WETLAND FUNCTIONAL AND IMPACT ASSESSMENT FOR THE PROPOSED GHANJA MINING PERMIT PROJECT

Ingquza Hill Local Municipality, OR Tambo District Municipality, Eastern Cape Province, South Africa

13/05/2024

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Report Name	**WETLAND FUNCTIONAL AND IMPACT ASSESSMENT FOR THE PROPOSED GHANJA MINING PERMIT PROJECT**	
Specialist Theme	Aquatic Biodiversity Theme	
Project Reference	Ghanja Mining Permit	
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Declaration	The Biodiversity Company and its associates operate as independent consultants under the auspice of the South African Council for Natural Scientific Professions. We declare that we have no affiliation with or vested financial interests in the proponent, other than for work performed under the Environmental Impact Assessment Regulations, 2017. We have no conflicting interests in the undertaking of this activity and have no interests in secondary developments resulting from the authorisation of this project. We have no vested interest in the project, other than to provide a professional service within the constraints of the project (timing, time and budget) based on the principals of science.	

Table of Contents

List of Tables

List of Figures

1 Introduction

1.1 Background

The Biodiversity Company was appointed to undertake a wetland functional and impact assessment for the proposed Ghanja Mining Permit Project. The applicant is proposing to apply for a mining permit to mine stone aggregate/ gravel on a portion of Remaining Extent of the Farm 89, Ngquza Hill Local Municipality, Eastern Cape Province.

According to Greenmined (2024): The proposed mining footprint will be 5 ha and will be developed over an undisturbed area of the farm. The mining method will make use of blasting in order to loosen the hard rock; the material will then be loaded and hauled to the crushing plant where it will be screened to various sized stockpiles. The aggregate will be stockpiled until it is transported from site using tipper trucks. All mining related activities will be contained within the approved mining permit boundaries. The assessment will include the proposed quarry, stockpile area and road.This proposed development area was given a 500-meter buffer and is referred to as the Project Area of Influence (PAOI) from herein. A map presenting the regional context of the PAOI can be seen in Figure 1-1 and a map presenting the project layout can be seen in Figure 1-2.

This assessment has been completed in accordance with the requirements of the published General 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.

This assessment was conducted in accordance with the amendments to the Environmental Impact Assessment Regulations (2014) (GNR 326, 7 April 2017) 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).

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.

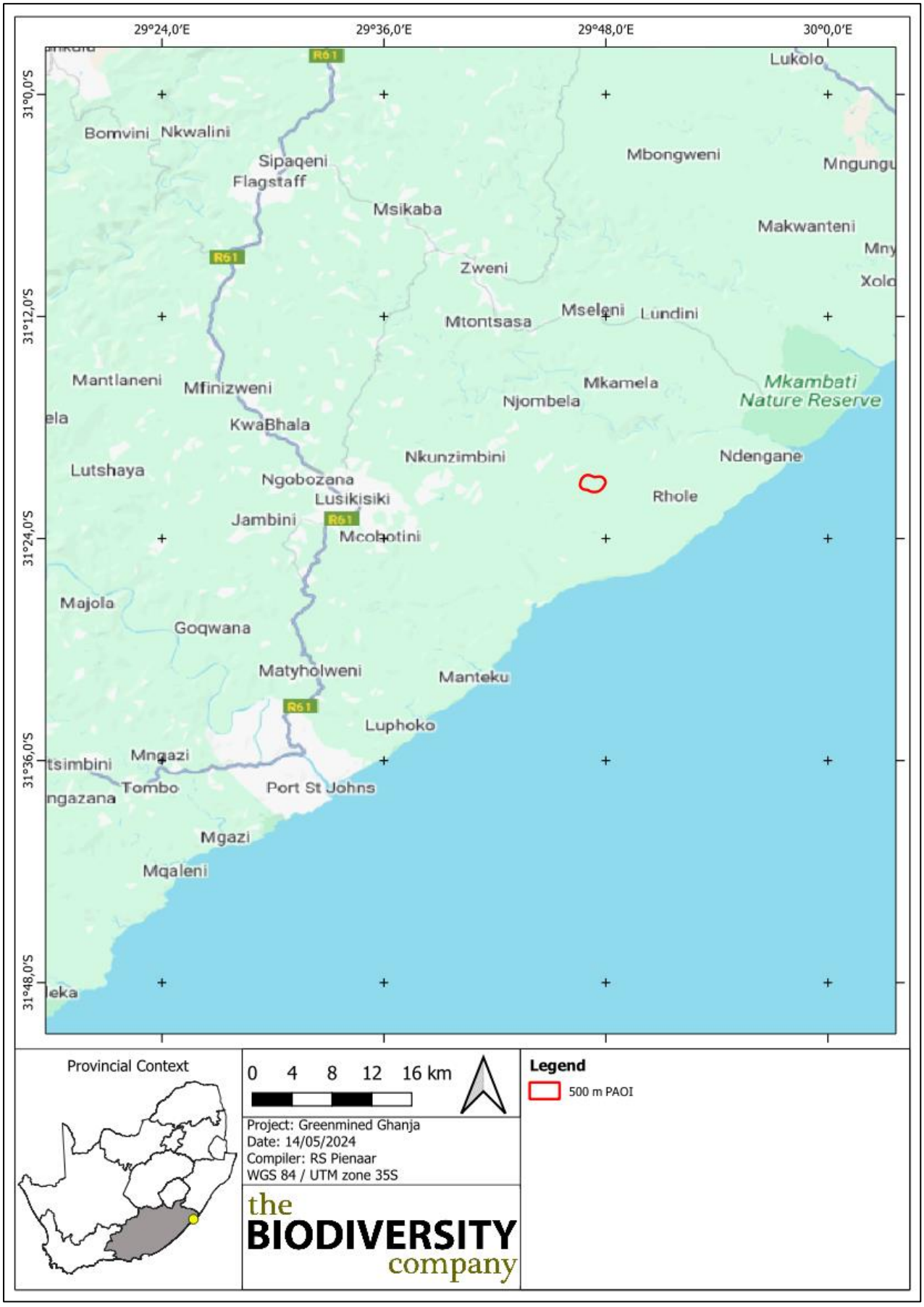


Figure 1-1 Location of the proposed project

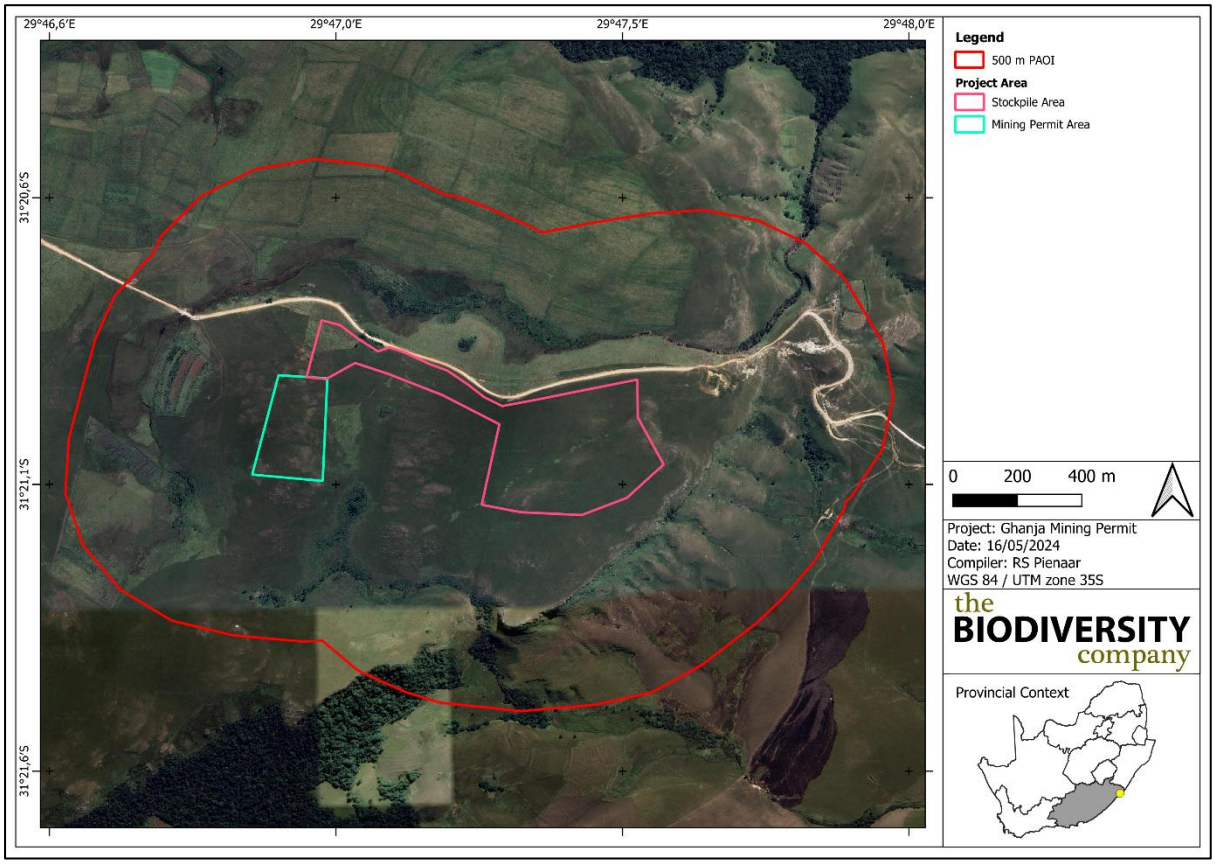


Figure 1-2 Map illustrating the project layout

1.2 Scope of Work

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

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

1.3 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 is accurate;
- Areas characterised by external wetland indicators have been the focus of this assessment. Areas lacking these characteristics have not been focussed on;
- The GPS used for water resource delineations is accurate to within five meters. Therefore, the wetland delineation plotted digitally may be offset by a maximum of five meters to either side; and

- Apart from the project site polygon, no spatial information was provided in relation to the layout of the proposed structures at the time of report preparation, therefore the impacts and their significance ratings should be revisited upon finalisation of a full project layout.

1.4 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	NEMA	Environmental Impact Assessment Regulations. 2014 (GNR 326, 7 April 2017), Appendix 6 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
	Assessment Protocol (March 2020)	The minimum criteria for reporting.
	Assessment Protocol (October 2020)	Protocol for the specialist assessment and minimum report content requirements.
	NEMWA	The regulation of waste management to protect the environment.
	NWA	The regulation of water uses.
	GN 1003 of GG 43726 of 18 Sept 2020	The regulation and management of alien invasive species.
	Conservation of Agricultural Resources Act, 1983 (Act 43 of 1983) (CARA)	To provide for control over the utilisation of the natural agricultural resources, including the vegetation and the combating of weeds and invader plants.
Provincial	Draft Eastern Cape Environmental Management Bill (Provincial Notice No. 205 in Government Gazette No. 4273 of 2019) [The above bill is proposed to repeal the Nature and Environmental Conservation Ordinance No. 19 of 1974; Nature Conservation Act, 1987 (Ciskei); Environmental Conservation Decree, 1992 (Transkei); and Mountain Catchment Areas Act, 1970]	To rationalize, consolidate and reform the law regulating environmental management and to provide for the harmonisation of provincial legislation with national legislation regulating protected areas, biodiversity, waste management and air quality; and to provide for matters connected therewith.
	Draft Eastern Cape Biodiversity Conservation Strategy and Action Plan (Provincial Notice No. 178 in Government Gazette No. 4111, 2018)	The spatial designation of conservation areas and targets within the province.

1.5 National Water Act (NWA, 1998)

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

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

A watercourse means:

- A river or spring;

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

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

1.6 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.

1.7 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.

An Aquatic / Freshwater Biodiversity Specialist Assessment Report must contain the information as presented in Table 1-2 below.

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

Information to be Included (as per GN 320, 20 March 2020)	Report Section
The assessment must be prepared by a specialist registered with the South African Council for Natural Scientific Professionals (SACNASP) with expertise in the field of aquatic sciences	0
Contact details of the specialist, their SACNASP registration number, their field of expertise and a curriculum vitae	0
A signed statement of independence by the specialist(s)	0
The assessment must be undertaken on the preferred site and within the proposed development footprint	1.1
A baseline description of the aquatic biodiversity and ecosystems on the site, including: aquatic ecosystem types; presence of aquatic species, and composition of aquatic species communities, their habitat, distribution and movement patterns.	3.1.5
The threat status of the ecosystem and species as identified by the screening tool	3.6.1
An indication of the national and provincial priority status of the aquatic ecosystem, including a description of the criteria for the given status (i.e. if the site includes a wetland or a river freshwater ecosystem priority area or sub	3.1.5

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)	
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)	3.4.1
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	-
Related to impacts, a detailed assessment of the potential impacts of the proposed development on the following aspects must be undertaken to answer the following questions: Is the proposed development consistent with maintaining the priority aquatic ecosystem in its current state and according to the stated goal? Is the proposed development consistent with maintaining the resource quality objectives for the aquatic ecosystems present? How will the proposed development impact on fixed and dynamic ecological processes that operate within or across the site? This must include: (a) impacts on hydrological functioning at a landscape level and across the site which can arise from changes to flood regimes (e.g. suppression of floods, loss of flood attenuation capacity, unseasonal flooding or destruction of floodplain processes); (b) will the proposed development change the sediment regime of the aquatic ecosystem and its sub-catchment (e.g. sand movement, meandering river mouth or estuary, flooding or sedimentation patterns); (c) what will the extent of the modification in relation to the overall aquatic ecosystem be (e.g. at the source, upstream or downstream portion, in the temporary / seasonal / permanent zone of a wetland, in the riparian zone or within the channel of a watercourse, etc.); and (d) to what extent will the risks associated with water uses and related activities change.	4.2
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.)	4.2
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?	4.2
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	2.1
The methodology used to undertake the site inspection and the specialist assessment, including equipment and modelling used, where relevant	7.1

A description of the assumptions made, any uncertainties or gaps in knowledge or data	1.3
The location of areas not suitable for development, which are to be avoided during construction and operation, where relevant	3.5
Additional environmental impacts expected from the proposed development	-
Any direct, indirect and cumulative impacts of the proposed development on site	4
The degree to which impacts and risks can be mitigated	4.2.2
The degree to which the impacts and risks can be reversed	4.2.2
The degree to which the impacts and risks can cause loss of irreplaceable resources	4
A suitable construction and operational buffer for the aquatic ecosystem, using the accepted methodologies	7.1.5
Proposed impact management actions and impact management outcomes for inclusion in the Environmental Management Programme (EMPr)	4.2.2
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	5.2
Any conditions to which this statement is subjected	5.2

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 8th and 9th of May 2024 (autumn), which constitutes a dry season survey, to identify the presence of freshwater features (wetlands) and to delineate their spatial extents. Furthermore, to determine the vegetation composition of the identified features and the likelihood of features to be used as habitat for fauna. 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 Vegetation Types

The PAOI falls within the Indian Ocean Coastal Belt (IOCB) Biome. The IOCB occurs as an almost 800 km long coastal strip between the South African border with Mozambique as far south as the mouth of the Great Kei River (near East London). It spans altitudes from 0–450 m (and higher up to 600 m in the Pondoland-Ugu Sandstone Coastal Sourveld). The landscapes of the IOCB are flat (Maputaland) or characterised by alternating rolling hills and deeply incised valleys (coastal stretch between Richards Bay and Port Edward in KwaZulu-Natal and then more markedly further south to Port St Johns as far as the Great Kei River mouth). Elevated plateaus and deep gorges are characteristic of the Pondoland coast and other regions with underlying sandstone geology. The belt is about 35 km wide at some places in the north (somewhat wider in the valley of the Thukela River), narrowing irregularly southwards to <20 km in parts of Pondoland to <10 km in several parts of the Wild Coast.

The east-west gradient of annual precipitation is remarkably steep, especially in Maputaland, with around 1 200 mm on the coast, while about 60 km inland (Ndumo) only about 60% of this amount occurs. Summers are hot to very hot, while winters are mild, with hardly any frost. The pronounced hot and damp tropical character of the climate of the IOCB in summer and its mild and slightly drier subtropical character in winter can be ascribed to the synergistic influence of the unusual southbound shift of the Intertropical Convergence Zone and the warm Agulhas Current flowing close to the eastern coasts of South Africa.

