ENVIRONMENTAL & ENGINEERING

# REPORT

# MANDLAGLO COMMODITIES (PTY) LTD - TALA BETHAL COAL MINE

## WETLAND ASSESMENT IN SUPPORT OF AN ENVIRONMENTAL AUTHORISATION & WATER USE LICENCE APPLICATION

REPORT REF: 22-1977-AUTH (TALA BETHAL WETLAND IMPACT ASSESSMENT)

WETLAND IMPACT ASSESSMENT FOR AN EA AND IWULA IN RESPECT TO PORTION 1 OF THE FARM KAFFERSTAD 195 IS, STEVE TSHWETE LOCAL MUNICIPALITY, MPUMALANGA PROVINCE

11/11/2022

VERSION AA

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## DISCLAIMER:

## DECLARATION OF INDEPENDENCE

I, Riana Panaino, declare that;

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

7 November 2022

**Signature** **Date**

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## EXECUTIVE SUMMARY

Mandlaglo Commodities (Pty) Ltd (hereinafter Mandlaglo) is currently operating Tala Bethal Coal Mine for which they hold a Mining Right (MR) (Ref: MP 30/5/1/2/2/10191 MR) in terms of the Minerals and Petroleum Resources Development Act, Act No. 28 of 2002 (MPRDA) and a Water Use Licence (06/B11A/ABCGIJ/9696) in terms of the National Water Act, Act No. 36 of 1998 (NWA).

Mandlaglo proposes to amend the Mining Right (MR) to include a new opencast section and a Wash Plant to the current surface infrastructure for on-site coal beneficiation, which will require amendments to their currently approved authorisations.

The study area is located 11 km southwest of Hendrina and 20 km northeast of Bethal, within the Steve Tshwete Local Municipality of Nkangala District Municipality, Mpumalanga Province.

The vegetation classification by Mucina & Rutherfords (2006) categorises the study area as the Eastern Highveld Grassland vegetation unit of the Grassland Biome, which is classified as an Endangered vegetation unit.

The site furthermore situated in the B11A Quaternary Catchment of the Upper Olifants Water Management Area, ~2km directly East of the confluence of the Bankspruit and Olifants River.

Three (3) different Hydrogeomorphic (HGM) units were identified within the three (3) wetland systems delineation on site:

- Tala Bethal Wetland System 1:
  - Permanent Open water Pan (TB Pan1)
  - Seasonal Grass Pan (TB Pan 2)
  - Hillslope Seepage Wetlands (TB HS1)
- Tala Bethal Wetland System 2
  - Isolated Hillslope Seepage Wetland (TB HS2)
- Tala Bethal Wetland System 3
  - Channelled Valley Bottom Wetland (TB CVB)
  - Hillslope Seepage Wetlands (TB HS3 and HS4)

The Present Ecological status (PES) for the Wetland Units ranged from B to D with the Tala Bethal Wetland System 1 being attaining the highest categories of the 3 systems. The sensitivity and importance ranged from low to moderate, with biodiversity maintenance and nutrient removal being the highest functions of the Pans and Hillslope Seepage wetlands respectively.

The following possible impacts to the wetlands have been identified should the proposed development go ahead:

- Loss of wetland habitat
- Loss of species of conservation concern
- Change in hydrological connectivity of the HGM units
- Sedimentation of the HGM units
- Wetland degradation
- Soil compaction
- Change in runoff intensities

The possible impacts were rated and found to be of Low to Medium significance should all mitigation measures be implemented. Should the TB HS2 be destroyed or deteriorated further due to the proposed mining activities, the Pan and Hillslope Seep system (TB Pan 1, Pan 2, and HS1) should be protected through a conservation initiative and the PES increased to Category B and maintained as such. A wetland specialist should furthermore be appointed to calculate the required offset for the wetlands lost due to mining.

It is the opinion of the wetland specialist that the proposed development can continue, with all the mitigation measures in place.

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# 1. INTRODUCTION

Mandlaglo has appointed Eco Elementum (hereinafter EcoE) as independent environmental assessment practitioners (EAPs) to undertake the required amendment processes for the environmental authorisations, as they apply to Portion 1 of Farm Kafferstad 195 IS. A Basic Assessment (BA) process is required in terms of NEMA Regulations, as amended for the application of the Section 102 MR amendment.

*This report serves as the specialist Wetland Impact Assessment in support of the abovementioned application.*

## 1.1 Background

Mandlaglo Commodities (Pty) Ltd (hereinafter Mandlaglo) holds a Mining Right (MR) (Ref: MP 30/5/1/2/2/10191 MR) in terms of the Minerals and Petroleum Resources Development Act, Act No. 28 of 2002 (MPRDA) and a Water Use Licence (06/B11A/ABCGIJ/9696) in terms of the National Water Act, Act No. 36 of 1998 (NWA). Mandlaglo is currently operating Tala Bethal Coal Mine, an underground mining operation located near Hendrina, in the Steve Tshwete Local Municipality, Nkangala District Municipality, Mpumalanga Province of South Africa.

The proposed project entails the amendment of the Mining Right (MR) to include a new opencast section and the addition of a Wash Plant to the current surface infrastructure for on-site coal beneficiation, this will require amendments to their currently approved authorisations. The amendment will apply to Portion 1 of Farm Kafferstad 195 IS.

**Table 1.1: Project description**

| | |
|---|---|
| **Farm Name:** | Portion 1 of the Farm Kafferstad 195 IS. |
| **Application area (Ha)** | Approximately 145 ha. |
| **Magisterial district:** | Steve Tshwete Local Municipality<br>Nkangala District Municipality<br>Bethal Magisterial District |
| **Distance and direction from nearest town** | Approximately 11 km southwest of Hendrina and 20 km northeast of Bethal. |
| **21 digit Surveyor General Code for each farm portion** | T0IS00000000019500001 |

# 2. STUDY AREA

## 2.1 Location

The study area is on Portion 1 of Farm Kafferstad 195 IS located 11 km southwest of Hendrina and 20 km northeast of Bethal. The study area falls within the Steve Tshwete Local Municipality of Nkangala District Municipality, Mpumalanga Province. The vegetation classification by Mucina & Rutherfords (2006) categorises the study area as Eastern Highveld Grassland vegetation unit of the Grassland Biome. This falls into the conservation status of ‘Vulnerable’ according to the Mpumalanga Biodiversity Sector Plan (MBSP) (Lotter, M.C., *et al.,* 2014) and in the National List of Threatened Ecosystems (SANBI & DEAT, 2011). Mucina & Rutherford (2006) classifies the vegetation as ‘Endangered’. The Eastern Highveld Grassland is typically associated with summer rainfall regions. This Biome covers approximately 28% of South Africa.

