

Wetland Delineation Assessment

For

Kangra Coal (Pty) Ltd:

Ballengeich Colliery

March 2025



M²ENCO



Title:

Wetland Delineation Study for Kangra Coal: Ballengeich Colliery located on Farm Ballengeich 3299 HS, Newcastle in the Province of KwaZulu-Natal

Client:

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EXECUTIVE SUMMARY

According to the South African National Biodiversity Institute's (SANBI) Atlas for Freshwater Ecosystem Priority Areas (Nel, *et al* 2011), the project area is situated within the V31K quaternary catchment. Rivers and wetlands within this quaternary catchment (V31K) are considered as Freshwater Ecosystem Priority Area (FEPA). The V31K quaternary drainage area forms part of the Pongola-Mtamvuna Water Management Area (WMA 4). The Target Environmental Class (TEC) for the Horn River at the confluence with the Ngagane River is set as Category C. The riparian vegetation must be maintained at VEGRAI $\geq$ C Ecological Category.

Ballengeich Colliery is a defunct coal mining operation that is located within the 500-meter buffer zone of a channelled valley bottom wetland system that is linked with the Ngagane River system. Furthermore, the mine is situated on a topographical flat with direct impact by means of acid mine drainage (AMD) decanting into a floodplain wetland that is linked to the Horn River. During the late 1980's the Horn River was diverted away from a coal discard dump contributing towards an altered flow regime within the mining area. Decant areas were subsequently observed that seeps into a floodplain wetland that is situated adjacent to the Horn River. The AMD has a long-term residual impact on wetland functionality that requires the implementation of mitigatory measures.

Kangra Coal (Pty) Ltd has proposed the implementation of a passive AMD treatment system to address the uncontrolled decant to the Horn River. The approved passive treatment train comprises two Anoxic Limestone Drains (ALDs), a Successive Alkaline Producing System (SAPS), a Sedimentation/Oxidation Pond, and two Aerobic Wetland units, designed to a treatment capacity of 1,000 m³/day. The system has been designed by Bhekani (Pty) Ltd (conceptual, February 2023) and finalised by GFK Consulting Engineers (SWMP, March 2026) in accordance with the requirements of the Water Use Licence Application (WULA; DWS Ref: WU33839). As part of the partial fulfilment of the mitigatory actions needed in terms of an issued Directive, an action plan submitted to the Department of Water and Sanitation (DWS) was approved for implementation. The proposed passive treatment system could be implemented on a pilot scale but it is further subject to a Water Use License in terms of section 21(c) and (i) of the National Water Act, 1998 (Act 36 of 1998).

It is recommended that a Water Use Licence (WUL) in terms of Section 40 of the National Water Act, 1998 (Act No. 36 of 1998) for the Section 21(c) and (i) water uses be issued for the proposed rehabilitation activities on the relevant properties, as all



proposed activities encroach within the 500-metre protective buffer zone of both a floodplain and a channelled valley bottom wetland system. A formal Water Use Licence Application has been submitted to DWS under Reference WU33839.

ABBREVIATIONS

ADI	Area of Direct Impact
AII	Area of Indirect Impact
AMD	Acid Mine Drainage
DEAT	Department of Environmental Affairs and Tourism
DWA	Department of Water Affairs
DWS	Department of Water and Sanitation
EIA	Environmental Impact Assessment
EIS	Ecological Importance and Sensitivity
EMP	Environmental Management Plan
EN	Endangered
FEPA	Freshwater Ecosystem Priority Area
GIS	Geological Information System
GN	Government Notice
Ha	hectare
I&AP	Interested and Affected Party
Menco	M2 Environmental Connections (Pty) Ltd
NEMA	National Environmental Management Act, 1998
NFEPA	National Freshwater Ecosystem Priority Area
NGO	Non-Government Organisation
NWA	National Water Act, 1998
NWRS	National Water Resource Strategy
PES	Present Ecological State
REC	Recommended Ecological Class
SANBI	South African National Biodiversity Institute
SDF	Spatial Development Framework
SR	Significance Rating
TWQR	Target Water Quality Range
WULA	Water Use License Application



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Declaration of Independence

I declare that I, Johan Maré, act as the independent specialist for the wetland assessment of this application. I conduct assessments in an objective manner, even when the views and findings might not be favourable to the Applicant. I have the expertise to conduct the assessment and will comply with the Act, regulations and other applicable legislation. I do not have conflicting interests in the undertaking of the activity. I undertake to disclose all material information in my possession that has or may have the potential of influencing any decision to be taken in respect to the application.

Signature of Specialist	
Name of Company	M² Environmental Connections (Pty) Ltd (MENCO)
Date	17 March 2025



Appendix 6: GNR 326 – EIA Regulations of 7 April 2017

1. (1) A specialist report prepared in terms of these Regulations must contain— (a) details of— (i) the specialist who prepared the report; and (ii) the expertise of that specialist to compile a specialist report including a curriculum vitae; (b) a declaration that the specialist is independent in a form as may be specified by the competent authority; (cA) an indication of the scope of, and the purpose for which, the report was prepared; (cB) an indication of the quality and age of base data used for the specialist report; (d) the duration, date and season of the site investigation and the relevance of the season to the outcome of the assessment; (e) a description of the methodology adopted in preparing the report or carrying out the specialised process inclusive of equipment and modelling used; (f) details of an assessment of the specific identified sensitivity of the site related to the proposed activity or activities and its associated structures and infrastructure, inclusive of a site plan identifying site alternatives; (g) an identification of any areas to be avoided, including buffers; (h) a map superimposing the activity including the associated structures and infrastructure on the environmental sensitivities of the site including areas to be avoided, including buffers; (i) a description of any assumptions made and any uncertainties or gaps in knowledge; (j) a description of the findings and potential implications of such findings on the impact of the proposed activity or activities; (k) any mitigation measures for inclusion in the EMPr; (l) any conditions for inclusion in the environmental authorisation; (m) any monitoring requirements for inclusion in the EMPr or environmental authorisation; (n) a reasoned opinion— (i) as to whether the proposed activity, activities or portions thereof should be authorised; (iA) regarding the acceptability of the proposed activity or activities; and (ii) if the opinion is that the proposed activity, activities or portions thereof should be authorised, any avoidance, management and mitigation measures that should be included in the EMPr, and where applicable, the closure plan; (o) a description of any consultation process that was undertaken during the course of preparing the specialist report; (p) a summary and copies of any comments received during any consultation process and where applicable all responses thereto; and (q) any other information requested by the competent authority.	Refer Section 4 of the Report Refer page vi Refer Section 2 Refer Section 3 Refer Section 7.1 Refer Section 7 Refer Section 7.3 and 8.4 Refer Figure 7-1 Refer Figure 8-12 and Figure 8-13 Refer Section 3 Refer Section 8 and 9 Refer Table 8-27 Refer Section 8 Refer Section 9 Refer Section 9 Refer Section 9 Part of the WUL process Refer supporting IWWMP Refer issued DirectiveDWS Section 19 Directive, Ref: 16/2/7/V301/A/1,
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1. INTRODUCTION

Wetlands are widely recognised as being some of the richest and most productive ecosystems on the planet. Wetlands are protected by Law in South Africa (National Water Act, 1998 (Act No. 36 of 1998), which defines a wetland as “land which is transitional between terrestrial and aquatic systems where the water table is usually at or near the surface, or the land is periodically covered with shallow water, and which land in normal circumstances supports or would support vegetation typically adapted to life in saturated soil”.

Kangra Coal's Ballengeich Colliery is a defunct coal mine situated in the catchment of the Ngagane River that is part of the V31K quaternary drainage area. A channelled valley bottom wetland system is linked to the Ngagane River. An acid mine drainage (AMD) decant point is situated within the footprint of the delineated wetland. As part of the amelioration of the AMD problem, Kangra Coal (Pty) Ltd proposes to implement a passive AMD treatment system comprising two Anoxic Limestone Drains (ALDs), a Successive Alkaline Producing System (SAPS), a Sedimentation/Oxidation Pond, and two Aerobic Wetland units. Therefore, the mine's rehabilitation operations fall within the 500-metre buffer zone of the wetland, triggering the need for a Section 21(c) and (i) Water Use Licence Application procedure to be followed. A formal WULA has been submitted to the Department of Water and Sanitation (DWS) under Reference WU33839 (Phase 1 submitted November 2024; Phase 2 submitted June 2026). It was therefore requested by DWS that the necessary Wetland Assessment be conducted in order to determine the Present Ecological State (PES) and Recommended Ecological Class (REC) of the affected sensitive environment.

The mining right area is situated approximately 15 km south of Newcastle on the N11 and includes Portions 10, 11, 14, 19, and 25 of the farm Ballengeich 3299 HS. The locality of the project area is depicted in **Figure 1-1**.

The South African National Biodiversity (SANBI) National Freshwater Ecosystem Priority Areas (NFEPA) Wetlands (SANBI, 2011) as shown in were used to determine whether any wetlands of National Importance are found within the region. An initial wetland desktop study was conducted during March 2022 that was based on the NFEPA and SANBI data sets with the outcome thereof that a wetland borders the south-eastern corner of the mine's property. A follow-up field survey was conducted during June 2022 specifically covered portions of the farm Ballengeich 3299 HS, on which a channelled valley bottom wetland is situated.



Following the meeting held with the officials from the Department of Water and Sanitation on 5 November 2024 regarding the status of the action plan related to rehabilitation and a Water Use License Application process, a field survey was conducted on 5 December 2024 to clarify the mitigation measures to be implemented in accordance with the requirements as contemplated in GN 4167 of 8 December 2023. The decant point is situated within a flood plain wetland system linked to the Horn River and the Risk assessment conducted in terms of Appendix A of the mentioned Regulation revealed that the impact is high and subject to a section 21(c) and (i) Water Use License (WUL). In order to implement a passive water treatment system in this area on a pilot scale, the required wetland delineation study must be conducted to establish the baseline conditions prior to the implementation of the proposed mitigatory measures.

On a national scale wetlands of regional significance are found within the catchment of the Ballengeich Colliery operation. The channelled valley bottom wetland is situated within the 500-meter buffer zone with only the mine haul road and stormwater runoff that have the potential to impact on the system.