On a fine-scale vegetation type, the proposed development overlaps with the Pondoland-Ugu Sandstone Coastal Sourveld vegetation type according to SANBI (2018) (Figure 3-1).

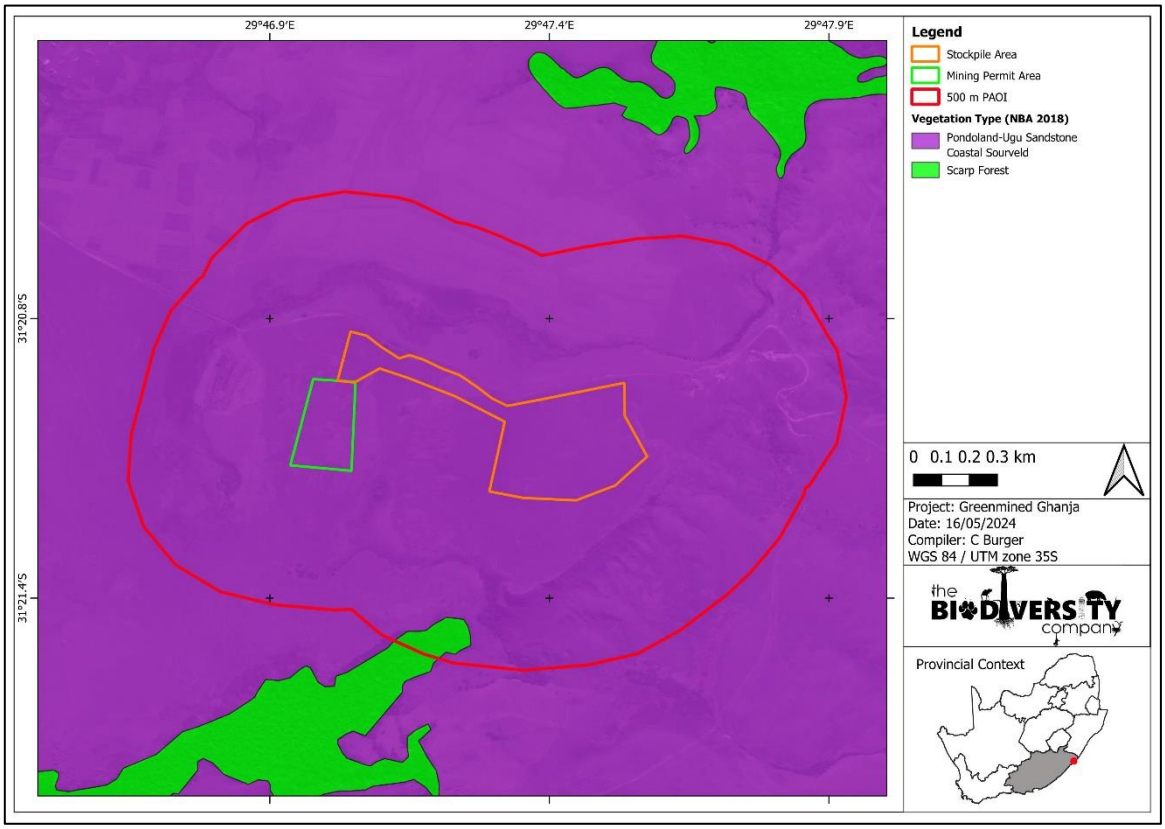


Figure 3-1 Map illustrating the vegetation types associated with the PAOI.

3.1.1.1.1 Pondoland-Ugu Sandstone Coastal Sourveld

Pondoland-Ugu Sandstone Coastal Sourveld is found on elevated coastal sandstone plateaus from Port St Johns on the Pondoland coast (Eastern Cape) to the vicinity of Port Shepstone (Ugu District, KwaZulu-Natal). Coastal peneplains and partly undulating hills with flat table-lands and very steep slopes of river gorges. These sites support natural, species-rich grassland punctuated with scattered low shrubs or small trees (sometimes with bush clumps, especially in small gullies). Rocky outcrops and krantzes are common and dramatic sea-cliffs occur. Proteaceous trees (Protea, Faurea) can be locally common where conditions allow (Mucina & Rutherford, 2006).

Important Plant Taxa

Important plant taxa are those species that have a high abundance, a frequent occurrence or are prominent in the landscape within a particular vegetation type (Mucina & Rutherford, 2006). The following species are important in the Pondoland-Ugu Sandstone Coastal Sourveld;

Graminoids: *Alloteropsis semialata subsp. eckloniana (d), Aristida junciformis subsp. galpinii (d), Cymbopogon nardus (d), Themeda triandra (d), Tristachya leucothrix (d), Cyperus rupestris, Diheteropogon amplectens, Elionurus muticus, Eragrostis capensis, E. plana, Eulalia villosa, Heteropogon contortus, Panicum natalense, Trachypogon spicatus.*

Herbs: *Chaetacanthus burchellii (d), Cyanotis speciosa (d), Heli¬chrysum allioides (d), H. appendiculatum (d), H. krebsianum (d), H. spiralepis (d), Pentanisia angustifolia (d), Rhynchosia totta (d), Tephrosia macropoda (d), Berkheya speciosa subsp. speciosa, Cephalaria oblongifolia, Chamaecrista mimosoides, Eriosema salignum, Euphorbia ericoides, Helichrysum adenocarpum subsp. adenocarpum, H. aureum var. monocephalum, H. herbaceum, H. nudifolium var. pilosellum, H. pallidum, Indigofera hilaris, Pentanisia prunelloides subsp. latifolia, Pimpinella caffra, Vernonia capensis* (Mucina & Rutherford, 2006).

Geophytic Herbs: *Brachystelma tenellum, Eriospermum mackenii* (Mucina & Rutherford, 2006).

Low Shrubs: *Athrixia phylicoides, E. natalensis, E. natalitia, Gnidia anthylloides, G. kraussiana, G. nodiflora, Leonotis intermedia, Polygala hottentotta.*

Small Trees: *Euryops brevipapposus, Syzygium cordatum. Semiparasitic Shrubs: Thesium acutissimum, T. cupressoides*.

Endemic Taxa:

Graminoid: *Fimbristylis variegata*.

Herbs: *Eriosema umtamvunense, Geranium sparsiflorum, Lotononis bachmanniana, Selago peduncularis, Senecio erubescens var. incisus*

Geophytic Herbs: *Brachystelma australe, B. kerzneri, Watsonia inclinataF, W. mtamvunaeF*.

Geoxylic Suffrutex: *Rhus acocksii*.

Low Shrubs: *Leucadendron spissifolium subsp. natalenseF (d), L. spissifolium subsp. oribinumF (d), Acalypha sp. nov. (Scott-Shaw 636 NU), Anthospermum streyi, Erica abbottii, E. cubica var. natalensisF, Eriosema dregei, E. latifolium, E. luteopetalum, Euryops leiocarpus, Gnidia triplinervis, Leucadendron pondoenseF, Leucospermum innovansF, Raspalia trigynaF, Struthiola pondoensisF, Syncolostemon ramulosus, Tephrosia bachmannii*.

Tall Shrub: *Tephrosia pondoensis.*

Conservation Status of the Vegetation Type

According to Mucina & Rutherford (2006), this vegetation type is classified as Vulnerable. The national target for conservation protection for this vegetation type is 25%, but only about 7% statutorily conserved in the Mkambati Wildlife Reserve & Marine Sanctuary, and Umtamvuna, Mbumbazi and Oribi Gorge Nature Reserves. About 29% transformed for cultivation and plantations or by urban sprawl. all part statutorily conserved in Ngoye, Mbumbazi and Vernon Crookes Nature Reserves.

3.1.2 Climate

3.1.2.1 SVcb 20

According to Mucina & Rutherford (2006), the Pondoland-Ugu Sandstone Coastal Sourveld region is characterised by a summer rainfall with limited precipitation in the winter months. No or very infrequent incidences of frost within this region. The mean maximum temperature of 32.2°C in January and a mean minimum temperature of 5.8°C in July (see Figure 4-4).

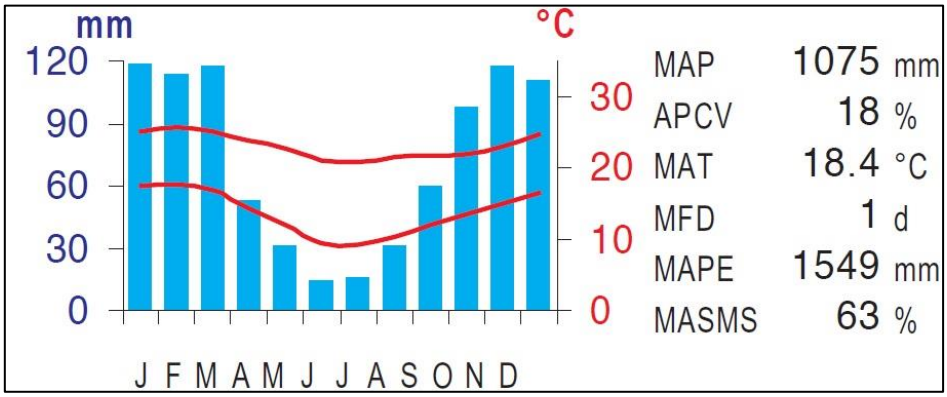


Figure 4-4 Climate for the Pondoland-Ugu Sandstone Coastal Sourveld (CB 4) (Mucina & Rutherford, 2006).

3.1.3 Soils and Geology

According to the land type database (Land Type Survey Staff, 1972 - 2006), the project area falls within the Ad 47 land types. The Ad 47 land type mainly consists of Clovelly and Oakleaf soil forms according to the Soil Classification Working Group (1991), with the occurrence of other soils within the landscape. The Ad land type is also characterised by red-yellow apedal, freely drained soils; yellow, dystrophic and/or mesotrophic.

According to Mucina & Rutherford (2006), the geology of this area is characterised by hard, coarse grained, white, siliceous quartz arenites of the Devonian Period Msikaba Formation. This geology has resulted in a nutrient-poor, shallow, acidic sandy soil. Approximately 80% of this region is characterised by the Fa land type with 10% being covered in the Aa land type.

3.1.4 Hydrological Characteristics

The PAOI falls within the North Eastern Coastal Belt Ecoregion, within the Mzimvubu-Tsitsikamma Water Management Area (WMA). At a finer scale, within the T60H quaternary catchment. The fine scale hydrological features are presented in the following section.

3.1.4.1 Topographical River Lines and Inland Water Areas

Only one inland water area has been identified within the proposed project site and its respective PAOI by means of the “3129” quarter degree square topographical river line data set (Figure 3-2). Multiple non-perennial features as well as a single perennial feature were identified within the proposed site and PAOI, all these features are located outside the development footprint except for one non-perennial feature.

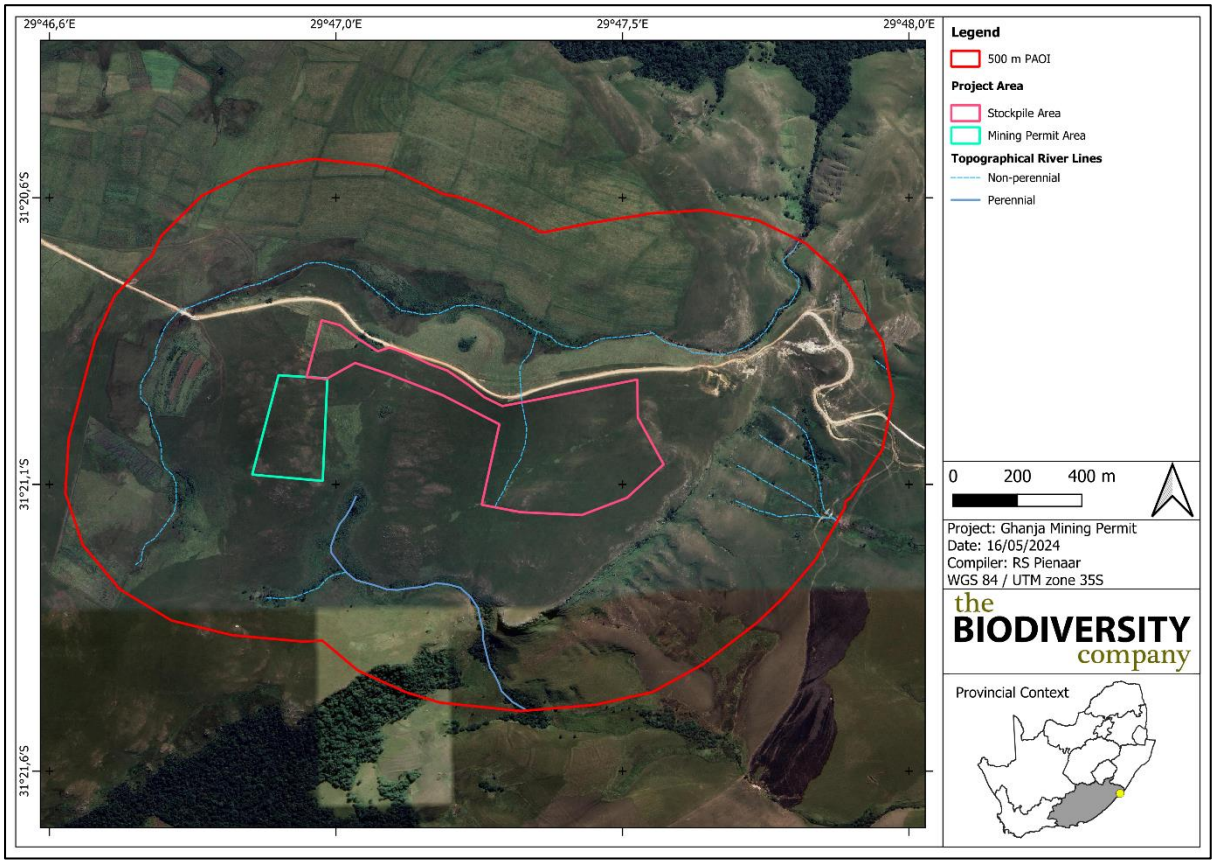


Figure 3-2 Topographical Drainage and Inland Water Areas relevant to the project

3.1.5 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)	Irrelevant – PAOI does not overlap with NBA water resources	3.1.5.1
National Freshwater Priority Area	Relevant – PAOI overlaps with NFEPA wetlands.	3.1.5.2
Strategic Water Source Areas	Irrelevant – PAOI does not overlap with SWSA.	N/A
Provincial Conservation Plan	Relevant – POAI does overlaps with Critical Biodiversity Areas and Ecological Support Areas of the Limpopo Conservation Plan.	3.1.5.3

3.1.5.1 South African Inventory of Inland Aquatic Ecosystems

No wetlands by means of the SAIIAE database were identified within the Proposed Site and PAOI. The closest wetland is approximately 2.5 km away from the Proposed Site (Figure 3-3).

