WETLAND IDENTIFICATION, DELINEATION AND ECOLOGICAL ASSESSMENT ASSOCIATED WITH THE FARM DAM ON THE FARM THE BREEZE NO. 6921 NEAR RAMSGATE IN KWAZULU-NATAL

July 2020

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SYNOPSIS

Identification, delineation and modelling of the wetlands associated with the farm dam on the Farm The Breeze No. 6921

KEY WORDS:

Wetlands, delineation, modelling

QUALITY VERIFICATION

This report has been prepared under the controls established by a quality management system that meets the requirements of ISO9001: 2008 which has been independently certified by DEKRA Certification under certificate number 90906882

Verification	Capacity	Name	Signature	Date
By Author	Wetland Ecologist	Jake Alletson		July 2020
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1. INTRODUCTION

Terratest (Pty) Ltd has been appointed by Doveton Farms CC to conduct a Wetland Assessment study of the wetland(s) that may be associated with the dam and impoundment area of the proposed farm dam on the farm The Breeze No. 6921 near Ramsgate.

This document constitutes a specialist assessment report relating to the aquatic features (wetlands and watercourses) within the project footprint as well as in the vicinity of the project area as and will be submitted in support of an Application for Environmental Authorisation in terms of the National Environmental Management Act (Act No. 107 of 1998): Environmental Impact Assessment Regulations (2014), as amended as well as the Water Use Licence Application in terms of the National Water Act (Act No. 36 of 1998).

The assessment of the aquatic features will include the following:

- Identification of any areas that meet the definition of a wetland or watercourse in accordance with the National Environmental Management Act (Act No. 107 of 1998) (NEMA): Environmental Impact Assessment (EIA) Regulations, 2014 (as amended);
- Determination of the extent of each of these wetlands or watercourses in relation to the proposed development, in accordance with the requirements of the National Water Act (Act No. 36 of 1998) and associated regulations;
- Determination and assessment of the various characteristics of these aquatic features;
- Determination of the extent of the proposed development's location within the "regulated area of a watercourse";
- Compilation of a Risk Based Assessment of the proposed development on the water features in accordance with the requirements of the regulations associated with the National Water Act (Act No. 36 of 1998); and
- Provision of management and mitigation measures to limit the identified risks.

1.1 Background

The Doveton Farm CC is currently expanding their existing Macadamia orchards which has resulted in an increase water demand for irrigation. To satisfy this increased demand, the Doveton Farm CC is proposing to construction a dam and associated impoundment to supply water to the irrigation of their trees.

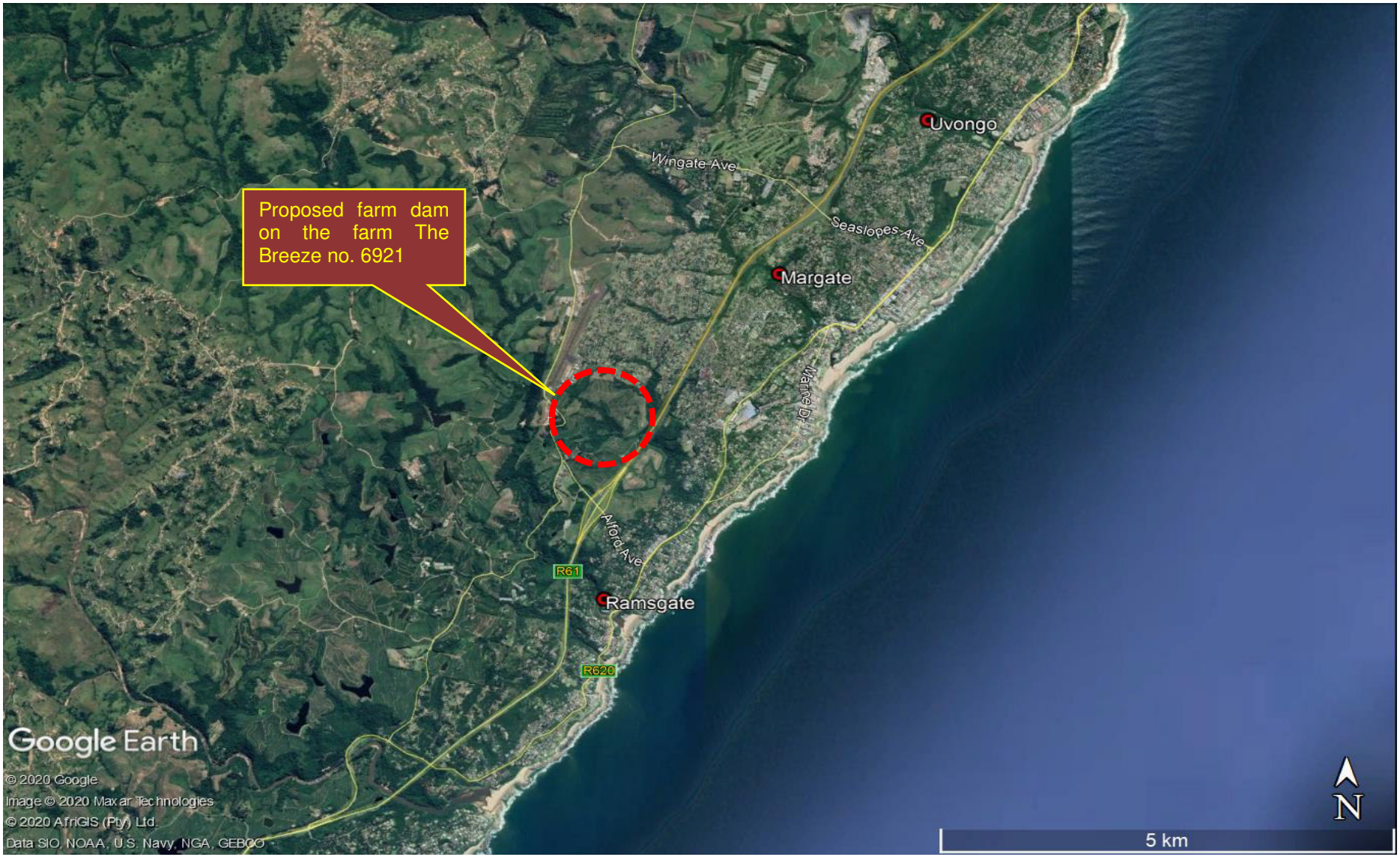


Figure 1: Location of the proposed farm dam on the farm The Breeze No. 6921

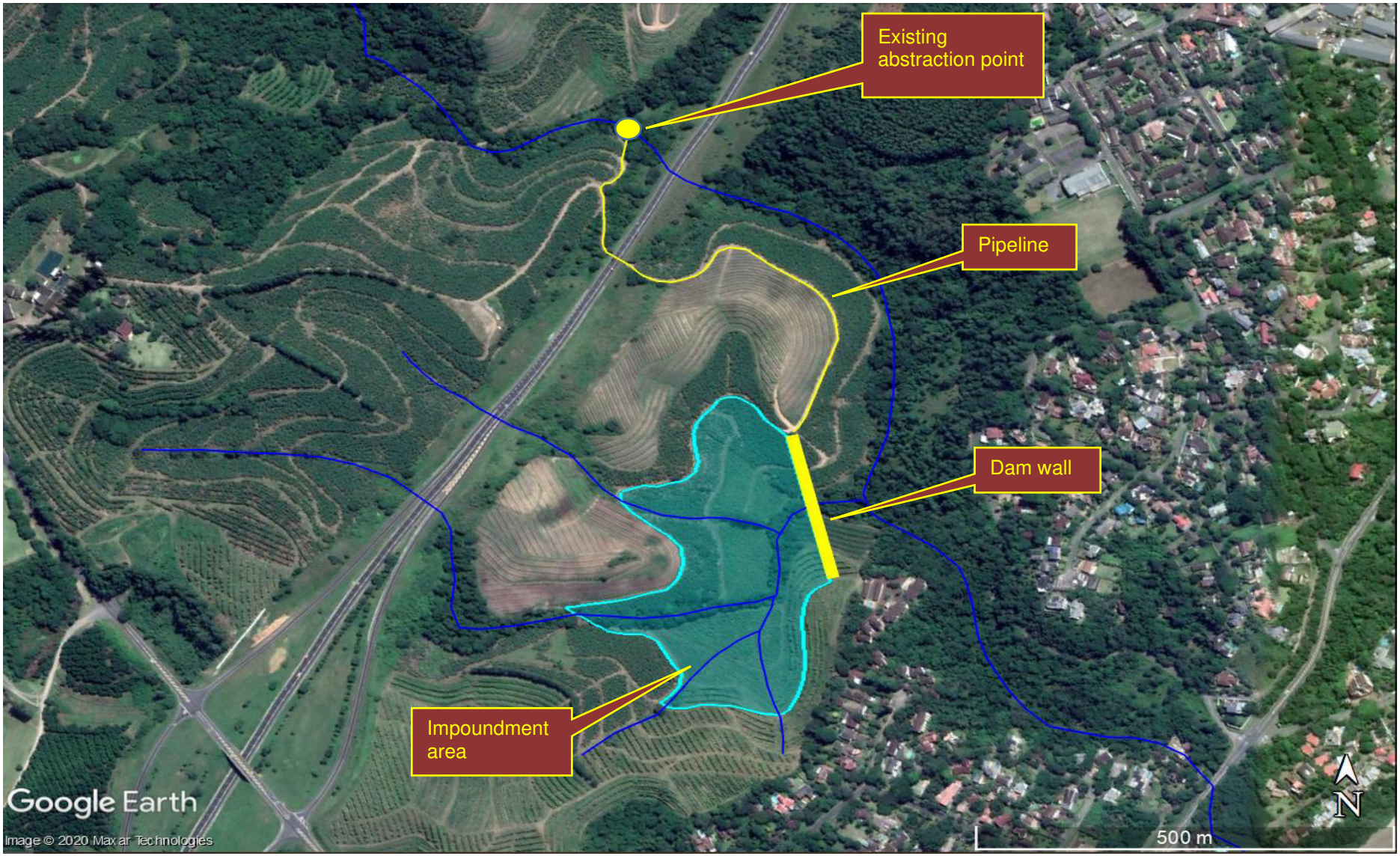


Figure 2: View of the proposed farm dam and associated infrastructure

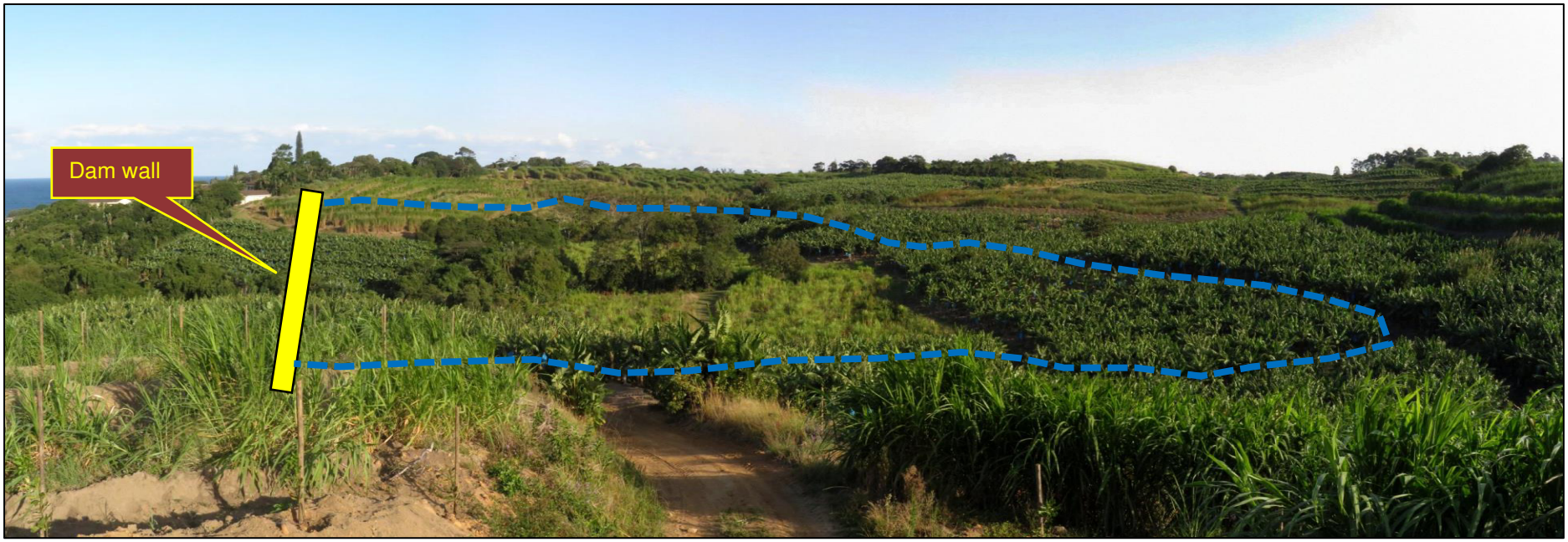


Plate 1: View of the dam wall location (in yellow) and the impoundment area (in blue) behind the wall

Plate 2: View of the existing abstraction works

1.2 Project Description

The preliminary indication of the size of the farm dam on the farm The Breeze No. 6921 is a dam wall with a height of approximately 25m and a length of approximately 200m spanning an open valley in a northwest / southeast direction. The capacity of the impoundment area is approximately 250 000m3 and will have surface area of approximately 7ha. The water supply to the dam will be from seasonal tributary of the uVuzana River as well as an existing abstraction point along the uVuzana River from which water will be pumped into the impoundment. The developer has indicated that it is his intention to pump water only during the rainy season or at other times when flow in the uVuzana River is high.