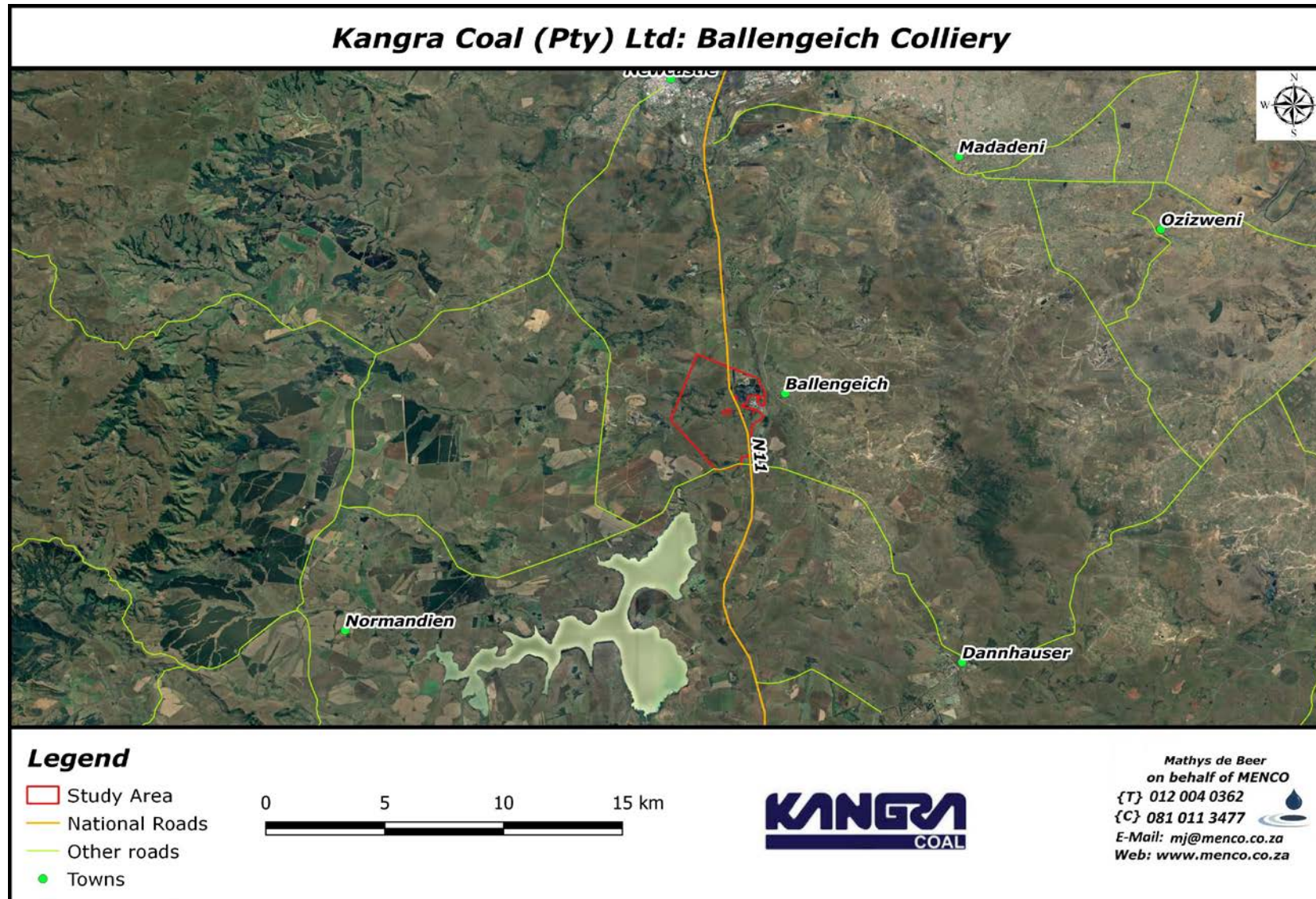


Figure 1-1: Locality Reference Map

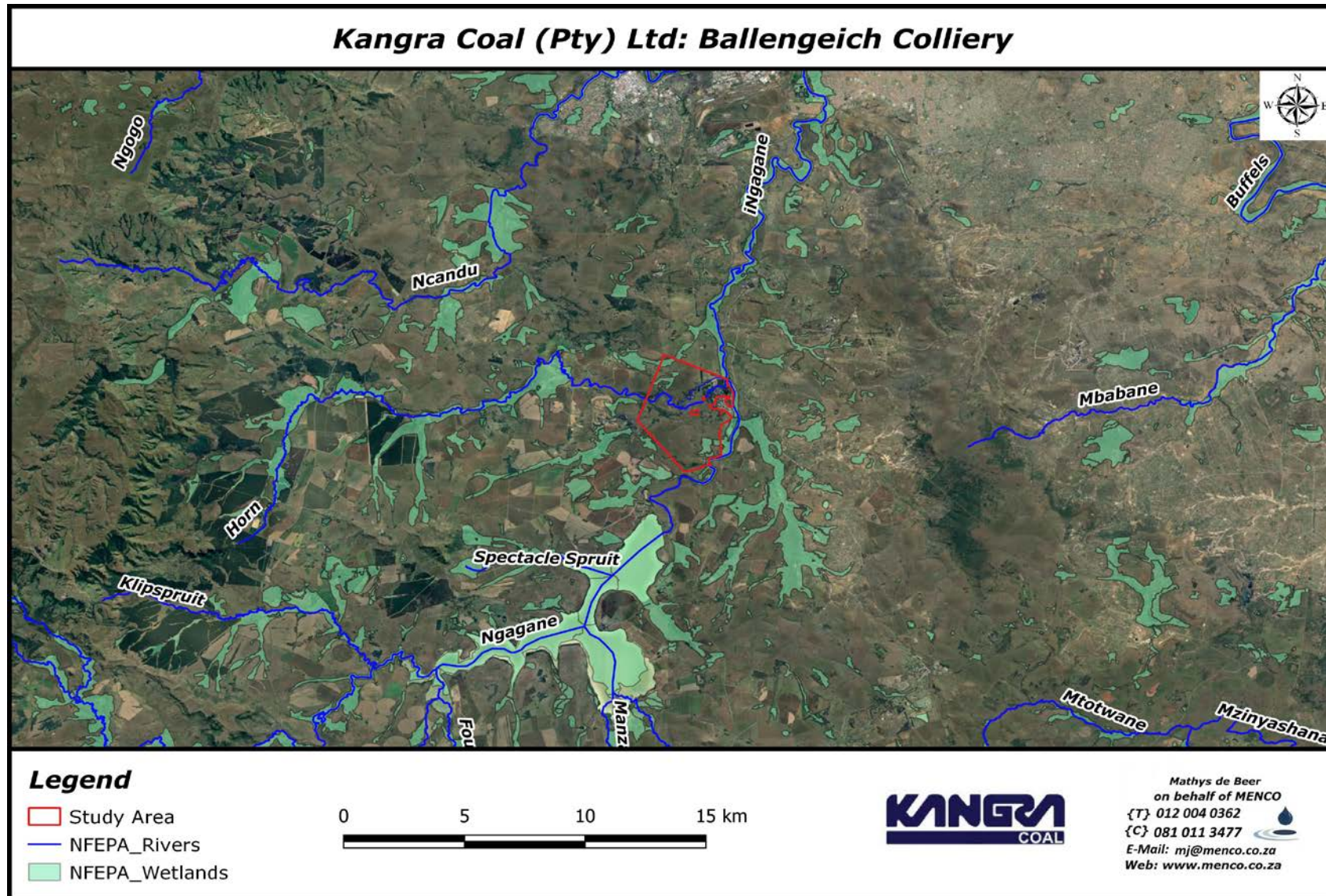


Figure 1-2: Delineated and NFEPA Wetlands in the vicinity of Ballengeich



2. TERMS OF REFERENCE

M2 Environmental Connections (Pty) Ltd (referred to as Menco) was appointed by Kangra Coal's Ballengeich Colliery (hereafter Ballengeich) to conduct the necessary wetland study for the Ballengeich Colliery project and gather all the necessary information needed for by the Regulatory Authority (DWS) in order to assess the water use licence application in support of a section 21(c) and (i) water use. Menco was also appointed to conduct the Aquatic Ecological Assessment as part of the WULA process.

The DWS has specifically requested that a PES and REC assessment be undertaken for the wetland. The study will incorporate these criteria as part of the information gathering phase in order to determine potential impacts on the wetlands

Therefore, the study included the following scope of work:

A desktop wetland assessment, which included:

- Classification of the main biome and description of the dominant vegetation type;
- Investigation of the riparian taxonomy within this region;
- Determination of the Ecoregion;
- Consultation of Biodiversity and National Databases;
- Geographical Interface Mapping and Modelling;
- Using the Wet-Tool to determine services and scores for the wetlands at Ballengeich Colliery; and
- Superimposing Buffer zones for the relevant wetland zones.

A comparative field survey was incorporated to:

- Conduct surface water analyses at the tributary (Horn River) of the Ngagane River by means of *In Situ* Monitoring and collection of surface water samples sent for analysis to Waterlab;
- Identify and determine the state of the Wetland areas on the property;
- Evaluate actual riparian vegetation composition in the area;
- Gather information regarding degrees of soil wetness using auger drilling; and
- Delineate the outer zone of wetlands accurately using software programming.¹

In addition to the surveys undertaken, the objective of the study was to also collate other specialist investigations undertaken in the area and from the available data:

- Conduct an impact assessment and provide mitigation measures and management plans to reduce severity of impacts to the Acid Mine Drainage

¹ My Tracks® software (Map My Tracks Software: Android Application - mapmytracks.com)



(AMD) aquatic ecology as well as the riparian zone in terms of flora and fauna in the region;

- Compile a report that embraces these requirements;
- Provide an Artificial Wetland Construction and Rehabilitation Plan to be incorporated into the IWWMP in support of the new WULA;
- Identify Storm water management principles to keep in mind with regards to Wetland management; and
- Recommendations that summarize the key findings.



3. DOCUMENT LIMITATIONS

In order to obtain definitive data regarding the biodiversity, hydrology and functioning of particular wetlands, studies should ideally be conducted over a number of seasons and over a number of years. This is particularly relevant for the assessment of Ecological Importance and Sensitivity of the wetland which should ideally be informed by multiple biodiversity studies.

However, cost implications and time constraints prevent such long-term studies, and the study therefore relied on information gained during several field surveys conducted during 2014 and 2016, desktop information for the area, information obtained from provincial conservation authorities and similar organisations, as well as professional judgement and experience gained during similar assessments.

Based on the above statement this particular study has the following limitations:

- This wetland assessment only outlines wetlands directly related to the study area and does not include wetlands outside the scope of work;
- Many other wetlands (wetland cluster) are found within the drainage of the Ngagane River and its tributaries and are not included in this wetland assessment;
- Wetlands as indicated by the latest SANBI Geographical Information Systems (GIS) database are indicated in Figure 1-2 and may or may not align to every extent of the desktop delineation and field delineation conducted as part of this study.
- The buffer zones indicated in this report are only applicable to the delineated wetland for this study and does not include buffer zones for other wetlands within the area as indicated by the desktop delineation and the SANBI GIS Database for wetlands of national priority.

SASS5 protocols rely greatly on the availability of biotopes within a stream or river (habitat), which is necessary for the benthic macro invertebrates to establish themselves within the ecosystem. The water level was a limitation as not all biotopes were present within the streams. For an accurate biological monitoring, there needs to be a multi seasonal and bi-annual assessment to generate the data for comparisons and trends. This is however a baseline studies and is representative of the events on the day.



4. EXPERTISE OF THE SPECIALIST

This study was conducted by *Johan Maré* of M2 Environmental Connections (Pty) Ltd. Mr. Maré holds a M.Sc degree in Microbiology from the University of Stellenbosch and has more than 35 years' experience in the field of Environmental Management. A list of studies related to wetland delineation is contained in **Table 4-1**.

Table 4-1: Project Experience

Client	Project
African Exploration, Mining and Finance Corporation (AEMFC)	Wetland delineation studies for Klippoortjie Mine and Vlakfontein Mine
AfriSam South Africa (Pty) Ltd	Wetland delineation studies for several quarries inclusive of Coedmore, Newcastle, Umlaas, Pietermaritzburg, Verulam, Ladysmith
Benoni Gold Mine (Pty) Ltd (BGM)	Wetland delineation study of the Blesbokspruit Wetland
Blue Hills Property Development	Wetland delineation study in support of a section 21(c) and (i) Water Use License Application
Canyon Coal (Pty) Ltd	Phalandwa Colliery Extension Project: Wetland Offset
Chevron SA	Wetland delineation study for Milly's as part of waste water treatment upgrade project
Eco Elementum (Pty) Ltd	Wetland delineation studies for several coal mining operations such as Kebrafields Mining, Roodepoort Colliery, Witbank Bricks, Van Oudshoornstroom and Vunene Colliery mining operations
Environmental Assurance (Pty) Ltd (Envass)	Wetland assessments for the Umlabu Coal Mining Project, Papkuilfontein, Lothair Paper Mill, Usuthu Colliery for portion 2 and 6, Elandsdrift Chrome Mine
ESKOM	Wetland delineation studies at Matla Power Station and Camden Power Station



Client	Project
Geo Pollution Technologies (Pty) Ltd	Wetland Delineation Studies for projects such as Broodsnyersplaas as part of the Makoya Inland Coal Terminal Project and wetland monitoring at the Eskom Ingula Project near Ladysmith
Imbabala Colliery	Wetland delineation study for a coal mining operation in Ermelo
Pan Palladium	Wetland delineation studies for the Altona Smelter Complex as well as the Pan Palladium Mining Project
Prescali Environmental Consultants (Pty) Ltd	Wetland Delineation for projects such as the Leandra Recreational Park Development, Phoenix Tailings Dam
Richmond Mining and Exploration (Pty) Ltd	Middelpunt Diamond Prospecting: Lakenvlei Wetland Delineation study
Rietspruit Crushers	Wetland Delineation study for a quarry project in the Upper Vaal Catchment near Ermelo
Sasol Limited	Wetland delineation projects for the conveyor crossings from Shondoni Shaft, Impumelelo and Thubelisha to SSC. Additional wetland studies at Zaaiwater Gas Pipeline crossing, Irenedale Shaft, Syferfontein Colliery
Savannah Environmental	Several wetland studies as specialist supporting documents as part of EIA studies which include the Transalloy Smelter Project, Cennergi Tshivasho IPP project near Lephalale, Umbani Power Station Project
Submerged Industrial	Wetland delineation studies for Elandsfontein Colliery as well as Weltevreden Coal project
William Patrick Bower (Pty) Ltd – Groenvlei Colliery	Wetland delineation studies of Lakenvlei and Groenvlei wetlands in support of a Water Use License Application



Mr Maré had been involved with wetland protection initiatives since 1993 as part of a governmental team participating with the Wildlife and Environment Society of South Africa (WESSA) under the coordination of David Lindley in order to delineate the Nylsvlei Wetland System. He has also completed an Advanced Wetland Delineation Course with the University of Pretoria. Mr. Maré is a member of WISA (WISA Member 26251) and an accredited Professional Natural Scientist with the South African Council for Natural Scientific Professions (SACNASP). His *Pri Sci Nat* registration number is 400092/91.



5. LEGAL ASSESSMENT

As prescribed in Government Notice No. 1199 dated 18 December 2009 “Replacement of General Authorization in terms of Section 39 of the National Water Act, 1998 (Act No. 36 1998)” for Section 21(c) and (i) water uses, some of the water uses excluded from the GN No. 1199 are related to wetlands and are:

6. *This Notice does not-*
 - a) *apply to the use of water in terms of section 21(c) and (i) for the rehabilitation of a wetland;*
 - b) *apply to the use of water in terms of section 21(c) and (i) within a 500-meter radius from the boundary of any wetland.*

According to the National Water Act, 1998 (Act No. 36 of 1998) (NWA) a watercourse refers to:

- a) *a river or spring;*
- b) *a natural channel in which water flows regularly or intermittently;*
- c) *a wetland, lake or dam into which, or from which, water flows; and*
- d) *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 National Water Act, 1998 (Act 36 of 1998) aims to manage the national water resources to achieve sustainable use of water for the benefit of all water users. This requires that the quality of water resources is protected and also requires integration of the management of water resources with the delegation of powers to institutions at the regional or catchment level.

The purpose of the Act is to ensure that the nation's water resources are protected, used, developed, conserved, managed and controlled in ways, which take into account:

- *Meeting the basic human needs of present and future generation*
- *Promoting equitable access to water*
- *Redressing the results of past racial discrimination*
- *Promoting the efficient, sustainable and beneficial use of water in the public interest*
- *Facilitating social and economic development*
- *Providing for the growing demand of water use*



- *Protecting aquatic and associated ecosystems and their biological diversity*
- *Reducing and preventing pollution and degradation of water resources*
- *Meeting international obligations*
- *Promoting dam safety; and*
- *Managing floods and droughts*

In the case that any of the above-mentioned activities should or would potentially take place within the 1:50 year flood line or 100 m horizontal distance of a watercourse, the following water uses are triggered and a formal application for a water use license need to be applied for:

- *Section 21(c)* impeding or diverting the flow of water in a watercourse; and
- *Section 21(i)* altering the bed, banks, course or characteristics of a watercourse;

Any construction activities therefore located within 500 m of a wetland boundary thus need to be authorized as a water use in terms of Section 21(c) and (i) by means of a License in terms of section 40 of the NWA.

Please refer to **Table 5-1** for a comprehensive summary on legislation applicable to wetland protection.

