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AQUATIC ASSESSMENT FOR THE PROPOSED INFRASTRUCTURE UPGRADES WITHIN THE GREAT FISH RIVER NATURE RESERVE IN THE EASTERN CAPE PROVINCE

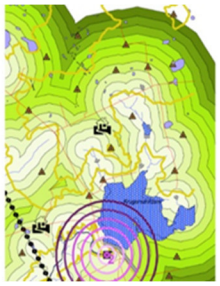
Version – final

March 2022

GCS Project Number: 21-0087

Client Reference:

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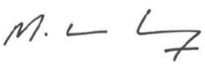
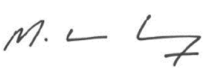
Author	Magnus van Rooyen		March 2022
Director	Magnus van Rooyen		March 2022

DECLARATION

I, Magnus Van Rooyen, declare that:

- I act as an independent specialist;
- Results will be interpreted in an objective manner, even if the viewpoints are not favourable to the applicant;
- I have the relevant expertise to conduct a report of this nature, including knowledge of the National Environmental Management Act (Act 107 of 1998) and the National Water Act (Act 36 of 1998);
- I will comply with the act(s) and other relevant legislation; and
- I understand that any false information published in this document is an offense in terms of regulation 71 and is punishable in terms of Section 24 (f) of the Act.

_____

Magnus Van Rooyen
Environmental Scientist
Pr.Sci.Nat 400335/11

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AQUATIC ASSESSMENT FOR THE PROPOSED INFRASTRUCTURE UPGRADES WITHIN THE GREAT FISH RIVER NATURE RESERVE IN THE EASTERN CAPE PROVINCE

1 INTRODUCTION

GCS Water and Environment (Pty) Ltd (GCS) has been appointed by JG Afrika (Pty) Ltd to conduct the Aquatic Assessment associated with the proposed infrastructure upgrades within the Great Fish River Nature Reserve in the Eastern Cape.

The Aquatic Assessment will be submitted in support of the Application for Environmental Authorisation in accordance with the National Environmental Management Act (Act No. 107 of 1998): Environmental Impact Assessment Regulations (2014), as amended as well as a Water Use Licence Application in accordance with the National Water Act (Act No. 36 of 1998).

1.1 Background

The following activities will form part of infrastructure development and upgrades:

a) Perimeter fence and perimeter road (jeep track) and associated gabion structures:
   - Repair and maintenance to sections of the perimeter fence around the reserve;
   - **A new 3m wide and approximately 100km long road (jeep track) running along the perimeter fence where currently no road exists; and,**
   - **Installation of new gabions structures along this perimeter track.**

b) Internal roads and associated culvert and/or gabion structures:
   - **Upgrading of sections of the existing internal gravel road network measuring approximately 3m wide and with a cumulative length of approximately 75km;**
   - **Installation of new culverts and/or gabions along the internal road alignment; and,**
   - **In addition, a few sections of new road will also be developed to connect to the existing road sections along the alignment. The width will not exceed 3m.**

c) Dams and pipeline infrastructure associated with existing boreholes:

- **Upgrading of three (3) existing dams at Botha's Post, Ballysaggart and Inkerman. Each of these dams have a current capacity not exceeding 600kℓ. Once upgraded by means of excavation, each dam will have a new capacity of approximately 2 000kℓ. The height of each dam wall, after upgrading, will not exceed 5m;**
- **Decommissioning of eleven (11) unwanted dams by removal of dam walls and the earth to be spread over the area of the dams;** and,
- Installation of new pipeline infrastructure associated with three existing boreholes. Water pipelines will be installed between the boreholes and existing dams to be upgraded. Such pipelines will not be larger than 0.065m in diameter. Location of these pipe alignments must still be confirmed, but will be placed along existing roads and tracks where possible.

d) Airfields (runway) strips:

- Refurbishment of the airfield (runway) strips at Kamadolo and Double Drift; and,
- **The Kamadolo airfield strip will also be extended by 100m x 15m, thereby increasing the footprint of the airfield by 1 500m^2 (0.15ha).**

e) Accommodation units:

- **Construction of a security manager's house (approximately 160 m^2 in size) and installation of twelve (12) modular field ranger accommodation units (approximately 42 m^2 each) distributed into three (3) clusters of four (4) units each. The required services in terms of water and sanitation will be installed.** The accommodation units will be using septic tanks and French drains. The cumulative length of the water and sewage pipelines will not exceed 1km and will have a diameter less than 0.065m. A single 6,000ℓ tank would suffice for each cluster, while a 1,750ℓ tank will be installed for the security manager's house.

f) Workshop and fuel storage:

- The development of a fuel storage facility and vehicle workshop to be located right next to each other with a combined footprint of approximately 280m^2. The volume of fuel to be stored at the proposed storage facility will be approximately 5m^3.

Not all of the above infrastructure components will require an Environmental Authorisation (EA). Those components indicated above in **bold** trigger Listed Activities or may potentially trigger Listed Activities. Confirmation on the complete list of infrastructure components triggering Listed Activities, and thus requiring an EA, will be confirmed once the aquatic impact assessment has been completed by the specialist.

2 TERMS OF REFERENCE

It is understood that the assessment will be submitted as part of the Application for Environmental Authorisation in accordance with the National Environmental Management Act (Act No. 107 of 1998): Environmental Impact Assessment (EIA) Regulations (2014), as amended and the Water Use Licence Application in accordance with the National Water Act (Act No. 36 of 1998). As such, the assessment is completed in accordance with the minimum requirements for specialist assessments as included in Appendix 4 of the *EIA Regulations* (2014) as well as with consideration of the *Regulations Regarding the Procedural Requirements for Water Use Licence Applications and Appeals* (24 March 2017). To this end, the assessment will meet the minimum requirements for this type of assessment as specified in Annexure 6, *Wetland Delineation Report*.

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

- A methodology of the site visit and techniques used to assess the specific aspects of the site;
- Details of the 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 (where applicable);
- An indication 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 activities;
- Any mitigation measures for inclusion in the Environmental Management Programme Report (EMPr);
- Any conditions for inclusion in the Environmental Authorisation and the Water Use Licence;
- Any monitoring requirements for inclusion into the EMPr or Water Use Licence; and
- A reasoned opinion whether the activity should be authorised based on the findings of the assessment.

Furthermore, an interrogation of the Department of Forestry, Fisheries and Environment's Online Screening Tool has indicated that the Aquatic Biodiversity Theme for the study area is classified as a combination of "Very High" and "Low". This combined classification is understandable based on the large extent of the study area.

As the online Screening Tool has indicated that parts of the study area contain areas with a "Very High" Aquatic Biodiversity Theme, the assessment will be conducted in accordance with the Aquatic Assessment protocol and will make provision for the following:

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 12 August 2021 by Mr Magnus van Rooyen of GCS.
- The assessment is based on the design information provided by the JG Afrika (Pty) Ltd.
- The following standardised and accepted methods to determine the various aspects of the study were used:
    - Electronic biodiversity databases managed by the South African National Biodiversity Institute (SANBI);
    - Available provincial electronic biodiversity databases;
    - Wetland and Riparian Habitat Delineation Document (Department of Water and Sanitation report);
    - Wetland Buffer Determination 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).

4 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 this extent of the study area in so far as the aquatic ecology is concerned.

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 or 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 each of the proposed new staff housing sites as well as the delineated riparian edge along the watercourses on which the crossings that will be upgraded occur.

5 EXPERTISE OF THE SPECIALIST

The *curriculum vitae* of the specialist, Mr Magnus van Rooyen is 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 wetland and terrestrial ecological studies in Southern and Western 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 development site;
- Identification and classification of any wetland and other aquatic features that are located within a 500m radius of the proposed additional housing sites;

- Assessment of the identified wetlands which are considered to be directly impacted upon by the development of the additional housing facilities;
- Modelling of the identified wetland and other aquatic features that may be directly impacted by the development;
- 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 as well as the Department of Forestry, Fisheries and Environment and includes the following aspects.

Furthermore, it must be pointed out that for the purposes of the assessment the watercourses have been classified as "Category 1" (channel width of less than 2m) and "Category 2" (channel width more than 2m) and will be categorised in terms of these parameters and assessed accordingly.

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.

Following the desktop assessment of the site, a site visit was conducted on 12 August 2021. During the site visit, the potential aquatic features identified through the desktop assessment were verified and any other aquatic features were identified and their boundaries accurately delineated.

7.2 Wetland Delineation

The delineation of these wetlands areas was conducted in accordance with the Department of Human Settlement, 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.

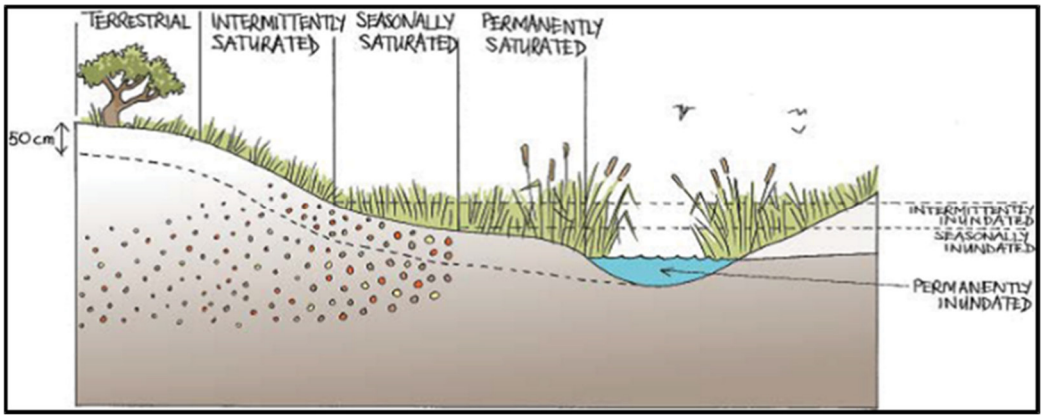
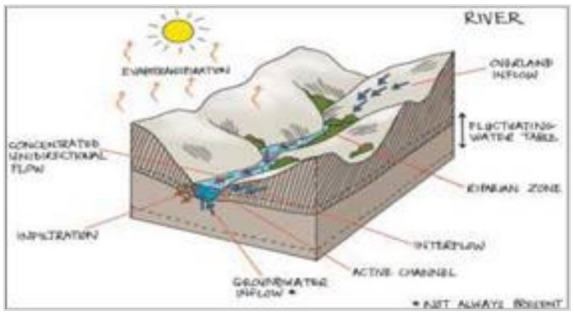
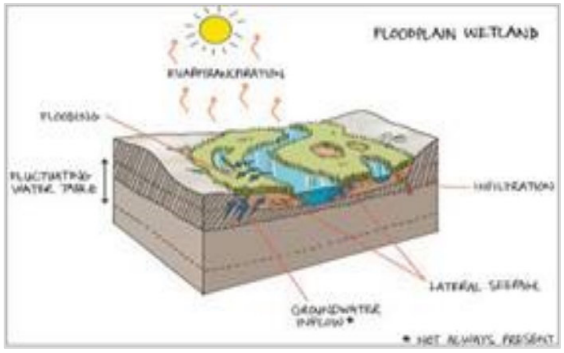
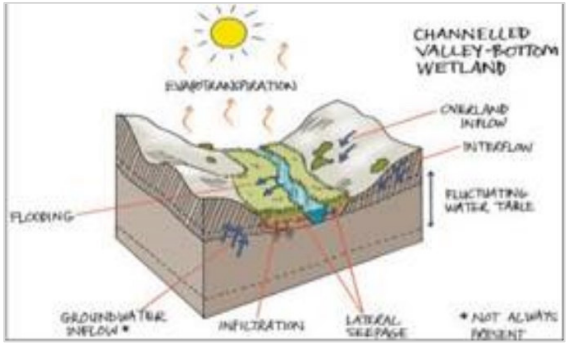
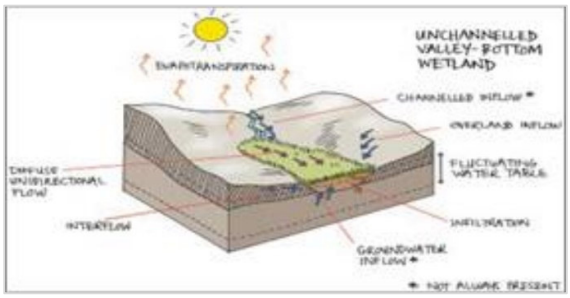
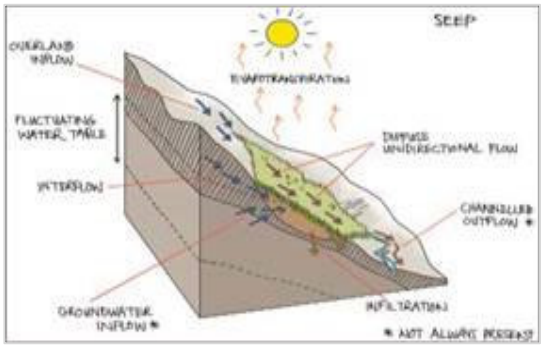
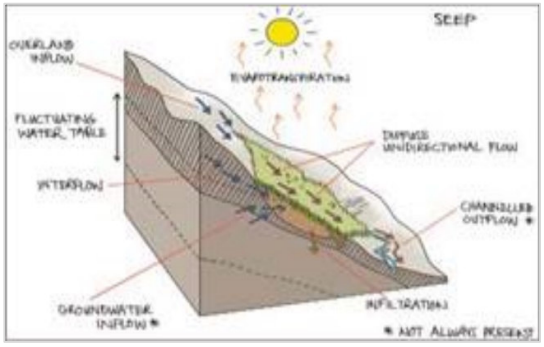
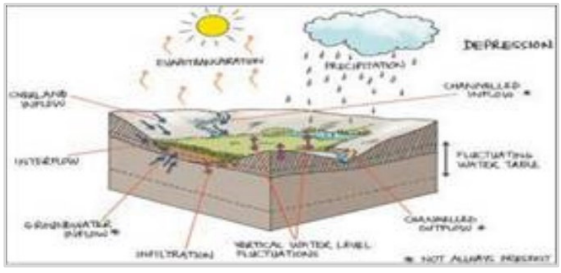


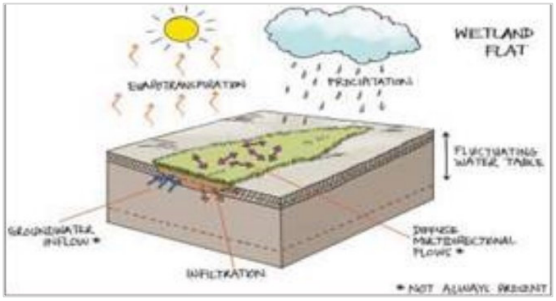
Figure 7-1: Cross section through a wetland, indicating the interaction between the soil wetness and vegetation

Following the identification of the wetland areas on the site, these are 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 7-1: 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.
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.
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.

