DIGBY WELLS
ENVIRONMENTAL

Proposed Mutsho Power Project

Wetland Baseline Scoping Report

Project Number:

SAV4689

Prepared for:

Mutsho Power Company (Pty) Ltd

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Digby Wells and Associates (South Africa) (Pty) Ltd
Co. Reg. No. 2010/008577/07. Turnberry Office Park, 48 Grosvenor Road, Bryanston, 2191. Private Bag X10046, Randburg, 2125, South Africa
Tel: +27 11 789 9495, Fax: +27 11 069 6801, info@digbywells.com, www.digbywells.com

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Name	Responsibility	Signature	Date
Lusanda Matee	Report Compilation		August 2017
Rudi Greffrath	Peer Review		August 2017
Renée van Aardt	Exco Review		August 2017

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1 Introduction

1.1 Wetlands Overview

South Africa is generally regarded a water-scarce country South Africa is a water-scarce country with an average annual rainfall of approximately half of (450 mm) the world average annual rainfall (860 mm) (Kohler, 2016). Wetlands are one of the most threatened ecosystems globally and South Africa is no exception in this regard (Walmsley, 1988). According to the National Biodiversity Assessment (2011), 30 – 60 % of wetlands have been degraded due to unsustainable social and economic pressures and the remaining only constitute 2.4% of South Africa's surface area.

The importance of wetland ecosystems is widely appreciated as water reservoirs, stream flow regulators, flood regulators, water purifiers, providers of specialized habitats for both aquatic and terrestrial biodiversity, as well as providers of various social and economic benefits (Bezabih and Mosissa, 2017). Due to the threats they face; the enormous variety of wetland types and the associated complexities in defining wetland boundaries there is a need to adopt a recognized definition that takes into consideration country specific needs.

The most widely used and accepted definition is that provided by the Convention on Wetlands of International Importance also known as Ramsar Convention, adopted in 1971 and entered into force in 1975 (Matthews, 1993). This convention defined wetlands as 'areas of marsh, fen, peatland or water, whether natural or artificial, permanent or temporary, with water that is static or flowing, fresh, brackish or salty, including areas of marine water, the depth of which does not exceed six meters' (Ramsar Convention Bureau (RCB), 1990). The Ramsar Convention definition makes it possible for countries to adapt the definition of wetlands in line with their biogeographic conditions and as such South Africa has a nationwide accepted definition provided by the National Water Act (NWA, Act 36 of 1998), which defines wetlands 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."

Although South Africa lacks the dedicated legislation for the precise protection of wetlands as it does with other habitat types, wetlands have been protected in terms of the National Water Act (NWA, Act 36 of 1998) as a water resource. The National Water Act defines water resources as water course, surface water, estuary and aquifer, where watercourses can constitute rivers and springs, the channels in which the water flows regularly or intermittently, wetlands, lakes and dams. The basic right to access to safe water is provided by the NWA and this act provides only two rights to water, the two components are the basic human need reserve and the ecological reserve. The term 'reserve' used here refers to the quality and quantity of water to satisfy basic human needs and sustain aquatic and associated ecosystems for ecologically sustainable development.

South Africa relies heavily on fossil fuels and almost 90% of the country's electricity is provided by coal fired power stations. From transportation to electricity generation to disposal, coal releases numerous toxic pollutants into the environment in the vicinity and surrounding environments. Therefore it is necessary to assess the potential adverse impacts that may arise from the development of a large-scale coal-fired power station.

This report serves as a desktop baseline report of the wetlands of the proposed Mutsho Power Project.

1.2 Terms of Reference

Digby Wells Environmental (hereafter Digby Wells) was commissioned by Savannah Environmental (Pty) Ltd (hereafter Savannah) to conduct the wetlands specialist studies to inform the proposed project. The aim of the wetlands assessment through Scoping and EIA phase is to provide a report and accompanying maps describing the following:

- Desktop scoping investigation of the potential wetlands for the project area;
- The identification and the delineation of wetlands within the area;
- A description and characterisation of the identified wetland areas;
- Assessment of potential impacts to the wetlands from the activities; and
- Discussion of recommended mitigation measures to be taken into account through the mitigation hierarchy.

The scoping phase results are discussed in this report thereafter the EIA report will be completed once the field work has been completed.

1.3 Details of the Specialist

- Rudi Greffrath is Digby Well's Biodiversity Manager and has a National diploma and B-tech in Nature Conservation from Nelson Mandela Metropolitan University's George Campus and is affiliated to the South African Council for Natural Scientific Professions as a Professional Natural Scientist in the field of practice Conservation Science, registration number is 400018/17. He has several years' experience in the environmental consulting field specifically in the terrestrial ecology within the Highveld grasslands and Savanna regions of Southern and central Africa and the forest regions of central and west Africa. He specialises in fauna and flora surveys, biodiversity surveys, environmental management plans, environmental monitoring and rehabilitation for projects in accordance with the International Finance Corporation (IFC) and World Bank. Rudi has gained experience working throughout Africa specifically Sierra Leone, Ghana, Mali, Botswana, Namibia, and Cote D'Ivoire.
- Renée is the Department Manager: Closure, GIS and Noise and has been appointed to assist with the management and co-ordination of all activities relevant to closure, GIS and noise projects. Renée's specialization is compilation of mine closure plans and developing closure liability assessments through the mine life cycle. Renée has extensive expertise in rehabilitation and several years' experience in the

implementation of closure plans as well as negotiating closure criteria and financial provisions in both South Africa and Tanzania. Prior to her appointment, she was a technical specialist at African Barrick Gold and provided support to exploration and operational sites in Tanzania..

- Lusanda Patrick Matee received a Bachelor of Science, Honours, and MSc in Biological Sciences from the University of KwaZulu-Natal. He is in the Biophysical department specialising in Ecology (Fauna and Flora). In this project he was involved in the compilation of the scoping report. Curriculum Vitaes (CVs) and declarations of independence are attached in Appendix A.

1.4 Project Description

The proposed project area is situated in the of Vhembe District, in the Limpopo Province, approximately 40 km north of the town Makhado and 7 km south-west of the Mopane Town, which is a town in Limpopo, a province of South Africa. The regional and local setting maps are shown on Figure 1 and Figure 2.

Mutsho Power proposes the development of a new coal-fired power plant and associated infrastructure. The power plant will utilise coal mined at the Makhado Mine (roughly 20 km south-east of the project site), owned and operated by Coal of Africa Limited (CoAL), to fuel its operations.