Table 5-1: Legislative framework for Wetland Protection

Legal Instrument	Purpose	Relevance
South African Constitution, 1996 (Act No. 108 of 1996)	The Constitution is the supreme law of the land and includes the Bill of rights which is the cornerstone of democracy in South Africa and enshrines the rights of people in the country. It includes the right to an environment which is not harmful to human health or well-being and to have the environment protected for the benefit of present and future generations through reasonable legislative and other measures.	The importance of promoting conservation of important areas such as Ramsar/NFEPA sites is recognized in the constitution. The environmental right also provides an obligation to prevent pollution and ecological degradation, promote conservation and secure ecologically sustainable development. This provides a strong basis for securing the long-term conservation of Ramsar/NFEPA sites for future generations.
National Environmental Management Act, 1998 (Act No. 107 of 1998)	The Act includes a set of environmental principles which further concretize the environmental right contained in the Constitution. The 18 Principles and 8 sub-principles address a wide range of aspects and apply to all organs of state. This includes the need to pay particular attention in management and planning to wetland resources, in areas prone to development	Given the importance of Ramsar/NFEPA sites, it is imperative that development activities with a potential impact on these sites are undertaken in such a manner that impacts to Ramsar/NFEPA sites are avoided, or where they cannot be altogether avoided, are minimized and remedied. In this regard, NEMA provides the legislative backing (including Impact Assessment



Legal Instrument	Purpose	Relevance
	pressure.	Regulations) for regulating development and ensuring that a risk-averse and cautious approach is taken when making decisions about activities with a potential impact on Ramsar/NFEPA sites. It also obligates anyone who causes significant pollution or degradation of the environment to take reasonable steps to ensure that further degradation is prevented or minimized.
The National Water Act, 1998 (Act No. 36 of 1998)	The purpose of the Act is to ensure that the nation's water resources are used, developed, conserved, managed and controlled in ways which ensure that basic human needs are met, equitable access to water is promoted and aquatic ecosystems and their biological diversity is adequately protected.	The NWA provides the legislative backing for protecting water resources, including wetland systems. This therefore supports actions required to safeguard or protect Ramsar/NFEPA sites from impacts to water resources. A key focal area of the act is the implementation of water management and protection strategies to ensure that water resources are sustainably managed. Key aspects here include (i) the classification of water resources; (ii) setting of resource quality objectives; (iii) determining and giving effect to the Reserve; (iv) 'duty of care' to ensure that water resources are not polluted and (v) control of emergency incidents. Requirements under the Act can therefore provide considerable support to management of Ramsar/NFEPA sites, particularly where such sites are threatened by poor water resource management. Water use is also strictly regulated under the Act whilst while systems for monitoring of water resources are also prescribed.
National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004)	The Biodiversity Act provides for the management and conservation of South Africa's biodiversity within the framework of the National Environmental Management Act.	The South African National Biodiversity Institute is established by this Act and is responsible for coordinating and implementing programs such as Working for Wetlands and Working for Water. These programs can provide considerable support to management of Ramsar/NFEPA sites where rehabilitation or control of alien invasive species is problematic. A three-tier hierarchy of plans is also catered for, providing for both spatial and strategic management planning. Of particular relevance, is Biodiversity Management Agreements (BMA) to implement any Biodiversity Management Plan. This is intended to formalize the emerging relationships between government and landowners and communities, but remains an



Legal Instrument	Purpose	Relevance
		adaptable and flexible option. This conservation option may very well be a vital means of making landowners responsible for managing sections of Ramsar/NFEPA sites eligible to receive assistance from government for land management in future.
Conservation of Agricultural Resources Act, 1967 (Act No. 43 of 1967)	The purpose of the Act is to control the utilization of the natural agricultural resources of the Republic (including wetlands) in order to conserve the soil, water sources and vegetation and the combating of weeds and invader plants.	Despite little agriculture typically taking place within Ramsar/NFEPA sites, the Act does provide for the Minister to prescribe control measures for the utilization and protection of water resources, including wetlands and the restoration and reclamation of eroded land. Directives issued under this Act may therefore be used to protect and rehabilitate wetland areas.
National Environment Management Act: Protected Areas Act, 2003 (Act No. 57 of 2003)	This Act provides for the protection and conservation of ecologically viable areas representative of South Africa's biological diversity and its natural landscapes and seascapes. It also seeks to provide for the sustainable utilization of protected areas and to promote participation of local communities in the management of protected areas.	For Ramsar/NFEPA sites declared as Protected Areas, the Act details requirements for the management of such areas. This includes various requirements related to management planning and development of a management plan. This includes (i) the need for consultation in preparing a management plan; (ii) the need to take account of integrated development plans of relevant municipalities; (iii) aspects to be included in the management plan. Other aspects such as monitoring and supervision, access control and restrictions relevant to protected areas are also addressed in the Act. For Ramsar/NFEPA sites not yet declared as Protected Areas, the Act provides the vehicle for improving the protection status of such areas in order to further strengthen their protection status.
National Heritage Resources Act, 1999 (Act No. 25 of 1999)	This legislation aims to promote good management of the national heritage resources, and to enable and encourage communities to nurture and conserve their legacy so that it may be bequeathed to future generations.	This Act provides for the protection and management of heritage resources. This includes the establishment of provincial heritage resources authorities who are responsible for management of heritage resources within each province. Such authorities may provide advice and assistance in managing heritage resources within Ramsar/NFEPA sites.
National Policies and plans		
National Spatial Biodiversity Assessment (NSBA)	The National Spatial Biodiversity Assessment (NSBA) represents South Africa's first national assessment of spatial priorities for conservation action, integrating terrestrial, river, estuarine and marine ecosystems, using available spatial data, biodiversity planning	The assessment highlights the poor implementation of catchment management planning in South Africa, owing to fragmented institutional arrangements, confusion about overlapping jurisdiction and areas of responsibility, and lack of appropriate management strategies



Legal Instrument	Purpose	Relevance
	software and a series of expert and stakeholder workshops	that bring wetlands to the fore in the water and natural resource sectors. This highlights the importance of ensuring that catchment management issues are incorporated into management planning for Ramsar/NFEPA sites.
Strategic Framework for Sustainable Development in South Africa	The development of a broad framework for sustainable development was initiated to provide an overarching and guiding National Sustainable Development Strategy. The Draft Strategic Framework for Sustainable Development (SFSD) in South Africa (September 2006) is a goal orientated policy framework aimed at meeting the Millennium Development Goals.	Biodiversity has been identified as one of the key crosscutting trends in the SFSD. The lack of sustainable practices in managing natural resources, climate change effects, loss of habitat and poor land management practices were raised as the main threats to biodiversity.
The National Water Resources Strategy (DWS, 2013)	The Second Edition of the National Water Resource Strategy (NWRS) describes how the water resources of South Africa will be protected, used, developed, conserved, managed and controlled in accordance with the requirements of the policy and law.	Chapter 5 of the NWRS recognized the importance of wetlands and the need for protection of riparian and wetland buffer areas as well as critical groundwater recharge areas.



6. DESKTOP FINDINGS

6.1 BACKGROUND

According to the South African National Biodiversity Institute's (SANBI) Atlas for Freshwater Ecosystem Priority Areas (2011), the project area is situated within a FEPA with regards to the rivers found in the V31K quaternary catchment (refer Figure 1-2).

From the SANBI GIS database all the wetlands identified in the vicinity of the Ballengeich Colliery are classified within the North Eastern Uplands Eco-Region 14. The dominant vegetation types are Natal Lowveld Bushveld, Natal Central Bushveld and Grassland (Moist Upland Grassland).

6.2 BIOPHYSICAL DESCRIPTION

1.1 Climate

The area receives summer rainfall that averages 650 mm per annum and varies between 600 mm and 900 mm per year. The regional climate is characterised by a moderate climate, i.e. summer rainfall, hot dry summers with the mean daily temperature between 20° – 30° C, and with high evaporation rates.

2. Hydrology

Surface water spatial layers such as the National Freshwater Ecosystems Priority Areas (NFEPA) Wetland Types for South Africa (SANBI, 2010) reflected the presence of several perennial and non-perennial rivers as well as alluvial wetland systems. Newcastle is located within the Pongola-Mtamvuna Water Management Area (WMA 4) and specifically within quaternary drainage area V31K. Please refer to Table 6-1 and Figure 6-5 for a brief description of the Thukela River with its main tributaries Ngagane, Buffalo and Horn Rivers.

Table 6-1: Description of Thukela River and Tributaries

Component	Description
Main tributaries	Buffalo, Ngagane, Horn Rivers
Catchment size in km ²	±30,000 km ²
Geology	Karoo Supergroup with rocks of Triassic System
Vegetation	Montane grasslands to <i>Acacia sieberiana</i> savanna
Mean annual precipitation (mm)	650 mm/a
Mean annual evaporation (mm)	1500 mm/a



Component	Description
Mean annual runoff (m ³)	3,799 Mm ³

The western boundary of Newcastle is characterised by mountainous terrain with the urban component situated on the flat terrain in the east. Most of the rivers in the V31K quaternary drainage area rise in the high lying mountainous area (western and north western parts) which drains into the Buffalo River which defines the eastern boundary of the catchment. The Buffalo River is the main northern tributary of the Thukela Water Basin and drains into the Thukela to its confluence close to Nkandla.

3. Land-Use

The Upper Buffalo is the most populated sub-catchment in the Thukela WMA. This particular catchment is centred in the Newcastle, Volsrust and Dannhauser urbanised areas and is characterised by numerous industrial and coal mining activities such as:

- AccillarMittal Steelworks;
- African Explosives and Chemical Industry (AECI);
- Karbochem;
- Operational and defunct coal mines (Durnacoal, CBR, Witklip, Kilbarchan).

The remainder of the land uses entail agricultural (irrigation, afforestation as well as conservation. The largest water user in the catchment is irrigation with a requirement of 50 Mm³ supplied from the Ntshingwayo and Zaaihoek Dams.

4. Wetlands

As stated in the Internal Strategic Perspective for the Thukela WMA (DWAF, 2005) the aquatic riparian habitats in this catchment require specific attention (refer **Figure 1-2**).

5. Regional Vegetation

The Kangra Ballengeich Project is situated within the North Eastern Uplands Ecoregion (Kleynhans *et al* 2005). The terrain morphology of Hills and Mountains (Moderate and High Relief) as well as Lowlands support vegetation types such as Natal Central Bushveld, Short Mistbelt Grasslands, North Eastern Mountain Grassland, Moist Upland Grassland and Patches of Afromontane Forest.

Refer to **Figure 6-3** and **Figure 6-4** for an illustration of the vegetation types.

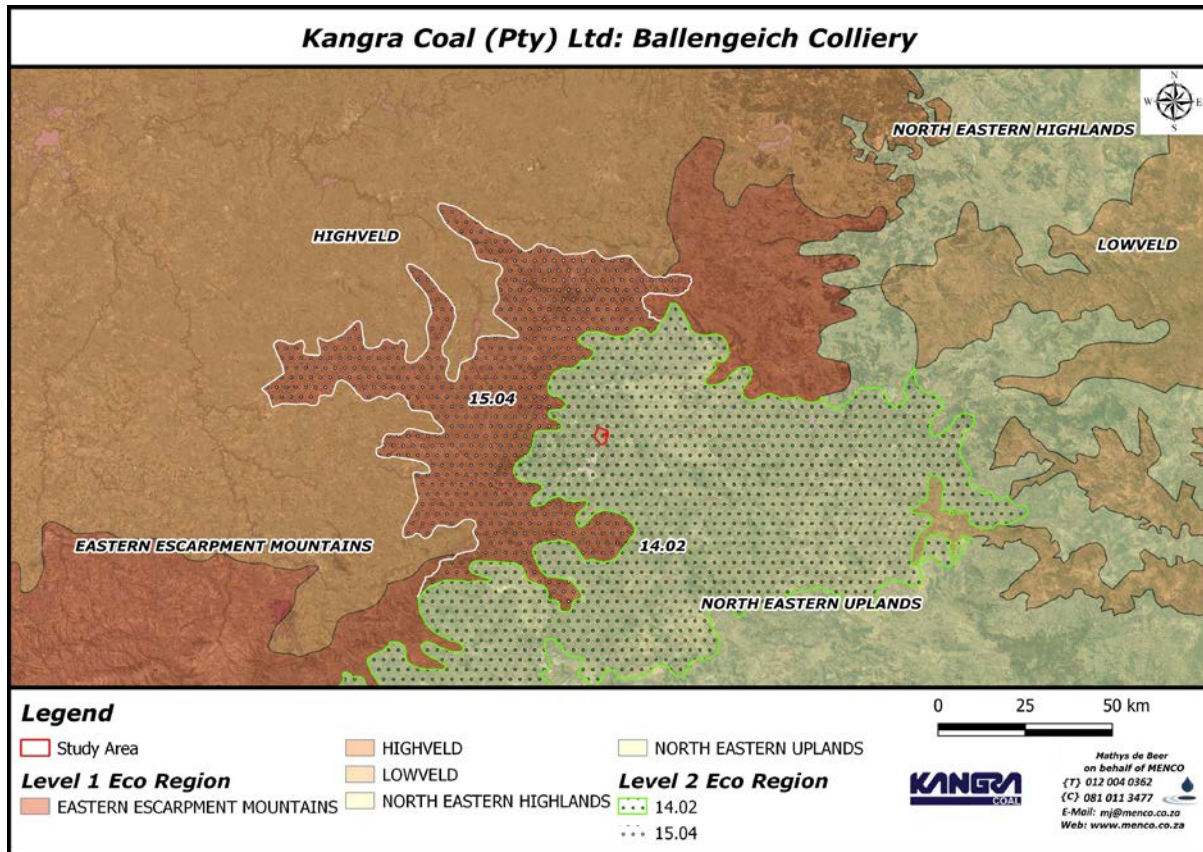


Figure 6-3: Vegetation types in relation to project area

The aquatic vegetation associated with the wetland system has the following species:

- *Andropogon eucomos* – Snowflake grass,
- *Imperata cylindrica* – Cottonwood grass,
- *Eragrostis racemose* – Love grass,
- *Heteropogon contortus* – Spear grass,
- *Hyparrhenia hirta* – Thatching grass,
- *Elionurus muticus* – Wire grass,
- *Prionum serratum* – Reeds
- *Phragmites australis* - Reeds.

