

**AN WETLAND ASSESSMENT OF THE SITE FOR THE
PROPOSED RESEDENTIAL DEVELOPMENT AT THANDA, THABONG,
WELKOM**

Commissioned by
NSVT Consultants

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Compiled by
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EXECUTIVE SUMMARY

The study area is located on open areas in Thanda residential area, Welkom. The aim of the proposed development is to expand the residential areas in order to address the housing needs of the residents of Thabong. The site was assessed for protected ecosystem and species, presence of wetlands and whether the site is suitable to develop in terms of an environmental perspective.

Although this wetland vegetation type occurs in the Vaal-Vet Sandy Grassland it does not have any species of this vegetation type. No Red Data listed plant species or protected species or sensitive ecosystems occur on site have been noted on site. The site is relatively degraded. A number of exotic species occur in the riparian plant community on the stream bank. Numerous weeds dominate the streambed community.

The vegetation of the wetlands is relatively degraded and it has a low conservation value and ecosystem functioning. The results from the PES analysis indicate riparian vegetation to be in **PES class C** indicating that it is seriously modified with losses of natural habitats and ecosystem functions. The **wetland area** has an Ecological Importance and Sensitivity (EIS) score of **1.93**. The site therefore has a **moderate EIS score**. It is regarded as being not ecologically important or sensitive with a low biodiversity and plays an insignificant role in moderating water quality and quantity

Recommendations:

- Development/construction within the wetland area is regarded as a section 21(c) listed activity (**altering the bed, banks, course or characteristics of a watercourse**) and requires an application for a water use license to the Department of Water Affairs.
- Development/construction should only occur outside the buffer zone as indicated on map (Fig 4);
- Measures to control erosion must be taken.
- Measures as stipulated in Appendix A must be followed when trenching through wetlands.

DECLARATION OF INDEPENDENCE

I, Pieter Johannes du Preez, ID 6008215016087, declare that I:

- am the co-owner of EcoCare (Pty) Ltd, a BEE compliant company;
- act as an independent specialist consultant in the field of botany, ecology and vegetation science;
- am assigned as specialist consultant by **NSVT Consultants** for this proposed project;
- I do not have or will not have any financial interest in the undertaking of the activity other than remuneration for work as stipulated in the terms of reference;
- have or will not have any vested interest in the proposed activity proceeding;
- have no and will not engage in conflicting interests in the undertaking of the activity;
- undertake to disclose to the client and the competent authority any material, information that have or may have the potential to influence the decision of the competent authority required in terms of the Environmental Impact Assessment Regulations 2006;
- will provide the client and competent authority with access to all information at my disposal, regarding this project, whether favourable or not.



PJ DU PREEZ

1. ASSIGNMENT AND TERMS OF REFERENCE

EcoCare (Pty) Ltd Environmental and Biodiversity Consultants were appointed by NSVT Consultants to undertake an independent wetland assessment of the area earmarked for residential development on the banks of stream that drains parts of Thabong residential area near Welkom. This assignment is in accordance with the EIA Regulations (No. R. 545, Department of Environmental Affairs and Tourism, 18 June 2010) deriving from Part 5 of the National Environmental Management Act 1998 (Act No. 107 of 1998) and the Water Act (Act 36 of 1998).

The assignment is interpreted as follows:

- To do a wetland/riparian zone assessment, delineation as well as to determine the wetland's present Ecological State (PES) and Ecological importance and Sensitivity (EIS)

2. ASSUMPTIONS AND LIMITATIONS

2.1 Assumptions

- The biodiversity on the construction site will be destroyed.

2.2 Limitations

- None.

3. STUDY AREA

The study area is located on the banks of a stream that drains parts of the Thabong township (Figure 1, 2 & 3). The study area falls within the **Grassland Biome** and classified as belonging to the endangered **Vaal-Vet Sandy Grassland vegetation type (Gh9)** (Mucina & Rutherford 2006).

The vegetation on the site is degraded and has been impacted on due to human influences and the continued grazing pressure by the communal cattle and goats that graze the grassland. The specific vegetation type along the stream can be regarded as **Azonal** as it consists only of riparian vegetation and wetland vegetation. The site slopes towards the west. The soil is a mix of sedimentary deposits. The site is surrounded by residential developments.