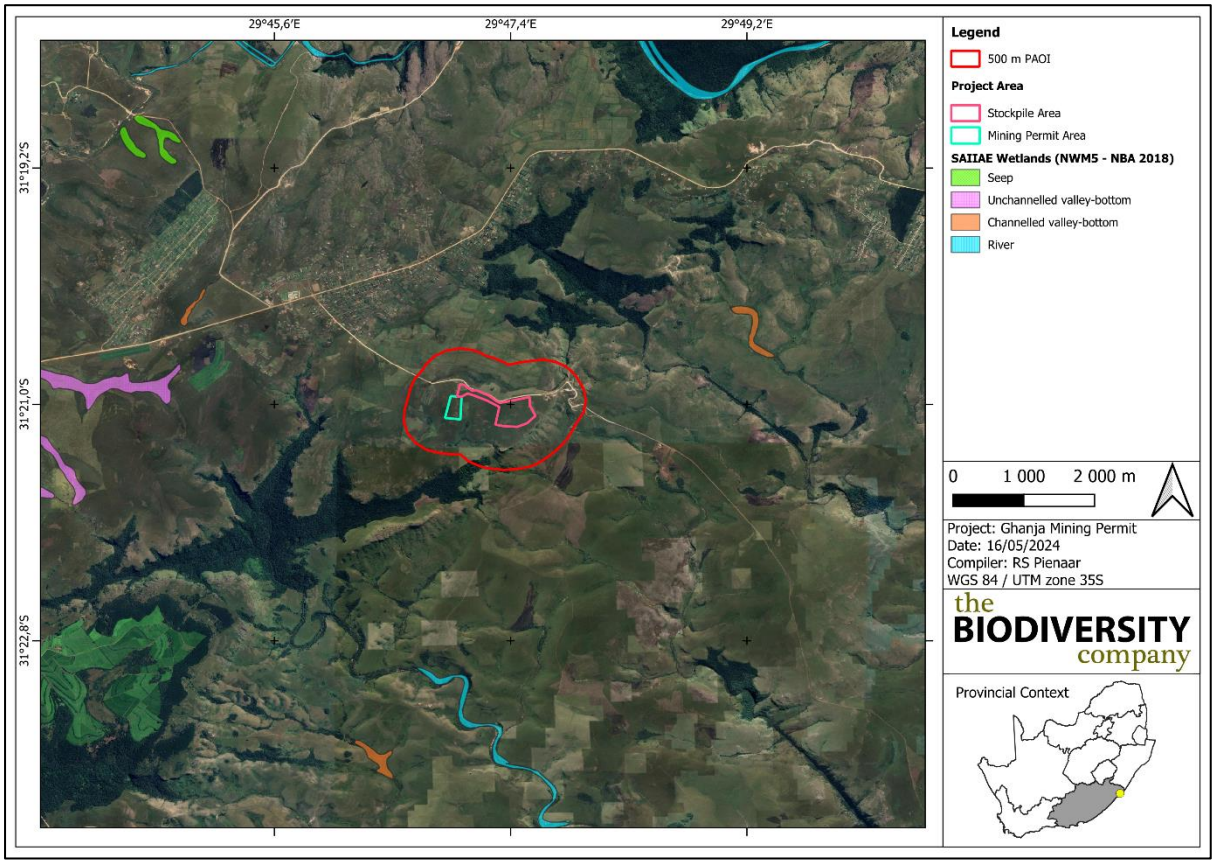


Figure 3-3 South African Inventory of Inland Aquatic Ecosystems in relevant to the project

3.1.5.2 National Freshwater Ecosystem Priority Areas

No wetlands by means of the NFEPA database were identified within the Proposed Site and PAOI. The closest wetland is approximately 4.6 km away from the Proposed Site (Figure 3-4).

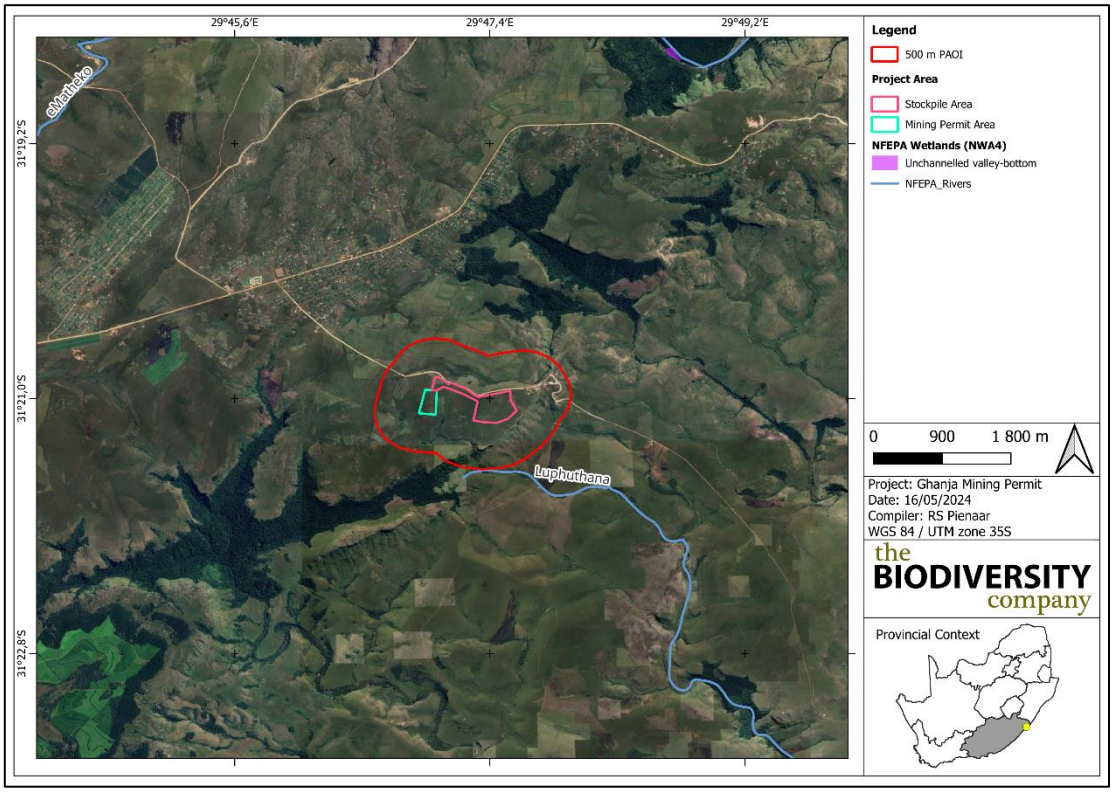


Figure 3-4 NFEPA Wetlands in relevant to the project

3.1.5.3 Eastern Cape Conservation Plan

The Eastern Cape's Biodiversity Conservation Plan (Berliner et al 2007) addresses the urgent need to identify and map critical biodiversity areas and priorities for conservation in the province.

The PAOI overlaps with a CBA 1 area (Figure 3-5).

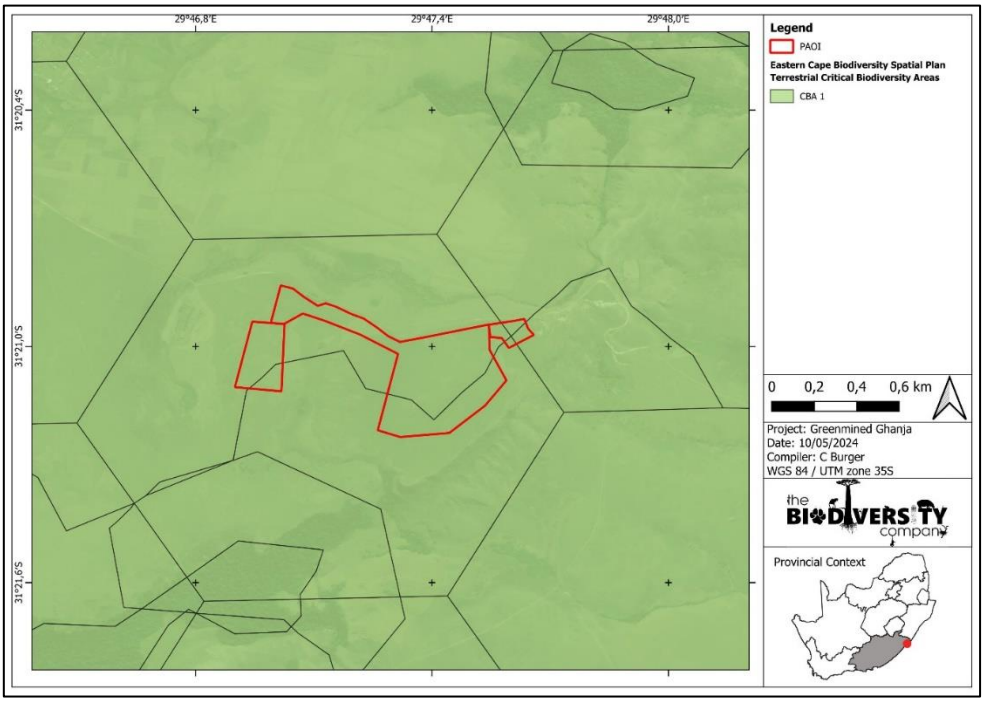


Figure 3-5 Map illustrating the PAOI in relation to the Eastern Cape CBA Map.

3.2 Wetland Field Survey

3.2.1 Delineation

Four HGM units has been identified in relation to the proposed project (Figure 3-6 and Figure 3-7). These HGM units have been classified as; two channelled valley-bottoms (HGM 1 & HGM 2), one unchannelled valley bottom (HGM 3) and one seep wetland (HGM 4). Along with the natural wetland features multiple drainage features were identified and delineated within the project area of influence. Wetland functional assessments have only been conducted for natural wetlands that will be impacted through development (HGM 1 & 2).

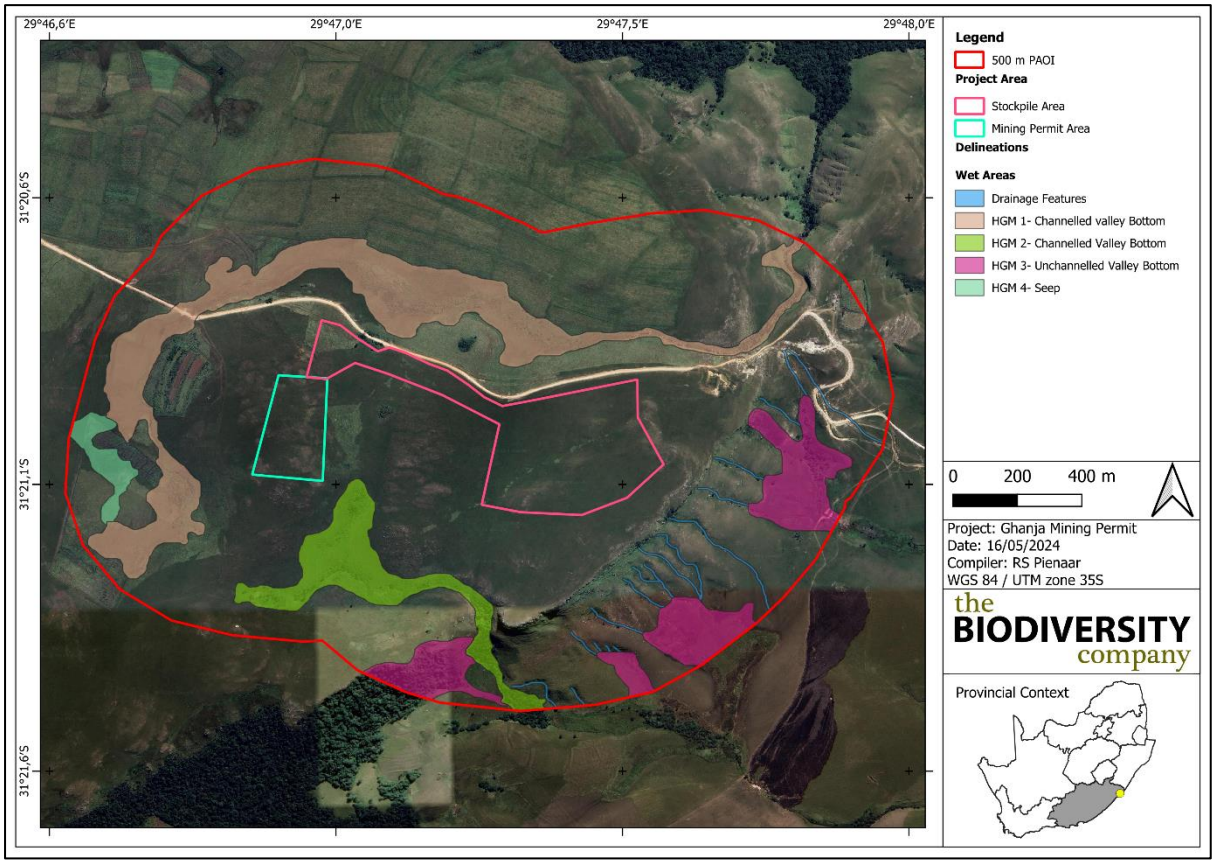


Figure 3-6 Delineation of wetland features within the Proposed Site and Project Area of Influence

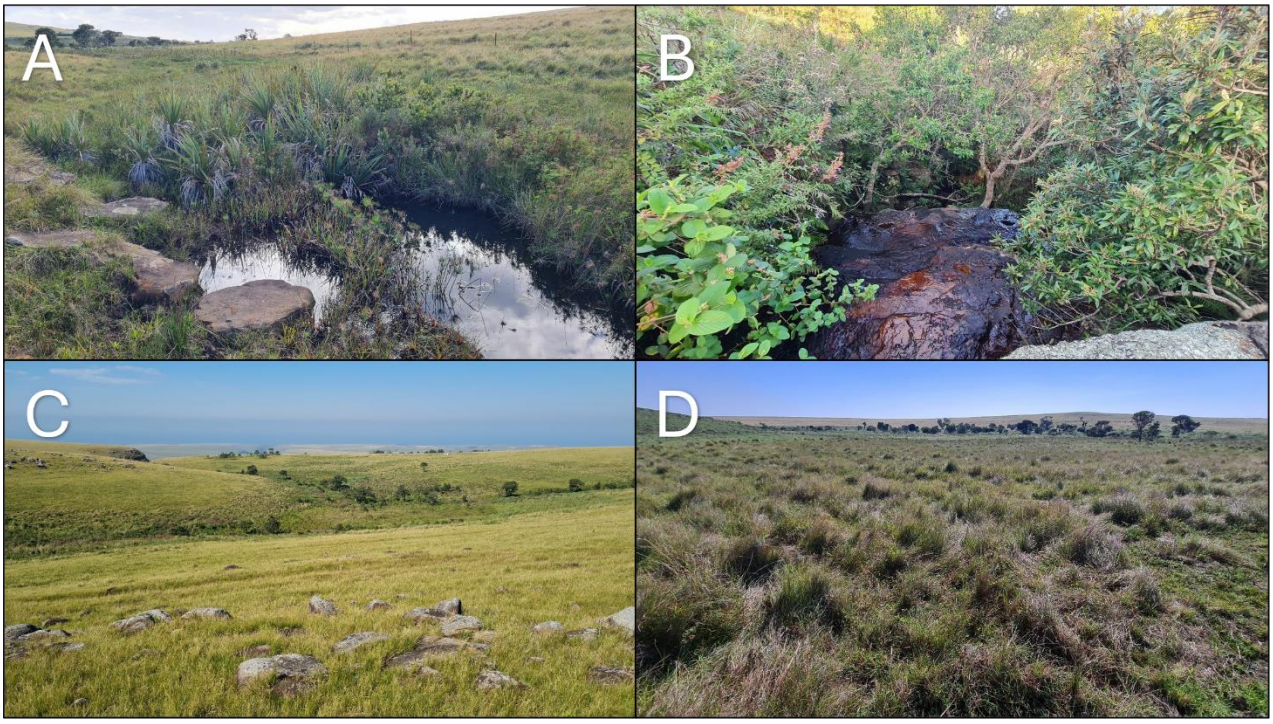


Figure 3-7 Examples of the different wetlands delineated within the project area of influence; A) Channelled valley-bottom (HGM 1), B) Channelled valley bottom (HGM 2), C) Unchannleed Valley Bottom (HGM 3) and, D) A seep wetland (HGM 4).

3.2.2 Classification and Description

The wetland classification as per SANBI guidelines (Ollis et al., 2013) is presented in Table 3-2. Three wetland types was identified within the project area, consisting of two channelled valley-bottom (HGM 1 & 2), one unchannelled valley bottom (HGM 3) and a seep wetland (HGM 4).

Table 3-2 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 1 & 2	Inland	North Eastern Coastal Belt	Central Bushveld Group 6	Valley floor	Channelled Valley Bottom	N/A	N/A
HGM 3					Unchannelled Valley Bottom	N/A	N/A
HGM 4				Hillslope	Seep	With Chanel Outflow	N/A

Channelled valley bottom wetlands are typically found on valley floors with a clearly defined, finite stream channel and lacks floodplain features, referring specifically to meanders. Channelled valley bottom wetlands are known to undergo loss of sediment in cases where the wetlands' slope is steep and the deposition thereof in cases of low relief. Figure 3-8 presents a diagram of a typical channelled valley bottom, showing the dominant movement of water into, through and out of the system.