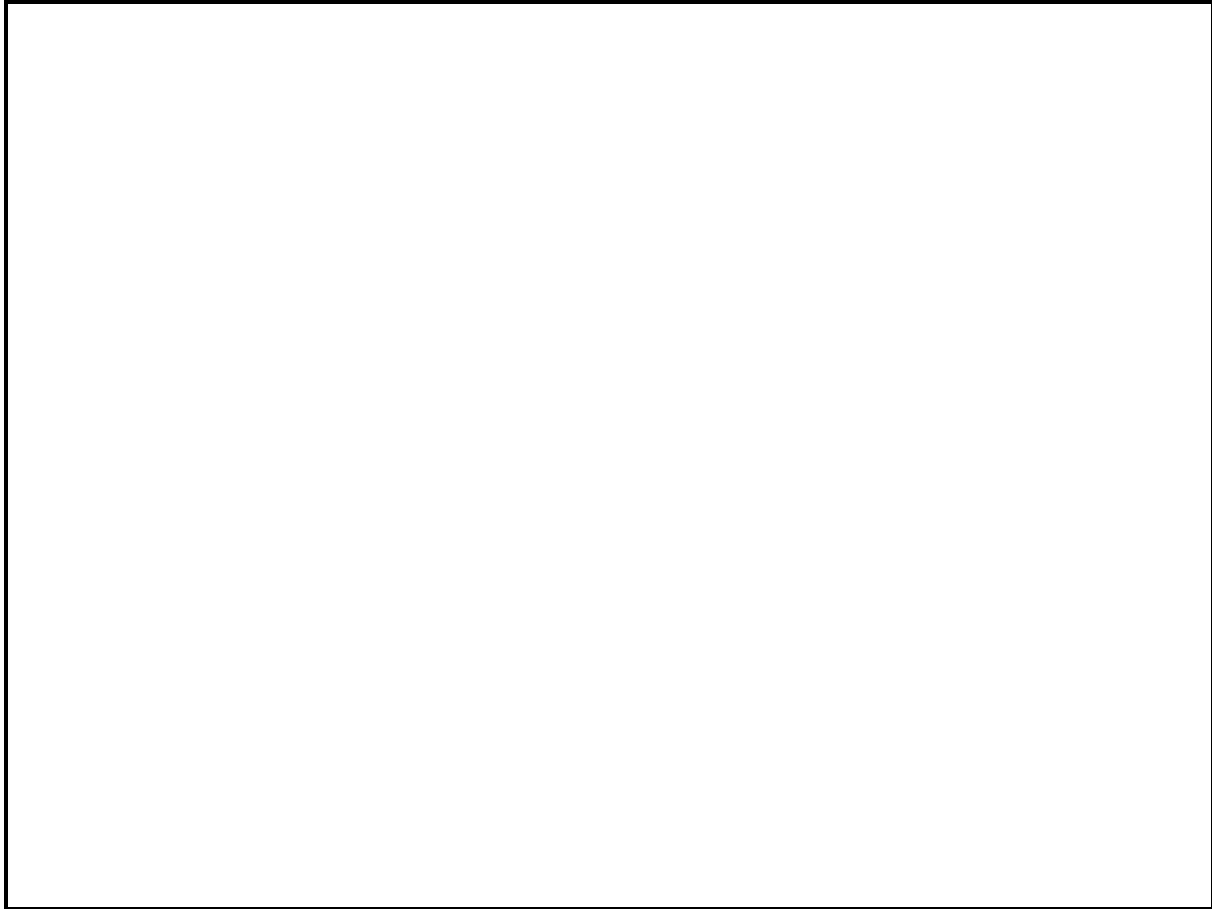


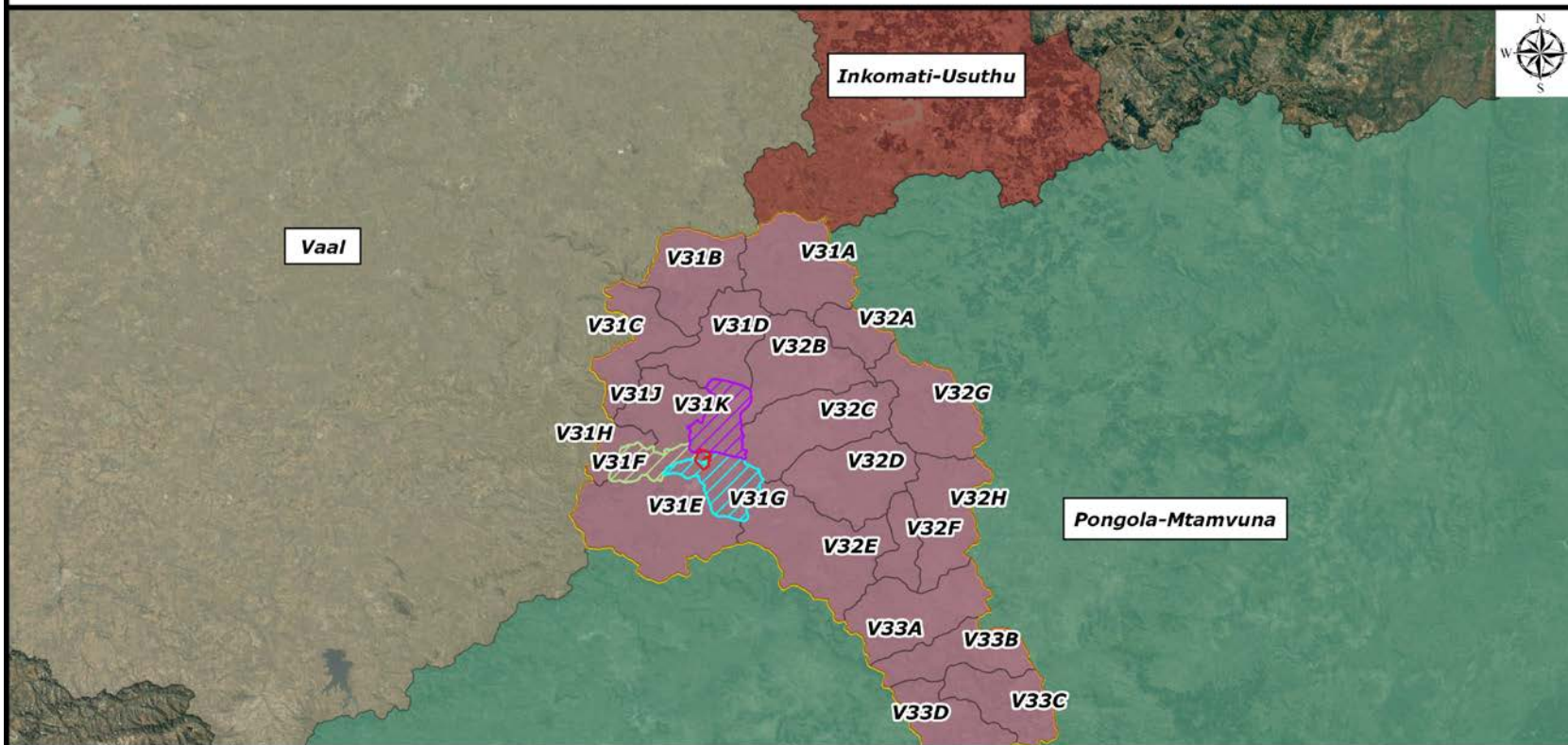
Figure 6-4: Dominant Cottonwool Grass within floodplain

Table 6-2: Information on vegetation types found in the Newcastle Area

Biome	Bioregion	Protection Status	Threatened Status
KwaZulu-Natal Highland Thornveld	Southern Tall Grassveld	1.6%	Least threatened
Northern KwaZulu-Natal Moist Grassland	Montane Grasslands	2%	Vulnerable



Kangra Coal (Pty) Ltd: Ballengeich Colliery



Legend

Study Area

Quaternary Catchments

Quaternary Catchments

V31F

V31G

V31K

Sub_Water Mannagement Areas

Buffalo

Water Mannagement Areas

Inkomati-Usuthu

Vaal

Pongola-Mtamvuna

0 25 50 km



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Figure 6-5: Thukela River Water Management Area

Table 6-3: Identified terrestrial and wetland vegetation at Ballengeich

Family	Common Name	Scientific Name	Category
Grasses			
Poaceae	Red grass	<i>Themeda triandra</i>	Grass
Poaceae	Hippo grass	<i>Ischaemum fasciculatum</i>	Grass
Poaceae	Couch grass	<i>Cynodon dactylon</i>	Grass
Poaceae	Common signal grass	<i>Brachiaria brizantha</i>	Grass
Poaceae	Natal red top	<i>Melinis repens</i>	Grass
Poaceae	Brown-seed finger grass	<i>Digitaria diagonalis</i>	Grass
Poaceae	Common thatching grass	<i>Hyparrhenia hirta</i>	Grass
Poaceae	Pan dropseed	<i>Sporobolus ioclados</i>	Grass
Poaceae	Narrow heart love grass	<i>Eragrostis racemosa</i>	Grass
Poaceae	Spreading Three-awn	<i>Aristida congesta subsp. barbicollis</i>	Grass
Poaceae	Gaint Spear Grass	<i>Trachypogon spicatus</i>	Grass
Poaceae	Kikuyu Grass	<i>Pennisetum clandestinum</i>	Grass
Poaceae	Thread-leaved Bluestem	<i>Diheteropogon filifolius</i>	Grass
Poaceae	Cottonwool grass	<i>Imperata cylindrica</i>	Grass
Poaceae	Blue Thatching Grass	<i>Hyparrhenia tamba</i>	Grass
Reeds			
Prioniaceae	Palmiet	<i>Prionum serratum</i>	Reeds
Typhaceae	Reeds	<i>Typha spp.</i>	Reeds
Trees			
Myrtaceae	Gum trees	<i>Eucalyptus spp.</i>	Tree
Salicaceae	Weeping willow	<i>Salix babylonica</i>	Tree
Fabaceae	Common hook-thorn	<i>Acacia caffra</i>	Tree
Invasive plants			
Poaceae	Common buffalo grass	<i>Panicum maximum</i>	Grass
Asteraceae	Blackjack	<i>Bidens spp.</i>	Herb (not woody)
Asteraceae	Cosmos	<i>Cosmos bipinnatus</i>	Herb (not woody)
Asteraceae	Tickseed	<i>Coreopsis lanceolata</i>	Herb (not woody)
Asteraceae	Tall khakiweed	<i>Tagetes minuta</i>	Herb (not woody)



Family	Common Name	Scientific Name	Category
Asteraceae	Dwarf marigold	<i>Schkuhria pinnata</i>	Herb (not woody)
Malvaceae	Bladder hibiscus	<i>Hibiscus trionum</i>	Herb (not woody)
Verbenaceae	Purple top	<i>Verbena bonariensis</i>	Herb (not woody)
Fabaceae	Red sesbania	<i>Sesbania punicea</i>	Shrub
Aizoaceae	Khakiweed	<i>Alternanthera pungens</i>	Spreading or flat-growing herb
Brassicaceae	Carrot weed	<i>Coronopus didymus</i>	Spreading or flat-growing herb
Fabaceae	Silver wattle	<i>Acacia dealbata</i>	Tree
Asteraceae	Common dandelion	<i>Taraxacum officinale</i>	Spreading or flat-growing herb



6. Soils

Soil sampling (auguring) was undertaken either to confirm whether an area was classified as a wetland or to delineate the boundaries of the wetland. Table 6-6 and Figure 6-6 below lists the soil forms and series found within the project area as illustrated in the Soil Zone Map compiled by Schulze *et al.* (1997). The soils encountered within the region are characterised by shallow, sandy and poorly drained with a marked effect on the vegetation.

Table 6-4: Soil forms encountered within the project area

Soil Zone	Form	Series
14	Longlands, Avalon	Lo21, Va41, Gs15, Sw40, Sw41, Av26
20	Mispah Hutton, Clovelly	Ms20, Gs28, Hu16, Sd20, Cv16

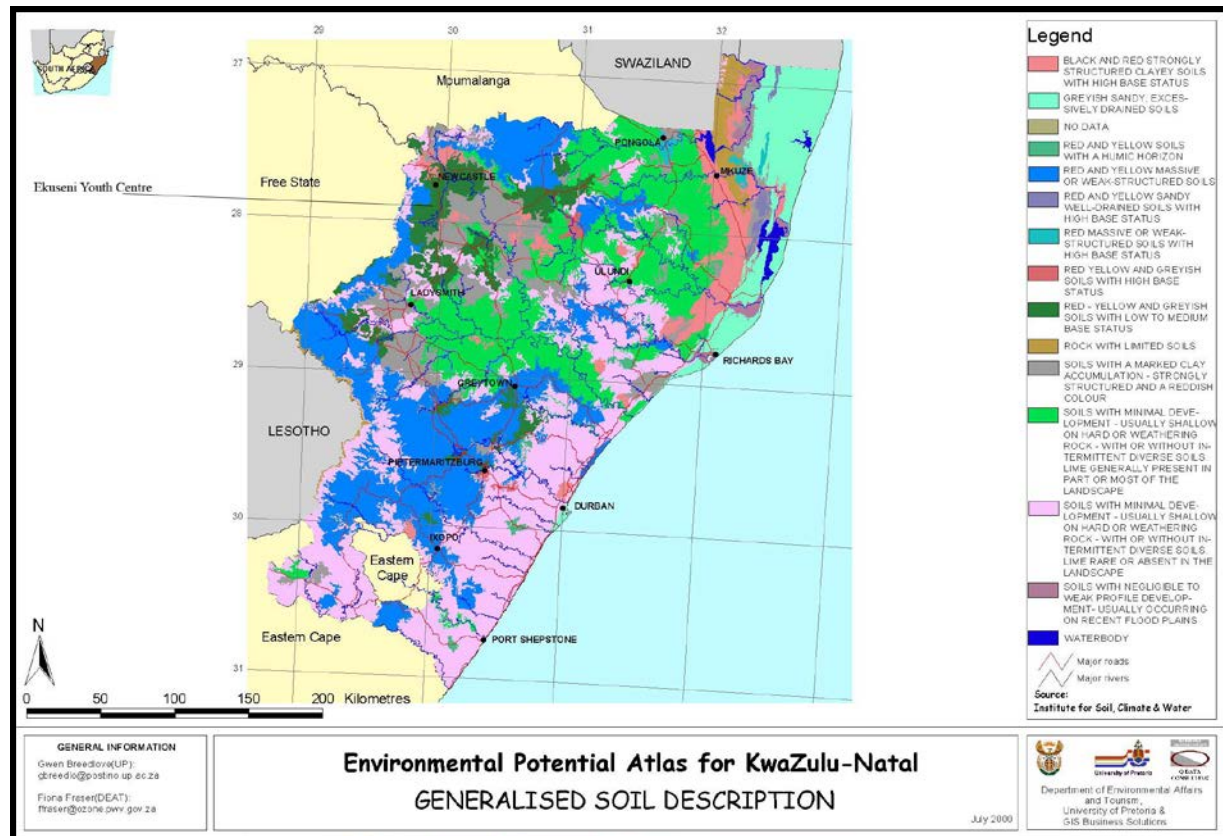


Figure 6-6: General soil description



7. METHOD OF ASSESSMENT

7.1 METHODOLOGY

The assessment was conducted as part of a three-phased approach. The first phase consisted of a rapid desktop assessment. The second phase was conducted in field to gather data. The third phase consisted of a second desktop assessment by combining field data and desktop data.

1. Rapid desktop assessment:
 - o Google Earth satellite imagery;
 - o Aerial photographs; and
 - o GIS mapping software (Maverick and Quantum GIS).
2. Field assessment by identifying the presence of one (at least) or more of the following attributes:
 - o Wetland/hydromorphic soils;
 - o Hydrophytes; and
 - o High water table.
3. Combining desktop data, field data and calculating the Wetland Index of Habitat Integrity (DWA, 2007) by using the following indices:
 - o Present Ecological Status (PES);
 - o Ecological Importance and Sensitivity (EIS); and
 - o Ecosystem Services supplied by wetland.

The following sections deal with the Wetland Index of Habitat Integrity as performed as part of the third phase of the study approach.

7.2 WETLAND DELINEATION AND ASSESSMENT

6.1.1 Present Ecological Status

Wetland functionality is defined as a measure of the deviation of wetland structure and function from its natural reference condition. In the current assessment the hydrological, geomorphological and vegetation integrity was assessed for the wetland units associated with the farm Ballengeich 3299 HS in order to provide a Present Ecological Status (PES) score. The health categories used to describe the integrity of the wetland is contained in Table 7-7.