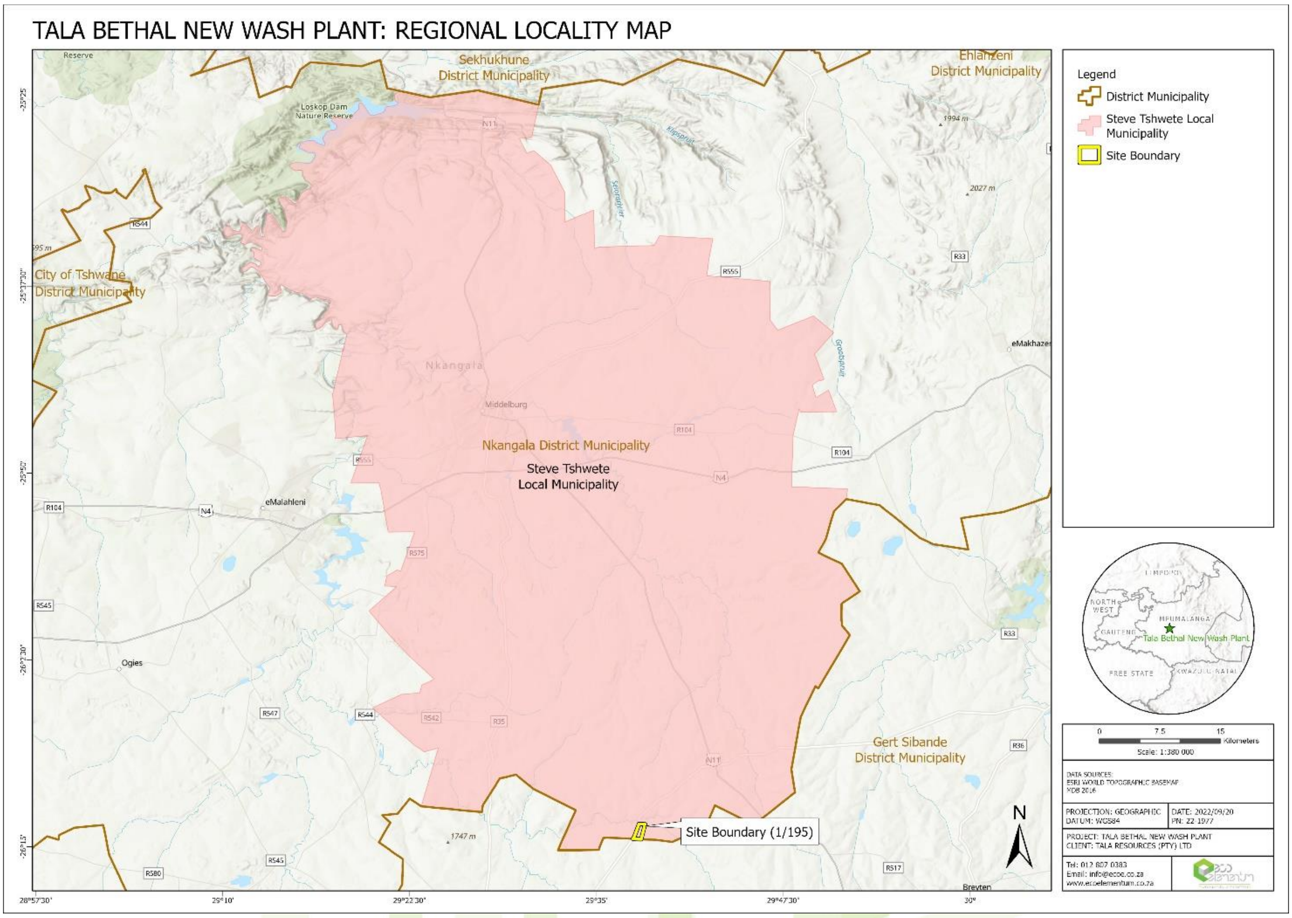



Figure 2.1: Regional Locality Map

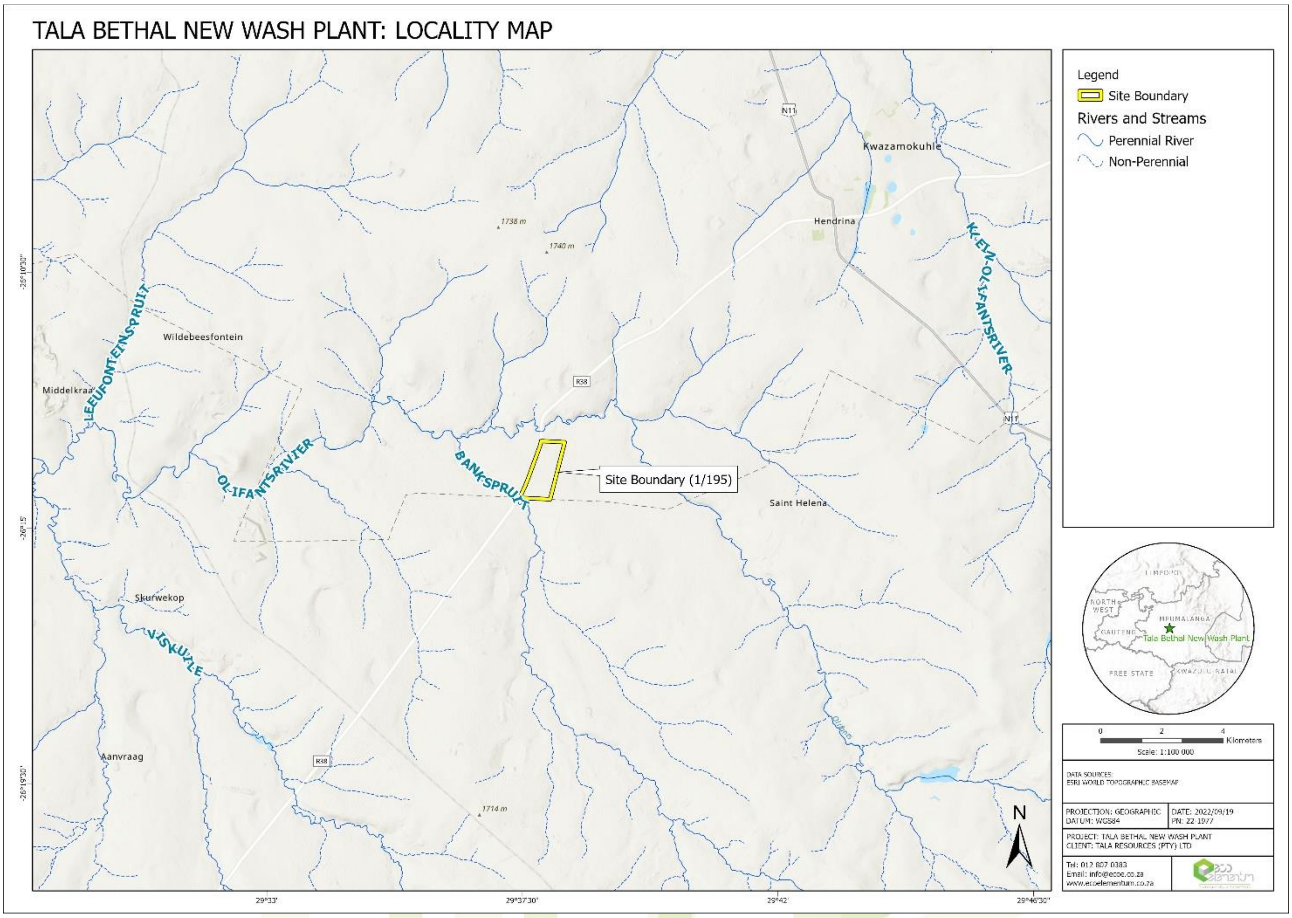



Figure 2.2: Locality Map

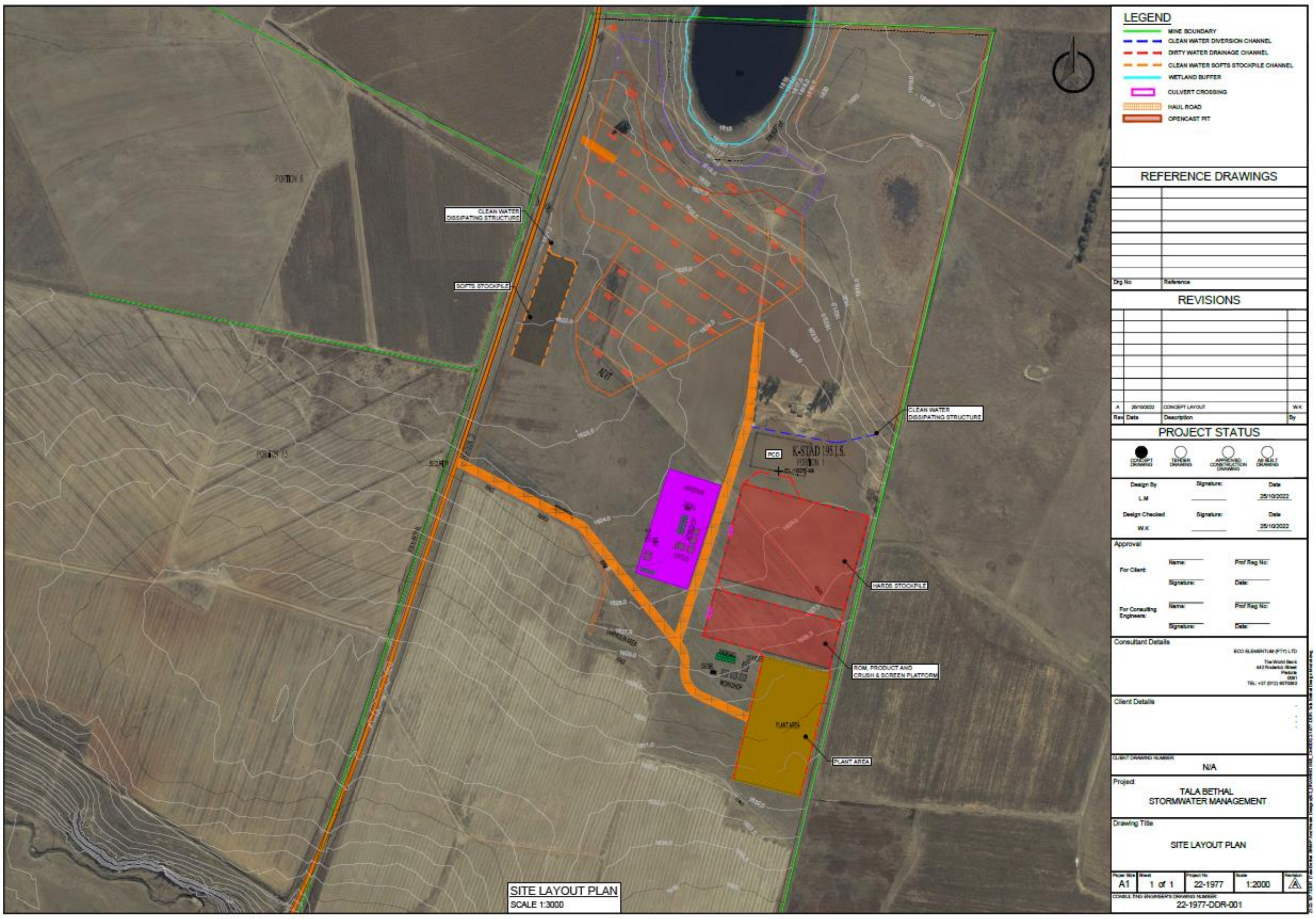



Figure 2.3: Activities Map

## 2.2 Vegetation

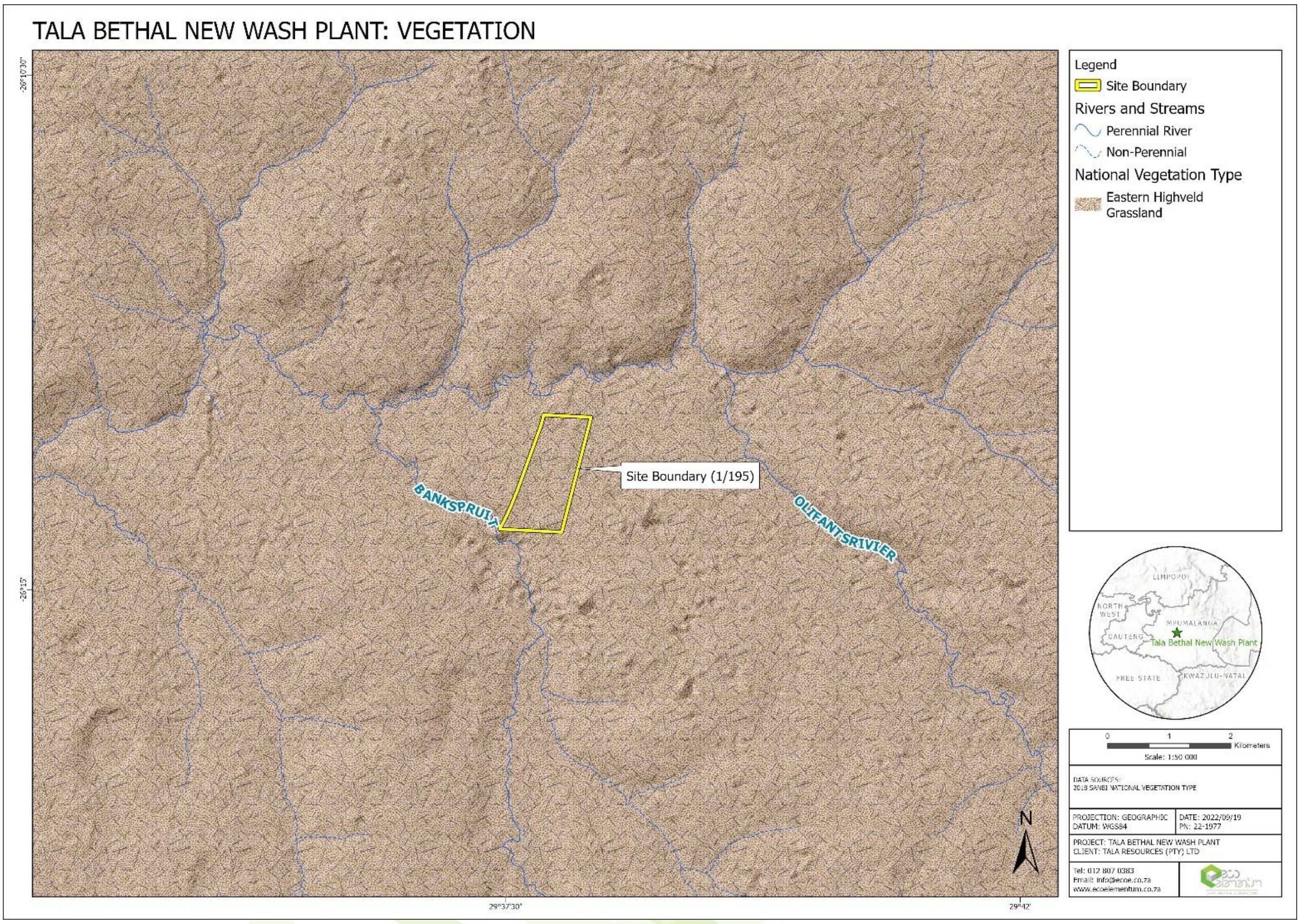



**Figure 2.4: Vegetation of the Study Area**

### 2.2.1 Eastern Highveld Grassland - Endangered

#### Vegetation & Landscape Features

Slightly to moderately undulating plains, including some low hills and pan depressions. The vegetation is short dense grassland dominated by the usual highveld grass composition (*Aristida, Digitaria, Eragrostis, Themeda, Tristachya* etc.) with small, scattered rocky outcrops with wiry, sour grasses and some woody species (*Senegalia caffra, Celtis africana, Diospyros lycioides* subsp *lycioides, Parinari capensis, Protea caffra, P. welwitschii* and *Searsia magalismontanum*).