7.3 Riparian Delineation

The delineation of the riparian 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).

Like wetlands, riparian areas have their own unique set of indicators. It is possible to delineate riparian areas by checking for the presence of these indicators. The riparian delineation process takes the following physical aspects into consideration:

- ***Topography associated with the watercourse*** – The topography is a good rough indicator of the outer edge of the riparian area as the riparian edge is the same as the edge of the macro channel bank.
- ***Vegetation*** – The delineation of riparian areas relies primarily on the vegetative indicators. Using vegetation, the outer boundary of a riparian area must be adjacent to a watercourse and can be defined as the zone where a distinctive change occurs:
    - In species composition relative to the adjacent terrestrial area; and
    - In the physical structure, such as vigour or robustness of growth forms of species similar to that of adjacent terrestrial areas. Growth form refers to the health, compactness, crowding, size, structure and/or numbers of individual plants.
- ***Alluvial soils and deposited material*** – Alluvial soils can be defined as relatively recent deposits of sand, mud, etc. set down by flowing water, especially in the valleys of large rivers. Riparian areas often, but not always, have alluvial soils.

7.4 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 7-2: 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

7.5 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 7-3: 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 7-4: 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

7.6 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.

7.7 Determining the Ecological Importance and Sensitivity of Wetlands

The outcomes of the implementation of the WET-EcoServices tool discussed above, is 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 it is linked to.

7.8 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.

7.9 Hydropedological conditions

The methodology used to conduct the assessment consists of a Desktop Assessment of the soils on the property. This assessment aims to characterize the dominant surface and subsurface flow paths of water through the landscape to wetland and streams or groundwater. The key steps to follow during the desktop assessment is as follows:

1. Identification of dominant hillslopes;
2. Conceptualizing hillslope hydropedological responses;
3. Quantification of hydraulic properties and flowrates; and
4. Quantification of hydropedological fluxes.

Only steps 1 and 2 above has been conducted for this assessment as the nature of the development will not result in a drastic land use change (e.g. open cast mine, etc.).

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 development area to identify areas that may be prone to the development of seep wetland areas.

The desktop soil classification will be used to categories the soils on the site into the applicable hydropedological soil type based on their characteristics. These soil types and their descriptions are provided in Table 7-5.

Table 7-5: 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.	

8 RESULTS

The results of the Aquatic Ecology Assessment relate to wetlands and watercourses that occur within the boundaries of the Great Fish River Nature Reserve. Specific areas of assessment made provision for the 500m radius around each of the housing sites as well as the areas within 100m of the edges of the watercourses that have been identified for watercourse crossing upgrades.

8.1 Wetland and watercourse identification and delineation

The available desktop information that was used in this assessment consisted of the following:

- National Freshwater Ecosystem Priority Areas (NFEPA) (2011);
- Wetland Database managed by the SANBI (2008);
- South African Inventory of Inland Aquatic Ecosystems (SAIIAE) (2018); and
- 1:50 000 Topographical Maps.

The NFEPA database indicated the presence of a large number of areas that are classified as “artificial wetland features” which directly relates to small stock dams within the reserve. All these small dams are directly associated with small, seasonal watercourses that drain the reserve. Furthermore, the database indicates the presence of a number of Channelled Valley Bottom Wetlands that are directly associated with the macro channel of the Kat, Great Fish, Koonap and Keiskamma Rivers. As these wetland areas are located within the macro channel of these rivers, they are considered to be part of the river rather than wetland areas.

The SANBI database indicated the presence of a large number of waterbodies (wetlands and watercourses) which are present within the nature reserve. The majority of the waterbodies identified related to small stock dams with the areas within the macro channels of the Kat, Great Fish, Koonap and Keiskamma Rivers being classified as valley bottom wetland area.

The SAIIAE dataset indicates the presence of the wetland areas within the macro channels of the Kat, Great Fish, Koonap and Keiskamma Rivers. The presence of a number of artificial wetland areas (stock dams) are also indicated in the dataset.

None of the datasets identified the presence of any wetland areas within a 500m radius of the proposed additional housing facilities within the nature reserve.

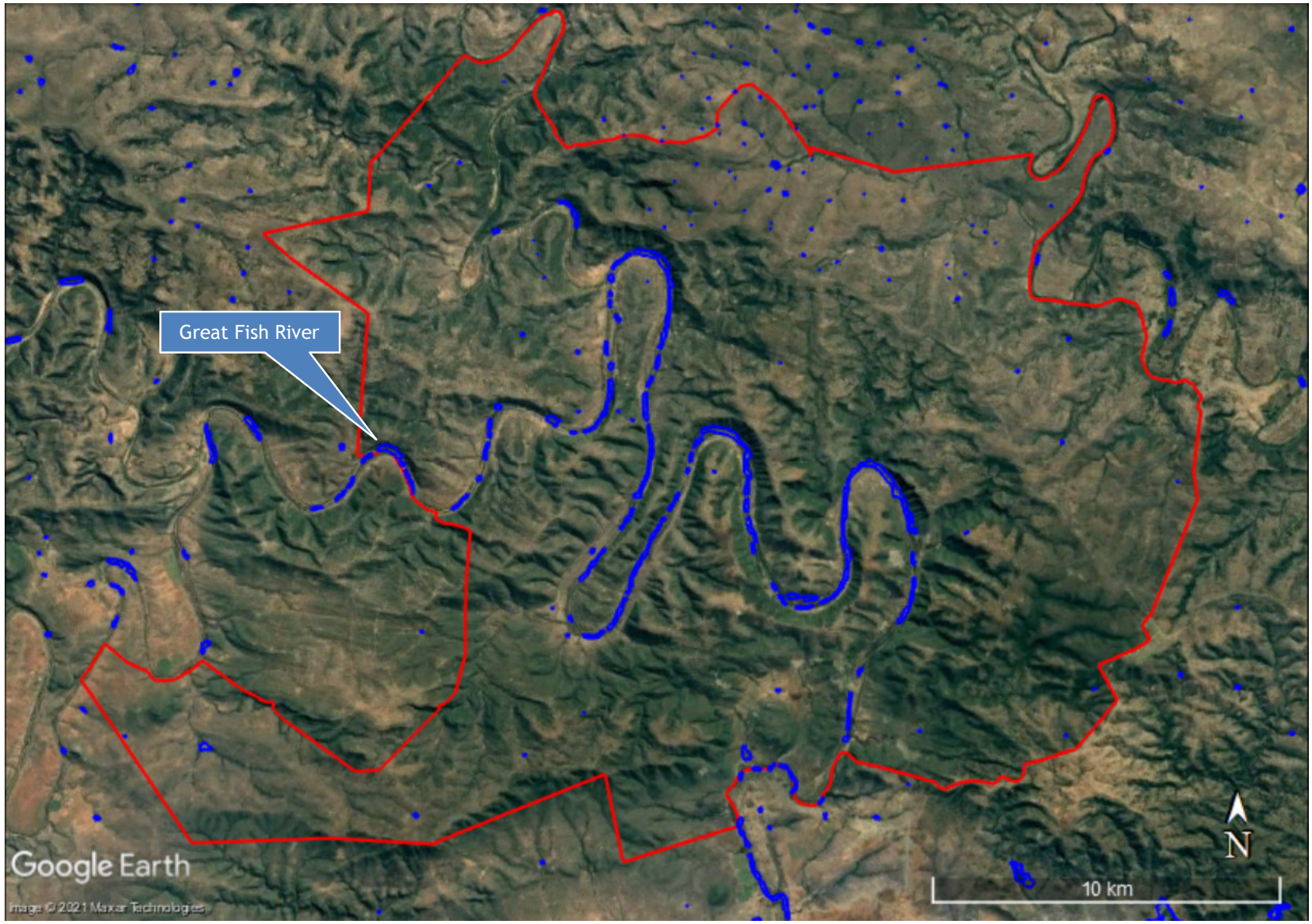


Figure 8-1: Wetland areas (indicated in blue) identified by the NFEPA database (2012)

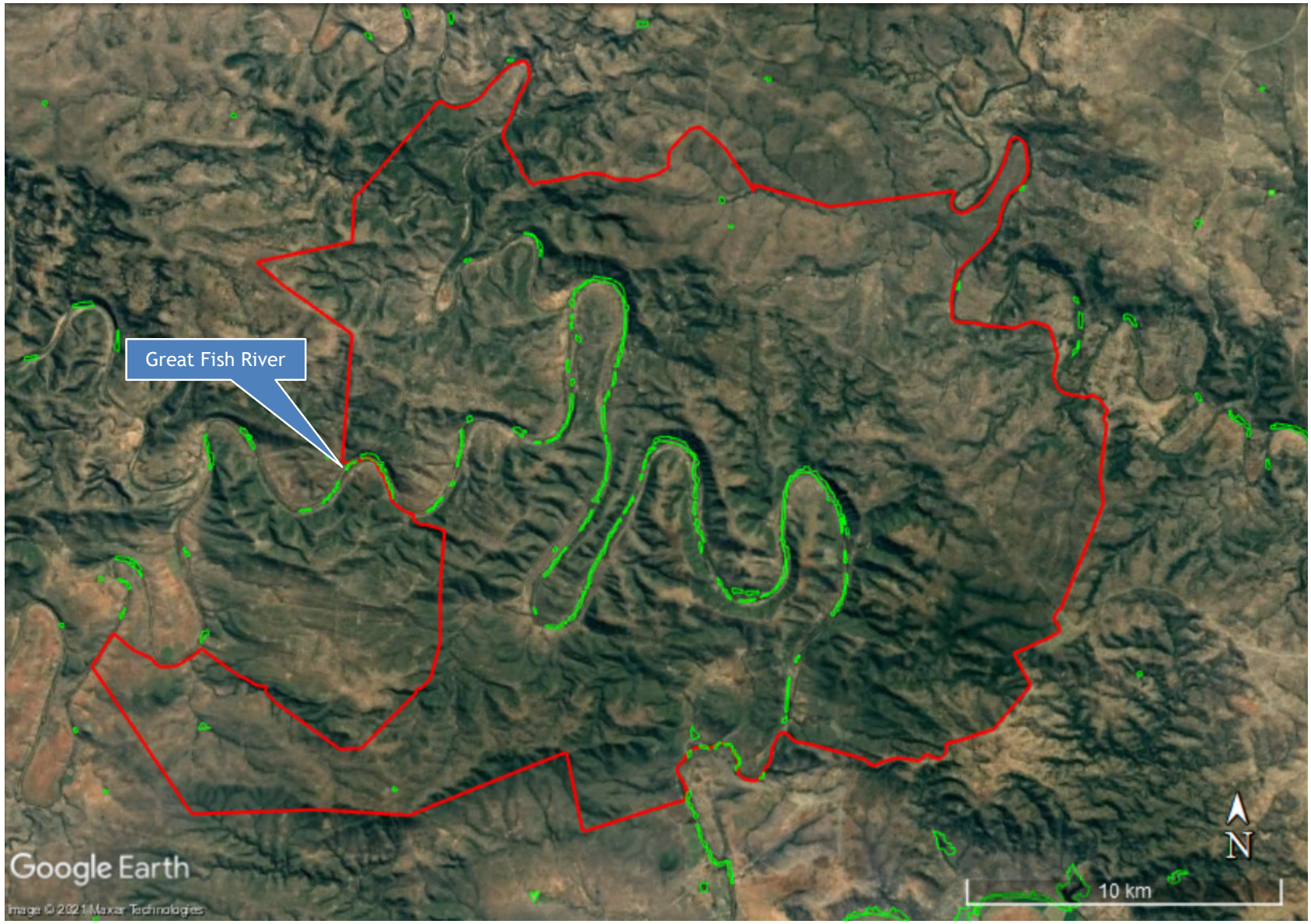


Figure 8-2: Waterbodies (indicated in green) identified by the SANBI database (2008)