**Table 7-5: Health categories used for describing Wetlands (WET-Health)**

Description	Class Boundary	Health Status
Unmodified natural	>4	A
Largely natural with few modifications. A slight change in ecosystem processes is discernable and a small loss of natural habitats and biota may have taken place	>3 and ≤4	B
Moderately modified. A moderate change in ecosystem and loss of natural habitats has taken place but the natural habitat remains predominantly intact	>2 and ≤3	C
Largely modified. A large change in ecosystem processes and loss of natural habitat and biota has occurred	2	D
The change in ecosystem processes and loss of natural habitat and biota is great but some remaining natural habitat features are still recognizable.	>0 and <2	E
Modifications have reached a critical level and the ecosystem processes have been modified completely with an almost complete loss of natural habitat and biota	0	F

The present Ecological status (PES) method (DWAF, 1995) was used to establish the integrity of the wetlands located within the project area. This method is based on the modified Habitat Integrity Approach developed by Kleynhans (DWAF, 2005). Anthropogenic modification of the criteria and its attributes can have an impact on the ecological integrity of the wetland as contained in Table 7-8.

Table 7-6: Habitat Integrity Assessment criteria for wetlands

Criteria and Attributes	Relevance
Hydrological	
Flow modification	Consequence of abstraction, regulation by impoundments or increased runoff from human settlements or agricultural land. Changes in flow regime, volumes, velocity which affect inundation of wetland habitats resulting in floristic changes or incorrect cues to biota. Abstraction of groundwater flows to or from a wetland.
Permanent Inundation	Consequence of impoundment resulting in destruction of natural wetland habitat and cues for wetland biota.
Water Quality	
Water quality modification	From point or diffuse sources. Measured directly by lab analysis or assessed indirectly from upstream agricultural activities, human settlements and industrial activities.
Sediment load modification	Consequence of reduction due to entrapment by impoundments or increase due to land use practices such as overgrazing. Cause of unnatural rates of erosion, accretion or infilling of wetlands and change in habitats.



Hydraulic / Geomorphic					
Canalization		Results in desiccation or changes to inundation patterns of wetland and thus changes in habitat. River diversions or drainage.			
Topographic alteration		Consequence of infilling, ploughing, dykes, trampling, bridges, roads, railway lines and other substrate disruptive activities which reduce or change wetland habitat.			
Biota					
Terrestrial encroachment		Consequence of desiccation of wetland and encroachment of terrestrial plant species due to changes in hydrology or geomorphology. Change from wetland to terrestrial habitat and loss of wetland function.			
Indigenous vegetation removal		Direct destruction of habitat through farming activities, grazing or firewood collection affecting wildlife habitat ad flow attenuation functions, organic matter input and increase in potential for erosion.			
Invasive plant encroachment		Affects habitat characteristics through changes in community structure and water quality (oxygen reduction and shading)			
Alien fauna		Presence of alien fauna affecting faunal community structure			
Over utilization of biota		Overgrazing and over fishing			
Attributes above are rated and scored as one of the following:					
Natural/unmodified	5	Largely natural	4	Moderately modified	3
Largely modified	2	Seriously modified	1	Critical modified	0

The PES of the wetland was based on the available information for each criterion listed in Table 7-8 and the mean score determined (refer Table 7-9). This methodology is based on the assumption that extensive degradation of any wetland attributes may determine the PES Class (DWAF, 2005).

6.1.2 Ecological Importance and Sensitivity

The Ecological Importance and Sensitivity (EIS) assessment was conducted according to the guidelines as prescribed by the Department of Water and Sanitation (DWAF, 1999). In this guideline DWS defines “ecological importance” of a water resource as an expression of its importance to the maintenance of ecological diversity and function on local and wider scales (regional, national). Ecological sensitivity refers to the system’s ability to resist disturbance and its capability to recover disturbance once it has occurred.

In the method outlined by DWS a series of determinates for EIS are assessed for the wetlands on a scale of 0 to 4 (refer Table 7-9), where 0 indicates no importance and 4 indicates very high importance. The median of the determinants is used to determine the EIS of the wetland unit (refer Table 7-10).

**Table 7-7: Score sheet for determining EIS**

Primary determinants
• Rare and endangered species
• Species/taxon riches
• Diversity of habitat types or features
• Migration route/breeding and feeding site for wetland species
• Sensitivity to change in the natural hydrological regime
• Sensitivity to water quality changes
• Flood storage, energy dissipation and particulate/element removal
Modifying determinants
• Protected status
• Ecological Integrity

Table 7-8: Ecological Importance and Sensitivity categories

Range of median	EIS Category	Category description
>3 and ≤4	Very High	Wetlands that are considered ecologically important and sensitive on a national scale. The biodiversity of these wetlands is usually very sensitive to flow and habitat modifications. Play major role in moderating the quantity and quality of water in major rivers.
<2 and ≤3	High	Wetlands that are considered to be ecological important and sensitive. The biodiversity of these wetlands is usually very sensitive to flow and habitat modifications. Play a role in moderating the quantity and quality of water in major rivers.
>1 and ≤2	Moderate	Wetlands that are to be considered to be ecological important and sensitive. The biodiversity of these wetlands is not usually sensitive to flow and habitat modifications. Play a small role in moderating the quantity and quality of water in major rivers.
>0 and ≤1	Low/Marginal	Wetlands that are not ecological important and sensitive at any scale. The biodiversity of these wetlands are ubiquitous and not sensitive to flow and habitat modifications. Play an insignificant role in moderating the quantity and quality of water in major rivers.

6.1.3 Ecosystem Services supplied by the Wetland

The assessment of the ecosystem services supplied by the identified wetland units was conducted according to the guidelines as described by Kotze et al (2005). A level 2 assessment was undertaken which examines and rates *Natural* as well as *Human* Services.



The following natural services were assessed by means of the Wetland Assessment Datasheet (WetTool):

- Flood attenuation;
- Stream flow regulation;
- Sediment trapping;
- Phosphate trapping;
- Maintenance of biodiversity;
- Nitrate removal;
- Toxicant removal;
- Erosion control; and
- Carbon storage.

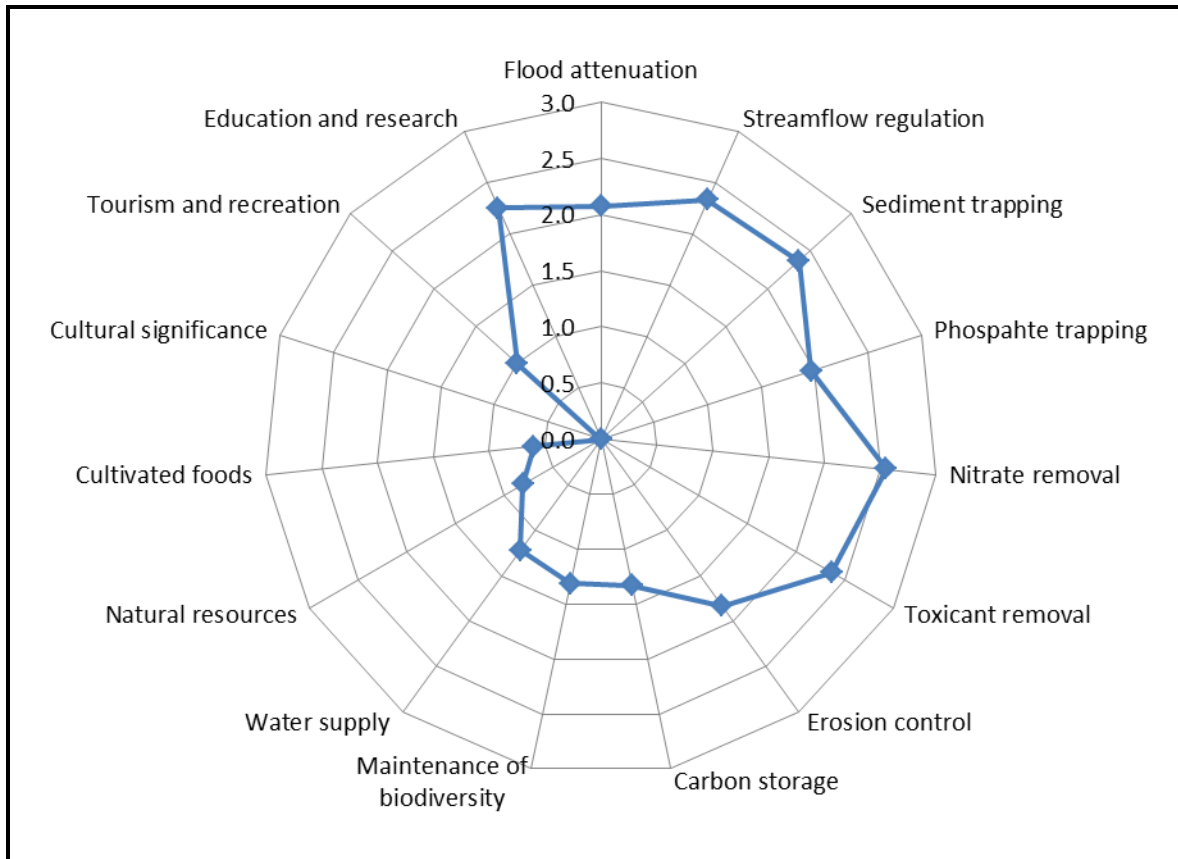


Figure 7-7: Ecosystem Services Graph for CVB wetland

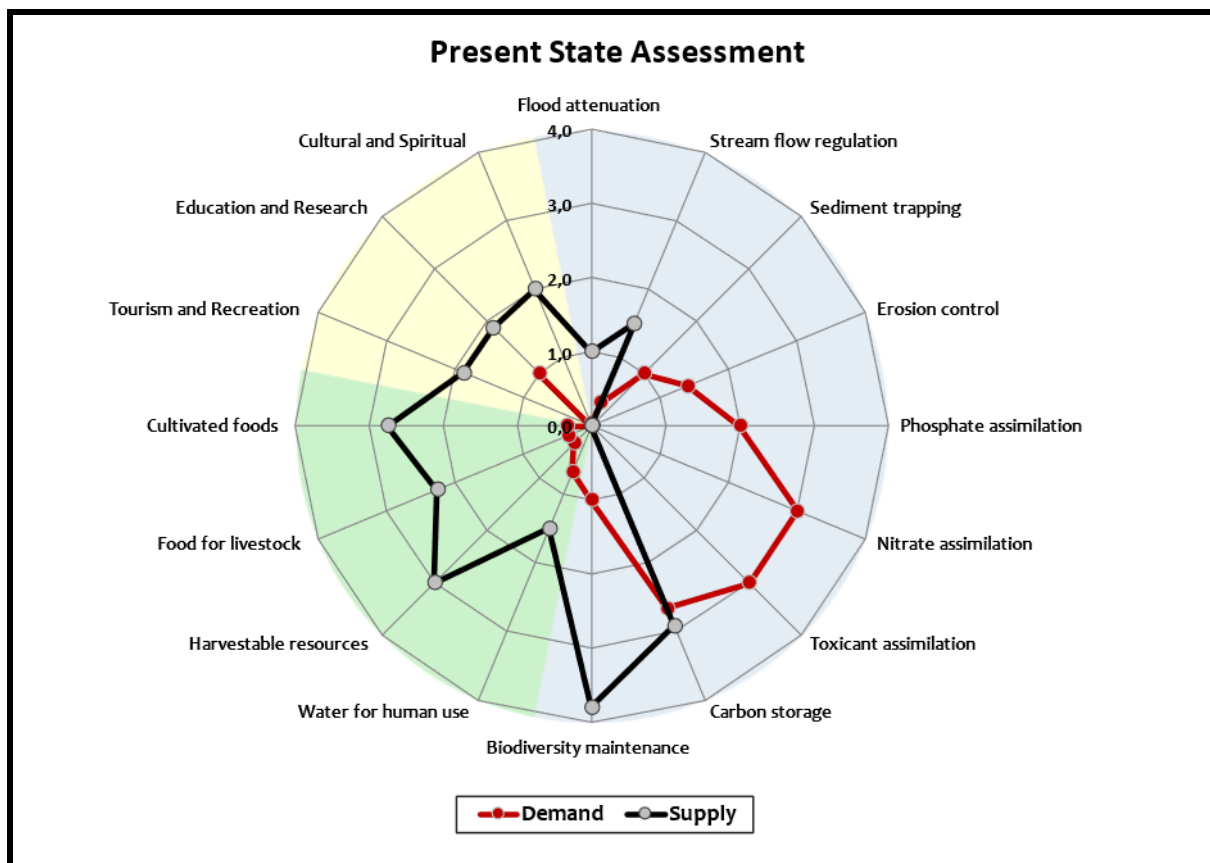


Figure 7-8: Present State Assessment for Floodplain Wetland

Scores for each of the above natural services assessment were allocated a class as outlined in Table 7-11. These scores were then added to determine the overall level of natural services for the wetland unit using the classes in Table 7-12.

Table 7-9: Classes for service scores

Class Boundary	Class Score
0 – 0.99	1
1 – 1.99	2
2 – 2.99	3
3 – 4	4

Table 7-10: Classes for the overall level of natural services provided by a wetland unit

Class Boundaries	Class	Class description
30 – 36	Very high	Unmodified, natural condition
24 – 29.9	High	Largely natural with few modifications
18 – 23.9	Moderate	Moderately modified, but with some loss of natural habitats
12 – 17.9	Low	Largely modified. A large loss of natural habitats and basic ecosystem functions has occurred
6 – 11.9	Very low	Seriously modified. The losses of natural habitats and basic ecosystem functions are extensive



Class Boundaries	Class	Class description
0 - 5.9	Non existent	Critically modified. Modifications have reached a critical level and the system has been modified completely with an almost complete loss of natural habitat.

The following human services indicators were assessed:

- Water supply for human use;
- Natural resources;
- Cultivated foods;
- Cultural significance;
- Tourism and recreation; and
- Education and research.

Scores for each of the above human services assessments were allocated a class as outlined in Table 7-12. These scores were then added to determine the overall level of human services for the wetland unit using the classes as shown in Table 7-13.

Table 7-11: Classes for overall level of human services provided by wetland unit

Class Boundaries	Class	Class description
20 -24	Very high	Local people are extremely dependent on the wetland and benefit from it greatly
16 – 19.9	High	Local people have a high level of dependence on the wetland and benefit from it considerably
12 – 15.9	Moderate	Local people are moderately dependent on the wetland and benefit from it occasionally
8 – 11.9	Low	Local people have a low dependency on the wetland and seldom benefit from it
4 – 7.9	Very low	Local people rarely rely on the wetland and almost never benefit from it
0 – 3.9	Non existent	Local people have no interaction with the wetland and never receive benefits from it.

7.3 WETLAND DELINEATION RESULTS

The project area is located in the V31K quaternary catchment, which forms part of the Pongola-Mtamvuna Water Management Area (WMA 4). The catchment area is about 227 km². The DWS has conducted a preliminary Reserve study for the catchment during December 2007. The Reserve study (under Reference 26/8/3/3/593 dated 24 May 2007) covered quaternary drainage area V31K in terms of surface and groundwater. The following Reserve data was presented as depicted in .



Table 7-12: Desktop Reserve data for quaternary catchment V31K

Sub Area	EIS	PES	REC	NMAR (10 ⁶ m ³)	EWR as % MAR
V31K	Moderate	C	C	1.096	0.68

As indicated in **Table 7-15** it was determined that the wetland obtained a Class C category in the Present Ecological State (PES) assessment, which indicates that, the habitat is moderately modified due to loss of natural habitats. The Ecological Importance and Sensitivity of the wetland is considered to be Moderate; the wetland was considered ecologically important on a provincial or local scale. The biodiversity of this valley bottom is not usually sensitive to flow and habitat modifications. The Hydrological Functional and Importance of this wetland is considered to be moderate; the wetland plays a small role in moderating the quantity and quality of water in major rivers. Direct Human Benefits obtained from this wetland is considered to be a Class D and consisted of uses such as grazing and livestock watering. This wetland contributes little towards the larger community.

Table 7-13: Summarised result for the wetlands at Ballengeich

Quaternary	Coordinates	Wetland	PES	EIS	Confidence	REC
V31K	27°53'25.42"S 29°57'46.40"E	Channelled Valley Bottom	C	Moderate	High	C
	27°53'27.56"S 29°57'44.18"E	Floodplain	C	High	High	C

Based on the hydro-geomorphic setting, a channelled valley bottom type wetland was identified in the project area. The hydrological benefits from this wetland are indicated in Table 7-16. The channelled valley bottom system is surrounded by farm land and is maintained by rain water precipitation draining the catchment that feeds into the wetland system. Flow within this wetland is therefore predominantly surface flow, generated as a result of rainfall events. The wetland has several functions still intact of which nutrient removal, flow regulation and sediment trapping appear to be most important.

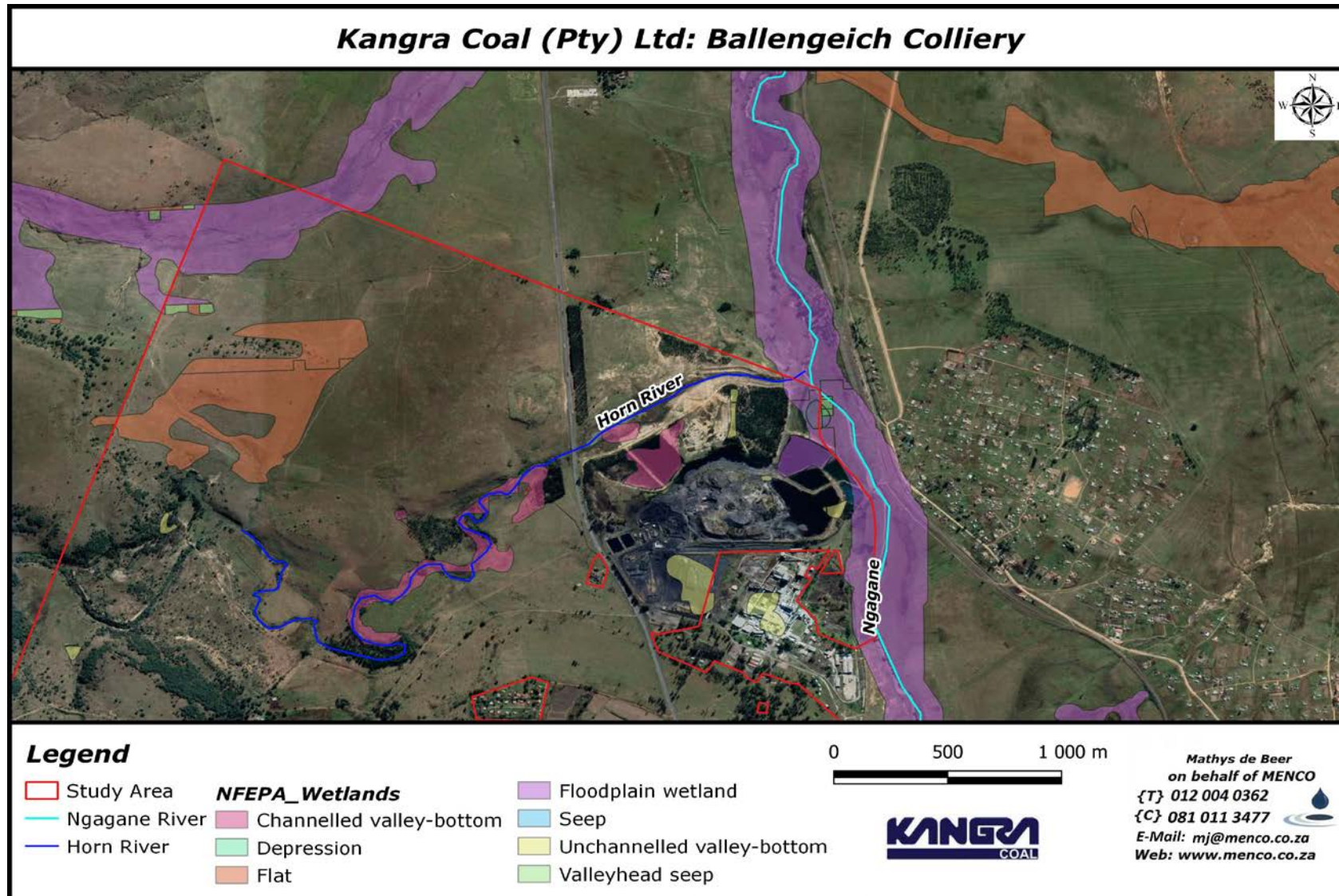


Figure 7-9: Locality of delineated bottom valley wetland with buffer zone



Figure 7-10 shows evidence of Acid Mine Drainage (AMD) seepage into the floodplain wetland before it discharges into the Horn River.



Figure 7-10: Flood plain wetland

The field survey has also revealed that the wetland soils at the auger points fluctuated from being permanently waterlogged to dry (indicative of seasonal mottling). The summarised results are contained in Table 7-15 and **Table 7-17**.

Table 7-14: Hydrological benefits provided by identified wetland units

Wetland Hydro- Geomorphic Type	Generic Hydrological benefits provided by the wetlands							
	Flood attenuation		Stream flow regulation	Erosion control	Sediment trapping	PO ₄	NO ₃	Toxicants
	Early wet season	Late wet season						
Floodplain	++	+	0	0	++	++	+	+
VBC	+	0	0	0	++	+	+	+
VBU	+	+	+	++	++	+	+	++
Hillslope	+	0	+	++	0	0	++	++
Hillslope not feeding stream	+	0	0	++	0	0	++	+
Depression	+	+	0	0	0	0	+	+
Rating	0 + ++	Benefit unlikely to be provided to any significant extent Benefit likely to be present at least to some degree Benefit very likely to be present (and often supplied to a high level)						



Table 7-15: PES, EIS, Hydro-functional Importance and Direct Human Benefits

Wetland	PES	EIS			Eco services	
		Ecological Importance & Sensitivity	Hydro-Functional Importance	Direct Human Benefits	Natural	Human
CVB	2.45 Class C	2.11	2.1	1.0	2.3	0.4
F	3.82 Class B	2.44 High	1.8	1.2		3.6

The wetland delineation manual of South Africa (DWAF, 2005) considers four wetland indicators in the delineation process namely:

- 1) terrain unit;
- 2) soil form;
- 3) soil wetness; and
- 4) vegetation indicators.

While a combination of the four indicators may be used in delineation, the soil wetness indicator is primary and vegetation indicator is confirmatory (DWAF, 2005). This criterion uses the soil forms in the Soil Classification of South Africa to delineate wetlands. The soil forms indicators in the permanent wet zone include the Champagne, Katspruit, Willowbrook and Rensburg forms. The existence of any of the four soil forms represents a wetland (DWAF, 2005).

Please refer to Figure 7-11 for a description of the wetland soils augured at the site.



Redoximorphic soil characteristics were encountered in the valley bottom wetland. The Orthic A topsoil that was underlain by a G-Horizon portrays distinctive iron mottling.

Figure 7-11: Description of the wetland soil



The terraces of the tributary of the Ngagane River are covered by deep, poorly drained, vertic clay with black topsoil overlying dark greyish, gleyed, calcareous subsoil of the **Rensburg form** (soil code Rg). Although the local soil water table has been lowered due to the incision of the river channel (therefore assuming the subsoil is presently displaying relic gleyed properties), the rusty streaking of the upper topsoil is proof of waterlogged conditions prevailing for long periods during the rainy season. The soils encountered within the project area have a low arable land use.

The hydrophilic vegetation was associated mainly with the seasonal and temporary wetland zones and permanent/ semi-permanent farm dam. There is a low abundance and frequency of hydrophilic plants in all temporary wetland zones. The wetlands are of moderate importance to the ecosystem functioning of the Ngagane River, which supplies water to downstream users (agriculture, mining, urban areas and conservation) and therefore must be managed with long term sustainability of these enterprises.

Table 7-16: EISC and PES of the applicable water courses

Attribute	Project Details
Water Management Area	Pongola-Mtamvuna (WMA 4)
Quaternary Drainage Region	V31K
Rivers	Ngagane River and its unnamed tributaries
DWA RQO PES	Class C
EISC	Class D
SANBI 1999 PES	Moderate



8. IMPACT RISK ASSESSMENT

The main purpose of this wetland study is to understand the significance of potential impacts and to develop strategies to ensure that impacts can be minimised or mitigated to an acceptable level. The identification of potential issues is broad and covers the construction as well as the operational phase of the proposed project.

Issues or impacts of low significance will not be carried through to the Impact Assessment, with supporting reasons, to ensure that the Impact Assessment phase focuses on the potentially “significant impacts” identified for the proposed project. This section of the Report identifies the full range of potential impacts. No significant impacts were identified that should be investigated in detail in an Impact Assessment Phase.

8.1 IMPACT ASSESSMENT CRITERIA

The criteria for the description and assessment of environmental impacts on the wetland environment were provided by the DWS during the recent consultation process followed for proposed amendments to the regulations. This risk assessment key was referenced from the DWS risk-based water use authorisation approach and delegated guidelines. The criteria were drawn from the EIA Regulations, published by the Department of Environmental Affairs and Tourism (DEAT, 1998) in terms of the NEMA.

The level of detail as depicted in the DWS Risk-Based Water Use Authorisation Approach and Delegation Guidelines was fine-tuned by assigning specific values to each impact. In order to establish a coherent framework within which all impacts could be objectively assessed, it was necessary to establish a rating system, which was applied consistently to all the criteria. For such purposes each aspect was assigned a value, ranging from one (1) to five (5), depending on its definition. This assessment is a relative evaluation within the context of all the activities and the other impacts within the framework of the project. An explanation of the impact assessment criteria is defined below in the Tables below Table 8-19.

Table 8-17: Ecological Importance of Affected Watercourses

Low EIS; OESAs; presence of species/habitats of Least Concern on the IUCN Red List or on a regional/national Red List and/or species which are common and widespread and/or habitats of low conservation interest	Low = 2
Medium EIS; ESAs; presence of species/habitats listed as VU or NT on the IUCN Red List; or listed as VU or NT on a regional/national Red List	Moderate = 3
High EIS; CBA2; presence of species/habitats listed as EN or CR on the IUCN Red List; or listed as EN or CR on a regional/national Red List	High = 4



Very high EIS; CBA1, NFEPA; presence of species/habitats listed as EN or CR on the IUCN Red List; or listed as EN or CR on a regional/national Red List; KBA or IBAs	Very high = 5
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Table 8-18: Intensity of Impact

Negative Impacts	
Negligible / non-harmful; no change in PES	0
Very low / potentially harmful; negligible deterioration in PES (<5% change)	+1
Low / slightly harmful; minor deterioration in PES (<10% change)	+2
Medium / moderately harmful; moderate deterioration in PES (>10% change)	+3
High / severely harmful; large deterioration in PES (by one class or more)	+4
Very high / critically harmful; critical deterioration in PES (to E/F or F class)	+5
Positive Impacts	
Negligible; no change in PES	0
Very low / potentially beneficial; negligible improvement in PES (<5% change)	-1
Low / slightly beneficial; minor improvement in PES (<10% change)	-2
Medium / moderately beneficial; moderate improvement in PES (>10% change)	-3
Highly beneficial; large improvement in PES (by one class or more) and/or increase in protection status	-4
Very highly beneficial; improvement to near-natural state (A or A/B class) and/or major increase in protection status	-5

Table 8-19: Spatial Scale of Impact

Very small portion of watercourse/s impacted (<10% of extent)	1
Moderate portion of watercourse/s impacted (10-60% of extent)	2
Large portion of watercourse/s impacted (60-80%)	3
Most or all of watercourse/s impacted (>80%)	4
Impacts extend into watercourses located well beyond the footprint of the activities	5

Table 8-20: Duration of Impact

Transient (One day to one month)	1
Short-term (a few months to 5 years) OR repeated infrequently (e.g. annually) for one day to one month	2
Medium-term (5 – 15 years)	3
Long-term (ceases with operational life)	4
Permanent	5

Table 8-21: Likelihood of Impact

Improbable / Unlikely	20%
Low probability	40%
Medium probability	60%
Highly probable	80%
Definite / Unknown	100%


Table 8-22: Risk Rating Classes

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

8.2 DETERMINATION OF SIGNIFICANCE

Determination of significance refers to the foreseeable significance of the impact after the successful implementation of the necessary mitigation measures. The Significance Rating (SR) is determined as indicated in .

Table 8-23: Calculations of Maximum Values

Intensity = Maximum Intensity Score (negative value for positive impact)	MAX = 5
Severity = Intensity + Spatial Scale + Duration (<Intensity - Spatial Scale - Duration> for positive impact)	MAX = 15 (MIN = -15 for +ve impacts)
Consequence = Severity X Importance rating	MAX = 75
Significance\Risk = (Consequence X Likelihood) X (100/75)	MAX = 100

Other aspects to take into consideration in the specialist studies are:

- Impacts should be described both before and after the proposed mitigation and management measures have been implemented.
- All impacts should be evaluated for the full-lifecycle of the development.



- The impact evaluation should take into consideration the cumulative effects associated with this and other facilities which are either developed or in the process of being developed in the region.
- The specialist studies must attempt to quantify the magnitude of potential impacts (direct and cumulative effects) and outline the rationale used. Where appropriate, national standards are to be used as a measure of the level of impact.

8.3 IDENTIFYING THE POTENTIAL IMPACTS

It is a general consensus that the defunct mining poses significant threats to the environment due to the uncontrolled decant activities causing long-term residual impacts. This is also applicable to active coal mining activities in the catchment although the environmental impacts are rated lower due to the fact that water resource management is linked to issued water use license authorisations. This is not the case with Ballengeich Colliery as the mine is subject to a WULA process.