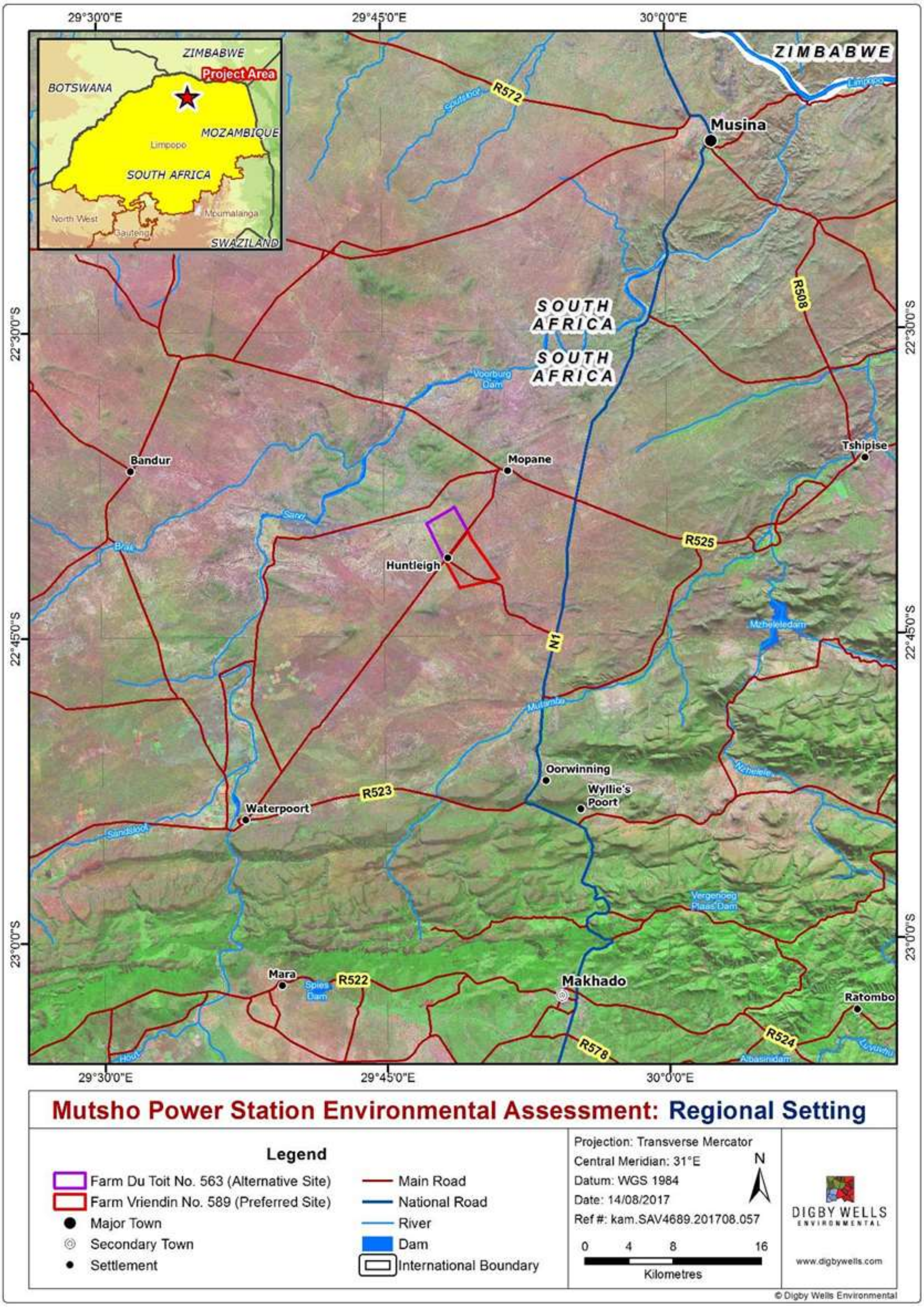


Figure 1: Regional Setting

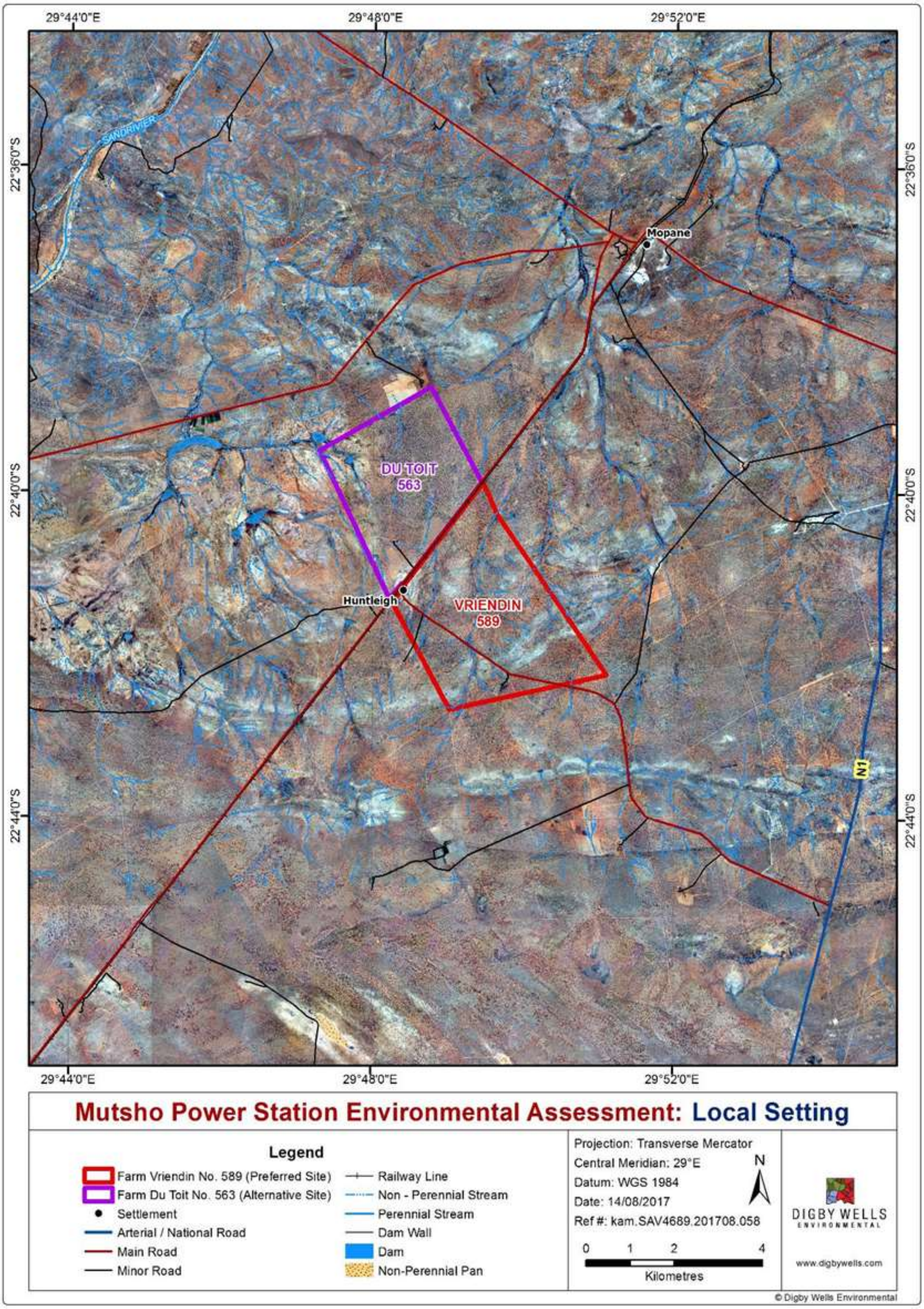


Figure 2: Local Setting

Once developed, the power plant is intended to form part of the Department of Energy's (DoE's) Coal Baseload Independent Power Producer (IPP) Procurement Programme (CBIPPPP). The project would have a generation capacity of up to 600MW in line with DoE's requirements, and will make use of either Pulverised Coal (PC) or Circulating Fluidised Bed (CFB) technology.

The project would typically comprise of the following key components and associated infrastructure:

- Power island consisting of:
  - Pulverised Coal (PC) with Flue Gas Desulphurisation (FGD), or Circulating Fluidised Bed (CFB) boiler technology.
  - Electrostatic Precipitator (ESP) / Bag filtration systems and Flue / smoke stacks.
  - Direct or indirect air cooling systems.
  - Balance of plant components (including steam turbines and generators etc.).
- Coal and limestone rail spur and / or road offloading systems.
- Coal crusher (for CFB); or coal milling plant (for PC).
- Strategic and working coal stockpiles.
- Limestone storage and handling area (for use with CFB or PC technology).
- Ammonia storage and handling area (for use in flue gas clean up with PC technology).
- Ash dump.
- Water infrastructure. This could include:
  - Raw water storage dams.
  - Water supply pipelines and booster stations.
  - Pollution control dams.
  - Water treatment plant (WTP).
  - Wastewater treatment plant (WWTP).
  - Stormwater management systems.
- HV yard and substation components with HV overhead transmission lines connecting to Eskom infrastructure.
- Control room, office / administration, workshop, storage and logistics buildings.
- Upgrading of external roads and establishment of internal access roads.
- Security fencing and lighting.

A minimum footprint of approximately 600 ha is required for the proposed power station and associated infrastructure. The type of technology selected for implementation would ultimately influence the final project layout and development footprint. While the physical power generation components require only approximately 50ha, supporting areas for the establishment of coal and other raw material stockpiles and an ash dump, increase the development footprint.

1.5 Policy and Legal Framework

The wetlands assessment aims to support the following regulations, regulatory procedures and guidelines:

- Section 19 of the National Water Act (NWA), 1998 (Act 36 of 1998);
- Section 21 (c), (g) and (i) of the National Water Act (Act 36 of 1998);
- Section 24 of the Constitution – Environment (Act 108 of 1996);
- National Environmental Management Biodiversity Act (NEMBA), 2004 (Act 10 of 2014)
- Section 5 of the National Environmental Management Act (NEMA), 1998 (Act No. 7 of 1998);
- Department of Water and Forestry (DWAF) guidelines for the delineation of wetlands (2005);
- Mining and Biodiversity Guideline (DEA *et al*., 2013);
- Mpumalanga Biodiversity Sector Plan (MTPB, 2014); and
- Wetland Management Series (published by Water Research Commission (WRC, 2007).

2 Scoping and EIA Methodology

The approach followed for the wetlands assessment is shown in the simple flow diagram below, Figure 3, and each stage is briefly discussed in the following sections. This report details the results from the desktop study, which informs the baseline and scoping-level input for this project. Thereafter the field investigation and the findings will lead to the formal impact assessment and mitigation recommendations according to the mitigation hierarchy.

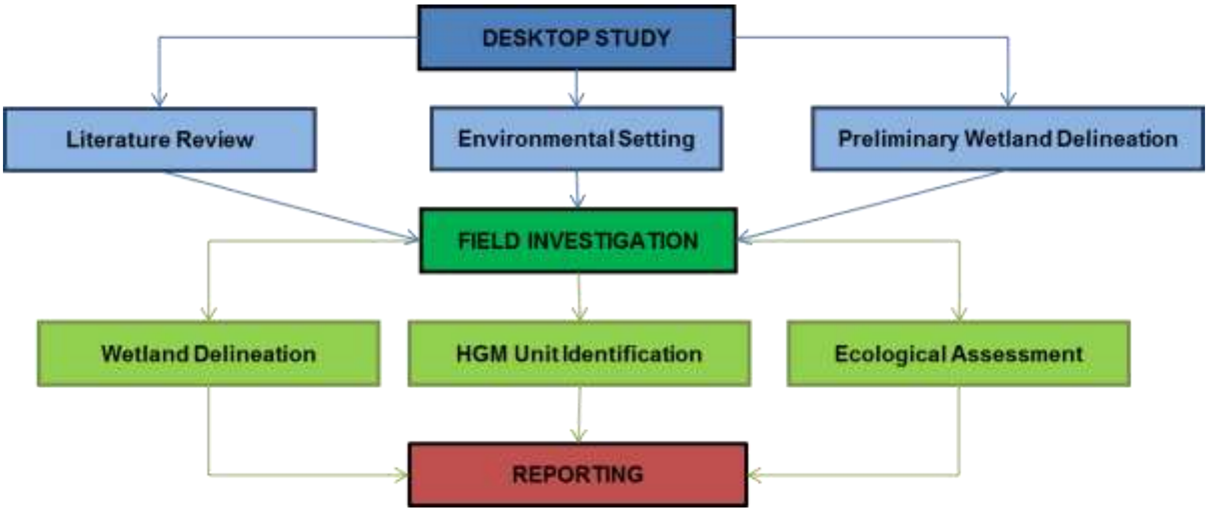


Figure 3: Simplified methodology followed for the wetland study

2.1 Scoping Phase

Baseline and background information was researched and used to understand the area prior to fieldwork and to complete the screening (desktop) assessment. A regional understanding of the project area is gained through this process, which enables more accurate ecological assessment to be done.

The information reviewed included:

- National Freshwater Ecosystem Priority Areas (NFEPA) (Nel et al., 2011); and
- Limpopo C-Plan.

2.2 EIA Phase

The EIA phase will entail field-based investigation of the wetlands of the project area. The methodology to be followed is detailed below.

2.2.1 Wetland Delineation and Identification

The wetland delineation procedure considers four attributes to determine the limitations of the wetland, in accordance with DWAF guidelines (now Department of Water and Sanitation (DWS) (2005)). The four attributes are:

- Terrain Unit Indicator – helps to identify those parts of the landscape where wetlands are more likely to occur;
- Soil Form Indicator – identifies the soil forms, which are associated with prolonged and frequent saturation;
- Soil Wetness Indicator – identifies the morphological "signatures" developed in the soil profile as a result of prolonged and frequent saturation; and
- Vegetation Indicator – identifies hydrophilic vegetation associated with frequently saturated soils.

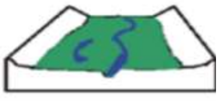
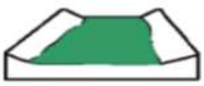
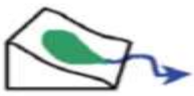
In accordance with the definition of a wetland in the NWA, vegetation is the primary indicator of a wetland, which must be present under normal circumstances. However, the soil wetness indicator tends to be the most important in practice. The remaining three indicators are then used in a confirmatory role. The reason for this is that the response of vegetation to changes in the soil moisture regime or management are relatively quick and may be transformed, whereas the morphological indicators in the soil are significantly more long-lasting and will hold the indications of frequent and prolonged saturation long after a wetland has been drained (perhaps several centuries) (DWAF, 2005). This tends to be very difficult under black clay vertic soil conditions as wetness indicators are lacking, and therefore topography, geomorphology and vegetation indicators play a stronger role (as found in some places of this study).