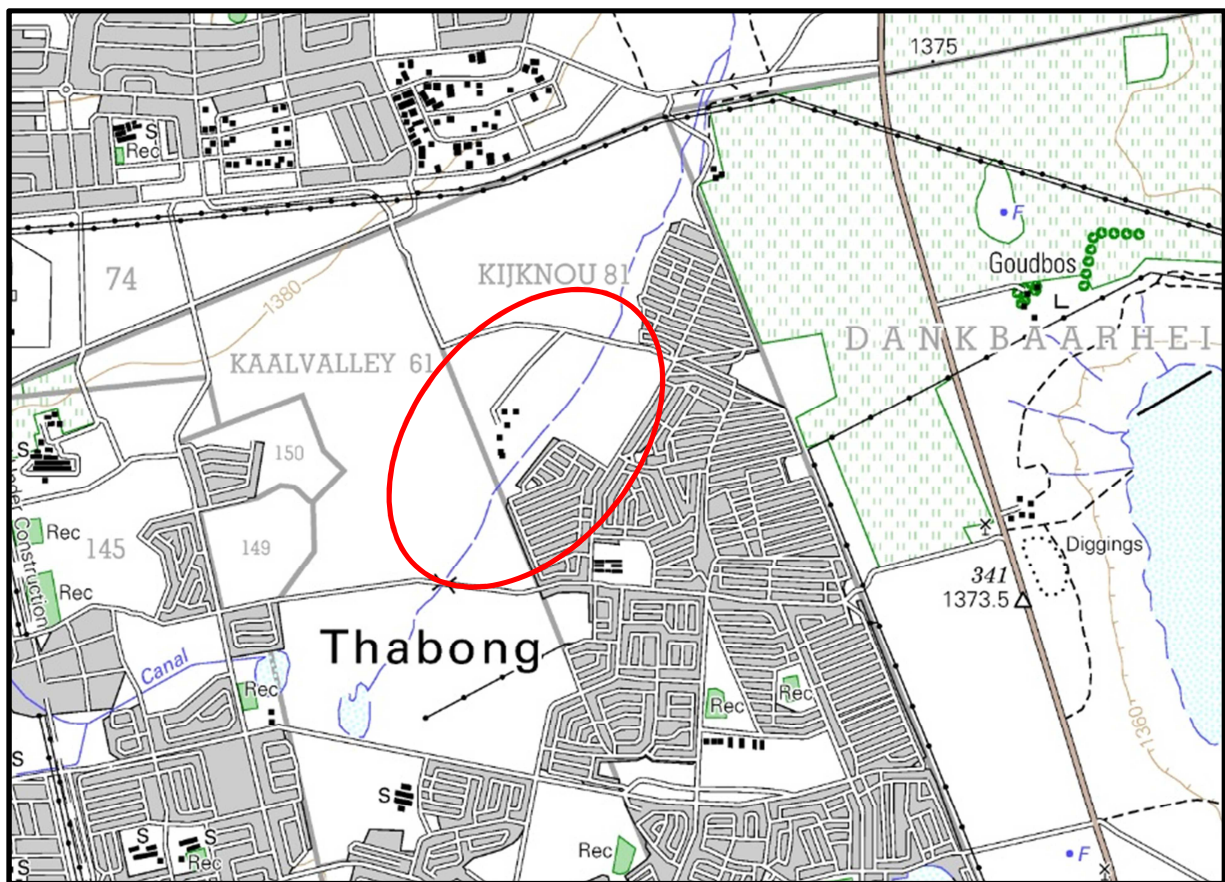


Figure 1: Locality the study area



Figure 2: Layout plan of proposed development



Figure 3: A close-up Google Earth photo of the site.

4. METHODS

The site visit was done on the **31st of October 2013**.

4.1 Wetland delineation

4.1.1 Introduction

For the purposes of this investigation a wetland was defined according to the definition in the National Water Act (Act 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 in normal circumstances supports or would support vegetation typically adapted to life in saturated soil.”

In 2005 DWAF published a wetland delineation procedure in a guideline document named “*A Practical Field Procedure for the Identification and Delineation of Wetlands and Riparian Areas*” These guidelines contain a number of stipulations relating to the protection of wetlands and the undertaking of wetland assessments. These guidelines state that a wetland delineation procedure must identify the outer edge of the temporary zone of the wetland, which marks the boundary between the wetland and adjacent terrestrial areas and is that part of the wetland that remains flooded or saturated close to the soil surface for only a few weeks in the year, but long enough to develop anaerobic conditions and determine the nature of the plants growing in the soil.

The guidelines also state that locating the outer edge of the temporary zone must make use of four specific indicators namely:

- the terrain unit indicator,
- the soil form indicator,
- the soil wetness indicator and
- the vegetative indicator.