#### Geology & Soils

Red to yellow sandy soils of the Ba and Bb land types found on shales and sandstones of the Madzaringwe Formation (Karoo Supergroup). Land types Bb (65%) and Ba (30%).

#### Important Taxa

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

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

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

**Succulent Herb:** *Aloe ecklonis.*

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

## 2.3 Management Areas

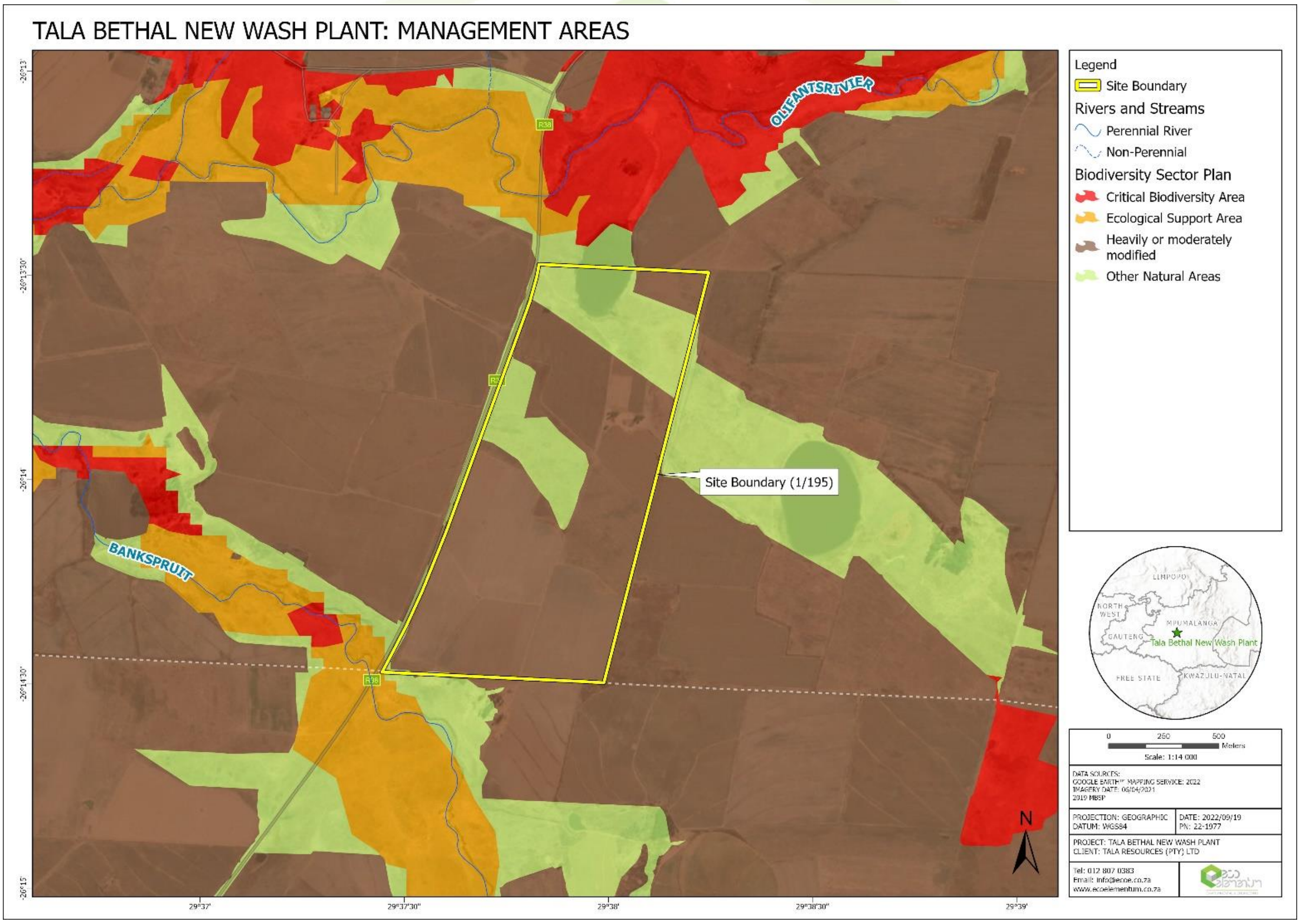



**Figure 2.5: Management areas associated with the site**

Biodiversity areas represent terrestrial and aquatic sites identified as Critical Biodiversity Areas (CBAs), Ecological Support Areas (ESA), Other Natural Areas and No Natural Remaining Areas conducted by SANBI.

### Critical Biodiversity Areas

Critical Biodiversity Areas are those areas required to meet biodiversity thresholds. CBA's are areas of terrestrial or aquatic features (or riparian vegetation alongside CBA aquatic features) which must be protected in their natural state to maintain biodiversity and ecosystem functioning (Desmet et al., 2013). According to Desmet et al (2013), these CBAs include:

i) Areas that need to be protected in order to meet national biodiversity pattern thresholds (target area); ii) Areas required to ensure the continued existence and functioning of species and ecosystems (including the delivery of ecosystem services); and/or iii) Important locations for biodiversity features or rare species.

### Ecological Support Areas

Ecological Support Areas (ESA) are supporting zones required to prevent the degradation of Critical Biodiversity Areas and Protected Areas. An ESA may include an aquatic or terrestrial feature. ESAs can be further subdivided into Critical Ecological Support Areas (CESA) and Other Ecological Support Areas (OESA). Critical Ecological Support Areas are aquatic features, with their terrestrial buffers, which fall within priority sub-catchments, whose protection is required in order to support the aquatic and terrestrial CBAs. An example might be a river reach which feeds directly into a CBA. Other Ecological Support Areas are all remaining aquatic ecosystems (not classed as CESA or CBA), with their terrestrial buffers, which have a less direct impact on the CBA, e.g. a wetland that is geographically isolated from a CBA, but contributes to ecological processes such as groundwater recharge, thereby indirectly impacting on a CBA downstream. (Desmet et al., 2010).

### Other Natural Areas

Other Natural Areas are areas of lesser biodiversity importance whose protection is not required in order to meet national biodiversity thresholds. Other Natural Areas may withstand some loss in terms of biodiversity through the conversion of their natural state for development. However, if all Critical Biodiversity Areas are not protected, certain Other Natural Areas will need to be reclassified as Critical Biodiversity Areas in order to meet thresholds. (Desmet et al., 2010).

No Natural Remaining Areas are those areas that have been irreversibly transformed through urban development, plantation and agriculture and poor land management. As a result, these areas no longer contribute to the biodiversity of the region. However, in some cases transformed land may be classified as an ESA or CBA if they still support biodiversity (Desmet et al., 2010).

## 2.4 CATCHMENT

The site is situated in the B11A Quaternary Catchment of the Upper Olifants Water Management Area. The site is further situated ~2km directly East of the confluence of the Bankspruit and Olifants River.

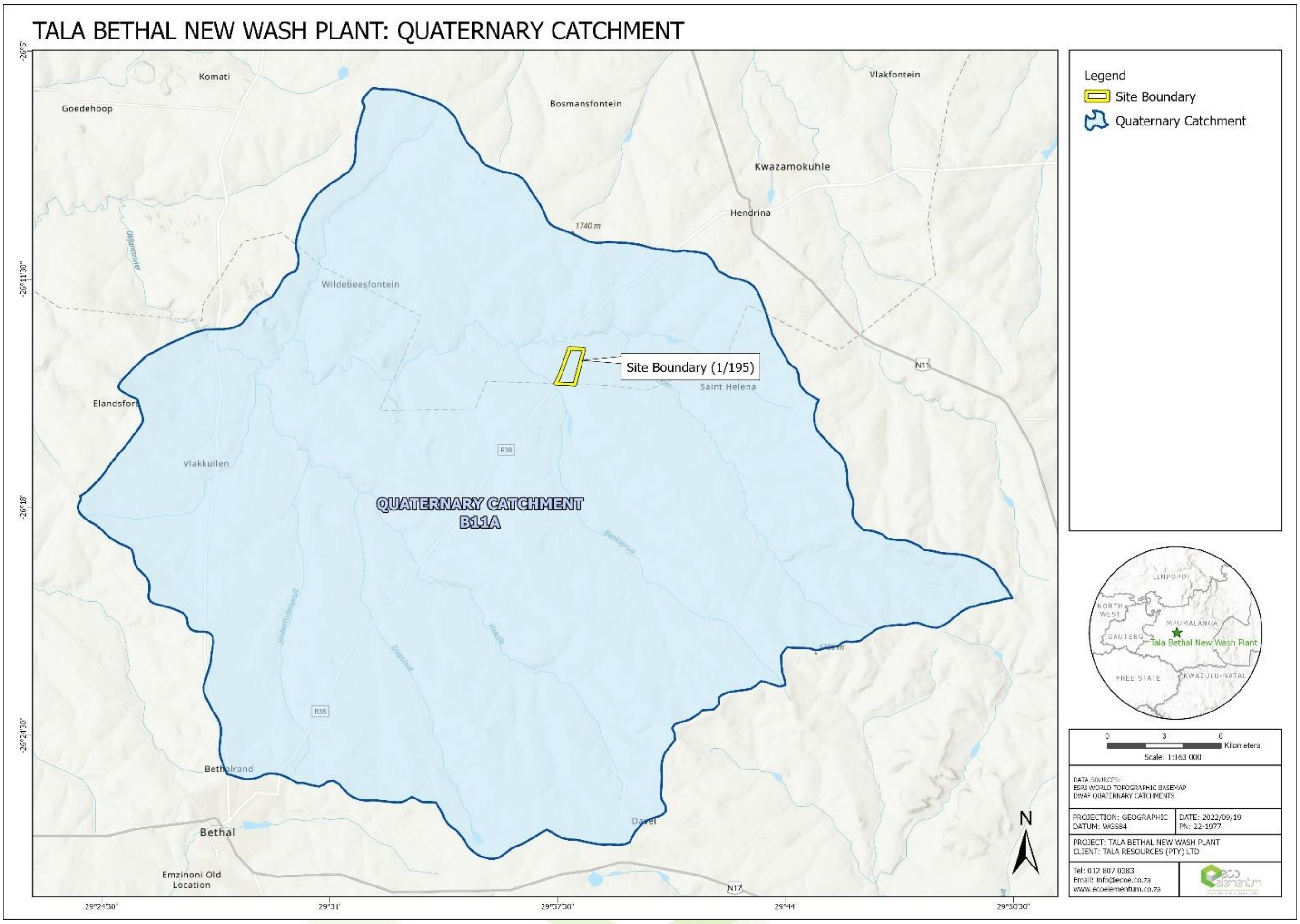



**Figure 2.6: Quaternary Catchment**

Recent studies (DWS, 2016) revealed that there is considerable concern around the wetlands in the Upper Olifants catchment where loss of wetlands due to mining through them and/or not rehabilitating when damaged, impacts on the ability of the catchment to filter the water. In addition as stated in the Internal Strategic Perspective for the Olifants WMA (DWAF, 2005) the aquatic riparian habitats in this catchment require specific attention. It is thus understandable that further studies had been undertaken in collaboration with recent Reserve studies for the catchment (DWS, 2016). The following priority wetlands had been identified for the Upper Olifants River:

- B11A (headwaters of the Olifants River);
- B11C (headwaters of the Steenkool Spruit); and
- B12A (headwaters of the Klein-Olifants River).