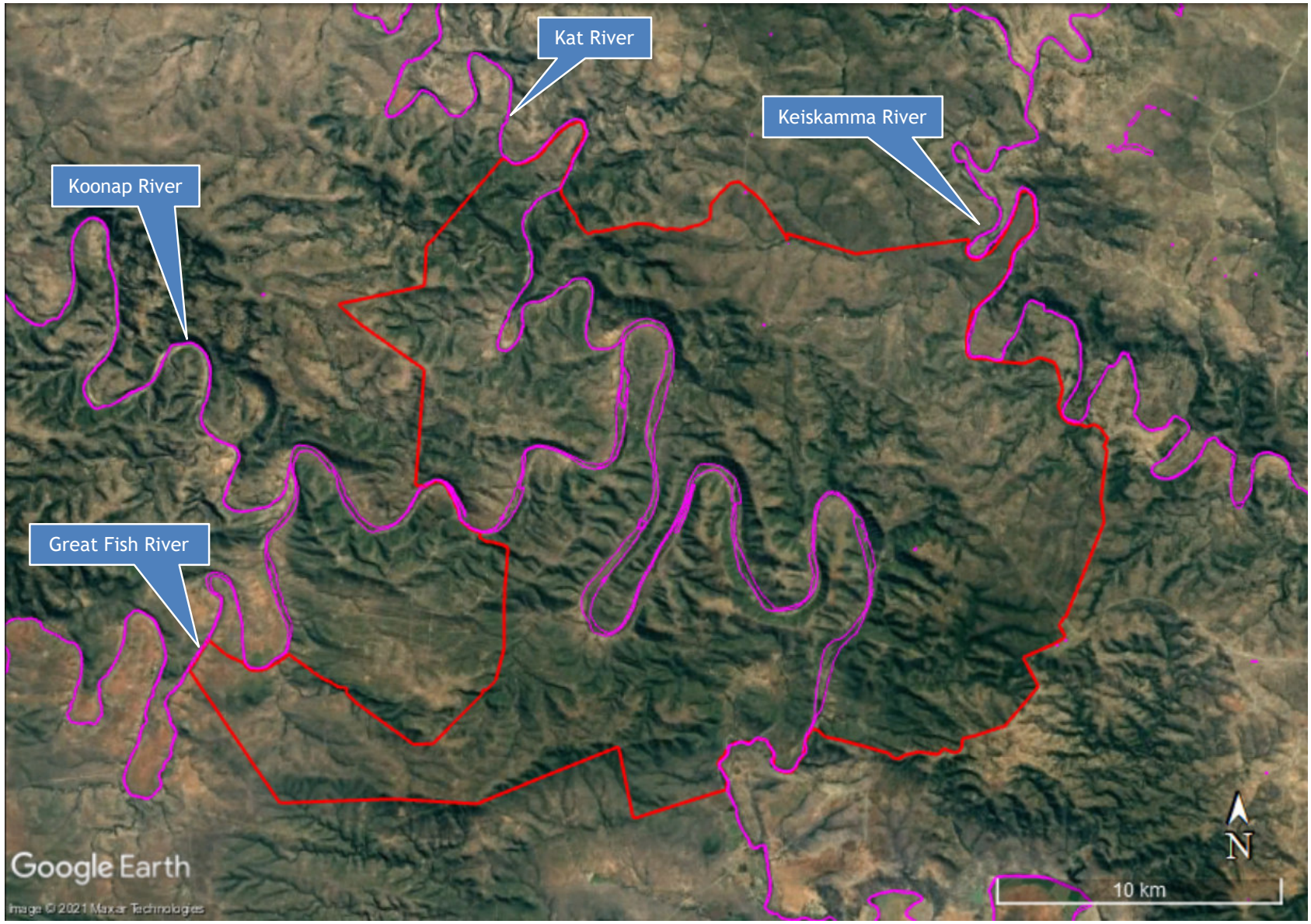


Figure 8-3: Inland Aquatic Ecosystems (indicated in purple) identified by the SAIIAE database (2018)

The site assessment confirmed the presence of the wetland features identified by the interrogated databases and did not find any additional wetland areas other than additional stock dams that were not mapped by the datasets.

The site assessment has further confirmed the finding of the datasets that no wetland areas are present within a 500m radius of any of the additional housing facilities that are proposed.

It must be noted that since no wetlands were identified that may be impacted by the activities associated with the proposed project, no further assessment of these were undertaken.

The watercourse information that was gathered from the 1:50 000 Topographical Maps has indicated the presence of a number of watercourses within the nature reserve. The majority of these are seasonal watercourses that will only carry water during rainfall events directly in their catchments. As these watercourses are small and seasonal in nature, the riparian vegetation along them are not well developed. These seasonal watercourses all form part of the Great Fish River catchment.

Several watercourses have been identified within the 500m radius of the proposed additional housing facilities. However, none of these additional housing facilities are located within the delineated riparian edge of these watercourses.

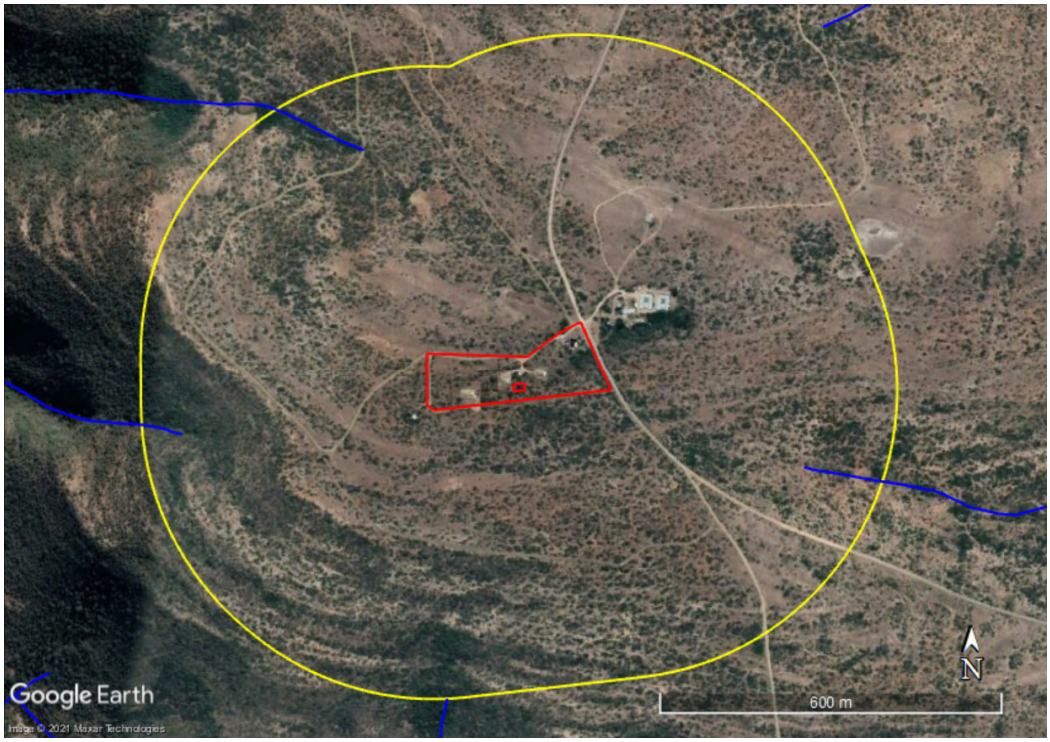


Figure 8-4: Watercourses within a 500m radius (shown in yellow) of Housing site no. 1

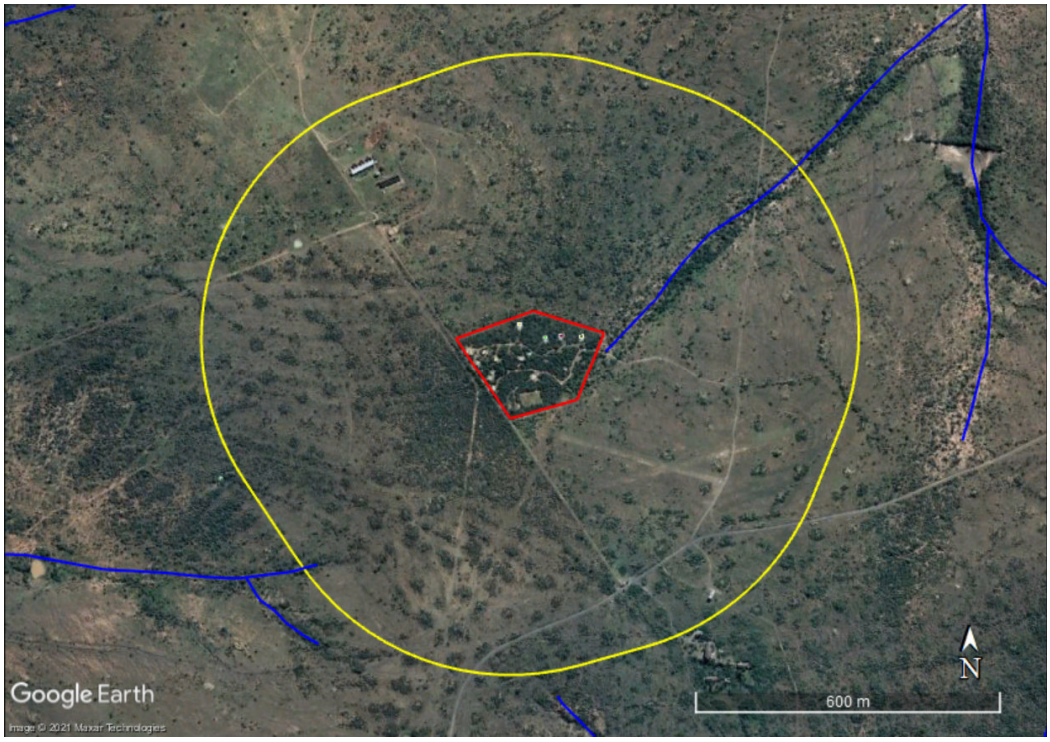


Figure 8-5: Watercourses within a 500m radius (shown in yellow) of Housing site no. 2

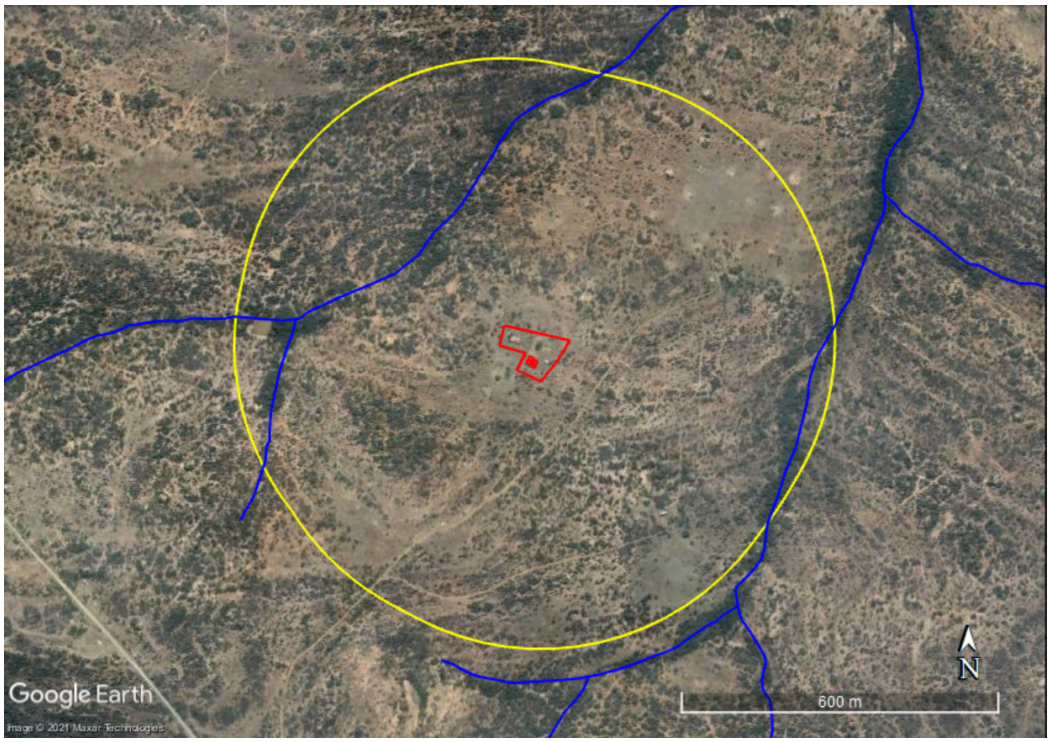


Figure 8-6: Watercourses within a 500m radius (shown in yellow) of Housing site no. 3