In addition the wetland and a protective buffer zone, beginning from the outer edge of the wetland temporary zone, must be designated as sensitive in a sensitivity map. The guidelines stipulate buffers to be delineated around the boundary of a wetland; the wetland and a protective buffer zone, beginning from the outer edge of the wetland temporary zone, must be designated as sensitive and a 32m buffer delineated around the edge of the wetland in which no development must be allowed to occur.

4.1.2 Desktop delineation

Use was made of 1:50 000 topographic maps, and geo-referenced Goggle Earth images to generate digital base maps of the study area onto which the wetland boundaries were delineated. A desktop delineation of suspected wetland areas was undertaken by identifying rivers and wetness signatures from the digital base maps. All identified areas suspected to be wetland were then further investigated in the field.

4.1.3 Site assessment

The area was traversed by foot and road to determine the presence of any wetland area/s. Notes were made of the broad ecological condition of the study site and any signs indicating the presence of a wetland. Delineation started in the lowest lying point of the site and auger samples were taken at approximately 2m intervals. A Dutch soil auger was used to extract the cores to a depth of 50cm.

The wetlands were subsequently classified according to their hydro-geomorphic determinants based on modification of the system proposed by Brinson (1993), and modified for use in South Africa by Marneweck and Batchelor (2002) and subsequently revised by Kotze *et al.* (2004). Notes were made on the levels of degradation in the wetlands based on field experience and a general understanding of the types of systems present.

4.2 Wetland assessment

4.2.1 Present Ecological Status

The **Present Ecological State (PES)** refers to the current state or condition of a watercourse in terms of all its characteristics and reflects the change to the watercourse from its reference condition. The results from such an assessment are compared to the standard DWAF A-F ecological categories (Table 1) from where the PES/Habitat integrity of the wetland can be determined. The values give an indication of the alterations that have occurred in the wetland system.

Table 1: Present Ecological Status Categories of Wetlands (adapted from Kleynhans, 1996 & 1999)

Ecological category	Score	Description
A	>90-100%	Unmodified, natural.
B	>80-90%	Largely natural with few modifications. A small change in natural habitats and biota may have taken place but the ecosystem functions are essentially unchanged
C	>60-80%	Moderately modified. Loss and change of natural habitat and biota have occurred, but the basic ecosystem functions are still predominantly unchanged.
D	>40-60%	Largely modified. A large loss of natural habitat, biota and basic ecosystem functions has occurred
E	>20-40%	Seriously modified. The loss of natural habitat, biota and basic ecosystem functions is extensive
F	0-20%	Critically / Extremely modified. Modifications have reached a critical level and the system has been modified completely with an almost complete loss of natural habitat and biota. In the worst instances the basic ecosystem functions have been

		destroyed and the changes are irreversible.
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4.2.2 Ecological Importance and Sensitivity

The **Ecological Importance and Sensitivity** (EIS) of a watercourse is an expression of its importance to the maintenance of ecological diversity and functioning on local and wider scales, and both abiotic and biotic components of the system are taken into consideration. Sensitivity refers to the system's ability to resist disturbance and its capability to recover from disturbance once it has occurred. The ecological importance and sensitivity categories are indicated in Table 2.

Table 2: Ecological Importance & Sensitivity Categories of Wetlands

EIS Categories	Description
Low/marginal	Not ecologically important and sensitive at any scale. Biodiversity ubiquitous and not sensitive to flow and habitat modifications (Wetlands: play an insignificant role in moderating water quality & quantity)
Moderate	Ecologically important & sensitive on provincial/local scale. Biodiversity not usually sensitive to flow & habitat modifications. (Wetlands: play a small role in moderating water quantity & quality)
High	Ecologically important & sensitive and important. Biodiversity may be sensitive to flow & habitat modifications. (Wetlands: Play a role in moderating water quantity & quality)
Very high	Ecologically important & sensitive on a national (or even international) level. Biodiversity usually very sensitive to flow & habitat modifications. (Wetlands: play a major role in moderating water quantity & quality)

5. RESULTS & DISCUSSION

5.1 Site assessment

A need exist to extend the residential area in the Thanda area of Thabong in Welkom. A stream drains the area (Fig 1, 2, 3, 4 & 5) and the associated wetland areas can be regarded as valley-bottom wetlands.



Figure 4: A map showing the delineated wetland areas (white line) in the study area. The red lines indicate the wetland buffer zone.

From a vegetation viewpoint, the stream bed and stream bank vegetation can be regarded as being highly transformed due to human impacts such as pollution, sewage enriched water, earthmoving activities, footpaths, trampling by cattle and other domestic animals and alien plant invasion. Rubble and litter is found strewn throughout the area and the water in the stream has the characteristic smell of sewage pollution (Fig 5).