# 3. METHODOLOGY

For the purpose of this assessment, wetlands are considered as those ecosystems defined by the National Water Act No. 36 of 1998 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."*

The following methodologies were used in conducting the specialist wetland study.

## 3.1 Wetland Delineation and Classification

### 3.1.1 Wetland delineation

The field procedure for the wetland delineation was based on the principles of the Guidelines for delineating the boundaries of a wetland set out by the Department of Water Affairs and Forestry (DWAF) (DWAF, 2005). Due to the transitional nature of wetland boundaries, these are often not clearly apparent and the delineations must therefore be regarded as a human construct.

The document requires the delineator to give consideration to four indicators in order to find the outer edge of the wetland zone:

- The Terrain Unit Indicator helps to identify those parts of the landscape where wetlands are more likely to occur.
- The Soil Form Indicator identifies the soil forms, as defined by the Soil Classification Working Group (1991), which are associated with prolonged and frequent saturation.
- The Soil Wetness Indicator identifies the morphological "signatures" developed in the soil profile as a result of prolonged and frequent saturation. Signs of wetness are characterised by a variety of aspects. These include marked variations in the colours of various soil components, known as mottling; a gleyed soil matrix or the presence of Mn/Fe concretions. It should be noted that the presence of signs of wetness within a soil profile is sufficient to classify an area as a wetland area despite the lack of other indicators.
- The Vegetation Indicator identifies hydrophilic vegetation associated with frequently saturated soils.

In assessing whether an area is a wetland, the boundary of a wetland or a non- wetland area should be considered to be the point where the above indicators are no longer present. An understanding of the hydrological processes active within the area is also considered important when undertaking a wetland assessment. Indicators should be 'combined' to determine whether an area is a wetland, to delineate the boundary of that wetland and to assess its level of functionality and health.

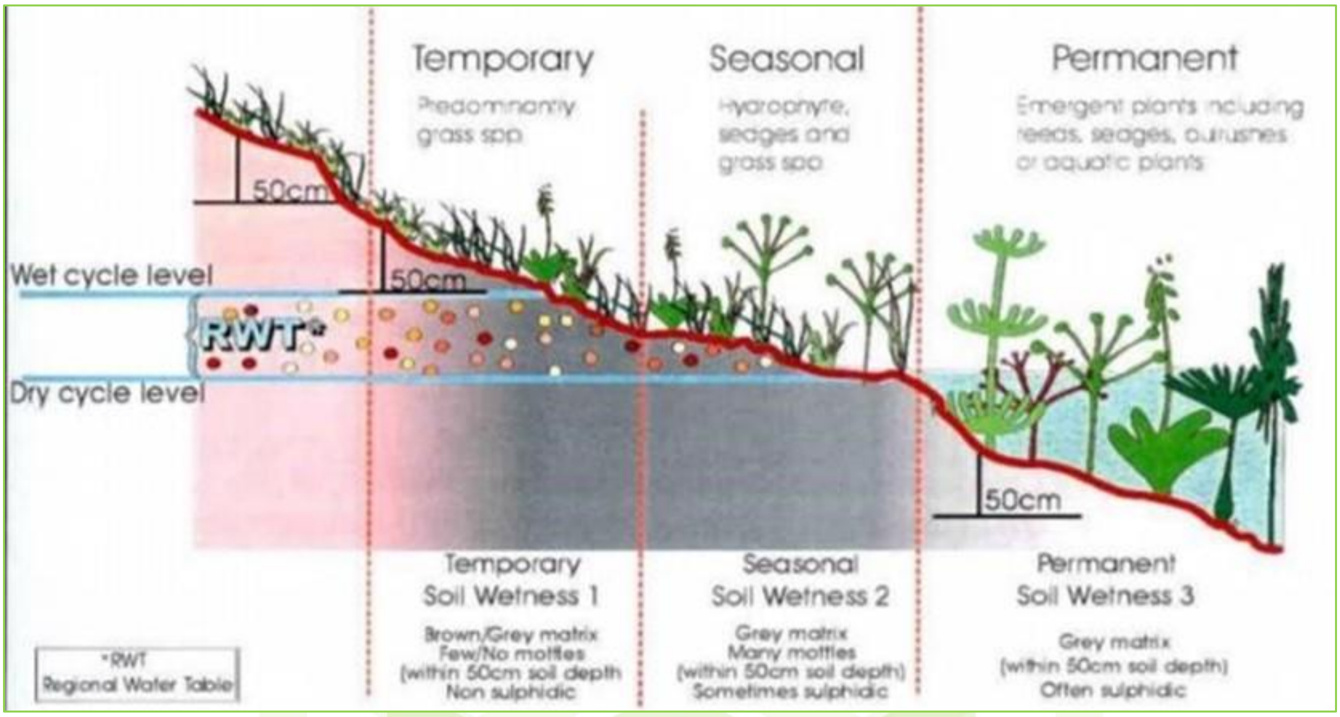



**Figure 3.1: Different zones of wetness found in wetlands, indicating how the soil wetness and vegetation indicators change (DWAF, 2005)**

### 3.1.2 Wetland classification

The classification of the wetlands in the study area was divided into different hydrogeomorphic types based on the report; *Further development of a proposed national wetland classification system for South Africa (SANBI, 2009)*.

## 3.2 WETLAND STATUS

### 3.2.1 A characterization of the flora found in the wetlands

The area was traversed on foot and species of plants seen were recorded.

### 3.2.2 An assessment of the wetlands Present Ecological Status (PES)

A Level 2 Wetland Health assessment was conducted on the wetland delineated as per the procedures described in 'Wet- Health: A technique for rapidly assessing wetland health' (MacFarlane et al., 2009). This document assesses the health status of a wetland through evaluation of three main factors -

- Hydrology: defined as the distribution and movement of water through a wetland and its soils.
- Geomorphology: defined as the distribution and retention patterns of sediment within the wetland.
- Vegetation: defined as the vegetation structural and compositional state.

The WET-Health tool evaluates the extent to which anthropogenic changes have impacted upon wetland functioning or condition through assessment of the above-mentioned three factors. Scores range from 0 indicating no impact to a maximum of 10 which would imply that impacts had completely destroyed the functioning of a particular component of the wetland. Impact scores obtained for each of the modules reflect the degree of change from natural reference conditions.

| IMPACT CATEGORY | DESCRIPTION | RANGE |
|---|---|---|
| None | No discernible modification or the modification is such that it has no impact on wetland integrity. | 0 – 0.9 |
| Small | Although identifiable, the impact of this modification on wetland integrity is small. | 1 – 1.9 |
| Moderate | The impact of this modification on wetland integrity is clearly identifiable, but limited. | 2 – 3.9 |
| Large | The modification has a clearly detrimental impact on wetland integrity. Approximately 50% of wetland integrity has been lost. | 4 – 5.9 |
| Serious | The modification has a clearly adverse effect on this component of habitat integrity. Well in excess of 50% of the wetland integrity has been lost. | 6 – 7.9 |
| Critical | The modification is present in such a way that the ecosystem processes of this component of wetland health are totally / almost totally destroyed. | 8– 10 |

The tool evaluates the health of the wetland and is determined by a score known as the Present Ecological Score. The health assessments for the hydrology, geomorphology and vegetation components were then represented by the Present Ecological State (PES) categories. The PES categories are divided into six units (A-F) based on a gradient from "unmodified/natural" (Category A) to "severe/complete deviation from natural" (Category F).

| DESCRIPTION | IMPACT SCORE | HEALTH CATEGORY |
|---|---|---|
| Unmodified, natural. | 0 – 1.0 | A |
| Largely natural with few modifications. A slight change in ecosystem processes is discernible and a small loss of natural habitats and biota may have taken place. | 1.1 - 2.0 | B |
| Moderately modified. A moderate change in ecosystem processes and loss of natural habitats has taken place but the natural habitat remains predominantly intact | 2.1 - 4.0 | C |
| Largely modified. A large change in ecosystem processes and loss of natural habitat and biota and has occurred. | 4.1 - 6.0 | D |
| The change in ecosystem processes and loss of natural habitat and biota is great but some remaining natural habitat features are still recognizable. | 6.1 - 8.0 | 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. | 8.1 - 10.0 | F |

### 3.2.3 Assessment of Ecological Importance and Sensitivity (EIS) of the wetlands

The ecological importance and sensitivity assessment was conducted according to the guidelines as discussed by DWAF (1999). Here DWAF 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. "Ecological sensitivity", according to DWAF (1999), refers to the system's ability to resist disturbance and its capability to recover from disturbance once it has occurred.