2. TERMS OF REFERENCE

It is understood that the assessment will be submitted as a specialist study to accompany the Application for Environmental Authorisation in terms of the National Environmental Management Act (Act No. 107 of 1998): Environmental Impact Assessment Regulations *2014), as amended as well as the Water Use Licence Application in terms of the National Water Act (Act No. 36 of 1998).

To this end, the terms of reference for this assessment is based on the requirements of Appendix 4 of the Environmental Impact Assessment Regulations as well as Annexure 6 “Wetland Delineation Report” of the Regulations Regarding the Procedural Requirements for Water Use Licence Applications and Appeals of 24 March 2017.

In brief, these requirements have as an outcome to achieve the following:

- A methodology of the site visit and the techniques used to assess the specific aspect of the site;
- Details of an assessment of the specific identified sensitivity of the site related to the proposed activity or activities and its associated structures and infrastructure, inclusive of site plan identifying site alternatives;
- An identification of any areas that are to be avoided, including provision of buffers;
- A description of any assumptions made and any uncertainties or gaps in knowledge;
- A description of the findings and potential implications of such findings on the impact of the proposed activity;
- Any mitigation measures for inclusion in the Environmental Management Programme Report (EMPr);
- Any conditions for inclusion in the Environmental Authorisation and/or Water Use Licence;
- Any monitoring requirements for inclusion in the EMPr or Environmental Authorisation; and
- A reasoned opinion whether the activity should be authorised based on the findings of the study.

3. KNOWLEDGE GAPS

No direct Knowledge Gaps have been identified that may influence the outcome of this assessment. The following assumptions however, have been made in the completion of the study:

- The assessment is based on a single site visit conducted on 27 May 2020 conducted by the Mr Magnus van Rooyen and Mr Jake Alletson of Terratest (Pty) Ltd.
- The assessment is based on discussions had with Mr Sean Doveton of Doveton Farms CC.
- At the stage of the site visit, no detailed design of the dam was available.
- The following standardised and accepted methods to determine the various aspects of the study were used:
    - Wetland and Riparian Habitat Delineation Document (Department of Water and Sanitation report);
    - Wetland Buffer Guideline (SANBI Water Research Commission Project Report);
    - Classification System for Wetlands and other Aquatic Ecosystems in South Africa (Inland Systems) (Ollis *et al.,* 2013 – SANBI Biodiversity Series 22); and
    - Risk Assessment Protocol and associated Matrix (Department of Water and Sanitation document).

4. STUDY AREA

4.1 Extent of the study area

The determination of the extent of the study area is an important factor for any assessment. Consideration of the requirements below has assisted in determining the extent.

The "*General Authorisation in terms of Section 39 of the National Water Act, 1998 (Act No. 36 of 1998) for Water Uses as defined in Section 21(c) and (i)",* Notice 509 of 2016, specifies that the "regulated area of a watercourse" is to mean:

(a) The outer edge of the 1 in 100 year flood line and / or delineated riparian habitat, whichever is the greatest distance, measured from the middle of the watercourse of a river, spring, natural channel, lake or dam;

(b) In the absence of a determined 1 in 100 year flood line or riparian area, the area within 100m from the edge of a watercourse where the edge of the watercourse is the first identifiable annual bank fill flood bench; or

(c) ***A 500m radius from the delineated boundary (extent) of any wetland or pan****.*

To this end, the study area therefore includes an area of 500m from the location of the approximate impoundment area.

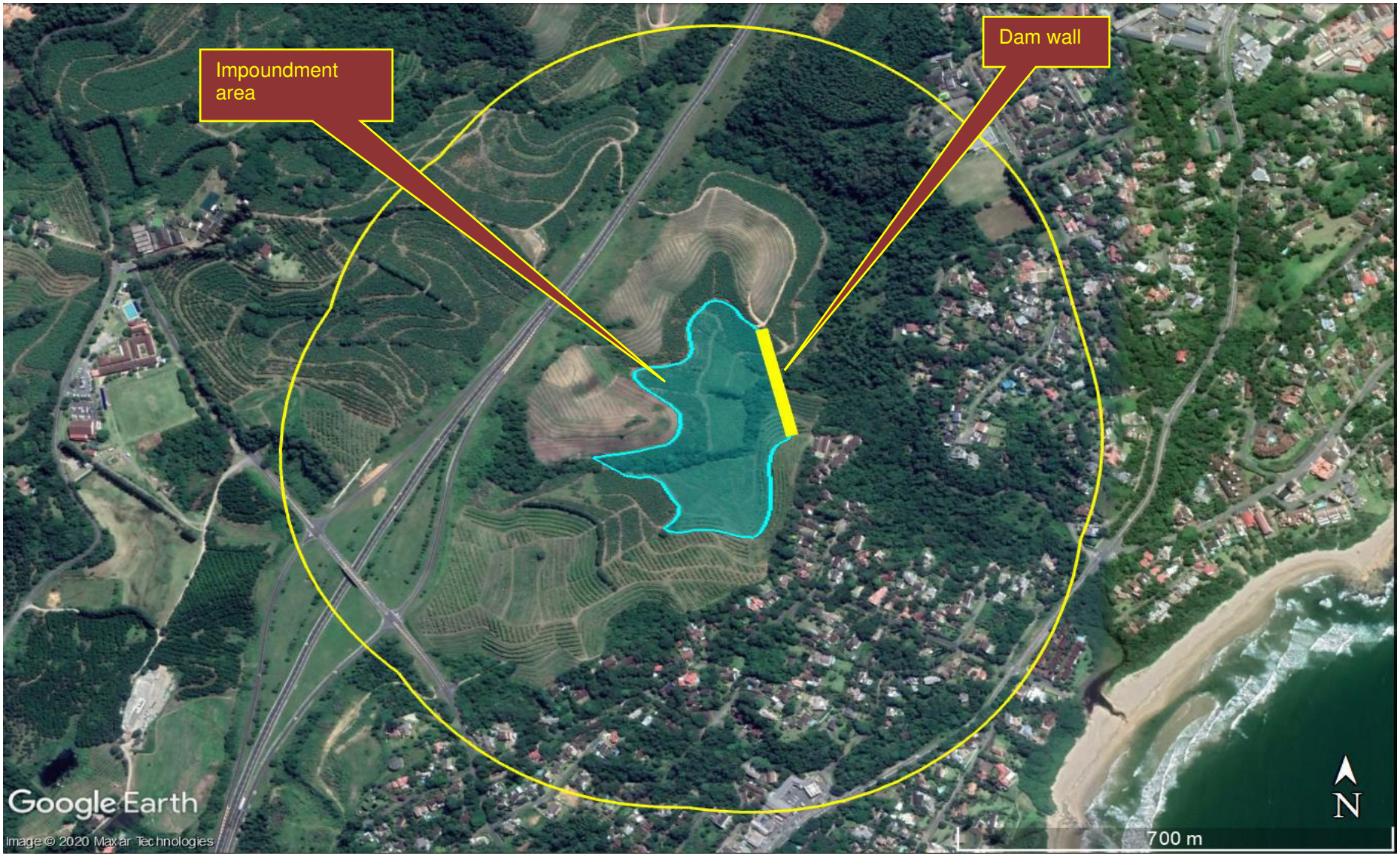


Figure 3: View of the Study Area with the 500m radius shown in yellow

4.2 Description of the study area

Vegetation

The vegetation around the pedestrian bridge site is classified as KwaZulu-Natal Coastal Belt Grassland (CB3) (Mucina and Rutherford, 2006) which has an original distribution in a broad strip along the KwaZulu-Natal coast, from an area near Mtunzini in the north, past Durban and Margate, to an area in the vicinity of Port Edward in the south. This vegetation type is closely associated with coastal regions and occurs at altitudes below 450m above sea level.

The original extent of the vegetation type has been severely fragmented along this coastal strip due to the cultivation of sugarcane, commercial timber plantations and the establishment of formal and informal urban developments. This fragmentation is very evident in the study area with the disturbances typically being the clearing of vegetation for the establishment of residential houses, associated infrastructure and the establishment of subsistence agricultural fields.

The dominant vegetation within the study areas is directly related to the commercial agricultural activities (Bananas and Macadamia nuts) as well as the remnants of the old Sugar Cane plantations. A large number of alien invasive species are also present in the disturbed areas and includes *Chromolaena odorata* (Triffid Weed), *Melia azedarach* (Syringa), *Solanum mauritianum* (Bug Weed) and *Psidium guajava* (Guava).

The riparian vegetation along the small tributaries of the uVuzana River consists of stands of woody vegetation consisting of *Bridelia micrantha* (Mitzeeri Sweetberry), *Phoenix reclinata* (Cape Date Palm), *Syzygium cordatum* (Umdoni Tree), *Albizia adianthifolia* (Flat-crown Albizia), *Antidesma venosum* (Tassel Berry) and *Voacanga thouarsii* (Wild-frangipani). However, the forest is a Coastal Type (FOz 7), and is not Swamp Forest.

Plate 3: View of the woody riparian vegetation along the small tributaries of the uVuzana River

Landuse

The landuse within and surrounding the study area is dominated by commercial agricultural activities. These activities relate to the growing of Banana plantations and Macadamia nut orchards on land previously used for the growing of Sugar Cane. The areas to the south and northeast of the study area consists of the residential areas associated with Ramsgate.

Plate 4: View of the old Sugar Cane fields now planted to Macadamia orchards

Plate 5: View of the Banana plantations in the study area

Topography and Drainage

The study area is located in an open valley that is drained by small tributaries of the uVuzana River in a south-easterly direction. The valley runs in a west to east direction with the confluence of the small tributaries and the uVuzana River located approximately 700m upstream of the river's estuary. See Figure 8.

The runoff from the catchment associated with the study area has been significantly impacted by the presence of large infrastructure (the R61 National Road) and intensive commercial agricultural activities.

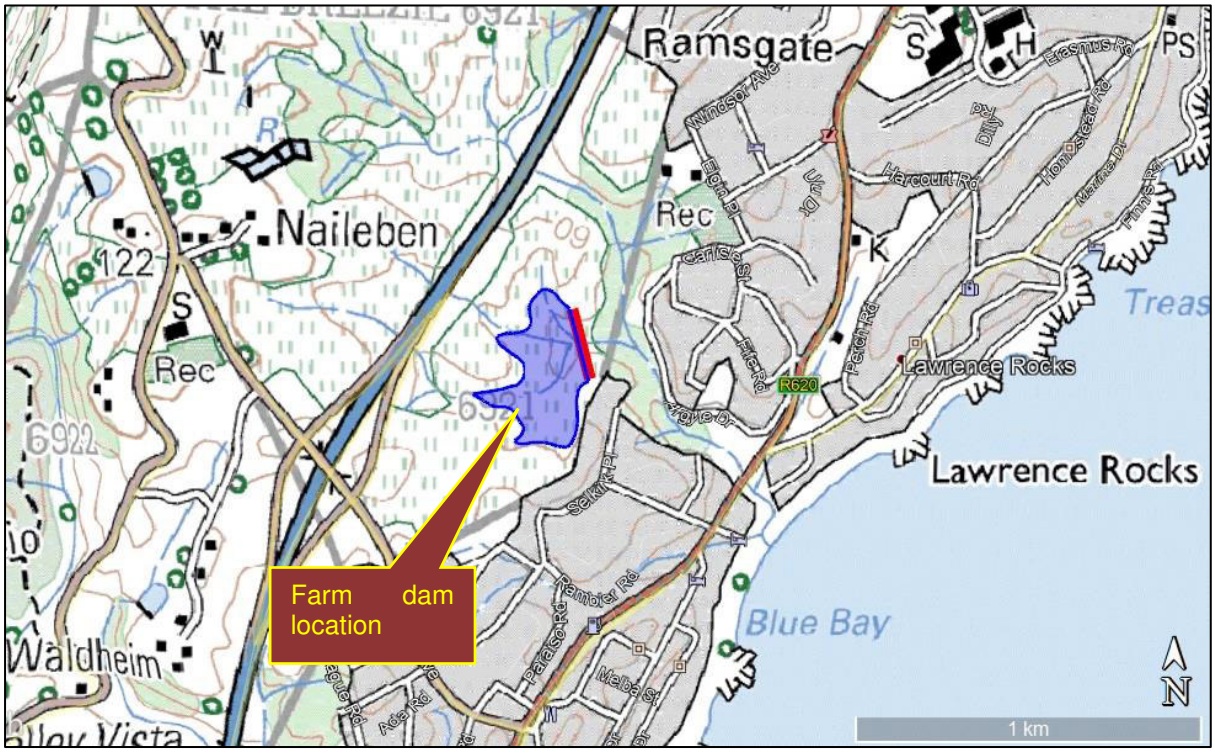


Figure 4: View of the topography and drainage of the area around the dam site. From Map Sheet 3030CD MARGATE

5. EXPERTISE OF THE SPECIALISTS

The *curricula vitae* of the specialists, Mr Magnus van Rooyen and Mr Jake Alletson are attached in Appendix A.

Mr Magnus van Rooyen is a registered natural scientist with the South African Council of Natural Scientific Professions (SACNASP) and holds a Master's degree in Environmental Management, a BSc Honours degree in Botany and a BSc degree in Botany and Zoology from the University of Stellenbosch. Mr van Rooyen has in excess of 15 years' experience in the field of aquatic and terrestrial ecological studies in Southern and Western Africa.

Mr Alletson is an ecologist registered with the SACNASP and holds a BSc Honours degree in Zoology from Rhodes University and a BSc degree in Botany and Zoology from the University of Natal. Mr Alletson has in excess of 35 years' experience in the field of aquatic and terrestrial ecological studies in Southern Africa.