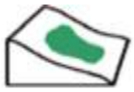
2.2.1.1 Terrain Unit Indicator

Terrain Unit Indicator (TUI) areas include depressions and channels where water would be most likely to accumulate. These areas are determined with the aid of aerial imagery and regional contours (DWAF, 2005). The HGM Unit system of classification focuses on the hydro-geomorphic setting of wetlands which incorporates geomorphology; water movement into, through and out of the wetland; and landscape / topographic setting. Once wetlands have been identified, they are categorised into HGM Units as shown in Table

1. HGM Units are then assessed individually for Present Ecological State (PES) and ecological services.

Table 1: Description of the difference Hydrogeomorphic Units for Wetland Classification

Hydromorphic wetland type	Diagram	Description
Floodplain		Valley bottom areas with a well-defined stream channel stream channel, gently sloped and characterised by floodplain features such as oxbow depression and natural levees and the alluvial (by water) transport and deposition of sediment , usually leading to a net accumulation of sediment. Water inputs from main channel (when channel banks overspill) and from adjacent slopes.
Valley bottom with a channel		Valley bottom areas with a well-defined stream channel but lacking characteristic floodplain features. May be gently sloped and characterized by the net accumulation of alluvial deposits or may have steeper slopes and be characterised by the net loss of sediment. Water inputs from the main channel (when channel banks overspill) and from adjacent slopes.
Valley bottom without a channel		Valley bottom areas with no clearly defined stream channel usually gently sloped and characterised by alluvial sediment deposition, generally leading to a net accumulation of sediment. Water inputs mainly from the channel entering the wetland and also from adjacent slopes.
Hillslope seepage linked to a stream channel		Slopes on hillsides, which are characterised by colluvial (transported by gravity) movement of materials. Water inputs are mainly from sub-surface flow and outflow is usually via a well-defined stream channel connecting the area directly to a stream channel.

Hydromorphic wetland type	Diagram	Description
Isolated hillslope seepage		Slopes on hillsides that are characterised by colluvial transport (transported by gravity) movement of materials. Water inputs are from sub-surface flow and outflow either very limited or through diffuse sub-surface flow but with no direct link to a surface water channel.
Pan/Depression		A basin-shaped area with a closed elevation contour that allows for the accumulation of surface water (i.e. It is inward draining). It may also receive subsurface water. An outlet is usually absent and so this type of wetland is usually isolated from the stream network.

2.2.1.2 Soil Form Indicator

Hydromorphic soils are taken into account for the Soil Form Indicator (SFI) which will display unique characteristics resulting from prolonged and repeated water saturation (DWAF, 2005). The continued saturation of the soils results in the soils becoming anaerobic and thus resulting in a change of the chemical characteristics of the soil. Iron and manganese are two soil components which are insoluble under aerobic conditions and become soluble when the soil becomes anaerobic and thus begin to leach out into the soil profile. Iron is one of the most abundant elements in soils and is responsible for the red and brown colours of many soils.

Resulting from the prolonged anaerobic conditions, iron is dissolved out of the soil, and the soil matrix is left a greying, greenish or bluish colour, and is said to be "gleyed". Common in wetlands which are seasonally or temporarily saturated is a fluctuating water table, these results in alternation between aerobic and anaerobic conditions in the soil (DWAF, 2005). Iron will return to an insoluble state in aerobic conditions which will result in deposits in the form of patches or mottles within the soil. Recurrence of this cycle of wetting and drying over many decades concentrates these insoluble iron compounds. Thus, soil that is gleyed and has many mottles may be interpreted as indicating a zone that is seasonally or temporarily saturated (DWAF, 2005).

2.2.1.3 Soil Wetness Indicator

In practice, the Soil Wetness Indictor (SWI) is used as the primary indicator (DWAF, 2005). Hydromorphic soils are often identified by the colours of various soil components. The frequency and duration of the soil saturation periods strongly influences the colours of these components. Grey colours become more prominent in the soil matrix the higher the duration and frequency of saturation in a soil profile (DWAF, 2005). A feature of hydromorphic soils are coloured mottles which are usually absent in permanently saturated soils and are most prominent in seasonally saturated soils, and are less abundant in temporarily saturated soils (DWAF, 2005). For a soil horizon to qualify as having signs of wetness in the temporary, seasonal or permanent zones, a grey soil matrix and/or mottles must be present. This is however difficult in vertic black soil with very high clay content.

2.2.1.4 Vegetation Indicator

As one moves along the wetness gradient from the centre of the wetland to the edge, and into adjacent terrestrial areas plant communities undergo distinct changes in species composition. Valuable information for determining the wetland boundary and wetness zone is derived from the change in species composition. A supplementary method for employing vegetation as an indicator is to use the broad classification of the wetland plants according to their occurrence in the wetlands and wetness zones (Kotze and Marneweck, 1999; DWAF, 2005). This is summarised in Table 2 below. When using vegetation indicators for delineation, emphasis is placed on the group of species that dominate the plant community, rather than on individual indicator species (DWAF, 2005). Areas where soils are a poor indicator (black clay, vertic soils), vegetation (as well as topographical setting) is relied on to a greater extent and the use of the wetland species classification as per Table 2 becomes more important.

Table 2: Classification of plant species according to occurrence in Wetlands (DWAF, 2005)

Type	Description
Obligate Wetland species (OW)	Almost always grow in wetlands: >99% of occurrences.
Facultative Wetland species (FW)	Usually grow in wetlands but occasionally are found in non-wetland areas: 67 – 99 % of occurrences.
Facultative species (F)	Are equally likely to grow in wetlands and non-wetland areas: 34 – 66% of occurrences.
Facultative dry-land species (fd)	Usually grow in non-wetland areas but sometimes grow in wetlands: 1 – 34% of occurrences.

2.2.2 Wetland Ecological Health Assessment

According to Macfarlane *et al.* (2009) the health of a wetland can be defined as a measure of the deviation of wetland structure and function from the wetland's natural reference condition. A WET-Health assessment was done on the wetlands in accordance with the method described by Kotze *et al.* (2007) to determine the integrity (health) of the characterised HGM units for the project area. A PES analysis was conducted to establish baseline integrity (health) for the associated wetlands.

The health assessment attempts to evaluate the hydrological, geomorphological and vegetation health in three separate modules to attempt to estimate similarity to or deviation from natural conditions. The overall health score of the wetland is calculated using Equation 1, which provides a score ranging from 0 (pristine) to 10 (critically impacted in all respects). The rationale for this is that hydrology is considered to have the greatest contribution to health. The PES is determined according to Table 3.

$$Wetland\ Health = \frac{3(Hydrology) + 2(Geomorphology) + 2(Vegetation)}{7}$$

Equation 1: Overall Wetland Ecological Health Score

Table 3: Impact scores and Present Ecological State categories used by Wet-Health

Description	Combined Impact Score	PES Category
Unmodified, natural.	0-0.9	A
Largely natural with few modifications. A slight change in ecosystem processes is discernible and a small loss of natural habitats and biota has taken place.	1-1.9	B
Moderately modified. A moderate change in ecosystem processes and loss of natural habitats has taken place but the natural habitat remains predominantly intact.	2-3.9	C
Largely modified. A large change in ecosystem processes and loss of natural habitat and biota has occurred.	4-5.9	D
The change in ecosystem processes and loss of natural habitat and biota is great but some remaining natural habitat features are still recognisable.	6-7.9	E
Modifications have reached a critical level and ecosystem processes have been modified completely with an almost complete loss of natural habitat and biota.	8-10	F

2.2.3 Ecological Importance and Sensitivity

The Ecological Importance and Sensitivity (EIS) tool was derived to assess the system's ability to resist disturbance and its capability to recover from disturbance once it has occurred. The purpose of assessing importance and sensitivity of water resources is to be able to identify those systems that provide higher than average ecosystem services, biodiversity support functions or are especially sensitive to impacts. Water resources with higher ecological importance may require managing such water resources in a better condition than the present to ensure the continued provision of ecosystem benefits in the long term.