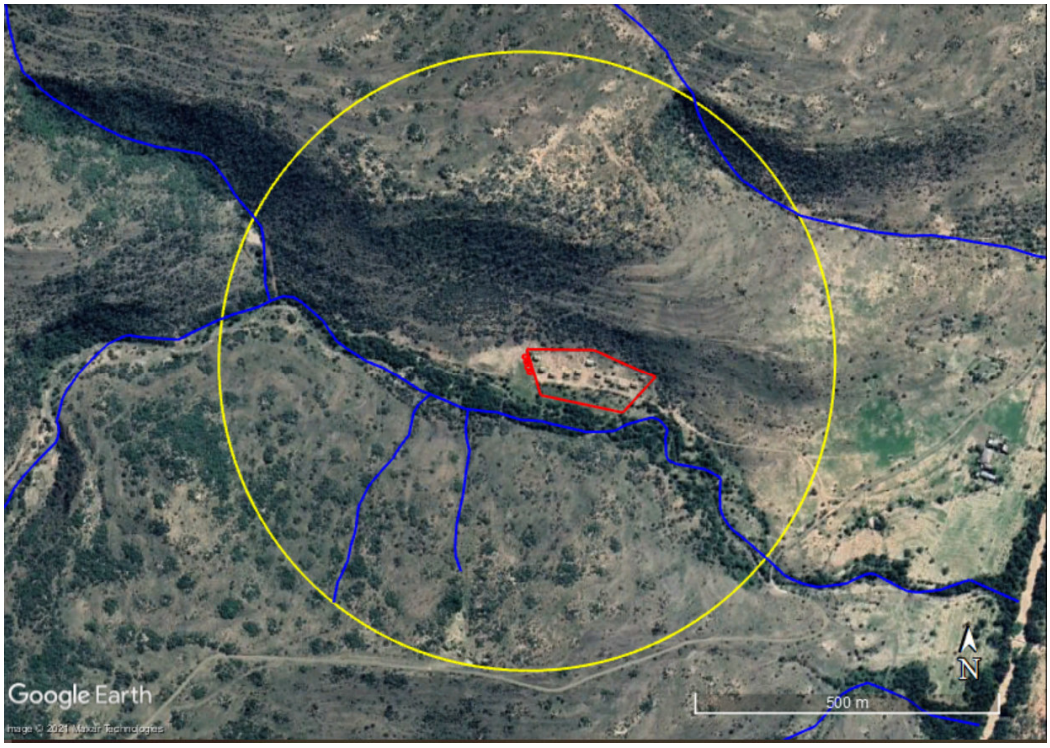


Figure 8-7: Watercourses within a 500m radius (shown in yellow) of Housing site no. 4

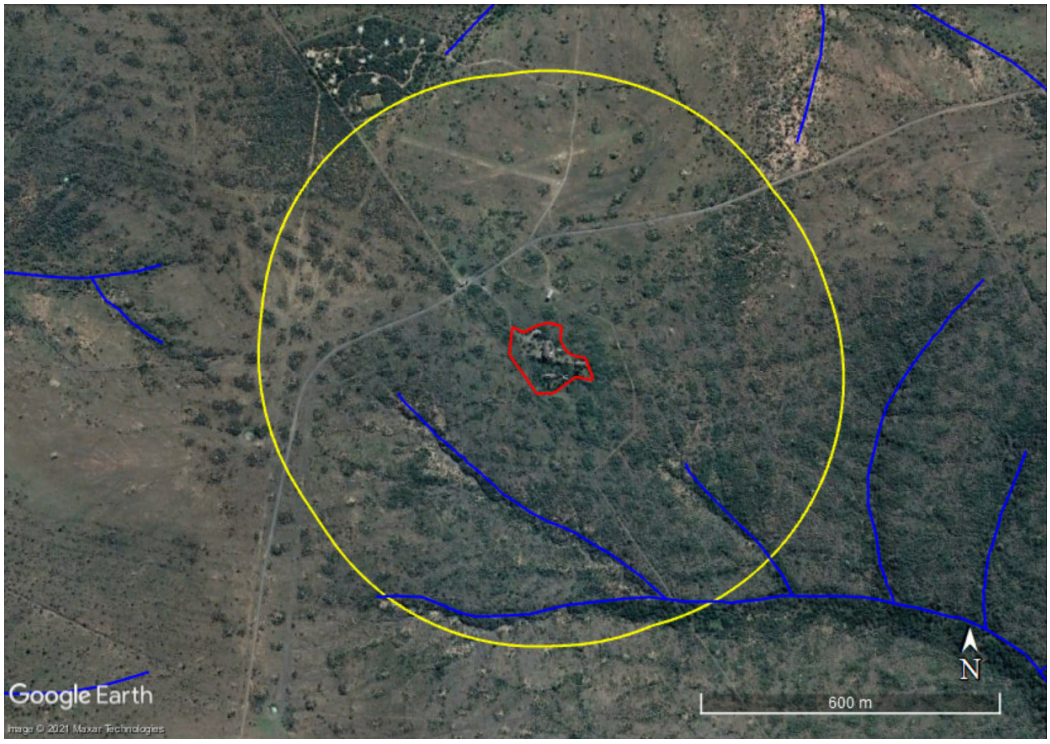


Figure 8-8: Watercourses within a 500m radius (shown in yellow) of Housing site no. 5

As none of the additional housing facilities is located within the "regulated area of a watercourse" as defined by the regulations under the National Water Act (Act No. 36 of 1998), no further assessment of these features will be conducted in this assessment. Furthermore, none of these proposed facilities are located within 32m of any of the watercourses identified and as such, will not require an Environmental Authorisation in terms of the National Environmental Management Act (Act No. 107 of 1998): Environmental Impact Assessment Regulations (2014), as amended for any Listed Activities that relate to the working near watercourses.

Three dams are proposed to be upgraded as part of the project. Two of these dams are considered to be off-stream dams as no watercourses were found to drain into them. In this regard, Dams 1 and 3 are located on high points in the landscape and are considered to be associated with old diggings in the area (see Figure 8-9 and 8-10 below). Dam 2 is directly associated with a watercourse that drains into the basin from the southwest (see Figure 8-11 below). Dam 2 is therefore considered to be an in-stream dam and all upgrading works are considered to take place within the "regulated area of a watercourse" as defined by the National Water Act (Act No. 36 of 1998).

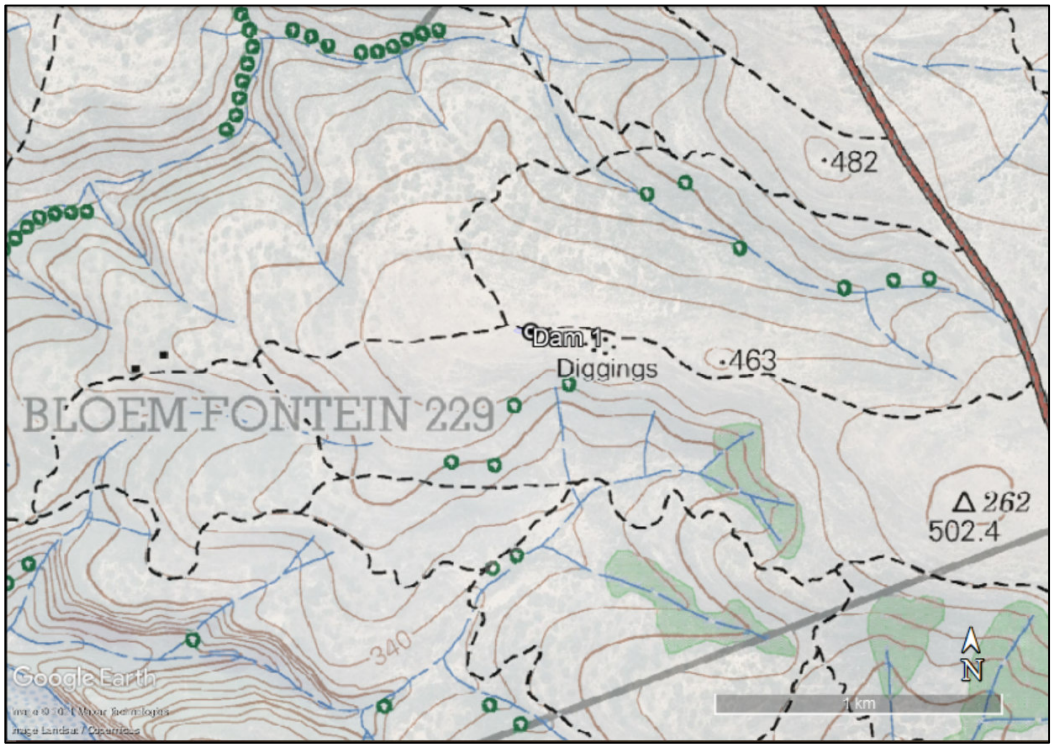


Figure 8-9: Location of Dam 1 on a high point in the topography (1:50 000 topographical map sheet 3326BB)

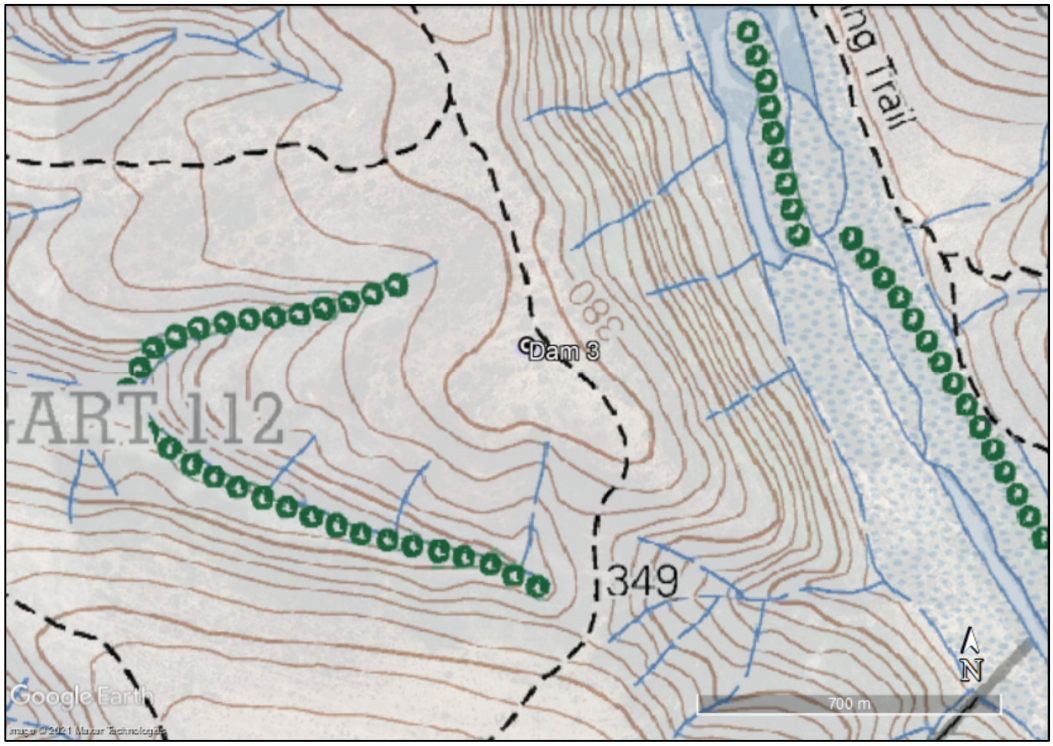


Figure 8-10: Location of Dam 3 on a high point in the topography (1:50 000 topographical map sheet 3326BB)

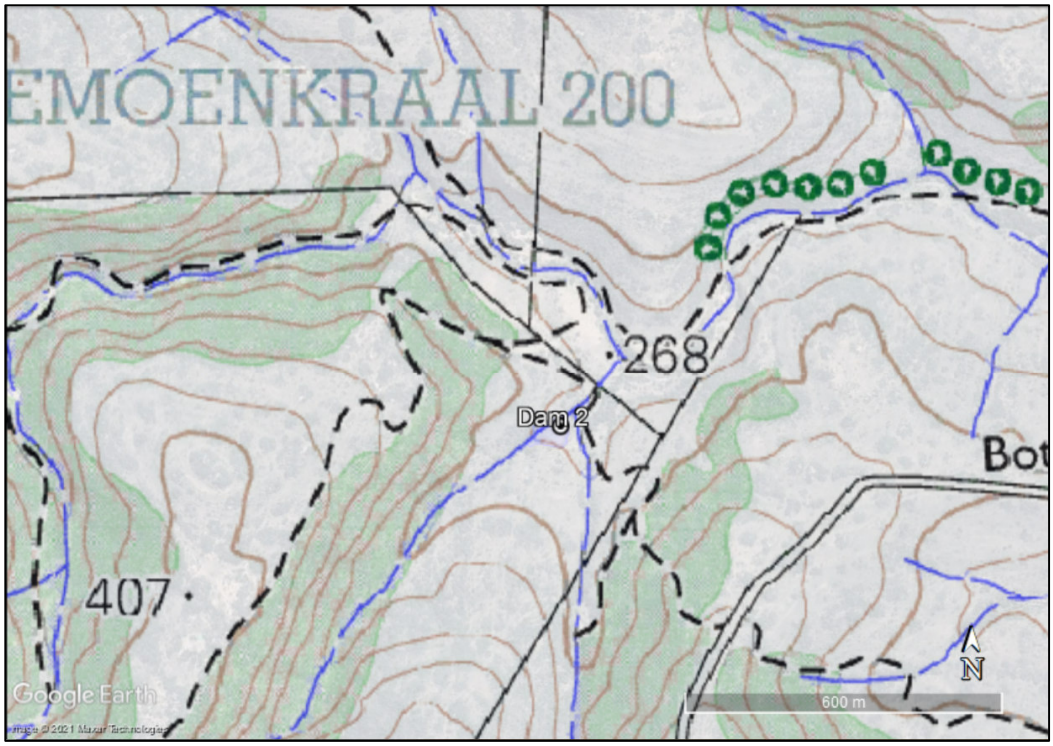


Figure 8-11: Dam 2 is associated with a watercourse draining into the basin from the southwest (1:50 000 topographical map sheet 3226DC)

All the eleven dams that will be decommissioned are all considered to be in-stream dams so all the works associated with the decommissioning will take place within the "regulated area of a watercourse" as defined by the National Water Act (Act No. 36 of 1998).