6. AIMS AND OBJECTIVES

The aim and objectives of this study is as follows:

- Identification and classification of any possible wetlands within footprint of the proposed dam location;
- Identification and classification of any wetland and other aquatic features that are located within a 500m radius of the proposed dam location;
- Assessment of the identified wetlands which are considered to be directly impacted upon by the development;
- Modelling of the identified wetland and other aquatic features that may be directly impacted by the development and related activities;
- Identification of potential impacts on the wetlands and aquatic features;
- Management and mitigation measures to implemented to limit or mitigate these impacts; and
- Provision of applicable buffers around each of the wetlands that have been identified as being directly impacted upon by the development proposal.

7. METHODOLOGY

The methodology that was followed in completing this study is in line with the requirements and specifications of the Department of Water and Sanitation and includes the following aspects.

7.1 Wetland Identification and Mapping

The initial wetland identification process was conducted at a desktop level during which available GIS databases were interrogated to determine the presence of any wetland areas that has been determined in the past. The key database in that was interrogated was the National Freshwater Ecosystem Priority Area (NFEPA) as managed and updated by the South African National Biodiversity Institute (SANBI).

In addition to the database interrogation, the most recent Google Earth and Zoom Earth Imagery of the site was considered to see if any wetland areas or "anomalies" within the site are visible. One such marker used for the coastal sugar cane growing areas is the presence of herringbone drains in the cane fields.

Following the desktop assessment of the site, a site visit was conducted on 7 May 2020. During the site visit, the wetland areas identified through the desktop assessment were verified and any other wetland areas or aquatic features were identified and their boundaries accurately delineated as best that the conditions allowed. Wetland Delineation

The delineation of these wetlands areas was conducted in accordance with the Department of Water and Sanitation document, *"A practical field procedure for identification and delineation of wetlands and riparian areas"* (2005).

This field guide makes use of several specific indicators which show the presence and the boundaries of wetlands. The presence of the following indicators was used during the identification and delineation of the site:

- ***Terrain Unit Indicator*** – Identification of the part of the landscape where wetlands are more likely to occur;
- ***Soil Form Indicator*** – Identification of the soil types which are associated with prolonged and frequent saturation;
- ***Soil Wetness Indicator*** – Identification of the morphological signatures that develop in soil profiles as a result of prolonged and frequent saturation; and
- ***Vegetation Indicator*** – Identification of the hydrophilic vegetation associated with frequently saturated soil.

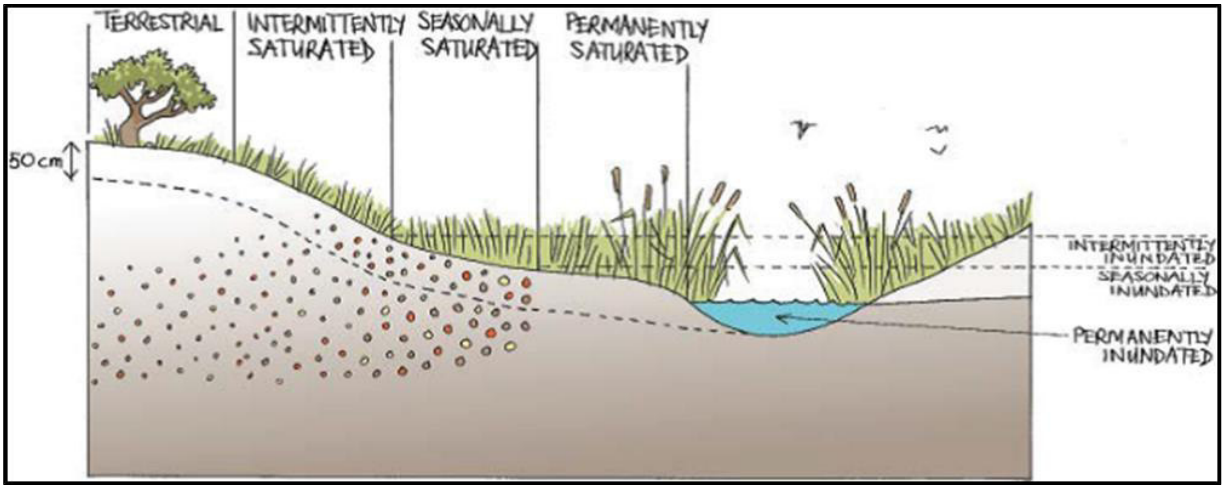
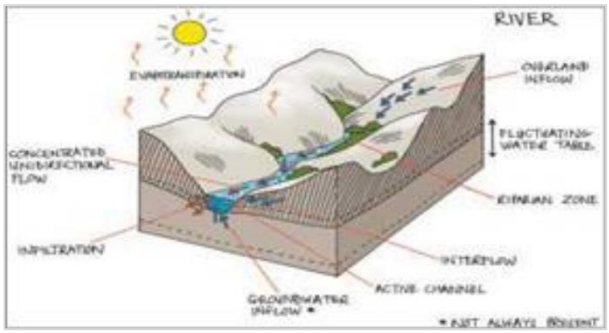


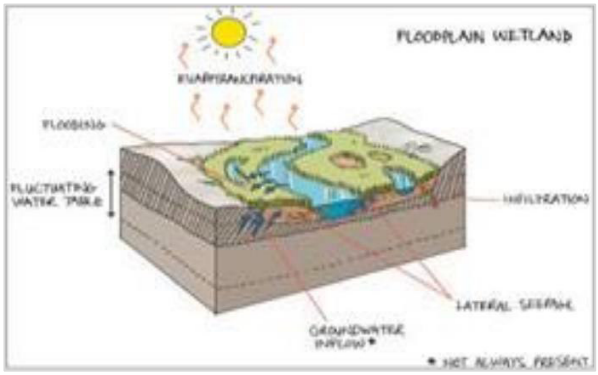
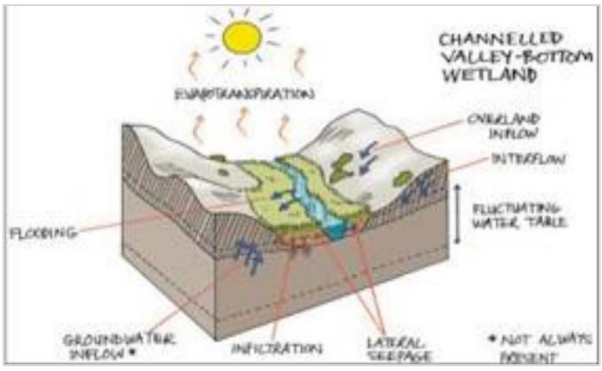
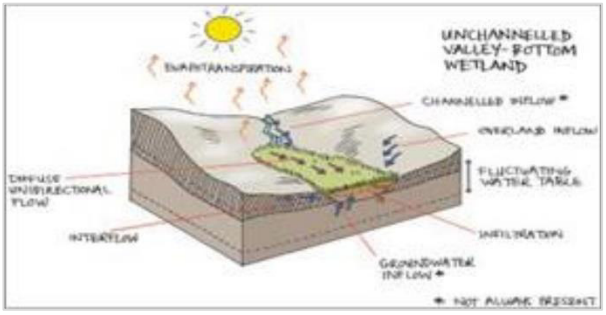
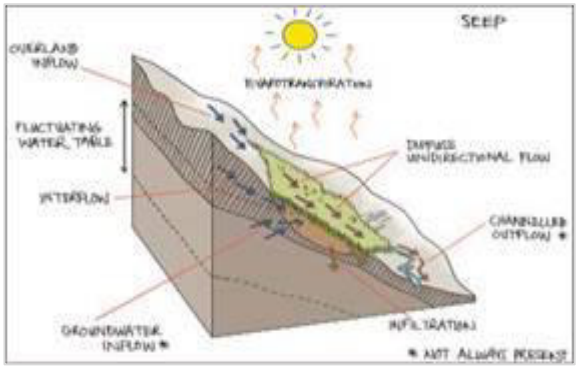
Figure 5: Cross section through a wetland, indicating the interaction between the soil wetness and vegetation

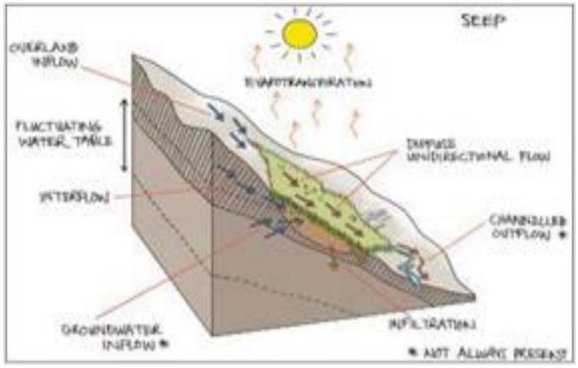
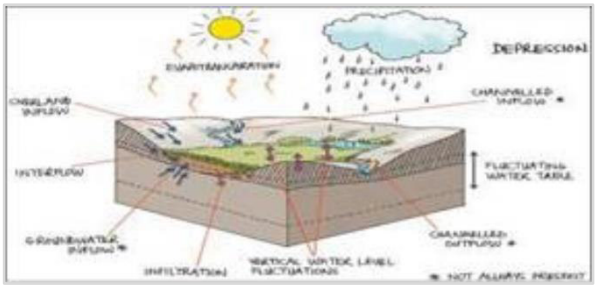
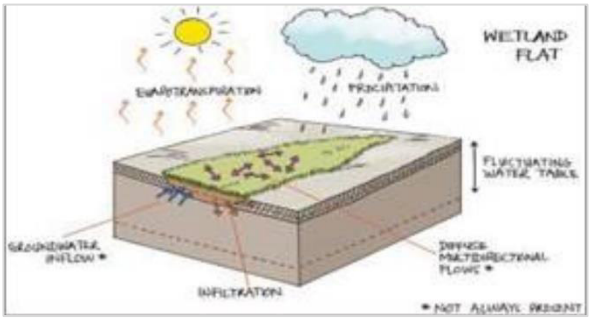
The indicators most used were those of wetness and vegetation since cultivation of the area had largely destroyed the natural soil profiles.

Following the identification of the wetland areas on the site, they were then classified into specific hydrogeomorphic (HGM) units according to the Classification System for Wetlands and other Aquatic Ecosystems in South Africa (inland systems) (Ollis *et al.*, 2013).

Table 1: Wetland hydrogeomorphic (HGM) types typically supporting inland wetlands in South Africa (Ollis *et al.*, 2013)

Hydrogeomorphic types		Description
River		Rivers are linear landforms with clearly discernible banks and a channel, which permanently or periodically, carries a contained and defined flow of water. A river is taken to include both the active channel and the riparian zone.

Hydrogeomorphic types		Description
Floodplain		Valley bottom areas with a well-defined stream channel, gently sloped and characterised by floodplain features such as oxbow depressions 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 channel		Valley bottom areas with a well-defined stream channel but lacking characteristic floodplain features. May be gently sloped and characterised by the net accumulation of alluvial deposits or may have steeper slopes and be characterised by the net loss of sediment. Water inputs from 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 channel entering the wetland and also from adjacent slopes.
Hillslope seepage linked to a stream channel		Slopes on hillsides, which are characterised by the colluvial (transported by gravity) movement of materials. Water inputs are mainly sub-surface flow and outflow is usually via a well-defined stream channel connecting the area directly to a stream channel.

Hydrogeomorphic types		Description
Isolated Hillslope seepage		Similar to other hillslope seeps but with no direct surface water connection to a stream channel. Slopes on hillsides, which are characterised by the colluvial (transported by gravity) movement of materials. Water inputs mainly from sub-surface flow and outflow primarily by diffuse sub-surface and/or limited surface flow.
Depression (includes Pans)		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 sub-surface water. An outlet is usually absent, and therefore this type is usually isolated from the stream channel network.
Wetland Flat		A flat wetland with no apparent inlet or outlet points. Water is obtained from surface or near surface flows and is lost either by downward percolation or evapotranspiration. May be only seasonal in terms of its wetness and hydromorphic soils may be only weakly developed or else be absent. Vegetation may be the strongest indicator.

7.2 Wetland Functional Assessment

Once the wetland areas had been identified and their boundaries determined, the assessment of the ecosystem services these wetland areas provide to the hydraulic system that they contribute to, as well as the immediate natural and social environment, was undertaken. An understanding of this functionality of the wetland contributes directly to the level importance that is attributed to the specific wetland is developed. The assessment was conducted by using a wetland modelling tool that forms part of the WET-Management Series (issued by the Water Research Commission), WET-EcoServices (Kotze *et al*. 2008).

The WET-EcoServices tool makes provision for the rapid assessment of the ecosystem services provided by a wetland and is designed for inland palustrine wetlands, i.e. marshes, floodplains, vleis and seeps. The process of applying the tool is based on the characterisation of hydrogeomorphic wetland types based on desktop and field assessment and observations of identified and delineated wetland areas. This model, furthermore, considers the biophysical and social conditions around a wetland and converts these considerations into a fixed score

for a series of defined ecosystem services that the wetland delivers. The services include the following:

- Flood Attenuation
- Sediment trapping
- Nitrate Assimilation
- Erosion control
- Maintenance of biodiversity
- Provision of harvestable resources
- Cultural significance
- Education and research
- Streamflow regulation
- Phosphate assimilation
- Toxicant Assimilation
- Carbon storage (sequestration)
- Provision of water for human use
- Provision of cultivated food
- Tourism and recreation

The maximum score for any service is a value of 4 and the rating of the probable extent of the service is shown in the table below.

Table 2: Ecoservices rating of the probable extent to which a benefit is being supplied

Score	Rating of likely extent to which a benefit is being supplied
< 0.5	Low
0.6 - 1.2	Moderately Low
1.3 - 2.0	Intermediate
2.1 - 3.0	Moderately High
> 3.0	High

7.3 Determining the Present Ecological State of Wetlands

The determination of the present ecological state (PES) of wetlands was conducted by using a tool from the WET-Management Series (issued by the Water Research Commission), the WET-Health (Macfarlane *et al.* 2008).