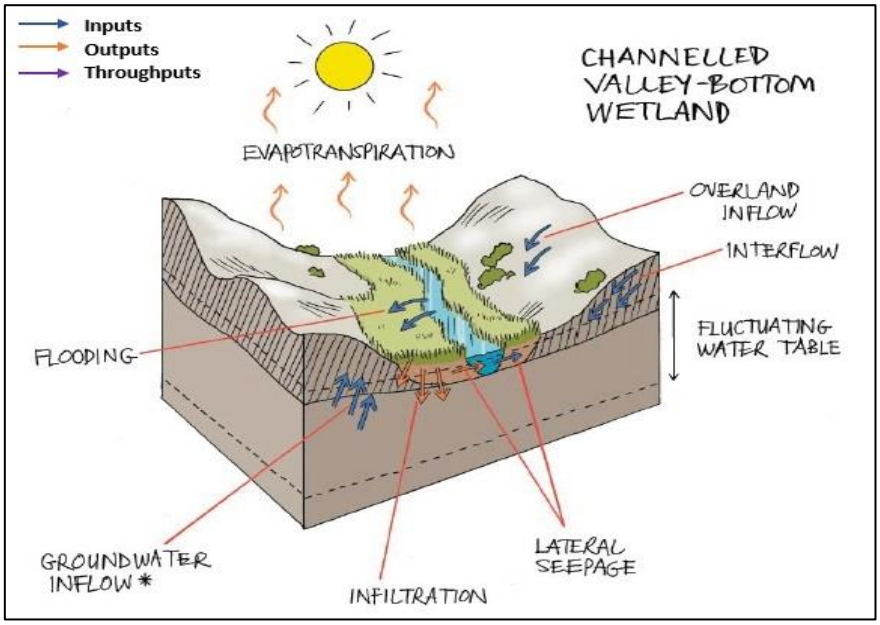


Figure 3-8 ***Amalgamated diagram of a typical channelled valley bottom, highlighting the dominant water inputs, throughputs and outputs, SANBI guidelines (Ollis et al. 2013)***

Unchannelled valley bottom wetlands are typically found on valley floors where the landscape does not allow high energy flows. Figure 3-9 presents a diagram of a typical unchannelled valley bottom wetland, showing the dominant movement of water into, through and out of the system.

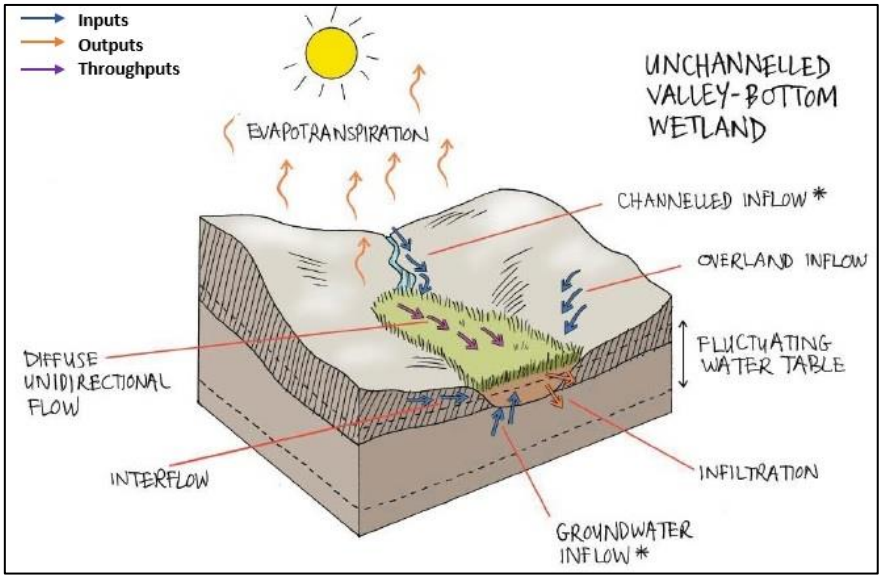


Figure 3-9 ***Amalgamated diagram of a typical unchannelled valley bottom, highlighting the dominant water inputs, throughputs and outputs, SANBI guidelines (Ollis et al. 2013)***

A typical hillslope seep is located within slopes, as mentioned in Figure 3-10. Isolated hillslope seeps are characterised by colluvial movement of material. These systems are fed by very diffuse sub-surface flows which seep out at very slow rates, ultimately ensuring that no direct surface water connects this wetland with other water courses within the valleys. Figure 3-10 illustrates a diagram of the hillslope seeps, showing the dominant movement of water into, through and out of the system.

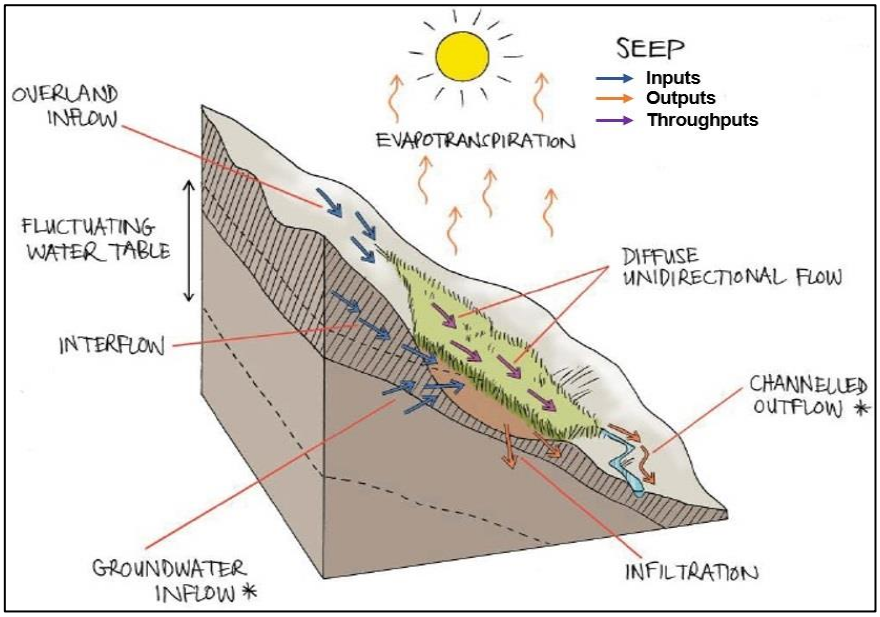


Figure 3-10 Amalgamated diagram of a typical hillslope seep, highlighting the dominant water inputs, throughputs and outputs, SANBI guidelines (Ollis et al. 2013)

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 (Figure 3-11). 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.

The drainage feature on site can be described as "A Section" channels.

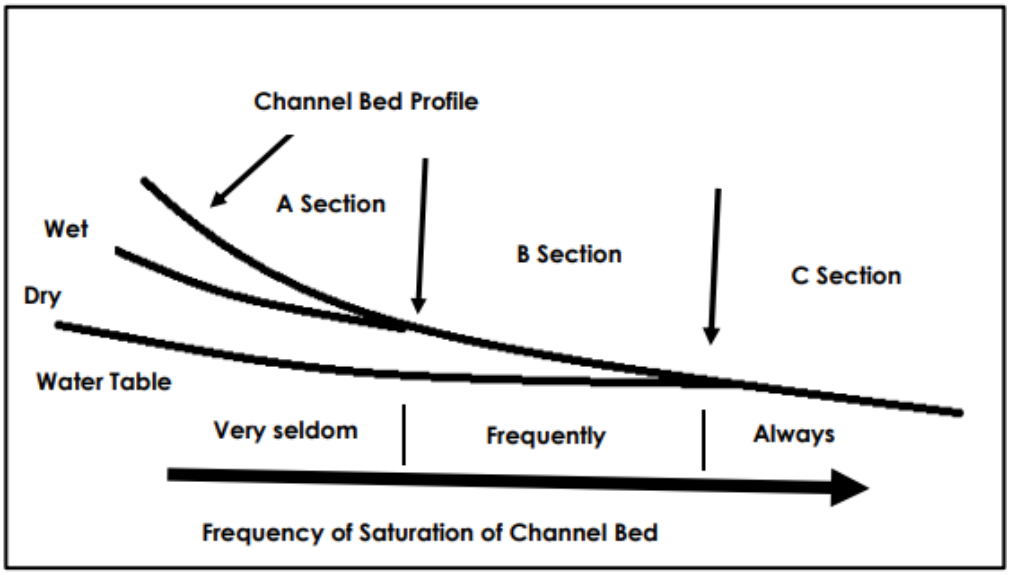


Figure 3-11 Watercourse classifications (DWAF, 2005)

3.3 Risk Screening

Table 3-3 and Figure 3-12 provides the results of risk screening for the delineated wetland and provides motivation for each of the determined categories.

Table 3-3 Risk status of the delineated wetlands

HGM unit	Risk Status	Rationale
HGM 1	At Risk	Although the development will take place outside the wetland and the calculated buffer, the development will still indirectly impact the wetland systems. The development will take place upslope of the wetland and thus runoff will flow into the system. The wetland will also be subjected to dust from the stockpiles. If all mitigations are adhered to the risks can be reduced but not avoided.
HGM 2	At Risk	Although the development will take place outside the wetland and the calculated buffer, the development will still indirectly impact the wetland systems. The development will take place upslope of the wetland and thus runoff will flow into the system. The wetland will also be subjected to dust from the stockpiles. If all mitigations are adhered to the risks can be reduced but not avoided.
HGM 3	Not at Risk	These wetlands are located far enough from the development that both the direct and indirect impacts can be mitigated. These systems will continue to function at the same level as at this present time.
HGM 4	Not at Risk	This system is protected by HGM 1 and will thus not be impacted by the proposed development. If the prescribed mitigation measures are adhered to there will be no indirect impacts of this system and the system will continue to function as before the development.

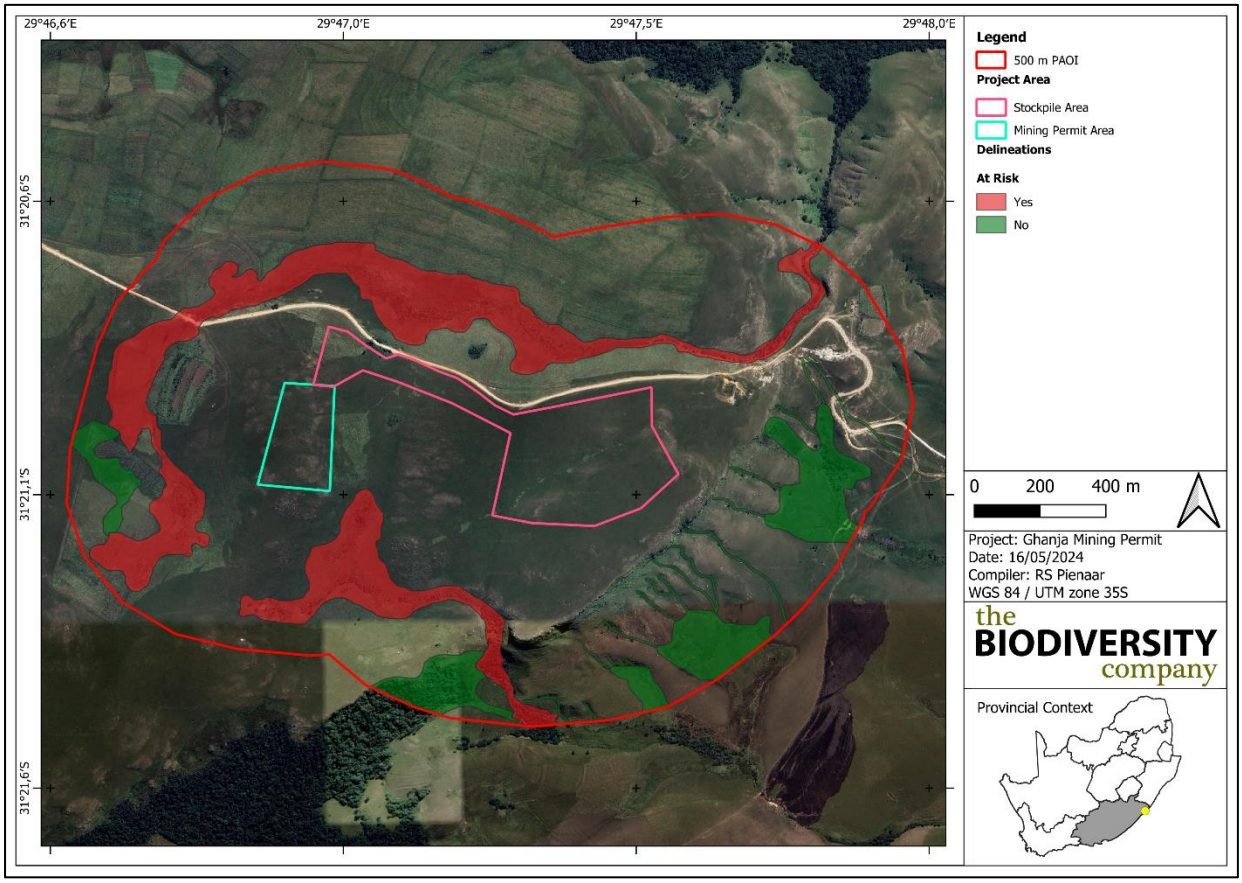


Figure 3-12 Risk status of the delineated wetland features

3.4 Functional and Ecological Assessment

Only wetlands at an appreciable level of risk in relation to the proposed project and related activities were considered for the Functional and Ecological Assessments. Thus, the functional assessment was conducted for HGM 1 and HGM 2.

3.4.1 Functional Assessment

3.4.1.1 General Functional Description

Channelled valley bottom wetlands tend to contribute less to sediment trapping and flood attenuation than other systems. Channelled valley bottom wetlands are well known to improve the assimilation of toxicants, nitrates and sulphates, especially in cases where sub-surface flows contribute to the system's water source (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.

3.4.1.2 Ecosystem Services

The ecosystem services provided by the relevant wetland units on site were assessed and rated using the WET-EcoServices method (Kotze *et al.,* 2008). The results of the assessment are presented in Table 3-4 and Figure 3-13. Ecosystem services contributing to these scores include flood attenuation, stream flow regulation, nutrient and toxicant assimilation and the maintenance of biodiversity.

HGM 1 was scored within the "High" ecosystem service score range. HGM 1 is classified as a valley-bottom wetland that plays an important role in the provisioning of flood attenuation which is important in the context of runoff from the surrounding activities. Services related to streamflow regulation are provided on a considerable level as the wetland has high volumes of hydrophyte vegetation that lowers the velocity of water in the system. Due to the surrounding landscape being relatively disturbed the wetlands will provide a corridor and refugia for fauna. Additionally, other services such as erosion control, sediment trapping, and toxicant assimilation (from runoff) will be provided at higher rates due to the fact that the wetland is well-vegetated with hydrophytes. The potential for the wetlands to be used for tourism and recreation is unlikely. Furthermore, the direct benefits such as the provisioning of harvestable resources and cultivated foods likely due to the type of vegetation present in the wetland also provide water for the pivot system irrigation of the farm. The use of the wetlands for cultural benefits and education and research is not supported.

HGM 2 scored within the "Intermediate" ecosystem services score rate. HGM 2 is classified as a channelled valley bottom wetland that plays an important role in the provisioning of flood attenuation. Although HGM 2 is also classified as being a channelled valley bottom the wetland plays a slightly lower role in the streamflow regulation and the assimilation of the different nutrients and toxicants due to a lower hydrophyte cover present inside the wetland. The wetland does not have obvious evidence of providing water or provisioning food for human use but does have some harvestable resources inside the wetlands. The potential for the wetlands to be used for tourism and recreation is unlikely. The use of the wetlands for cultural benefits as well as education and research is not supported.