As the proposed mine rehabilitation activities alters the drainage patterns of the catchment and in addition will have direct adverse effects on that specific aquatic feature as well as knock-on effect (indirect impacts) on the riparian vegetation and aquatic invertebrates within such a system, it will be subject to sections 21(c) and (i) water use license.

Generic key issues stemming from mining that are associated with aquatic ecology, wetlands and rivers are anticipated to include:

- Destruction of or alteration to FEPA wetlands and rivers;
- Modification of Ecological Support Areas;
- Movement of sediments into the river or wetland;
- Loss of soil and riparian vegetation due to mining infrastructure and mining front development;
- Disruption of stream flow in rivers; and
- Contamination of the wetland or river through the release of stormwater or other pollutants associated with operational activities.

Following the assignment of the necessary weights to the respective aspects, criteria are summed and multiplied by their assigned probabilities, resulting in a value for each impact (prior to the implementation of mitigation measures). Significance without mitigation is rated on the following scale as contemplated in . In order to gain a comprehensive understanding of the overall significance of the impact, after



implementation of the mitigation measures, it will be necessary to re-evaluate the impact.

8.4 AREAS OF INFLUENCE

In order to assess the impact of the mine activities and associated infrastructure on the wetland, various areas of potential impacts have been assessed as mentioned above. The first area is referred to as the “area of direct influence” (ADI) which is the area directly impacted upon by the AMD decant from the defunct mine as well as the proposed passive treatment system with SAPS and pipeline linking the mine with the remainder of the infrastructure. The second area is referred to as the “area of indirect influence” (AII) which includes the broader V31K quaternary catchment of the Ngagane River.

Area of direct influence (ADI)

The ADI for water resources is determined by:

- Interception of watercourse and drainage areas by the infrastructure associated with the Ballengeich constructed wetland Project for passive treatment of AMD;
- Reduction of base flow feeding the wetland caused by a drawdown cone resulting from treatment of AMD decant;
- Increased stormwater runoff from the affected footprint area due to hardened surfaces, roads, and areas of cleared vegetation; and
- Potential for accidental spillage or discharge from pollution control facilities.

In terms of the EIA methodology, the spatial extent of the ADI is referred to as “Local” and “Site Specific”.

Area of indirect influence (AII)

The Area of Indirect Influence (AII) is determined by the boundaries of the Ngagane River catchment as a portion of the storm water will drain towards this catchment. In terms of the EIA methodology, the spatial extent of the AII is referred to as “Regional”.

Please refer to , Table 8-19 **Table 8-22** and Table 8-23 for the identification and quantification of risks. The calculation of risk as illustrated in **Table 8-26** was done in accordance with the methodology as stated in and .



Table 8-24: Calculation of the severity rating based on the identified impacts at Ballengeich Colliery

No	Phase	Activity	Specialist assessment	Impact	Mitigation	Criteria	Risk rating without mitigation	Risk rating with mitigation
1	Planning	Acid Mine Drainage (AMD) decanting into Horn River causing environmental degradation of Horn and Ngagane Rivers	Geohydrology, Wetland, Aquatic Ecology, Waste Load Allocation, Hydrology, Hydropedology, Civil Engineering Design	AMD high in TDS and SO ₄ with low pH causes acidification of the receiving environment with deterioration in water quality and aquatic life	Interception of AMD to West Decant PCD via existing surface drainage; implementation of passive treatment system inclusive of two ALDs, SAPS, Sedimentation/Oxidation Pond, and two Aerobic Wetland units	Intensity: (Max = 10)	10	6
						Spatial: (max = 5)	3	3
						Duration: (max = 5)	4	4
						Severity: (max = 20)	17	13
						Importance: (max = 5)	5	4
						Consequence: (max =100)	85	52
						Likelihood: (0 – 100%)	100	80
						Significance: (max = 100)	85	41,6
Risk Rating:						High	Moderate	
2	C	Site Clearance & Construction of rehabilitation infrastructure at Ballengeich	Aquatic Ecology Biodiversity	Loss of dominated mesoic grassland and riparian Areas; destruction/transformation of 5 ha of riparian vegetation type along Horn River flood plain, Floral destruction and faunal displacement within a Vulnerable ecosystem	River rehabilitation measures to be implemented in accordance with conditions of a section 21(c) and (i) WUL	Intensity: (Max = 10)	6	4
						Spatial: (max = 5)	2	2
						Duration: (max = 5)	2	2
						Severity: (max = 20)	10	8
						Importance: (max = 5)	5	3
						Consequence: (max =100)	50	24
						Likelihood: (0 – 100%)	100	100
						Significance: (max = 100)	50	24
Risk Rating:						Moderate	Low	
3	C	Rehabilitation construction and heavy	IWWMP	Hydrocarbon & Chemical pollution of water and soil due to construction		Intensity: (Max = 10)	6	6
						Spatial:	2	2



No	Phase	Activity	Specialist assessment	Impact	Mitigation	Criteria	Risk rating without mitigation	Risk rating with mitigation
		machinery		vehicles and equipment, soil compaction		(max = 5)		
						Duration: (max = 5)	2	2
						Severity: (max = 20)	10	10
						Importance: (max = 5)	3	3
						Consequence: (max = 100)	30	30
						Likelihood: (0 – 100%)	60	60
						Significance: (max = 100)	18	18
						Risk Rating:	Low	Low
4	C	Construction of West Decant Sump infrastructure and AMD containment measures to convey artesian AMD decant to lined PCD	Civil Engineering Design	AMD to continue to discharge into Horn River during construction; disturbance in wetland area causing erosion and siltation	Construction to commence in dry season when AMD outflow is low, less rainfall to cause siltation, implement buffer zone, limit disturbed footprint	Intensity: (Max = 10)	8	6
						Spatial: (max = 5)	4	3
						Duration: (max = 5)	4	2
						Severity: (max = 20)	16	11
						Importance: (max = 5)	5	5
						Consequence: (max = 100)	80	55
						Likelihood: (0 – 100%)	100	60
						Significance: (max = 100)	80	33
						Risk Rating:	High	Moderate
5	C	Construction of Anoxic Limestone Drain or Trench below seeping PCD	Aquatic Ecology, Wetland, Engineering Design, IWWMP	Seepage of polluted water into Horn River, destruction of riparian vegetation, siltation	ALD neutralize the AMD and causes precipitation of metal ions improving water quality, rehabilitation of disturbed area to be transferred into constructed aerobic wetland, reinstate obligatory wetland plants, level 2 wetland monitoring	Intensity: (Max = 10)	8	6
						Spatial: (max = 5)	4	2
						Duration: (max = 5)	4	2
						Severity: (max = 20)	16	10



No	Phase	Activity	Specialist assessment	Impact	Mitigation	Criteria	Risk rating without mitigation	Risk rating with mitigation
						Importance: (max = 5)	5	4
						Consequence: (max =100)	80	40
						Likelihood: (0 – 100%)	100	60
						Significance: (max = 100)	80	24
						Risk Rating:	High	Low
6	C, O	Erosion Control	Stormwater Management Plan	Uncontrolled runoff causes erosion, silt deposition and exposure of carbonaceous material likely to cause further pollution of the Horn River	Implement SWMP in accordance with GN704 Regulations, fill-up eroded areas, implement river bed and bank stabilization measures (gabions), rehabilitation should include revegetation of eroded areas with indigenous grass seed mix	Intensity: (Max = 10)	8	6
						Spatial: (max = 5)	5	4
						Duration: (max = 5)	2	2
						Severity: (max = 20)	15	12
						Importance: (max = 5)	3	3
						Consequence: (max =100)	45	36
						Likelihood: (0 – 100%)	80	60
						Significance: (max = 100)	36	21,6
						Risk Rating:	Moderate	Low
7	C, O	Stormwater water management	SWMP, Engineering Design, IWWMP	Creating diversion in the natural drainage system causing an alteration of drainage patterns, construction of drainage channels and stabilisation with gabion structures, potential impact on catchment yield	Implement BPG on Stormwater management, separate clean from dirty areas, maximize clean areas and minimize dirty areas, contain dirty water in HDPE lined PCDs, monitor	Intensity: (Max = 10)	8	6
						Spatial: (max = 5)	4	3
						Duration: (max = 5)	4	2
						Severity: (max = 20)	16	11
						Importance: (max = 5)	3	3
						Consequence: (max =100)	48	33
						Likelihood:	80	80



No	Phase	Activity	Specialist assessment	Impact	Mitigation	Criteria	Risk rating without mitigation	Risk rating with mitigation
						(0 – 100%)		
						Significance: (max = 100)	33,6	26,4
						Risk Rating:	Moderate	Low
8	C, O	Reduce footprint of Old Discard Dump	SWMP, IWWMP	Discard Dump source of carbonaceous material that causes increased salinity in the catchment, contributing towards ground and surface water pollution	Reduce the footprint of dump by reworking the saleable material, implement SWM measures, contain runoff in PCD, intercept the diffuse seepage by means of ALD	Intensity: (Max = 10)	10	6
						Spatial: (max = 5)	4	4
						Duration: (max = 5)	3	3
						Severity: (max = 20)	17	13
						Importance: (max = 5)	5	4
						Consequence: (max =100)	80	52
						Likelihood: (0 – 100%)	100	80
						Significance: (max = 100)	80	41,6
9	O	Discharge of AMD into constructed passive wetland system	Civil Engineering Design, wetland delineation, IWWMP	A positive impact is anticipated as AMD neutralization will take place, waste load to the Horn River will be reduced in terms of Fe, Al, Mn and SO ₄ but salinity will remain high (TDS)	Construction in accordance with civil design parameters, neutralizing agents (limestone) for dosage of SAPS and ALD to be sufficient to ensure pH >7, vegetation to be done with selected wetland plants, maintenance of system on regular basis, monitor system as part of the pilot scale treatment process	Risk Rating:	High	Moderate
						Intensity: (Max = 10)	6	6
						Spatial: (max = 5)	3	3
						Duration: (max = 5)	5	5
						Severity: (max = 20)	14	14
						Importance: (max = 5)	5	5
						Consequence: (max =100)	70	70
						Likelihood: (0 – 100%)	80	80
						Significance: (max = 100)	56	56
						Risk Rating:	Moderate	Moderate

**Table 8-25: Mitigation and Management Plan**

Objective	Mitigation	Action Plan	Timing	Responsible Person	Significance after Mitigation
Limit or prevent erosion stemming from exposed areas related to the operation of the mine and associated infrastructure	Design the surface and storm water infrastructure to be within the footprint of the project area, separate clean from dirty water and allow discharge of water to designated areas. Vegetate disturbed areas to limit erosion	Limit the loss of the channelled valley bottom wetland not to allow any activity within the 500-meter buffer zone	Operational Phase	Works Manager	Low
Limit the alteration of the wetland catchment area	Delineate the sub-catchments and ensure that no dirty run-off from the project area transverse the wetland	Implement berms, trenches and storm water management measures in accordance with GN 704 Regulations to ensure no discharge of affected storm water into the catchment of the wetland	Operational and Closure Phases	Works Manager	Moderate alteration
Limit wetland soil compaction caused by road construction and fencing	Access servitudes should avoid wetland area and no activity allowed in the wetland area	Compacted soil areas in and around the periphery of the wetland will be ripped to break up compacted soil and vegetated with indigenous seed mix	On-going	Works Manager	Low
Mining development activities will be planned and managed to ensure no degradation of the wetland below Class C	The wetland and associated catchment will be regarded as a sensitive environment to be protected by an appropriate buffer zone in which no mining related activity should be allowed.	Apply for a section 21(c) and (i) water use authorisation and develop a Wetland Rehabilitation Plan to maintain the system at REC C/B.	Operational and Closure Phase	Works Manager	Low Moderate alteration
Prevent surface water contamination that could impact on the functionality of the wetland	All potential pollution risk areas need to be isolated and enclosed within the dirty footprint of the mine	Pollution Control Dams to be designed to cater for the required storage capacity	Construction and Operational Phase	Works Manager	Moderate



8.5 IMPACT ASSESSMENT

Activity 1: Rehabilitation of Defunct Coal Mine

The rehabilitation of the AMD source at the defunct mine has a moderate risk of altering the natural drainage of the catchment. It is envisaged to construct rehabilitation measures within a floodplain wetland that lies adjacent to the decant area. The old Discard Dump will be reworked to reduce the dirty footprint with improved stormwater management measures. Similarly, the construction of water management infrastructure could lead to increased and concentrated water discharges that may result in the altering of the wetland characteristics.

Activity 2: Discharge of acid mine drainage

The potential for direct discharge of the AMD to the Horn River has caused a high impact on the river as well as the linked floodplain wetland system. The Horn River water quality data has revealed deterioration of surface water quality on a seasonal variation basis and considering the assimilative capacity of the Ngagane River, the impact downstream of the confluence has been found to be moderate.

Activity 3: Erosion Control

The Drakensberg Escarpment including the Northern KwaZulu-Natal Moist Grassland range is regarded as an active erosion feature in a macro-geological context. The project area could be characterised as having a steep longitudinal gradient with a narrow valley cross sectional profile along the Horn River. This profile allows for a significant source of runoff feeding into the river systems especially from rehabilitated areas. Erosion gullies and river bank destabilisation is evident along the river channel causing the exposure of carbonaceous material that has the ability to cause moderate impacts on the riparian zone. It is therefore important to ensure that disturbed areas are properly managed by means of the implementation of gabion structures to prevent deep gully incisions that would eventually contribute toward erosion problems.

Activity 4: Stormwater Management

Wetlands in general are dynamic environmental features in terms of characterising the hydromorphology as they are associated with the movement of water. As described earlier in the report the hydrogeomorphic forms differ for the various hydrological regimes being channelled or un-channelled. Naturally occurring channels are considered dynamic features which determine the meandering shape of rivers. Silt deposition along with erosion is part of the hydromorphological process that drives channel formation. Uncontrolled storm water management can accelerate channel formation causing un-channelled wetlands to be drained. Accelerated channel formation has a moderate



negative impact on the catchment causing desiccation of the wetland and vastly reducing the ecological and water quality related functionality of the system.

Activity 5: Anoxic Limestone Drain

Due to the nature of the topography, there is a potential for contaminants from the constructed PCD's to infiltrate the channelled valley bottom wetland. This risk has been calculated as high and is therefore subject to mitigation. The mitigation measure to be implemented entails an ALD whereby the acidic seepage will be neutralised. The neutralised AMD outflow from the ALD will be further treated by means of the SAPS, Oxidation Pond, and Aerobic Wetland units that will be located along the Horn River corridor, integrated with the riparian zone of the Horn River. These constructed wetland units will also act as augmentation systems improving wetland eco-services in terms of sediment trapping, flood attenuation, and toxicant removal. The rehabilitation measures will have a positive impact on the Horn River

Activity 6: Clearing of vegetation altering FEPA wetlands

The removal of topsoil and vegetation as part of the preparation of a constructed wetland will result in the altering of a natural wetland. There is a slight risk that vegetation clearance will result in a low to moderate risk on loss of wetland biodiversity. If unmanaged, this would eventually lead to the alteration and modification of catchment drainage.