This tool is designed to assess the health or integrity of a wetland. Wetland health is defined as a measure of the deviation of wetland structure and function form the wetland's natural reference condition. The tool therefore attempts to assess the hydrological, geomorphological and vegetation impacts that has been imparted on the wetland at the time of assessment.

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

Table 3: The magnitude of impacts on wetland functionality (Macfarlane et al, 2008)

Impact Category	Description	Score
None	No Discernible modification or the modification is such that it has no impacts on the wetland integrity	**0 to 0.9**
Small	Although identifiable, the impact of this modification on the wetland integrity is small.	**1.0 to 1.9**
Moderate	The impact of this modification on the wetland integrity is clearly identifiable, but limited.	**2.0 to 3.9**
Large	The modification has a clearly detrimental impact on the wetland integrity. Approximately 50% of wetland integrity has been lost.	**4.0 to 5.9**
Serious	The modification has a highly detrimental effect on the wetland integrity. More than 50% of the wetland integrity has been lost.	**6.0 to 7.9**
Critical	The modification is so great that the ecosystem process of the wetland integrity is almost totally destroyed, and 80% or more of the integrity has been lost.	**8.0 to 10**

The level of impacts on these three parameters is a direct indication of the PES of the wetland as well as the functioning of the wetland. A wetland area that has undergone severe impacts on its hydrology, geomorphology or vegetation or a combination of all three will reflect a low present ecological state while the converse is also true for pristine wetlands. Since hydrology, geomorphology and vegetation are interlinked in the model, their scores are aggregated to obtain the overall PES health score using the formula:

Health = ((Hydrology value x 3) + (Geomorphology value x 2) + (Vegetation value x 2))/7

Table 4: Definitions of the PES categories (Macfarlane *et al*, 2008)

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

7.4 Determining the Ecological Integrity of the Wetlands

The ecological integrity (EI) of a wetland is determined by a combining the findings of the WET-EcoServices and WET-Health tool as both these tools provide considerations in this regard. For instance, a wetland that makes very little ecosystem services contribution to the hydraulic system that it is linked to and has a low PES score will consequently have a low ecological integrity. The converse is also therefore true for wetlands making a large ecological contribution to the hydraulic system it is linked to as well as a high PES score.

7.5 Determining the Ecological Importance and Sensitivity of Wetlands

The outcomes of the implementation of the WET-EcoServices tool discussed above, are key in the determination of the ecological importance and sensitivity of wetlands as the results is a direct indication of the contribution that the wetland is making to the hydraulic system with which it is linked. This contribution is linked to the sensitivity of this wetland to any possible change and how this will impact on the hydraulic system within which it is embedded.

7.6 Ecological Classification and Description

The ecological classification and description are direct results of the implementation of the methodology and tools described above as the results of these determinations contribute to the understanding of the ecology of the wetland. The description of the wetland will therefore make provision for a description of the physical attributes of the wetland (location, size, etc.), the ecosystem services that the wetland provides, the current ecological state of the wetland and the importance of the wetland as well as its sensitivity.

7.7 Hydropedological Conditions

The methodology used to conduct the assessment consists of two phases, a Desktop Assessment and a Field Assessment.

Desktop assessment

The hydropedological conditions on the assessment area was determined by using desktop soil classifications to assist in the understanding of the soil characteristics that are present on the site. In addition to the soil characteristics, various GIS datasets were used to determine the various slopes that occur within the site to identify areas that may be prone to the development of seep wetland areas.

Field assessment

The slopes and gradients present within the study area had been identified during the desktop assessment from the available contour data and aerial imagery. This has indicated the possible flow path of water in the soils based on the gradients.

These locations were then amended where required to make provision for access (dense vegetation, etc.) and further refined. Sampling locations were determined based on the presence of wetland areas as the soils immediately above these wetlands were sampled.

A total of 3 locations were augered above the proposed dam inpoundment, with a hand auger to determine the soil physical properties and the soil morphology. The depth of the sampling was to a depth of 1.5m (or to refusal on the underlying dolerite) with all hydropedological features being recorded.

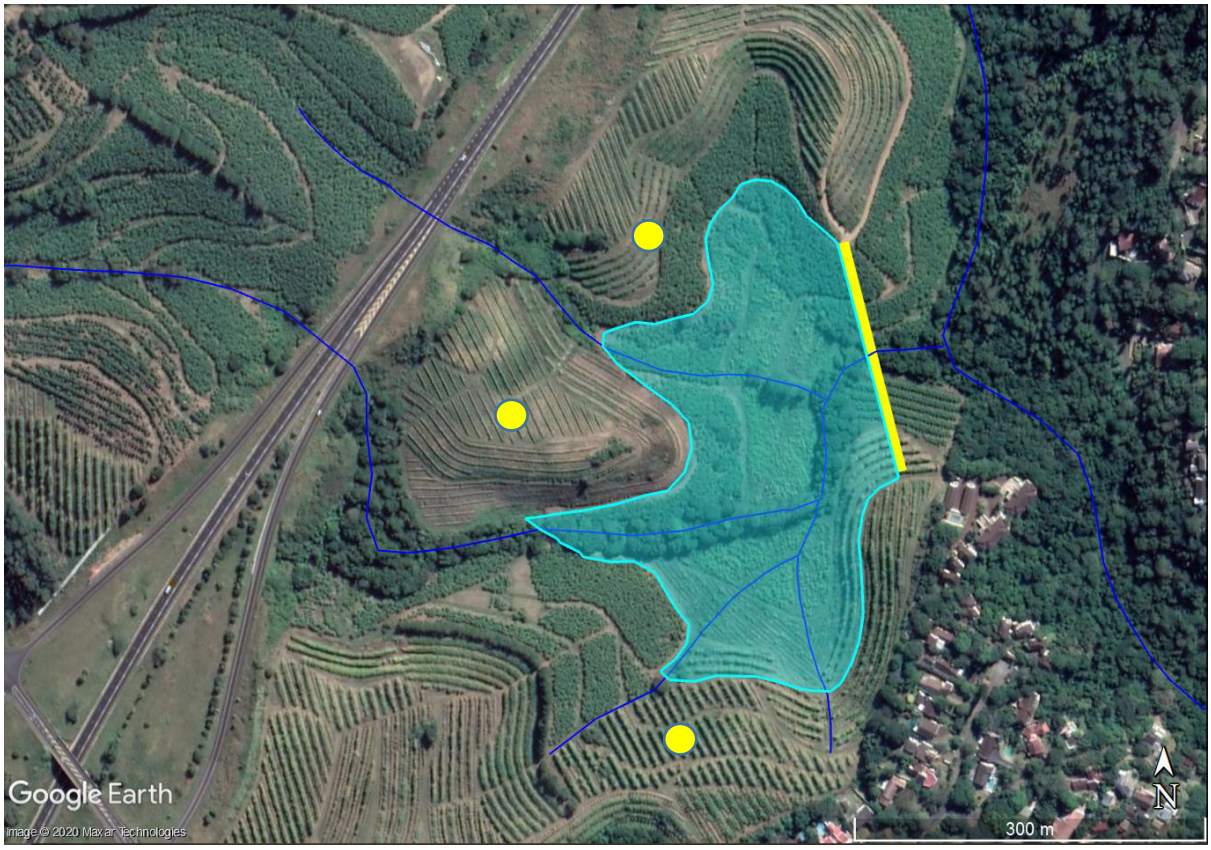


Figure 6: Location of the auger sites (shown in yellow) in relation to the pedestrian bridge crossing

Following the taking of soil samples, the samples were grouped into various hydrological response units in accordance to their physical nature and morphology in order to classify them into a hydropedological category. These categories are provided in the table below.

Table 5: Hydropedological soil categories (Le Roux, et al., 2015)

Hydropedo-logical soil type	Description	Symbol
Recharge	Soils without any morphological indication of saturation. Vertical flow through and out the profile into the underlying bedrock is the dominant flow direction. These soils can either be shallow or fractured bedrock with limited contribution to evapotranspiration or deep freely drained soils with significant contribution to evapotranspiration.	
Interflow (A/B)	Duplex soils where the textural discontinuity facilitates build-up of water in the topsoil. Duration of drainable water depends on the rate of evapotranspiration, position in the hillslope (lateral addition/release) and slope (discharge in a predominantly lateral direction).	
Interflow (soil/bedrock)	Soils overlying relatively impermeable bedrock. Hydromorphic properties signify temporal build-up of water on the soil/bedrock interface and slow discharge in a predominantly lateral direction.	
Responsive (shallow)	Shallow soils overlying relatively impermeable bedrock. Limited storage capacity results in the generation of overland flow after rain events.	
Responsive (saturated)	Soils with morphological evidence of long periods of saturation. These soils are close to saturation during rainy seasons and promote the generation of overland flow due to saturation excess.	

The soil samples were also evaluated for their permeability rates (cm/hour) based on their soil texture (Food and Agriculture Organisation, 1980). The table below provides the rates based on the soil texture.

Table 6: Average permeability rate for different soil textures in cm/hour (Food and Agriculture Organization, 1980)

Soil texture	Permeability (cm/hour)
Sand	5
Sandy loam	2.5
Loam	1.3
Clay loam	0.8
Silty clay	0.25
Clay	0.05

Linked to the above soil permeability, the soils ability to contain wetness was also assessed based on the soil texture. This was also done in accordance with the Food and Agricultura Organisation (1980) guidelines. The figure below provides an indication of how the soil texture impacts on the soil wetness.

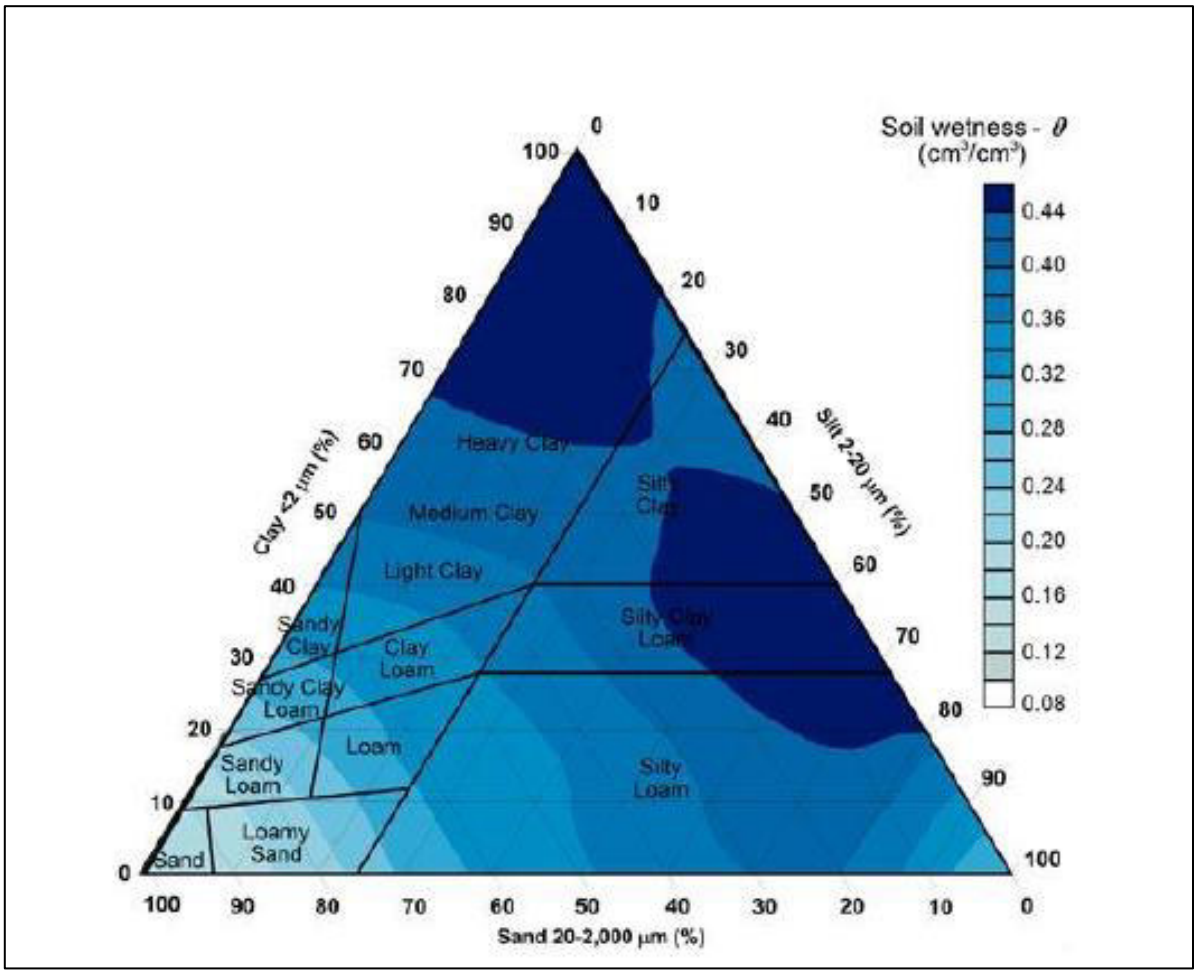


Figure 7: Soil wetness based on soil textural class

7.8 Watercourse Identification and Mapping

Reference was made to the watercourse mapping from the office of the Surveyor General and to the NFEPA river database. The watercourses identified in this way were verified during the site inspection. It was noted that the most of the channels are classified as being non-perennial but that the lowest section of the uVuzana River is perennial and is listed in the NFEPA database The river rises on the property at a site near the Margate Airport and flows down to a minor estuary after passing through the farm and a residential area of Ramsgate.