Table 3-4 Summary of the average ecosystem scores of the assessed wetland units

Wetland Unit					HGM 1	HGM 2
Ecosystem Services Supplied by Wetlands	Indirect Benefits	Regulating and supporting benefits		Flood attenuation	3.9	3.2
				Streamflow regulation	3.6	2.7
			Water Quality enhancement benefits	Sediment trapping	3.7	2.3
				Phosphate assimilation	3.7	2.4
				Nitrate assimilation	3.8	2.4
				Toxicant assimilation	3.6	2.2
				Erosion control	3.6	2.1
				Carbon storage	3.7	3
	Direct Benefits	Biodiversity maintenance			3.9	2.2
		Provisioning benefits		Provisioning of water for human use	1.2	0.8
				Provisioning of harvestable resources	3.2	1.4
				Provisioning of cultivated foods	3.4	1.2
		Cultural benefits		Cultural heritage	1.0	1.0
				Tourism and recreation	1.0	1.0
				Education and research	1.8	1.3
Overall					45.10	29.20
Average					3.01	1.95
Class					High	Intermediate

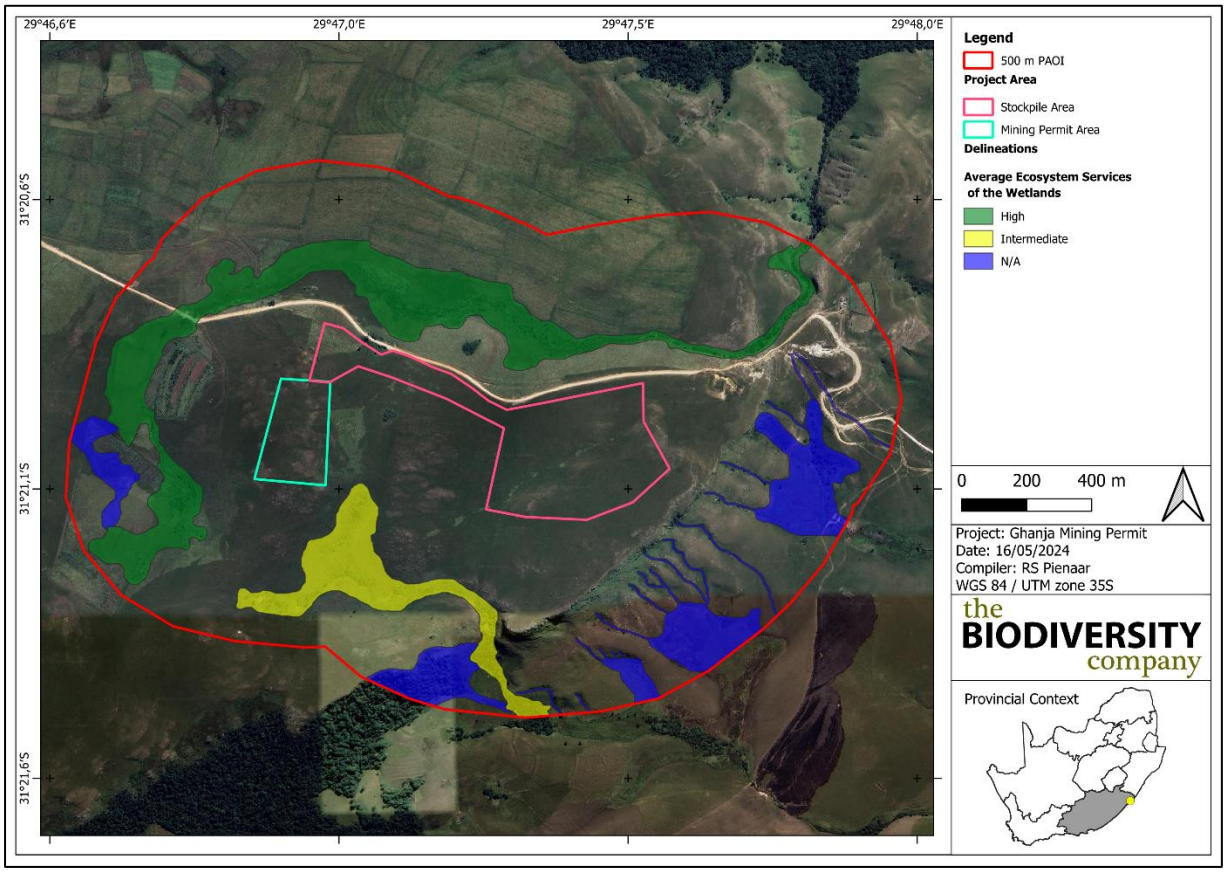


Figure 3-13 Average Ecosystem Service Scores of the assessed wetland units

3.4.2 Present Ecological State

The wetland has exhibited modification resulting from natural physical changes as well as anthropogenically induced impacts at both the local and catchment levels. Resultingly, the wetland scored average Present Ecological State (PES) scores ranging from 'B – Largely Natural' to "D – Largely Modified" PES classes. These impacts are further discussed in Section 4.1. The results of the wetland health and integrity assessment are provided in Figure 3-14.

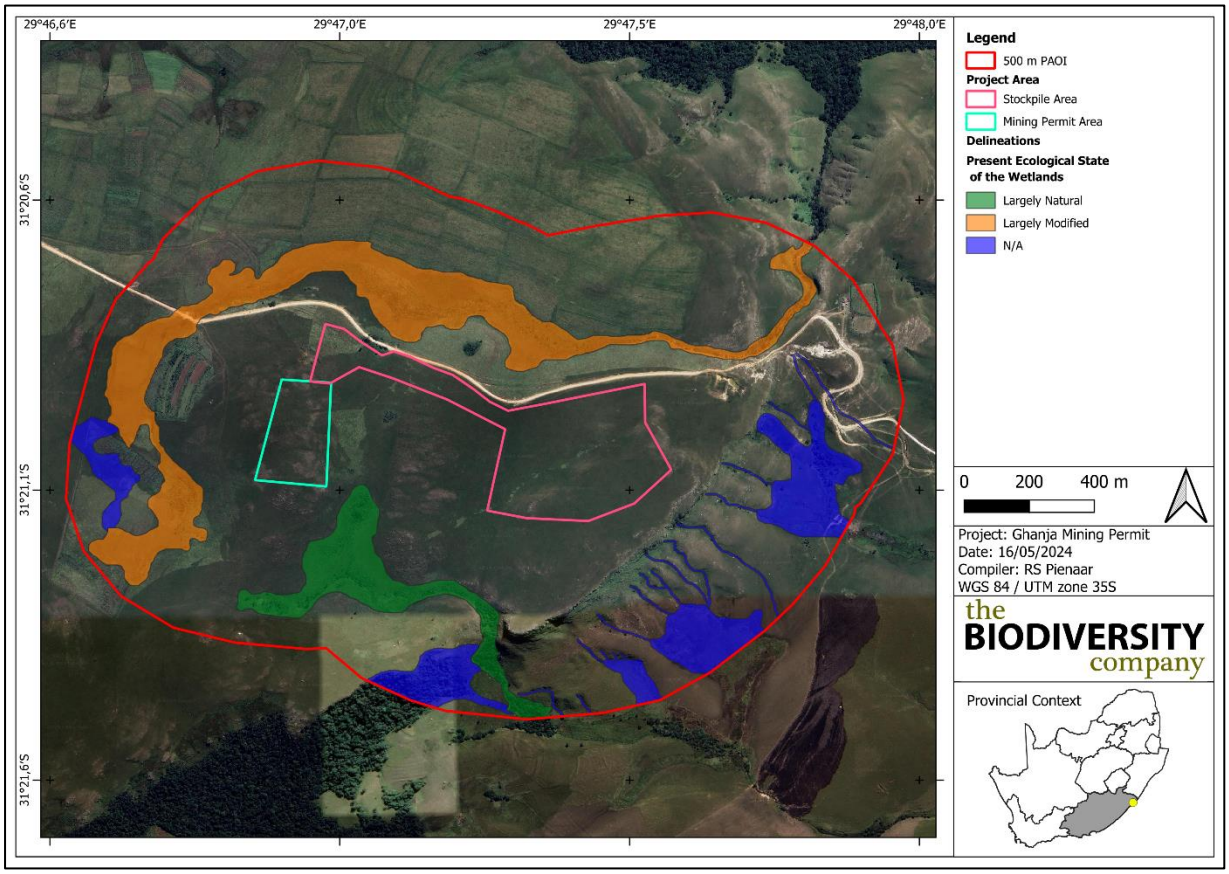


Figure 3-14 Overall present ecological state of delineated wetlands

3.4.3 Ecological Importance and Sensitivity

The Ecological Importance and Sensitivity (EIS) assessment was applied to the HGM unit in conjunction with the ecosystem service scores in the preceding sections, to assess the levels of sensitivity and ecological importance of the wetland. Various components pertaining to the protection status of a wetland is considered for the EIS, including Strategic Water Source Areas (SWSA), the NFEPA wet veg protection status and the protection status of the wetland itself considering the NBA wetland dataset as displayed in Table 3-5. The results of the assessment are shown in Figure 3-15. The wetlands average EIS scores range are in the "Moderate" class.

Table 3-5 Aspects considered in the Ecological Importance and Sensitivity assessment

HGM Type	NFEPA Wet Veg			NBA Wetlands			SWSA (Y/N)	CBA/ESA (Y/N)
	Type	Ecosystem Threat Status	Ecosystem Protection Level	Wetland Condition	Ecosystem Threat Status 2018	Ecosystem Protection Level		
Channelled valley-bottom	Indian Ocean Coastal Belt Group 3	Least Threatened	Moderately protected	B Largely Natural	Critical	Poorly Protected	N	Y

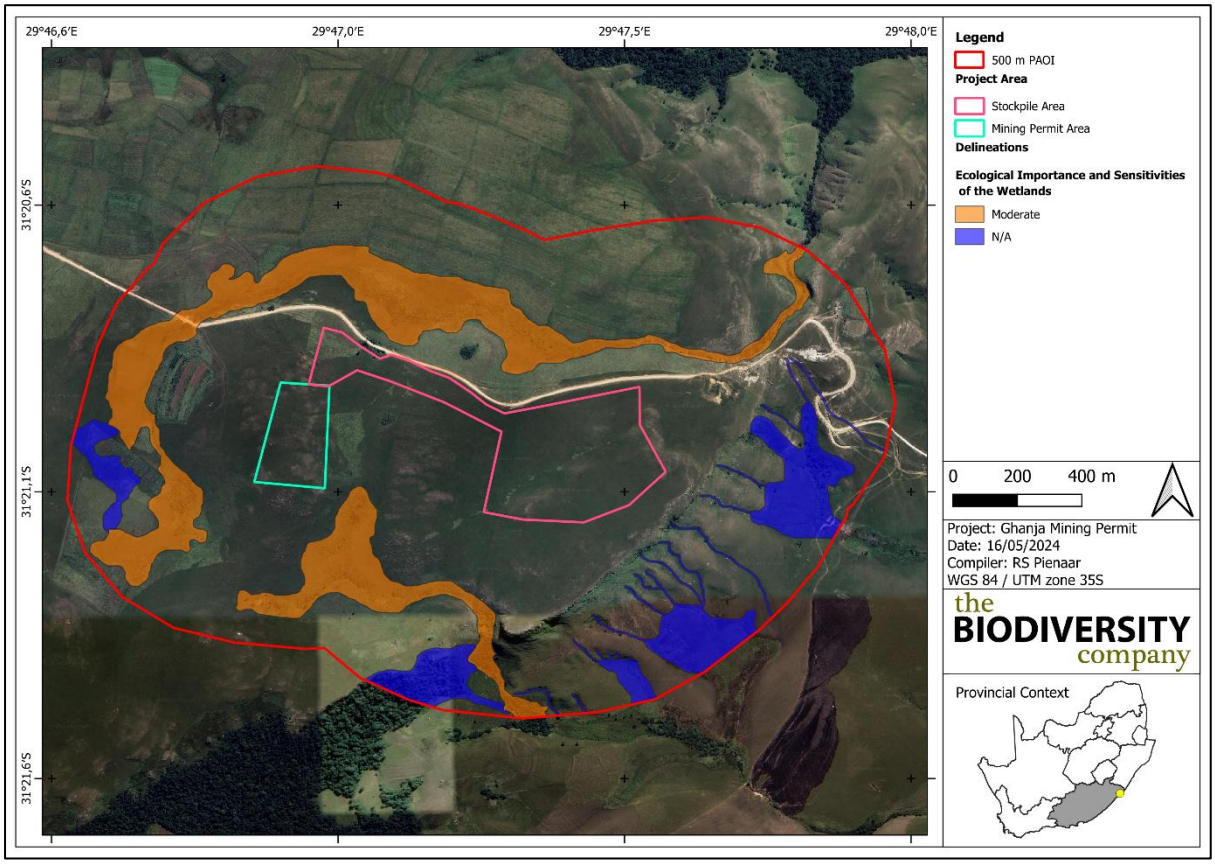


Figure 3-15 Average Ecological Importance and Sensitivity of the assessed wetlands

3.4.4 Recommended Ecological Category and Recommended Management Objective

The REC and RMO for the wetland areas are determined from the results of the PES and EIS assessments. Due to the fact that the wetlands play important functional roles in the environment and thus, it's important to maintain their functions. The appropriate REC and RMO estimated for the wetland areas are presented in Table 3-6 below.

Table 3-6 Summary of the REC and RMO categories assigned to the relevant wetlands

HGM Unit	REC – RMO
HGM 1	D - Maintain
HGM 2	B - Maintain

3.5 Buffer Requirements

The buffer requirements (Figure 3-16) for the wetland was calculated using the Site-Based Tool: Determination of buffer zone requirements for wetland ecosystems (Macfarlane *et al.*, 2014). The recommended buffer zones were calculated and are presented in Table 3-7 below. The soil type and erodibility within the wetland were also considered in this assessment and contributed to the calculated buffer widths. The pre-mitigation buffer for HGM 1 was calculated to be 50 m. With the implementation of mitigation measures these buffer widths may be reduced to 36 m for both the channelled valley bottoms. The drainage features will have a 10 m post-mitigation buffer that should be avoided.

Table 3-7 Buffer requirements for the relevant wetland features

Aspect	Pre-Mitigation	Post-Mitigation
HGM 1 & 2 – Channelled valley-bottom	50 m	36 m

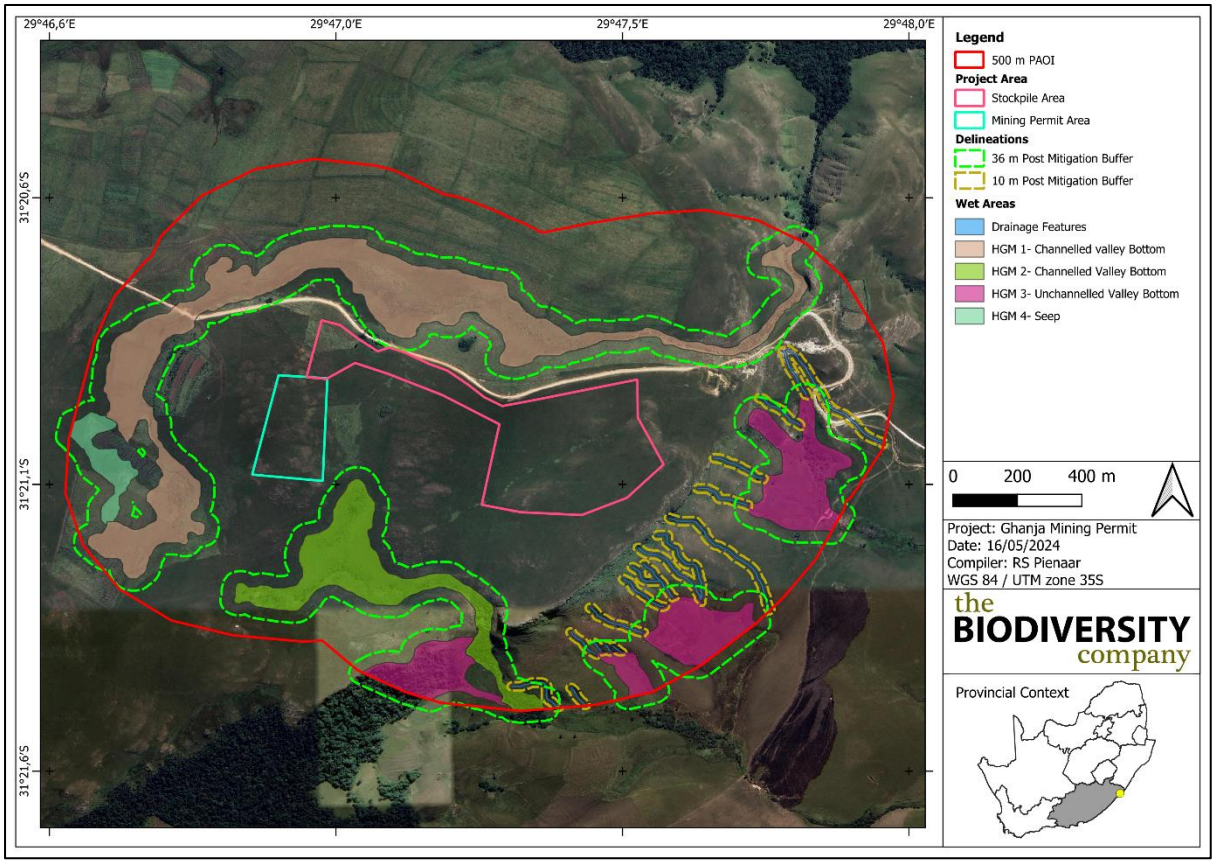


Figure 3-16 Recommended Buffers for the identified wetlands in relation to the proposed development

Regulation Zones

Table 3-8 presents the legislated zones of regulation that would be applicable to the wetland areas.