### 3.2.4 Wetland Functionality and Ecosystem Services

Wetlands within the study area serve to improve habitat within and potentially downstream of the study area through the provision of various ecosystem services. Many of these functional benefits contribute directly or indirectly to increased biodiversity within the transformed study area as well as downstream of the study area through provision and maintenance of appropriate habitat and associated ecological processes

| | | | | | |
|---|---|---|---|---|---|
| **Ecosystem services supplied by wetlands** | **Indirect benefits** | **Regulating and supporting benefits** | | Flood attenuation | The spreading out and slowing down of floodwaters in the wetland, thereby reducing the severity of floods downstream |
| | | | | Streamflow regulation | Sustaining streamflow during low flow periods |
| | | | Water quality enhancement benefits | Sediment trapping | The trapping and retention in the wetland of sediment carried by runoff waters |
| | | | | Phosphate assimilation | Removal by the wetland of phosphates carried by runoff waters |
| | | | | Nitrate assimilation | Removal by the wetland of nitrates carried by runoff waters |
| | | | | Toxicant assimilation | Removal by the wetland of toxicants (e.g. metals, biocides and salts) carried by runoff waters |
| | | | | Erosion control | Controlling of erosion at the wetland site, principally through the protection provided by vegetation. |
| | | | | Carbon storage | The trapping of carbon by the wetland, principally as soil organic matter |
| | **Direct benefits** | | | **Biodiversity maintenance[2]** | Through the provision of habitat and maintenance of natural process by the wetland, a contribution is made to maintaining biodiversity |
| | | **Provisioning benefits** | | Provision of water for human use | The provision of water extracted directly from the wetland for domestic, agriculture or other purposes |
| | | | | Provision of harvestable resources | The provision of natural resources from the wetland, including livestock grazing, craft plants, fish, etc. |
| | | | | Provision of cultivated foods | The provision of areas in the wetland favourable for the cultivation of foods |
| | | **Cultural benefits** | | Cultural heritage | Places of special cultural significance in the wetland, e.g., for baptisms or gathering of culturally significant plants |
| | | | | Tourism and recreation | Sites of value for tourism and recreation in the wetland, often associated with scenic beauty and abundant birdlife |
| | | | | Education and research | Sites of value in the wetland for education or research |

An indication of the functions and ecosystem services provided by wetlands can be assessed through the WET- EcoServices manual (Kotze et al., 2008) and are based on a number of characteristics that are relevant to the particular benefit provided by the wetland. A Level 2 WET-EcoServices assessment was undertaken for the wetlands occurring on site.

## 3.3 Impact Assessment

**Table 3.1: Impact Criteria and Assigned Rating**

| Intensity (Magnitude) | | ASSIGNED QUANTITATIVE SCORE |
|---|---|---|
| **The intensity of the impact is considered by examining whether the impact is destructive or benign, whether it has a significant, moderate or insignificant** | | |
| **(L)OW** | The impact alters the affected environment in such a way that the natural processes or functions are not affected. | **1** |
| **(M)EDIUM** | The affected environment is altered, but functions and processes continue, albeit in a modified way. | **3** |
| **(H)IGH** | Function or process of the affected environment is disturbed to the extent where it temporarily or permanently ceases. | **5** |
| **Duration** | | |
| **The lifetime of the impact, that is measure in relation to the lifetime of the proposed development.** | | |
| **(S)HORT TERM** | The impact will either disappear with mitigation or will be mitigated through a natural process in a period shorter than that of the construction phase. | **1** |
| **(SM) SHORT - MEDIUM TERM** | The impact will be relevant through to the end of a construction phase. | **2** |
| **(M)MEDIUM** | The impact will last up to the end of the development phases, where after it will be entirely negated. | **3** |
| **(L)ONG TERM** | The impact will continue or last for the entire operational lifetime (i.e. exceed 20 years) of the development, but will be mitigated by direct human action or by natural processes thereafter. | **4** |
| **(P)ERMANENT** | This is the only class of impact, which will be non-transitory. Mitigation either by man or natural process will not occur in such a way or in such a time span that the impact is transient. | **2** |
| **Spatial Scale/Extent** | | |
| **Classification of the physical and spatial aspect of the impact** | | |
| **(F)OOTPRINT** | The impacted area extends only as far as the activity, such as footprint occurring within the total site area. | **1** |
| **(S)ITE** | The impact could affect the whole, or a significant portion of the site. | **2** |
| **(R)EGIONAL** | The impact could affect the area including the neighbouring Farms, the transport routes and the adjoining towns. | **3** |
| **(N)ATIONAL** | The impact could have an effect that expands throughout the country (South Africa). | **4** |

| | | |
|---|---|---|
| **(I)NTERNATIONAL** | Where the impact has international ramifications that extend beyond the boundaries of South Africa. | **5** |
| **Probability** | | |
| **This describes the likelihood of the impact actually occurring. The impact may occur for any length of time during the life cycle of the activity. The classes are rated as follows:** | | |
| **(I)MPROBABLE** | The possibility of the Impact occurring is none, due to the circumstances or design. The chance of this Impact occurring is zero (0%) | **1** |
| **(P)OSSIBLE** | The possibility of the Impact occurring is very low, due either to the circumstances or design. The chance of this Impact occurring is defined as 25% or less | **2** |
| **(L)IKELY** | There is a possibility that the impact will occur to the extent that provisions must therefore be made. The chances of Impact occurring is defined as 50% | **3** |
| **(H)IGHLY LIKELY** | It is most likely that the Impacts will occur at some stage of the development. Plans must be drawn up before carrying out the activity. The chances of this impact occurring is defined as 75 %. | **4** |
| **(D)EFINITE** | The impact will take place regardless of any prevention plans, and only mitigation actions or contingency plans to contain the effect can be relied on. The chance of this impact occurring is defined as 100 %. | **5** |
| **Weighting Factor** | | |
| **Subjective score assigned by Impact Assessor to give the relative importance of a particular environmental component based on project knowledge and previous experience. Simply, such a weighting factor is indicative of the importance of the impact in terms of the potential effect that it could have on the surrounding environment. Therefore, the aspects considered to have a relatively high value will score a relatively higher weighting than that which is of lower importance** | | |
| **(L)OW** | | **1** |
| **LOW- MEDIUM** | | **2** |
| **MEDIUM (M)** | | **3** |
| **MEDIUM-HIGH** | | 4 |
| **HIGH (H)** | | 5 |
| **Mitigation Measures and Mitigation Efficiency** | | |
| **Determination of significance refers to the foreseeable significance of the impact after the successful implementation of the necessary mitigation measures** | | |
| Mitigation measures were recommended to enhance benefits and minimise negative impacts and address the following:<br>Mitigation objectives: what level of mitigation must be aimed at: For each identified impact, the specialist must provide mitigation objectives (tolerance limits) which would result in measurable reduction in impact. Where limited knowledge or expertise exists on such tolerance limits, the specialist must make "educated guesses" based on professional experience;<br>Recommended mitigation measures: For each impact the specialist must recommend practicable mitigation actions that can measurably affect the significance rating. The specialist must also identify management actions, which could enhance the condition of the environment. Where no mitigation is considered feasible, this must be stated and reasons provided; | | |

Effectiveness of mitigation measures: The specialist must provide quantifiable standards (performance criteria) for reviewing or tracking the effectiveness of the proposed mitigation actions, where possible; and

Recommended monitoring and evaluation programme: The specialist is required to recommend an appropriate monitoring and review programme, which can track the efficacy of the mitigation objectives. Each environmental impact is to be assessed before and after mitigation measures have been implemented.

The management objectives, design standards, etc., which, if achieved, can eliminate, minimise or enhance potential impacts or benefits. National standards or criteria are examples, which can be stated as mitigation objectives.

| | | |
|---|---|---|
| **HIGH** | The impact is of major importance. Mitigation of the impact is not possible on a cost-effective basis. The impact is regarded as high importance and taken within the overall context of the project, is regarded as a fatal flaw. An impact regarded as high significance, after mitigation could render the entire development option or entire project proposal unacceptable. | **0.2** |
| **MEDIUM-HIGH** | The impact is of major importance but through the implementation of the correct mitigation measures, the negative impacts will be reduced to acceptable levels. | **0.4** |
| **MEDIUM** | Notwithstanding the successful implementation of the mitigation measures, to reduce the negative impacts to acceptable levels, the negative impact will remain of significance. However, taken within the overall context of the project, the persistent impact does not constitute a fatal flaw. | **0.6** |
| **LOW -MEDIUM** | The impact is of importance, however, through the implementation of the correct mitigation measures such potential impacts can be reduced to acceptable levels. | **0.8** |
| **LOW** | The impact will be mitigated to the point where it is of limited importance. | **1.0** |

**Table 3.2: Description of bio-physical assessment parameters with its respective weighting**

| Extent | Duration | Intensity | Probability | Weighting Factor (WF) | Significance Rating (SR) | Mitigation Efficiency (ME) | Significance Following Mitigation (SFM) |
|---|---|---|---|---|---|---|---|
| Footprint 1 | Short term 1 | Low 1 | Probable 1 | Low 1 | Low 0-19 | High 0,2 | Low 0-19 |
| Site 2 | Short to medium 2 | | Possible 2 | Low to medium 2 | Low to medium 20-39 | Medium to high 0,4 | Low to medium 20-39 |
| Regional 3 | Medium term 3 | Medium 3 | Likely 3 | Medium 3 | Medium 40-59 | Medium 0,6 | Medium 40-59 |
| National 4 | Long term 4 | | Highly Likely 4 | Medium to high 4 | Medium to high 60-79 | Low to medium 0,8 | Medium to high 60-79 |
| International 5 | Permanent 5 | High 5 | Definite 5 | High 5 | High 80-100 | Low 1,0 | High 80-100 |

**Table 3.3: Significant Rating Scale Without Mitigation**

**Potential Impacts Without Mitigation Measures (WOM)**

Following the assignment of the necessary weights to the respective aspects, criteria are summed and multiplied by their assigned weightings, resulting in a value for each impact (prior to the implementation of mitigation measures).

**SIGNIFICANT RATING EQUATION**

| Significant Rating (SR) = (Extent + Intensity + Duration) x Probability | | |
|---|---|---|
| **S=0** | **INSIGNIFICANT** | The impact will be mitigated to the point where it is regarded as insubstantial. |
| **SR < 30** | **LOW (L)** | The impact will be mitigated to the point where it is of limited importance. |
| **20<SR<39** | **LOW- MEDIUM** | The impact is of importance, however, through the implementation of the correct mitigation measures such potential impacts can be reduced to acceptable levels; |
| **40> SR < 59** | **MEDIUM (M)** | Notwithstanding the successful implementation of the mitigation measures, to reduce the negative impacts to acceptable levels, the negative impact will remain of significance. However, taken within the overall context of the project, the persistent impact does not constitute a fatal flaw. |
| **60<SR>79** | **MEDIUM-HIGH** | The impact is of major importance but through the implementation of the correct mitigation measures, the negative impacts will be reduced to acceptable levels. |
| **80<SR > 100** | **HIGH (H)** | The impact is of major importance. Mitigation of the impact is not possible on a cost-effective basis. The impact is regarded as high importance and taken within the overall context of the project, is regarded as a fatal flaw. An impact regarded as high significance, after mitigation could render the entire development option or entire project proposal unacceptable. |

**Table 3.4: Significant Rating Scale with Mitigation**

| **Potential Impacts with Mitigation Measures (WM) –**<br>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. | | |
|---|---|---|
| **SIGNIFICANT RATING WITH MITIGATION EQUATION**<br>Significance Rating (WM) = Significance Rating (WOM) x Mitigation Efficiency.<br>Or WM = WOM x ME | | |
| **S=0** | **INSIGNIFICANT** | The impact will be mitigated to the point where it is regarded as insubstantial. |
| **SR < 30** | **LOW (L)** | The impact will be mitigated to the point where it is of limited importance. |
| **20<SR<39** | **LOW- MEDIUM** | The impact is of importance, however, through the implementation of the correct mitigation measures such potential impacts can be reduced to acceptable levels; |
| **40> SR < 59** | **MEDIUM (M)** | Notwithstanding the successful implementation of the mitigation measures, to reduce the negative impacts to acceptable levels, the negative impact will remain of significance. However, taken within the overall context of the project, the persistent impact does not constitute a fatal flaw. |
| **60<SR>79** | **MEDIUM-HIGH** | The impact is of major importance but through the implementation of the correct mitigation measures, the negative impacts will be reduced to acceptable levels. |
| **80<SR > 100** | **HIGH (H)** | The impact is of major importance. Mitigation of the impact is not possible on a cost-effective basis. The impact is regarded as high importance and taken within the overall context of the project, is regarded as a fatal flaw. An impact regarded as high significance, after mitigation could render the entire development option or entire project proposal unacceptable. |

# 4. RESULTS AND DISCUSSION

A site investigation was undertaken on 2 November 2022, following adequate rainfall, which made the conditions favourable for the wetland assessment to be conducted, in order to determine the status and functionality at a high confidence level.