8. RESULTS

The results presented below are based on the findings of the desktop assessment as well as the field investigations conducted for the study.

8.1 Wetland Delineation

The interrogation of the NFEPA Wetland Database and the Ezemvelo KZN Wildlife wetland database showed no wetland sites within the 500 m radius around the proposed dam site. However, examination of Google Earth images of the site revealed a number of small wetland patches which are all associated with drainage lines. The presence of some of these was confirmed in the course of the field survey. The sites are shown in Figure 8. All but two are located upslope of the full supply level of the proposed dam and are surrounded by cultivated areas which were sugar cane in the past but are now mainly under bananas, or macadamia nut trees. These sites will not be affected by the proposed dam and so are further ignored.

The remaining two sites are located within the actual dam basin. They have been cultivated in the past and are now severely transformed from the natural state with the outer edges being very indistinct. Therefore, the delineation was done on the basis of past herringbone drains seen in Google Earth, and on the vegetation observed during the site visit. Since the sites are located on either side of a tributary of the uVusane River it is highly probably that they were originally parts of a single natural system. However, the channel between them has become deeply incised, probably as a consequence of the past agricultural activities in the area, as well as accelerated runoff from Road R61 which passes across the catchment a short distance upstream of the dam site. See Figures 8 and 9.

8.2 Wetland Unit Setting

In their natural state the two wetlands remnant patches within the dam basin were probably a Channelled Valley Bottom as shown in Table 1. The small and unnamed tributary of the uVuzana River which flows between them probably originally had a shallow channel which may or may not have been protected by swamp forest. It is now deeply incised but some of the trees alongside it, such as the *Voacanga thouarsii* (Wild-frangipani) are known to favour the riparian zone. The two smaller wetland patches are regarded as a single system and are modelled as such.

8.3 Wetland Soils

The soils in the wetland area are highly disturbed as a result of agricultural activities in the area. However, they now appear to be the heavy undifferentiated clay soils which are typical of the area as a whole.

The augering that was conducted to determine the hydropedological conditions is discussed in a later section.

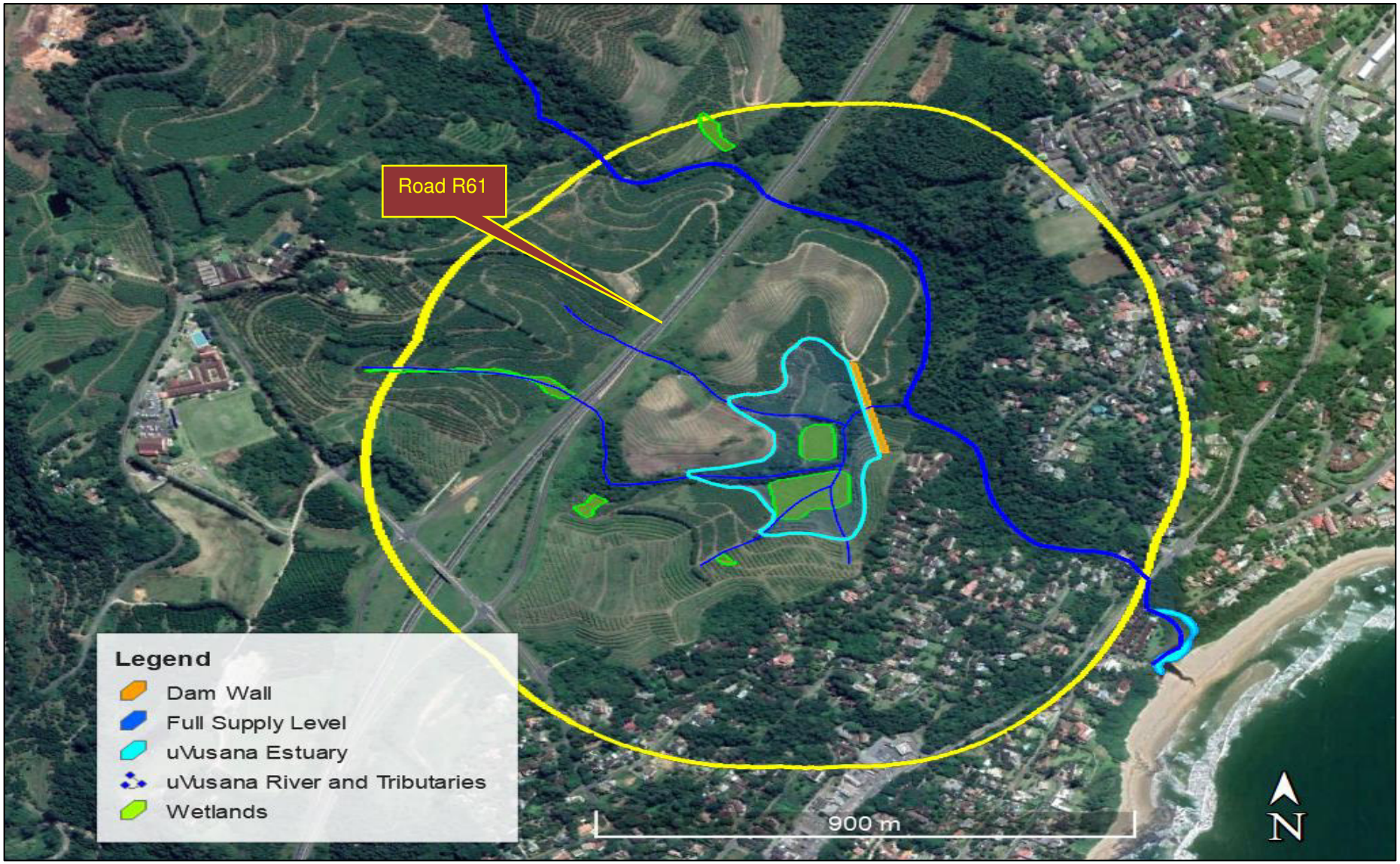


Figure 8: Location of the wetlands located within with the study area

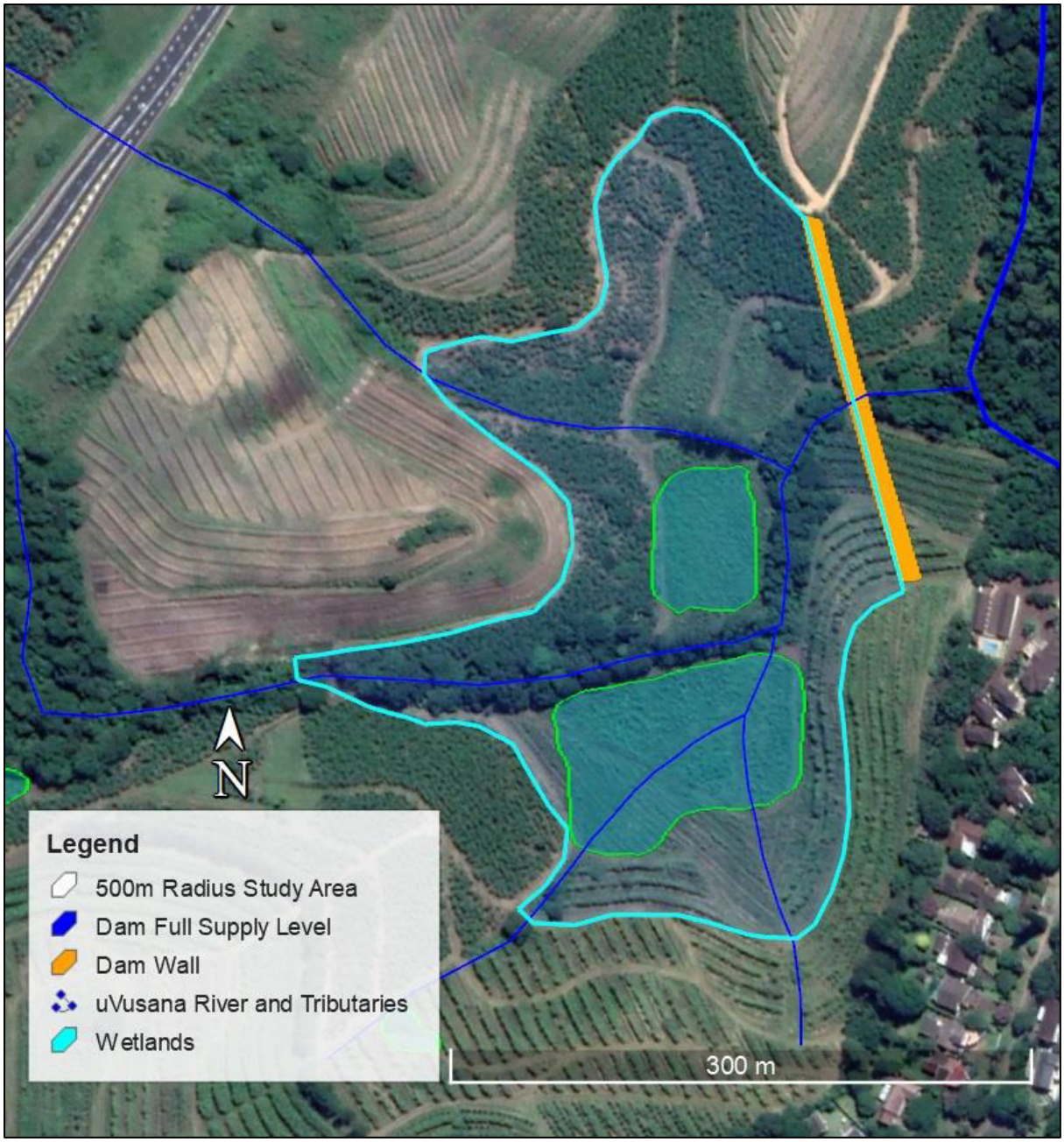


Figure 9: Details of the dam basin area

Plate 6: **V**iew of the southern wetland segment.

8.4 Description of Wetland Type

The Channelled Valley Bottom wetland totals 1.4ha in extent and is located on the valley floor that is drained by a small unnamed tributary of the uVusane River.

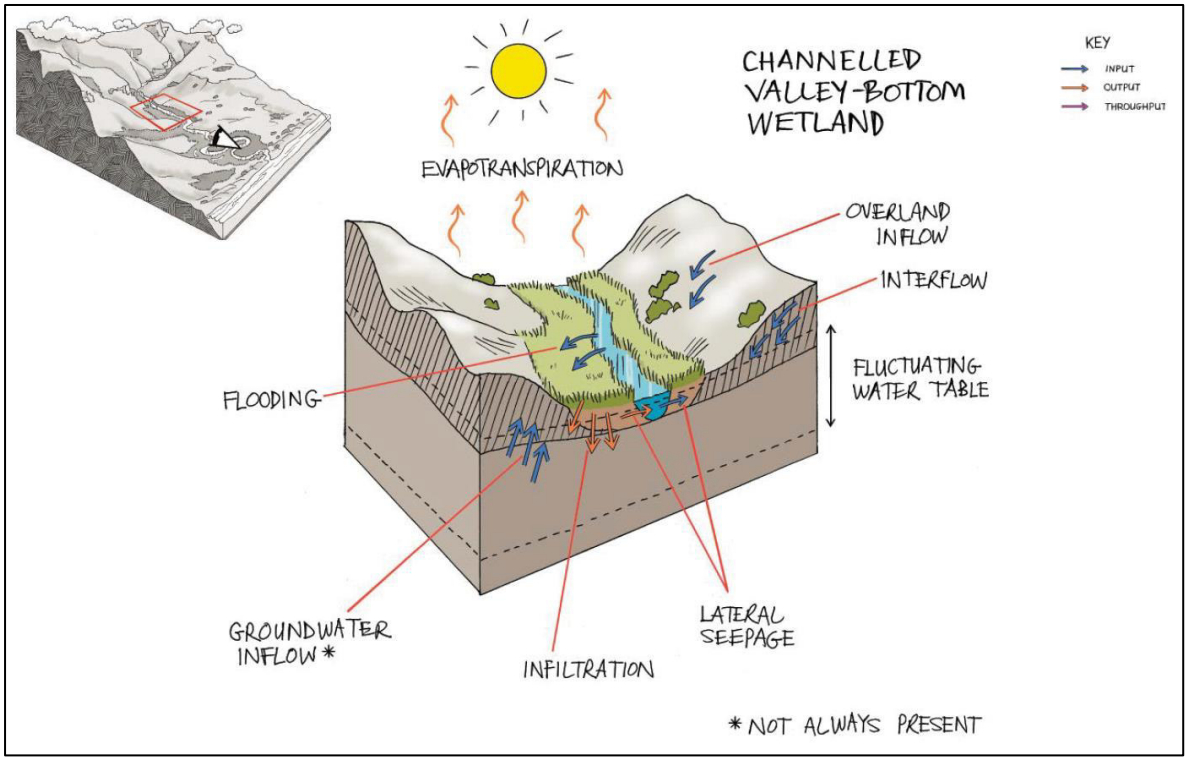


Figure 10: Diagrammatic representation of the wetland type

The total area may have been bigger under natural conditions in the past but the true boundaries cannot be determined now.

8.5 General Functional Description of Wetland Types

Channelled Valley Bottom wetlands are characterised by their location on a valley floor, the absence of characteristic floodplain features, and the presence of at least one channel flowing through the wetland.

The water inputs to these wetlands are from the channel flowing through the wetland, either as surface flow resulting in flooding, or as sub-surface flow, and/or from adjacent valley-side slopes (as overland or interflow). The water generally moves through the wetland as diffuse sub-surface flow, although occasional, short-lived concentrated surface flows are possible during flooding events.