8.2 Riparian Delineation

As mentioned in the section above the activities listed below, associated with the project are considered to be within the "regulated area of a watercourse" as defined by the National Water Act (Act No. 36 of 1998) as well as within 32m or within a watercourse as defined by the National Environmental Management Act (Act No. 107 of 1998): Environmental Impact Assessment Regulations (2014), as amended.

- Upgrading of Dam 2;
- Decommissioning of Dam A to K; and
- Upgrading of existing road crossings over the seasonal watercourses.

As all these activities are taking place within their associated watercourses, the need to delineate the riparian edges was considered superfluous. However, for the purposes of the assessment, the following determination was made, "Category 1" watercourses (channel width of less than 2m) has a riparian edge (where present) of 4m either side of the channel and "Category 2" watercourses (channel width of more than 2m) has a riparian edge of 8m either side of the channel.

Plate 8-1: View of a "Category 1" Watercourse crossing, note the very narrow or absent riparian edge

Plate 8-2: View of a "Category 2" Watercourse crossing, note the dense riparian vegetation along the channel

8.3 Watercourse classification

The study area falls predominantly within Ecoregion 18 – Drought Corridor and to a far lesser extent within Ecoregion 19 – Southern Folded Mountains. The Great Fish River is the prominent aquatic feature in the region with very few other prominent aquatic features due to the generally low annual rainfall.

The Classification System for Wetland and other Aquatic Ecosystems in South Africa (Ollis et al.,2013) defines a river or watercourse to be "lotic (or flowing) aquatic ecosystems with flowing water concentrated within a distinct channel, either permanently or periodically".

In the case of the watercourses directly associated with the activities to be undertaken in the nature reserve, these watercourses are all seasonal and will only contain flowing water during rainfall events or for short periods thereafter. As with all aquatic features, the key drivers of these watercourses are their hydrology (presence and or movement of water) and their geomorphology (landform characteristics and processes). These two aspects will be used in the classification of the watercourses that form part of the assessment.

The three NFEPA watercourses that occur within the Great Fish River Nature Reserve is the Great Fish River, the Keiskamma River and the Kat River. These rivers are large lowland rivers with all the seasonal streams that form part of the assessment being classified as seasonal mountain streams that drain into one of these large lowland rivers.

The majority of the rivers fall within the quaternary catchment, Q93A, with smaller portions of the reserve occurring in quaternary catchments Q93B, R10k, R10J, Q94F and Q91C which all forms part of the larger Fish to Tsitsikamma and Keiskamma to Mzimvubu Water Management Areas.

The wetland Ecosystem Type is classified as the Albany Thicket Valley Bushveld with the landcover predictably being classified as "natural" based on the protected area classification of the reserve.

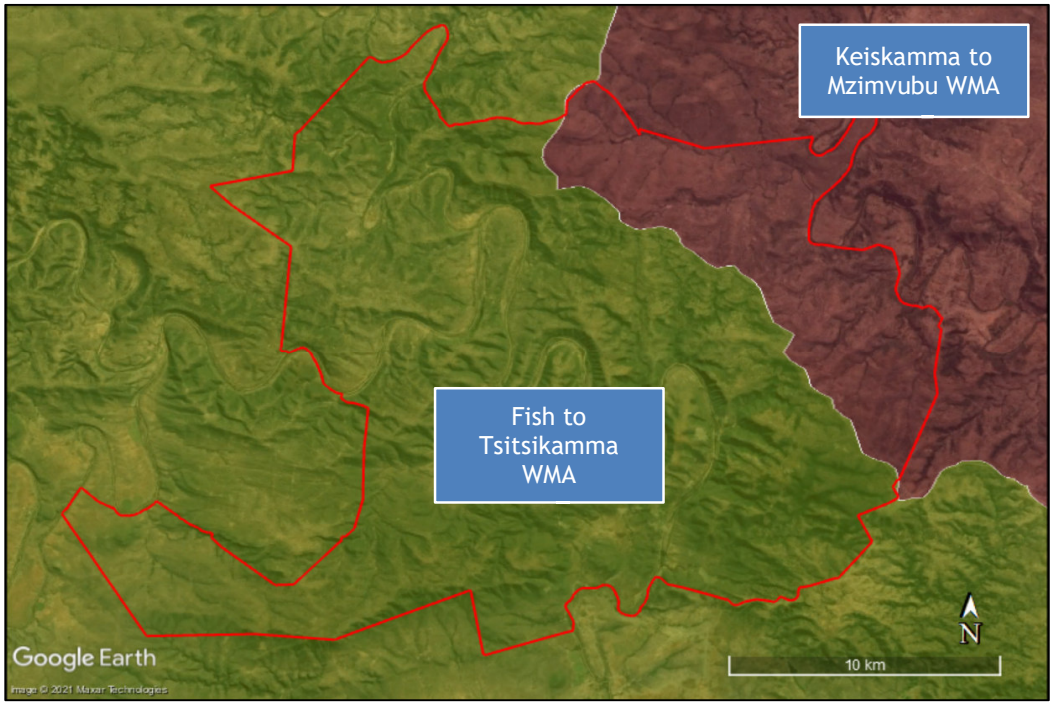


Figure 8-12: Water Management Areas associated with the Great Fish River Nature Reserve

8.4 Soils

The soils within the channel beds of the watercourses vary from bedrock to alluvial deposits of fine, weathered shale from the surrounding catchment. The presence of soil deposition is very limited as a result of the periodic and high velocity runoff in the catchment.

Plate 8-3: View of the soil/rocks within the watercourse channel bed

8.5 General Functional Description of Watercourses

Watercourses or rivers provide key functions to the ecosystem in which they occur as they form the pathways along which water moves through these systems. As shown in Figure 8-12 below, the water inputs into watercourses predominantly from overland flow as a result of rainfall within the catchments. This overland flow runs towards the low points in the landscape where it accumulates and travels down gradient. The key ecosystem service that watercourses provide is therefore the facilitation of movement of water (and associated materials) through the water cycle.

These watercourses typically will sustain riparian vegetation along the watercourse banks which provides habitat for aquatic and terrestrial species. The presence or absence and extent of this riparian vegetation is a direct function of the period of time that water is present within the watercourse channels.

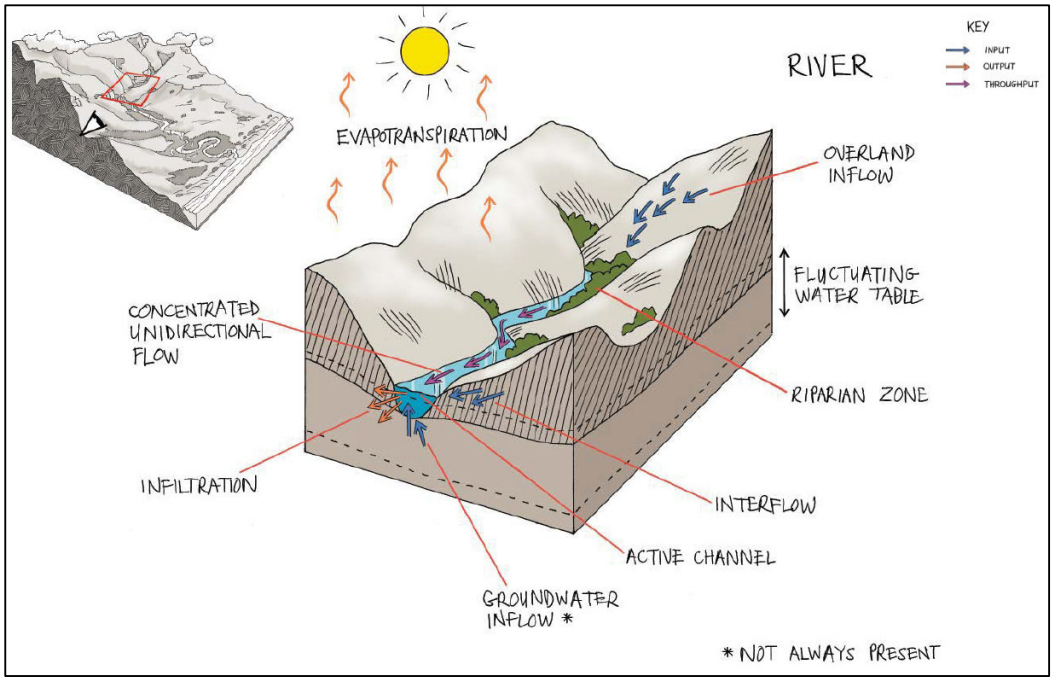


Figure 8-13: Conceptual illustration of a watercourse, showing the typical landscape setting and dominant inputs, throughputs and outputs of water

8.6 The Present Ecological State and Ecological Importance and Sensitivity of the watercourses

The Present Ecological State (PES) of a watercourse is a function of the impacts that are present within the footprint of the watercourse as well as the catchments associated with each of these features and how these impacts affect the drivers of the watercourses. The following are impacts that are present in the quaternary catchments of the identified watercourses are provided in the Table 8-1 below.

Table 8-1: Identified impacts on each wetland feature

Quaternary Catchment	Catchment extent (km^2)	Impacts to the catchment
Q93A	336	Overgrazing Alien invasive plant species Infrastructure (roads) Agricultural activities
Q93B	392	Overgrazing Alien invasive plant species Infrastructure (roads) Agricultural activities
Q91C	484	Overgrazing Alien invasive plant species Infrastructure (roads) Agricultural activities
Q94F	734	Overgrazing Alien invasive plant species Infrastructure (roads) Agricultural activities
R10J	179	Overgrazing Alien invasive plant species Infrastructure (roads) Agricultural activities
R10K	602	Overgrazing Alien invasive plant species Infrastructure (roads) Agricultural activities

Based on the above impacts, the table below provides the Present Ecological State as well as the Ecological Importance and Sensitivity of the watercourses that may be impacted by the project activities. This classification is based on the findings of Kleynhans (2000).

Table 8-2: Present Ecological State and Ecological Importance and Sensitivity of the watercourses (per quaternary catchment) (Kleynhans, 2000)

Quaternary Catchment	Present Ecological State	Ecological Importance and Sensitivity
Q93A	Class D – Largely Modified	Moderate
Q93B	Class D – Largely Modified	Moderate
Q91C	Class D – Largely Modified	Moderate
Q94F	Class D – Largely Modified	High
R10J	Class D – Largely Modified	High
R10K	Class D – Largely Modified	High

8.7 Buffer determination

All the activities associated with the project will occur within the channels of the watercourses. As such, no buffers are proposed for the actual activities, however, buffers are prescribed for the location of the site camps, construction storage areas or ablution facilities. All such facilities associated with each of the construction sites must be placed at a distance greater than 40m from the demarcated edge of the riparian vegetation.

8.8 Hydropedological conditions

Due to the limited impact that the development will have on the hydropedological conditions in the study area, a desktop assessment of these conditions was undertaken. This assessment has indicated that the soils in the study site consists of soils that are derived from the underlying shale, mudstone and sandstone bedrock. The soils on the site are typically coarse grained lithosols (shallow soils on hard or weathered rock).

Water will therefore move through these soils in a vertical direction until it reaches the impermeable bedrock from where the water will move in a horizontal direction along the bedrock. The water in the soils will daylight at locations where the soil/bedrock interface daylight, such as at the watercourses.

As a result of these soil characteristics, the soils in the study area are classified as interflow soils. These soils and how the water moves through them are depicted in Figure 8-14.