8.6 MANAGEMENT AND REHABILITATION

Management Objective

Rehabilitate degraded areas, including the re-establishment of biodiversity and the restoration of key processes which support long term persistence of biodiversity. It will be further required to:

- Maintain physical, chemical and biological processes in freshwater wetland areas.
- Alien plants and other invasive biota: Control and where possible eliminate alien/invasive biota to facilitate re-establishment of natural biodiversity pattern and process in invaded areas.
- Degraded land: strive towards re-establishment of biodiversity patterns and process in degraded land.

Management and Rehabilitation Actions

The following management measures and actions must be implemented:

- Improve understanding of freshwater wetlands and their functioning.
- Implement constructive wetlands as passive waste water treatment systems for the control of Acid Mine Drainage.
- Remove alien vegetation in freshwater wetland areas.
- Prevent or minimise development within freshwater wetlands.
- Prioritise areas for alien removal focusing on biodiversity restoration.
- Implement removal programs for priority species and areas (alien plants, mobile dunes).
- Investigate options for the control of alien species (e.g. biological control).
- Encourage and facilitate natural recovery of transformed areas.
- Rehabilitate discard dumps, pollution control dams, decommissioned roads and unused infrastructure
- Reconciling biodiversity with external threats:
 - o Engage with regional land management authorities, with respect to Integrated Development Plans (IDPs) and Spatial Development Frameworks (SDFs) at local and regional level.
 - o Encourage eco-friendly resource use and land management practices on Kangra properties.
 - o Encourage reserve determination for wetland systems.

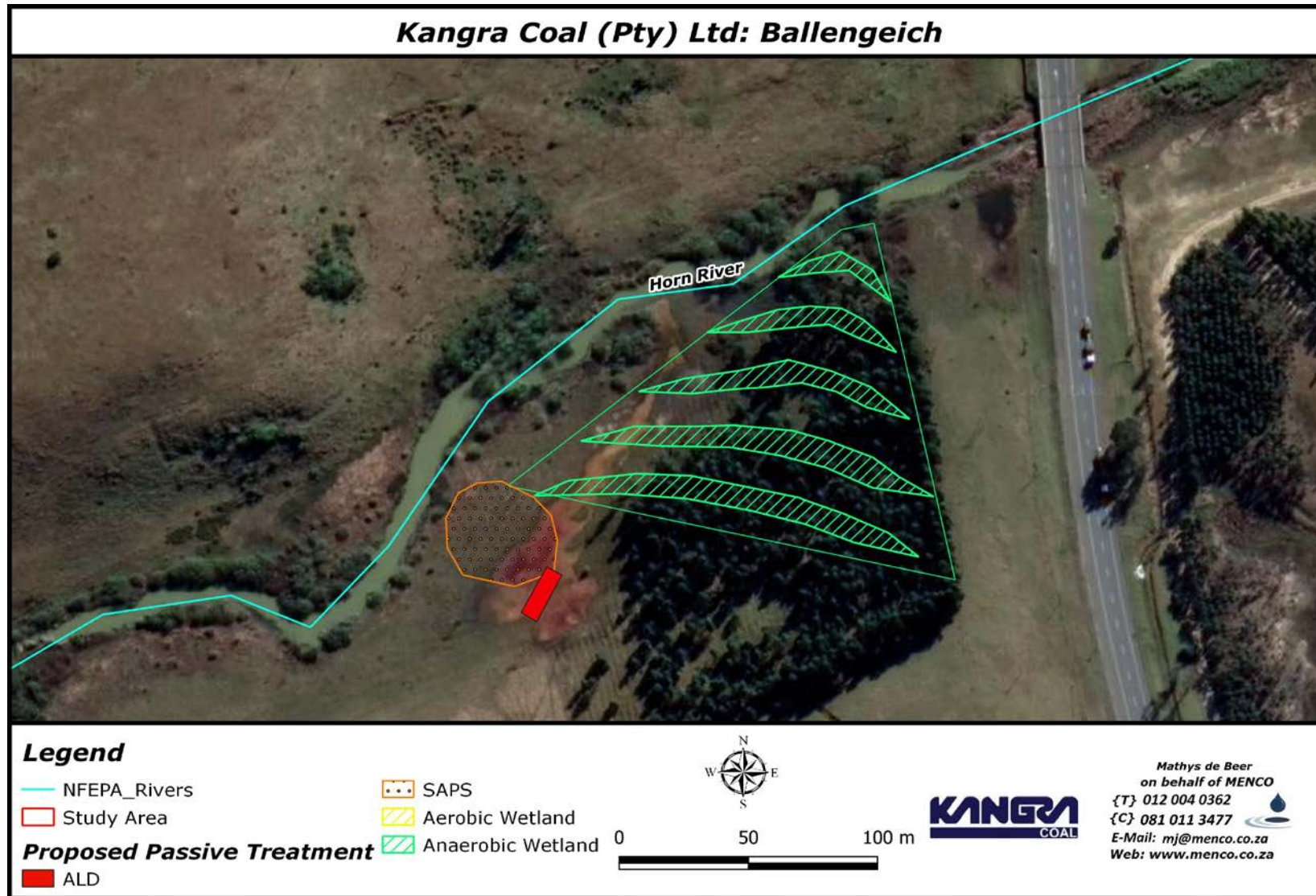


Figure 8-12: Proposed passive AMD treatment system layout — ALD, SAPS and Aerobic Wetland units

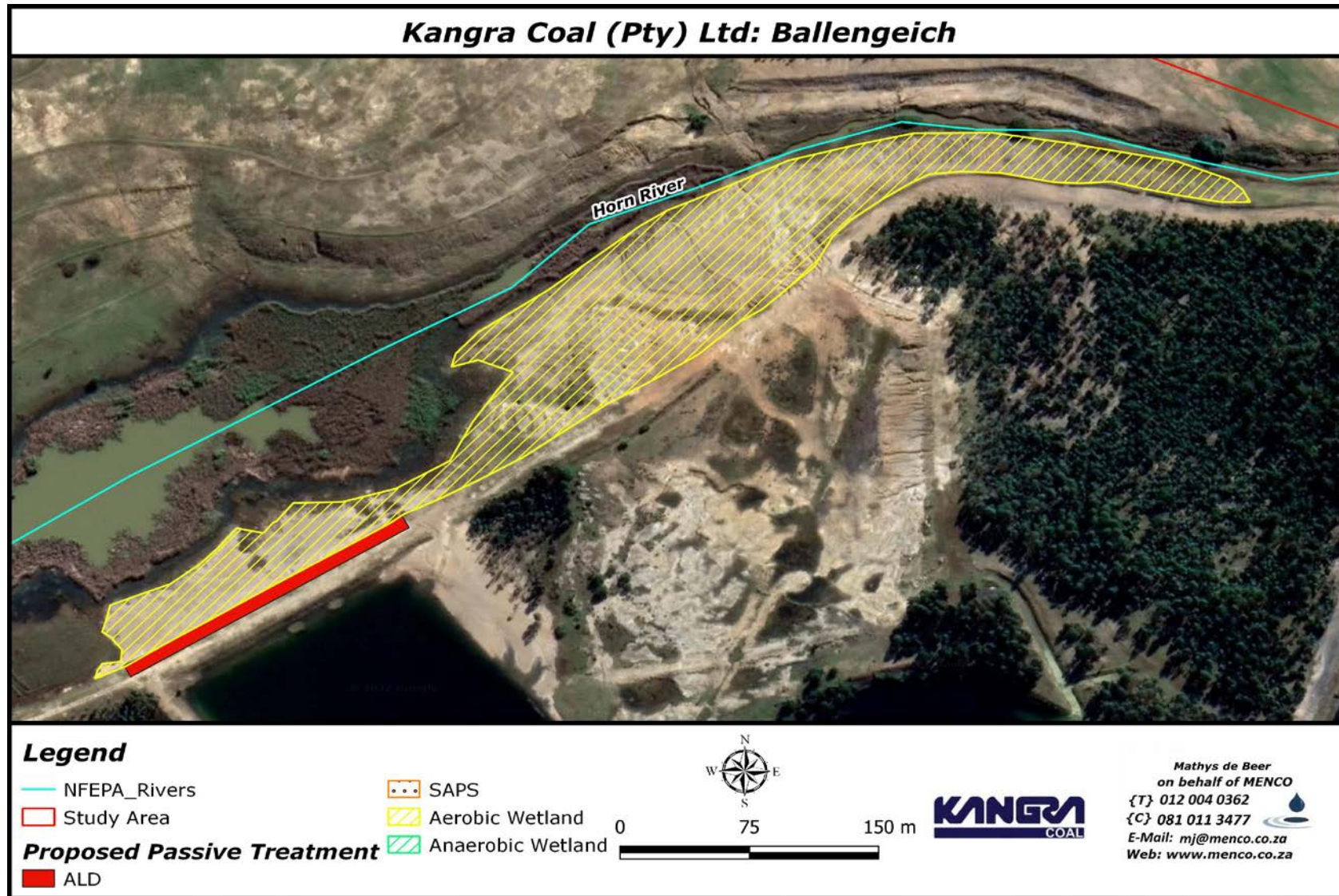


Figure 8-13: Proposed aerobic wetland for control of PCD seepage

**Table 8-26: Description of mitigation measures to be implemented**

Photo Plate	Impact Description with intervention
	Decant at Ballengeich causing Acidic Mine Drainage to discharge to the Horn River. The decant quality is typical in high salinity (TDS), sulphates, metals such as Fe, Al, Mn with low pH values (pH 2 – 4,5). The Waste Load Allocation study was conducted on the Horn and Ngagane Rivers during 2023 based on average flow in the Horn River of 0,263 m³/s representing the worst-case scenario while the average flow was given as 0,79 m³/s. The maximum discharge of AMD of 0,01 m³/s was used in impact quantification indicating a moderate impact on the Horn River due to a high dilution factor providing for sufficient assimilative capacity. The proposed passive treatment system (ALD → SAPS → Oxidation Pond → Aerobic Wetland; 1,000 m³/day) will ensure no further deterioration of the system and the PES Class C will be sustainable over the 20-year Water Use Licence period.



Photo Plate	Impact Description with intervention
	Storm water runoff from various areas at the project site including runoff from the rehabilitated mining areas have a negative impact on the river banks of the Horn River and the associated channelled valley bottom wetland. The impact is rated as high and with the implementation of mitigatory measures such as stabilisation with gabions the impact could be lowered to low.
	Accumulation of acidic decant in a wetland system linked to the Horn River. There is a high concentration of salts such as MgSO_4, CaSO_4, Na, Mg and K that impacts on wetland soils causing degradation of wetland growth and renders eco-services to be less efficient. Change in soil properties cause barren areas prone to soil erosion, sedimentation and siltation of the system. The impacted areas could be rectified by means of pollution source control (interception of seepage) and implementation of the passive treatment train (ALD → SAPS → Oxidation Pond → Aerobic Wetland). With mitigation the impacts could be reduced to low – moderate significance



9. DISCUSSION AND RECOMMENDATION

9.1 DISCUSSION

The wetland study conducted for Ballengeich Colliery was based primarily on the latest dataset available for national and regional wetland systems and was refined with a field investigation.

The importance and existence of this wetland was then further compared to the importance of their management on a regional scale (aquatic biodiversity sub-catchment, quaternary catchment, and National Freshwater Ecosystem Priority Area's (NFEPA's) for rivers and wetlands). FEPA's represent rivers, wetlands and estuaries that are required to maintain a high integrity for the protection of our country's freshwater ecosystems and water resources for human use. This protection is not aimed to exclude the identified areas from human contact, but rather to promote efficient planning and management strategies in and around the project area.

The wetland study revealed that the Wetland PES is Moderately Modified (Class C) with a Moderate EIS.

9.2 RECOMMENDATIONS

The Ballengeich Colliery project is located within an area of intensive industrial and coal mining activities. In addition, the agricultural activities in the catchment have led to numerous impacts on wetlands within the region that has resulted in an overall degradation of the wetland habitats. Existing impacts observed on and around the site include:

- Roads and railway linear infrastructure with associated bridges and culverts transecting the wetland areas are contributing towards erosion and bank destabilisation;
- Erosion along farm tracks, tilled agricultural fields and grazing have led to increased sedimentation;
- Presence of alien vegetation encroaching onto the wetland systems;
- Illegal dumping of building rubble in wetland systems
- Acidic decant from defunct coal mines in the area seeping into the wetlands.

Regardless of the fact that several activities in the catchment had a negative impact on the wetlands, the overall wetland services at Ballengeich are still intact. The wetland has a PES Class C which compares favourably with the overall Reserve classification for the V31K catchment. The Recommended Environmental Class (REC) for water resources



within the catchment is set at Class C. It is thus important that the receiving water resource be protected to prevent any further degradation or at least, attempt to manage the resource to maintain the PES at Class C. Therefore, it is recommended that the following considerations be taken into account and applied accordingly to ensure protection of the natural resource and to prevent any further degradation of wetlands within the region:

- In terms of Section 40 of the National Water Act, 1998 (Act No. 36 of 1998), a WULA and Environmental Risk Assessment (ERA) must be submitted for all activities within 500 m of a wetland.
- Secondly that a minimum of 100 m buffer zone be maintained around the wetland areas wherein no mining activities are allowed to take place in order to protect the integrity of the wetland as these wetlands still remain a priority wetland system in the region with a modified condition and high ecological importance and sensitivity class. This buffer zone should be clearly demarcated as a “NO GO” area to prevent any accidental entrance into the area (refer Figure 1-2).
- Any activities that may potentially result in significant adverse effect on the in wetland should be avoided.
- Storm-water management practices must be applied and incorporated into management with the aid of a suitably qualified engineer to avoid disposal or spillage of any environmentally harmful materials or waste into the wetland.
- Should the mitigation measures fail to adequately protect the integrity of the wetland habitat, compensatory measures in terms of a wetland offset strategy needs to be negotiated with the Regulatory Authority.
- A Water Use Licence in terms of Section 40 of the National Water Act, 1998 (Act No. 36 of 1998) for the Section 21(c) and (i) uses has been applied for under DWS Reference WU33839. All proposed passive treatment infrastructure, PCD upgrades, and riparian rehabilitation works are located within the 500 m protective buffer zone of the delineated wetland systems and accordingly require a WUL rather than a General Authorisation.

These recommendations should be incorporated into the WULA and EMP and should be considered during the IWWMP evaluation process.



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