In accordance with General Notice (GN) 509 of 2016 as it relates to the NWA (1998), a regulated area of a watercourse for Section 21 (c) and 21 (i) of the NWA, 1998 means the outer edge of the 1 in 100 year flood or where no flood line has been determined it means 100 m from the edge of a watercourse or a 500 m radius from the delineated boundary (extent) of any wetland or pan.

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.

Table 3-8 Legislated zones of regulation

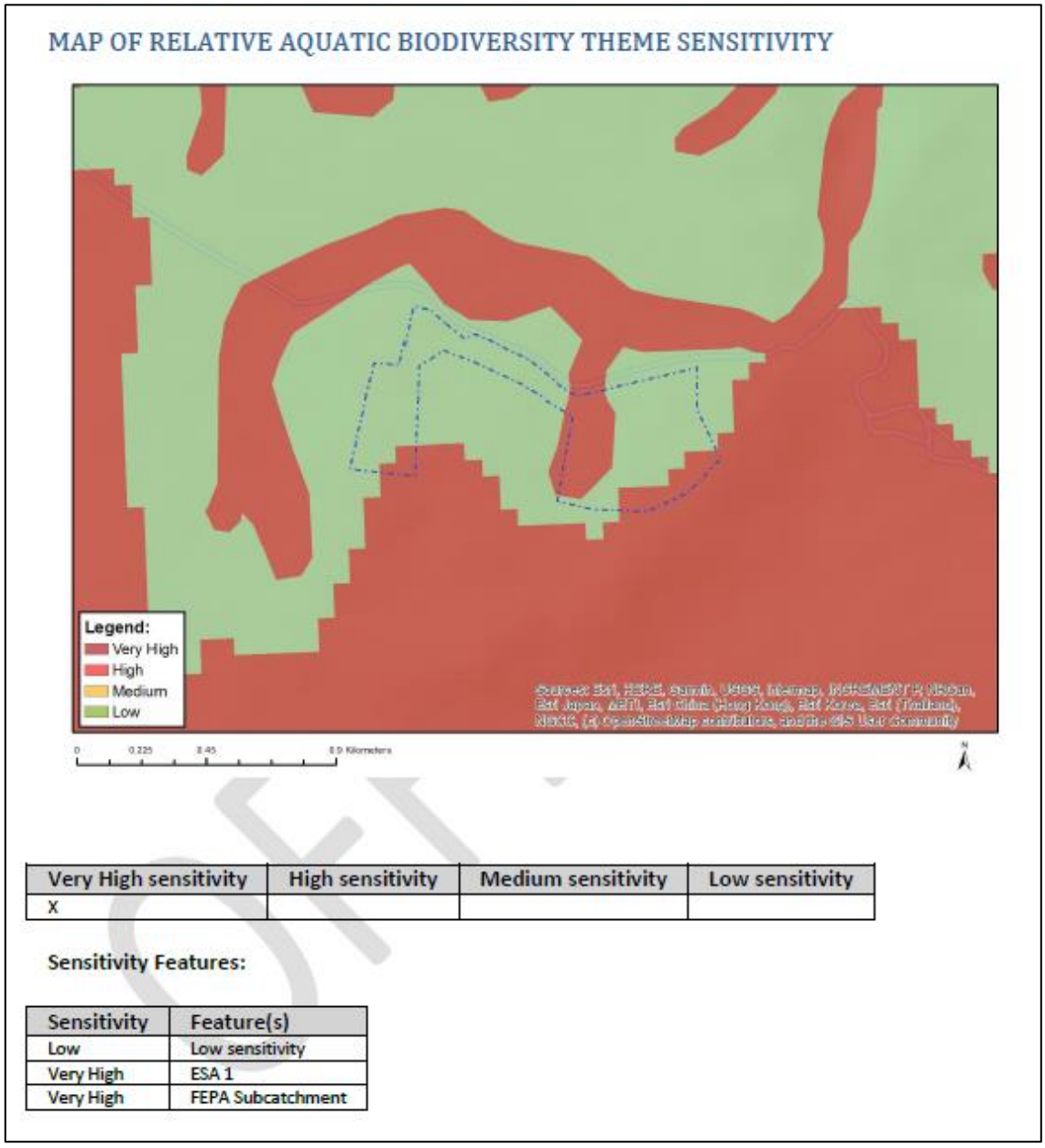
Regulatory authorisation required	Zone of applicability
Water Use License Application in terms of the National Water Act, 1998 (Act No. 36 of 1998). Department of Water and Sanitation (DWS)	Government Notice 509 as published in the Government Gazette 40229 of 2016 as it relates to the National Water Act, 1998 (Act No. 36 of 1998). In accordance with GN509 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.
Listed activities in terms 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 meters 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 meters of a watercourse, measured from the edge of a watercourse. Excluding – … (dd) where such development occurs within an urban area… 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 “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.”

3.6 Site Sensitivity Verification

3.6.1 Desktop Ecological Senstivity

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

- Aquatic Biodiversity Theme sensitivity as “Very High” for a section of the Proposed Site and PAOI, assigned for the presence of an Ecological Support Area and FEPA subcatchment, with the remainder of the site classed as “Low” (Figure 3-17).



Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
X			

Sensitivity Features:

Sensitivity	Feature(s)
Low	Low sensitivity
Very High	ESA 1
Very High	FEPA Subcatchment

Figure 3-17 Aquatic Biodiversity Theme Sensitivity

3.6.2 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. The specialist-assigned sensitivity ratings are based largely on the PES and EIS assessment processes

followed in the previous section, and consideration is given to any observed or likely presence of sensitive fauna and flora.

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	Aquatic Biodiversity Theme	Very High	Moderate	Screening Tool Sensitivity Disputed. Rational for the specialist assigned 'Moderate' rating: The wetland system has experienced historical impact related to agriculture, housing, roads and grazing. The wetland is perceived to be seasonal as little to no surface water was observed and wetland vegetation within the system was abundant. The wetland has therefore been assigned a 'Moderate' sensitivity rating.
Remaining Area	Aquatic Biodiversity Theme	Low	Low	Screening Tool Sensitivity Validated. Rational for the specialist assigned 'Low' rating: Much of the area has been historically modified through agricultural activity. The proposed activities are not anticipated to significantly modify the hydrological characteristics of the entire area; therefore a "Low" sensitivity has been assigned for these areas in relation to freshwater biodiversity.

4 Risk and Impact Assessment

4.1 Current Impacts to Freshwater Biodiversity

The assessed wetlands exhibit impacts at local scale. These impacts result from present and historical land use relating to agricultural practices and developing in or in near proximity to wetlands which have transformed the wetland habitats and has altered their natural hydrological regime and vegetation composition. The list below refers to the present-day local impacts observed within the assessed wetland areas:

- Wetland disturbance from other agricultural practises, and foot traffic;
- Altered hydrological inputs resulting from changes to the surrounding landscape;
- Erosion induced from altered hydrodynamics in combination with the loss of wetland vegetation;
- Altered geomorphology from historical agricultural practices within the wetland;
- Loss of wetland vegetation from continual disturbances, historical land use and the establishment of alien invasive flora species in some approaches of the wetlands; and
- Wetland degradation from agricultural activities.

Alternatives Considered

No alternative sites were provided for the proposed development and this assessment at this stage of the project.

4.2 Quantitative Risk and Impact Assessment

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

Two levels of risk have been identified and considered for the overall risk assessment, these include medium, and low risks. Medium risk refers to wetland areas where direct impacts will occur inside the wetlands buffer. Low risks are wetland systems where both the wetlands and their buffers are avoided by the proposed activities but indirect impacts such as dust and runoff will still impact the wetlands.

For this assessment, the specialist was provided with the proposed layout for the stockpile, quarry and chip plant area. The specialist focussed on the wetlands within the 500 m regulated area around the Proposed Site.

It is assumed that the proposed development (Stockpile and access roads) will avoid the delineated wetland and its respective buffer zones. Emphasis was therefore placed on minimising the indirect impacts by means of mitigation.

A Risk / Impact Assessment was undertaken for the two project components (Stockpile and access roads).

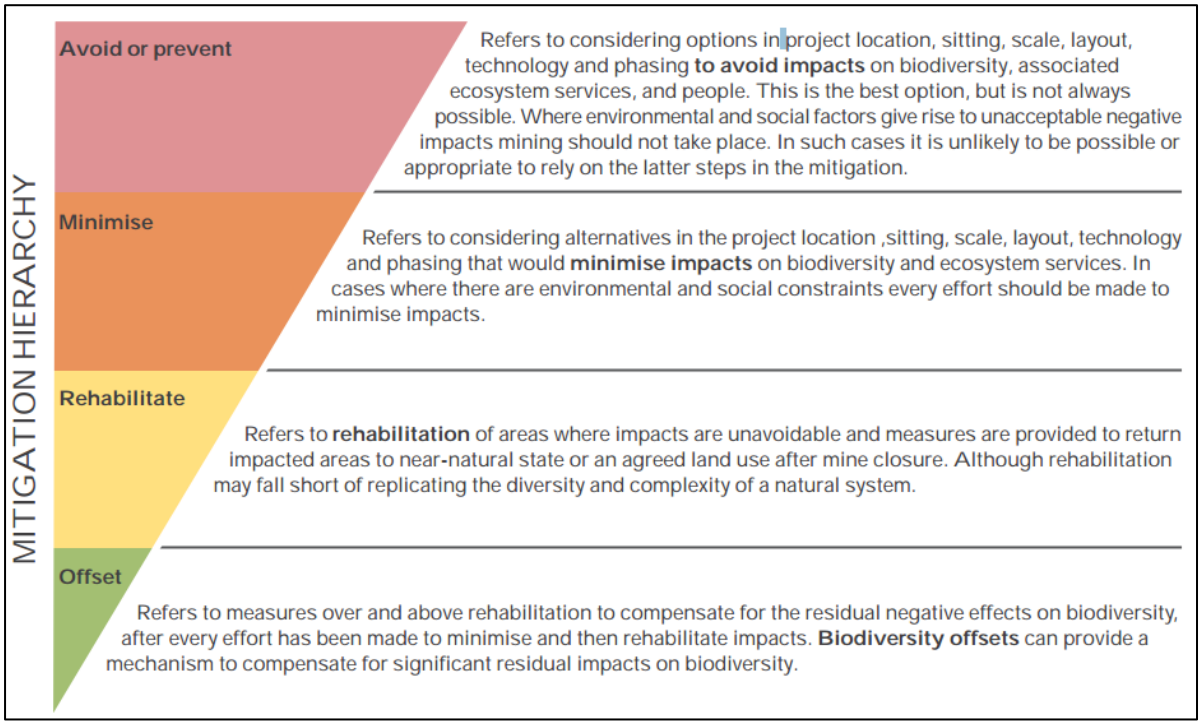


Figure 4-1 The mitigation hierarchy as described by the DEA (2013)

4.2.1 Potential Aniticipated Impacts

Table 4-1 illustrates the potential aspects expected to threaten the integrity of sensitive receptors during the proposed activities. The pre- and post- mitigation significance ratings have been calculated considering various parameters, these results are presented in the subsequent tables.

Table 4-1 Aspects and impacts relevant to the proposed activity

Phases	Activity	Impact
Construction of Stockpile, chipper and Access Roads	Site Clearing and Preparation	Increased bare surface and dust, runoff and potential for erosion
		Degradation of wetland vegetation and the introduction and spread of alien and invasive vegetation
	Installation of infrastructure	Increased sediment loads to downstream reaches and dust blown wind.
		Contamination of wetlands with hydrocarbons due to machinery leaks and eutrophication of wetland systems with human sewerage and other waste
		Disruption of wetland soil profile and alteration of hydrological regime
Operation of Stockpile, chipper and Access Roads	Routine operation and monitoring	Increased sediment and dust inputs into the wetland systems
Decommissioning of Stockpile, chipper and Access Roads	Removal of infrastructure	Degradation of wetland vegetation and proliferation of alien and invasive species
		Disruption of wetland soil profile, hydrological regime, and increased sediment loads

It is anticipated that the project will pose “Low” post-mitigation risks to the wetland, provided that the suggested mitigations are implemented. Should the wetland areas and their respective post-mitigation buffers be avoided by the proposed development, the greatest risk to the wetlands is anticipated to be

from the access roads which have the potential to induce wetland loss and to alter the hydrodynamics of the affected systems. However, the impact of this can still be mitigated to a large degree by demarcating all wetland areas and avoid any placement of materials or movement within the wetland areas.

Table 4-2 Summative results of the Risk Assessment conducted for the proposed project

Phase	Activity	Impact	Significance (max = 100)	Risk Rating	Confidence level
CONSTRUCTION	Site clearing and preparation	Increased bare surfaces, dust, runoff and potential for erosion	**7,8**	**L**	High
		Degradation of wetland vegetation and the introduction and spread of alien and invasive vegetation	**7,2**	**L**	High
	Installation of infrastructure	Increased sediment loads to downstream reaches and dust blown wind.	**14,4**	**L**	High
		Contamination of wetlands with hydrocarbons due to machinery leaks and eutrophication of wetland systems with human sewerage and other waste	**6,0**	**L**	High
		Disruption of wetland soil profile and alteration of hydrological regime	**14,4**	**L**	High
OPERATIONAL	Routine operation and monitoring	Increased sediment and dust inputs into the wetland systems	**19,2**	**L**	High
DECOMMISSIONING	Removal of infrastructure	Degradation of wetland vegetation and proliferation of alien and invasive species	**12,0**	**L**	High
		Disruption of wetland soil profile, hydrological regime, and increased sediment loads	**13,2**	**L**	High

4.2.2 Mitigation Measures

In light of the expected impacts from proposed activities the following mitigation measures have been proposed to lower the intensity of the impacts on the ecological integrity of the wetlands.

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

- Prevent the unnecessary destruction and fragmentation of the vegetation community of the wetland areas; and

- Limit the construction area to the defined project areas and only impact those areas where it is unavoidable to do so otherwise.

4.2.2.1 Development Specific Mitigation

The following stockpile and access road development specific mitigation measures are provided:

- All 'High' sensitivity and wetland habitats must be avoided (unless authorised), all laydown and staff areas must be restricted to the ‘Low' and ‘Very Low’ sensitivity areas;

- Adhere to the prescribed wetland buffers. Restrict all non-essential activities (e.g. cement mixing and equipment wetland machinery storage) to outside of wetlands and their prescribed buffers;

- Demarcate the avoidance areas;

- Dust suppression should be implemented. The residual and sediment laden water from the suppression activities should not be directly released into the wetland in order to prevent higher inputs of sediment into the systems;

- Areas other than the footprint areas and existing surface infrastructure areas must be declared as ‘no-go’ areas;

- Try to reduce the disturbance footprint and the unnecessary clearing of vegetation;

- Construct as far as possible during winter when runoff from storms are lowest, prioritise this for crossing sites. This will reduce impacts to wetlands due to soil poaching and vegetation trampling under peak saturation levels. Additionally, the risk of vehicles getting stuck and further degrading the vegetation integrity is lowest during this time;

- Prevent run-off by subsurface drainage channels. Any signs of erosion and scouring must be immediately addressed;

- Mixing of concrete must under no circumstances take place in any wetland or their buffers. Scrape the area where mixing and storage of sand and concrete occurred to clean once finished;

- Do not situate any of the construction material laydown areas within any wetland;

- No machinery should be allowed to be parked in any wetlands;

- Flatten and lightly till (no deeper than 30 cm) excavated / cleared areas to encourage vegetation establishment as soon as possible;

- Promptly remove all alien and invasive plant species that may emerge during construction (i.e. weedy annuals and other alien forbs) must be removed;

- The use of herbicides is not recommended in or near wetlands (opt for mechanical removal);

- Appropriately stockpile topsoil cleared from the project area. This can be used for rehabilitation of the impacted wetlands;
- Clearly demarcate construction footprint, and limit all activities to within this area;
- Minimize unnecessary clearing of vegetation;
- Landscape and re-vegetate all denuded areas as soon as possible with indigenous vegetation;
- Re-instate topsoil and lightly till disturbance footprint;
- Install sandbags on downstream side of the footprint, where necessary, to trap sediment until the site has been constructed and vegetation has re-established;
- Make sure all excess consumables and building materials / rubble is removed from site and deposited at an appropriate waste facility;
- Appropriately contain any generator diesel storage tanks, machinery spills (e.g. accidental spills of hydrocarbons oils, diesel etc.) or construction materials on site (e.g. concrete) in such a way as to prevent them leaking and entering the north-western seep;
- Regularly maintain stormwater infrastructure, pipes, pumps and machinery to minimise the potential for leaks. Check for oil leaks, keep a tidy operation, install bins and promptly clean up any spills or litter;
- Maintain storm water run-off & Discharge Water Quality monitoring;
- No servicing of machines, vehicles and equipment on site and Storage of potential contaminants in bunded areas;
- Provide appropriate sanitation facilities during construction and service them regularly;
- Ensure that topsoil is appropriately stored and re-applied during trench backfilling;
- Make sure that the soil is backfilled and compacted to accepted geotechnical standards to avoid conduit formation along the trench;
- Conduct regular inspections along the stockpile to ensure the integrity of the facility;
- Speed limits must be put in place to reduce erosion. Soil surfaces must be wetted as necessary to reduce the dust generated by the project activities. Speed bumps and signs must be erected to enforce slow speed; and
- Waste management must be a priority and all waste must be collected and stored adequately. It is recommended that all waste be removed from site on a weekly basis to prevent rodents and pests entering the site.

4.2.2.2 General Mitigation Measures

The following general mitigation measures are provided in addition to the aforementioned mitigation:

- It is preferable that construction takes place during the dry season to reduce the erosion potential of the exposed surfaces;

- The wetland areas outside of the specific project site area must be avoided where possible;
- The project should be relocated to outside of the wetland buffer zones, which would significantly reduce potential impacts to the said systems;
- The construction vehicles and machinery must make use of existing access routes as much as possible, before adjacent areas are considered for access;
- Laydown yards, camps and storage areas must be beyond the wetland areas. Where possible, the construction of the road and crossings must take place from the existing paths;
- Prevent uncontrolled access of vehicles through the watercourses that can cause a significant adverse impact on the hydrology and alluvial soil structure of these areas;
- All chemicals and toxicants to be used for the construction must be stored outside the watercourse areas and their respective buffers and in a bunded area;
- All machinery and equipment should be inspected regularly for faults and possible leaks, these should be serviced off-site in a designated area;
- All contractors and employees should undergo induction which is to include a component of environmental awareness. The induction is to include aspects such as the need to avoid littering, the reporting and cleaning of spills and leaks and general good “housekeeping”;
- Adequate sanitary facilities and ablutions on the servitude must be provided for all personnel within the project area. Use of these facilities must be enforced (these facilities must be kept clean so that they are a desired alternative to the surrounding vegetation);
- Have action plans on site, and training for contactors and employees in the event of spills, leaks and other impacts to the aquatic systems;
- The contractors used for the project should have spill kits available to ensure that any fuel or oil spills are clean-up and discarded correctly;
- All removed soil and material must not be stockpiled within the system. Stockpiling should take place outside of the watercourse buffers. All stockpiles must be protected from erosion, stored on flat areas where run-off will be minimised, and be surrounded by bunds;
- Mixing of concrete must under no circumstances take place within the drainage or wetland systems. Scrape the area where mixing and storage of sand and concrete occurred to clean once finished;
- No dumping of construction material on-site may take place;
- All waste generated on-site during construction must be adequately managed. Separation and recycling of different waste materials should be supported; and
- Consideration should be given to implementing an alien invasive plant management plan post construction to control any current invaded areas and prevent the growth of alien invasive species on cleared areas.

5 Conclusion

Four HGM units have been identified in relation to the proposed project, which have been classified as; two channelled valley-bottom (HGM 1 & HGM 2), multiple unchannelled valley-bottom wetlands (HGM 3) and a single hillslope seep (HGM 4). Along with these natural wetlands, a few drainage features were identified and delineated. The entire proposed site is located within a CBA 1 area.

The health and integrity of the wetland systems ranged from “B – Largely Natural” to “D – Largely Modified” class with ecosystem service provision ranging from “Intermediate” to “High”. The Ecological Importance and Sensitivity of the wetlands are presented within the “Moderate” range.

A summary of the functional assessments pertaining to the “At Risk” wetlands are presented in Table 5-1 below. The post-mitigation buffer of 20 m is suggested for HGM 1.

Table 5-1 Summary of the system functionality assessment results

HGM	Present Ecological Status (PES)	Ecological Importance and Sensitivity (EIS)	Ecological services class	Recommended ecological category and management Objective (REC-RMO)
HGM 1	D - Largely Modified	C-Moderate	High	D - Maintain
HGM 2	B – Largely Natural	C- Moderate	Intermediate	B - Maintain

5.1 Risk and Impact Statement

The overall residual risk of the proposed development was calculated to be “Low”.

5.2 Specialist Opinion

Considering the assessment findings, no fatal flaws are evident for the proposed project at this stage in relation to freshwater resources. It is the opinion of the specialists that the project may be favourably considered for authorisation, on condition that all prescribed mitigation measures are implemented. This includes the avoidance of sensitive freshwater habitats and, the minimisation of development within these areas in the case of linear infrastructure such as the access roads.

6 References

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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.

SANBI. 2017. Technical guidelines for CBA Maps: Guidelines for developing a map of Critical Biodiversity Areas & Ecological Support Areas using systematic biodiversity planning. Driver, A., Holness, S. & Daniels, F. (Eds). 1st Edition. South African National Biodiversity Institute, Pretoria.

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7 Appendix Items

7.1 Appendix A: Methodology

7.1.1 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).

7.1.1.1 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.

7.1.1.2 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.

7.1.1.3 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.

7.1.1.4 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).

7.1.1.4.1 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.

7.1.1.4.2 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).

7.1.2 Wetland Field Survey

7.1.2.1 Identification and Mapping

The wetland areas were delineated in accordance with the DWAF (2005) guidelines, a cross section is presented in Figure 7-1. 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.

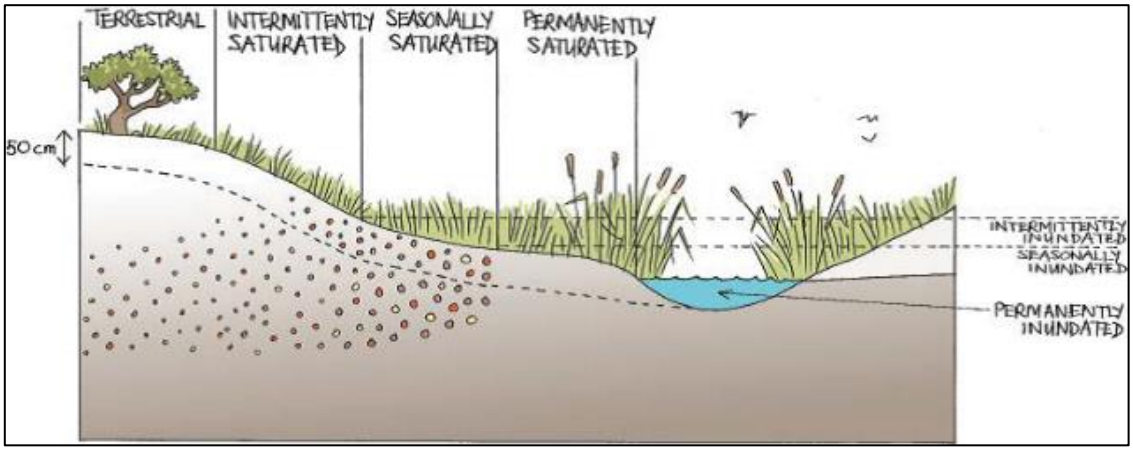

Figure 7-1 Cross section of a wetland, indicating how the soil wetness and vegetation indicators respond to changes in topography (Ollis et al. 2013)

7.1.2.2 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.

7.1.2.3 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).

7.1.3 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'.

7.1.4 Wetland Functional and Ecological Assessment

7.1.4.1 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 (Kotze *et al.,* 2009). An assessment was undertaken that examines and rates the following services according to their degree of importance and the degree to which the services are provided (Table 7-1).

Table 7-1 Classes for determining the likely extent to which a benefit is being supplied

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

2.1 - 3.0	Moderately High
> 3.0	High

7.1.4.2 Present Ecological Status

The overall approach is to quantify the impacts of human activity or clearly visible impacts on wetland health, and then to convert the impact scores to a Present Ecological Status (PES) score. This takes the form of assessing the spatial extent of impact of individual activities/occurrences and then separately assessing the intensity of impact of each activity in the affected area. The extent and intensity are then combined to determine an overall magnitude of impact. The Present State categories are provided in Table 7-2.

Table 7-2 The Present Ecological Status categories (Macfarlane et al., 2007)

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

7.1.4.3 Ecological Importance and Sensitivity

The importance and sensitivity of water resources is determined in order establish resources that provide higher than average ecosystem services, biodiversity support functions or are particularly sensitive to impacts. The mean of the determinants is used to assign the Ecological Importance and Sensitivity (EIS) category as listed in Table 7-3.

Table 7-3 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

7.1.4.4 Recommended Ecological Category and Recommended Management Objective

The Recommended Ecological Category (REC) and Recommended Management Objective (RMO) (Table 7-4) 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 7-4 Recommended Ecological Category and Recommended Management Objectives for water resources based on Present Ecological State and Ecological Importance and Sensitivity scores

PES	Ecological Importance and Sensitivity

	Very High	*High*	*Moderate*	*Low*
A (Pristine)	A Maintain	A Maintain	A Maintain	A Maintain
B (Natural)	A Improve	A/B Improve	B Maintain	B Maintain
C (Good)	A Improve	B/C Improve	C Maintain	C Maintain
D (Fair)	C Improve	C/D Improve	D Maintain	D Maintain
E/F (Poor)	D Improve	E/F Improve	E/F Maintain	E/F Maintain

7.1.5 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.

7.1.6 Site Sensitivty 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.

7.2 Appendix B: Risk and Impact Assessment

The Department of Water and Sanitation (DWS) risk matrix assesses impacts in terms of consequence and likelihood. The significance of the impact is rated according to the classes presented in Table 7-5.

Table 7-5 Significance ratings matrix

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

7.3 Appendix C – Specialist Declaration of Independence

I, Rian Pienaar, declare that:

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

Rian Pienaar

Ecologist

The Biodiversity Company

May 2024

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

May 2024

7.5 Appendix D – Specialist CVs

Rian Pienaar

M.Sc. Environmental Science

Pri Sci Nat (135544)

Cell: +27 78 0505 0201
Email: rian@thebiodiversitycompany.com
Identity Number: 9405235011089
Date of birth: 23 May 1994

Profile Summary

Working experience throughout Southern Africa

Specialist experience with mining, construction and agriculture.

Specialist expertise include wetlands resources, aquatic ecology, parasitology and ecotoxicology.

Areas of Interest

Mining, Oil & Gas, Renewable Energy & Bulk Services Infrastructure Development, Farming, Land Contamination, Sustainability and Conservation.

Key Experience

- Environmental Impact Assessments (EIA)
- Environmental Management Programmes (EMP)
- Wetland delineations and ecological assessments
- Rehabilitation Plans and Monitoring
- Soil classification
- Agriculture potential assessments
- Land contamination assessments

Country Experience

South Africa

Mozambique

Botswana

Nationality

South African

Languages

English – Proficient

Afrikaans – Proficient

Qualifications

- MSc (North-West University of Potchefstroom) – Environmental Science (Cum Lauda)
- BSc Honours (North-West University of Potchefstroom) – Environmental Science with Aquatic ecosystem heath.
- BSc Environmental sciences
- Pri Sci Nat (135544)

Namitha Singh

BSc. (Hons) Environmental Science (*Cum Laude*) (*Pr Sci Nat*)

Cell: +27 63 684 1752
Email: namitha@thebiodiversitycompany.com
Identity Number: 9509260335089
Date of birth: 26 September 1995

Profile Summary

Working experience in 7 provinces of South Africa.

Specialist experience within construction and development (residential/commercial/mixed-use/solar), wastewater infrastructure and agriculture.

Specialist expertise includes wetland resource management and rehabilitation, estuary and coastal management and, hydropedology.

Areas of Interest

Water Resource Management, Mining, Renewable Energy, Infrastructure Development, Agriculture, Land contamination, Sustainability and Conservation.

Key Experience

- Wetland Delineation and Functional Assessments
- Hydropedology Assessments
- Wetland Rehabilitation
- Coastal and Estuarine Assessments

Country Experience

South Africa

Nationality

South African

Languages

English – Proficient

Afrikaans – Basic

Qualifications

- BSc. Honours – Environmental Science (*Cum Laude*)
- BSc. Environmental Science and Life Science

7.6 Appendix E - Alternatives Desktop Assessment

Based on the assessment undertaken in this report it was found that the Initial Stockpile Area is not a viable site for development purposes and as such alternative sites had to be considered. Following this, two site alternatives site for the stockpile area were provided by Greenmined (2024) and has been assessed on a desktop basis (Figure 7-2).

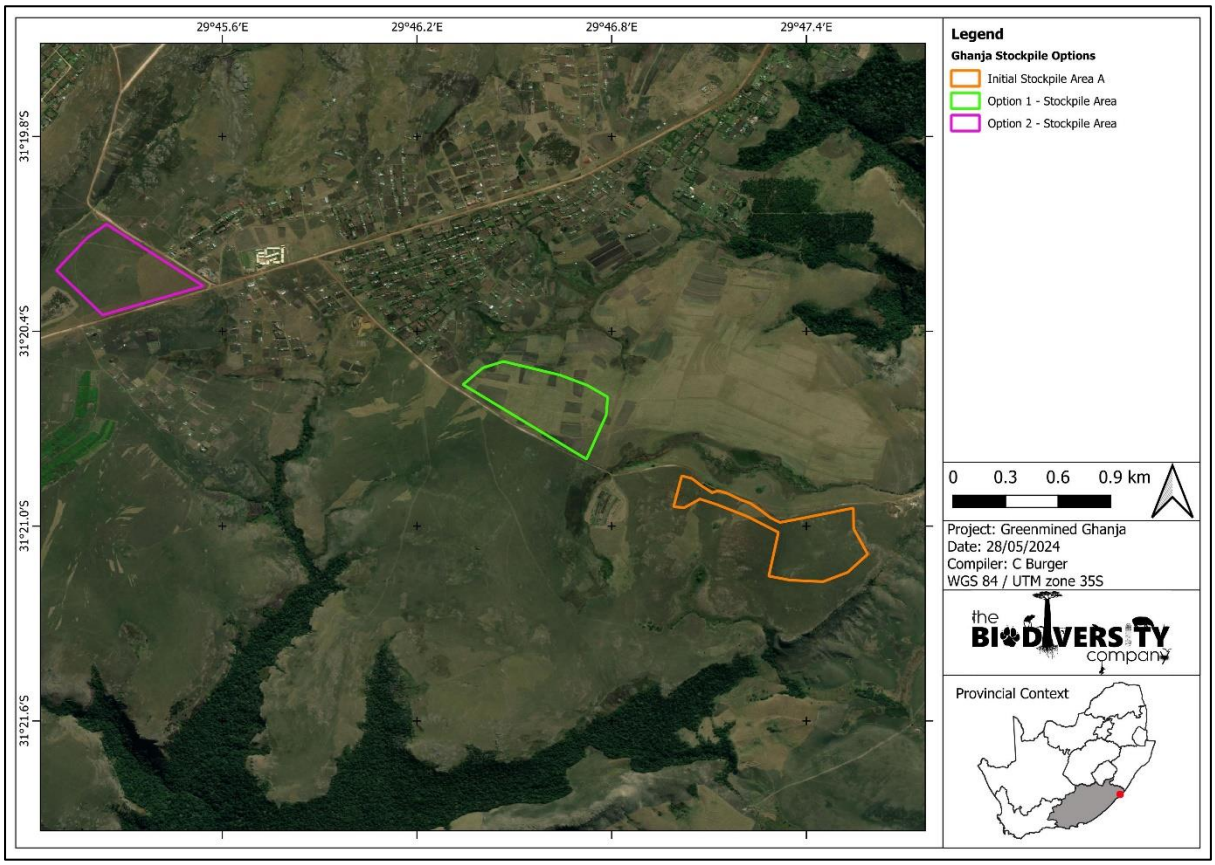

Figure 7-2 Map illustrating the Stockpile Alternatives

7.6.1 Hydrological Characteristics

The PAOI falls within the North Eastern Coastal Belt Ecoregion, within the Mzimvubu-Tsitsikamma Water Management Area (WMA). At a finer scale, within the T60H and T60G quaternary catchment. The fine scale hydrological features are presented in the following section.