The methodology outlined by DWAF (1999) and updated in Rountree and Kotze, (2012, in Rountree *et al*. (2012) was used for this study. In this method there are three suites of importance criteria; namely:

- **Ecological Importance and Sensitivity**: incorporating the traditionally examined criteria used in EIS assessments of other water resources by DWA and thus enabling consistent assessment approaches across water resource types;
- **Hydro-functional Importance**: which considers water quality, flood attenuation and sediment trapping ecosystem services that the wetland may provide; and
- **Importance in terms of Basic Human Benefits**: this suite of criteria considers the subsistence uses and cultural benefits of the wetland system.

These determinants are assessed for the wetlands on a scale of 0 to 4, where 0 indicates no importance and 4 indicates very high importance. It is recommended that the highest of these three suites of scores be used to determine the overall Importance and Sensitivity category of the wetland system, as defined in Table 4.

Table 4: Interpretation of overall Ecological Importance and Sensitivity (EIS) scores for biotic and habitat determinants (Rountree & Kotze, 2012)

Ecological Importance and Sensitivity Category (EIS)	Range of Scores
Very high	>3 and <=4
Wetlands that are considered ecologically important and sensitive on a national or even international level. The biodiversity of these systems is usually very sensitive to flow and habitat modifications. They play a major role in moderating the quantity and quality of water of major rivers.	
High	>2 and <=3
Wetlands that are considered to be ecologically important and sensitive. The biodiversity of these floodplains may be sensitive to flow and habitat modifications. They play a role in moderating the quantity and quality of water of major rivers.	
Moderate	>1 and <=2
Wetlands that are considered to be ecologically important and sensitive on a provincial or local scale. The biodiversity of these systems is not usually sensitive to flow and habitat modifications. They play a small role in moderating the quantity and quality of water of major rivers.	
Low/marginal	>0 and <=1
Wetlands that are not ecologically important and sensitive at any scale. The biodiversity of these systems is ubiquitous and not sensitive to flow and habitat modifications. They play an insignificant role in moderating the quantity and quality of water of major rivers.	

2.2.4 Wetland Functional Assessment

In accordance with the method described by Kotze *et al.* (2007), an ecological functional assessment of the associated wetland was undertaken. This methodology provides for a scoring system to establish the services of the wetland ecosystem. The onsite wetlands are grouped according to homogeneity and assessed utilizing the functional assessment technique, WET-EcoServices, developed by Kotze *et al,* (2007) to provide an indication of the benefits and services. This methodology computes a score out of 4 for each index and provides an indication of the ecological services offered by the different HGM units for the study area. Results are given in the form of a radial plot showing the relative importance of the 15 indices. Ecoservices were rated as high are scored more than or equal to 2.8.

3 Baseline Environment

3.1 State of the Sand River Catchment

The project area is located within the Limpopo River Catchment (Primary Catchment A) and more specifically within quaternary catchment A71K (refer Figure 4), the upper Sand River Catchment which is within the Limpopo WMA North. The Sand (Polokwane River) River Catchment (SRC) is a major tributary of the Sabie River located in the north-eastern part of South Africa, spanning Limpopo and Mpumalanga provinces (Pollard, 2008). The major tributaries of this river catchment are Brak, Hout, Dwars and Dorp rivers. This catchment spans an area of 1910 km² and is subdivided into 9 quaternary catchments (Smits et al., 2004). The source of the Sands River is located in the hills at the edge of Drakensberg where the average rainfall is 1800 mm/yr (Pollard et al., 1998). It must be however noted that the majority of this catchment lies in the dry Lowveld, where the mean annual rainfall is only 500 mm/yr (Pollard and Walker, 2000).

This catchment is the driest catchment in the Limpopo WMA North with very limited surface water resources. Despite this there is a high demand for water in this catchment compared to the rest of the WMA with agriculture (Irrigation) being the largest users of the. Water requirement of this area include activities such as power generation; irrigated agriculture, forestry; mining, domestic use and industrial and residential developments. The major land-uses of this catchment include commercial forestry, dryland and irrigated agriculture, relatively dense rural settlements, state and privately owned conservation areas and mineral resource extraction. The surface water resources in this catchment are heavily utilized and severely limited, however it has exceptional ground water resources are being currently fully extracted and possibly over-exploited (DWA 2016).