## 4.1 Wetland Delineation and Classification

Three (3) different Hydrogeomorphic (HGM) units were identified within the three (3) wetland systems delineation on site:

- Tala Bethal Wetland System 1:
  - Permanent Open water Pan (TB Pan1)
  - Seasonal Grass Pan (TB Pan 2)
  - Hillslope Seepage Wetlands (TB HS1)
- Tala Bethal Wetland System 2
  - Isolated Hillslope Seepage Wetland (TB HS2)
- Tala Bethal Wetland System 3
  - Channelled Valley Bottom Wetland (TB CVB)
  - Hillslope Seepage Wetlands (TB HS3 and HS4)

Fountain within the Hillslope Seepage Wetland associated with the Pan1 and 2

Looking upslope to the south-west of the Hillslope seepage wetland associated with Pan1 and 2. Dominant species present were *Cyperus esculentus, Cyperus compressus, Centella asiatica*, and *Leersia hexandra*

| | |
|---|---|
| <br>*Crinum bulbispermum* within the Hillslope Seepage wetland associated with the Pans. | <br>Grass Pan (TB Pan 2) dominated by *Leersia hexandra*, with tufts of *Schoenoplectus* sp and *Cyperus* sp |
| <br>Looking South onto TB Pan 1. | <br>Sandstone outcrops toward the southern edge of the site associated with the Channeled Valley Bottom Wetland and adjacent Hillslope Seepage Wetlands. |

Mottling in the soils within the Isolated Hillslope Seepage Wetland (TB HS2)

Cultivated areas surrounding TB HS2, which is otherwise dominated by *Helichrysum* sp, *Senecio* sp and grasses such as *Cynodon dactylon*, *Sporobolus africanus* and *Eragrostus curvula*

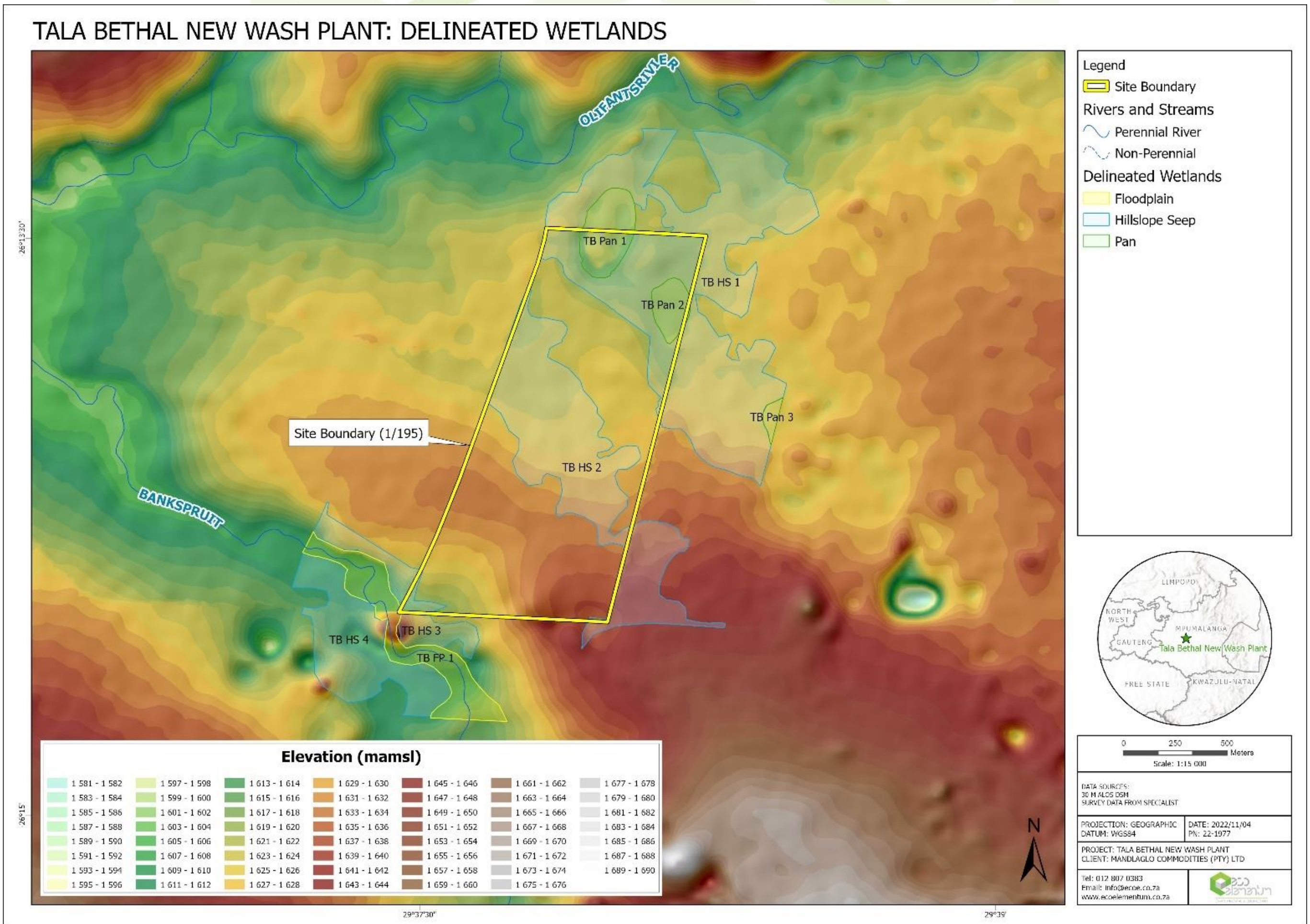



**Figure 4.1: Terrain indicator - Digital Elevation Model of the site**

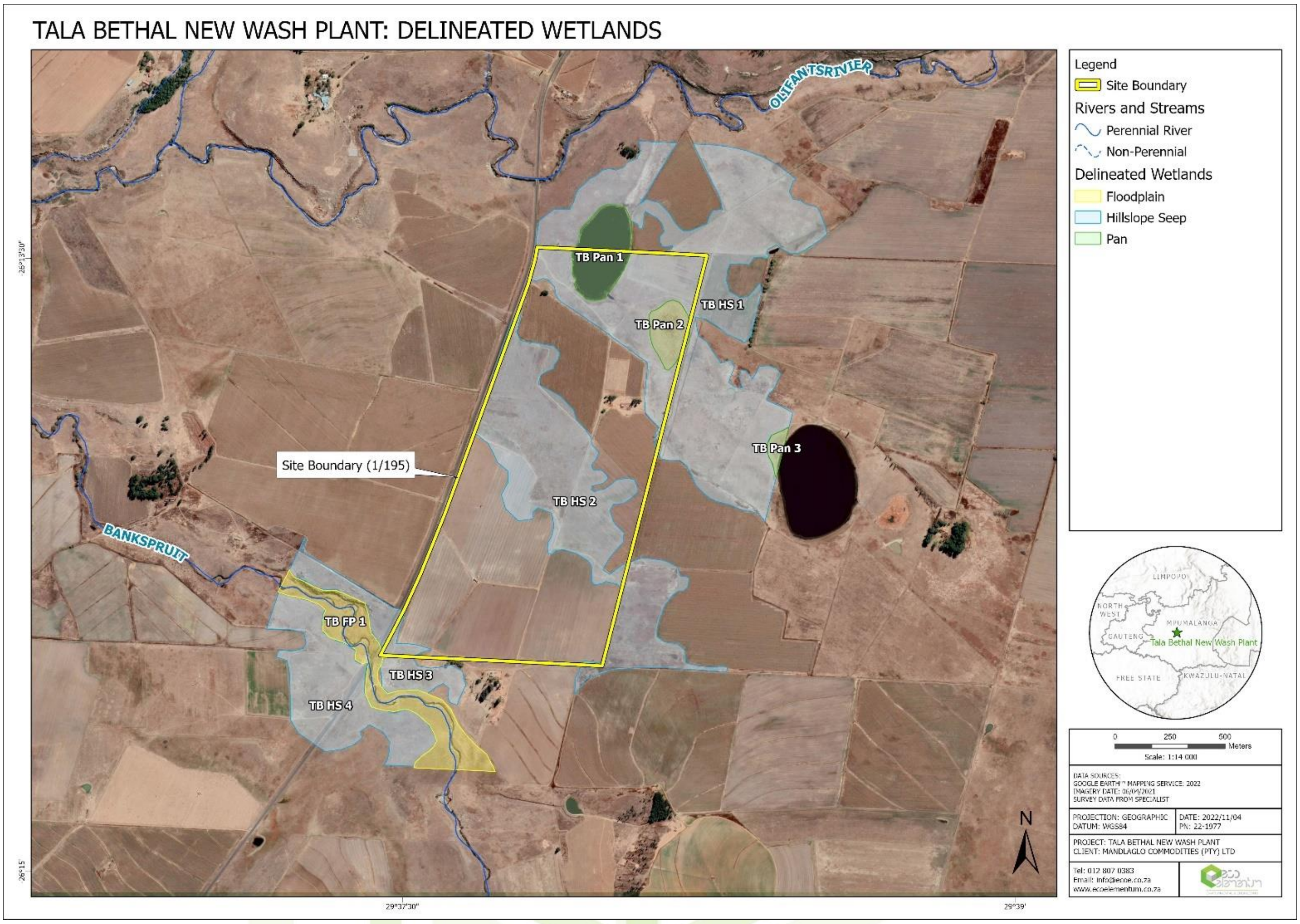



Figure 4.2: Delineated wetlands within the 500m buffer of the project area

## 4.2 Wetland Status

The Present Ecological status (PES) for the Wetland Units were divided into the Hydrology component, Geomorphology component and Vegetation component. The overall combined PES ranged from B to D as can be seen in Table 4.1.