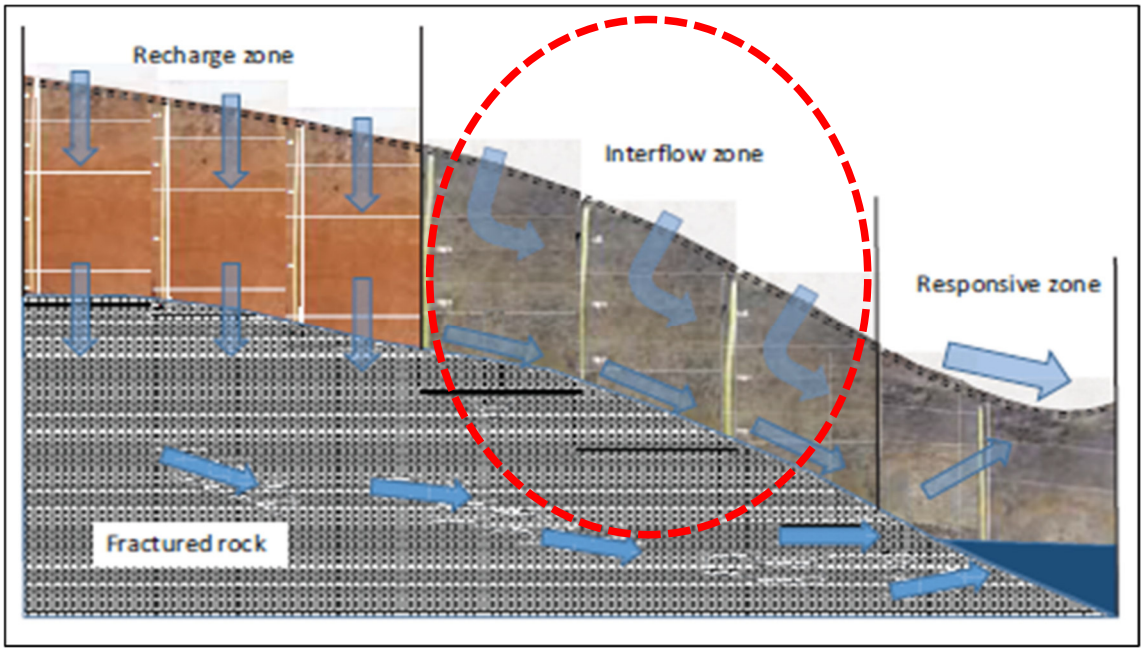


Figure 8-14: Hydropedological characteristics of the interflow soils in the study area

9 IMPACT AND RISK ASSESSMENT

Likely impacts associated with the proposed activities planned within the Great Fish River Nature Reserve on the aquatic biodiversity baseline have been identified through the undertaking of site visits, consultation of published information, comments from the relevant authority and independent assessment by the Environmental Project Team. Impacts have also been identified by the specialist assessments undertaken.

The impact assessment will make provision for the assessment of the following impacts:

- No-go impacts;

- Planning and design phase impacts;
- Construction phase impacts;
- Operational phase impacts;
- Decommissioning phase impacts; and
- Cumulative impacts.

Impacts identified were assessed according to the criteria outlined in Appendix B. Each impact was ranked according to extent, duration, magnitude and probability. These criteria are based on the Department of Environmental Affairs and Tourism (DEAT) (now the Department of Forestry, Fisheries and the Environment) Guideline Document to the EIA Regulations (1998). Where possible, mitigatory measures were recommended for the impacts identified.

It must be noted that only the impacts on the aquatic biodiversity baseline are included in this impact assessment as the other impacts associated with the biodiversity of the nature reserve will be provided in another report.

9.1 No-go impacts

To contextualise the potential impacts of the project's activities and associated infrastructure, the existing impacts (or *status quo*) associated with current aquatic biodiversity conditions need to be described in terms of the presence of aquatic features. This *status quo* should be used as the comparison against which the other project impacts are assessed. The main issues identified with the existing impacts are:

- The infrastructure in or near any identified aquatic features will be left in their current state.
- The impacts to the catchment of the aquatic features on the site will persist which will result in a potential continuous degradation of these features.

Since these existing impacts will continue even if the project is not implemented, they are considered to be "no-go" impacts.

9.2 Planning and design phase impacts

Activities associated with the design and pre-construction phase pertain mostly to a feasibility assessment which is done mostly at a desktop level. In some cases, further site visits need to take place, but the impacts of these visits are negligible, if any, e.g. photographs and field surveys, etc.

For the purposes of this assessment, no impacts have been identified that are directly associated with the project.

9.3 Construction phase impacts

This section will assess the impacts associated with the implementation of the proposed infrastructure upgrades on the aquatic biodiversity within the reserve. During the construction phase the of the proposed infrastructure the following impacts have been identified:

- Potential impact to the water quality in the aquatic features as a result of inadequate stormwater management.
- Potential impact to the hydrological characteristics of the aquatic features.
- Potential impacts to the water quality as a result of leaking portable chemical toilets used during construction.
- Potential impact to the water quality in the aquatic features as a result of petrochemical spillages from plant and equipment.
- Potential impact to the water quality in the aquatic features as a result of leaking petrochemical storage facilities.

9.4 Operational phase impacts

This phase assesses the impacts associated with the operational phase of the proposed infrastructure. The following impacts have been identified:

- Potential impact to the hydrological characteristics of the aquatic features.
- Potential impact to the water quality in the aquatic features as a result of leakages from plant and equipment using the road.
- Potential impact to the water quality in the aquatic features as a result of inadequate stormwater management.
- Potential impact of the spread of alien invasive vegetation into the aquatic features.

9.5 Decommissioning phase impacts

As the infrastructure will not be decommissioned, no provision is made for the any decommissioning impacts.

9.6 Cumulative impacts

The following cumulative impacts associated with the proposed infrastructure in the reserve have been identified:

- Potential impact to the hydrological regime of the aquatic features.
- Potential impact to the water quality of the aquatic features as a result of inadequate stormwater management.

- Potential impact to the water quality of the aquatic features as a result of the operations of the road infrastructure.

Table 9-1: No-go impacts associated with the infrastructure in the Great Fish River Nature Reserve

Nature of impact	Impact summary	Without mitigation					Significance rating (pre-mitigation)	Proposed mitigation and management measures	With mitigation					Significance rating (post-mitigation)
		S = Status; E = Spatial extent; D = Duration; P = Probability; M = Magnitude							S = Status; E = Spatial extent; D = Duration; P = Probability; M = Magnitude					
		S*	E	D	M	P			S	E	D	M	P	
Hydrology, geomorphology and biodiversity	The current impacts (agricultural activities) will persist to impact on the aquatic features which will result in a degradation of the characteristics of these features.	N	2	2	4	5	Score: 40 Medium Negative	None, as the no-go option reflects the *status quo*.	N	2	2	4	5	Score: 40 Medium Negative

Table 9-2: Construction impacts associated with the infrastructure in the Great Fish River Nature Reserve

Nature of impact	Impact summary	Without mitigation					Significance rating (pre-mitigation)	Proposed mitigation and management measures	With mitigation					Significance rating (post-mitigation)
		S = Status; E = Spatial extent; D = Duration; P = Probability; M = Magnitude							S = Status; E = Spatial extent; D = Duration; P = Probability; M = Magnitude					
		S*	E	D	M	P			S	E	D	M	P	
Water quality	Impact to the water quality in the aquatic feature because of inadequate stormwater management.	N	2	3	6	3	Score: 33 Medium Negative	The stormwater outlets associated with the infrastructure must make provision for energy dissipators at the mouth of the outlets. This will reduce the risk of erosion and associated siltation which can contaminate the water quality.	N	2	3	2	1	Score: 7 Low Negative
Hydrology	Impact to the hydrological characteristics of the aquatic feature due to changes in the catchment.	N	2	3	6	3	Score: 33 Medium Negative	The provision for adequate stormwater management (as described above) as well as the hydraulic structures that have adequate sizes to prevent any damming of water upstream of the structure must be ensured.	N	2	3	2	1	Score: 7 Low Negative
Water quality	Impact to the water quality in the aquatic features because of the leakages from the portable chemical toilets that will be used during construction.	N	2	3	6	3	Score: 33 Medium Negative	The following management and mitigation measures must be included into the EMPr Report for the project to limit the potential impacts of leakages from the ablution facilities: • Only portable chemical toilets with a sealed reservoir will be allowed on site. • The capacity of the reservoirs in the portable chemical toilets must be monitored on a daily basis to ensure that they can be serviced timeously.	N	2	3	2	2	Score: 14 Low Negative

Nature of impact	Impact summary	Without mitigation					Significance rating (pre-mitigation)	Proposed mitigation and management measures	With mitigation					Significance rating (post-mitigation)
		S = Status; E = Spatial extent; D = Duration; P = Probability; M = Magnitude							S = Status; E = Spatial extent; D = Duration; P = Probability; M = Magnitude					
		S*	E	D	M	P			S	E	D	M	P	
								• All removal of the collected sewage waste from the portable chemical toilets must be conducted by a registered service provider for disposal at a municipal wastewater treatment facility.						
Water quality	Impact to the water quality in the aquatic features because of petrochemical spillages from plant and equipment.	N	2	3	6	3	Score: 33 Medium Negative	The following management and mitigation measures must be included into the EMPr for the project: • All plant and equipment that make use of petrochemical substances must be checked leakages daily before operations commence. • All plant and equipment that are found to be leaking must be removed from the property and only returned once the leakages have been addressed. • If any petrochemical substances are stored on the property, this storage must be done on an impermeable surface in a bunded area that makes provision for 110% of volume of the substances that are stored. • All refuelling of plant and equipment must be conducted over a drip-tray. • If any plant or equipment is to be parked on the site, these must be parked within the demarcated construction footprint that has been cleared. • If any spillages from plant or equipment occur, the spill must be immediately contained, the contaminated soils must be collected and bagged in impermeable bags and stored on site to be removed and disposed of by a registered service provider.	N	2	3	2	2	Score: 14 Low Negative

Nature of impact	Impact summary	Without mitigation					Significance rating (pre-mitigation)	Proposed mitigation and management measures	With mitigation					Significance rating (post-mitigation)
		S = Status; E = Spatial extent; D = Duration; P = Probability; M = Magnitude							S = Status; E = Spatial extent; D = Duration; P = Probability; M = Magnitude					
		S*	E	D	M	P			S	E	D	M	P	
Water quality	Impact to the water quality in the aquatic features as a result of leaking petrochemical facilities.	N	2	3	6	3	Score: 33 Medium Negative	It is unsure if any construction camps will be established for use during the construction phase, however, if a camp with associated petrochemical storage will be established, the following management and mitigation measures must be included in the EMPr: • All storage containers must be contained in a bunded area that has the capacity of 110% of the total volume of the storage containers. • The bunded area must consist of an impermeable floor as well as walls and be fitted with a valve that can be used to drain any spillages. • If the storage facility will be in use during the rainy season, the bunded area must be rooved to prevent any rainwater entering the bund and reducing its capacity.	N	2	3	2	2	Score: 14 Low Negative

Table 9-3: Operational impacts associated with the infrastructure in the Great Fish River Nature Reserve

Nature of impact	Impact summary	Without mitigation					Significance rating (pre-mitigation)	Proposed mitigation and management measures	With mitigation					Significance rating (post-mitigation)
		S = Status; E = Spatial extent; D = Duration; P = Probability; M = Magnitude							S = Status; E = Spatial extent; D = Duration; P = Probability; M = Magnitude					
		S*	E	D	M	P			S	E	D	M	P	
Hydrology	Impact to the hydrological characteristics of the aquatic feature due to changes in the catchment.	N	2	3	6	3	Score: 33 Medium Negative	The stormwater outlets associated with the infrastructure must make provision for energy dissipators at the mouth of the outlets. This will reduce the risk of erosion and associated siltation which can contaminate the water quality. In addition, to the provision for adequate stormwater management (as described	N	2	3	2	1	Score: 7 Low Negative

Nature of impact	Impact summary	Without mitigation S = Status; E = Spatial extent; D = Duration; P = Probability; M = Magnitude					Significance rating (pre-mitigation)	Proposed mitigation and management measures	With mitigation S = Status; E = Spatial extent; D = Duration; P = Probability; M = Magnitude					Significance rating (post-mitigation)
		S*	E	D	M	P			S	E	D	M	P	
								above) as well as the hydraulic structures that have adequate sizes to prevent any damming of water upstream of the structure must be ensured. These hydraulic structures will also need to be monitored on a regular basis to ensure that they are free draining and have not blockages that can cause damming on the upstream side.						
Water quality	Impact to the water quality in the aquatic features because of inadequate stormwater management.	N	1	3	6	3	Score: 30 Medium Negative	The stormwater outlets associated with the infrastructure must make provision for energy dissipators at the mouth of the outlets. This will reduce the risk of erosion and associated siltation which can contaminate the water quality. In addition, to the provision for adequate stormwater management (as described above) as well as the hydraulic structures that have adequate sizes to prevent any damming of water upstream of the structure must be ensured. These hydraulic structures will also need to be monitored on a regular basis to ensure that they are free draining and have not blockages that can cause damming on the upstream side.	N	2	3	2	2	Score: 14 Low Negative
Water quality	Impact to the water quality in the aquatic features as a result of leakages from vehicles and plant using the road.	N	2	3	6	3	Score: 33 Medium Negative	As the majority of the vehicles, plant and equipment that will travel on the road will be used on the reserve, the regular management and maintenance of these vehicles, plant and equipment must be ensured to limit the risk of any leakages.	N	2	3	2	2	Score: 14 Low Negative

Table 9-4 Cumulative impacts associated with the infrastructure in the Great Fish River Nature Reserve

Nature of impact	Impact description	Impact rating post mitigation
Disruption of the catchment characteristics impacting on the catchment hydrology	The establishment of the proposed infrastructure has the potential to impact the current hydrological regime of the catchment, which will have an impact on the hydrological characteristics of the wetland areas identified. However, considering the design dimensions of the proposed infrastructure, the hydraulic structures associated with these as well as their location outside of the proposed 40m buffer, it is considered that the cumulative impact of the infrastructure on the wetland hydrology will be low.	**Low Negative**
Deterioration of the water quality in the hydrological system due to inadequate stormwater management.	The stormwater management measures as well as the crossing structures proposed for the road crossings is considered to be adequate to ensure that the stormwater runoff from the infrastructure does not result in uncontrolled runoff from these areas which the resultant siltation. As such, the cumulative impact of siltation associated with the increased velocities associated with uncontrolled stormwater runoff is considered to be low.	**Low Negative**

9.7 Risk Assessment

The risk assessment that is provided below, was conducted in accordance with the Department of Water and Sanitation Risk Assessment Matrix as contained in Notice No. 509 of 2016. The Risk Assessment Matrix that was used was dated March 2016 with the results provided in Table 10-1.

