WETLAND FUNCTIONAL AND IMPACT ASSESSMENT FOR THE PROPOSED MOTUOANE EXPLORATION RIGHT 386 APPLICATION

Matjabeng & Moqhaka Local Municipalities, Lejweleputswa & Fezile Dabi District Municipalities, Free State Province, South Africa

14/04/2026

Prepared by:

The Biodiversity Company

Cell: +27 81 319 1225

Fax: +27 86 527 1965

info@thebiodiversitycompany.com

www.thebiodiversitycompany.com

Report Name	**WETLAND FUNCTIONAL AND IMPACT ASSESSMENT FOR THE PROPOSED MOTUOANE EXPLORATION RIGHT 386 APPLICATION**	
Specialist Theme	Aquatic Biodiversity Theme	
Project Reference	Motuoane ER386	
Report Version	14/04/2026	
Environmental Assessment Practitioner	EIMS ENVIRONMENTAL IMPACT MANAGEMENT SERVICES	
Technical Support	Dawid Coetsee (Can. Sci. Nat. 152512)[1]	
Responsible Specialist	Namitha Singh (Pr. Sci. Nat. 157927)	
Reviewer	Divan van Rooyen (Pr. 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.	

[1] All work was undertaken under the guidance and supervision of a registered professional Namitha Singh (Pr. Sci. Nat. 157 927)

Table of Contents

List of Tables

List of Figures

1 Introduction

1.1 Background

The Biodiversity Company was appointed to undertake a wetland assessment for the proposed Motuoane Exploration Right 386 EA12/3/386 application. The proposed project is located over an area of approximately 58 000 ha, covering various farm portions in Welkom near towns of Virginia, Hennenman and Odendaalsrus, Free State Province. The site is located within the Matjabeng and Moqhaka Local Municipalities, Lejweleputswa and Fezile Dabi District Municipalities. A map presenting the regional context of the Project Area of Influence (PAOI) can be seen in Figure 1-1.

This assessment was conducted in accordance with the amendments to the Environmental Impact Assessment Regulations (NEMA EIA Regulations, 2014 as amended) of the National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA). The approach has taken cognisance of the recently published Government Notices (GN) 320 (20 March 2020) and GN 1150 (30 October 2020) in terms of NEMA, dated 20 March and 30 October 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” (Reporting Criteria).

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 appropriate water use authorisation.

After considering the findings and recommendation provided by the specialist herein, this report should inform and guide the Environmental Assessment Practitioner (EAP) and regulatory authorities, enabling informed decision making regarding the ecological viability of the proposed development and related activities.

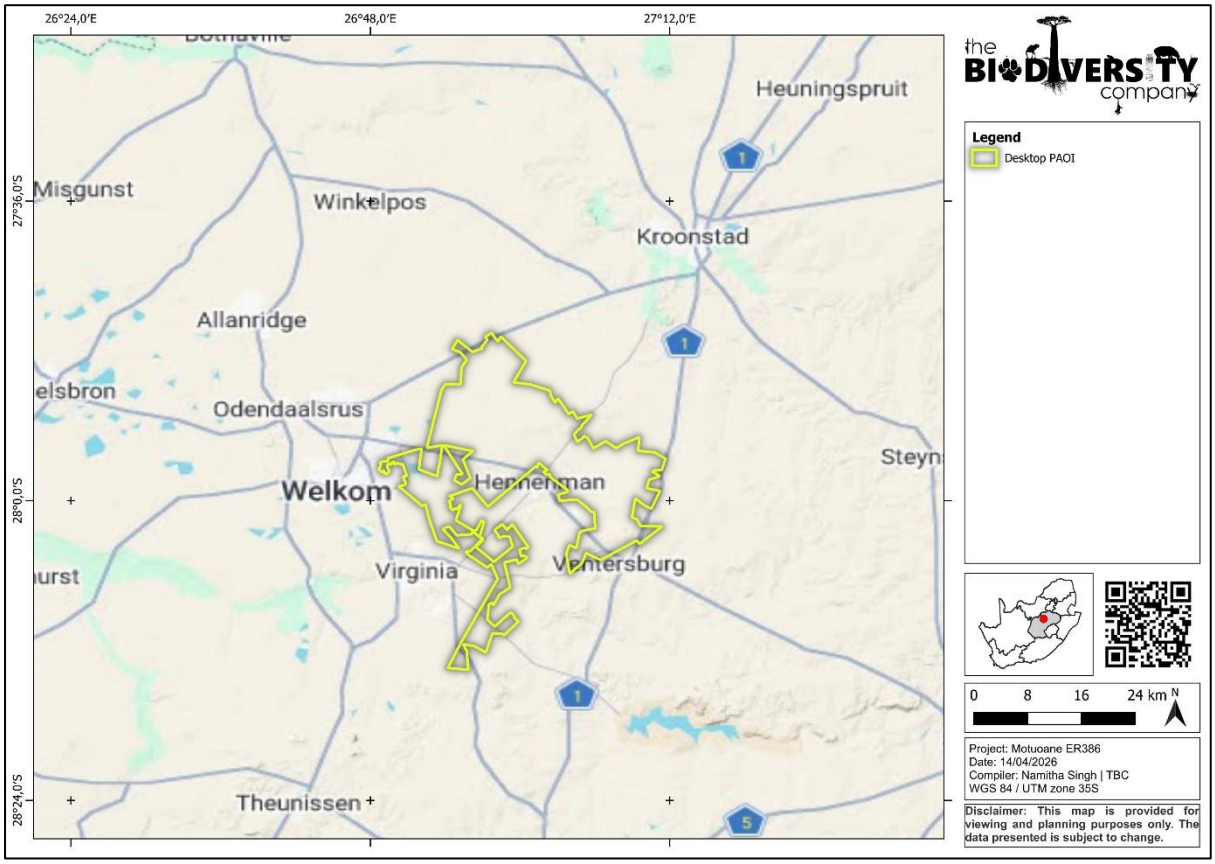


Figure 1-1 Location of the proposed project

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 the target 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 findings.

1.3 Project Description

Exploration Right (ER) 386 represents the consolidation of three previously individual tenures, TCP235, TCP240, and ERA341, which were merged into a single Exploration Right after 2024. This consolidation streamlines the management and exploration of saleable gases, including but not limited to Methane, Carbon Dioxide, Helium, and Nitrogen. The application for ER386 was submitted to cover all saleable gases within the consolidated area.

The exploration activities proposed under ER386 include:

- Identification and Assessment of Existing Blowers: Locating existing blowers within the exploration right and undertaking well workover and intervention where necessary.

- Drilling of New Exploration Wells: Drilling up to 5 new exploration wells at pre-identified or newly identified areas of interest.

- Establishment of Drilling Pads: Setting up 50x50 m drilling pads, which will require the clearance of indigenous vegetation.

- Access Road Construction: Establishing new temporary gravel access roads, only where necessary, to facilitate exploration activities.

- Seismic and Magnetotelluric Surveys: Conducting seismic and/or magnetotelluric surveys across the Exploration Right, focusing on areas of interest. Motuoane will first review existing seismic data from the Council for Geoscience and the Petroleum Agency. If no suitable data are available, new surveys will be conducted, following environmental protocols and with landowner consent. Preliminary survey transects are proposed to cover just over 70 km, with locations and lengths subject to change as exploration progresses.

- Vegetation Clearance: Clearing areas of 300 m² or more, and up to 1 hectare or more (but less than 20 hectares), of indigenous vegetation within specified geographical areas to facilitate exploration activities.

- Gas Composition Analysis: Performing gas composition analysis on samples from both existing boreholes and newly drilled wells within the exploration right.

- Site Rehabilitation and Closure: Rehabilitating all disturbed areas and ensuring the proper closure of blower sites upon completion of activities.

Figure 1-2 illustrates the spatial layout of the Motuoane ER386 project area, highlighting the key project components:

- Desktop PAOI (Project Area of Interest):
    - The area outlined in yellow represents the Desktop PAOI, which encompasses the full extent of the exploration right (ER386).

- Seismic Transects and 500 m Buffer:
    - The orange lines indicate the proposed seismic transects, which are linear survey paths identified for geophysical data collection. Surrounding each transect is a red buffer zone representing a 500-meter corridor on either side of the transect.

- Target Areas for Drilling Wells:
    - The white circles and their immediate surroundings mark the primary target areas for exploration drilling.

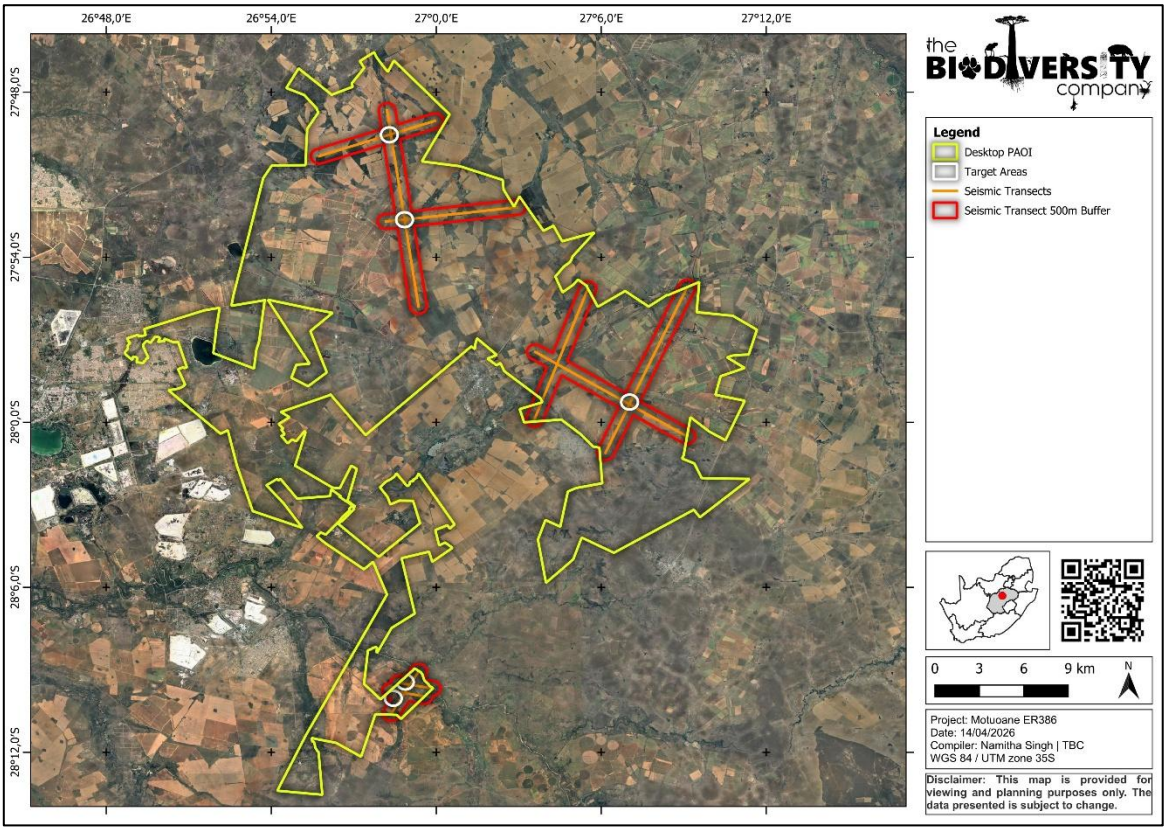


Figure 1-2 Map illustrating the proposed Target Areas, Seismic Transects and Project Area of Influence

1.4 Assumptions and Limitations

The following aspects were considered as limitations:

- It has been assumed that the extent of the project area provided to the specialist are accurate;
- Areas characterised by external wetland indicators have been the focus for this assessment. Areas lacking these characteristics have not been focussed on;
- Representative sampling for the different wetland areas was conducted and is considered to be sufficient for the purpose of this report;
- Only the Target Areas were delineated based on field verification findings, as access was not granted to the remaining portions of the PAOI during the survey period. The 500 m Buffer around the Seismic Transects was delineated on a high-level desktop basis due to access constraints and is included to ensure the transects are incorporated into the impact assessment; however, this desktop delineation may still require further refinement upon field verification. The broader PAOI was included only for the desktop assessment, and no detailed field-based delineations or findings are available for this area due to access constraints;
    - Resultingly, the ecological and functional assessments were only provided for the wetlands identified within the Target Areas; 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) (GNR 326, 7 April 2017), Appendix 6 requirements	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)	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: Government Notice (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)	The regulation and management of alien invasive species.
Provincial	Free State Province Biodiversity Plan: Technical Report v1.0 (2016)	A spatial tool comprising of a set of maps of biodiversity priority areas accompanied by contextual information and land-use guidelines for use in land-use and development planning, environmental assessment and regulation, and natural resource management.

1.6 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 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).

1.7 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 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 sensitivity” 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;
- 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 Assessment must contain the information as presented in Table 1-2 below.

Table 1-2 Aquatic Biodiversity 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	8.3
Contact details of the specialist, their SACNASP registration number, their field of expertise and a curriculum vitae	8.3
A signed statement of independence by the specialist(s)	8.2
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;	3.1

presence of aquatic species, and composition of aquatic species communities, their habitat, distribution and movement patterns.	
The threat status of the ecosystem and species as identified by the screening tool	3.5
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)	3.1.4.2
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)	3.4.3
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	3.5.2
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.	5
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); (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.)	5
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?	5

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?	-
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
The methodology used to undertake the site inspection and the specialist assessment, including equipment and modelling used, where relevant	8.1
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	3.2.1
Additional environmental impacts expected from the proposed development	5
Any direct, indirect and cumulative impacts of the proposed development on site	5
The degree to which impacts and risks can be mitigated	5
The degree to which the impacts and risks can be reversed	5
The degree to which the impacts and risks can cause loss of irreplaceable resources	5
A suitable construction and operational buffer for the aquatic ecosystem, using the accepted methodologies	3.2.1
Proposed impact management actions and impact management outcomes for inclusion in the Environmental Management Programme (EMPr)	5.2 & 5.3
A motivation must be provided if there were development footprints identified as having a “low” aquatic biodiversity sensitivity and that were not considered appropriate	-
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	6.2
Any conditions to which this statement is subjected	6.2

A signed copy of the assessment must be appended to the Basic Assessment Report or Environmental Impact Assessment Report.

2 Fieldwork

2.1 Freshwater Biodiversity Field Assessment

A field survey for the area was undertaken on the 16th to the 19th of March 2026 (summer), which constitutes a wet season survey, 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 of which the results are conclusive.

3 Results & Discussion

3.1 Desktop Dataset Assessment

3.1.1 Climate

The dominant vegetation type within the PAOI, the Vaal-Vet Sandy Grassland, was used to draw inferences on the climate for area. This region is characterised by a summer rainfall, high summer temperatures, severe frost occurrence and with a Mean Annual Precipitation (MAP) ranging from 500 mm to 560 mm (Figure 3-1; Mucina & Rutherford, 2006).

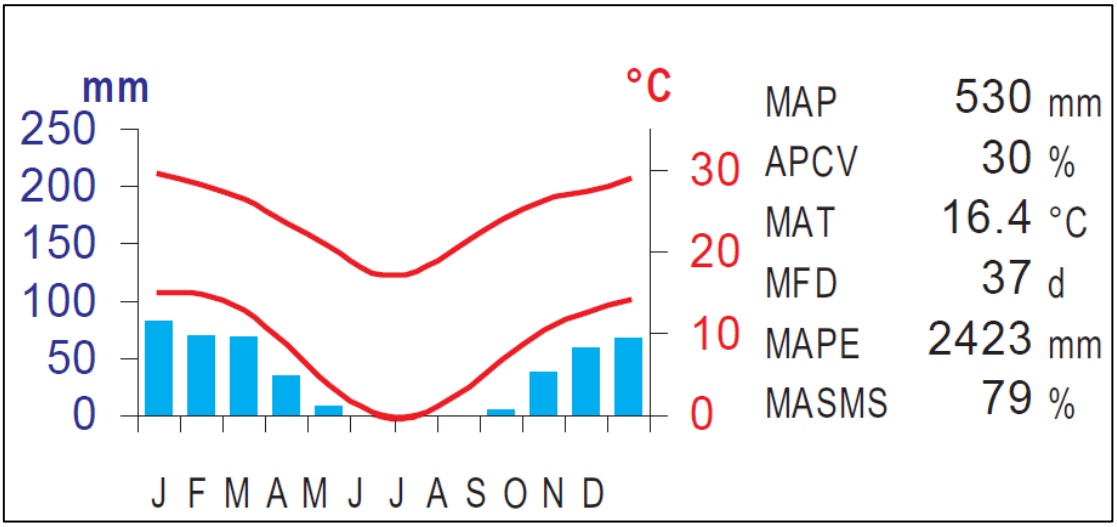


Figure 3-1 Climate for the Project Area of Influence based on the Vaal-Vet Sandy Grassland (Mucina & Rutherford, 2006)

3.1.2 Soils and Geology

The geology of the project area is notably diverse, comprising a range of formations that influence the distribution and characteristics of local soils. The dominant geological units include aeolian and colluvial sands overlying sandstone, mudstone, and shale of the Karoo Supergroup, particularly the Ecca Group, as well as older Ventersdorp andesite and basement gneiss. These geological substrates support a variety of soil forms, most notably Avalon, Westleigh, and Clovelly, which are typically associated with the Bd, Ba, Bc, and Ae land types.

In certain portions of the project area, sedimentary mudstone and sandstone of the Adelaide Subgroup (Beaufort Group, Karoo Supergroup) are present, along with rocks of the Ecca Group. These formations give rise to vertic, melanic, and red soils, with typical soil forms including Arcadia, Bonheim, Kroonstad, Valsrivier, and Rensburg, commonly found within the Dc land types. Additionally, the presence of dolerite sills intruding alternating layers of mudstone and sandstone (Adelaide Subgroup, Beaufort Group) supports stony Mispah and gravel-rich Glenrosa soil forms, primarily associated with the Ea and Dc land types.

The area also contains Quaternary alluvial (fluvial) sediments, which result in deep, sandy to clayey (but mostly coarse sand) alluvial soils. The predominant soil forms in these areas are Oakleaf, Dundee, Shortlands, Glenrosa, and Mispah (Mucina & Rutherford, 2006).

According to the Land Type Survey Staff (1972–2006), the project area falls within several land types, namely Bc 30, Bd 19, Bd 20, Bd 21, Db 1, Dc 8, Dc 9, Dc 12, and Ea 40. Each of these land types is characterized by a specific suite of dominant soil forms, as classified by the Soil Classification Working Group (1991). For example, Bc 30 is mainly associated with Mispah, Glenrosa, Bainsvlei, and Willowbrook soils; Bd 19 and 21 with Avalon, Valsrivier, and Dundee; Bd 20 with Clovelly, Hutton, and Valsrivier; Db 1 with Sterkspruit and Willowbrook; Dc 8 with Valsrivier, Rensburg, Oakleaf, and Dundee; Dc 9 with Hutton, Swartland, Katspruit, and Willowbrook; Dc 12 with Mayo, Mispah, Swartland, Bonheim, Dundee, and Oakleaf (including rocky areas); and Ea 40 with Mayo, Arcadia, Oakleaf, and Rensburg. Other soil forms may also occur within the landscape, reflecting the geological and geomorphological complexity of the area.

3.1.3 Hydrological Characteristics

The PAOI falls within the Highveld Ecoregion, within the Vaal-Orange Water Management Area (WMA). At a finer scale, the project occurs within the C42H, C42J and C60H quaternary catchments. The fine scale hydrological features are presented in the following section.

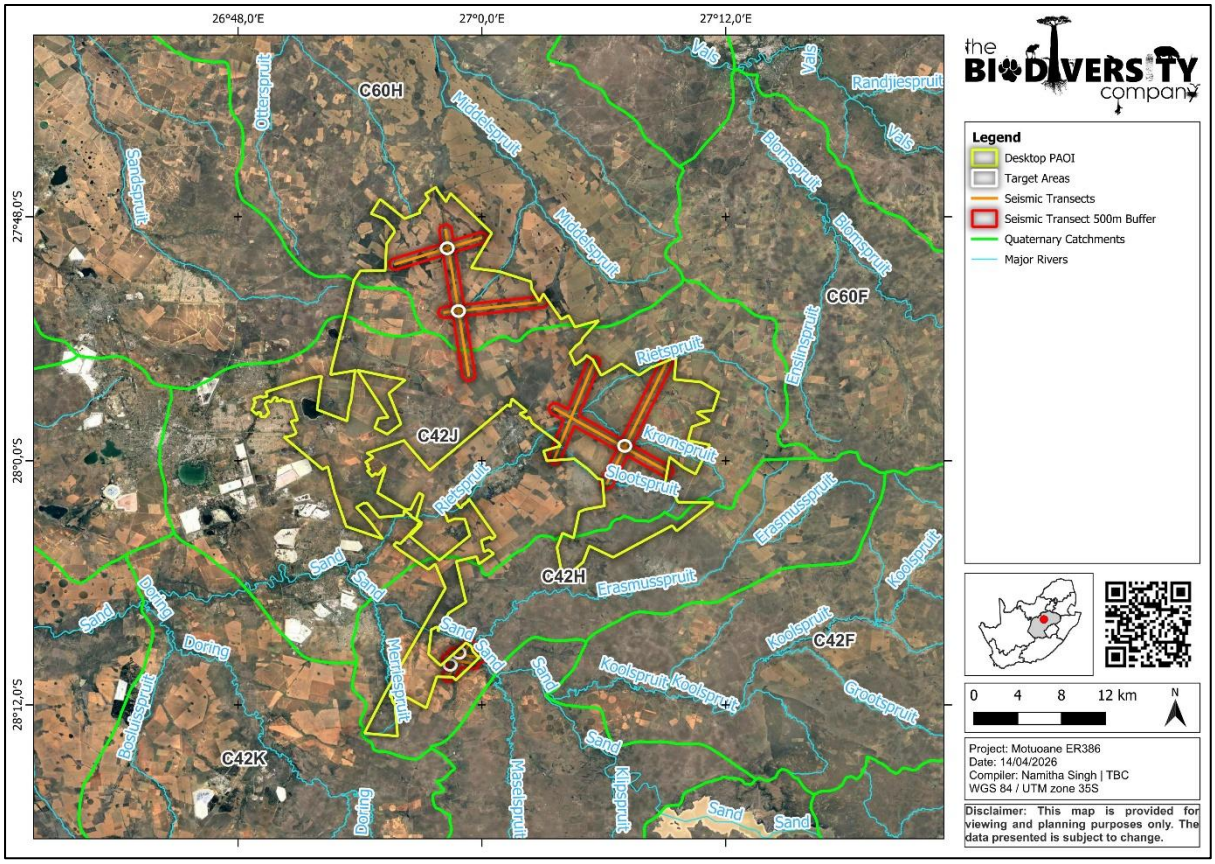


Figure 3-2 Catchment context for the Project Area of Influence

3.1.3.1 Topographical River Lines and Inland Water Areas

Figure 3-3 details the distribution of drainage features and inland water areas according to the 1:50000 topographical dataset.

A variety of inland water areas are mapped within the PAOI, including:

- Dams
- Marsh Vleis
- Non-perennial pans
- Perennial pans
- Sewerage works; and
- Reservoirs.

In addition, several non-perennial and perennial drainage watercourses traverse the PAOI (Figure 3-3).

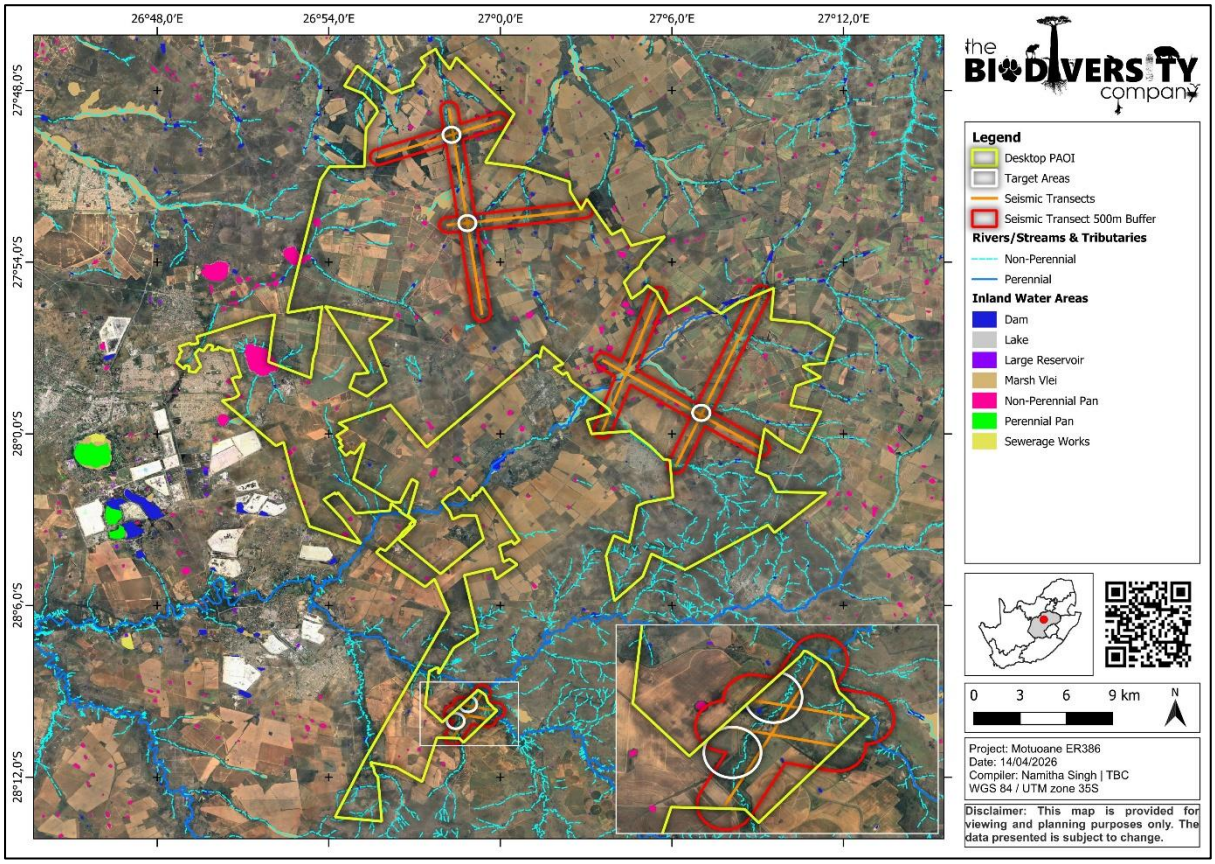


Figure 3-3 Topographical Drainage and Inland Water Areas relevant to the project

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.

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 NBA wetlands and Rivers.	3.1.4.1
National Freshwater Priority Area	Relevant – PAOI overlaps with NFEPA wetlands and Rivers.	3.1.4.2
Provincial Conservation Plan	Relevant – PAOI overlaps with Terrestrial CBAs and ESAs.	3.1.4.3
Strategic Water Source Areas	Irrelevant – PAOI does not overlap with a SWSA or GWSWSA.	-

3.1.4.1 South African Inventory of Inland Aquatic Ecosystems

Several wetlands were identified within the PAOI by means of the SAIIAE dataset (Figure 3-4). These wetlands mainly consist of isolated depressions scattered throughout the PAOI, with few floodplain and valley-bottom wetlands coinciding with the major stream paths in the northeastern PAOI. Main rivers identified within the PAOI according to the dataset was the Merriespruit, Sand River, Erasmusspruit, Rietspruit, Kromspruit, Slootpsruit, and tributary to the Middelspruit.

The depression wetlands were classified as “Least Concern” and “Poorly Protected” with regard to Ecosystem Threat Status, and Ecosystem Protection Level, respectively. Furthermore, the valley-bottom and floodplain systems were classified as “Critically Endangered” and “Not Protected”.

All identified rivers were classified as “Critically Endangered” and were dominantly “Not Protected” with a few systems being classified as “Poorly Protected”.

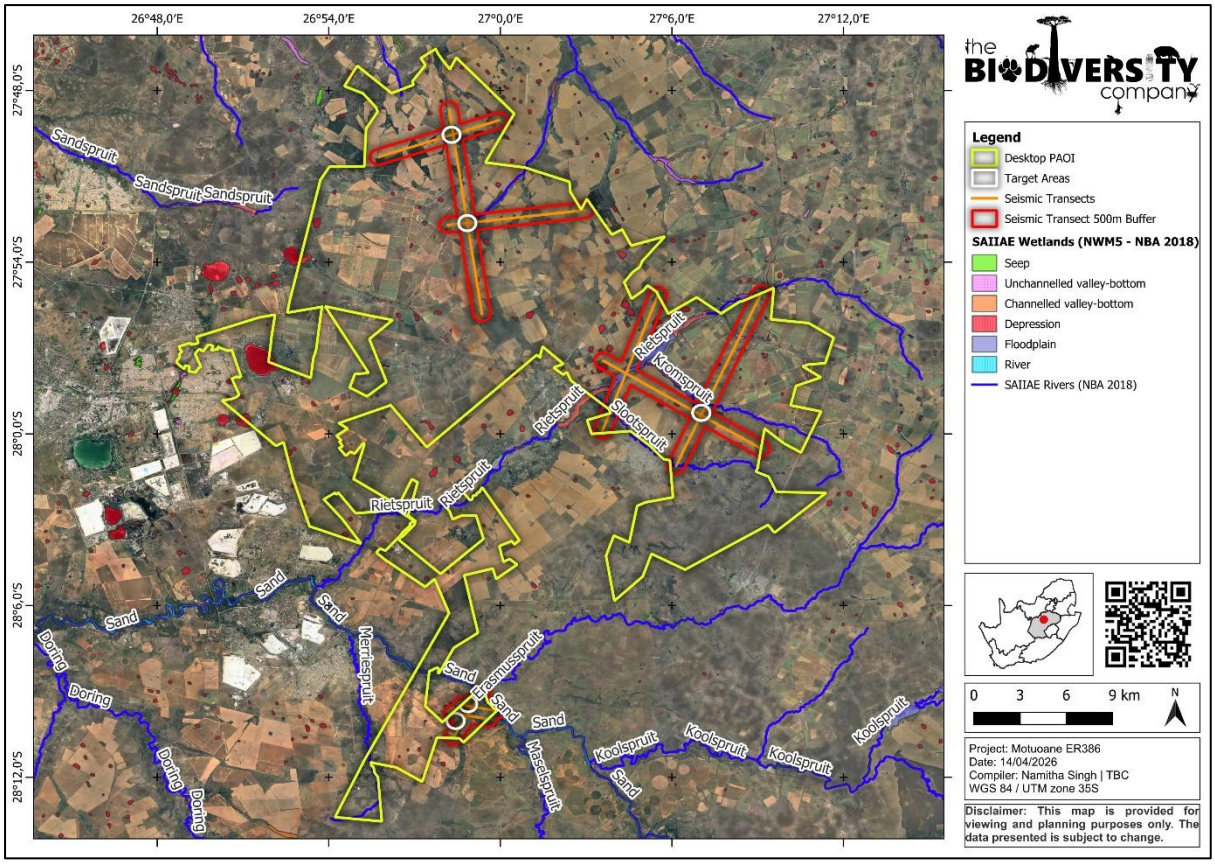


Figure 3-4 South African Inventory of Inland Aquatic Ecosystems with relevance to the project

3.1.4.2 National Freshwater Ecosystem Priority Areas

As with the SAIIAE dataset, several wetlands were identified within the PAOI, consisting mainly of depression wetlands with few valley-bottom and floodplain systems located within the major stream paths (Figure 3-5). Furthermore, several rivers were identified which coincide with the identified features from the SAIIAE dataset. Only three wetlands were identified to be “Priority” ecosystems, and these features occur on the edges of PAOI and not within the Target Areas or 500 m Buffer of the Seismic transects. The remaining wetlands were classified as “Non-Priority” ecosystems.

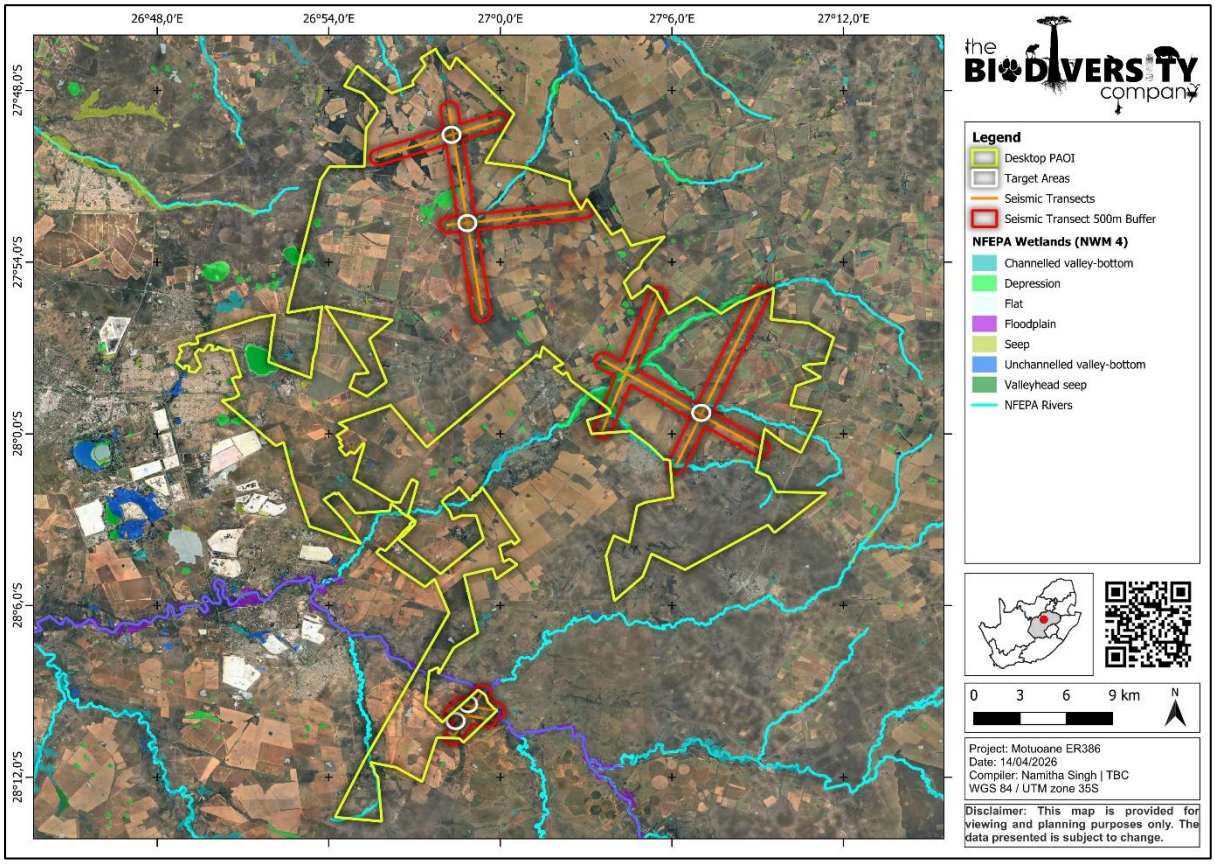


Figure 3-5 NFEPA Wetlands with relevance to the project

3.1.4.3 Free State Biodiversity Sector Plan

The Free State Conservation Plan (v4) classified areas within the province on the basis of its contribution to reach the conservation targets within the province. These areas are classified as Critical Biodiversity Areas (CBAs) and Ecological Support Areas (ESAs) to ensure sustainability in the long term. The CBAs are classified as either 'Irreplaceable' (must be conserved), or 'Important'. It is important to note that this conservation plan does not distinguish between aquatic (freshwater) and terrestrial ecosystems. As a result, while the dataset is more directly relevant to terrestrial biodiversity, it has been included to provide a comprehensive overview of the existing conservation priorities within the area.

Figure 3-6 shows the PAOI superimposed on the Free State Conservation Plan dataset. The PAOI overlaps ESAs 1 & 2, CBAs 1 & 2, DAs, as well as ONAs.

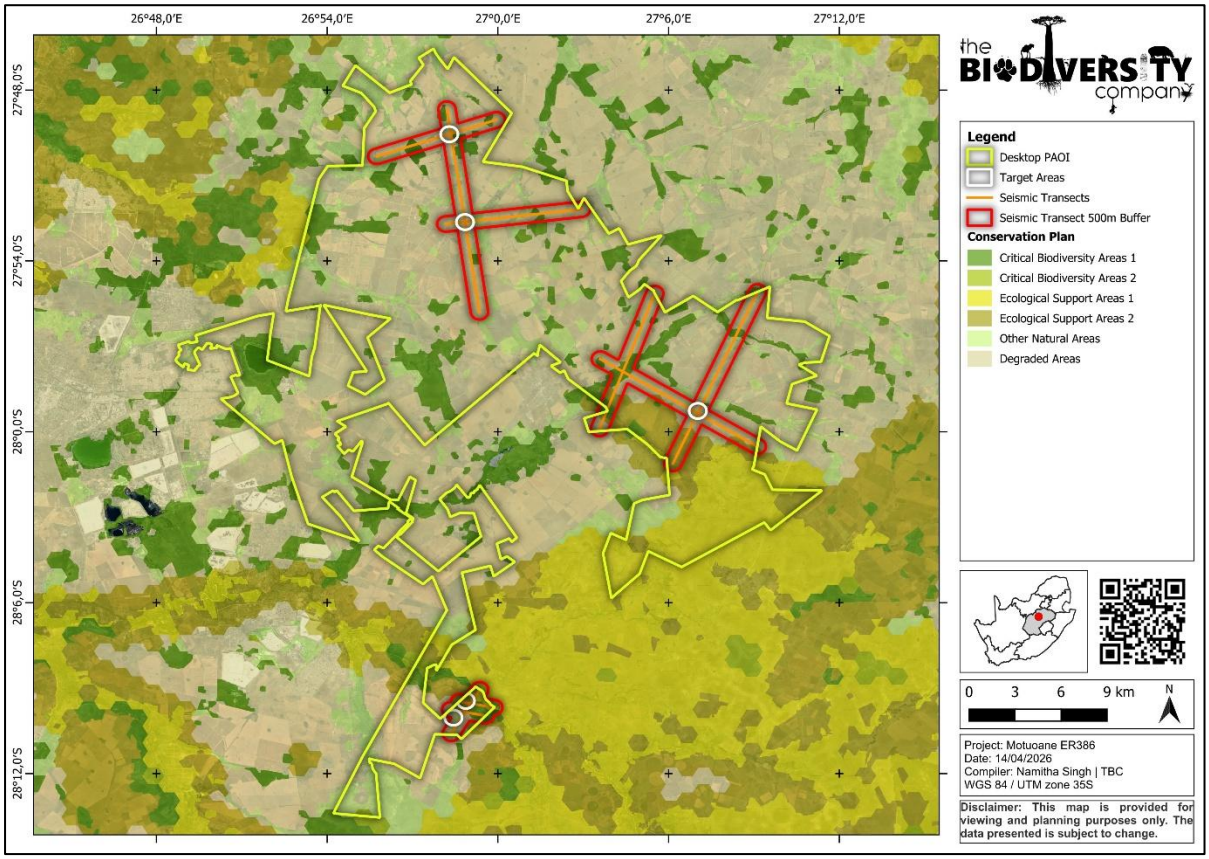


Figure 3-6 The Free State Biodiversity Sector Plan in relation to the project

3.2 Wetland Baseline Results

The baseline results have been spatially limited to the Target Areas (for the proposed drilling wells) which have been field verified and the 500 m Buffer of the Seismic Transects through high-level desktop delineations as access within this area was not granted during the field survey. The larger PAOI has been excluded from further assessment as access within this area was not granted during the field visit and the available desktop data, which has been presented in Section 3.1, was undertaken at a low resolution (national scale). As a result, there are expected to be notable differences between the desktop outputs and actual on-ground conditions, as this has been the case for the verified Target Areas and high-level desktop delineations for the 500 m Buffer of the Seismic Transects. It is therefore expected that extensive refinement would be required to provide a comprehensive set of delineations which are based on the analysis of satellite imagery and representative field-verified findings for the PAOI.

As previously stated, the ecological and functional assessments were only provided for the wetlands identified within the Target Areas as these were the wetlands that were field verified during the survey.

3.2.1 Delineation

The delineated wetlands were grouped into Hydrogeomorphic (HGM) units based on their topographic similarity, shared exposure to comparable threats, and the expectation that they provide similar ecological benefits. This approach ensures that wetlands with analogous landscape positions, hydrological regimes, and vulnerability to anthropogenic pressures are assessed collectively.

Twenty-one (21) HGM units were identified and delineated within the 500 m Buffer of the Seismic Transects (Figure 3-7 - Figure 3-9). These features were classified as channelled valley-bottoms, unchannelled valley-bottoms, seeps, depressions and floodplain systems. In addition, two main riparian

systems and several non-perennial drainage features and dams (instream and off-channel) were identified. Furthermore, several artificial wet areas were delineated, which have resulted from stormwater management and land-use practices (agriculture).

Five (5) of the identified HGM units were delineated within the Target Areas (Figure 3-10), these consist of two unchannelled valley-bottoms, a depression, a seep, and a channelled valley-bottom. In addition, non-perennial drainages, artificial drainage channels, and dams were identified within the Target Areas.

The buffer requirements for the wetlands were calculated using the Site-Based Tool: Determination of buffer zone requirements for wetland ecosystems (Macfarlane et al. 2014). The recommended post-mitigation buffers were calculated to be 15 m and are presented in Figure 3-7 to Figure 3-10.

A summary of the delineated features is provided in Table 3-2. Representative photographs of the delineated features are provided Figure 3-11.

Table 3-2 Summary of delineated wetland features

Feature	General Location
HGM 1 – Unchannelled Valley-Bottom	Northern Cluster (Seismic Transect 500 m) **Target Area**
HGM 2 – Depression	
HGM 3 – Seep	Northern Cluster (Seismic Transect 500 m)
HGM 4 – Seep	Northern Cluster (Seismic Transect 500 m) **Target Area**
HGM 5 – Depression	Northern Cluster (Seismic Transect 500 m)
HGM 6 – Seep	Eastern Cluster (Seismic Transect 500 m)
HGM 7 – Depression	
HGM 8 – Floodplain	
HGM 9 – Depression	
HGM 10 – Seep	
HGM 11 – Seep	
HGM 12 – Channelled Valley-Bottom	**Eastern Cluster (Seismic Transect 500 m)** **Target Area**
HGM 13 – Seep	Eastern Cluster (Seismic Transect 500 m)
HGM 14 – Seep	
HGM 15 – Unchannelled Valley-Bottom	
HGM 16 – Seep	
HGM 17 – Seep	Southern Cluster (Seismic Transect 500 m)
HGM 18 – Unchannelled Valley-Bottom	Southern Cluster (Seismic Transect 500 m) **Target Area**
HGM 19 – Channelled Valley-Bottom	Southern Cluster (Seismic Transect 500 m)
HGM 20 – Depression	
HGM 21 – Depression	
Non-Perennial Drainage	Southern Cluster (Seismic Transect 500 m) **Target Area**
Artificial Wet Area	Northern Cluster (Seismic Transect 500 m) **Target Area**
Artificial Drainage Channel	Southern Cluster (Seismic Transect 500 m) **Target Area**
Sand River	Southern Cluster (Seismic Transect 500 m)
Slootspruit	Eastern Cluster (Seismic Transect 500 m)

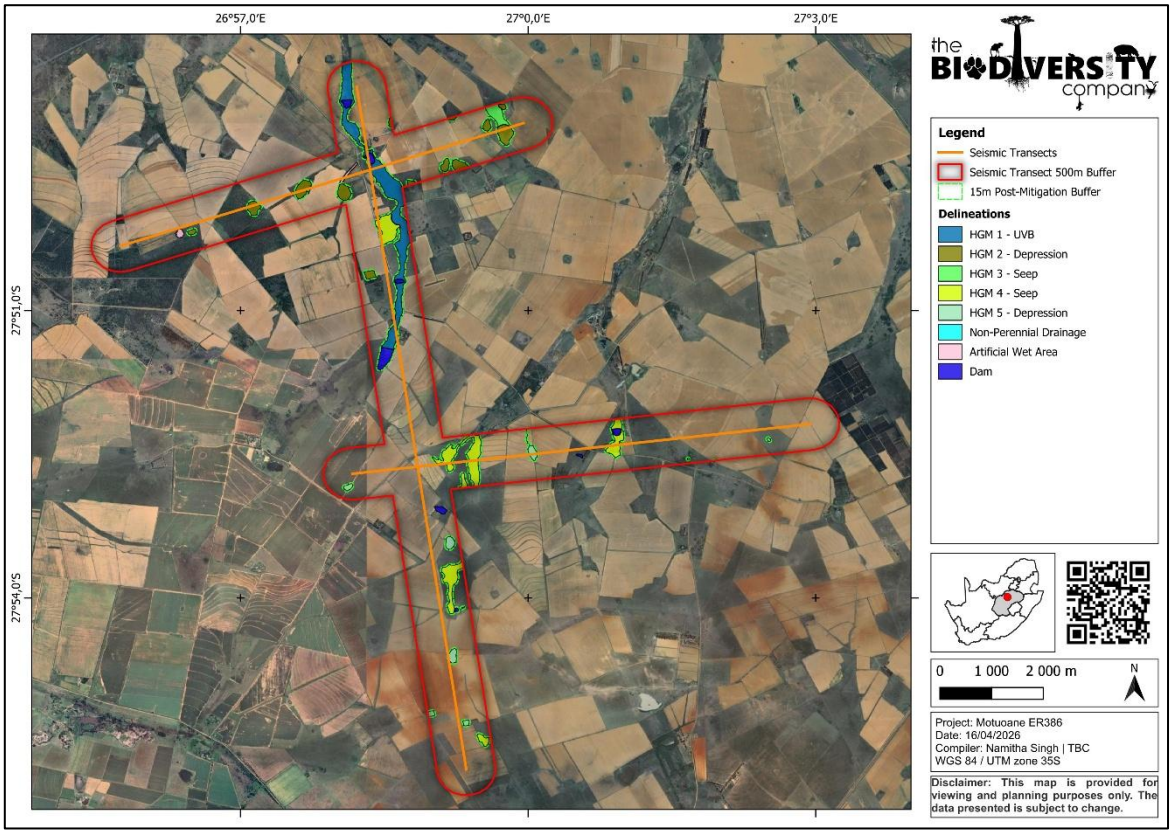


Figure 3-7 Delineation of wetland features within the 500 m Buffer of the Seismic Transects (Northern Cluster)

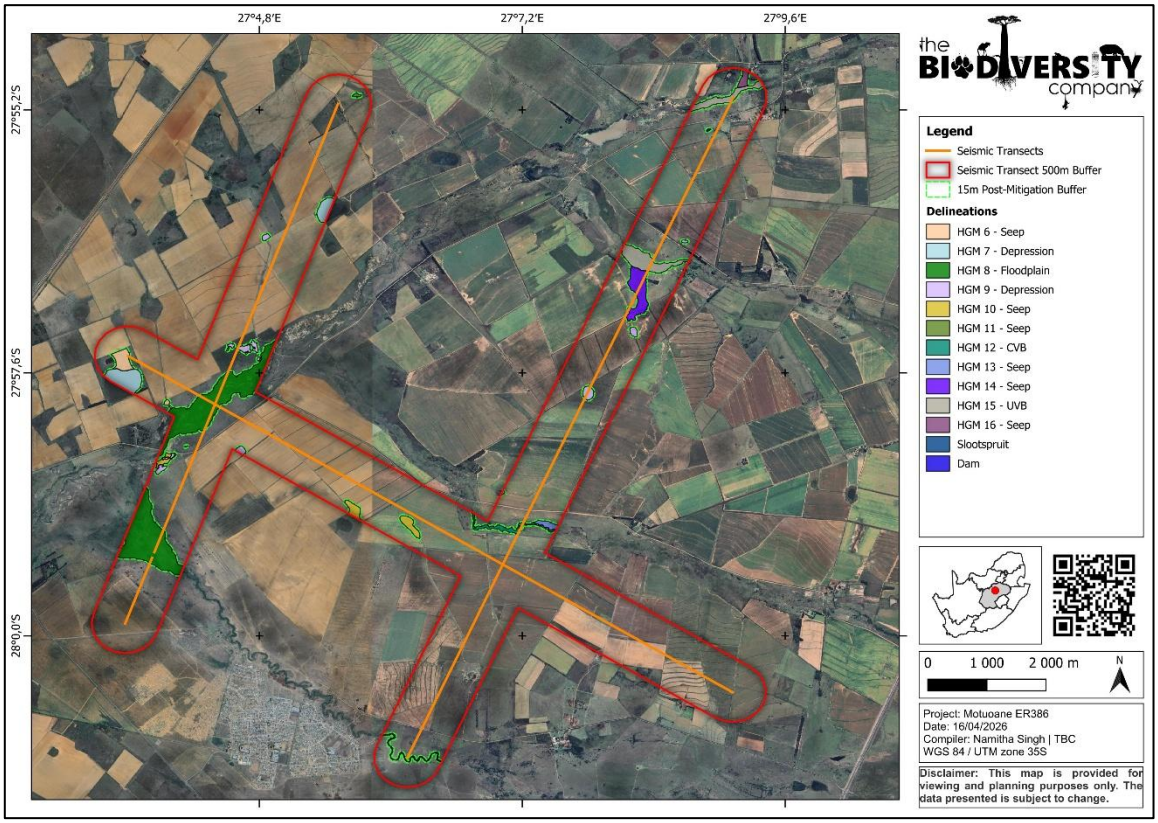


Figure 3-8 Delineation of wetland features within the 500 m Buffer of the Seismic Transects (Eastern Cluster)

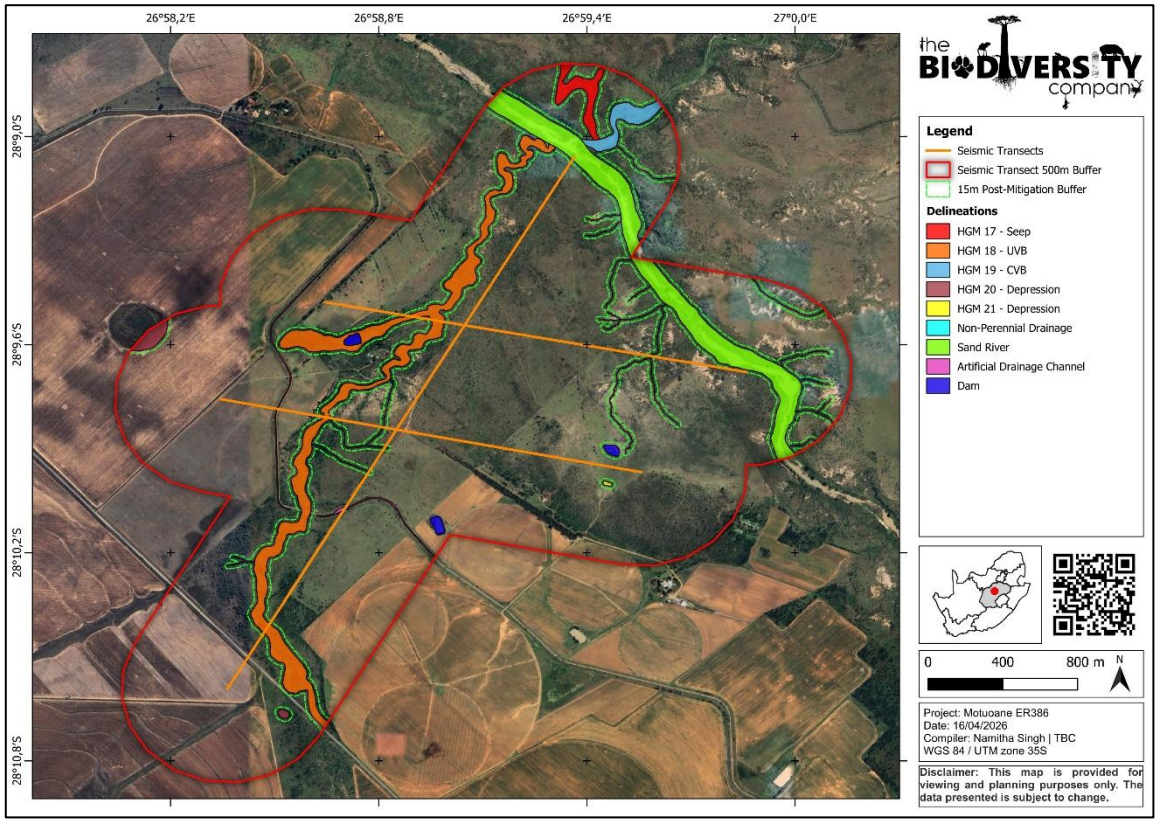


Figure 3-9 Delineation of wetland features within the 500 m Buffer of the Seismic Transects (Southern Cluster)

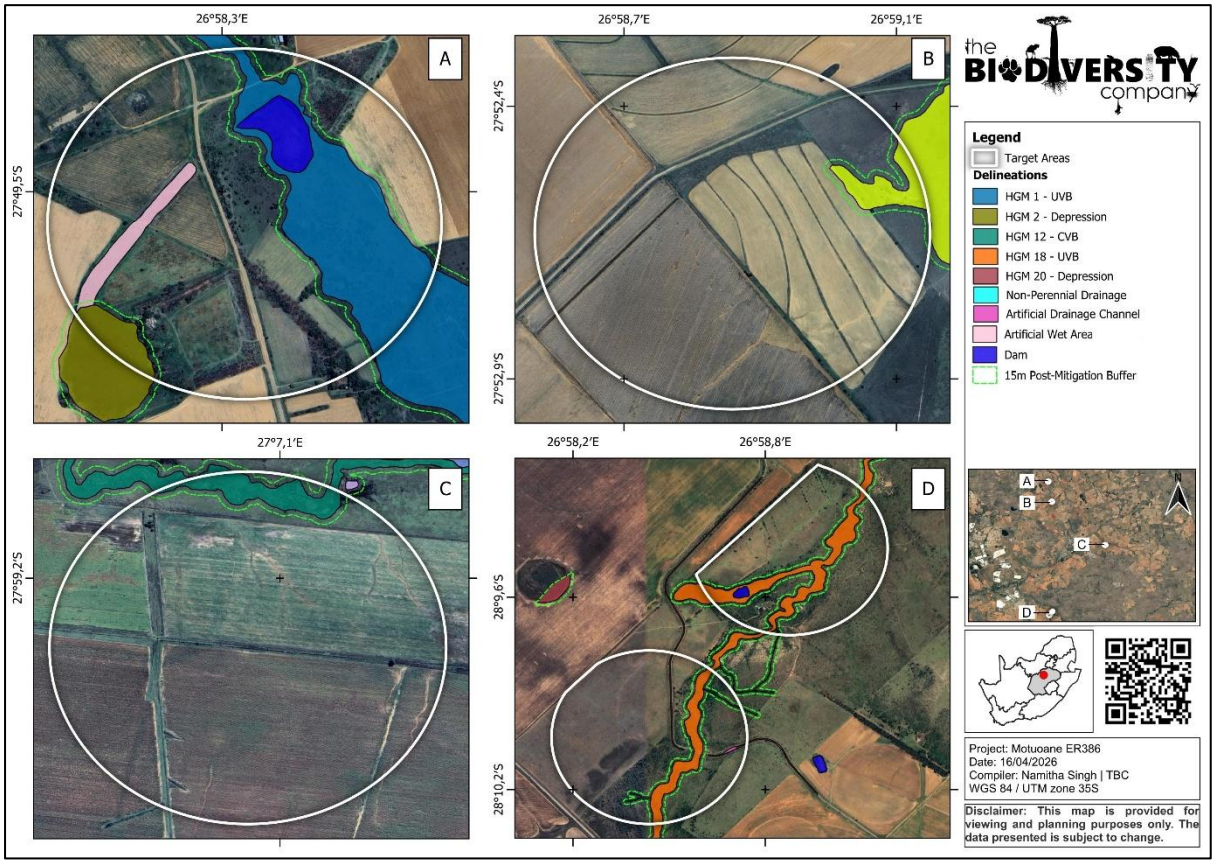


Figure 3-10 Delineation of wetland features within the Target Areas

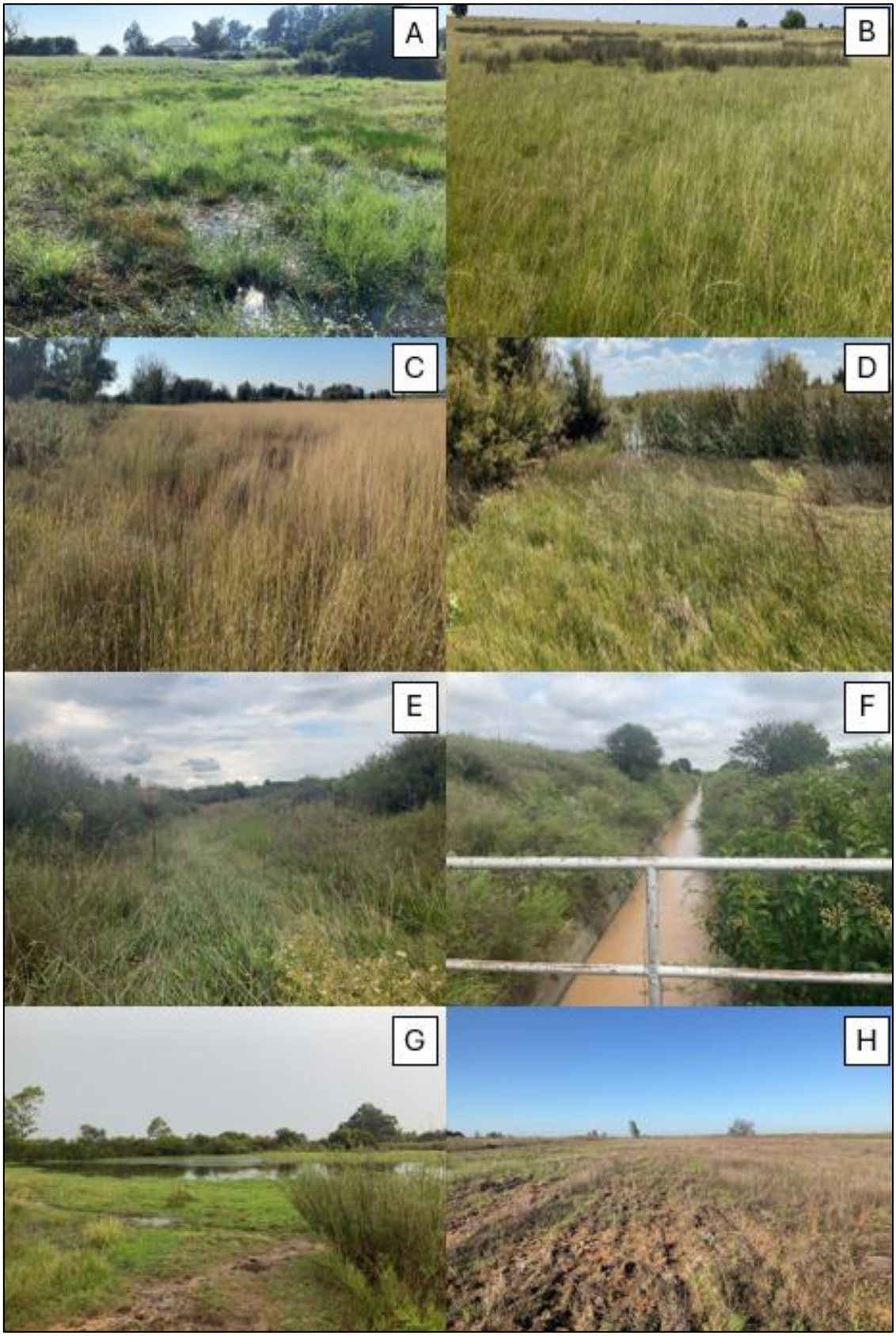


Figure 3-11 ***Examples of the watercourses delineated within the project area. A) Unchannelled valley-bottom; B) Seep; C) Depression; D) Channelled valley-bottom; E) Non-perennial drainage; F) Artificial drainage; G) Dam and; H) Artificial wet area***

3.2.2 Classification and Description

The wetland classification as per SANBI guidelines (Ollis *et al.*2013) for the proposed site is presented in Table 3-3.

Table 3-3 Wetland 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 12 HGM 19	Inland	Highveld	Dry Highveld Grassland Group 3	Valley Floor	Channelled valley-bottom	N/A	N/A
HGM 1 HGM 15 HGM 18					Unchannelled valley-bottom	N/A	N/A
HGM 3 HGM 4 HGM 6 HGM 10 HGM 11 HGM 13 HGM 14 HGM 16 HGM 17				Slope	Seep		N/A
HGM 2 HGM 5 HGM 7 HGM 9 HGM 20 HGM 21				Plain/Bench/Slope	Depression	Endorheic	Without channelled inflow
HGM 8				Valley Floor	Floodplain	Flat	N/A

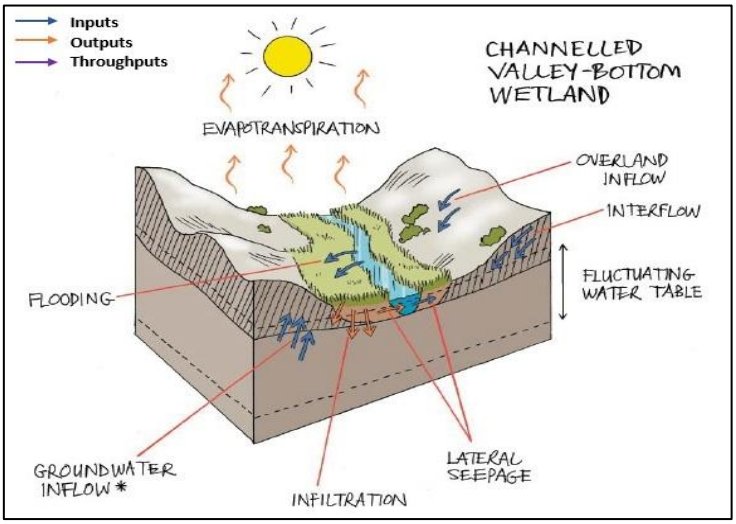


Figure 3-12 Amalgamated diagram of a typical channelled valley bottom, highlighting the dominant water inputs, throughputs and outputs, SANBI guidelines (Ollis et al. 2013)

A depression wetland is characterised by its distinct geomorphological features (Ollis *et al.*2013). These wetlands are defined by closed or near-closed elevation contours, which increase in depth from the perimeter to a central area of greatest depth, where water typically accumulates. Depressions may be flat-bottomed, often referred to as pans, or round-bottomed, and can have various combinations of inlets and outlets or lack them entirely. The hydrodynamics of a depression are typically dominated by vertical water level fluctuations, with water inputs primarily from precipitation, groundwater discharge, interflow, and diffuse or concentrated overland flow. The classification system further categorizes depressions

based on their outflow drainage characteristics as exorheic (outward-draining), endorheic (inward-draining), or dammed, and by their inflow drainage characteristics as with or without channelled inflow. This detailed classification helps in understanding the ecological functions and management needs of depression wetlands in South Africa. Figure 3-15 presents a diagram of a typical depression wetland, showing the dominant movement of water into, through and out of the system.

An unchannelled valley-bottom wetland, is a wetland located on a valley floor, characterised by the absence of a distinct river channel (Ollis *et al.*2013). These wetlands are defined by their diffuse water flows, which are not confined within channel banks, allowing water to spread across the valley floor. The primary water inputs for unchannelled valley-bottom wetlands include diffuse surface and subsurface flows from upstream channels that lose confinement, as well as seepage from adjacent valley side-slopes. The hydrodynamics of these wetlands are dominated by horizontal, unidirectional, diffuse surface flow, although infiltration and evapotranspiration can also be significant. This setting allows unchannelled valley-bottom wetlands to function as important sites for sediment deposition, water filtration, and habitat provision, supporting a diverse range of plant and animal species. Their unique hydrological and geomorphological characteristics make them vital components of the landscape, contributing to the overall ecological health of the valley systems in which they occur. Figure 3-13 presents a diagram of a typical unchannelled valley-bottom wetland, showing the dominant movement of water into, through and out of the system.

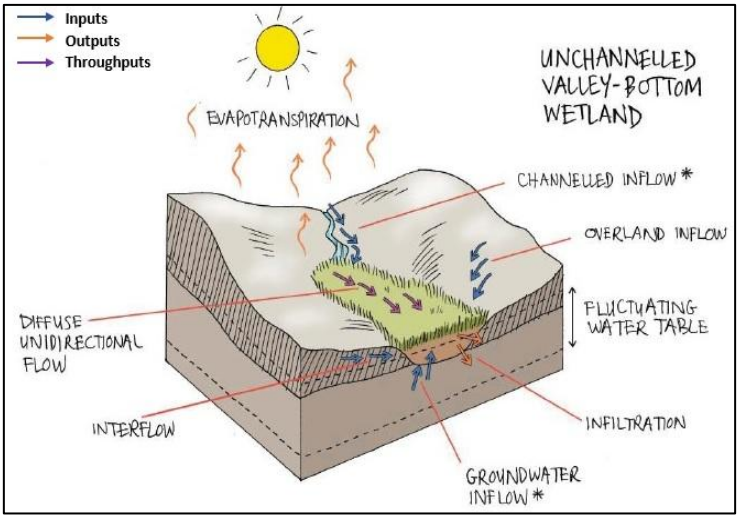


Figure 3-13 Amalgamated diagram of a typical unchannelled valley bottom, highlighting the dominant water inputs, throughputs and outputs, SANBI guidelines (Ollis et al. 2013)

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 3-14 illustrates a diagram of the hillslope seeps, showing the dominant movement of water into, through and out of the system.

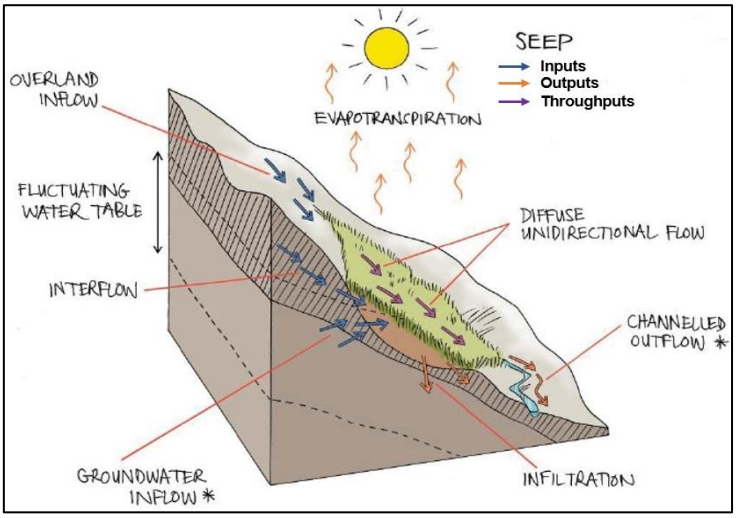


Figure 3-14 Amalgamated diagram of a typical hillslope seep, highlighting the dominant water inputs, throughputs and outputs, SANBI guidelines (Ollis et al. 2013)

A depression wetland is characterised by its distinct geomorphological features (Ollis *et al.*2013). These wetlands are defined by closed or near-closed elevation contours, which increase in depth from the perimeter to a central area of greatest depth, where water typically accumulates. Depressions may be flat-bottomed, often referred to as pans, or round-bottomed, and can have various combinations of inlets and outlets or lack them entirely. The hydrodynamics of a depression are typically dominated by vertical water level fluctuations, with water inputs primarily from precipitation, groundwater discharge, interflow, and diffuse or concentrated overland flow. The classification system further categorizes depressions based on their outflow drainage characteristics as exorheic (outward-draining), endorheic (inward-draining), or dammed, and by their inflow drainage characteristics as with or without channelled inflow. This detailed classification helps in understanding the ecological functions and management needs of depression wetlands in South Africa. Figure 3-15 presents a diagram of a typical depression wetland, showing the dominant movement of water into, through and out of the system.

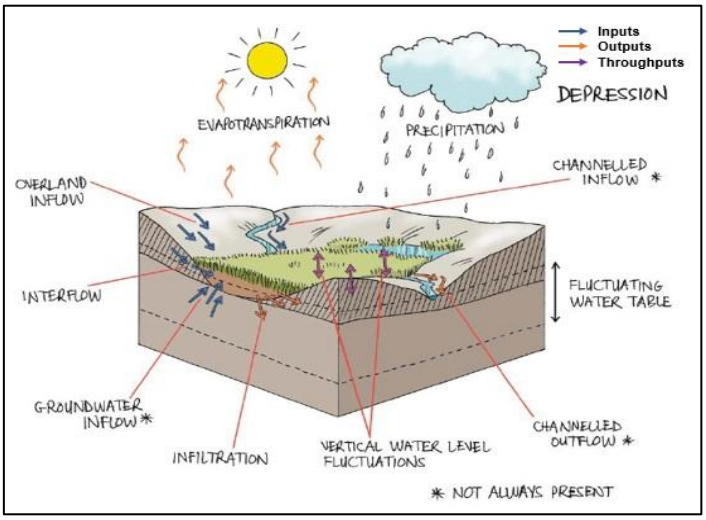


Figure 3-15 Amalgamated diagram of a typical depression wetland, highlighting the dominant water inputs, throughputs and outputs, SANBI guidelines (Ollis et al. 2013)

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

characterised 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 3-16 presents a diagram of a floodplain, showing the dominant movement of water into, through and out of the system.

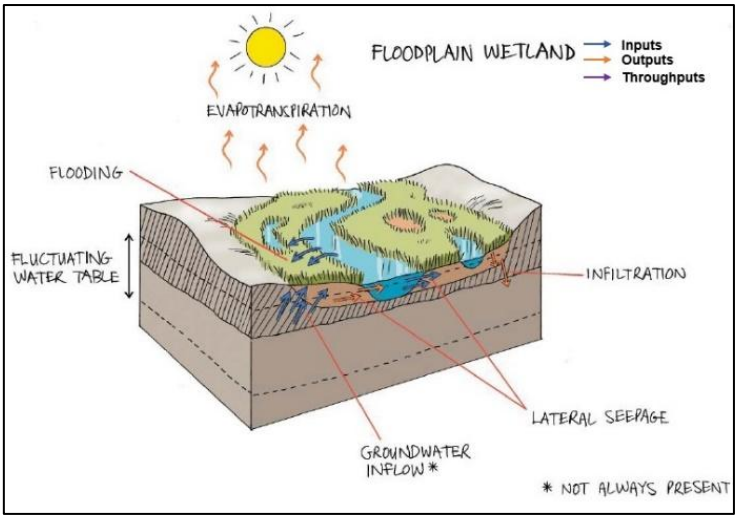


Figure 3-16 Amalgamated diagram of a typical floodplain system, highlighting the dominant water inputs, throughputs and outputs, SANBI guidelines (Ollis et al. 2013)

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.

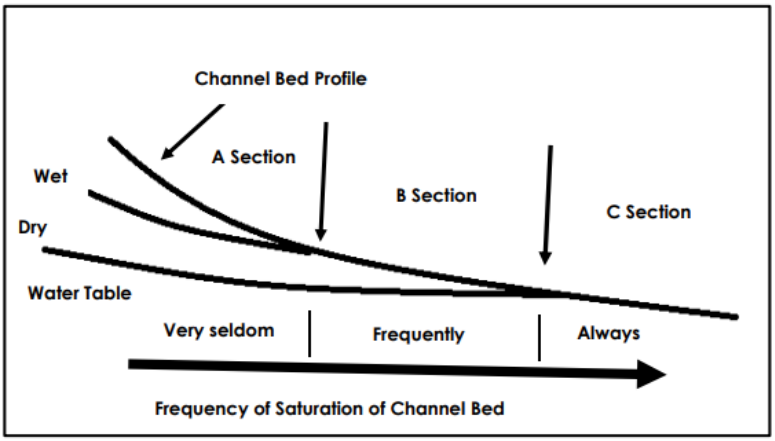


Figure 3-17 The watercourse classifications (DWAF, 2005)

3.3 Risk Screening

Table 3-4 provides the results of risk screening for the delineated features and provides motivation for each of the determined categories in relation to the 500 m Buffer of the Seismic Transects. Upon further analysis, it was determined that only a few HGM units and features are “At Risk” and coincide directly with the designated Target Areas for the drilling wells. Specifically, HGM 1, HGM 2, HGM 3, HGM 4, HGM 12, HGM 18, and a few of the Non-Perennial Drainage.

Table 3-4 Risk status of the delineated wetlands

HGM unit / Feature	Risk Status	Reasoning
HGM 4, HGM 2, HGM 9, HGM 6, HGM 12, HGM 14, HGM 8, HGM 1, HGM 5, HGM 18, HGM 20, HGM 16, HGM 11, HGM 15, Sand River & Non-Perennial Drainage	**At Risk**	These features are wholly or partially overlapping with the proposed activities or are located downstream of the proposed activities and have therefore been determined as "At Risk". It is anticipated that there will be some level of impact on these systems.
HGM 17, HGM 19, HGM 21, HGM 10, HGM 3, HGM 13, HGM 7 and Slootspruit	**Not at Risk**	These features are located within 500 m of the proposed activities but are not in a position of the landscape where the activities are expected to result in impact and have therefore been determined as "Not at Risk". No direct or indirect impacts are anticipated.
Dam, Artificial Wet Area, Artificial Drainage Channel	**Not Applicable**	These features are artificial or engineered water management structures or are not natural wetland systems. As such, the risk assessment framework does not apply, and therefore, no risk status regarding potential impacts from the proposed activities is deemed necessary.

3.4 Functional and Ecological Assessment

3.4.1 General Functional Description

Channelled valley-bottom wetlands are characterised 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).

Unchannelled valley-bottom wetlands are characterised by their location in valley bottoms without a distinct stream channel, resulting in diffuse water flow across the wetland. These wetlands are highly effective in sediment trapping due to their gentle gradients and the extensive areas that remain permanently saturated, which promote the deposition of sediments carried by runoff waters. The high levels of soil organic matter in these wetlands enhance their capacity for nitrate and toxicant removal, as the prolonged contact with runoff waters facilitates these processes. However, phosphate retention may be lower compared to other wetland types due to potential remobilization under prolonged anaerobic conditions. Unchannelled valley-bottom wetlands also contribute to streamflow regulation to some extent, although this is influenced by factors such as vegetation transpiration and soil characteristics. These wetlands play a crucial role in maintaining water quality and providing habitat for diverse species, making them vital components of the landscape (Kotze et al. 2009).

Hillslope seep wetlands are typically found on hillsides where water emerges from subsurface flows, creating a diffuse downslope movement. These wetlands are primarily fed by groundwater discharges, although surface water contributions can also supplement flows. Hillslope seeps are particularly effective in water quality enhancement, notably in the removal of excess nutrients and pollutants such as nitrates, through processes like denitrification. This is facilitated by the wetland's vegetation, which provides organic carbon necessary for microbial processes that assimilate these nutrients. The vegetation also plays a critical role in stabilizing the soil, thereby reducing erosion risks, although the generally steep slopes of hillslope seeps can increase erosion susceptibility if vegetation cover is compromised. Additionally, these wetlands contribute to streamflow regulation by slowing down subsurface water movement, which prolongs water contribution to stream systems during low flow periods, although their flood attenuation capacity is limited once the soils are saturated (Kotze et al. 2009).

Depression wetlands are characterised by their basin-shaped areas with closed elevation contours, allowing for the accumulation of surface water. These wetlands are typically isolated from stream channels, which limits their role in streamflow regulation. However, they play a crucial role in capturing runoff, thereby reducing the volume of surface water that would otherwise contribute to downstream flooding. The inward-draining nature of depressions, combined with their generally impermeable underlying layers, means they are not significant contributors to streamflow regulation. Instead, they are more effective in nutrient cycling, particularly nitrogen, through processes such as denitrification and volatilization. The water quality in depression wetlands is influenced by local pedology, geology, and climate, which also affects their response to nutrient inputs. These wetlands can also serve as important sites for the precipitation of minerals, including phosphate minerals, due to the concentrating effects of evaporation (Kotze et al. 2009).

Floodplains are vital wetland ecosystems located in valley bottom areas with well-defined stream channels. They are characterised 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.

3.4.1.1 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. 2020). The results of the assessment are presented in Table 3-5. The average ecosystem services score of wetlands within the Target Areas range between “Moderately-Low” and “Moderately-High” (Table 3-5).

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

Moderately-Low	Moderate	Moderately-High
HGM 2	HGM 12	HGM 1

HGM 4	HGM 18	-

The assessment of ecosystem services provided by the different HGM units within the study area revealed a spectrum of functional importance. HGM Unit 2, which is classified as a depression, and HGM Unit 4, identified as a seep, both offer ecosystem services that are considered “Moderately-Low”. This suggests that while they contribute to functions such as water retention, limited flood attenuation, and providing habitat for certain species, their overall influence on the landscape is relatively restricted. In contrast, HGM Unit 12 and HGM Unit 18, both unchannelled valley-bottom wetlands, were rated as “Moderate” in their delivery of ecosystem services. These HGM units play a balanced role in supporting biodiversity, improving water quality through natural filtration, and regulating water flow across the landscape. Of particular note is HGM Unit 1, which is a channelled valley-bottom wetland. This unit demonstrated a “Moderately-High” provision of ecosystem services, highlighting its significant role in maintaining ecological connectivity, attenuating floods, supporting a diverse range of plant and animal species, and enhancing the overall resilience of the landscape to environmental changes.

3.4.2 Present Ecological Status

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 “C – Moderately Modified” and “D – Largely Modified” PES classes. The results of the wetland health and integrity assessment is provided in the table below.

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

C – Moderately Modified	D – Largely Modified
HGM 1	HGM 2
HGM 4	HGM 18
HGM 12	-

Impacts to the wetlands include:

- Loss of wetland vegetation from historical land clearance for agricultural activities;
- Altered overland flow from catchment modification and abstraction from valley-bottom systems;
- Erosion and sedimentation of watercourses from poor stormwater and runoff management from roads and agricultural fields;
- Water quality impairments from polluted runoff entering the watercourses from residential and agricultural land use activities within the catchment;
- Proliferation of alien and weedy annuals within the wetlands from physical disturbances as well as from altered hydrological regimes;
- Altered geomorphological structure of the watercourse from infilling and excavations within the watercourses; and
- Reduced integrity of the system and subsequent decline in the provisioning of ecological benefits.

3.4.3 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 wetlands range between the "Moderate" and "High" EIS class as noted in the table below.

Table 3-7 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	Ecosystem Protection Level			
HGM 1	Dry Highveld Grassland Group 3	Vulnerable	Poorly Protected	C (Field Visit)	Least Threatened	Not Protected	N	Y (CBA)	B - High
HGM 2				D (Field Visit)	Least Threatened			N	C - Moderate
HGM 4				C (Field Visit)	Endangered			N (ONA)	C - Moderate
HGM 12				C (Field Visit)	Least Threatened			Y (CBA)	B - High
HGM 18				D (Field Visit)	Least Threatened			Y (ESA)	B - High

3.4.4 Recommended Ecological Category and 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 valley-bottoms is to improve on the current PES, whereas the objective for depression and seep is aimed at maintaining the current PES.

However, it should be noted that any REC above a Category C is deemed insufficient according to the DWS. Therefore, the overarching objective for even the most modified wetlands should be to improve on the current condition and develop in a manner that does not lead to continued degradation of the affected system.

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

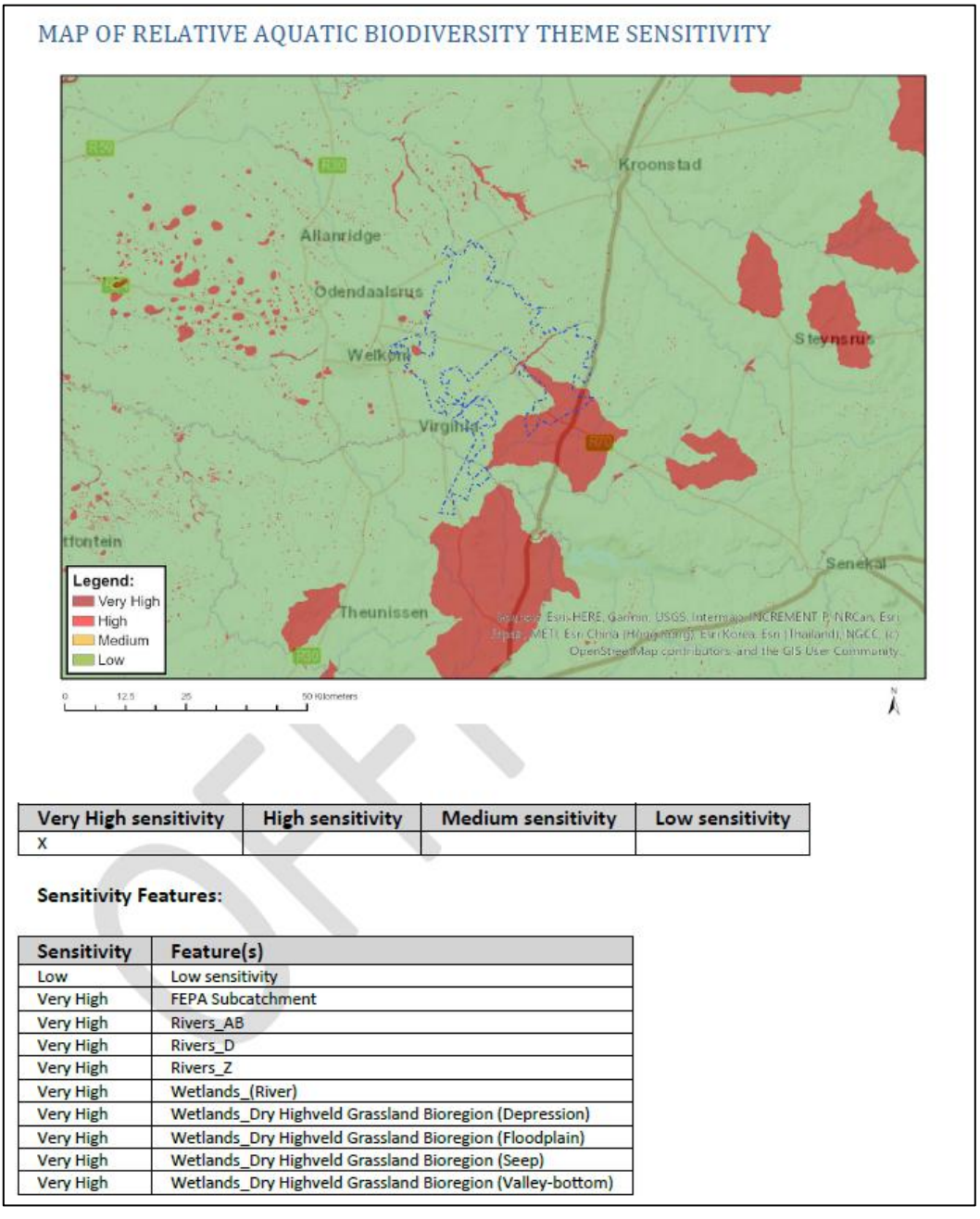
HGM Unit	REC	RMO
HGM 1	B/C	Improve
HGM 2	D	Maintain
HGM 4	C	Maintain
HGM 12	B/C	Improve
HGM 18	C/D	Improve

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):

- The National Web-based Environmental Screening Tool has characterised the Aquatic Biodiversity Theme sensitivity as “Low” for majority of the PAOI (Figure 3-18); and
- The National Web-based Environmental Screening Tool has characterised the Aquatic Biodiversity Theme sensitivity as “Very High” for some areas within the PAOI, assigned for the presence of wetlands, rivers and FEPA sub-catchments (Figure 3-18).



Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
X			

Sensitivity Features:

Sensitivity	Feature(s)
Low	Low sensitivity
Very High	FEPA Subcatchment
Very High	Rivers_AB
Very High	Rivers_D
Very High	Rivers_Z
Very High	Wetlands_(River)
Very High	Wetlands_Dry Highveld Grassland Bioregion (Depression)
Very High	Wetlands_Dry Highveld Grassland Bioregion (Floodplain)
Very High	Wetlands_Dry Highveld Grassland Bioregion (Seep)
Very High	Wetlands_Dry Highveld Grassland Bioregion (Valley-bottom)

Figure 3-18 The Aquatic Biodiversity Theme Sensitivity for the proposed project (National Environmental Web-based Screening Tool (DEA, 2026)

3.5.2 Screening Tool Comparison

The allocated sensitivities for each of the relevant themes are either disputed or validated for the assessed areas in Table 3-9 below. A summative explanation for each result is provided as relevant. 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 for the natural and assessed wetlands have considered the ecological characteristics of the delineated features. As previously indicated sensitivities were provided for the 500 m Buffer of the Seismic Transects from a desktop perspective, with only the sensitivities within the Target Areas being field verified. Maps highlighting the Freshwater Sensitivity are provided in Figure 3-19 to Figure 3-22.

Table 3-9 Summary of the screening tool vs specialist assigned sensitivities

Features	Screening Tool Theme	Environmental Screening Tool Sensitivity	Specialist Sensitivity	Tool Validated or Disputed by Specialist - Reasoning
Wetlands & Instream Dams	Aquatic Biodiversity Theme	**Very High**	**Very High**	Validated. These are larger intact valley-bottom systems with good landscape connectivity and that support high levels of ecological benefit.
		Low		Disputed. These are larger intact valley-bottom systems with good landscape connectivity and that support high levels of ecological benefit.
		Very High	**High**	Disputed. These wetlands are important for maintaining ecological processes and supporting biodiversity but have experienced some degree of modification resulting in some change of ecological process and benefit provision.
		Low		
		Very High	**Medium**	Disputed. These wetlands are the smaller systems with reduced connectivity and have reduced ecological function and service provision resulting from modification.
		Low		
15 m Buffer		**Low**	**Medium**	Validated. Buffers play a role in protecting adjacent wetlands from edge effects and supporting ecological connectivity and their sensitivity is therefore determined by the features they encompass.
		Very High		Disputed. Buffers play a role in protecting adjacent wetlands from edge effects and supporting ecological connectivity and their sensitivity is therefore determined by the features they encompass.
Non-perennial Drainage		**Low**	**Low**	Validated. These features provide limited habitat and are minor hydrological sources to the downstream wetlands they have connectivity with.

Artificial Wet Areas Off-Channel Dams Artificial Drainage Features		**Low**	**Low**	Validated. These features are man-made and typically lack the biodiversity, habitat complexity, and ecological functionality associated with natural wetland systems.
Remaining Area		**Low**	**Low**	Validated. No natural wetland of freshwater ecosystem identified within this area.
		Very High		Disputed. No natural wetland of freshwater ecosystem identified within this area.

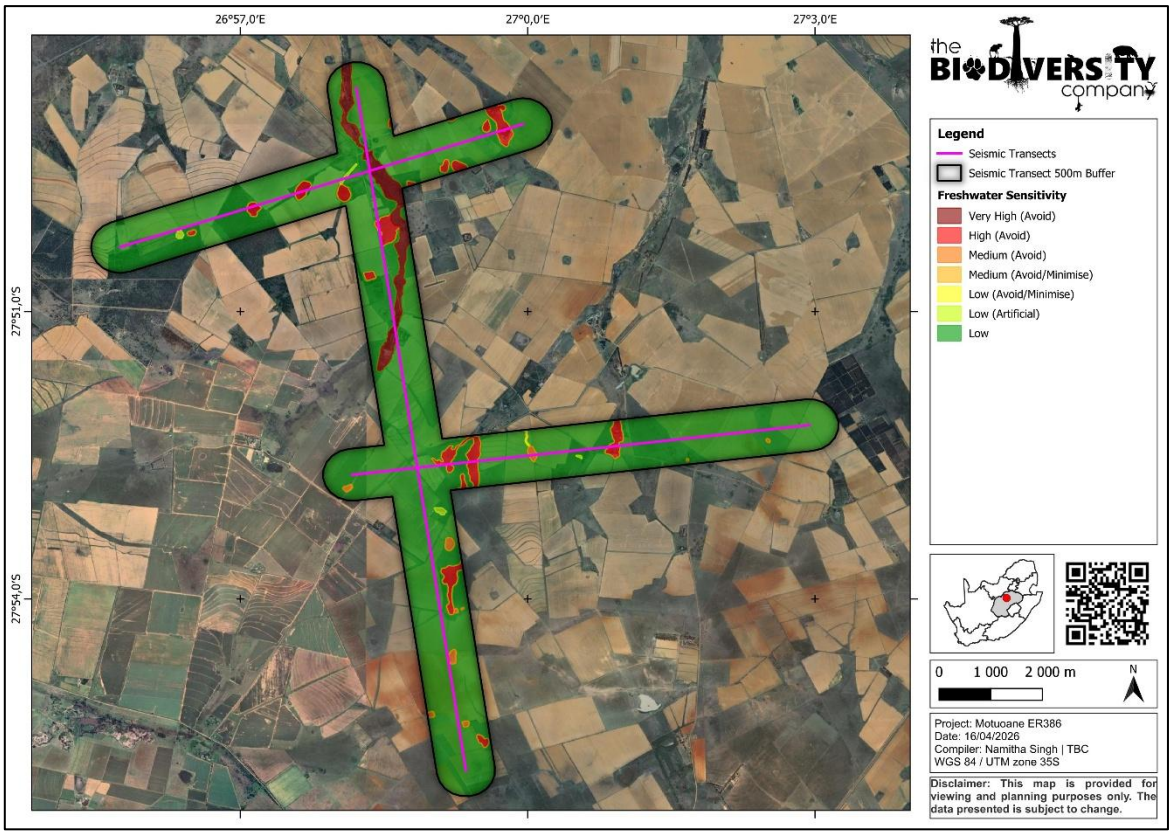


Figure 3-19 Desktop Aquatic Sensitivity for the 500 m Buffer of the Seismic Transects (Northern Cluster)

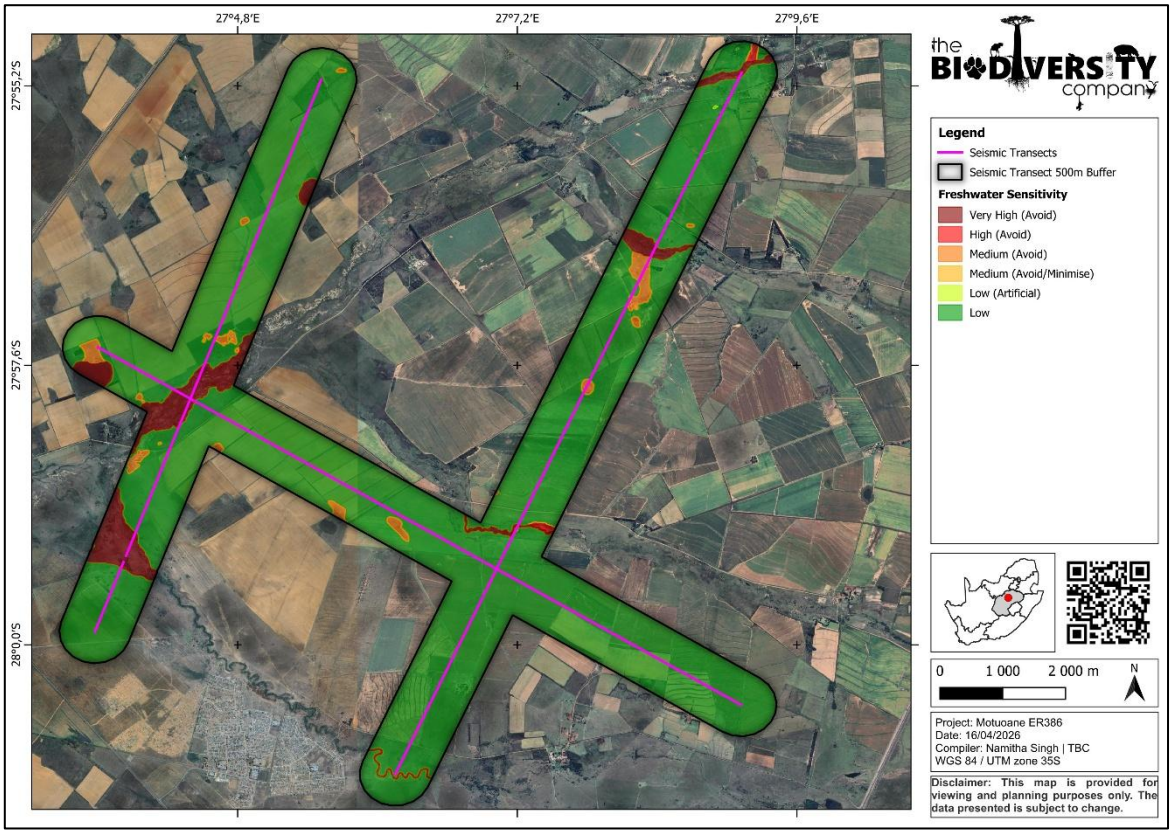


Figure 3-20 Desktop Aquatic Sensitivity for the 500 m Buffer of the Seismic Transects (Eastern Cluster)

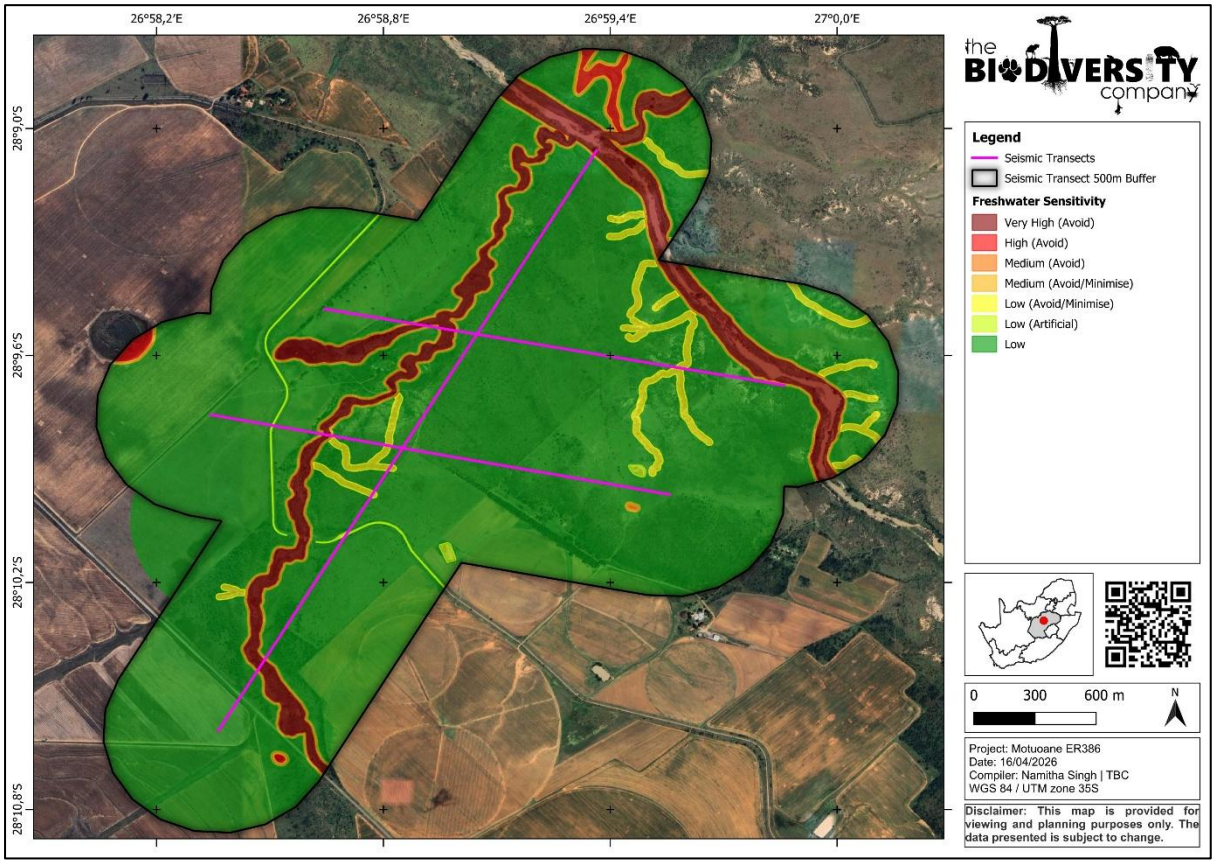


Figure 3-21 Desktop Aquatic Sensitivity for the 500 m Buffer of the Seismic Transects (Southern Cluster)

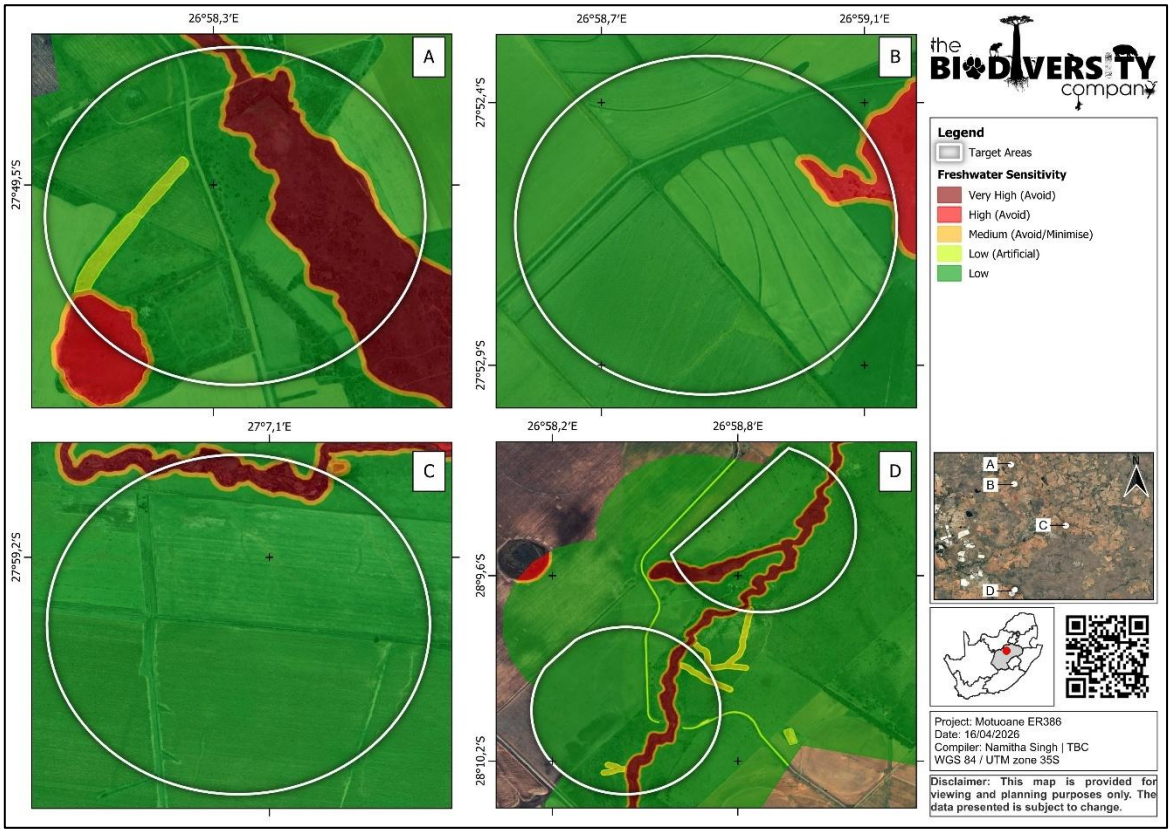


Figure 3-22 Field verified Aquatic Sensitivity for the Target Areas

4 Regulation Zones

Table 4-1 and Figure 4-1presents the legislated zones of regulation that would be applicable to the wetland 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.

Listed activities in terms of the NEMA (1998), (Act 107 of 1998) EIA Regulations as amended in April 2017 must be taken into consideration if any infrastructure is to be placed within the applicable zone of regulation, which in this case is 32 m from a watercourse.

Table 4-1 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.

Environmental Authorisation in terms of the Listed activities of the National Environmental Management Act, 1998 (Act No. 107 of 1998). EIA Regulations (2014), as amended.	Activity 12 of Listing Notice 1 (GN 327) of the National Environmental Management Act, 1998 (Act No.107 of 1998) EIA regulations, 2014 (as amended) states that: The development of: (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. Excluding: (dd) where such development occurs within an urban area… (ee) where such development occurs within existing roads or road reserves. Activity 19 of Listing Notice 1 (GN 327) of the National Environmental Management Act, 1998 (Act No. 107 of 1998) 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." Activity 14 of Listing Notice 3 (GN 327) of the National Environmental Management Act, 1998 (Act No. 107 of 1998) EIA regulations, 2014 (as amended) states that: The development of— (ii) infrastructure or structures with a physical footprint of 10 square metres or more; where such development occurs— (a) within a watercourse; or (c) if no development setback has been adopted, within 32 metres of a watercourse, measured from the edge of a watercourse.

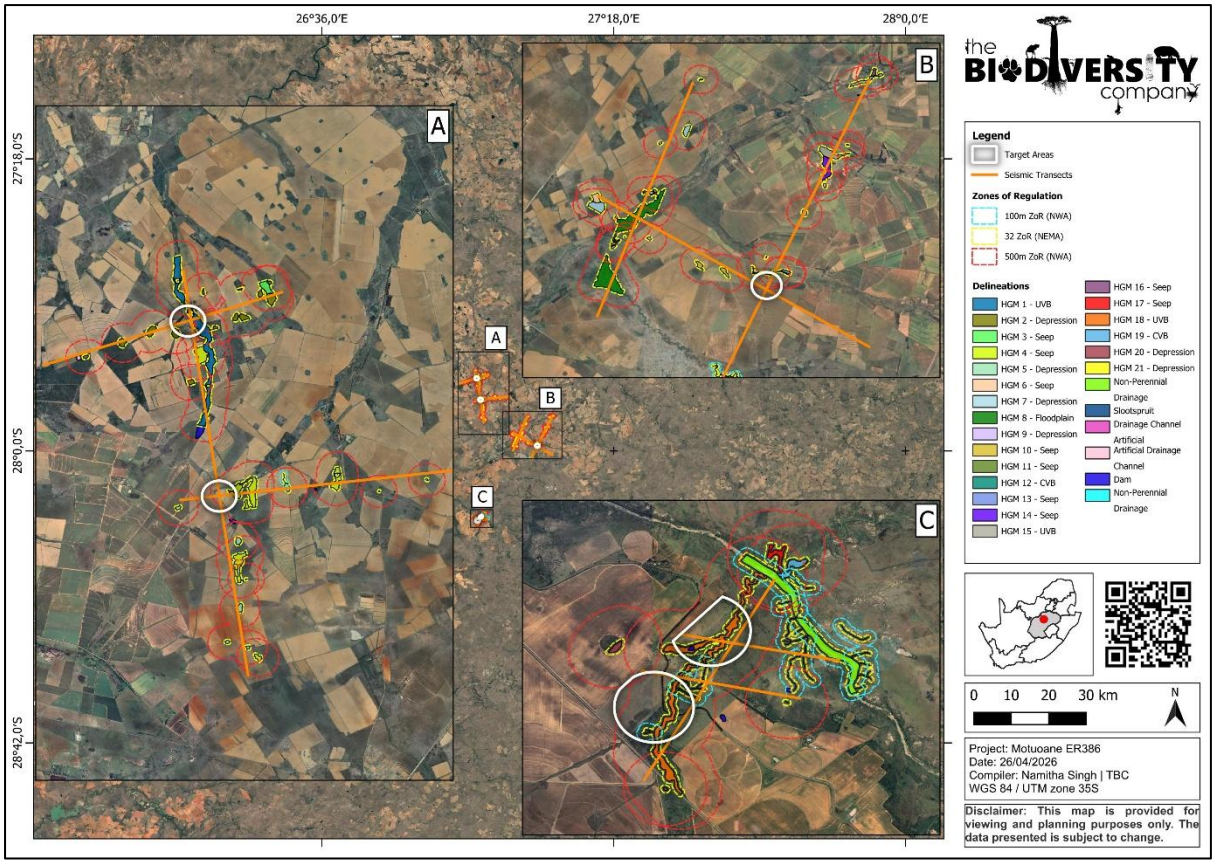


Figure 4-1 Regulated areas of the identified watercourses in relation to the proposed activities

5 Risk and Impact Assessment

The Risk / Impact Assessment considered the 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 5-1). 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.

For this assessment, the specialist was provided with the Target Areas for the proposed drilling activities and the Seismic Survey Transect. It is assumed that the proposed activities will be able to avoid the delineated wetlands, and where no avoidance is possible, the wetlands will be rehabilitated. It is therefore imperative that all the impacted wetlands are correctly rehabilitated with indigenous wetland vegetation, and an Alien Invasive Management/ Monitoring Plan be implemented. This will be sufficient to result in no net loss of wetland area. Emphasis was therefore placed on minimising impacts by means of mitigation.

The proposed Seismic Transect survey is anticipated to result in localised, predominantly temporary disturbance within the project footprint, primarily associated with vehicle movement along the planned transect lines and related field activities. The principal freshwater-related risk is that ground disturbance, particularly under wet conditions, may lead to rutting/compaction, vegetation disturbance and the development of localised erosion hotspots, with the potential for increased sediment and contaminant mobilisation toward wetlands and drainage features. Although direct impacts to wetlands are not anticipated based on an avoidance approach, inappropriate routing, wet-weather access or uncontrolled driving could result in incidental encroachment into sensitive wetland areas. The only phases assessed for the Seismic Transect survey was the Construction (Exploration Phase) and Post-Exploration (Rehab and Closure Phase) as the nature of seismic surveys is such that all significant activities and associated impacts occur during the initial data acquisition period.

The proposed exploration drilling wells are expected to cause localised and largely temporary disturbance within the designated drilling sites and immediate surroundings. The primary freshwater-related risks are associated with site clearance and earthworks required for the drilling pads, drilling operations themselves, and the movement of vehicles and equipment to and from the well locations (Construction Phase). These activities may result in soil compaction, vegetation removal, and the generation of drill cuttings and fluids, which, if not properly managed, could lead to increased sedimentation, hydrocarbon or chemical contamination, and altered surface drainage patterns.

While it is assumed that direct impacts to wetlands are to be avoided through careful site selection and adherence to buffer zones, accidental spills, improper waste handling, or inadequate containment of drilling fluids could result in the mobilisation of pollutants into adjacent wetland and drainage features. The risk of impact is heightened during wet conditions or if mitigation measures are not strictly implemented.

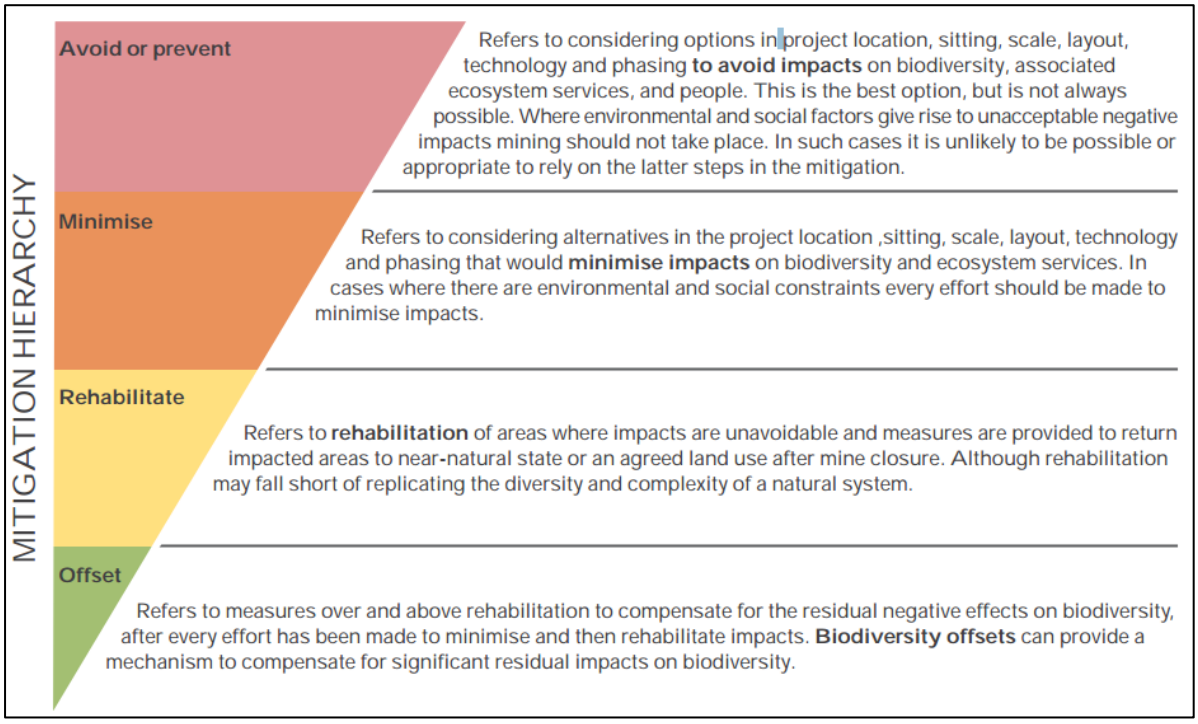


Figure 5-1 The mitigation hierarchy as described by the DEA (2013)

5.1 GN 4167 RAM

The potential impacts associated with the proposed activities was assessed through the use of the DWS GN 4167 (2023) RAM as presented in Table 5-1 and Table 5-2.

The risk assessments for the indicate that the risks from the proposed activities are generally of "Low" significance with the application of mitigation measures. The results confirm that, with proper controls, the long-term impacts on wetland and freshwater ecosystem health and functionality are minimal.

Table 5-1 Summative results of the Risk Assessment for the proposed Seismic Transects survey activities (Desktop)

Phase	Activity	Impact	Potentially affected watercourses	Significance (max = 100)	Risk Rating
			Name/s		
Construction (Exploration)	**Seismic Transect Survey (Within 500m of wetland and 100m from drainage)** Site clearing and preparation Earthworks and vehicle movement Civil works Storage and use of hazardous substances and equipment	Altered surface flows from soil compaction and creation of preferential flow paths leading to erosion and sedimentation	HGM 1 HGM 9 HGM 12 HGM 15 HGM 18 HGM 19	**25,6**	**L**
			HGM 2 HGM 3 HGM 4 HGM 5 HGM 6 HGM 7 HGM 9 HGM 10 HGM 11 HGM 13 HGM 14 HGM 16 HGM 17 HGM 20 HGM 21 Non-Perennial Drainage	**19,2**	**L**
		Disturbance to wetland vegetation and soil leading to proliferation of alien invasive plants	HGM 1 HGM 9 HGM 12 HGM 15 HGM 18 HGM 19	**19,2**	**L**
			HGM 2 HGM 3 HGM 4 HGM 5 HGM 6 HGM 7 HGM 9 HGM 10 HGM 11 HGM 13 HGM 14 HGM 16 HGM 17 HGM 20 HGM 21 Non-Perennial Drainage	**9,6**	**L**

		Impaired water quality from contaminated runoff (accidental chemical and oil spills from machinery and equipment)	HGM 1 HGM 9 HGM 12 HGM 15 HGM 18 HGM 19	**25,6**	**L**
			HGM 2 HGM 3 HGM 4 HGM 5 HGM 6 HGM 7 HGM 9 HGM 10 HGM 11 HGM 13 HGM 14 HGM 16 HGM 17 HGM 20 HGM 21 Non-Perennial Drainage	**14,4**	**L**
Rehab and Closure	**Closure and Post-Exploration of Seismic Transect Survey (Within 500m of wetland and 100m from drainage)** Removal of drill rig, support vehicles, and all associated machinery from the site Dismantling and removal of temporary infrastructure (e.g., safety barriers, signage, storage containers) Collection and removal of all waste materials (drilling fluids, cuttings, general refuse, hazardous materials) Removal of any remaining fuel, lubricants, or chemicals Rehabilitation of Drill Pad Area	Continued degradation of wetlands from improper post-exploration rehabilitation	HGM 1 HGM 9 HGM 12 HGM 15 HGM 18 HGM 19	**25,6**	**L**
			HGM 2 HGM 3 HGM 4 HGM 5 HGM 6 HGM 7 HGM 9 HGM 10 HGM 11 HGM 13 HGM 14 HGM 16 HGM 17 HGM 20 HGM 21 Non-Perennial Drainage	**19,2**	**L**
		Impaired water quality from contaminated runoff (accidental chemical and oil spills from machinery and equipment)	HGM 1 HGM 9 HGM 12 HGM 15 HGM 18 HGM 19	**25,6**	**L**

			HGM 2 HGM 3 HGM 4 HGM 5 HGM 6 HGM 7 HGM 9 HGM 10 HGM 11 HGM 13 HGM 14 HGM 16 HGM 17 HGM 20 HGM 21 Non-Perennial Drainage	**14,4**	**L**
		Improvement in wetland functionality from successful rehabilitation	HGM 1 HGM 9 HGM 12 HGM 15 HGM 18 HGM 19	**-25,6**	**+**
			HGM 2 HGM 3 HGM 4 HGM 5 HGM 6 HGM 7 HGM 9 HGM 10 HGM 11 HGM 13 HGM 14 HGM 16 HGM 17 HGM 20 HGM 21 Non-Perennial Drainage	**-19,2**	**+**

Table 5-2 Summative results of the Risk Assessment for the Target Areas associated with the proposed drilling activities

Phase	Activity	Impact	Potentially affected watercourses Name/s	Significance (max = 100)	Risk Rating
Construction	**Construction of Drill Pad (Within 500m of wetland and 100m of Drainage)** Site clearing and preparation Earthworks and vehicle movement Civil works	Increased runoff, erosion and sedimentation from exposed areas	HGM 1 HGM 12 HGM 18	**28**	**L**
			HGM 2 HGM 4 Non-Perennial Drainage	**19,2**	**L**

	Storage and use of hazardous substances and equipment	Edge effects associated with proliferation of alien species from vegetation clearance	HGM 1 HGM 12 HGM 18	**16,8**	L
			HGM 2 HGM 4 Non-Perennial Drainage	**9,6**	L
		Impaired water quality from contaminated runoff (accidental chemical and oil spills from machinery and equipment)	HGM 1 HGM 12 HGM 18	**22,4**	L
			HGM 2 HGM 4 Non-Perennial Drainage	**14,4**	L
Operation	**Operation of Drilling Rig (Within 500m of wetland and 100m of Drainage)** Drilling operations Temporary handling and storage of materials and waste Sample collection and management Management of drilling fluids and cores/chips/cuttings Maintenance of drill rig and support vehicles	Increased runoff, erosion and sedimentation from exposed areas	HGM 1 HGM 12 HGM 18	**28**	L
			HGM 2 HGM 4 Non-Perennial Drainage	**24**	L
		Water quality impairment from contaminated runoff (spills/leaks and waste management)	HGM 1 HGM 12 HGM 18	**28,8**	L
			HGM 2 HGM 4 Non-Perennial Drainage	**18**	L
		Edge effects from continued proliferation of alien invasive vegetation	HGM 1 HGM 12 HGM 18	**21,6**	L
			HGM 2 HGM 4 Non-Perennial Drainage	**12**	L
Decommissioning	**Decommissioning of Drill Pad (Within 500m of wetland and 100m of Drainage)** Removal of drill rig, support vehicles, and all associated machinery from the site Dismantling and removal of temporary infrastructure (e.g., safety barriers, signage, storage containers) Collection and removal of all waste materials (drilling fluids, cuttings, general refuse, hazardous materials) Removal of any remaining fuel, lubricants, or chemicals Rehabilitation of Drill Pad Area	Increased runoff, erosion and sedimentation from exposed areas	HGM 1 HGM 12 HGM 18	**28**	L
			HGM 2 HGM 4	**19,2**	L
		Edge effects associated with proliferation of alien species from vegetation clearance	HGM 1 HGM 12 HGM 18	**16,8**	L
			HGM 2 HGM 4	**9,6**	L
		Impaired water quality from contaminated runoff (accidental chemical and oil spills from machinery and equipment)	HGM 1 HGM 12 HGM 18	**22,4**	L
			HGM 2 HGM 4	**14,4**	L
		Reduced sediment and pollutant runoff and increased habitat quality	HGM 1 HGM 12 HGM 18	**-25,6**	+

			HGM 2 HGM 4	**-21,6**	**+**

5.2 Impact Assessment

The impacts associated with the proposed activities, was assessed in the impact matrix provided by EIMS and the results are given in Table 5-4 for the activities relating to the Seismic Transects and Table 5-5 for the activities relating to the Target Areas for the drilling wells.

The impact assessments indicate that the risks from the proposed activities are generally of "Medium to Low" significance prior to mitigation. With the application of mitigation measures, all impacts are reduced to "Low" significance, indicating effective management. The results confirm that, with proper controls, the long-term impacts on wetland and freshwater ecosystem health and functionality are minimal.

The mitigation measures listed below are drawn from the EMPr (EIMS, 2024) and must be implemented in conjunction with those provided in the impact tables below. The impact tables offer additional detail and context, ensuring that all relevant risks are addressed comprehensively. Implementing both sets of measures together will provide a robust framework for effective environmental management and impact mitigation.

Table 5-3 Mitigations measures extracted from the approved EMPr (EIMS, 2024)

Category	Mitigation Measure
Site Clearance, Planning, and Construction	**No-go Areas and Buffers** - No seismic or drilling activities within wetlands/watercourses (32 m pre-mitigation, 15 m post-mitigation buffer) - High sensitivity areas outside direct footprint = 'no-go' zones
	Minimizing Disturbance - Minimise removal of vegetation - Limit vehicle access - No disturbance to areas/soils outside direct footprint
	Stormwater and Erosion Control - Implement stormwater management and erosion control (e.g., cut-off drains, berms) during rehabilitation - Ensure proper and adequate drainage
Drilling and Operation	**Surface Water Protection** - Avoid construction/drilling during rainy days; if unavoidable, implement extra precautions - Excavations open for shortest period; use above-ground sumps with secondary containment - Maintain vehicles to minimize oil spills; use spill trays for on-site refueling - Construct cut-off trenches/berms around drill pads - Use liners and drip trays where hydrocarbons are handled
	Water Quality Monitoring - Submit pre- and post-drilling water quality monitoring results to DWS - Implement groundwater monitoring program in nearby private boreholes; obtain baseline groundwater/surface water quality data before drilling
	Well Construction Standards - Install casings and cement seals in exploration wells to protect groundwater quality

Decommissioning and Rehabilitation	**Rehabilitation Objectives** - Restore environment as close as possible to pre-exploration conditions, including stormwater management and erosion control - Restore natural drainage patterns - Ensure all waterways/stormwater flow areas are open and unobstructed during/after rehabilitation
	Well Plugging - Properly seal drilling sites to prevent gas escape and crossflow into aquifers; use cement plugs to isolate hydrocarbon/water-bearing formations
Waste and Spill Management	**Hazardous Substances** - Handle, store, and dispose of hazardous substances safely to prevent environmental pollution - Place equipment that may leak on watertight drip trays
	Spill Response - Take immediate action to contain spills, prevent further spread, and dispose of contaminated materials appropriately
Monitoring Requirements	**Surface Water Monitoring** - Monthly monitoring of water containment facilities, boreholes, streams, and drainage lines - Bi-annual monitoring of perennial streams near drill sites - Monthly water samples upstream and downstream of drilling areas in wetlands - Monitor drinking water for faecal coliforms monthly - Monitor pH, conductivity, TDS, major ions, hydrocarbons monthly; metals bi-annually - Follow SABS ISO 5667 sampling standards
	Rehabilitation Monitoring - Monitor erosion, sedimentation, surface drainage, water quality, re-vegetation, and invasive species control
	Post-Closure Monitoring - Continue water quality monitoring at abandoned well sites, with annual reports for at least three years post-decommissioning

Table 5-4 Summative results of the Impact Assessment conducted for the proposed activities in relation to the Seismic Transects (Desktop)

ID: WetA1	Phase	Pre-Mitigation Significance	Post-Mitigation Significance	Final Significance
Impact: Altered surface flows from soil compaction and creation of preferential flow paths leading to erosion and sedimentation	**Construction**	**Medium to Low**	**Low**	**Low**
Mitigation Measures				
• Avoid delineated wetlands and their 15 m post-mitigation buffer. • Pre-survey and mark transects to follow natural contours and avoid low-lying, saturated, or visibly sensitive areas. • Use existing paths or disturbed areas where possible to minimize new disturbance. • Lay down geotextile mats or timber bog mats on soft ground to spread vehicle weight and prevent rutting. • Limit the width of access path transects to the minimum required for equipment passage. • Backfill and re-profile any ruts or depressions created during passage at the end of each workday. • Lightly scarify compacted soil to restore micro-topography and infiltration capacity.				
ID: WetA2 **Impact: Soil compaction leading to increased risk of erosion and sedimentation**	**Construction**	**Medium to Low**	**Low**	**Low**
Mitigation Measures				
• Avoid delineated wetlands and their 15 m post-mitigation buffer. • Restrict vehicle access to only those essential for seismic work; use vehicles with wide, low-pressure tires. • Prohibit vehicle movement during or immediately after heavy rainfall to avoid excessive compaction. • Place temporary ground protection (e.g., plywood sheets, bog mats) in areas where repeated crossings are unavoidable. • Cover exposed soil with mulch or brush immediately after disturbance to reduce erosion risk.				
ID: WetA3 **Impact: Disturbance to wetland vegetation and soil leading to proliferation of alien invasive plants**	**Construction**	**Medium to Low**	**Low**	**Low**
Mitigation Measures				
• Avoid delineated wetlands and their 15 m post-mitigation buffer. • Cut vegetation at ground level rather than uprooting; avoid disturbing root systems. • Stockpile removed vegetation for use in site rehabilitation. • Re-cover disturbed soil with native vegetation or mulch. • Re-seed or plant with locally sourced indigenous wetland species where natural recovery is slow. • Implement an alien invasive management plan that prioritises wetland areas.				
ID: WetA4 **Impact: Impaired water quality from hydrocarbon spills and leaks and associated contaminated runoff**	**Construction**	**Medium to Low**	**Low**	**Low**
Mitigation Measures				
• Designate refuelling and maintenance areas at least 50 m from any wetland or watercourse.				

• Use secondary containment (e.g., portable bunds) for all fuel and oil storage. • Fit all vehicles and equipment with drip trays when parked or stationary. • Carry spill kits (absorbent pads, booms, disposal bags) on all vehicles and train staff in their use. • Develop a site-specific spill response plan and conduct drills before starting work. • Immediately report and remediate any spills, removing contaminated soil and disposing of it at a licensed facility.				
ID: WetA5 **Impact: Impaired water quality from hydrocarbon spills and leaks and associated contaminated runoff from rehabilitation activities**	**Rehab and Closure**	**Medium to Low**	**Low**	**Low**
Mitigation Measures				
• Designate refuelling and maintenance areas at least 50 m from any wetland or watercourse. • Use secondary containment (e.g., portable bunds) for all fuel and oil storage. • Fit all vehicles and equipment with drip trays when parked or stationary. • Carry spill kits (absorbent pads, booms, disposal bags) on all vehicles and train staff in their use. • Develop a site-specific spill response plan and conduct drills before starting work. • Immediately report and remediate any spills, removing contaminated soil and disposing of it at a licensed facility.				
ID: WetA6 **Impact: Continued degradation of wetlands from improper post-exploration rehabilitation**	**Rehab and Closure**	**Medium to Low**	**Low**	**Low**
Mitigation Measures				
• Remove all temporary materials, waste, and equipment from the wetland and buffer zone. • Lightly loosen compacted soils and re-profile to match surrounding micro-topography. • Replace stockpiled topsoil and vegetation, or use brush packing to stabilise bare areas. • Inspect rehabilitated areas quarterly for at least one year; re-treat areas where erosion, compaction, or invasive species are observed.				
ID: WetA7 **Impact: Improvement in wetland functionality from successful rehabilitation**	**Rehab and Closure**	**Low+**	**Low to Medium +**	**Medium to low +**
Mitigation Measures				
• Conduct wetland rehabilitation in accordance with the approved rehabilitation plan. • Monitor vegetation cover, soil stability, and water quality and adjust rehabilitation methods based on monitoring results (adaptive management).				