Table 4.1: PES as determined by the WET-Health tool

| Site | Parameter | *Hydrology* | *Geomorphology* | *Vegetation* | Overall Score |
|---|---|---|---|---|---|
| **TB Pan 1** | Score | 1,5 | 3,7 | 1,1 | **2,1** |
| | Category | B | C | B | **C** |
| | Trajectory | (↓) | (↓) | (→) | (↓) |
| **TB Pan 2** | Score | 1,5 | 3,7 | 1,5 | **2,2** |
| | Category | B | C | B | **C** |
| | Trajectory | (↓) | (↓) | (↓) | (↓) |
| **TB HS1** | Score | 3 | 3,8 | 1,3 | **2,7** |
| | Category | C | C | B | **B** |
| | Trajectory | (↓) | (↓) | (↓) | (↓) |
| **TB HS2** | Score | 4 | 5,8 | 2,3 | **4,0** |
| | Category | C | D | C | **D** |
| | Trajectory | (↓↓) | (↓↓) | (↓) | (↓↓) |
| **TB HS3, HS4, CVB** | Score | 4,8 | 4 | 3,9 | **4,2** |
| | Category | D | C | C | **D** |
| | Trajectory | (↓↓) | (↓↓) | (↓) | (↓↓) |

TB Pan1 was only moderately modified with grazing, drainage trenches and some cultivation prevalent within the direct catchment. Artificial trenches had been dug in the past to most likely drain excess water from the pan to the Olifants River and also between TB Pan 2 and TB Pan 1 to drain excess water from the immediate catchment, possibly to dry out larger areas for cultivation and/or grazing. The effects of the trenches were limited and both pans were still largely in tact.

The effects of grazing and runoff from cultivated areas has had a more noticeable effect on TB Pan2 and HS1, although also still only moderately modified at most. Care should be taken to keep mining activities and vehicles out of the 100m buffer of Pan 1 specifically.

The Bankspruit Channelled Valley Bottom wetland and adjacent Hillslope seeps have been impacted by vegetation clearance and mining activities within the wetland systems, which is the main cause for the largely modified state assigned to the system.

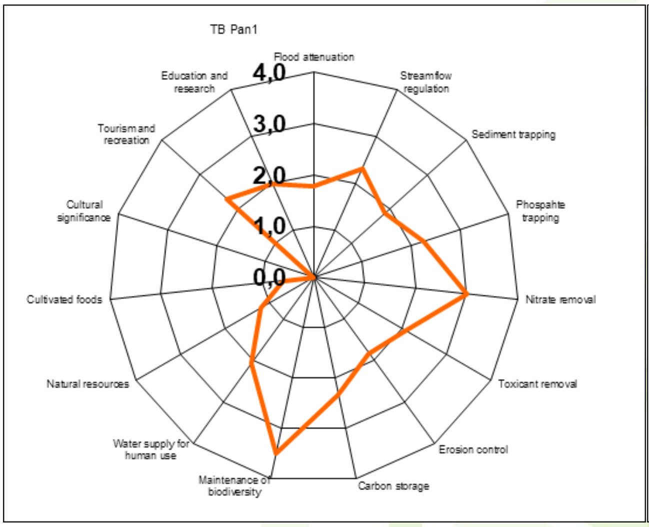
The Ecological Importance and Sensitivity (EIS) was calculated, and the scores ranged from Low to Moderate sensitivity and importance within the landscape. Hydrological function was rated as Moderate due to the connectivity of majority of the wetlands within the landscape and the role it plays it feeding into the Olifants River to the North and Bankspruit to the South. Human Benefits were rated as Low as the wetlands weren't specifically utilised for human benefit in the form of a harvestable resource, and mostly as a water source to aid in cultivation and grazing for livestock. The Ecological Importance of the wetlands could be seen in the form of suitable habitat for wetland fauna and flora and also due to the fact that protected floral species are present in abundance within the pans and associated Hillslope Seep. The Low Ecological Importance of the isolated Hillslope Seep can be attributed to the encroachment of cultivation in the wetland boundary and subsequent sediment and nutrient runoff impacting on the ecological state.

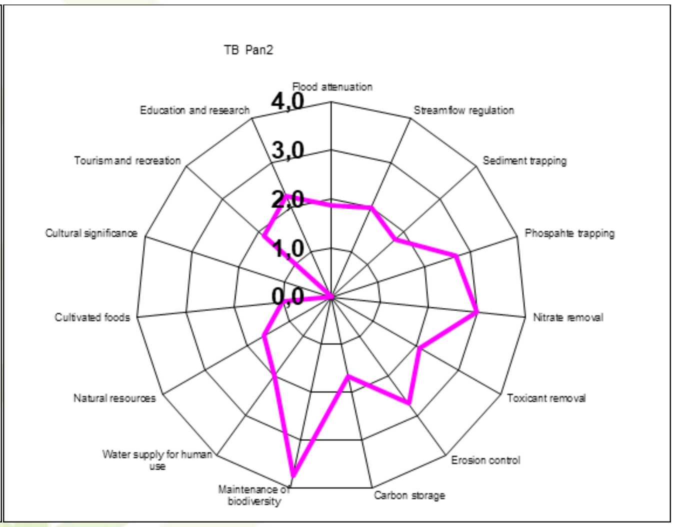
Table 4.2: Ecological Importance and Sensitivity

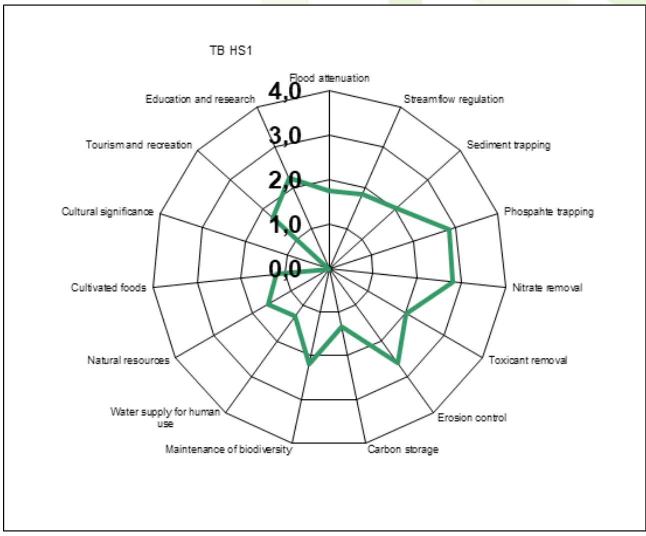
| | TB Pan 1 | TB Pan 2 | TB HS1 | TB HS2 | TB HS3, HS4, CVB |
|---|---|---|---|---|---|
| Biodiversity support | 2 | 2 | 2 | 1 | 2 |
| Landscape scale | 3 | 3 | 2 | 2 | 2 |
| Sensitivity of the wetland | 1 | 1 | 1 | 2 | 3 |
| **ECOLOGICAL IMPORTANCE & SENSITIVITY** | **2** | **2** | **2** | **1** | **2** |
| | Moderate | Moderate | Moderate | Low | Moderate |

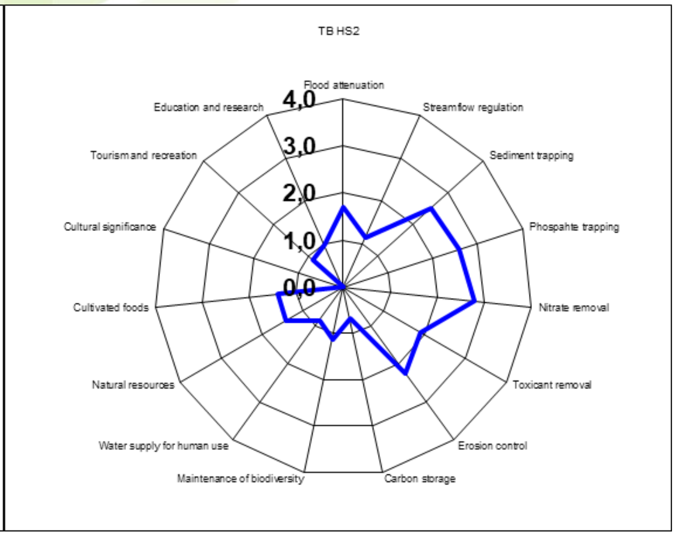
| | TB Pan 1 | TB Pan 2 | TB HS1 | TB HS2 | TB HS3, HS4, CVB |
|---|---|---|---|---|---|
| HYDROLOGICAL/FUNCTIONAL IMPORTANCE | 2 | 2 | 2 | 2 | 2 |
| | Moderate | Moderate | Moderate | Moderate | Moderate |
| DIRECT HUMAN BENEFITS | 1 | 1 | 1 | 1 | 1 |
| | Low | Low | Low | Low | Low |

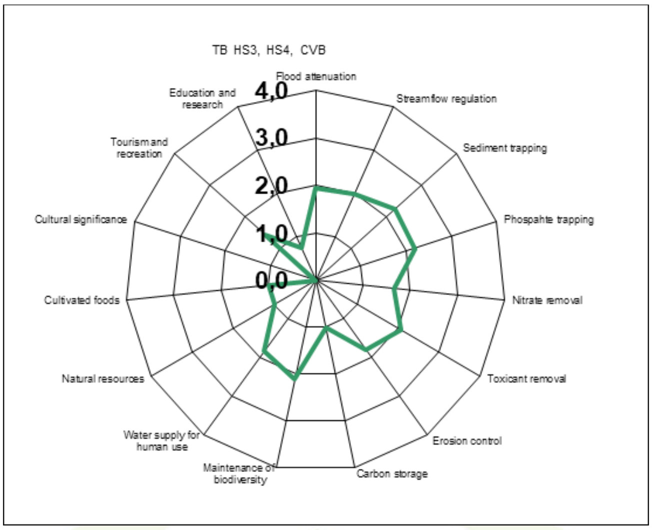
The below spider diagrams detail the functionality of each HGM as assessed with the WET-Ecoservices assessment tool. Within both pans the maintenance of biodiversity was the highest scoring function. The Hillslope seeps on the other hand was calculated to mostly perform a nutrient removal function along with erosion control. The site specific functioning of the Channelled valley Bottom Wetland was average due to the current impact of the adjacent mining activities within the wetland and it's direct catchment.






## 4.3 Recommended Ecological Class

The DWS has conducted a Reserve study for the catchment during January 2013. The Reserve study (Report Reference DM/WMA04/00/CON/CLA/0213) covered quaternary drainage area B11A in terms of surface and groundwater. The following Reserve data was presented as depicted in Table 4.3.

**Table 4.3: Reserve data for sub-area B11A**

| Sub Area | Node | EI | ES | PES | REC | MAR ($Mm^3/a$) | EWR as % MAR |
|---|---|---|---|---|---|---|---|
| B11A | Olifants River (EWR Site 1 – HN1) | High | High | C | B | 61.3 | 10.25 |

From the above data it is prevalent that the Recommended Ecological Category for the systems on site should be Category B. The Pans and Hillsope Seepage wetlands should therefore be maintained or improved to a Category B status, and regular monitoring should be undertaken to ensure that the proposed mining operations for Tala Bethal do not contribute to further degradation of the Bankspruit system.