7.6.1.1 Topographical River Lines and Inland Water Areas

Only one inland water area has been identified within the proposed project site and its respective PAOI by means of the “3129” quarter degree square topographical river line data set (Figure 7-3). Multiple non-perennial features as well as multiple single perennial features were identified within the proposed site and PAOI, all these features are located outside the development footprint except for one non-perennial feature located within the Initial Stockpile Area.

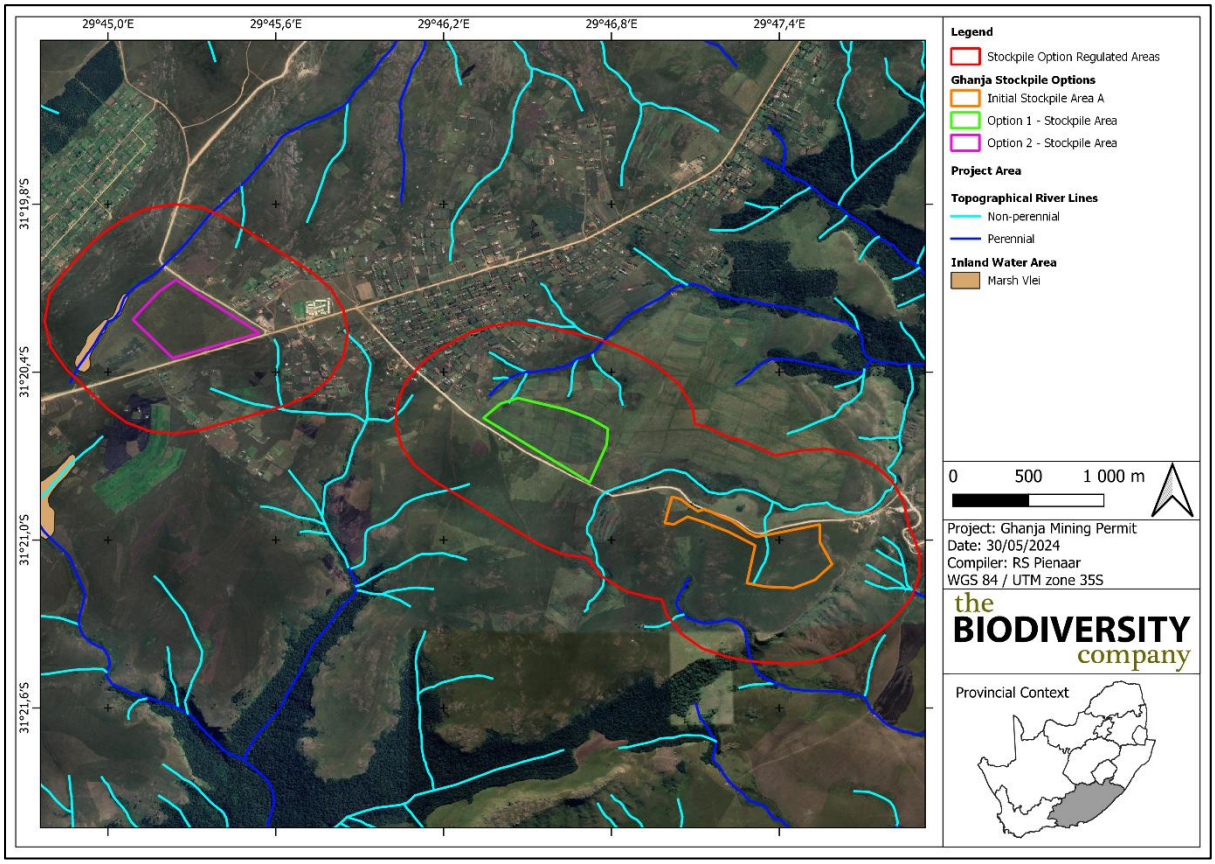

Figure 7-3 Topographical Drainage and Inland Water Areas relevant to the project

7.6.2 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 7-6 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 water resources at Option 2	7.6.2.1
National Freshwater Priority Area	Irrelevant – PAOI does not overlap with NFEPA wetlands.	7.6.2.2
Strategic Water Source Areas	Irrelevant – PAOI does not overlap with SWSA.	N/A
Provincial Conservation Plan	Relevant – POAI does overlaps with Critical Biodiversity Areas and Ecological Support Areas of the Limpopo Conservation Plan.	7.6.2.3

7.6.2.1 South African Inventory of Inland Aquatic Ecosystems

A single wetland was identified within regulated area around the proposed stockpile areas by means of the SAIIAE database. The wetland is classified as a channelled valley bottom wetland characterised as being critically threatened and poorly protected (Figure 7-4).

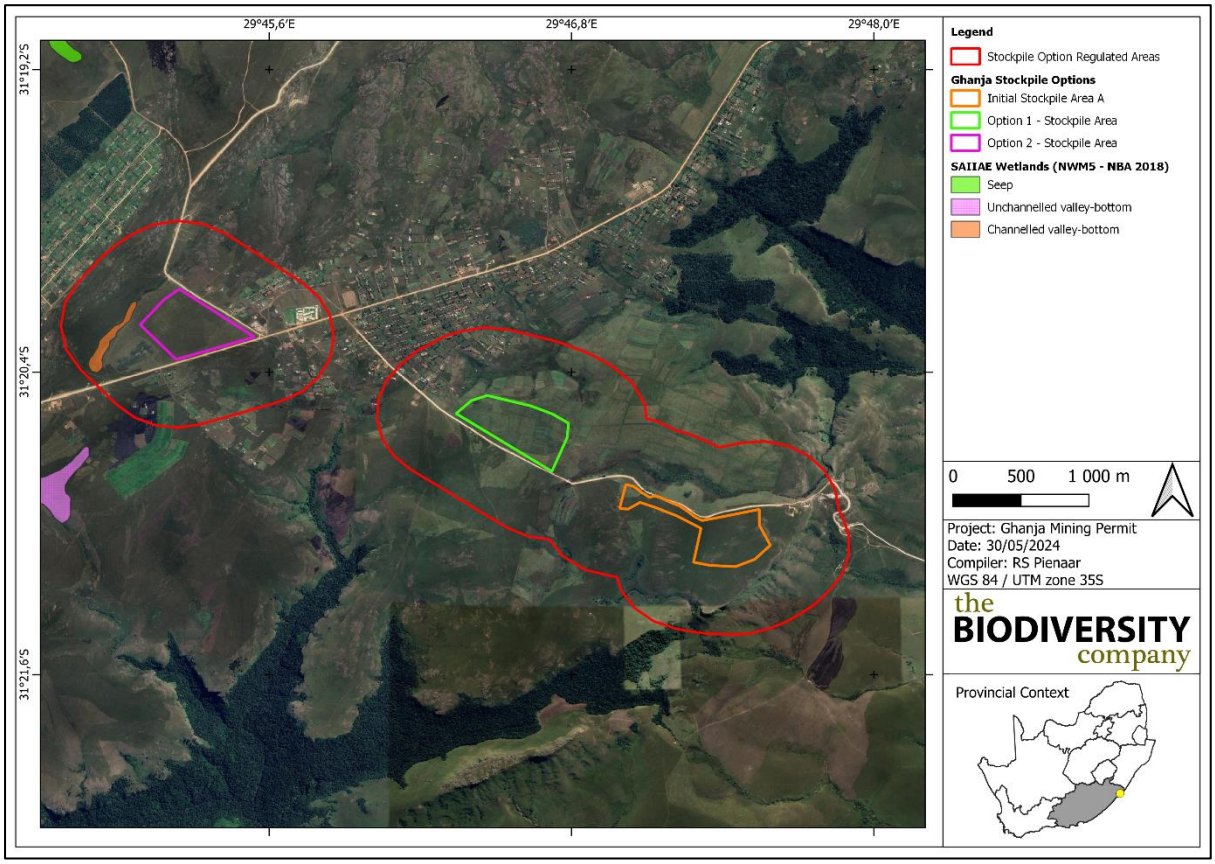

Figure 7-4 South African Inventory of Inland Aquatic Ecosystems in relevant to the project

7.6.2.2 National Freshwater Ecosystem Priority Areas

No wetlands by means of the NFEPA database were identified within the Proposed Site and PAOI. The closest wetland is approximately 4.6 km away from the Proposed Site. A single NFEPA river is located south of the proposed Initial Stockpile Area (Figure 7-5).

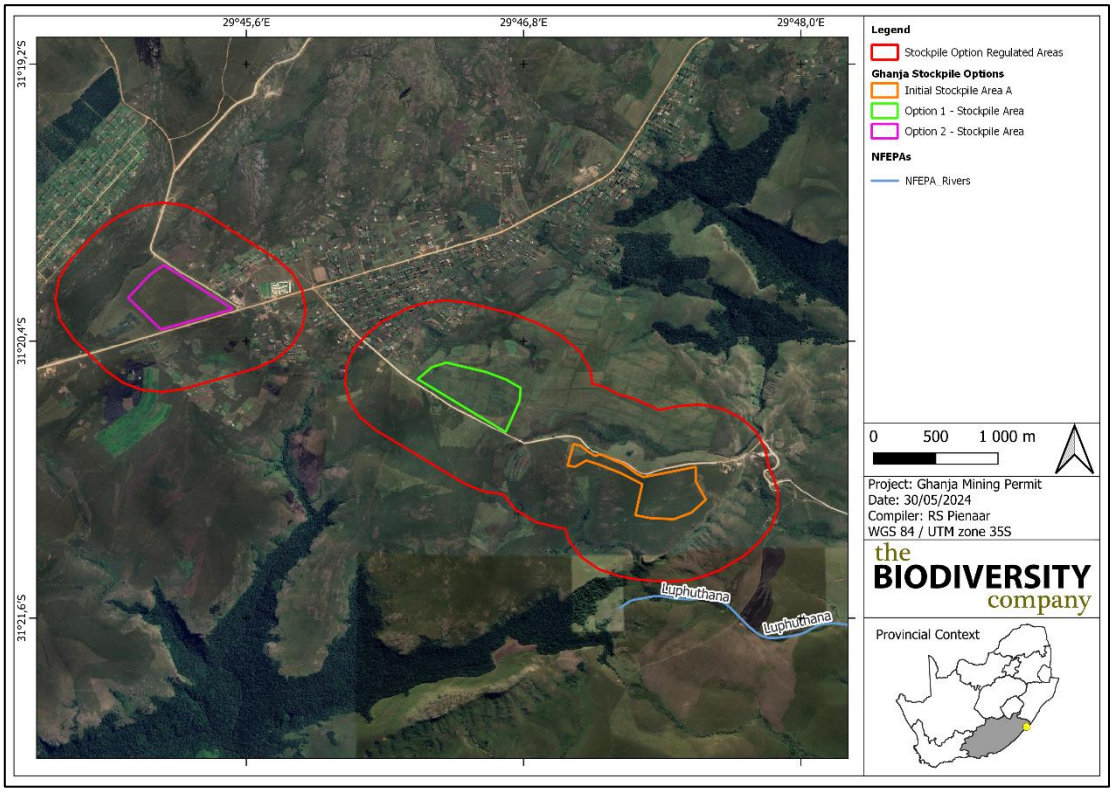

Figure 7-5 NFEPA Wetlands in relevant to the project

7.6.2.3 Eastern Cape Conservation Plan

The Eastern Cape's Biodiversity Conservation Plan (Berliner et al 2007) addresses the urgent need to identify and map critical biodiversity areas and priorities for conservation in the province.

All Stockpile options overlaps with a CBA 1 area (Figure 7-6).

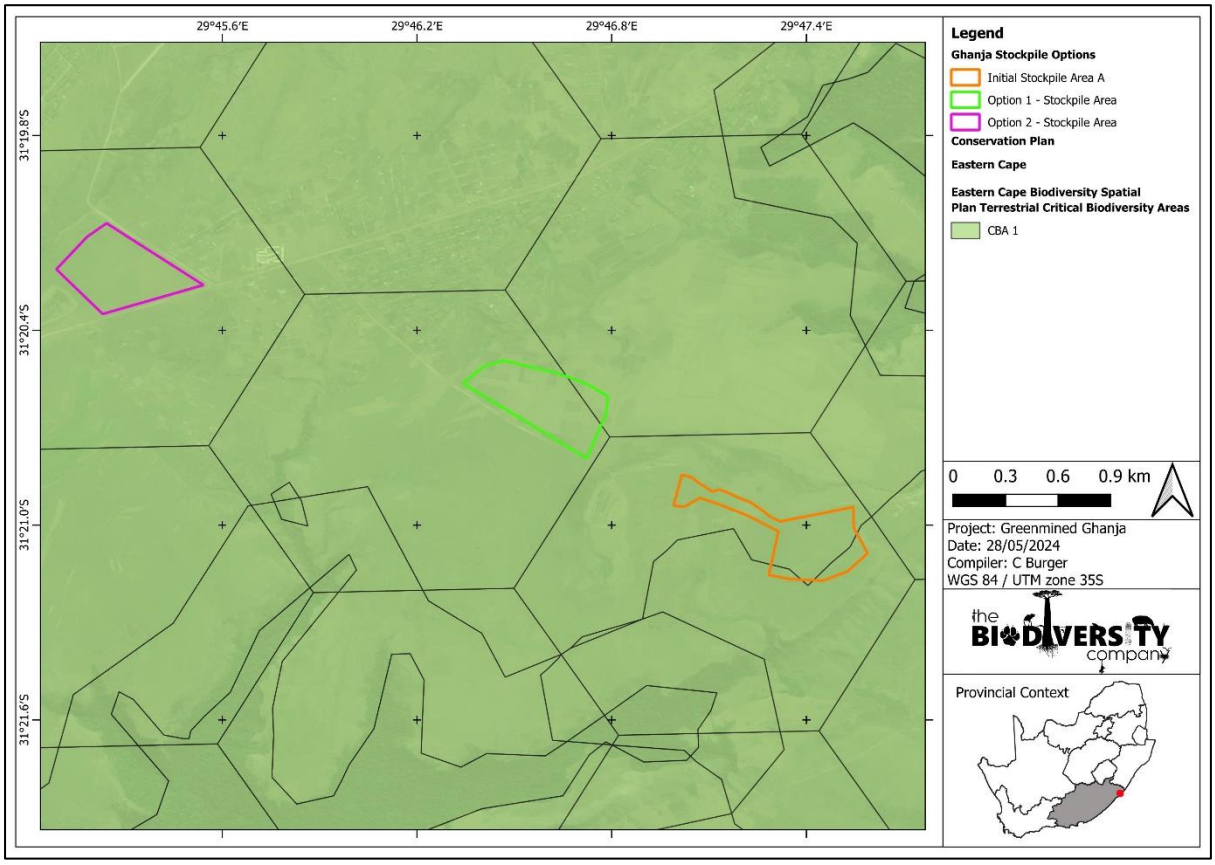

Figure 7-6 Map illustrating the PAOI in relation to the Northern Cape CBA Map.

7.6.3 Conclusion

Based on the desktop assessment undertaken it was found that the Stockpile Option 1 area is considered to be the most viable option for the stockpile area from a wetland ecological perspective. It is evident that from a desktop study Option 1 is the furthest away from any NFEPA or SAIIAE wetlands. This is however based on a desktop data and must be verified by a site inspection.