Water exits this wetland type in the form of diffuse surface or sub-surface flow into the adjacent river, with infiltration into the ground and evapotranspiration of water from the wetland area also being significant.

In light of the above brief description of the flow of water into and from the wetland, the following are general ecosystem services provided by this wetland type:

- Limited flood attenuation as the wetland is activity drained by a defined channel;
- Sediment trapping, especially sediment that erodes from the slopes of the surrounding valley; and

- Nitrate, phosphate and toxicant trapping from the slopes of the surrounding valley.

The ecological integrity of the wetland and its surrounding catchment plays a key role in the level at which these services are provided.

8.6 Wetland Ecological Functional Assessment

The results of the WET-EcoServices Model are provided in Table 7 below. The results indicate that the key services provided by the wetland are as follows:

- Flood Attenuation;
- Trapping of sediments that erode from the slope above the wetland; and
- Trapping of nitrates, phosphates and toxicants that is freed from the slopes above the wetland area.

However, it provides only very low levels of services in relation to provision of resources for human consumption. These results are considered to be a function of the degree of alteration of the wetland area as well as the disturbances and activities within the catchment area upslope of it.

Table 7: Ecosystem service provide by the wetlands

Wetland Unit					CVB*
Ecosystem Services Supplied by Wetlands	Indirect Benefits	Regulating and supporting benefits	Flood attenuation		2.2
			Streamflow regulation		1.5
			Water Quality enhancement benefits	Sediment trapping	2.5
				Phosphate assimilation	2.7
				Nitrate assimilation	2.9
				Toxicant assimilation	2.5
				Erosion control	2.5
			Carbon storage		0.7
	Direct Benefits	Biodiversity maintenance			1.5
		Provisioning benefits	Provisioning of water for human use		0.8
			Provisioning of harvestable resources		0.0
			Provisioning of cultivated foods		0.6
		Cultural benefits	Cultural heritage		0.0
			Tourism and recreation		0.4
			Education and research		1.0
Overall Total Score					21.8
Average Ecosystem Service Score					1.5
Threats to Existing Ecosystem Services					4.0
Opportunities for Enhancing Ecosystem Services					0.0

*Channelled Valley Bottom

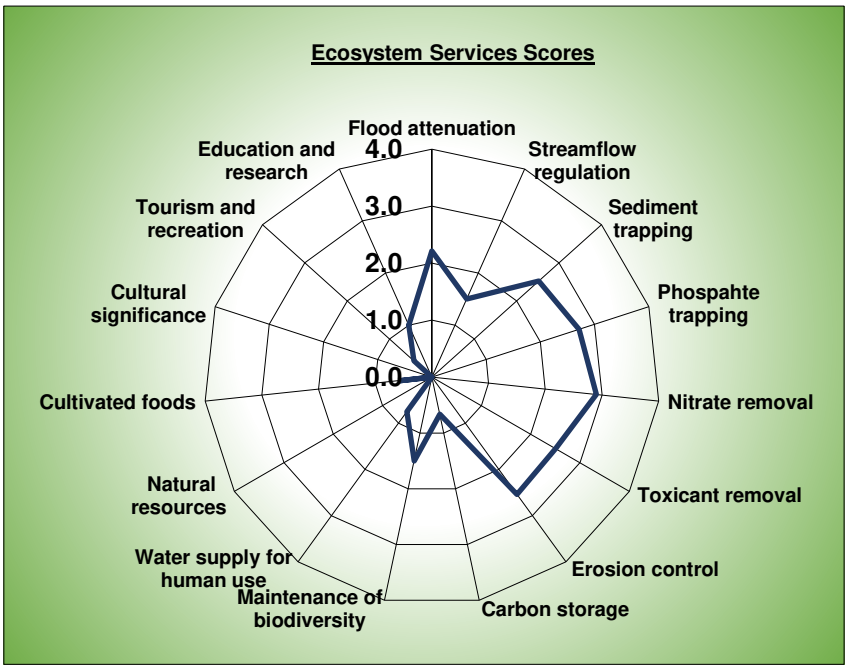


Figure 11: Spider graph showing the ecosystem services provided by the wetland

8.7 The Ecological Importance and Sensitivity Assessment of the remaining wetland areas

The results of the Level 1 assessment of the WET-Health model has indicated that the wetland area has a PES score of Class E –Seriously Modified. This indicates a large change in the ecosystem processes and a loss of habitat and biota has occurred within the wetland. The PES of the Channelled Valley Bottom Wetland are as follows:

Table 8: PES scores for the floodplain wetland fragments – Wetland 1

HGM Unit	Ha	Hydrology		Geomorphology		Vegetation	
		Impact Score	Change Score	Impact Score	Change Score	Impact Score	Change Score
CVB*	1.4	10.0	-2.0	5.0	-2.0	7.7	-2.0
Average area weighted impact scores		**10.0**	**-2.0**	**5.0**	**-2.0**	**7.7**	**-2.0**
PES Category		**F**	↓↓	**D**	↓↓	**E**	↓↓
Overall Combined PES Score		**7.9 (E)**					

*Channelled Valley Bottom

Because the area was previously drained for agricultural purposes, the results of the WET-Health Model are consistent with the observations made during the site assessment.

The hydrology, geomorphology, and vegetation were all impacted upon by the sugar cane production of the past and this, together with some invasion by alien weed species, led to the degradation of the site.

8.8 Ecological importance and sensitivity of the wetland

The Ecological Importance and Sensitivity of the wetland is a function of the PES and Ecosystem Services that the wetland provides and has been determined to be low. The table below provides the results from the models considering the applicable aspects.

Table 9: Ecological importance and sensitivity of the wetland

	Importance	EIS Class
Ecological importance and sensitivity	0.8	**Moderately Low**
Hydrological/Functional importance	2.2	**Moderately High**
Direct human benefits	0.5	**Low**

The **Moderately High** score for Hydrological/Functional importance appears to be an anomaly but is based on the site's ability to trap sediments, nutrients, and toxicants, all of which might be present as a result of the agriculture in the catchment area.

8.9 Watercourse Ecological Importance

The uVuzana River is a small system flowing only some 2.5 km from its source near the Margate Airport to the coast where it forms a minor estuary. Flows are listed as being non-perennial in the upper catchment and as perennial at the estuary. The system is very poorly studied and the SAEON estuarine database (https://saeis.saeon.ac.za/Info/63) contains very little information on the system. The following material is presented:

Bioregion	Subtropical
Condition	Fair
Siltation	Severe
Importance Category	D
National Ranking	245 out of 275
Management Recommendations	None provided
Issues	Sewage spillage, Nutrient enrichment, Mouth breaching

It is noted that the forested area downstream of the proposed dam site is listed as a CBA 1 site. However, the vegetation is not a swamp forest and so is not directly dependent on the river itself.

8.10 Buffer determination

Since the wetland site is embedded in an area which is intensively used for agricultural purposes, and has itself been drained and cultivated in the past, there is no buffer around it at present. It would be inundated by the proposed dam and so no buffer is suggested even if the dam is built.

However, it is recommended that no site camp or plant and vehicle parking area be allowed within the full supply level of the proposed dam or within 35 m of any watercourse.

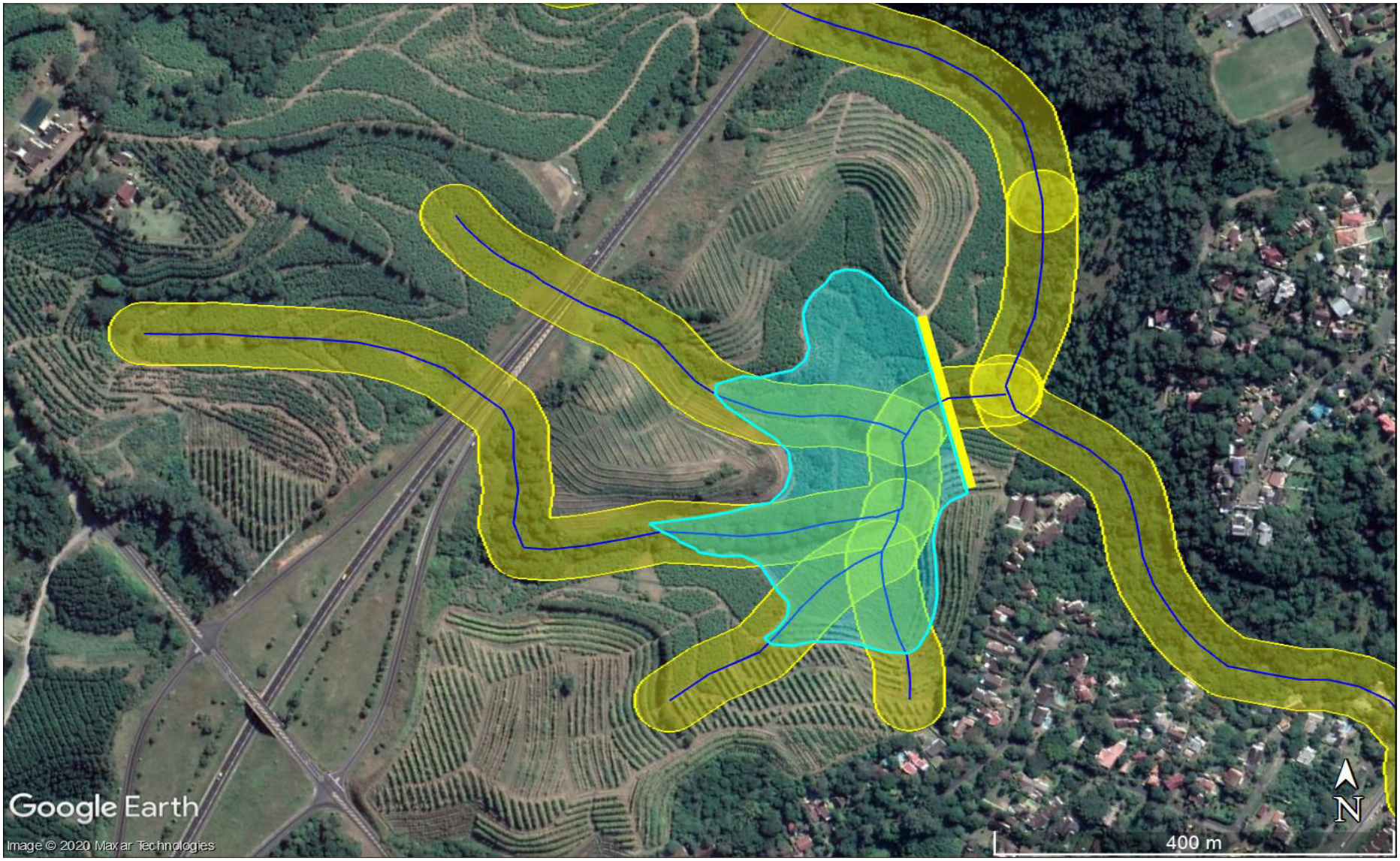


Figure 12: Location and extent of the dam impoundment area (in blue) and the 35m buffers from the watercourses

8.11 *Hydropedological conditions*

The desktop findings of the soil characteristics within the project area has indicated the presence of Glenrosa and Mispah soil forms that generally have a high natural fertility. The presence of intensive agricultural activities in the area is a reflection of this fertility.

The soils is relatively deep and consist of clayey-silty soils with a relatively high water retention capacity. The water retention capacity is reflected in the high soil water content during the wet season which is reflected in the "plastic" properties of the soil. The soils show signs of surface "cracking" during the dry season as a result of the contraction of the soils.

As a result of the soil physical properties described above and the underlying granitic geology the hydropedological characteristics of these soils are typically classified as "interflow" soils with a strong soil/bedrock interaction. These soils signify temporal build-up of water on the soil/bedrock interface which is then discharges slowly in a lateral direction down the gradient.

9. RISK ASSESSMENT DISCUSSIONS

The impact assessment makes provision for the identification and assessment of impacts on the identified wetland area associated with the proposed dam. It must be noted that the Risk Assessment has been completed in accordance with the risk assessment requirements as prescribed by the Department of Water and Sanitation requirements.

9.1 *Risk Assessment*

The risks identified with the construction and operation of the proposed dam to the identified wetland areas and the uVuzana River are as follows:

- Reduction of flows in the lower uVuzana River;
- Contamination of the river by leaking plant and equipment during construction;
- Contamination of the river by the storage of dangerous goods (petrochemicals) within the construction camp and administrative buildings;
- Contamination of the river by leakages from the on-site ablution facilities during the construction phase;
- Contamination of the river by domestic waste during the construction phase;
- Contamination of the river by hazardous waste during the construction phase;
- Loss of wetland habitat; and
- Siltation of the river as a result of erosion from the temporary works areas during construction.

These risks have been included in the Risk Assessment Matrix as specified for completion by the Department of Water and Sanitation (DWS, 2016). Table 10 below represents the results of the assessment.