Figure 5: View of the stream that drains the study area. Note the pollution of the area.

5.2 Vegetation description

The vegetation of the region can be described as belonging to the endangered Vaal-Vet Sandy Grassland (Gh9). The azonal vegetation in and along rivers and streams are frequently subjected to disturbance such as erosion of the soil and/or the deposition of sediment. Most of the species are pioneers which can tolerate these disturbances. The stream bed and stream bank vegetation is characterized by exotic grasses *Bromus catharticus*, *Paspalum dilatatum*, and *Pennisetum clandestinum*, the sedges *Mariscus congestus* and *Typha capensis*, the exotic forbs *Amaranthus caudatus*, *Argemone subfusiformis*, *Bidens bipinnata*, *Chenopodium album*, *Oenothera rosea*, *Rumex crispus*, *Tagetes minuta*, *Verbena bonariensis*, *V. braziliensis*, and *V tenuisecta* (Bromilow 2001).

5.3 Wetland assessment

5.3.1 Present ecological status (PES)

A mean PES value between 0 and 5 is obtained from the PES calculations and a PES class is attributed to the wetland based on Table 3. It should however be noted that if a score of less than 2 is attributed to any impact, the lowest rating is used to attribute PES class and not the mean.

Table 3: PES classes (from Kleynhans 1999) indicating the interpretation of the mean scores to rate the PES category.

WITHIN GENERALLY ACCEPTABLE RANGE		
Category	Score	Description
A	>4	Unmodified, or approximates natural condition and/or represents a natural condition due to successful rehabilitation process/program(s) which has occurred and/or is in the process of occurring.
B	>3 and 4	Largely natural with few modifications. A small change in natural habitats and biota may have taken place but the ecosystem functions are essentially unchanged
C	>2 and 3	Moderately modified. Loss and change of natural habitat and biota have occurred, but the basic ecosystem functions are still predominantly unchanged.
D	2	Largely modified. A large loss of natural habitats and basic ecosystem functions has occurred.
OUTSIDE GENERAL ACCEPTABLE RANGE		
E	>0 and 2	Seriously modified. The losses of natural habitats and basic ecosystem functions are extensive
F	0	Critically modified. Modifications have reached a critical level and the system has been modified completely with

		an almost complete loss of natural habitat
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The results from the PES analysis indicate the stream bank areas to be in **PES class C** (Table 4) indicating that it is moderately modified. Loss and change of natural habitat and biota have occurred, but the basic ecosystem functions are still predominantly unchanged.

Table 4: PES calculation for the wetland area

Criteria and attributes	Relevance	Score	Confidence
Hydraulic/Geomorphic			
Canalisation	Results in desiccation or changes to inundation patterns of wetland and thus changes in habitats. River diversions or drainage.	3	4
Topographic Alteration	Consequence of infilling, ploughing, dykes, trampling, bridges, roads, railway lines and other substrate disruptive activities which reduce or changes wetland habitat directly or through changes in inundation patterns.	3	5
Biota			
Terrestrial Encroachment	Consequence of desiccation of wetland and encroachment of terrestrial plant species due to changes in hydrology or geomorphology. Change from wetland to terrestrial habitat and loss of wetland functions.	3	5

Indigenous Vegetation Removal	Direct destruction of habitat through any human activities affecting wildlife habitat and flow attenuation functions, organic matter inputs and increases potential for erosion.	2	5
Invasive plant encroachment	Affect habitat characteristics through changes in community structure and water quality changes (oxygen reduction and shading).	3	5
Alien fauna	Presence of alien fauna affecting faunal community structure.	4	4
Overutilisation of biota	Overgrazing, Over-fishing, etc	1	4
Mean		2.7	4.6
Class		C	

5.3.2 Ecological Importance and Sensitivity (EIS)

The EIS and functions were calculated using the new draft DWA guidelines and model, as developed by M. Rountree. Information was used from the SIBIS and VEGMAP products. A mean score between 0 and 4 is obtained, with 0 as the lowest and 4 as the highest score. No classification of the scores is given.

The **wetland area** has an Ecological Importance and Sensitivity (EIS) score of **1,93** (Table 5). This is a value between 0 and 4, with 0 being very low and 4 very high. The wetland therefore has a **moderate EIS score**. It is regarded as being moderate ecological importance or sensitive with a low biodiversity and plays an insignificant role in moderating water quality and quantity

Table 5: EIS calculation of the wetland area.

