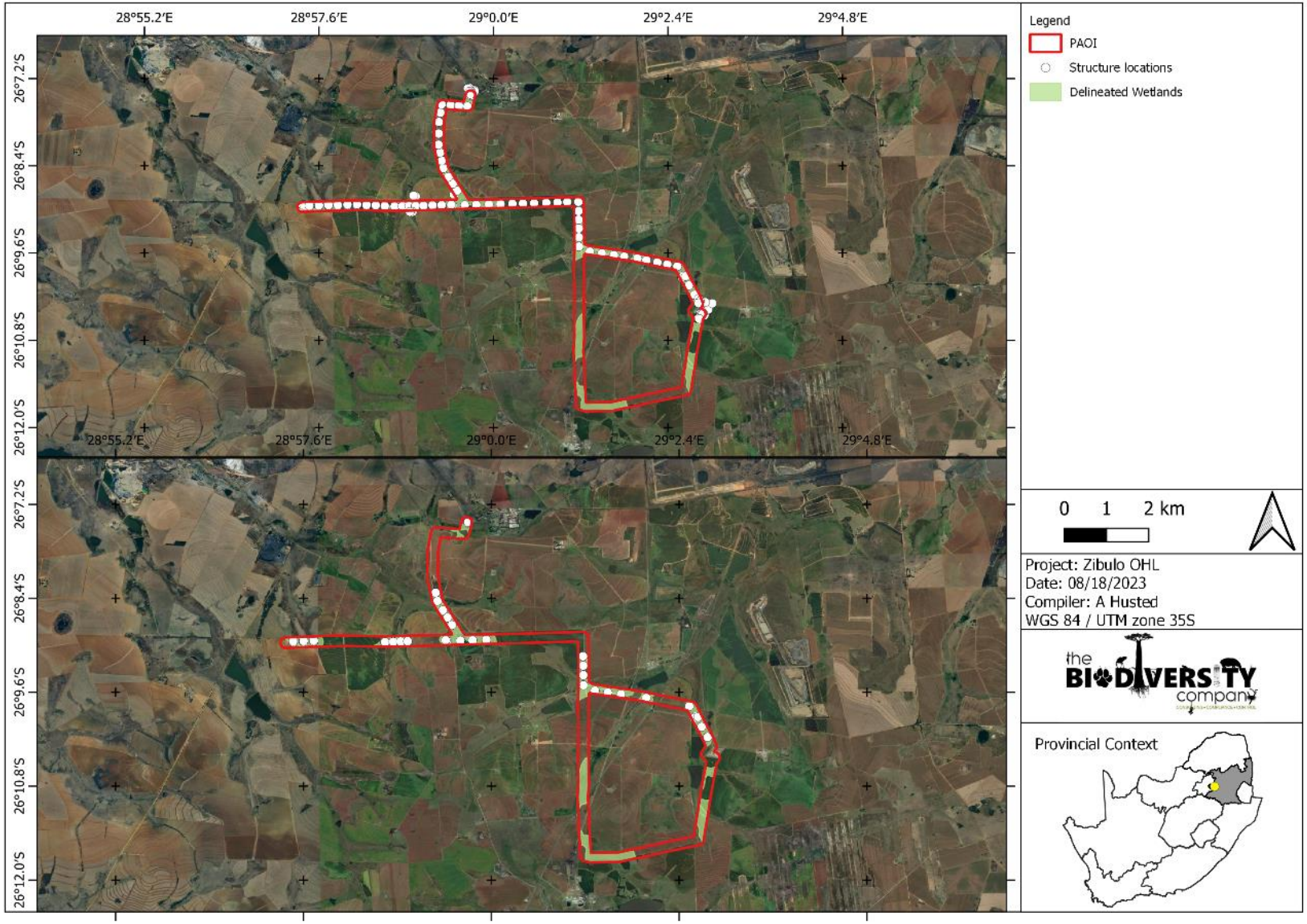


Figure 6-2 The identified risk areas for the overhead line.

Table 6-1 DWS Risk Impact Matrix for the proposed OHL

Activity	Aspect	Impact	Mitigation Scenario	Severity															Control Measures
				Flow Regime	Water Quality	Habitat	Biota	Severity	Spatial scale	Duration	Consequence	Frequency of activity	Frequency of impact	Legal Issues	Detection	Likelihood	Significance	Risk Rating	
Construction																			
Clearing and preparation of overhead line route including storage of equipment	Wetland vegetation deterioration and soil exposure.	Disturbance and degradation of wetland vegetation	Without	2	2	3	3	2.5	3	3	8.5	2	2	5	1	10	85	M	• Avoid wetlands and buffers where feasible. Implement a rehabilitation plan for any disturbed wetlands. Cleared areas must be rehabilitated and stabilised to avoid impacts to adjacent wetland and buffer areas. • Maintain the calculated (22m and 30m) buffers on the delineated wetlands to lower the potential for bird collisions which are highest near water resources.
			With	1	1	2	2	1.5	2	2	5.5	2	1	5	1	9	49.5	L	
		Increased bare surfaces, runoff and potential for erosion	Without	2	2	3	2	2.3	3	2	7.3	3	3	1	1	8	58	M	• Limit construction activities in proximity (< 50 m) to wetlands to the dry season when storms are least likely to wash concrete and sand into wetlands. This is only where towers are within wetlands and buffer areas. • Mixing of concrete must under no circumstances take place in any wetland or their buffers. Scrape the area where mixing and storage of sand and concrete occurred to clean once finished. • Limit the placement of pylons within wetlands and buffer areas where feasible. • No machinery should be allowed to parked in any wetlands or buffer areas.
			With	1	1	2	1	1.3	2	2	5.3	2	1	1	1	5	26.25	L	
		Introduction and spread of alien and invasive vegetation	Without	1	1	3	3	2	1	2	5	3	3	5	1	12	60	M	• Promptly remove all alien and invasive plant species that may emerge during construction (i.e. weedy annuals and other alien forbs) must be removed. • The use of herbicides is not recommended in or near wetlands (opt for mechanical removal). • Lightly till any disturbed soil around the tower footprint to avoid compaction.
			With	1	1	2	1	1.25	1	2	4.25	3	1	1	1	6	26	L	
Excavation, levelling and installation of transmission towers.	Soil disturbance, sedimentation	Increased sediment loads to downstream reaches	Without	2	2	2	2	2	2	2	6	3	3	1	1	8	48	L	• See mitigation for increased bare surfaces, runoff and potential for erosion • Re-instate topsoil and lightly till transmission tower disturbance footprint.
			With	1	1	1	1	1	1	2	4	3	1	1	1	6	24	L	

Activity	Aspect	Impact	Mitigation Scenario	Severity: Flow Regime	Water Quality	Habitat	Biota	Severity	Spatial scale	Duration	Consequence	Frequency of activity	Frequency of impact	Legal Issues	Detection	Likelihood	Significance	Risk Rating	Control Measures
		Contamination of wetlands with hydrocarbons due to leaks and spillages from machinery, equipment & vehicles as well as Contamination and eutrophication of wetland systems with human sewerage and litter.	Without	2	3	2	2	2.25	2	2	6.25	3	3	1	1	8	50	L	• Make sure all excess consumables and building materials / rubble is removed from site and deposited at an appropriate waste facility. • Mixing of concrete must under no circumstances take place within the wetland or buffer areas.
			With	1	3	1	1	1.5	2	2	5.5	3	1	1	1	6	33	L	
Operation																			
Routine operation and maintenance of power line route	Clearing of wetland vegetation beneath power line	Degradation of wetland vegetation wetland vegetation.	Without	1	1	1	3	1.5	2	4	7.5	3	2	5	1	11	82.5	M	• Avoid the use of herbicides and diesel to treat stumps within the wetland and buffer areas.
			With	1	1	1	2	1.3	2	4	7.3	2	1	1	1	5	36.25	L	
	Alien and Invasive species	Proliferation of alien and invasive species	Without	1	1	3	4	2.3	2	3	7.3	3	2	5	1	11	79.75	M	• All alien vegetation along the transmission servitude should be managed in terms of the Regulation GNR.1048 of 25 May 1984 (as amended) issued in terms of the Conservation of Agricultural Resources Act, Act 43 of 1983. By this the applicant is obliged to control category 1, 2 and 3 plants to the extent necessary to prevent or to contain the occurrence, establishment, growth, multiplication, propagation, regeneration and spreading such plants within servitude areas.
			With	1	1	2	3	1.8	2	2	5.8	2	1	1	1	5	28.75	L	

7 Conclusion and Recommendation

7.1 Baseline Ecology

During the site assessment, two HGM units were identified within the PAOI, namely, 14 seep wetlands (HGM1 – HGM14) and four (4) unchannelled valley bottom wetlands (HGM15 – HGM18). The ecosystem service and EIS scores were determined to range between "Low" and "Very High". The wetlands presented PES scores of C – "Moderately Modified", D "Largely Modified" and E "Seriously Modified due to the modification of the substrate, hydrology and vegetation of the wetlands through anthropogenic activities, with the main activity being agriculture. A RMO and scientifically calculated buffer was assigned to each wetland system and details thereof are summaries in Table 7-1 below.

Table 7-1 Summary of the system functionality assessment results

HGM	Present Ecological Status (PES)	Ecological Importance and Sensitivity (EIS)	Recommended Management Objective (RMO)	Buffer Requirements
HGM 1	C - Moderately Modified	B – High	B/C - Improve	30m
HGM 2	D – Largely Modified	C - Moderate	D - Maintain	22m
HGM 3	C - Moderately Modified	B – High	B/C - Improve	30m
HGM 4	C - Moderately Modified	A – Very High	A - Improve	30m
HGM 5	E - Seriously Modified	C - Moderate	E/F - Maintain	22m
HGM 6	D – Largely Modified	B – High	C/D - Improve	30m
HGM 7	D – Largely Modified	B – High	C/D - Improve	30m
HGM 8	D – Largely Modified	B – High	C/D - Improve	30m
HGM 9	C - Moderately Modified	B – High	B/C - Improve	30m
HGM 10	E - Seriously Modified	D - Low	E/F - Maintain	22m
HGM 11	E - Seriously Modified	C - Moderate	E/F - Maintain	22m
HGM 12	E - Seriously Modified	C - Moderate	E/F - Maintain	22m
HGM 13	D – Largely Modified	B – High	C/D - Improve	30m
HGM 14	D – Largely Modified	B – High	C/D - Improve	30m
HGM 15	C - Moderately Modified	C - Moderate	C - Maintain	22m
HGM 16	C - Moderately Modified	B – High	B/C - Improve	30m
HGM 17	D – Largely Modified	B – High	C/D - Improve	30m
HGM 18	C - Moderately Modified	C - Moderate	C - Maintain	22m

7.2 Risk Assessment

No fatal flaws were identified for the project. A risk assessment was conducted in line with Section 21 (c) and (i) of the National Water Act, 1998, (Act 36 of 1998). The overall residual risk posed to the delineated watercourses is low.

7.3 Specialist Recommendation

Based on the results and conclusions presented in this report, it is of the specialists' opinion that if all mitigation measures are met with the placement of the pylons and use of existing roads, it is expected that the proposed activities will pose low risks on the wetlands and thus no fatal flaw was identified for the project. A General Authorisation (GN 509 of 2016) is required for the water use authorisation. Pylon placement within the delineated water resources and associated buffers is permissible, but the number

and extent of pylons must be kept to a minimum for the feasibility of the line. In this regard, the overall residual impacts are also expected to be low a GA is applicable.

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