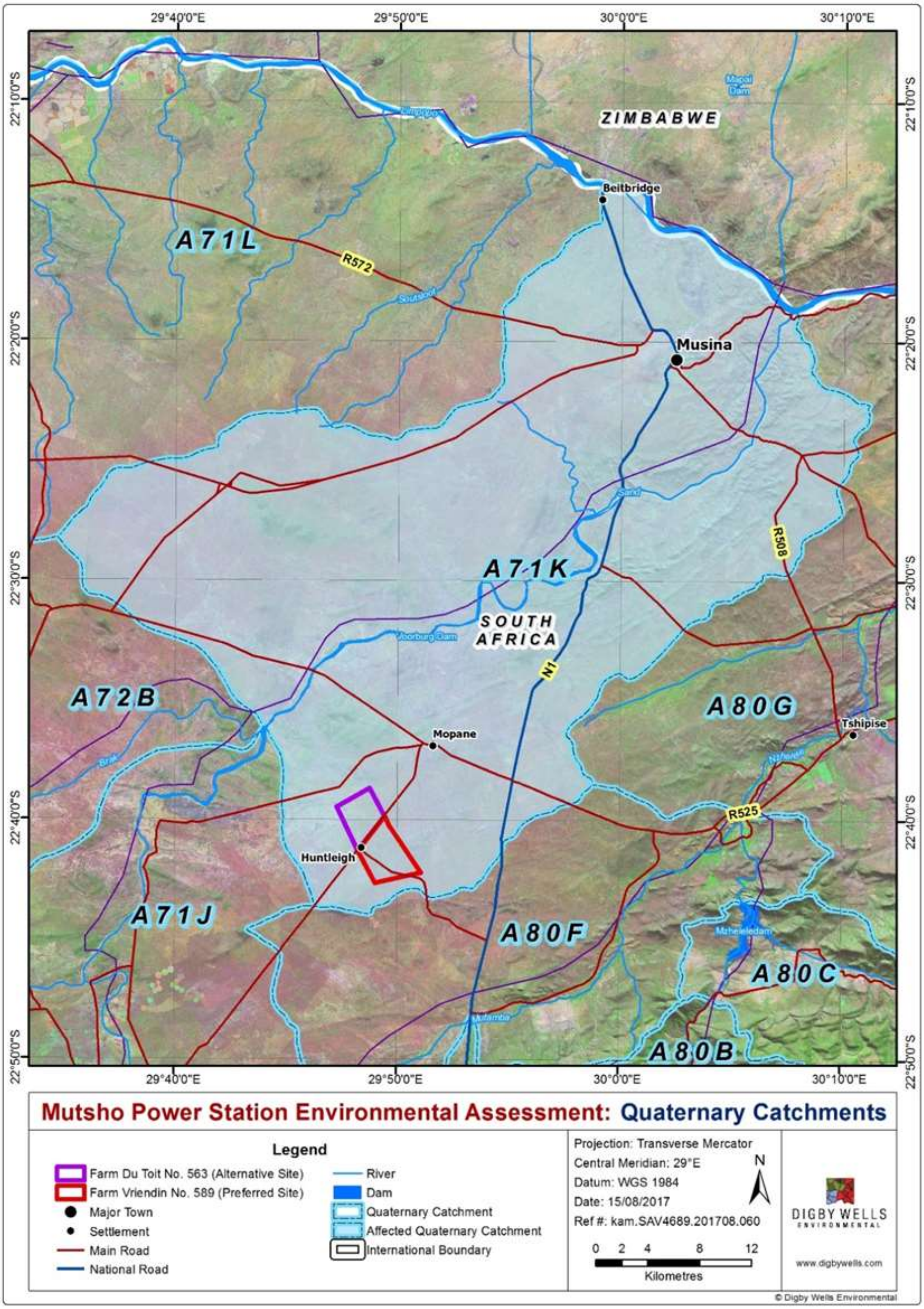


Figure 4: Quaternary Catchments

Mineral resource extraction is an important economic activity in this area with a Platinum smelter and silicon mine near Polokwane and much closer to the study area there are mining developments and other industrial developments, with Coal of Africa Limited (CoAL) planning to develop a number coal mines between Louis Trichardt and Musina (DWA 2016).

3.2 National Freshwater Ecosystem Priority Areas

The National Freshwater Ecosystem Priority Areas (NFEPA) provide strategic spatial priorities for conserving the country's freshwater ecosystems and supporting sustainable use of water resources (Nel *et al.,* 2011). Demarcation of these areas is firmly rooted in the National Water Act (No. 36 of 1998) and the National Environmental Management Biodiversity Act (No. 10 of 2004). Conservation importance of the wetlands was based on their designated status as NFEPA wetlands (Nel *et al.,* 2011). Table 5 below indicates the criteria that were considered for the ranking of wetland areas.

Table 5: NFEPA Wetland Classification Ranking criteria

NFEPA Wetland Criteria	NFEPA Rank
Wetlands that intersect with a RAMSAR site.	1
Wetlands within 500 m of an IUCN threatened frog point locality; Wetlands within 500 m of a threatened water bird point locality; Wetlands (excluding dams) with the majority of their area within a sub-quaternary catchment that has sightings or breeding areas for threatened Wattled Cranes, Grey Crowned Cranes and Blue Cranes; Wetlands (excluding dams) within a sub-quaternary catchment identified by experts at the regional review workshops as containing wetlands of exceptional Biodiversity importance, with valid reasons documented; and Wetlands (excluding dams) within a sub-quaternary catchment identified by experts at the regional review workshops as containing wetlands that are good, intact examples from which to choose.	2
Wetlands (excluding dams) within a sub-quaternary catchment identified by experts at the regional review workshops as containing wetlands of biodiversity importance, but with no valid reasons documented.	3
Wetlands (excluding dams) in A or B condition AND associated with more than three other wetlands (both riverine and non-riverine wetlands were assessed for this criterion); and Wetlands in C condition AND associated with more than three other wetlands (both riverine and non-riverine wetlands were assessed for this criterion).	4

NFEPA Wetland Criteria	NFEPA Rank
Wetlands (excluding dams) within a sub-quaternary catchment identified by experts at the regional review workshops as containing Impacted Working for Wetland sites.	5
Any other wetland (excluding dams).	6

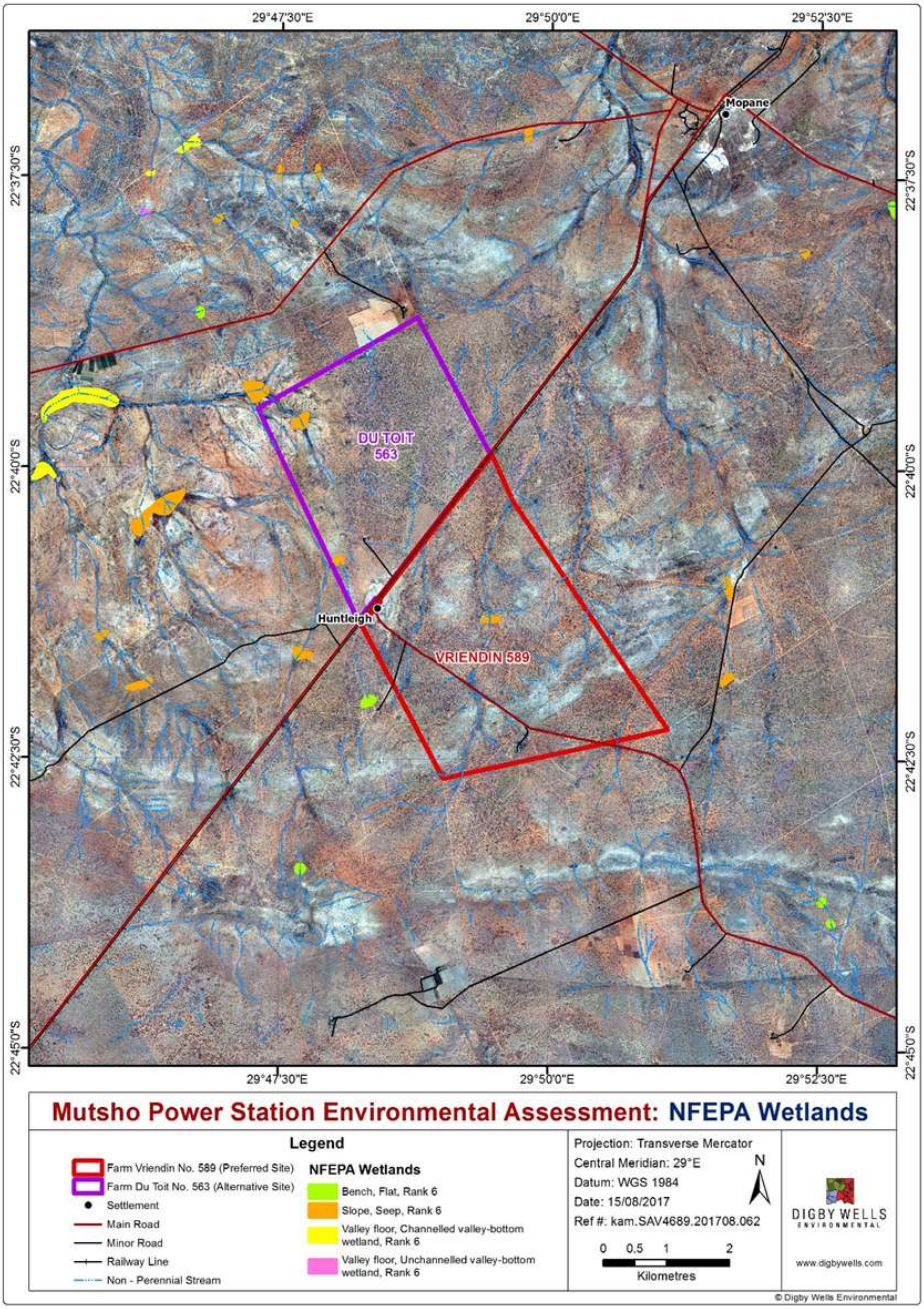


Figure 5: NFEPA Wetlands within Project Areas

The project area is characterised by many NFEPA wetlands as shown in Figure 5. Based on the NFEPA data the landscape is dominated by hillslope seep wetlands which, followed by bench wetlands and to a very smaller extent channel valley bottom.