Table 10: Results of the Risk Assessment Matrix in relation to the uVusana River (DWS, 2016)

No.	Phases	Activity	Aspect	Impact	Risk Rating	Control Measures
1	Const. and Opp.	Pumping of water from the existing weir on the uVuzana River to the proposed dam.	The flows in the lowest part of the uVuzana River will be reduced.	Biodiversity in the aquatic system including the lagoon/estuary could be affected.	L	**1.** Pumping of water to fill the dam must be restricted to only times of higher river flow. **2.** The flow of water in the uVuzana River must not be stopped. i.e. perennial flow must be sustained. **3.** Pumping may not be done if no water is entering the holding weir on the river.
2	Const.	Risk of contamination of the uVuzana River by leaking plant and equipment during construction.	If leaking plant and equipment are used during the construction phase of the project, the risk of contamination exists.	Impact on the water quality in the river, which will negatively impact on the water quality in the system.	L	**1.** Before the commencement of any construction activities within the project area, the recommended construction phase buffers must be clearly demarcated. **2**. No plant or equipment may be stored/parked within 30m of the edge of the wetland area or the watercourses. Plant and equipment must be parked at designated parking areas within the site. **3.** All plant and equipment must be checked on a daily basis for leaks, any plant that is found to be leaking will be removed off site for maintenance.
3	Const.	Risk of contamination of the uVuzana River by the storage of dangerous goods (petrochemicals) within the construction camp and administrative buildings.	If the petrochemical storage facilities within the construction camp or administrative buildings are not adequately designed and managed, potential leakages and spillages could impact on the water quality in the uVuzana River	Impact on the water quality in the river, which will negatively impact on the water quality in the greater system.	L	**1.** The construction site camp must not be located within 30m of the edge of the delineated edge of the wetland area or a watercourse. **2.** All dangerous goods must be stored in bunded areas providing for 110% of the capacity of the dangerous goods to be stored.

No.	Phases	Activity	Aspect	Impact	Risk Rating	Control Measures
4	Const.	Risk of contamination of the uVuzana River by leakages from the on-site ablution facilities during the construction.	If the ablution facilities at the construction site is not adequately located or designed leakages from these facilities may contaminate the water quality within the river.	Impact on the water quality in the river, which will negatively impact on the water quality in the greater system.	L	**1.** All temporary ablution facilities (portable chemical toilets) must be located outside of the recommended construction buffers (30m from the delineated edge of the wetland). **2.** The portable chemical toilets must be serviced on a regular basis by a registered service provider.
5	Const..	Risk of contamination of the uVuzana River by domestic waste during the construction phase.	Domestic waste materials (food containers, plastics, papers, etc.) that will be used by the labour and employees during the construction phases may contaminate the river.	The domestic waste materials could potentially contaminate the river, which could pose a risk to the water quality characteristics in the greater system.	L	**1.** During the construction phase, domestic waste must be collected in waste bins that are located on site. The content of these bins must be cleared on a daily basis to a collection point in the site camp from where the waste can be removed on a weekly basis. The collected waste must be disposed of at a municipal landfill facility. **2.** A designated eating area must be identified outside of the recommended construction buffers (30m from the delineated edge of the wetland area). This eating area must be used by the employees during their eating breaks. **3.** Waste bins must be placed at this designated eating area for use by these employees.
6	Const.	Risk of contamination of the uVuzana River by hazardous waste (grease rags, used oil filters, etc.).	Hazardous waste materials (grease rags, used oil filters, etc.) that will be used by the labour and employees and in the plant and equipment during the construction phases may contaminate the river.	The hazardous waste materials could potentially contaminate the river, which could pose a risk to the water quality characteristics of the catchment.	L	**1.** During the construction phase, hazardous waste must be collected in the site camp and be removed from the site by a registered service provider for disposal. The collected hazardous waste must be stored in designated containers.

No.	Phases	Activity	Aspect	Impact	Risk Rating	Control Measures
7	Const. and Opp.	Risk of siltation of the uVuzana River as a result of erosion from the temporary construction areas.	In the event that the stormwater drainage associated with the development is not adequately designed, it may impact on the natural surface water flow of the area.	Inadequate stormwater provision may result in erosion from the project site. This erosion will result in the potential siltation of the river which will impact on the water quality of the river and the catchment.	L	**1.** Provision must be made during the planning phases of the project to ensure that the stormwater associated with the construction phase will not result in any erosion.
8	Opp.	Risk of inundation of wetland areas by the dam reservoir.	The wetland areas that have been identified in the dam basin will be flooded when the dam fills up.	The inundation of the wetland areas within the dam basis will lead to the loss of wetland vegetation from the catchment.	M	The very low PES and EIS of the wetland areas as well as their relatively small areas results in a low level of ecosystem service provision by these wetlands. As such, the loss of these wetlands areas are not considered to be of great significance to the catchment. No mitigation is therefore suggested in this regard.

9.2 Discussion and management measures

Reduction of flows in the lowest section of the uVuzana River

Flows in the uVuzana River will be reduced when water is pumped to fill the proposed new dam. If the flow in the river is totally taken up then the aquatic ecosystem downstream of the pump site could be adversely affected. There are no listed species of concern in the river or its estuary. However much of the water in the dam will come from the seasonal tributaries which pass through the dam basin itself.

To limit this impact, the following management and mitigation measures are suggested:

1. Pumping of water to fill the dam must be restricted to only times of higher river flow.
2. The flow of water in the uVuzana River must not be stopped by pumping more than the incoming flows.
3. Pumping may not be done if no water is entering the holding weir on the river.

Risk of contamination of the uVuzana River by leaking plant and equipment during construction

If leaking plant and equipment are used during the construction phase of the development, the risk of contamination exists. This risk translates to a potential impact on the water quality in the river, which will negatively impact on the water quality in the downstream system.

To limit this impact, the following management and mitigation measures are suggested:

1. Before the commencement of any construction activities within the project area, the recommended construction phase buffers must be clearly demarcated.
2. No plant or equipment may be stored/parked within 30m of the edge of the wetland area. Plant and equipment must be parked at designated parking areas within the site.
3. All plant and equipment must be checked on a daily basis for leaks, any plant that is found to be leaking will be removed off site for maintenance.

Risk of contamination of the uVuzana River by the storage of dangerous goods (petrochemicals) within the construction camp and administrative buildings

If the petrochemical storage facilities within the construction camp or administrative buildings are not adequately designed and managed, potential leakages and spillages could impact on the water quality in the river. The impact on the water quality in the river will negatively impact on the water quality of the larger downstream system.

To limit this impact, the following management and mitigation measures are suggested:

1. The construction site camp must not be located within 30m of the edge of the delineated edge of the wetland area.
2. All dangerous goods must be stored in bunded areas providing for 110% of the capacity of the dangerous goods to be stored.

Risk of contamination of the uVuzana River by leakages from the on-site ablution facilities during the construction

If the ablution facilities at the construction sites are not adequately located or designed leakages from these facilities may contaminated the water quality within the river. This risk

translates to an impact on the water quality in the river, which will negatively impact on the water quality of the downstream system.

To limit this impact, the following management and mitigation measures are suggested:

1. All temporary ablution facilities (portable chemical toilets) must be located outside of the recommended construction buffers (30m from the delineated edge of the wetland).
2. The portable chemical toilets must be serviced on a regular basis by a registered service provider.

Risk of contamination of the uVuzana River by domestic waste during the construction phase

Domestic waste materials (food containers, plastics, papers, etc.) that will be used by the labour and employees during the construction and operational phases may contaminate the river, which could post a contamination risk to the water quality characteristics of the greater system.

To limit this impact, the following management and mitigation measures are suggested:

1. During the construction phase, domestic waste must be collected in waste bins that are located on site. The content of these bins must be cleared on a daily basis to a collection point in the site camp from where the waste can be removed on a weekly basis. The collected waste must be disposed of at a municipal landfill facility.
2. A designated eating area must be identified outside of the recommended construction buffers (30m from the delineated edge of the wetland area). This eating area must be used by the employees during their eating breaks.
3. Waste bins must be placed at this designated eating area for use by these employees.

Risk of contamination of the uVuzana River by hazardous waste (grease rags, used oil filters, etc.)

Hazardous waste materials (grease rags, used oil filters, etc.) that will be used by the labour and employees and in the plant and equipment during the construction phase may contaminate the river, which in turn could result in the contamination of the larger downstream aquatic ecosystem.

To limit this impact, the following management and mitigation measures are suggested:

1. During the construction phase, hazardous waste must be collected in the site camp and be removed from the site by a registered service provider for disposal. The collected hazardous waste must be stored in designated containers.

Risk of siltation of the uVuzana River as a result of erosion from the temporary construction areas

In the event that the stormwater drainage associated with the project is not adequately designed, it may impact on the natural surface water flow of the area. This inadequate stormwater provision may result in erosion from the development which could result in siltation of the river.

To limit this impact, the following management and mitigation measures are suggested:

1. Provision must be made during the planning phases of the project to ensure that the stormwater associated with the construction phase will not result in any erosion.

Risk of inundation of wetland areas by the dam reservoir

The wetland areas that have been identified in the area that will be inundated by the dam impoundment will be lost from the catchment in which the dam is located. These wetlands have all been classified with very low PES and EIS characteristics which has translated into a very low level of ecosystem service provision. These wetland characteristics as well as the relatively small sizes of the wetland areas makes the loss of these areas from the catchment insignificant.

In addition, the dam impoundment area will substitute the ecosystem service provision of sediment trapping, storage of nitrates and phosphates and toxicants from the catchment, provided by the wetlands. The level of service provision by the dam impoundment area will be greater than the level of service provision by the wetlands in their current state.

No mitigation is therefore suggested.

9.3 Monitoring and management requirements

The management requirements provided above must be included in the Environmental Management Programme for the project. The implementation of these measures must be monitored by and Environmental Control Officer during the construction phase of the project.

The auditing intervals must be in accordance with the Environmental Authorisation that is needed in terms of the National Environmental Management Act (Act No. 107 of 1998): Environmental Impact Assessment Regulations (2014), as amended. A provisional monitoring schedule is provided below.

Table 11: Provisional Environmental monitoring schedule

Time/Interval	Actions	Personnel
Pre-construction site visit and familiarisation.	Key role players visit site together and also consider the proposed locality of the site camp.	ECO, Project Engineer, Client, and Contractor
Early in the construction camp installation and construction phase.	Site inspection and reporting to the client.	ECO, and Contractor
Construction phase and then rehabilitation period.	Monthly visits for site inspection and reporting to the client.	ECO, and Contractor
End of construction and rehabilitation	Final inspection prior to sign off the project.	ECO, Project Engineer, Client and Contractor

10. CONCLUSION

Examination of the area in and around the site of a new proposed irrigation dam on the property The Breeze No. 6921 located in Ramsgate, KwaZulu-Natal, found that there are several wetland patches upslope of the dam and which will not be affected, and two within the dam basin. The site is within the catchment of the uVuzana River which is a small system which has perennial flows only at the point close to where it enters its estuary.

The wetlands within the basin are thought to be remnants of a single Channelled Valley Bottom site which has been drained and fragmented a s a result of agricultural activities, including production of sugar cane and bananas, over a time period of many years. Their combined area is 1.4 ha and they were modelled as a single site with a PES in Category E (Seriously Modified). Inspection found that the old herringbone drains are still functional and that wet areas are restricted to just some of these. The wetland system is situated on a non-perennial tributary of the uVuzana River which was barely flowing at the time of the site visit in May 2020.

The key ecosystem services provided by the wetland area are to the following:

- Sediment trapping
- Phosphate trapping
- Nitrate and toxicant removal; and
- Cultivation of commercial crops.

The levels at which the water purification services are provided is of some importance since fertilisers could be leaching from the cultivated areas upslope of the site. Clearly, if the dam is authorised and built, the wetland function will be lost. However, the dam is on a non-perennial watercourse and is not expected to overflow except at times of very high rainfall. It will therefore act as a sediment and nutrient trap and protect the uVuzana estuary from contamination.

Based on the PES and the level of ecosystem services provided by the wetland areas, it has been determined that the EIS of the site is Moderately Low.

The assessment of the hydropedological conditions on the project area has indicated that the soils have interflow characteristics with the dominant flow direction being in a lateral direction.

The risks posed by the construction and operation of the dam on the uVuzana River were identified as part of the Risk Assessment that was conducted. These risks are as follows:

- Reduction of flows in the lower uVuzana River;
- Risk of contamination of the river by leaking plant and equipment during construction;
- Risk of contamination of the river by the storage of dangerous goods (petrochemicals) within the construction camp and administrative buildings;
- Risk of contamination of the river by leakages from the on-site ablution facilities during the construction;
- Risk of contamination of the river by domestic waste during the construction phase;
- Risk of contamination of the river by hazardous waste (grease rags, used oil filters, etc.);
- Risk of the loss of wetland areas; and
- Risk of siltation of the river as a result of erosion from the temporary construction areas.

The assessment of these risks according to the Department of Water and Sanitation's Risk Assessment Matrix (2016) has indicated that all can be successfully mitigated and managed by the implementation of site-specific management and mitigation measures.

In consideration of these risks in light of these management and mitigation measures, it is the opinion of the Specialist that the majority of the risks can all be classed as being **"Low"** risks, with a single risk being classified as a **"Medium"** risk.

The monitoring requirements specified by this assessment make provision for the construction activities to be monitored by an Environmental Control Officer who must meet the requirements for an Environmental Control Officer as specified in the National Environmental Management Act (Act No. 107 of 1998): Environmental Impact Assessment Regulations (2014) as amended.

Considering the findings of the above assessment of the site associated with the proposed irrigation dam, it is the Specialist's opinion that there are no fatal flaws associated with the project that have been identified and assessed and that will prevent the implementation of the project. Therefore, the proposed development is not opposed.

11. REFERENCES

DWAF. 2005. A Practical Field Procedure for Identification and Delineation of Wetlands and Riparian Areas. Department of Water Affairs and Forestry. Private Bag X 313 Pretoria.

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MUCINA, L. and RUTHERFORD, M. (Eds). 2006. The vegetation of South Africa, Lesotho and Swaziland. Strelitzia 119. South African National Biodiversity Institute, Pretoria.

Van GINKEL, C.E., GLEN, R.P., GORDON-GRAY, K.D., CILLIERS, C.J., MUASYA, M. and van DEVENTER, P.P. 2011. Easy Identification of some South African Wetland Plants. WRC Report No. TT 479/10 Water Research Commission, Gezina, 0031.