Table 5-5 Summative results of the Impact Assessment conducted for the proposed activities in relation to Target Areas for the drilling wells

ID: WetB1	Phase	Pre-Mitigation Significance	Post-Mitigation Significance	Final Significance
Impact: Altered surface flows from soil compaction and creation of preferential flow paths leading to erosion and sedimentation	**Construction**	**Medium to Low**	**Low**	**Low**
Mitigation Measures				
• Avoid delineated wetlands and their 15 m post-mitigation buffer. • Site pads and access routes on higher, less saturated ground to minimize flow disruption. • Install temporary drainage controls (e.g., berms, silt socks, or biodegradable check dams) around pads to direct runoff in a manner that does not contribute to erosion or sedimentation. • Use geotextile mats or timber bog mats under heavy equipment to distribute weight and reduce compaction. • Restore natural surface contours and micro-topography by backfilling and light scarification.				
ID: WetB2 **Impact: Soil compaction leading to increased risk of erosion and sedimentation**	**Construction**	**Medium to Low**	**Low**	**Low**
Mitigation Measures				
• Restrict heavy vehicle and equipment movement to designated access routes and pad areas only. • Use low ground pressure vehicles or track mats to minimise compaction. • Prohibit vehicle movement during or immediately after heavy rainfall. • Cover exposed soil with mulch, brush, or erosion control blankets immediately after disturbance. • Install silt fences or sediment barriers downslope of pads and access routes to intercept eroded material.				
ID: WetB3 **Impact: Disturbance to wetland vegetation and soil leading to proliferation of alien invasive plants**	**Construction**	**Medium to Low**	**Low**	**Low**
Mitigation Measures				
• Minimise vegetation clearing to the smallest area necessary for drilling pads and access. • Cut vegetation at ground level rather than uprooting; avoid disturbing root systems. • Stockpile removed vegetation and topsoil separately for use in site rehabilitation. • Clean all vehicles and equipment before entering the wetland to prevent introduction of invasive species. • Implement an alien invasive management plan, including regular post-activity inspections and rapid removal of invasives.				
ID: WetB4 **Impact: Impaired water quality from hydrocarbon spills and leaks and associated contaminated runoff**	**Construction**	**Medium to Low**	**Low**	**Low**
Mitigation Measures				
• Designate refuelling and maintenance areas at least 50 m from wetlands and watercourses. • Store all fuels, oils, and chemicals in secondary containment (e.g., bunded areas) away from the wetland. • Fit all stationary equipment with drip trays and inspect regularly for leaks. • Keep spill kits (absorbent pads, booms, disposal bags) at all drilling pads and train staff in their use.				

• Develop and implement a site-specific spill response plan; immediately remediate any spills and remove contaminated soil for proper disposal.				
ID: WetB5 **Impact: Altered surface flows from soil compaction and creation of preferential flow paths leading to erosion and sedimentation**	**Construction (unplanned)**	**Medium to Low**	**Low**	**Low**
Mitigation Measures				
• Immediately halt work in the event of unplanned disturbance and assess the extent of impact. • Install temporary berms or silt socks to prevent further runoff and sediment transport. • Backfill and re-profile any ruts or depressions as soon as possible. • Restore surface contours and apply mulch or brush to stabilise soil. • Monitor the area for signs of altered flow or erosion and implement additional controls if needed.				
ID: WetB6 **Impact: Soil compaction leading to increased risk of erosion and sedimentation**	**Construction (unplanned)**	**Medium to Low**	**Low**	**Low**
Mitigation Measures				
• Restrict further access to the affected area until soils have dried and stabilised. • Loosen compacted soils using hand tools or light machinery, taking care not to further disturb wetland vegetation. • Install temporary sediment barriers downslope of the affected area. • Cover bare soil with mulch or brush to reduce erosion risk. • Monitor for ongoing erosion and re-treat as necessary.				
ID: WetB7 **Impact: Disturbance to wetland vegetation and soil leading to proliferation of alien invasive plants**	**Construction (unplanned)**	**Medium to Low**	**Low**	**Low**
Mitigation Measures				
• Immediately remove and properly dispose of any invasive plant material found in the disturbed area. • Re-cover disturbed soil with stockpiled native vegetation or mulch. • Re-seed or plant with locally sourced indigenous wetland species if natural recovery is slow. • Increase frequency of post-activity invasive species inspections in the affected area. • Update the invasive management plan to address new risk areas.				
ID: WetB8	**Phase**	**Pre-Mitigation Significance**	**Post-Mitigation Significance**	**Final Significance**
Impact: Impaired water quality from hydrocarbon spills and leaks and associated contaminated runoff	**Construction (unplanned)**	**Medium to Low**	**Low**	**Low**
Mitigation Measures				
• Stop all work and contain the spill using absorbent materials and booms. • Remove contaminated soil and dispose of it at a licensed facility. • Notify relevant authorities as required. • Review and reinforce spill prevention and response training for all staff. • Inspect and repair equipment before resuming work.				

ID: WetB9 **Impact: Impaired water quality from hydrocarbon spills and leaks and associated contaminated runoff**	**Rehab and Closure**	**Medium to Low**	**Low**	**Low**
Mitigation Measures				
• Remove all fuels, oils, and chemicals from the site before starting rehabilitation. • Inspect the site for any signs of contamination and remediate as necessary. • Use only clean, non-contaminated fill and materials for rehabilitation. • Monitor water quality in adjacent wetlands during and after rehabilitation activities. • Maintain spill kits on site until all rehabilitation is complete.				
ID: WetB10 **Continued degradation of wetlands from improper post-exploration rehabilitation**	**Rehab and Closure**	**Medium to Low**	**Low**	**Low**
Mitigation Measures				
• Remove all temporary infrastructure, waste, and debris from the wetland and buffer zone. • Lightly loosen compacted soils and re-profile to match surrounding micro-topography. • Replace stockpiled topsoil and vegetation, or use brush packing to stabilize bare areas. • Inspect rehabilitated areas quarterly for at least one year; re-treat areas where erosion, compaction, or invasive species are observed. • Engage wetland specialists or ECO to review rehabilitation success and recommend improvements.				
ID: WetB11 **Improvement in wetland functionality from successful rehabilitation**	**Rehab and Closure**	**Low+**	**Low to Medium +**	**Medium to low +**
Mitigation Measures				
• Conduct rehabilitation in accordance with the approved wetland rehabilitation plan. • Monitor vegetation cover, soil stability, and water quality and adjust rehabilitation methods based on monitoring results (adaptive management).				

5.3 Impact Management Outcomes

The following tables set out the proposed mitigation and impact management measures for the wetland features associated with the Seismic Transects and Target Areas for the drilling wells, including responsibilities, monitoring requirements and performance indicators.

The mitigation approach prioritises avoiding traversing all delineated wetlands and buffers, where, feasible and, where crossings cannot be avoided, using designated, pre-approved existing crossing points only to traverse the watercourse areas.

Table 5-6 Impact Management Measures and Outcomes

Main Activity	ID	Mitigation / Management Measure	Phase	Responsible Party for Implementation	Monitoring (Frequency)	Monitoring Responsibility	Target (Outcome)	Performance Indicators (Monitoring Tool)
Seismic Transect Survey	WetA1	As indicated in Table 5-4 and Table 5-5	Construction	Contractor (Site Supervisor)	Daily during works	ECO/Environmental Officer (Weekly)	No new erosion or sedimentation in wetlands	Site inspection reports, photographic records
	WetA2		Construction	Contractor (Site Supervisor)	Daily during works	ECO/Environmental Officer (Weekly)	No visible soil compaction or erosion	Site inspection reports, photographic records
	WetA3		Construction	Contractor (Site Supervisor)	Ongoing during works	ECO/Environmental Officer (Monthly)	No increase in invasive species; native vegetation recovery	Vegetation surveys, invasive species logs
	WetA4		Construction	Contractor (Site Supervisor)	Ongoing during works	ECO/Environmental Officer (Weekly)	No hydrocarbon spills in wetlands	Spill incident logs, water quality tests
	WetA5		Rehab & Closure	Contractor (Site Supervisor)	During rehabilitation	ECO/Environmental Officer (Weekly)	No hydrocarbon contamination during rehab	Spill logs, water quality monitoring
	WetA6		Rehab & Closure	Contractor (Site Supervisor)	Bi-annually	ECO/Environmental Officer (Quarterly)	Full wetland recovery, no ongoing degradation	Rehabilitation inspection reports
	WetA7		Rehab & Closure	Contractor (Site Supervisor)	Bi-annually	Wetland Specialist (Quarterly)	Improved wetland functionality	Vegetation cover, soil stability, water quality data
Drilling Wells	WetB1		Construction	Contractor (Site Supervisor)	Daily during works	ECO/Environmental Officer (Weekly)	No new erosion or sedimentation	Site inspection reports
	WetB2		Construction	Contractor (Site Supervisor)	Daily during works	ECO/Environmental Officer (Weekly)	No soil compaction or erosion	Inspection checklists, erosion monitoring
	WetB3		Construction	Contractor (Site Supervisor)	Ongoing during works	ECO/Environmental Officer (Monthly)	No increase in invasive species	Vegetation/invasive species surveys

	WetB4		Construction	Contractor (Site Supervisor)	Ongoing during works	ECO/Environmental Officer (Weekly)	No hydrocarbon spills	Spill logs, water quality tests
	WetB5		Construction (Unplanned)	Contractor (Site Supervisor)	As needed	ECO/Environmental Officer (After incident)	No further erosion or sedimentation	Incident reports, site inspections
	WetB6		Construction (Unplanned)	Contractor (Site Supervisor)	As needed	ECO/Environmental Officer (After incident)	No ongoing compaction or erosion	Inspection reports
	WetB7		Construction (Unplanned)	Contractor (Site Supervisor)	As needed	ECO/Environmental Officer (After incident)	No invasive species proliferation	Invasive species logs, inspection reports
	WetB8		Construction (Unplanned)	Contractor (Site Supervisor)	As needed	ECO/Environmental Officer (After incident)	No hydrocarbon contamination	Spill logs, water quality tests
	WetB9		Rehab & Closure	Contractor (Site Supervisor)	During rehabilitation	ECO/Environmental Officer (Weekly)	No hydrocarbon contamination during rehab	Water quality monitoring, inspection reports
	WetB10		Rehab & Closure	Contractor (Site Supervisor)	Bi-annually	Wetland Specialist (Quarterly)	Full wetland recovery	Rehabilitation inspection reports
	WetB11		Rehab & Closure	Contractor (Site Supervisor)	Bi-annually	Wetland Specialist (Quarterly)	Improved wetland functionality	Vegetation cover, soil stability, water quality data

6 Conclusion

Twenty-one HGM units were identified and delineated within the 500 m Buffer of the Seismic Transects. These features were classified as channelled valley-bottoms, unchannelled valley-bottoms, seeps, depressions and floodplain systems. In addition, two main riparian systems and several non-perennial drainage features and dams (instream and off-channel) were identified. Furthermore, several artificial wet areas were delineated, which have resulted from stormwater management and land-use practices (agriculture).

Five of the identified HGM units were delineated within the Target Areas, these consist of two unchannelled valley-bottoms, a depression, a seep, and a channelled valley-bottom. In addition, non-perennial drainages, artificial drainage channels, and dams were identified within the Target Areas.

The buffer requirements for the wetlands were calculated to be 15 m.

6.1 Impact Statement

The overall post-mitigation residual risk of the proposed development was calculated to be “Low” and is deemed acceptable given that the mitigation measures are adhered to. Furthermore, the cumulative impacts based on avoidance on the wetlands and their prescribed buffers is considered to be “Low” with no irreplaceable loss of freshwater ecosystems expected.

6.2 Specialist Opinion

Considering the assessment findings, no fatal flaws are evident for the proposed project. It is the opinion of the specialists that the project can be considered for authorisation by the Competent Authority, subject to implementation of the provided mitigations. Any directly affected watercourse must be rehabilitated post-construction.

7 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.

Environmental Impact Management Services. 2024. Amended Environmental Management Programme (EMPr). The Proposed Exploration of Hydrocarbons and Associated Gas on Various Farms Near the Town of Hennenman, Within Fezile Dabi District and Lejweleputswa District Municipalities, Free State Province. EA Reference Number: 12/3/315

Kotze, D.C., Macfarlane, D.M., Edwards, R.J. & Madikizela, B. (2020) WET-EcoServices Version 2: A technique for rapidly assessing ecosystem services supplied by wetlands and riparian areas. Water Research Commission, Pretoria.

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.

Mbona, N., Job, N., Smith, J., Nel, J., Holness, S., Memani, S. and Dini, J. 2015. Supporting Better Decision-making Around Coal Mining in the Mpumalanga Highveld Through the Development of Mapping Tools and Refinement of Spatial Data on Wetlands: Report to the Water Research Commission. Pretoria: Water Research Commission.

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 JL, Murray KM, Maherry AM, Petersen CP, Roux DJ, Driver A, Hill L, Van Deventer H, Funke N, Swartz ER, Smith-Adao LB, Mbona N, Downsborough L and Nienaber S. 2011. Technical Report for the National Freshwater Ecosystem Priority Areas project. WRC Report No. K5/1801.

Ollis DJ, Snaddon CD, Job NM, 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. & 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.

8 Appendix Items

8.1 Appendix A – Methodology

8.1.1 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).

8.1.1.1 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.

8.1.1.2 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.

8.1.1.3 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.

8.1.1.4 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); and
- Strategic Water Source Areas, 2021 (Lötter & Le Maitre, 2021).

8.1.1.4.1 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.

8.1.1.4.2 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).

8.1.2 Wetland Field Survey

8.1.2.1 Identification and Mapping

The wetland areas were delineated in accordance with the DWAF (2005) guidelines, a cross section is presented in Figure 8-1. 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.

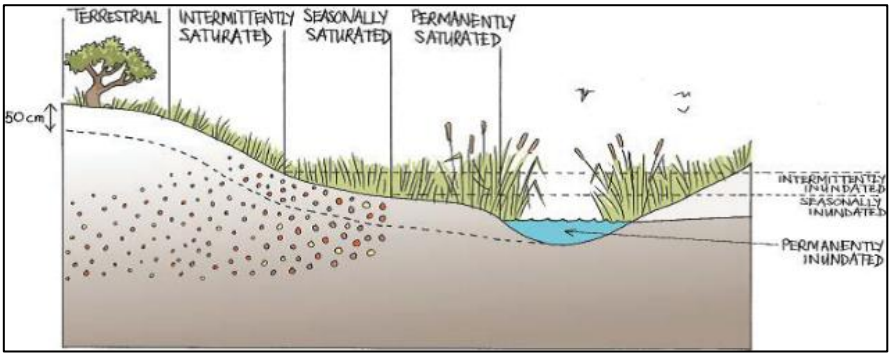


Figure 8-1 Cross section of a wetland, indicating how the soil wetness and vegetation indicators respond to changes in topography (Ollis et al. 2013)

8.1.2.2 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.

8.1.2.3 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).

8.1.3 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'.

8.1.4 Wetland Functional and Ecological Assessment

8.1.4.1 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. 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 (Version 2, Kotze et al. 2020). 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 8-1).

Table 8-1 The Importance categories assigned to the benefits (Kotze et al. 2020)

Importance Category		Description
Very Low	0-0.79	The importance of services supplied is very low relative to that supplied by other wetlands.
Low	0.8 – 1.29	The importance of services supplied is low relative to that supplied by other wetlands.
Moderately-Low	1.3 – 1.69	The importance of services supplied is moderately-low relative to that supplied by other wetlands.

Moderate	1.7 – 2.29	The importance of services supplied is moderate relative to that supplied by other wetlands.
Moderately-High	2.3 – 2.69	The importance of services supplied is moderately-high relative to that supplied by other wetlands.
High	2.7 – 3.19	The importance of services supplied is high relative to that supplied by other wetlands.
Very High	3.2 - 4.0	The importance of services supplied is very high relative to that supplied by other wetlands.

8.1.4.2 Present Ecological Status

The overall approach as described by Macfarlane et al. 2009 and 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 8-2.

Table 8-2 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

8.1.4.3 Ecological Importance and Sensitivity

The importance and sensitivity of water resources is determined in order to identify 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 8-3.

Table 8-3 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

8.1.4.4 Recommended Ecological Category and Recommended Management Objective

The Recommended Ecological Category (REC) and Recommended Management Objective (RMO) (Table 8-4) 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 8-4 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

8.1.5 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.

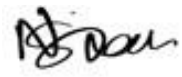
8.1.6 Site Sensitivity Verification

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 Importance and Sensitivity of the different systems (where applicable), with consideration been given to the presence of observed or likely sensitive fauna and flora.

8.2 Appendix B – Specialist Declaration of Independence

I, Namitha Singh, 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.



Namitha Singh

Ecologist

The Biodiversity Company

April 2026

8.3 Appendix C – Specialist CVs

Namitha Singh

Pr Sci Nat 157927 +27 63 684 1752 namitha@thebiodiversitycompany.com

PROFILE SUMMARY

Environmental scientist and Pri Sci Nat (SACNASP 157927) with ~5+ years' specialist consulting experience across South Africa. Specialist expertise include wetland resource delineation, management and rehabilitation, estuary and coastal management, and hydropedology. Expereience spans the mining, construction, infrastructure development (industrial/residential/commercial/service) and agricuture sectors. Responsible for current oversight of the Wetland Unit at TBC. Competence in delivering field surveys and technical reporting aligned with in-country legislative requirements and international lender standards.

PERSONAL INFO

Nationality: South African

Date of birth: 26 September 1995

EXPERIENCE

Wetland and related Specialist Assessments for Environmental Impact Assessments (EIA) and Water Use Authorisations

Environmental Management Programmes (EMPr)

Project Management

SKILLS

- ✓ Wetland delineation and functional assessments
- ✓ Ecology
- ✓ Rehabilitation

LANGUAGES

English – Proficient

Afrikaans – Basic

Signed: Namitha Singh

ACADEMIC QUALIFICATIONS

University of KwaZulu-Natal (2019): BACHELOR OF SCIENCE HONOURS – ENVIRONMENTAL SCIENCE (*Cum Laude*)
Coastal Geomorphology

University of KwaZulu-Natal (2018): BACHELOR OF SCIENCE IN ENVIRONMENTAL SCIENCE.
Majors: Environmental Science and Life Science

PROFESSIONAL EXPERIENCE

Oct 2022 – Present	**The Biodiversity Company** Wetland Ecologist
Jan 2020 – Sep 2022	**Parisara Consulting** Wetland Specialist and Consultant
June 2019 – Nov 2019	**Parisara Consulting** Intern

INTERNATIONAL EXPERIENCE

South Africa