All the identified wetlands in the study area of rank 6. Rank 6 wetlands are all other wetlands that are identified as NFEPA wetland but do not fall within rank 1 to 5

3.3 The Limpopo C-Plan

To facilitate and assist with managing and monitoring biodiversity the Limpopo Department of Economic Development, Environment & Tourism (LEDET) developed the Limpopo Conservation Plan Version 2 (2013), updated in 2012, and made available in 2013. This initiative was undertaken with the primary objectives of producing a revised conservation plan for Limpopo Province that conformed to the Bioregional Planning guidelines published by SANBI (South African National Biodiversity Institute) in 2009 (Limpopo CPlan V2, 2013).

The purpose of a conservation plan is to inform land-use planning, environmental assessment and authorisations, and natural resource management, by a range of sectors whose policies and decisions impact on biodiversity. Accompanying the map of the CBA's are land-use guidelines that are compatible or not with the biodiversity management objective of the CBA category. The CBA's are summarised below.

- Protected Areas: Formal Protected Areas and protected Areas pending declaration under National Environmental Management; Protected Areas Act, 2003 (Act No. 57 of 2003) (NEMPA).
- Critical Biodiversity Area 1: Irreplaceable sites. Areas required to meet biodiversity pattern and/or ecological process targets. No alternative sites are available to meet targets.
- Critical Biodiversity Area 2: Best Design Selected sites. Areas selected to meet biodiversity patter and/or ecological process targets. Alternative sites may be available to meet targets.
- Ecological Support Areas 1: Natural, near natural and degraded areas supporting CBAs by maintaining ecological processes.
- Ecological Support Areas 2: Areas with no natural habitat that is important for supporting ecological processes.
- Other Natural Areas: Natural and intact but not required to meet targets, or identified as CBA or ESA.

Table 6 lists the definitions of important biodiversity areas identified within the study site.

Table 6: Definitions of Important Biodiversity Areas for the Limpopo Conservation Plan

Category	Definition
Critical Biodiversity Areas (CBAs)	CBA's are the parts of the landscape we went to keep natural and are required for meeting the biodiversity targets for ecosystems, species or ecological processes as identified in a systematic biodiversity plan.
Ecological Support Areas (ESAs)	These area support the ecological functioning of the CBA's and/ or provide ecosystem services. ESA's need to stay functional to maintain the integrity of CBA's; however this doesn't necessarily mean that they need to maintain natural. As a consequence, land use and management differs between CBA's and ESA's.

The project area is characterised by both CBA's and ESA's as shown in Figure 6. The preferred site is mainly located in the sub-category ESA 1 which can be classified as intact natural areas supporting CBAs, however its southern boundary is on sub-category CBA 2, which are classified as best design selected sites required to meet biodiversity targets. The alternative site is exclusively characterised by sub-category ESA 1.

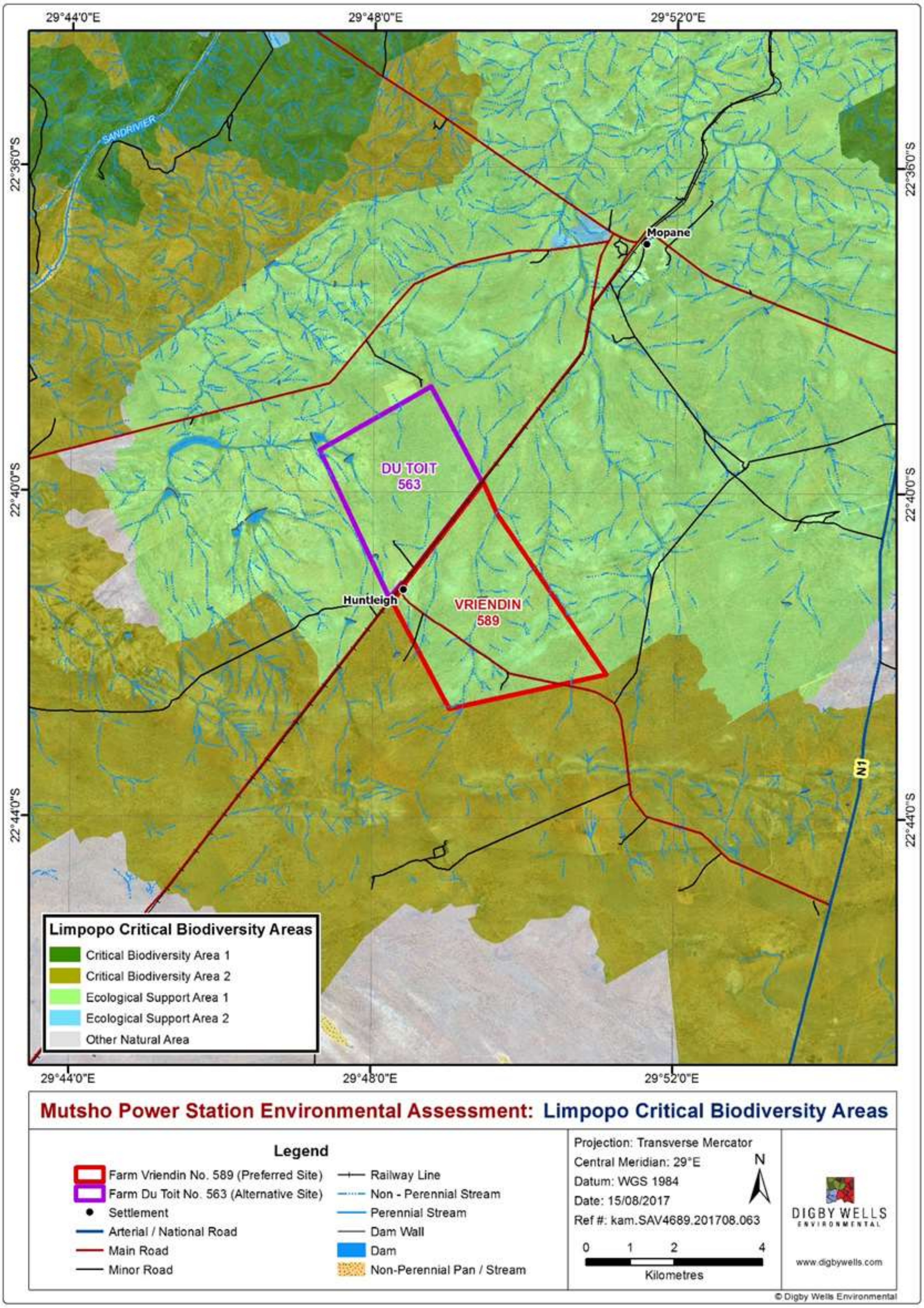


Figure 6: Important Biodiversity Areas within Project Areas

4 Potential Impacts

The aim of an impact assessment is to strive to avoid damage or loss of ecosystems and services that they provide, and where they cannot be avoided, to reduce and mitigate these impacts (DEA, 2013). Offsets to compensate for loss of habitat are regarded as a last resort, after all efforts have been made to avoid, reduce and mitigate. The impact assessment is completed in the next phase of the project. Potential impacts are highlighted herein for further investigation.