ECOLOGICAL IMPORTANCE & SENSITIVITY	Score (0-4)	Confidence (1-5)	Motivation
Biodiversity support	0.00	4	
<i>Presence of Red Data species</i>	0.00	<i>4.00</i>	No known red data or protected species observed on site.
<i>Populations of unique species</i>	0.00	<i>4.00</i>	No unique plant or animal populations were observed.
<i>Migration/breeding/feeding sites</i>	0.00	<i>4.00</i>	Highly unlikely. No breeding sites were observed with very few bird species seen.
Landscape scale	0.6	5.00	
<i>Protection status of the wetland</i>	1.00	<i>5.00</i>	The stream area is being used as a dumping site while clearing of vegetation and dumping of soil has taken place throughout the area.
<i>Protection status of the vegetation type</i>	1.00	<i>5.00</i>	The stream is located in a critically red vegetation type (Vaal-Vet Sandy Grassland). Vegetation is however transformed and comprises mostly pioneer and invasive species with few indigenous species present. Vegetation is burnt by local residents on an annual basis.
<i>Regional context of the ecological integrity</i>	1.00	<i>5.00</i>	The wetland is in PES class C due to the large scale degradation of the surrounding areas as well as the wetland area itself.

<i>Size and rarity of the wetland type/s present</i>	0.00	5.00	The wetland is not particularly large or rare, is human made and has no vulnerable ecosystem present.
<i>Diversity of habitat types</i>	0.00	5.00	The wetland has a low species diversity as well as habitat diversity. The largest component of the natural vegetation has been removed due to human activities or alien invasive species.
Sensitivity of the wetland	1.33	4.00	
<i>Sensitivity to changes in floods</i>	1.00	4.00	The area is totally surrounded by various developments. High rainfall events will result in storm water being channelled into the human made dams/wetlands.
<i>Sensitivity to changes in low flows/dry season</i>	2.00	4.00	Minimally impacted by changes in flow. Receives water in rainy season and dry for largest part of the year.
<i>Sensitivity to changes in water quality</i>	1.00	4.00	The wetland receives water of various qualities during the rainfall season such as storm water runoff.
ECOLOGICAL IMPORTANCE & SENSITIVITY	1,93	4.3	

6. CONCLUSION & RECOMMENDATIONS

Although this can be regarded as a degraded wetland, DETEA regards all wetland areas as sensitive ecosystems. As a result thereof no development is allowed within 32m from the edge of the wetland or stream. The planned residential development must therefore be planned accordingly.

In terms of the PES and EIS scores the site has scored a **C** (Moderately modified. Loss and change of natural habitat and biota have occurred, but the basic ecosystem functions are still predominantly unchanged) and an EIS score of **1,93** respectively. Due to the presence of alien vegetation, no protected species occur but there is still some ecosystem functions (water retention, bank stabilisation, erosion control, etc.) performed by the alien vegetation.

Recommendations:

- Development/construction within the wetland area is regarded as a section 21(c) listed activity (**altering the bed, banks, course or characteristics of a watercourse**) and requires an application for a water use license to the Department of Water Affairs.
- Development/construction should only occur outside the buffer zone as indicated on map (Fig 4);
- Measures to control erosion must be taken.
- Measures as stipulated in Appendix A must be followed when trenching through wetlands.

7. REFERENCES

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APPENDIX A

Guidelines for trenching and ground works in wetlands and stream bank vegetation

To reduce the impact on wetland and stream bank soils and hydrology during trenching, the following needs to be considered:

- Wetland boundaries should be clearly marked in work areas to assist the project personnel, contractors and environmental officer to avoid unplanned disturbances to the stream bank vegetation.
- Preferably trenching should be done in the dry season to minimize the risk of compaction and disturbance to the wetland.
- Maintain only the minimal footprints for the work necessary to accomplish the task at hand.
- Replace the soil in the reverse order in which it was removed, i.e. the soil that was removed last must be used as the first backfill.
- The backfill must be restored to its pre-construction elevation upon completion of the work. This is to prevent the establishment of preferential flow pathways.
- Ensure that trenching does not create a subsurface drain, i.e. an underground preferential flow path due to i.e. backfilling with soil of lower permeability. This in particular where trenching is to occur in the same direction of the natural flow. Precautions can include inserting clay plugs at approximate 1m – 2m intervals.
- The use of concrete within wetlands is not considered to pose any specific environmental risk, other than potentially influencing subsurface drainage patterns through its physical presence. This will, however, depend on the extent.
- Stream bank must be stabilised by concrete blocks to protect the soft erodible sediment.