The risk assessment is based on the portion of the project components that are located within the "regulated area of a watercourse" as defined, above.

The scoring in the risk assessment makes provision for pre- and post-mitigation scenarios. The key outcome of the risk assessment is that all the identified risks are classified as **LOW RISK** pre- and post-mitigation.

Table 9-5: Results of the DWS Risk Assessment Matrix

No.	Phases	Activity	Aspect	Impact	Pre/Post mitigation	Likelihood	Significance	Risk rating	Confidence Level
1	Cons.	Inadequate stormwater design resulting in siltation which impacts the water quality.	Siltation could impact on the turbidity of the water that flows into the wetland.	The impact on the water quality could impact on the PES, EIS and Ecosystem Services of the aquatic features.	Pre-mitigation	8	48	LOW RISK	90
					Post-mitigation	8	44	LOW RISK	80
2	Cons.	Construction of the new infrastructure.	The new infrastructure may affect the runoff from the catchment.	The potential change to the runoff from the catchment may impact on the hydrological characteristics of the aquatic system.	Pre-mitigation	8	44	LOW RISK	80
					Post-mitigation	8	24	LOW RISK	80
3	Cons.	Toilets could leak or have spillage allowing wastes to be washed into the river	Contaminated water could percolate to the watercourses and result in contamination of the system	Contamination of the watercourse could create a health hazard to animals.	Pre-mitigation	8	34	LOW RISK	90
					Post-mitigation	8	24	LOW RISK	90
4	Cons.	Plant and equipment used during construction may leak petrochemical substances	The petrochemical leaks may impact on the water quality in the aquatic system	The potential impact to the water quality feeding into the aquatic system may impact the PES of the system.	Pre-mitigation	8	30	LOW RISK	90
					Post-mitigation	8	24	LOW RISK	90
5	Cons.	Petrochemical spillages may occur from any storage facilities that may be in place.	The petrochemical spillages my impact on the water quality in the aquatic system.	The potential impact to the water quality feeding into the aquatic system may impact the PES of the system.	Pre-mitigation	8	28	LOW RISK	80
					Post-mitigation	8	24	LOW RISK	90

No.	Phases	Activity	Aspect	Impact	Pre/Post mitigation	Likelihood	Significance	Risk rating	Confidence Level
6	Ops.	The presence of the new infrastructure may impact on the runoff from the catchment.	The changed runoff potential may impact the water delivery to the wetland.	The changed hydrological characteristics of the wetland may impact on the PES or the functionality of the aquatic system.	Pre-mitigation	**8**	**34**	**LOW RISK**	90
					Post-mitigation	**8**	**26**	**LOW RISK**	90
7	Ops.	Inadequate stormwater design resulting in siltation which impacts the water quality.	Siltation could impact on the turbidity of the water that flows into the aquatic system.	The impact on the water quality could impact on the PES, EIS and Ecosystem Services of the aquatic system.	Pre-mitigation	**9**	**38.25**	**LOW RISK**	90
					Post-mitigation	**8**	**24**	**LOW RISK**	90

10 MANAGEMENT AND MITIGATION MEASURES

The management and mitigation measure to be included in the Environmental Management Programme Report (EMPr) for the construction and operation of the proposed infrastructure within the Great Fish River Nature Reserve are provided in Tables 9-1 to 9-3, above.

11 MONITORING REQUIREMENTS

It is recommended that an Environmental Control Officer, who meets the requirements of the NEMA: EIA Regulations (2014) as amended, be appointed to conduct monthly audits of the construction and rehabilitation works for the duration of the project. An audit report must be completed for each monthly audit and be submitted to the competent authority.

Furthermore, a specialist ecologist should conduct a site visit at the commencement of the rehabilitation phase of the project to ensure that the contractor is adequately informed of the rehabilitation requirements associated with the works.

12 REASONED OPINION BY THE SPECIALIST

The following considerations were taken for the generation of the reasoned opinion regarding the potential impacts of the proposed infrastructure and infrastructure upgrades associated with the Great Fish River Nature Reserve:

- The nature and extent of the proposed infrastructure;
- The location of this infrastructure within the “regulated area of a watercourse” as defined by the national legislation;
- The characteristics (PES, EIS and Ecosystem Services) of the aquatic features that occur within this “regulated areas of a watercourse”; and
- The assessment of the potential impacts and risks on these aquatic features as a result of the establishment and operations of the aspects of the project.

Based on the consideration of the above, it is considered that the establishment and operations of the proposed new infrastructure will not result in a reduction of the current, Class D PES or the MODERATE to HIGH EIS of the identified aquatic features. Similarly, with the implementation of the management and mitigation measures as described in this report, the current Ecosystem Service provision of these aquatic features will not change. These management and mitigation measures must be included in the Environmental Management Programme for the operations.

As such, it is the specialist's opinion that the establishment and operations of the proposed infrastructure associated with the implementation and operation of the proposed infrastructure at the Great Fish River Nature Reserve should be authorised as the pose a LOW to NO risk to the characteristics of the identified aquatic features.

13 CONCLUSION

Based on the findings of the assessment it is the opinion of the Specialist that there are no reasons that the establishment of the proposed infrastructure should not be authorised in accordance with the specifications as presented in this assessment. The authorisation must make provision for the various management and mitigation measures detailed in this report.

14 REFERENCES

BOON, R., 2010. Pooley's Trees of Eastern South Africa – A Complete Guide. Flora and Fauna Publication Trust.

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APPENDIX A

SPECIALIST CURRICULUM VITAE

APPENDIX B

IMPACT ASSESSMENT METHODOLOGY

IMPACT ASSESSMENT METHODOLOGY

Likely impacts associated with the proposed development on the identified aquatic and terrestrial biodiversity baseline have been identified through the undertaking of site visits, consultation of published information, comments from Interested and Affected Parties, comments from the relevant authority and independent assessment by the Environmental Project Team. Impacts have also been identified by the specialist assessments undertaken.

The impact assessment will make provision for the assessment of the following impacts:

- No-go impacts;
- Planning and design phase impacts;
- Construction phase impacts;
- Operational phase impacts;
- Decommissioning phase impacts; and
- Cumulative impacts.

Impacts identified were assessed according to the criteria outlined below. Each impact was ranked according to extent, duration, magnitude and probability. These criteria are based on the Department of Environmental Affairs and Tourism (DEAT) (now the Department of Environmental Affairs, Forestry and Fisheries) Guideline Document to the EIA Regulations(1998). A significance rating was calculated as per the methodology outlined below. Where possible, mitigatory measures were recommended for the impacts identified.

Status of the Impact

The impacts were assessed as having either of the following:

Table 1: Impact status classification

Classification	Definition
Negative effect	at a cost to the environment
Positive effect	a benefit to the environment
Neutral	Neutral effect on the environment

Extent of the Impact

The extent of each impact was rated as being one of the following:

Table 2: Impact extent classification

Classification	Definition
1	Site - within the boundaries of the development site
2	Local - the area within 5 km of the site
3	Municipal - the Local Municipality
4	Regional - The Province

5	National – South Africa
6	International – Southern Africa

Duration of the Impact

The duration of each impact was rated as being one of the following:

Table 3: Impact duration classification

Classification	Definition
1	Immediate - > 1 year
2	Short term – 1 to 5 years
3	Medium term – 6 to 15 years
4	Long Term – the impact will cease when the operation stops
5	Permanent – no mitigation measure will reduce the impact after construction

Magnitude of the Impact

The intensity or severity of each impact was rated as being one of the following:

Table 4: Impact severity classification

Classification	Definition
0	None – where the aspect will have no impact on the environment
2	Minor – where the impact affects the environment in such a way that natural, cultural and social functions / processes are not affected
4	Low – where the impact affects the environment in such a way that the natural, cultural and social functions / processes are slightly affected
6	Moderate – where the affected environment is altered but natural, cultural and social functions / processes continue, albeit in a modified way
8	High – natural, cultural or social functions / processes are altered to the extent that they will temporarily cease
10	Very high / unknown – natural, cultural or social functions / processes are altered to the extent that they will permanently cease

Probability of Occurrence

The likelihood of the impact actually occurring is indicated as either:

Table 5: Impact probability classification

Classification	Definition
0	None – the impact will not occur
1	Improbable – the possibility of the impact materialising is very low as a result of design, historic experience or implementation of adequate corrective actions
2	Low – there is a probability that the impact will occur
3	Medium – the impact may occur
4	High – it is most likely that the impact will occur
5	Definite / unknown – the impact will occur regardless of the implementation of any prevention or corrective actions, or it is not known what the probability will be, based on a lack of published information

Significance of the Impact

Based on the information contained in the points above, the potential impacts have been assigned a significance weighting (S). This weighting is formulated by adding the sum of the numbers assigned to extent (E), duration (D) and magnitude (M) and multiplying this sum by the probability (P) of the impact.

S = (E+D+M)*P

The significance weightings are ranked as:

Table 6: Impact significance rating

Impact rating	Definition
< 30	Low – the impact would not have a direct influence on the decision to develop in the area;
30 – 60	Medium – the impact could influence the decision to develop in the area unless it is effectively managed / mitigated;
> 60	High - the impact must have an influence on the decision-making process for development in the area.

environmental affairs

Department:
Environmental Affairs
REPUBLIC OF SOUTH AFRICA

DETAILS OF THE SPECIALIST, DECLARATION OF INTEREST AND UNDERTAKING UNDER OATH

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

Application for authorisation in terms of the National Environmental Management Act, Act No. 107 of 1998, as amended and the Environmental Impact Assessment (EIA) Regulations, 2014, as amended (the Regulations)

PROJECT TITLE

PROPOSED INFRASTRUCTURE DEVELOPMENT AND UPGRADES IN THE GREAT FISH RIVER NATURE RESERVE, WITHIN THE MAKANA LOCAL MUNICIPALITY, RAYMOND MAHLABA LOCAL MUNICIPALITY AND NGQUSHWA LOCAL MUNICIPALITY, EASTERN CAPE PROVINCE

Kindly note the following:

1. This form must always be used for applications that must be subjected to Basic Assessment or Scoping & Environmental Impact Reporting where this Department is the Competent Authority.
2. This form is current as of 01 September 2018. It is the responsibility of the Applicant / Environmental Assessment Practitioner (EAP) to ascertain whether subsequent versions of the form have been published or produced by the Competent Authority. The latest available Departmental templates are available at https://www.environment.gov.za/documents/forms.
3. A copy of this form containing original signatures must be appended to all Draft and Final Reports submitted to the department for consideration.
4. All documentation delivered to the physical address contained in this form must be delivered during the official Departmental Officer Hours which is visible on the Departmental gate.
5. All EIA related documents (includes application forms, reports or any EIA related submissions) that are faxed; emailed; delivered to Security or placed in the Departmental Tender Box will not be accepted, only hardcopy submissions are accepted.

Departmental Details

Postal address:
Department of Environmental Affairs
Attention: Chief Director: Integrated Environmental Authorisations
Private Bag X447
Pretoria
0001

Physical address:
Department of Environmental Affairs
Attention: Chief Director: Integrated Environmental Authorisations
Environment House
473 Steve Biko Road
Arcadia

Queries must be directed to the Directorate: Coordination, Strategic Planning and Support at:
Email: EIAAdmin@environment.gov.za

1. SPECIALIST INFORMATION

Specialist Company Name:	GCS Environment South Africa			
B-BBEE	Contribution level (indicate 1 to 8 or non-compliant)	2	Percentage Procurement recognition	
Specialist name:	Magnus van Rooyen			
Specialist Qualifications:	BSc (Botany and Zoology), BSc Hons (Botany), Mphil (Environmental Management)			
Professional affiliation/registration:	South African Council for Natural Scientific Professions – Reg. No. 400335/11			
Physical address:	4a Judge's Walk, Old Main Road, Kloof			
Postal address:	PO Box 819, Gillits			
Postal code:	3625	Cell:	084 249 2365	
Telephone:	031 764 7130	Fax:		
E-mail:	magnusvr@gcs-sa.biz			

2. DECLARATION BY THE SPECIALIST

I, Magnus van Rooyen, declare that –

- I act as the independent specialist in this application;
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, Regulations and all other applicable legislation;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- all the particulars furnished by me in this form are true and correct; and
- I realise that a false declaration is an offence in terms of regulation 48 and is punishable in terms of section 24F of the Act.

Signature of the Specialist

GCS Environment South Africa

Name of Company:

2023-06-28

Date

3. UNDERTAKING UNDER OATH/ AFFIRMATION

I, Magnus van Rooyen, swear under oath / affirm that all the information submitted or to be submitted for the purposes of this application is true and correct.

Signature of the Specialist

GCS Environment South Africa

Name of Company

2023-06-28

Date

Signature of the Commissioner of Oaths

2023-06-28

Date

SOUTH AFRICAN POLICE SERVICE
COMMUNITY SERVICE CENTRE
2023 -06- 28
PINETOWN
SOUTH AFRICAN POLICE SERVICE

Magnus van Rooyen

Technical Director - Environment

CORE SKILLS

- Environmental Impact Assessment
- Specialist Ecological (Terrestrial and Aquatic) Assessment
- Environmental Screening Assessment
- Due Diligence Assessment and Feasibility Studies
- Mining Applications
- Environmental Management Programmes and Plans
- Strategic Environmental Assessments
- Wildlife Management Plans

DETAILS

Qualifications

- MPil. Environmental Management
- BSc (Hon) Botany
- BSc (Botany and Zoology)
- Post Graduate Certificate in Education (Science and Biology)

Memberships

- South African Council for Natural Scientific Professions (Pr. Sci. Nat. 400335/11)
- International Association of Impact Assessors (Ref No. 1839)

Languages

- Afrikaans - fluent
- English - fluent
- German - fair
- Zulu - communication

Countries worked in:

South Africa, Namibia, Lesotho, Mozambique, Botswana, Guinea, Liberia, United States, United Kingdom

PROFILE

Mr van Rooyen is currently a Technical Director – Environment and the Branch Manager of the KwaZulu-Natal Office of GCS in Durban.

In addition to holding a Masters degree in Environmental Management, he also holds a BSc degree in Botany and Zoology, an Honors degree in Botany and a Post Graduate Certificate in Education. He has in excess of 18 years' experience in the environmental consulting field through conducting and managing Environmental Impact Assessments, Specialist Terrestrial and Aquatic Ecology Assessments and Strategic Environmental Management inputs into various project feasibility studies.

Through these services, he has been exposed to projects in a range of sectors which include the general public infrastructure sector (national and provincial roads, harbour and rail developments, water (dams and supply) and wastewater (treatment works and reticulation), private infrastructure sector (small and large scale housing developments, lodges, private dams, etc.), agricultural sector (dams, establishment of orchards, plantations and feedlots), mining sector (coal mines, gold mine, manganese mines, aggregates and associated mining infrastructure) and the industrial sector (light and heavy industrial infrastructure development).

In addition, Mr van Rooyen has extensive experience in conducting specialist terrestrial and aquatic ecological assessments for various infrastructure (roads, dams, ports) and industrial (smelters, power plants) development projects in a number of diverse ecosystems across Africa. He has experience in the compilation of Resettlement Policy Framework Plans, Due Diligence Assessments and Feasibility Studies associated with infrastructure development projects. Mr van Rooyen has experience in working on various private and public sectors as well as rural and urban environments in various countries

Previous Experience

Client	Project Description	Role/ Responsibility
Private client	**Wetland Assessment for the farm dam on the Farm Compentation near Matatiele** Undertaking of the wetland assessment for the development of an irrigation dam on the Farm Compensation near Matatiele in KwaZulu-Natal.	Wetland Specialist
Senekal Boerdery	**Wetland and Biodiversity Assessment for the Mkuze Township Establsishment** Undertaking of the wetland and biodiversity assessment associated with the township establishment in the town of Mkuze, KwaZulu-Natal.	Wetland and Biodiversity Specialist
WSP Consulting	**Wetland Assessment associated with the establishment of a flood protection berm at the SAPPI Saiccor Mill** Undertaking of the wetland assessment for the construciton of a flood protection berm between the uMkomaas River and the SAPPI Saiccor Mill in KwaZulu-Natal.	Wetland Specialist
Transnet National Ports Authority	**Forest mapping within the Port of Richards Bay** Undertaking of the mapping and classification of all the indigenous forest areas withini the Port of Richards Bay, KwaZulu-Natal.	Biodiverstiy Specialist
RHDHV	**KwaMathanya Water Supply Scheme Wetland Assessment** Undertaking of the wetland assessment of the KwaMathanya water supply scheme near town of Ixopo in KwaZulu-Natal.	Wetland Specialist
Private client	**Brownsdrift Hydropedological Assessment** Undertaking of the wetland and hydropedological assessment associated with the proposed residential developmnet on the site in Browndrift, eThekwini Municipality, KwaZulu-Natal.	Wetland Specialist
GreenScene Environmental	**Wetland and Biodiversity Assessment for a residential property in Pumula** Undertaking of the wetland and biodiversity assessment for the residential development on Lot 967 Pumula, KwaZulu-Natal.	Wetland and Biodiversity Specialist
GreenScene Environmental	**Wetland and Biodiversity Assessment for Lot 962 and 965 Port Edward** Undertaking of the wetland and biodiversity assessment for the residential development on Lot 962 and 965 Port Edward, KwaZulu-Natal.	Wetland and Biodiversity Specialist
Msunduzi Municipality	**Wetland and Biodiversity Assessment for various Military Veterans Housing sites within the Msuduzi Municipality** Undertaking of the wetland and biodiversity assessment for the various sites earmarked for the establishment of residential houses for the Military Veterans in the Msunduzi Municipality, KwaZulu-Natal.	Wetland and Biodiversity Specialist
Private client	**Forest delineation of a private property in Munster** Undertaking of the delineation of the forest margins on the residential property in Munster, KwaZulu-Natal.	Biodiverstiy Specialist

JG Afrika (Pty) Ltd	**Gunyana Water Supply Scheme Wetland and Biodiviersity Assessment** Undertaking of the wetland and biodiverstiy assessment of the Gunyana community water supply scheme near town of Pomeroy in KwaZulu-Natal.	Wetland and Biodiversity Specialist
GreenScene Environmental	**Wetland and Vegetation Assessment associated with the construction of the Ingwebaba Pedestrian Bridge near Shelly Beach** Undertaking of the wetland and vegetaiton assessment for the construction of the Ingwebaba Pedestrian Bridge near Shelly Beach in KwaZulu-Natal.	Wetland and Biodiversity Specialist
Terratest (Pty) Ltd	**Wetland and Vegetation Assessment associated with the construction of the KwaHlokohloko Rural Water Supply Scheme near Eshowe** Undertaking of the wetland and biodiverstiy assessment of the KwaHlokoloko community water supply scheme near town of Eshowe in KwaZulu-Natal.	Wetland and Biodiversity Specialist
Coastal Macadamias	**Wetland Assessment associated with the development of an irrigation dam for Coastal Macadamias near Ramsgate** Undertaking of the wetland assessment for the development of an irrigation dam for the Coastal Macadamias property near Ramsgate, KwaZulu-Natal.	Wetland Specialist
South African National Roads Agency Limited	**Ballito to Tinley Manor Wetland and Biodiveristy Assessment** Undertaking of the wetland and biodiversity study to support the preliminary design for the upgrade of the N3 between Ballito and Tinley Manor.	Wetland and Biodiversity Specialist
Vale Limitada	**Biodiversity Assessment for the alternative water supply pipeline** Undertaking of the biodiversity assessment to suport the preliminary design of the proposed alternative water supply pipeline at the Moatize Mine in Tete, Mozambique.	Biodiversity Specialist
GIB Consulting Engineers	**Aquadene Wetland Assessment** Undertaking of the wetland assessment for the Aquadene housing development in Richards Bay.	Wetland Specialist
JG Afrika (Pty) Ltd	**Wetland Assessment for the pipeline route for the drought relief pipeline in Laingsburg** Undertakaing of the wetland assessment assocaited with the 25km pipeline route from the watersource to the town of Laingsburg in the Western Cape.	Wetland Specialist
Seche International	**Wetland and Biodiversity Assessment for the proposed new uMgungundlovu Landfill Site** Preliminary wetland and biodiversity assessment for the proposed new uMgungundlovu Landfill site outside of Pietermaritzburgg.	Wetland and Biodiversity Specialist
South African National Roads Agency Limited	**Wetland and Vegetation Assessment associated with the upgrading of the N1 between Heuningspruit and Koppies** Undertaking of the wetland and biodiversity assessment for the upgrading of the N1 between Heuningspruit and Koppies in the Freestate Province.	Wetland and Biodiversity Specialist
Terratest (Pty) Ltd	**Wetland and Vegetation Assessment associated with the upgrading of the Nelson Mandelar Museum at Qunun**	Wetland and Biodiversity Specialist

	Undertaking of the wetland and vegetation assessment associated with the upgrading of the Nelson Mandela Museum in Qunu in the Eastern Cape Province.	
GreenScene Environmental	**Wetland and Vegetation Assessment associated with the construction of the Ulundi Water Supply Scheme** Undertaking of the wetland and biodiverstiy assessment of the Ulundi water supply scheme near town of Eshowe in KwaZulu-Natal.	Wetland and Biodiversity Specialist
MOZAL	**Biodiversity Assessment for the raw water supply pipeline for the Mozal Aluminium Smelter in Mozambique** Undertkaing of the biodiversity assessment for the raw water supply pipeline from the desalination plant in the Port of Matola to the MOZAL smelter int Boane, Maputo, Mozambique.	Biodiversity Specialist
JG Afrika (Pty) Ltd	**Wetland and Biodiveristy Assessment for various water supply schemes in the Cedarberg Municpality** Undertaking of the wetland and biodiversity assessments for the water supplys schemes for the town of Whupperthal, Clanwilliam and Citrusdal in the Western Cape.	Biodiversity Specialist
uKhozi Environmentalists	**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.	Wetland and Biodiversity Specialist
Kongiwe Environmental Consultants	**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.	Wetland and Biodiversity Specialist
Nzingwe Consultancy	**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.	Wetland Specialist
WSP Environmental	**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.	Wetland Specialist
WSP Environmental	**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	Wetland Specialist
WSP Environmental	**SAPPI Saiccor Alien Invasive Plant – Risk Assessment**	Vegetation Specialist

	Undertaking of the risk assessment of the presence of various listed category I and II alien invasive plant species on the SAPPI Saiccor Mill site, uMkomaas.	
Environmental Resources Management	**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.	Wetland and Biodiversity Specialist
South African National Roads Agency Limited	**N3 – Market 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 N3 – Market Road Interchange, Pietermaritzburg.	Wetland and Biodiversity Specialist
ESKOM SOC	**ESKOM 22 kVA Lines Vegetation Assessments** Undertaking of vegetation assessments for the establishment of various 22kVA electrification lines in KwaZulu-Natal.	Vegetation Specialist
ESKOM SOC	**Tombo to Mafini 300kVA Line Vegetation Assessments** Undertaking of vegetation assessment for the route alignment of the 300kVA high voltage electricity line from the Tombo Substation to Mafini, Port St. Johns.	Vegetation Specialist
Element Consulting Engineers	**Port St. Johns Water Treatment Works 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 Port St. Johns Water Treatment Works, Port St. Johns.	Wetland and Biodiversity Specialist
South African National Roads Agency Limited	**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.	Wetland and Biodiversity Specialist
South African National Roads Agency Limited	**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.	Wetland and Biodiversity Specialist
Afrimat	**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.	Wetland and Biodiversity Specialist

South African National Roads Agency Limited	**N3 – Epworth 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 N3 – Epworth Road Interchange, Pietermaritzburg	Wetland and Biodiversity Specialist
Millennium Challenge Account - Mozambique	**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.	Biodiversity Specialist
WSP Environmental	**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.	Wetland and Biodiversity Specialist
South African National Roads Agency Limited	**N3 – Chota Motala 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 N3 – Chota Motala Road Interchange, Pietermaritzburg.	Wetland and Biodiversity Specialist
South African National Roads Agency Limited	**R30 Glen Lyon to Brandfort 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 R30 between Glen Lyon and Brandfort.	Wetland and Biodiversity Specialist
South African National Roads Agency Limited	**R30 Virginia to Beatrix Mine 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 R30 between Virginia and Beatrix Mine.	Wetland and Biodiversity Specialist
Miranda Minerals	**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.	Wetland and Biodiversity Specialist
Miranda Minerals	**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.	Wetland and Biodiversity Specialist
Miranda Minerals	**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.	Wetland and Biodiversity Specialist

Ultimate Goal	**Ultimate Goal Colliery Biodiversity Assessment** Undertaking the wetland and biodiversity specialist study in support of the Mining Right Application for the establishment of the Ultimate Goal Colliery, Dundee.	Biodiversity Specialist
Canton Trading	**Taylors Halt Quarry Wetland and Biodiversity Assessment** Undertaking the wetland and biodiversity specialist study in support of the Mining Right Application for the establishment of the Taylor Halt Quarry, Pietermaritzburg.	Wetland and Biodiversity Specialist
South African National Roads Agency Limited	**uMtamvuna Quarry Biodiversity Assessment** Undertaking the biodiversity specialist study in support of the Mining Right Application for the establishment of the SANRAL Quarry, Kokstad.	Biodiversity Specialist

SACNASP

South African Council for Natural Scientific Professions

herewith certifies that

Magnus van Rooyen

Registration Number: 400335/11

is a registered scientist

in terms of section 20(3) of the Natural Scientific Professions Act, 2003
(Act 27 of 2003)
in the following fields(s) of practice (Schedule 1 of the Act)

Environmental Science (Professional Natural Scientist)

Effective **31 August 2011** Expires **31 March 2024**

Chairperson

Chief Executive Officer

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