Refer to Table 7 to below for the identified potential impacts to the wetlands.

Table 7: Potential Impacts during the Construction Phase

<table>
<tr><td colspan="4">Impact:
Loss of Wetland Habitat
Desktop Sensitivity Analysis of the Site:
NFEPA wetlands have been identified on site and if the infrastructure plan does not avoid these wetlands, wetland habitat may be lost as a result of construction activities.</td></tr>
<tr><td>Issue</td><td>Nature of Impact</td><td>Extent Impact</td><td>Impacted Areas</td></tr>
<tr><td>Potential significant negative impact to wetlands, their buffer areas and catchments due to the clearance of vegetation for construction.</td><td>Loss of wetland habitat including NFEPA wetland within an ESA.</td><td>Local</td><td>Footprint areas of associated infrastructure.</td></tr>
<tr><td colspan="4">Description of expected significance of impact
The impact has the potential to be significant but can be avoided by placing infrastructure outside of the wetlands and their buffer areas.</td></tr>
<tr><td colspan="4">Gaps in knowledge & recommendations for further study
The extent of the wetlands within the proposed project areas needs to be verified through a site visit and detailed wetland delineation. The wetland delineation should inform the placement of infrastructure.</td></tr>
</table>

<table>
<tr><td colspan="4">Impact:
Degradation of Wetland Habitat
Desktop Sensitivity Analysis of the Site:
NFEPA wetlands have been identified on site and construction activities may result in the contamination of the wetland systems and impact on the ecological status and functionality of the wetlands.</td></tr>
<tr><td>Issue</td><td>Nature of Impact</td><td>Extent Impact</td><td>Impacted Areas</td></tr>
<tr><td>Potential significant negative impact to wetlands, their buffer areas and catchments due to contamination.</td><td>Loss of wetland functionality.</td><td>Local</td><td>Wetlands, their buffer areas and catchments associated with the proposed project area.</td></tr>
<tr><td colspan="4">Description of expected significance of impact
Contamination associated with construction activities may include siltation (due to the erosion of cleared areas) and spillages of hazardous materials such as hydrocarbons. Although potentially significant, these impacts can be minimized by reducing the extent of the areas disturbed and ensuring contractors adhere to standard operating procedures with respect to the transport and handling of hazardous materials.</td></tr>
<tr><td colspan="4">Gaps in knowledge & recommendations for further study
The current ecological status of the wetlands within the proposed project areas needs to be determined through a site visit.</td></tr>
</table>

Table 8: Potential Impacts during the Operational Phase

<table>
<tr><td colspan="4">Impact:
Degradation of Wetland Habitat
Desktop Sensitivity Analysis of the Site:
NFEPA wetlands have been identified on site and operational activities may result in the contamination of the wetland systems and impact on the ecological status and functionality of the wetlands. Specifically of concern would be surface water runoff and seepage from coal stockpiles and the ash dump.</td></tr>
<tr><td>Issue</td><td>Nature of Impact</td><td>Extent Impact</td><td>Impacted Areas</td></tr>
<tr><td>Degradation of wetlands due to contaminants reporting to the wetland systems.</td><td>Loss of wetland functionality.</td><td>Local to Regional</td><td>Wetlands, their buffer areas and catchments associated with the proposed project area.</td></tr>
<tr><td colspan="4">Description of expected significance of impact
Contaminated surface run off and/or seepage emanating from stockpiles and the ash dump may report to wetlands and streams resulting in the degradation of these systems and ultimately reducing the functionality of the wetlands. Depending on the connectivity of the wetlands in the project area to other wetlands systems, the extent of the impact may range from local to regional.</td></tr>
<tr><td colspan="4">Gaps in knowledge & recommendations for further study
The potential sources of contamination such as the stockpiles and ash dump will need to be correctly designed to ensure there is separation of clean and dirty water and contaminates are contained on site in lined facilities.</td></tr>
</table>

Table 9: Potential Impacts during the Decommissioning and Closure Phase

<table>
<tr><td colspan="4">Impact:
Degradation of Wetland Habitat
Desktop Sensitivity Analysis of the Site:
NFEPA wetlands have been identified on site and rehabilitation activities may result in the contamination of the wetland systems and impact on the ecological status and functionality of the wetlands.</td></tr>
<tr><td>Issue</td><td>Nature of Impact</td><td>Extent Impact</td><td>Impacted Areas</td></tr>
<tr><td>Potential significant negative impact to wetlands, their buffer areas and catchments due to contamination.</td><td>Loss of wetland functionality.</td><td>Local</td><td>Wetlands, their buffer areas and catchments associated with the proposed project area.</td></tr>
<tr><td colspan="4">Description of expected significance of impact
Contamination associated with rehabilitation activities would be similar to the construction phase and includes spillages of hazardous materials such as hydrocarbons. Although potentially significant, these impacts can be minimized by ensuring contractors adhere to standard operating procedures with respect to the transport and handling of hazardous materials. There is a potential positive impact associated with rehabilitation as contaminate sources will be remediated and minimized which in turn will mean a decrease in the probability of contaminates reporting to the wetlands and streams.</td></tr>
<tr><td colspan="4">Gaps in knowledge & recommendations for further study
The current ecological status of the wetlands within the proposed project areas needs to be determined through a site visit in order to establish a baseline. The status of the wetlands can be re-evaluated post closure to determine if the proposed project has positive impact on the functionality of the wetlands within the project area.</td></tr>
</table>

4.1 Cumulative Impacts

Some of the major contributing factors to the decline of wetlands in South Africa include mining, industrial and agricultural activities as well as poor treatment of waste water from industry and mining (Oberholster *et al.*, 2011). Construction may cause the destruction of wetlands via direct impacts such as removal of habitat, alteration of flow and contamination of water. The construction and operation of Mutsho Power Plant Project may contribute further to the degradation of the wetland systems in the area.

5 Conclusion

The project area totals approximately 600 ha in the Highveld area located in the Ermelo Coal Field. It is anticipated that limited wetlands will characterise this area, which will be ground-truthed by undertaking a specialist in-field wetland assessment. The desktop baseline information available for the area has shown that the area has NFEPA wetlands dotted throughout the site. The impacts associated with the constructed and operation of the Mutsho Power Plan; however this will be assessed in the EIA phase.

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