# 5. IMPACT ASSESSMENT

The following possible impacts to the wetlands have been identified should the proposed development go ahead:

- Loss of wetland habitat
- Loss of species of conservation concern
- Change in hydrological connectivity of the HGM units
- Sedimentation of the HGM units
- Wetland degradation
- Soil compaction
- Change in runoff intensities

The possible impacts were rated and found to be of Low to Medium significance should all mitigation measures be implemented, as can be seen in Table 5.1.

It should be noted that site establishment had already commenced at the time of the field investigation and wetland habitat loss and hydrological connectivity deterioration was already prevalent.

Figure 5.1: Waterfilled cut-off trench within TB HS2

Figure 5.2: Cut-off trench running down slope within TB HS2

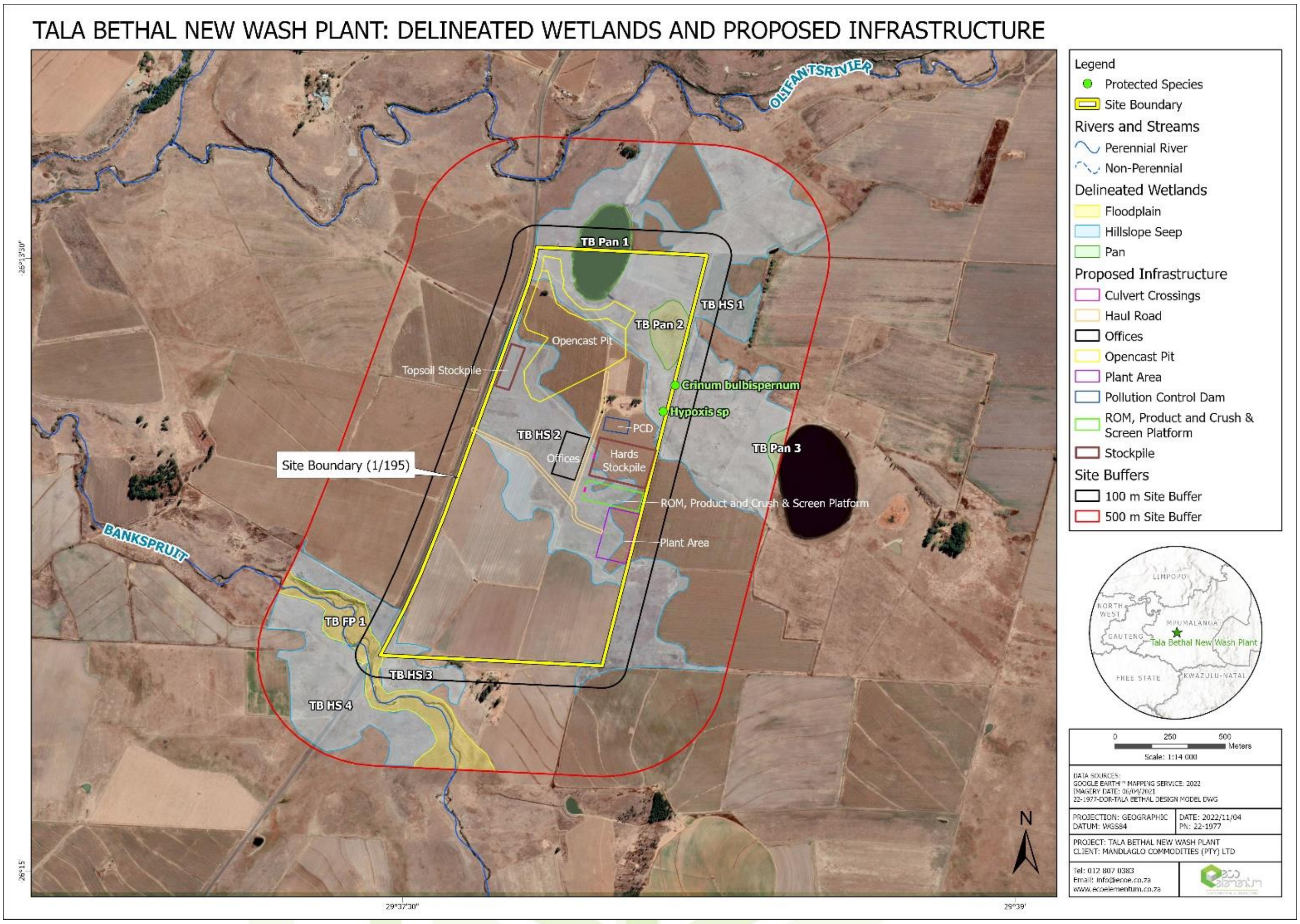



**Figure 5.3: Delineated Wetlands and protected wetland floral species in relation to the proposed mining infrastructure.**

Table 5.1: Section 21 (c) and (i) Risk Matrix with associated Management and Monitoring Measures

| Activity | Aspect | Impact | Phase | +/- | Significance without mitigation | +/- | Significance with mitigation | Mitigation measures | Action Plan |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | |
| Site establishment and mining | Site clearance | Loss of wetland habitat | Construction and operation | Negative | Med-High | Negative | Low-Med | Remain out of wetlands, and where possible the wetland buffer | Fence off wetlands areas and where possible, buffer zones.<br>Restrict heavy vehicle and machinery movement to outside of wetland areas. |
| Site clearance | Vegetation clearance and habitat removal | Loss of species of conservation concern | Construction and operation | Negative | Med-High | Negative | Low-Med | Remain out of wetlands, and where possible the wetland buffer | Fence off wetlands areas and where possible, buffer zones.<br>Restrict vehicle movement to outside of wetland areas.<br>Perform a protected, and red data species search and rescue for relocation outside of impacted areas. |
| Site establishment and mining | Diversion trenches and storm water management systems on site, as well as removal of geological strata | Change in hydrological connectivity of the HGM units | Construction and operation | Negative | Med-High | Negative | Med | Remain out of wetlands, and where possible the wetland buffer.<br>Ensure clean water from the catchment reach the downstream system | Fence off wetlands areas and where possible, buffer zones.<br>Avoid mining activities within wetlands and the buffer zone where possible.<br>Maintain a 100m buffer between Pan1 and proposed mining activities..<br>Implement simulated natural clean water diversion systems to divert clean water around the impacted area to the downstream wetlands. |
| Site establishment and mining | Site clearance and erosion | Sedimentation of the HGM units | Construction and operation | Negative | Med-High | Negative | Low-Med | Avoid sediment runoff into the wetland from the site | Implement sediment traps on the downstream area of the site.<br>Maintain Stormwater Management systems |
| Site establishment and mining | Sedimentation, change in hydrological connectivity | Wetland degradation | Construction and operation | Negative | Med-High | Negative | Med | Remain out of wetlands, and where possible the wetland buffer.<br>Ensure clean water from the catchment reach the downstream system<br>Avoid sediment runoff into the wetland from the site | Fence off wetlands areas and where possible, buffer zones.<br>Avoid activities within wetlands and the buffer zone where possible.<br>Maintain a 100m buffer between Pan1 and proposed mining activities.<br>Implement simulated natural clean water diversion systems to divert clean water around the impacted area to the downstream wetlands.<br>Implement sediment traps on the downstream area of the site. |

| Activity | Aspect | Impact | Phase | +/- | Significance without mitigation | +/- | Significance with mitigation | Mitigation measures | Action Plan |
|---|---|---|---|---|---|---|---|---|---|
| Mining operations | Heavy vehicle movement | Soil compaction | Construction and operation | Negative | Low-Med | Negative | Low | Remain out of wetlands, and where possible the wetland buffer. | Restrict heavy vehicle and machinery movement to outside of wetland areas. |
| Heavy vehicle movement | soil compaction | Change in runoff intensities | Construction and operation | Negative | Med-High | Negative | Low-Med | Remain out of wetlands, and where possible the wetland buffer.<br>Avoid sediment compaction | Restrict heavy vehicle and machinery movement to outside of wetland areas.<br>Rip compacted areas<br>Revegetate bare soil |

## 6. KNOWLEDGE GAPS AND LIMITATIONS

- Connection of the pan to the groundwater table was not determined.
- TB Pan1 could not be accessed directly due to community protest.
- TB HS2 could only be accessed partially due to the site being fenced off with an electric fence and surrounded by cut-off trenches.
- Detailed vegetation and faunal assessments were not undertaken.
- Detailed soil forms were not identified, and only the presence of mottling was determined.

## 7. RECOMMENDATIONS AND CONDITIONS FOR INCLUSION IN THE EA

The following management measures are proposed

- Fence off wetlands areas and where possible, buffer zones.
- Restrict heavy vehicle and machinery movement to outside of wetland areas. Specifically the pan buffer.
- Perform a protected, and red data species search and rescue for relocation outside of impacted areas.
- Avoid trenching and mining within wetlands and the buffer zone where possible.
- Implement simulated natural clean water diversion systems to divert clean water around the impacted area to the downstream wetlands.
- Implement sediment traps on the downstream area of the site.
- Maintain Stormwater Management systems.
- Rip compacted areas.
- Revegetate bare soil.
- Monitoring should be undertaken twice a year during spring, and late summer.
- A buffer zone should be determined by a hydropedologist to ensure maintained hydrological connectivity, with a management plan where the buffers cannot be implemented, to compensate for the losses.
- The Pans and Hillsope Seepage wetlands should therefore be maintained or improved to a Category B status

Should the TB HS2 be destroyed or deteriorated further due to the proposed mining activities, the Pan and Hillslope Seep system (TB Pan 1, Pan 2, and HS1) should be protected through a conservation initiative and the PES increased to Category B and maintained as such. A wetland specialist should furthermore be appointed to calculate the required offset for the wetlands lost due to mining.

## 8. REASONED OPINION

It is the opinion of the wetland specialist that the proposed development can continue, with all the mitigation measures in place as per the recommendations.

## 9. CONCLUSION

Three (3) different Hydrogeomorphic (HGM) units were identified within the three (3) wetland systems delineation on site:

- Tala Bethal Wetland System 1:
    - Permanent Open Water Pan (TB Pan1)

  - Seasonal Grass Pan (TB Pan 2)
  - Hillslope Seepage Wetlands (TB HS1)
- Tala Bethal Wetland System 2
  - Isolated Hillslope Seepage Wetland (TB HS2)
- Tala Bethal Wetland System 3
  - Channelled Valley Bottom Wetland (TB CVB)
  - Hillslope Seepage Wetlands (TB HS3 and HS4)

The overall combined PES ranged from B to D. The Ecological Importance and Sensitivity (EIS) was calculated, and the scores ranged from Low to Moderate sensitivity and importance within the landscape.

Site establishment had already commenced at the time of the field investigation and wetland habitat loss and hydrological connectivity deterioration was already prevalent.

It is the opinion of the wetland specialist that the proposed development can continue, with all the mitigation measures in place as per the recommendations.