APPENDIX A
SPECIALISTS CURRICULA VITAE

Summary CV

Magnus van Rooyen

Personal Summary

Year of birth: 1976

Nationality: South African

Languages:

- English
- Afrikaans
- German

Qualifications:

- MPhil. Environmental Management (University of Stellenbosch, 2002
- BSc (Hons), University of Stellenbosch, 1998
- BSc Zoology and Botany, University of Stellenbosch, 1997

Society membership:

- South African Council for Natural Scientific Professions (400335/11)
- Member of the International Association for Impact Assessment (1839)

Courses completed:

- Tools for Wetland Assessment (Sept 2013); and
- Wetland Buffer Determination (Aug 2014).

Key skills:

- Specialist Wetland

Magnus van Rooyen holds a Masters degree in Environmental Management as well as undergraduate and postgraduate degrees in Natural Sciences, BSc Hons (Botany) and a BSc (Botany and Zoology). He has in excess of 15 years' experience in working in the environmental field conducting specialist biodiversity, ecological and wetland studies for various types of projects and in various countries in the SADC Region.

Experience and Skills

University of Stellenbosch Department of Botany (2001 – 2003)

- **Junior Lecturer**
  - Botanical Research

University of Stellenbosch Department of Conservation Ecology (2003 – 2005)

Researcher

- Ecological Research

Terratest (Pty) Ltd (April 2005 – present)

- **Executive Associate**
  - Management of EIAs, including public participation
  - Specialist Biodiversity Studies
  - Specialist Wetland Studies
  - Specialist Ecological Studies
  - Development and implementation of EMPs
  - Site auditing and community liaison
  - Due diligence assessments

Selected Projects

Phalanndwa Coal Mine Biodiversity and Wetland Assessment

Undertaking the wetland and biodiversity specialist study in support of the Application for Environmental Authorisation for the Phalanndwa Coal Mine Expansion near Delmas.

Lephalale Coal Mine Biodiversity and Wetland Assessment

Undertaking the wetland and biodiversity specialist study in support of the Application for Environmental Authorisation for the Lephalale Coal Mine near Lephalale.

Riversdale Coal Mine Wetland Assessment

Undertaking the wetland specialist study in support of the Application for Environmental Authorisation and the Water Use Licence Application for the Riversdale Coal Mine near Vryheid**.**

SAPPI Saiccor Wetland Assessment

Undertaking the wetland specialist study in support of the Application for Environmental Authorisation for the construction of flood protection measures associated with the SAPPI Saiccor Mill, uMkomaas.

11th Avenue Interchange Wetland Assessment

Undertaking the wetland specialist study in support of the Application for Environmental Authorisation for the construction of the 11th Avenue Interchange, Durban

Uithoek Colliery Wetland and Biodiversity Assessment

Undertaking the wetland and biodiversity specialist study in support of the Mining Right Application for the establishment of the Uithoek Colliery, Dundee.

Studies

- Specialist Biodiversity Studies
- Specialist Ecological Studies
- General environmental management and advisory

Publications:

Van Rooyen, M. & Donkin (Weldon), D.A. 2012. Environment, Health & Safety Lessons learnt from the Southern African Context. IAIA International, Porto, Portugal, May 2012. (Co-author)

Van Rooyen, M. Assessment of the impact assessment conducted for the Nacala Dam Rehabilitation project in Mozambique, May 2018 (Presenting author)

Burnside Colliery Wetland and Biodiversity Assessment

Undertaking the wetland and biodiversity specialist study in support of the Mining Right Application for the establishment of the Burnside Colliery, Dundee.

Sesikhona Colliery Wetland and Biodiversity Assessment

Undertaking the wetland and biodiversity specialist study in support of the Mining Right Application for the establishment of the Sesikhona Colliery, Dannhauser.

Ladysmith Quarry Wetland and Biodiversity Assessment

Undertaking the wetland and biodiversity specialist study in support of the Mining Right Application for the establishment of the Afrimat Quarry, Ladysmith.

N2 – uMgeni Road Interchange Wetland and Biodiversity Assessment

Undertaking of the wetland and biodiversity specialist study in support of the Application for Environmental Authorisation for the upgrading of the N2 – uMgeni Road Interchange, Durban.

N2 – Mt Edgecombe Interchange Wetland and Biodiversity Assessment

Undertaking of the wetland and biodiversity specialist study in support of the Application for Environmental Authorisation for the upgrading of the N2 – Mt Edgecombe Interchange, Durban.

Nacala Dam rehabilitation Biodiversity Assessment

Undertaking of the biodiversity specialist study in support of the Application for an Environmental Permit for the rehabilitation and raising of the Nacala Dam, Mozambique.

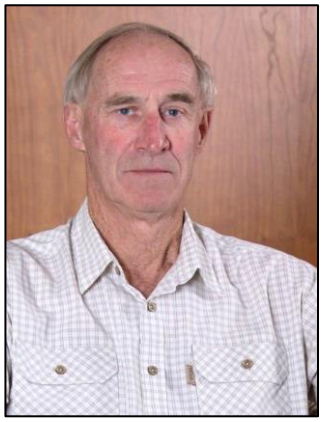
Bhangazi Community Tented Camp Wetland and Biodiversity Assessment

Undertaking of the wetland and biodiversity specialist study in support of the Application for Environmental Authorisation for the establishment of the Bhangazi Community Tented Camp in the isiMangoliso Wetland Park, St. Lucia.

SAPPI Ngodwana Mill Expansion Wetland and Biodiversity Assessment

Undertaking of the wetland and biodiversity specialist study in support of the Application for Environmental Authorisation for the expansion of the Ngodwana Mill, Waterval Boven.

Summary CV



Jake Alletson

Personal Summary

Year of birth: 1948

Nationality: South African

Languages:

- English
- Afrikaans

Qualifications:

- BSc (Hons) Zoology, Rhodes University, 1972
- BSc (Biological Sciences), University of Natal (now University of KwaZulu-Natal), 1968

Society membership:

- South African Council for Natural Scientific Professions (Membership No 125697)
- Member of the International Association for Impact Assessment (Membership No. 035)

Courses completed:

- Wetland Buffer Determination (April 2015);
- Biodiversity Offset Determination (SANBI, November 2018); and
- Biodiversity Offsets (IAIAsa, October 2019)

Jake Alletson has a BSc degree in Biological Sciences from the University of Natal and a BSc (Hons) degree in Zoology from Rhodes University. Since then he worked in the fields of environmental research and conservation gaining 25 years of experience and then as an environmental consultant until the present time. As a consultant he has undertaken a wide variety of terrestrial and aquatic surveys together with impact assessments and participation in development of water resource related methodology. He has conducted projects in several countries in the SADC Region.

Experience and Skills

Oceanographic Research Institute (1996 – 1971 and 1973 - 1975)

- **Research Technician and Research Officer**
  - Estuarine prawns and fish
  - Deep sea prawns and other resources. Collection of specimens for museums and research institutes.

Natal Parks Board (Now Ezemvelo KZN Wildlife) (1975 – 1996)

- **Research Officer (Freshwater fish, rivers, and wetlands), Conservation Planning**
  - Ecological Research on fish, and on wetland and river conservation and management
  - Contributed to development of water reserve modelling techniques, and to development of SASS
  - Development of the KwaZulu-Natal Conservation Atlas

Alletson Ecologicals (1997 – 2011)

- **Sole proprietorship company**
  - Undertaking of EIAs including some specialist studies
  - Participation in river catchment water reserve determinations
  - Specialist Biodiversity Studies
  - Specialist Wetland Studies
  - Environmental Control Officer functions

Terratest (Pty) Ltd (April 2012 – present)

- **Ecological Specialist**
  - Participation in EIAs
  - Specialist Biodiversity Studies
  - Specialist Wetland Studies
  - Specialist Ecological Studies
  - Development of EMPs
  - Team leader in large biodiversity survey projects

Selected Projects

Phalanndwa Coal Mine Biodiversity and Wetland Assessment

Undertaking the wetland and biodiversity specialist studies in support of the Application for Environmental Authorisation for the Phalanndwa Coal Mine Expansion near Delmas.

Lephalale Coal Mine Biodiversity and Wetland Assessment

Participating in the wetland and biodiversity specialist study team in support of the Application for Environmental Authorisation for the Lephalale Coal Mine near Lephalale.

Riversdale Coal Mine Wetland Assessment

Key skills:

- Specialist Wetland Studies
- Specialist Biodiversity Studies
- Specialist Ecological Studies
- General environmental management and advisory

Participating in the wetland specialist study team in support of the Application for Environmental Authorisation and the Water Use Licence Application for the Riversdale Coal Mine near Vryheid**.**

SAPPI Saiccor Wetland Assessment

Participating in the wetland specialist study team in support of the Application for Environmental Authorisation for the construction of flood protection measures associated with the SAPPI Saiccor Mill, uMkomaas.

Southport Housing Project Vegetation and Estuarine Survey

Wetland and Vegetation Specialist. The vegetation at the site of a proposed housing project, as well as a nearby stream and the Umhlangamkulu River Estuary were surveyed and assessed in relation to a proposed housing development.

Provision of Housing for Military Veterans

Wetland and Biodiversity Specialist. Four sites in the Pietermaritzburg area which are under consideration for housing for military veterans were visited in order to survey any wetlands and the biodiversity at each.

Rocabar Project Roads Assessment

Wetland and Biodiversity Specialist. The area around the proposed Rocabar commercial development in Kokstad was considered in relation to the impacts of access roads on the vegetation and wetlands.

Comrie Dam

The nGudwini River downstream of the Comrie dam near Bulwer is being monitored in compliance with the conditions of the Water Use Licence. It has been found that the river has recovered to a certain extent but that the fish populations are permanently affected.

Road R61 Upgrade

Wetland and Biodiversity Specialist. The rivers, wetlands, and vegetation along a 24 kilometre section of Road R61 were surveyed and assessed together with a vegetation specialist. Especial attention was given to the larger rivers as their nearby estuaries are of high importance.

Upgrade of Roads P2 and R389

Wetland Specialist. Two roads in northern KwaZulu-Natal, and which are to be upgraded, were examined and the wetlands and watercourse crossings were assessed.

Water Use Licence Applications (Multiple Projects)

Wetland Specialist. Wetland surveys and assessments have been undertaken for numerous Water Use Licence Applications.

Delineation of Wetlands (Multiple Projects)

Acted as specialist wetland ecologist for numerous projects (including roads, powerlines, municipal infrastructure, housing, dams, timber plantations) requiring identification and delineation of wetlands.

Biodiversity and Wetland Survey for a Bulk Water Supply Upgrade for the Estcourt Industrial Area

Wetland and Biodiversity Specialist. Conducted surveys along the routes of several pipelines. The wetlands were assessed, and management recommendations were put forward.

Wetlands Search and Delineation Along the Route of a Proposed New Bulk Raw Water Supply Pipeline from Spioenkop Dam to Ladysmith Water Treatment Works

Wetland and Biodiversity Specialist. Searches for wetlands along the proposed pipeline route were undertaken and the systems found were delineated and assessed. Terrestrial biodiversity surveys were also undertaken at the same time.

Biodiversity Assessment – Proposed New Durban Dig-out Container Port Survey Team Leader. Assembled a team of biodiversity specialist to undertake surveys of the biodiversity at the site of the old Durban Airport in relation to the proposed excavation of a new container shipping terminal. Also undertook wetland and biodiversity surveys and much of the final data compilation and reporting.

APPENDIX B:

DETAILS OF SPECIALIST AND DECLARATION OF INTEREST

edtea

Department :
Economic Development, Tourism and Environmental Affairs
PROVINCE OF KWAZULU-NATAL

DETAILS OF SPECIALIST AND DECLARATION OF INTEREST

	(For official use only)
File Reference Number:	DC/
NEAS Reference Number:	
Date Received:	

Application for an environmental authorisation in terms of section 24(2) of the National Environmental Management Act, 1998 (Act No. 107 of 1998) or for a waste management licence in terms of section 20(b) of the National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008).,

PROJECT TITLE

WETLAND IDENTIFICATION, DELINEATION AND ECOLOGICAL ASSESSMENT ASSOCIATED WITH THE FARM DAM ON THE FARM THE BREEZE NO. 6921 NEAR RAMSGATE IN KWAZULU-NATAL

Specialist:	Wetland Specialist		
Contact person:	Magnus van Rooyen		
Postal address:	PO Box 794, Hilton		
Postal code:	3245	Cell:	084 249 2365
Telephone:	033 343 6789	Fax:	033 343 6788
E-mail:	vanrooyenm@terratest.co.za		
Professional affiliation(s) (if any)	South African Council for Natural Scientific Professionals (Pr. Sci.Nat. 400335/11) International Association of Impact Assessors (Membership No. 1839)		

Project Consultant:	GreenScene Environmental		
Contact person:	Felicity Swanepoel		
Postal address:			
Postal code:		Cell:	071 355 0266
Telephone:		Fax:	
E-mail:	felicity@green-scene.co.za		

4.2 The specialist appointed in terms of the Regulations_

I, **Magnus van Rooyen** , declare that --

General declaration:

- I act as the independent specialist in this application;
- do not have and will not have any vested interest (either business, financial, personal or other) in the undertaking of the proposed activity, other than remuneration for work performed in terms of the Environmental Impact Assessment Regulations, 2014;
- 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 am aware that a person is guilty of an offence in terms of Regulation 48 (1) of the EIA Regulations, 2014, if that person provides incorrect or misleading information. A person who is convicted of an offence in terms of sub-regulation 48(1) (a)-(e) is liable to the penalties as contemplated in section 49B(1) of the National Environmental Management Act, 1998 (Act 107 of 1998).

Signature of the specialist:

Terratest (Pty) Ltd

Name of company (if applicable):

17 July 2020

Date: