AQUATIC BIODIVERSITY IMPACT ASSESSMENT

PROPOSED SWIMMING POOL, RECREATIONAL FACILITIES AND ASSOCIATED INFRASTRUCTURE AT DIE STROOM PICNIC SITE IN THE BONTEBOK NATIONAL PARK ON ERF RE/5338, SWELLENDAM

Prepared by: Nicolaas Hanekom
Pri.Sci.Nat (Ecology) 004415
Contact details: Telephone: 0769636450
or email: nicolaas@enviro-eap.co.za

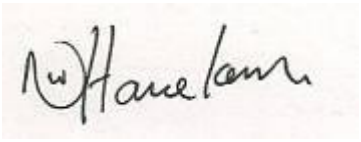
MAY 2025

DECLARATION OF THE SPECIALIST

Note: Duplicate this section where there is more than one specialist.

I **Nicolaas Willem Hanekom**, as the appointed Specialist hereby declare/affirm the correctness of the information provided or to be provided as part of the application, and that:

- In terms of the general requirement to be independent:
  - other than fair remuneration for work performed in terms of this application, have no business, financial, personal or other interest in the development proposal or application and that there are no circumstances that may compromise my objectivity; or
- In terms of the remainder of the general requirements for a specialist, have throughout this EIA process met all of the requirements;
- I have disclosed to the applicant, the EAP, the Review EAP (if applicable), the Department and I&APs all material information that has or may have the potential to influence the decision of the Department or the objectivity of any Report, plan or document prepared or to be prepared as part of the application; and
- I am aware that a false declaration is an offence in terms of Regulation 48 of the EIA Regulations.



Nicolaas Hanekom
Pri.Sci.Nat (Ecology) 004415 **12 May 2025**

Signature of the ~~EAP~~/ Specialist: Date:

Enviro-EAP (Pty) Ltd

Name of company (if applicable):

COMPLIANCE WITH THE DEPARTMENT OF ENVIRONMENTAL AFFAIRS SCREENING TOOL	ADDRESSED IN SPECIALIST REPORT
Contact details and curriculum vitae of the specialist including SACNASP registration number and field of expertise and their curriculum vitae	Page 1
A signed statement of independence by the specialist	Page 2 of report
Duration, date and season of the site inspection and the relevance of the season to the outcome of the assessment. The assessment must be undertaken on the preferred site and within the proposed development footprint.	Section 1.8 and 4
A description of the methodology used to undertake the impact assessment and site inspection, including equipment and modelling used where relevant	Section 1.5
A description of the assumptions made and any uncertainties or gaps in knowledge or data as well as a statement of the timing and intensity of site inspection observations	Section 1.6
A description of the aquatic biodiversity and ecosystems on the site, including; (a) aquatic ecosystem types; and (b) presence of aquatic species, and composition of aquatic species communities, their habitat, distribution and movement patterns;	Section 4
the threat status of the ecosystem and species as identified by the screening tool	Section 4
an indication of the national and provincial priority status of the aquatic ecosystem	Section 4
a description of the ecological importance and sensitivity of the aquatic ecosystem	Section 4
The assessment must identify alternative development footprints within the preferred site which would be of a “low” sensitivity as identified by the screening tool and verified through the site sensitivity verification and which were not considered appropriate	Section 4
Areas not suitable for development, to be avoided during construction and operation (where relevant)	Section 5
Additional environmental impacts expected from the proposed development based on those already evident on the site and a discussion on the cumulative impacts	Section 6
Impact management actions and impact management outcomes proposed by the specialist for inclusion in the EMPr	Section 6
A motivation where the development footprint identified as per section 2.3 in this Table were not considered stating reasons why these were not being considered	Section 1 and 7

A reasoned opinion, based on the findings of the specialist assessment, regarding the acceptability or not of the development and if the development should receive approval or not, and any conditions to which the statement is subjected	Section 7

TABLE OF CONTENT

1. INTRODUCTION AND METHODOLOGY

The DFFE screening report from the national web based environmental screening tool reported a “low sensitivity for Aquatic Biodiversity” sensitivity. An aquatic biodiversity impact assessment was conducted. This report presents the findings of the Aquatic Biodiversity Impact Assessment that was prepared by Nicolaas Hanekom as part of the EIA for the proposed development.

1.1. Background & Competency

Nicolaas Hanekom is a registered Professional Natural Scientist in the ecological science field with the South African Council for Natural Scientific Professions (“SACNASP”), Pri Sci Nat (Reg. No. 004415) Ecological Science (Pri.Sci.Nat); Aquatic Science, Conservation Science and Zoological Science (Cand.Sci.Nat) and a qualified registered Environmental Assessment Practitioner (“EAP”) who holds a Masters Technologiae, Nature Conservation (“Vegetation Ecology and Biodiversity Assessment”) degree from the Cape Peninsula University of Technology (Refer to Appendix A, CV). Nicolaas Hanekom is suitably qualified SACNASP registered specialist.

1.2. Conditions Relating to this Report

The findings, results, observations, conclusions and recommendations given in this report are based on the author’s best scientific and professional knowledge as well as available information and knowledge of the area. Nicolaas Hanekom reserves the right to modify aspects of the report including the recommendations if and when new information may become available from on-going research or further work in this field, pertaining to this assessment.

This report may not be altered or added to without the prior written consent of the author. This restraint also refers to electronic copies of this report which are supplied as sub portion of other reports, including main reports. Similarly, any recommendations, statements, or conclusions drawn from or based on this report must specifically refer to this report. If such comments form part of a main report for this investigation, the report must be included in its entirety as an appendix or separate section to the main report.

1.3. Scope and Objectives

The assessments entailed both a literature review of the region, as well as on site evaluations, during which specific primary data will be collected and evaluated. In addition, the identification of key ecological features will be undertaken allowing for the interpretation of the prevailing habitat form and associated processes.

All data collected in the field and during the literature review will be evaluated and interpreted in order to provide an understanding of the nature of the prevailing environment at a landscape and habitat level. In addition, specific evaluation of data relating to habitat form and structure will be undertaken, aiding in the identification of bio-physical anomalies within the prevailing environment. Such variance may be

considered to be indicative of differing habitat forms, which under consideration, may be of higher order ecological value in relation of the prevailing environment.

The protocol[1] provides the criteria for the reporting of requirements for the assessment and reporting of impacts on aquatic biodiversity for activities requiring environmental authorisation.

General Information

An applicant intending to undertake an activity identified in the Scope of this Protocol, on a site identified as being of "very high sensitivity" for Aquatic biodiversity on the national web based environmental screening tool must submit an Aquatic Biodiversity Impact Assessment Report. However, where the information gathered from the Initial Site Sensitivity Verification and the specialist assessment differs from the designation of "very high" aquatic biodiversity sensitivity from the national web based environmental screening tool and it is found to be of a "low" sensitivity, then an aquatic biodiversity impact assessment is not required. Should this apply, an Aquatic Biodiversity Compliance Statement is to be provided. However, given the site's proximity to a Breede river and the proposal to discharge sewage and pool backwash water into a soakaway system, a comprehensive aquatic impact assessment were conducted.

1.4. Terms of Reference

- The assessment must be undertaken by a suitably qualified and SACNASP registered specialist, within the preferred development site and on the preferred development footprint.

- Description of the preferred development site -The following aspects as a minimum must be considered in the baseline description:
  - A description of the aquatic biodiversity and ecosystems on the site, Including: a. Aquatic ecosystem types; b. Presence of aquatic species and composition of aquatic species communities, their habitat, distribution and movement patterns;
  - Threat status, according to the national web based environmental screening tool of the species and ecosystems, including Listed Ecosystems, as well as locally important habitat types identified;
  - National and Provincial priority status of the aquatic ecosystem (i.e. is this a wetland or river Freshwater Ecosystem Priority Area (FEPA), a FEPA sub catchment, a Strategic Water Source Area (SWSA), a priority estuary, whether or not they are free-flowing rivers, wetland clusters, etc., a CBA or an ESA; including for all a description of the criteria for their given status; and
  - Development footprint means the area within the site on which the development will take place and includes all ancillary developments for

1 Published in Government Notice No. 648GOVERNMENT GAZETTE 4542110 MAY 2019.This gazette is also available free online at www.gpwonline.co.za

example roads and power lines which require vegetation clearance or which will be disturbed and for which the application has been submitted.

- A description of the Ecological Importance and Sensitivity of the aquatic ecosystem including:
  a. The description (spatially, if possible) of the ecosystem processes that operate in relation to the aquatic ecosystems on and immediately adjacent to the site (e.g. movement of surface and subsurface water, recharge, discharge, sediment transport, etc.);
  b. The historic ecological condition (reference) as well as Present Ecological State (PES) of rivers (in-stream, riparian and floodplain habitat), wetlands and/or estuaries in terms of possible changes to the channel, flow regime (surface and groundwater).

- Identify any alternative development footprints within the preferred development site which would be of a “low” sensitivity as identified by the national web based environmental screening tool and verified through the Initial Site Sensitivity Verification;

- Assessment of impacts -a detailed assessment of the potential impact(s) of the proposed development on the following very high sensitivity areas/ features:
  - Is the development consistent with maintaining the priority aquatic ecosystem in its current state and according to the stated goal.
  - Is the development consistent with maintaining the Resource Quality Objectives for the aquatic ecosystems present;
  - How will the development impact on fixed and dynamic ecological processes that operate within or across the site, including:
    a. Impacts on hydrological functioning at a landscape level and across the site which can arise from changes to flood regimes (e.g. suppression of floods, loss of flood attenuation capacity, unseasonal flooding or destruction of floodplain processes); and b. Change in the sediment regime (e.g. sand movement, meandering river mouth/estuary, changing flooding or sedimentation patterns) of the aquatic ecosystem and its sub-catchment;
    c. The extent of the modification in relation to the overall aquatic ecosystem (i.e. at the source, upstream or downstream portion, in the temporary / seasonal / permanent zone of a wetland, in the riparian zone or within the channel of a watercourse, etc.). d. Assessment of the risks associated with water use/s and related activities.
  - How will the development impact on the functionality of the aquatic feature, including: a. Base flows (e.g. too little/too much water in terms of characteristics and requirements of system);
    b. Quantity of water including change in the hydrological regime or hydroperiod of the aquatic ecosystem (e.g. seasonal to temporary or permanent; impact of over-abstraction or instream or off-stream impoundment of a wetland or river)
    c. Change in the hydrogeomorphic typing of the aquatic ecosystem (e.g. change from an unchannelled valley-bottom wetland to a channelled valley-bottom wetland).
    d. Quality of water (e.g. due to increased sediment load, contamination by chemical and/or organic effluent, and/or eutrophication).
    e. Fragmentation (e.g. road or pipeline crossing a wetland) and loss of ecological connectivity (lateral and longitudinal). The loss or degradation of all

or part of any unique or important features (e.g. waterfalls, springs, oxbow lakes, meandering or braided channels, peat soils, etc.) associated with or within the aquatic ecosystem.

- How will the development impact on the functionality of the aquatic feature, including: a. water including change in the hydrological regime or hydroperiod of the aquatic ecosystem (e.g. seasonal to temporary or permanent; impact of over-abstraction or instream or off-stream impoundment of a wetland or river).
  b. Change in the hydrogeomorphic typing of the aquatic ecosystem (e.g. change from an unchannelled valley-bottom wetland to a channelled valley-bottom wetland).
  c. Quality of water (e.g. due to increased sediment load, contamination by chemical and/or organic effluent, and/or eutrophication).
  d. Fragmentation (e.g. road or pipeline crossing a wetland) and loss of ecological connectivity (lateral and longitudinal).
  e. The loss or degradation of all or part of any unique or important features (e.g. waterfalls, springs, oxbow lakes, meandering or braided channels, peat soils, etc.) associated with or within the aquatic ecosystem.
- How will the development impact on key ecosystem regulating and supporting services especially:
  a. Flood attenuation;
  b. Streamflow regulation;
  c. Sediment trapping;
  d. Phosphate assimilation;
  e. Nitrate assimilation;
  f. Toxicant assimilation;
  g. Erosion control; and
  h. Carbon storage.
- How will the development impact community composition (numbers and density of species) and integrity (condition, viability, predator-prey ratios, dispersal rates, etc.) of the faunal and vegetation communities inhabiting the site.
- In addition to the above, where applicable, impacts to the frequency of estuary mouth closure should be considered, in relation to: a. Size of the estuary; b. Availability of sediment; c. Wave action in the mouth; d. Protection of the mouth; e. Beach slope; f. Volume of mean annual runoff (MAR); g. Extent of saline intrusion (especially relevant to permanently open systems).
- A motivation must be provided if there were development footprints identified that were identified as having a “low” biodiversity sensitivity and were not considered appropriate.

- The findings of the Aquatic Biodiversity Impact Assessment must be written up in an Aquatic Biodiversity Impact Assessment Report. This report must contain as a minimum the following information:
  - Contact details and curriculum vitae of the specialist including SACNASP registration number and field of expertise and their curriculum vitae;
  - A signed statement of independence by the specialist;
  - The duration, date and season of the site inspection and the relevance of the season to the outcome of the assessment;
  - The methodology used to undertake the impact assessment and site inspection, including equipment and modelling used, where relevant;

- A description of the assumptions made and any uncertainties or gaps in knowledge or data as well as a statement of the timing and intensity of site inspection observations;
- Areas not suitable for development, to be avoided during construction and operation (where relevant);
- Additional environmental impacts expected from the proposed development based on those already evident on the site and a discussion on the cumulative impacts;
- A suitable construction and operational buffer for the aquatic ecosystem, using the accepted protocol;
- Impact management actions and impact management outcomes proposed by the specialist for inclusion in the EMPr;
- A motivation where the development footprint identified were not considered stating reasons why these were not being not considered; and
- A reasoned opinion, based on the finding of the specialist assessment, regarding the acceptability or not, of the development and if the development should receive approval, and any conditions to which the statement is subjected.

- The findings of the Aquatic Biodiversity Impact Assessment must be incorporated into the Basic Assessment Report or the Environmental Impact Assessment Report, including the mitigation and monitoring measures as identified, which must be incorporated into the EMPr. A signed copy of the Assessment must be appended to the Basic Assessment Report or Environmental Impact Assessment Report.

1.5. Approach and Methodology

A literature review and desktop analysis were undertaken prior to the field investigation, utilizing various sources including the South African National Biodiversity Institute (SANBI) data and other relevant sources. Recent and historical aerial imagery of the site was reviewed in order to identify points for investigation during the field survey. Utilising the above information, a field investigation was undertaken whereby:

- Sites of geomorphological or topographic variance were identified and subjected to an evaluation of species present within transects established across the selected site.
- Species were identified and collated.
- Additional random sample points were selected from other sites surrounding the proposed impacted areas for comparative purposes.
- Any additional species of significance, not identified within the sample sites were also noted.

As explained below, the ideal period for the assessment of plant species within this region is between August and November months, but for aquatic biodiversity it is the winters months in this region. However, proven methodology is used to assess the Freshwater Ecological features and this can be done throughout the year. The sampling and analysis of the site on 16 January 2019, 17 August 2022 and 26 March 2025 is an optimum season in terms of Aquatic Biodiversity Assessment and provides suitable data and results to present an informed decision on the local freshwater

ecology.
All data was collated and subjected to evaluation using methods in order to:

- Give consideration to the overall structure of habitat within the subject site.
- Identify any habitat anomalies that may be identified in such analysis.
- Allow for the interpretation of such data in order to prioritise and evaluate habitat form and structure within the study area.

1.5.1. FRESHWATER ECOLOGICAL ASSESSMENT SITES AND SITE SELECTION

The sites were visually assessed. Several methods (refer to below) were used to assess the risks to the freshwater ecology at the project area.

The objective is to demarcate and delineate river reaches[2] following a hierarchical approach according to the following considerations:

- **Broad natural physical reaches** that constitute the river from its source downstream. These reaches are the result of the various drivers of the system under reference conditions, viz. Hydrology, Geomorphology and Physico-chemical attributes. It follows that the biota responded and adapted to these reference conditions (i.e., the broad natural habitat template) in a dynamic way depending on natural climatic variation. The boundaries between different broad natural reaches are not necessarily crisp and clear. However, where marked and rapid changes occur due to geology (e.g. geomorphology and physico-chemical changes) and hydrology (e.g. large tributaries or a change in climate) these boundaries may be easy to identify.
- **Smaller natural reaches** may be distinguished within these large reaches. Depending on the characteristics of the biological group and taxa considered, the distribution of biota will broadly coincide with the demarcation of the natural reaches. However, depending on the attributes (e.g. preferences and intolerances) of the biota they may be limited to smaller natural reaches within the broad natural physical reaches. These will result in so-called biological habitat segments (e.g. fish habitat segments, Kleynhans 1999).
- Superimposed on these natural reaches are the changes brought about by anthropogenic activities. These activities may result in a homogenous impact throughout the length of a broad natural reach or their impact may be heterogeneous and result in smaller distinguishable sub-reaches. Physical driver changes as well as biological change agents (e.g. alien biota) may be involved.

Reference conditions (in terms of natural reaches, drivers and biota) need to be considered as these provide the natural evolutionary setting that indicates the resilience of the system to various forms of modification and stress. However, pragmatic considerations that come into the picture include anthropogenic changes to the system that are within the medium and long term not likely to change. These may include modifications to the system such as impoundments, agricultural, urbanization and forestry. Such modifications brings about changes in the natural reach characteristics in terms of the system drivers and biota and indicates changed reaches

[2] For the purpose of this document, "reach" is broadly defined as "a specified segment of a stream's path" (www.wwnorton.com/college/geo/earth2/glossary/r.htm).

that needs particular consideration in order to manage them accordingly inter alia, ecological importance and sensitivity, Present Ecological State (PES), the recommended category and sustainability. This rationale also therefore enables the setting of resource quality objectives, ecological specifications and monitoring objectives and specifications.

The freshwater delineations as presented in this report are regarded as the best based on the site conditions present at the time of the assessment.

Figure 1: Non-perennial drainage line and 1:100 year floodline of the Breerivier tributary in relation to the proposed development area at the Die Stroom picnic site within the Bontebok National Park.

1.5.1.1. Ecological Importance and Sensitivity (EIS)

The Ecological Importance and Sensitivity (EIS) of riparian areas is an expression of the importance of the aquatic resource for the maintenance of biological diversity and ecological functioning on a local scale to a more broader scale; whilst Ecological Sensitivity (or fragility) refers to a system's ability to resist disturbance and its capability to recover from disturbance once it has occurred (Kleynhans & Louw, 2007). The list of the EIS categories and rating scheme used in the assessment tool are shown in Table 1 and Table 2 respectively.

Table 1: List of the EIS categories used in the assessment tool (Kleynhans & Louw, 2007)

EISC	General description	Range of median
Very high	Quaternaries/delineations that are considered to be unique on a national and international level based on unique biodiversity (habitat diversity, species diversity, unique species, rare and endangered species). These rivers (in terms of biota and habitat) are usually very sensitive to flow modifications and have no or only a small capacity for use.	>3-4
High	Quaternaries/delineations that are considered to be unique on a national scale based on their biodiversity (habitat diversity, species diversity, unique species, rare and endangered species). These rivers (in terms of biota and habitat) may be sensitive to flow modifications but in some cases may have substantial capacity for use.	>2-≤3
Moderate	Quaternaries/delineations that are considered to be unique on a provincial or local scale due to biodiversity (habitat diversity, species diversity, unique species, rare and endangered species). These rivers (in terms of biota and habitat) are not usually very sensitive to flow modifications and often have substantial capacity for use.	>1-≤2
Low/ marginal	Quaternaries/delineations which are not unique on any scale. These rivers (in terms of biota and habitat) are generally not very sensitive to flow modifications and usually have substantial capacity for use.	≤1

Table 2: Rating scheme used for the assessment of riparian EIS (Kleynhans & Louw, 2007)

Score	Channel Type	Conservation context			Vegetation and Habitat Integrity	Connectivity	Threat status of Vegetation Type
0	Ephemeral Stream	Non-FEPA river	No status	None/ Excluded	No natural remaining	None	No Status
1	Stream non-perennial		Upstream management area	Available	Very poor	Very poor	Least threatened
2	Stream-perennial flow		Rehab FEPA		Poor	Low	Vulnerable
3	Minor river-non-perennial flow		Fish corridor	Earmarked for conservation	Moderately modified	Moderate	Near Threatened
4	Minor river-perennial flow		Fish support area		Largely natural	High	Endangered
5	Major river-perennial	FEPA river	River FEPA	Protected	Unmodified / natural	Very high	Critically Endangered

	flow				habitat		

1.5.1.2. National Freshwater Ecosystem Priority Areas (NFEPA; 2011)

The National Freshwater Ecosystem Priority Areas (NFEPA) project was a partnership and collaborative process led by the CSIR with the South African National Biodiversity Institute (SANBI), Department of Water Affairs (DWA), the Water Research Commission (WRC), WWF South Africa, as well as expertise from South African National Parks (SANParks), the South African Institute for Aquatic Biodiversity (SAIAB) and Department of Environmental Affairs and Tourism (DEAT). The project was originally conceived in 2006 and the project proposal was submitted to the WRC in July 2007. An inception meeting took place in August 2008 to introduce the aims of the project to relevant stakeholders from the freshwater science, governance and management sectors. The NFEPA project aimed to identify a national network of freshwater conservation areas and to explore institutional mechanisms for their implementation.

NFEPA takes forward the implementation of the Cross-Sector Policy Objectives for Inland Water Conservation. It also builds on the river component of the National Spatial Biodiversity Assessment (NSBA) 2004 and will feed directly into the NBA (National Biodiversity Assessment) 2010.

The NFEPA database was searched in terms of conservation status of rivers, wetland habitat and wetland feature present in the vicinity of the proposed development.

1.5.1.3. Wetland and Freshwater Ecological Features Delineation

The wetland delineation process uses four wetland indicators to provide an estimate of the extent of a wetland. They are: landscape position (must be flat or depressed), vegetation (must be hydrophilic), soil form (must compliment an existing wetland type) and soil wetness (water table must be within 50cm of profile).

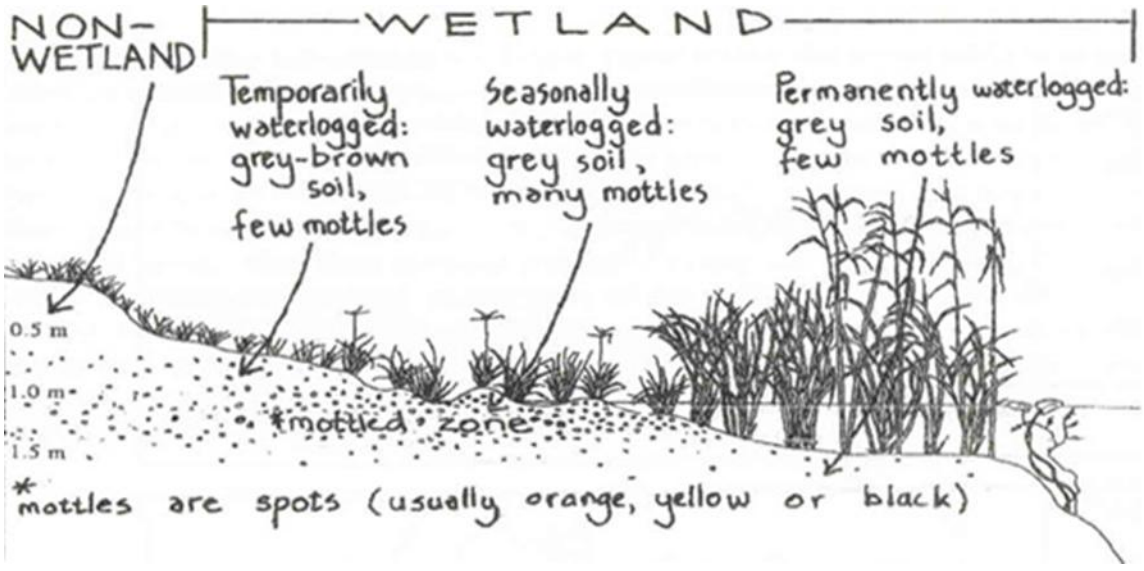
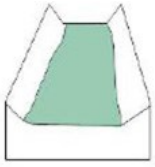
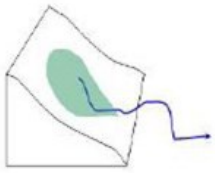


Figure 2: Wetland illustration

The guideline document, “A Practical Field Procedure for the Identification and

Delineation of Wetlands and Riparian Areas", as published by DWAF (2005) was followed for the delineation of the wetland areas[3] (if present). According to the delineation procedure, the wetlands were delineated by considering the following wetland indicators: terrain unit indicator; soil form indicator; soil wetness indicator; and vegetation indicator.

Table 3: Wetland hydro-geomorphic types typically supporting inland wetlands in South Africa

Hydro-geomorphic types	**Description**	**Source of water maintaining wetland [1]**	
		Surface	**Sub-surface**
Floodplain 	Valley bottom areas with a well-defined stream channel gently sloped and characterized by floodplain features and the alluvial transport and deposition of sediment, usually leading to a net accumulation of sediment. Water inputs from main channel and from adjacent slopes.	***	*
Valley bottom with a channel 	Valley bottom areas with a well-defined stream channel but lacking characteristic floodplain features. May be gently sloped and characterized by the net accumulation of alluvial deposits or may have steeper slopes and be characterized by the net loss of sediment. Water inputs from main channel and from adjacent slopes.	***	*/ ***
Valley bottom without a channel 	Valley bottom areas with no clearly defined stream channel usually gently sloped and characterized by alluvial sediment deposition, generally leading to a net accumulation of sediment. Water inputs mainly from channel entering the wetland and from adjacent slopes.	***	*/ ***
Hillslope seepage linked to stream channel 	Slopes on hillsides, characterized by the colluvial movement of materials. Water inputs are mainly from sub-surface flow and outflow is usually via a well-defined stream channel connecting the area directly to a stream channel.	*	***

[3] Department of Water Affairs and Forestry. (2005b). *A practical field procedure for identification and delineation of wetland and riparian areas.* DWAF, Pretoria.

Isolated hillslope seepage 	Slopes on hillsides, which are characterized by the colluvial (transported by gravity) movement of materials. Water inputs mainly from sub-surface flow and outflow either very limited or through diffuse sub-surface and/or surface flow but with no direct surface water connection to a stream channel.	*	***
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.	*/ ***	*/ ***

[1] Precipitation is an important water source and evapotranspiration is important.
Water source: * Contribution usually small
*** Contribution usually large
*/ *** Contribution may be small or important depending on the local circumstances

Low or Moderate EIS: Should any indicator be 2 and lower, i.e. a no impact, small or moderate impact, no management intervention should be initiated.

High EIS: Should any indicator exceed 2, i.e. a large to extreme impact, a management intervention should be initiated, e.g. move up to the next level of monitoring, more frequent biomonitoring, more frequent assessments of that site, or identification of the cause.

1.5.1.4. Determining the Present Ecological Status (PES)

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 Present Ecological Status (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 Present Ecological Status categories (Macfarlane, et al., 2009)

Impact Category	**Description**	**Impact Score Range**	**PES**
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

1.5.1.5. Department of Water and Sanitation (DWS) Resource Quality Information Services (RQIS), Present Ecological State / Ecological Importance and Sensitivity (PES/EIS) Database (2014)

The information obtained from these assessments/databases was used as first level desktop assessments for purposes of ecological reserve determination and for Ecological Water Resource Monitoring (EWRM).

1.5.1.6. RISK ASSESSMENT KEY (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) or Section 21(i) (Gazette No. 49833, Notice 4167, 8 December 2023): Section 21 c and i water use Risk Assessment Protocol)

TABLE 4 – IMPORTANCE OF AFFECTED WATERCOURSE/S	
What is the overall importance of the watercourse/s, based on the criteria and guidelines provided below?*	
(If no formal assessment of EI / EIS / Wetland Importance has been completed, assign rating according to criterion below that results in the highest score)	
Low or Very Low EI / EIS / Wetland Importance rating; OR, If EI/EIS has not been determined, Low rating based on presence of: - no areas identified to be of conservation importance (i.e. OESA at most); and/or - only species/habitats of Least Concern on the IUCN Red List or on a regional/national Red List (including freshwater ecosystem types of Least Concern in terms of the NBA); and/or - only species which are common and widespread and/or habitats of low conservation interest; and/or - highly degraded habitat of extremely small size	**Low / Very low** = 2
Medium EI / EIS / Wetland Importance rating; OR, If EI/EIS has not been determined, Moderate rating based on presence of: - CESAs; and/or - species/habitats listed as VU or NT on the IUCN Red List or on a regional/national Red List (including VU/NT freshwater ecosystem types in terms of the NBA); and/or - functionality as an important ecological corridor or buffer area	**Moderate** = 3

High EI / EIS / Wetland Importance rating; OR, If EI/EIS has not been determined, High rating based on presence of: - CBA2; and/or - species or degraded habitats (in poor condition) listed as EN or CR on the IUCN Red List or on a regional/national Red List (including EN/CR freshwater ecosystem types in terms of the NBA)	**High** = 4
Very high EI / EIS / Wetland Importance rating; OR, If EI/EIS has not been determined, Very high rating based on presence of: -CBA1; and/or - FEPA; and/or - species or intact habitats (in fair or good condition) listed as EN or CR on the IUCN Red List or on a regional/national Red List (including EN/CR freshwater ecosystem types in terms of the NBA); and/or - KBA or IBA or Ramsar site	**Very high** = 5
* EI=Ecological Importance; EIS=Ecological Importance & Sensitivity; OESA=Other Ecological Support Areas; IUCN=International Union for Conservation of Nature; CESA=Critical Ecological Support Area; NBA=National Biodiversity Assessment; VU=Vulnerable; NT=Near Threatened; EN=Endangered; CR=Critically Endangered; CBA=Critical Biodiversity Area; FEPA=Freshwater Ecosystem Priority Area; KBA=Key Biodiversity Area; IBA=Important Bird Area.	

TABLE 5- INTENSITY OF IMPACT	
What is the intensity of the impact on the resource quality (hydrology, water quality, geomorphology, biota)?	
Negative Impacts	
Negligible / non-harmful; no change in PES	0
Very low / potentially harmful; negligible deterioration in PES (<5% change)	+1
Low / slightly harmful; minor deterioration in PES (<10% change)	+2
Medium / moderately harmful; moderate deterioration in PES (>10% change)	+3
High / severely harmful; large detrioration in PES (by one class or more)	+4
Very high / critically harmful; critrical deterioration in PES (to E/F or F class)	+5
Positive Impacts	
Negligible; no change in PES	0
Very low / potentially beneficial; negligible improvement in PES (<5% change)	-1
Low / slightly beneficial; minor improvement in PES (<10% change)	-2
Medium / moderately beneficial; moderate improvement in PES (>10% change)	-3
Highly beneficial; large improvement in PES (by one class or more) and/or increase in protection status	-4
Very highly beneficial; improvement to near-natural state (A or A/B class) and/or major increase in protection status	-5
NOTE: Positive Impacts must be given a negative Intensity Score	
***PES of affected watercourses must be considered when scoring Impact Intensity**	

TABLE 6 – SPATIAL SCALE (EXTENT) OF IMPACT	
How big is the area that the activity is impacting on, **relative to the size of the impacted watercourses**?	
Very small portion of watercourse/s impacted (<10% of extent)	1
Moderate portion of watercourse/s impacted (10-60% of extent)	2
Large portion of watercourse/s impacted (60-80%)	3

Most or all of watercourse/s impacted (>80%)	4
Impacts extend into watercourses located well beyond the footprint of the activities	5

TABLE 7 – DURATION OF IMPACT	
How long does the activity impact on the resource quality?	
Transient (One day to one month)	1
Short-term (a few months to 5 years) OR repeated infrequently (e.g. annually) for one day to one month	2
Medium-term (5 – 15 years)	3
Long-term (ceases with operational life)	4
Permanent	5

TABLE 8 – LIKELIHOOD OF THE IMPACT	
What is the probability that the activity will impact on the resource quality?	
Improbable / Unlikely	20%
Low probability	40%
Medium probability	60%
Highly probable	80%
Definite / Unknown	100%

TABLE 9: RISK RATING CLASSES		
RATING	**CLASS**	**MANAGEMENT DESCRIPTION**
1 – 29	**(L) Low Risk OR (+) Positive (+ +) Highly positive**	Acceptable as is or or with proposed mitigation measures. Impact to watercourses and resource quality small and easily mitigated, or positive.
30 – 60	**(M) Moderate Risk**	Risk and impact on watercourses are notable and require mitigation measures on a higher level, which costs more and require specialist input. Licence required.
61 – 100	**(H) High Risk**	Watercourse(s) impacts by the activity are such that they impose a long-term threat on a large scale and lowering of the Reserve. Licence required.
A low risk class must be obtained for all activities to be considered for a GA		

TABLE 10: CALCULATIONS AND MAXIMUM VALUES	
Intensity = Maximum Intensity Score (negative value for positive impact) X 2	MAX = 10
Severity = Intensity + Spatial Scale + Duration (<Intensity - Spatial Scale - Duration> for positive impact)	MAX = 20 (MIN = -20 for +ve impacts)
Consequence = Severity X Importance rating	MAX = 100
Significance\Risk = Consequence X (Likelihood / 100)	MAX = 100

1.6. Assumptions and limitations

The ground-truthing, site survey and delineation of the freshwater resource assessment thereof are confined to two site visits undertaken on 16 January 2019, 17 August 2022 and 26 March 2025, as identified within the EIA application. All freshwater resources identified within the investigation area were delineated in fulfilment of Regulation GN509 of the National Water Act, 1998 (Act 36 of 1998) using desktop methods described above, including the use of topographic maps, historical and current digital satellite imagery and aerial photographs and were ground-truthed.

Die Stroom picnic is an historical picnic site next to the Breerivier that's been used by the local community for a number of years. As a result of this the areas surrounding the development in terms of Freshwater ecology impacts have undergone significant changes (such as infilling downstream next to Breede River and road crossings at places) which have altered the geomorphic characteristics, hydrological regime and vegetation composition. The proposed development area is however located outside the mapped non-perennial river and the Breede River and its floodplain. The freshwater resource delineations as presented in this report are regarded as the best based on the site conditions present, as observed during the site assessment. The results obtained are, however, considered sufficiently accurate to allow planning and decision making to take place.

Freshwater resources and terrestrial zones create transitional areas where an ecotone is formed as vegetation species change from terrestrial to obligate/facultative species. Within this transition zone, some variation of opinion on the freshwater resource boundaries may occur. However, if the best practice and latest methods are followed, all assessors should get largely similar results. With ecology being dynamic and complex, certain aspects (some of which may be important) may have been overlooked. However, the delineations as provided in this report are deemed appropriately accurate to guide any future development plans.

1.7. Source of Information

This assessment was undertaken utilising:

- 1:50 000 topographic mapping sourced from the Surveyor General's office;
- Aerial imagery sourced from Google Earth.
- Aerial imagery sourced from ESRI.
- Vegetation types and their conservation status was extracted from the South African National Vegetation Map (Mucina and Rutherford 2018).
- Freshwater and wetland information was extracted from the National Freshwater Ecosystem Priority Areas assessment, NFEPA (Nel et al. 2011) and National Wetlands Map.
- Important catchments and protected areas expansion areas were extracted from the National Protected Areas Expansion Strategy 2008 (NPAES).
- CapeNature. 2024. 2023 Western Cape Biodiversity Spatial Plan and Guidelines Overview V2.0. Unpublished Report.

In addition, use was made of the following data:

- Wetland and riparian habitat Geographic Information System (GIS) data sourced

from the National Freshwater Ecological Priority Area Programme of South African National Biodiversity Institute (SANBI);
- SANBI veld types data; and
- Literature as referenced

1.8. Site Visit

The site survey was conducted on 16 January 2019, 17 August 2022 and 26 March 2025. The survey was conducted in an ideal period for the assessment of aquatic biodiversity within this region. The sampling and analysis techniques used provided suitable data and results to present an informed decision on the local aquatic biodiversity and ecology. During the site visit, the different biodiversity features, habitat, vegetation and landscape units present were identified and recorded in the field. The presence of wetlands or pans and rivers were noted in the field if present and recorded and mapped using satellite imagery of the site.

2. APPLICABLE LEGISLATION AND PERMIT REQUIREMENTS

The proposed development within the study site is considered to elicit a requirement for possible compliance with the following legislation applicable to this assessment.
- The National Water Act (Act 36 of 1998)

The National Water Act (Act 36 of 1998)
The National Water Act controls activities in and around water resources, as well as the general management of water resources, including abstraction of groundwater and disposal of water. Authorisation for activities impacting on the land other than the current landuse, up to 500 m from a defined (water source) wetland system and 100m from a defined water sources (river) will require an application for a Water Use Licence from the Department of Water and Sanitation. The development area of the recommended site is within 500m from wetlands and rivers (NWA regulated zones). No infrastructure will be constructed inside the wetland areas or the non-perennial river.

3. DESCRIPTION OF PROJECT ASPECTS RELEVANT TO AQUATIC BIODIVERSITY FEATURES

The proposed swimming pool, recreational facilities and associated infrastructure at Die Stroom Picnic Site in the Bontebok National Park, Swellendam will include the following:
- Pool Backwash tank slab = 15m^2 for 5000liter JoJo
- Septic tank and Pump chamber = 40m^2
- Pool pump room = 40m^2
- Ablutions/Shower/Change Area = 105m^2
- Swimming Pool = 315m^2
- Terrace less Pool = 1115m^2
- Fence = 210m long and 1.5m high
- Physically Disabled Ramp =80m^2
- Parking = 240m²
- Underground electrical cable = 110m long (Area measured in sewer trench

calculation)
- Sewer line /Soak-away = 260m long (Area = 390m^2)
- Pool back-wash and soak-away = 260m long (Area measured in sewer trench calculation)
- Water supply line = 25m long (Area 25m^2) (Balance of area measured in sewer trench calculation)
- Soak-away = 150m^2 (15m x 10m)
- 2 x Biofilters = 64m^2 (4m x 8m each)

Construction footprint = 0.44ha
Proposed development will lead to the permanent clearance of ±0.2ha of indigenous vegetation.

The final development footprint for the developments as described above = ± 0.28Ha

4. DESCRIPTION OF THE AFFECTED ENVIRONMENT.

4.1. Locality

Die Stroom picnic is an historical picnic site next to the Breerivier that's been used by the local community for a number of years. As per the agreement between the Municipality and SANParks, the local community would still have access to Die Stroom for recreational purposes. Subsequent to the proclamation of the Consumer Protection Act (CPA), SANParks Risk Management deemed the Breede River to be unsafe for various reasons, including water quality, clarity, depth and hazardous rubble found on the river bed, the lack of lifeguards on duty and possible attacks by Zambezi (bull) sharks, which have been documented as dwellers of the Breede River. SANParks has therefore cited "swim at own risk" for the afore-mentioned reasons at the relevant picnic site. As the Breede River is traditionally utilised by the local communities for swimming, SANParks would like to provide visitors with a safe swimming environment. The proposed development with offer day visitors an enclosed swimming pool with dedicated ablutions including male and female shower facilities and toilets. The proposed development will also ensure privacy to Die Stroom Function Venue charted to visitors at an extra cost to visitors.

As far as possible the proposed development has been placed on already cleared and impacted areas and along existing roads and pipeline routes to minimise impacts on the natural environment and indigenous vegetation. The proposed development is also to be located behind the existing picnic area, outside of the 1:100 year floodline area of the Breerivier.

Figure 3: Locality Map

4.2. Topography

The topography of the overall site slopes from northwest to southeast towards the Breerivier, with an elevation of between 67m to 55m.

4.3. Geology and Soils

Soil – Glenrosa and/or Mispah forms (other soils may occur), lime rare or absent in upland soils but generally present in low-lying soils
Geology – Shale, siltstone and subordinate sandstone of the Bokkeveld and Witteberg Groups, occasionally covered by various surficial deposits
Source: Soils & Geology (ENPAT – Cape Farm Mapper 20/08/2022)

4.4. A description of the aquatic biodiversity and ecosystems on the site, including; (a) aquatic ecosystem types; and (b) presence of aquatic species, and composition of aquatic species communities, their habitat, distribution and movement patterns;

H70B, in which the proposed site falls, is a quaternary catchment of the Breede Olifants Management Area. Two aquatic biodiversity features were applicable to the study area, namely 1. The identified one non-perennial river which flows into the Breede River and 2. The perennial Breede River with associated wetlands and floodplains was the only aquatic biodiversity features applicable to this study. The 1:100 year flood line mapped as constrains is located outside the development area. The delineated wetlands are all located within the 1:100 year flood line and not on the development area.

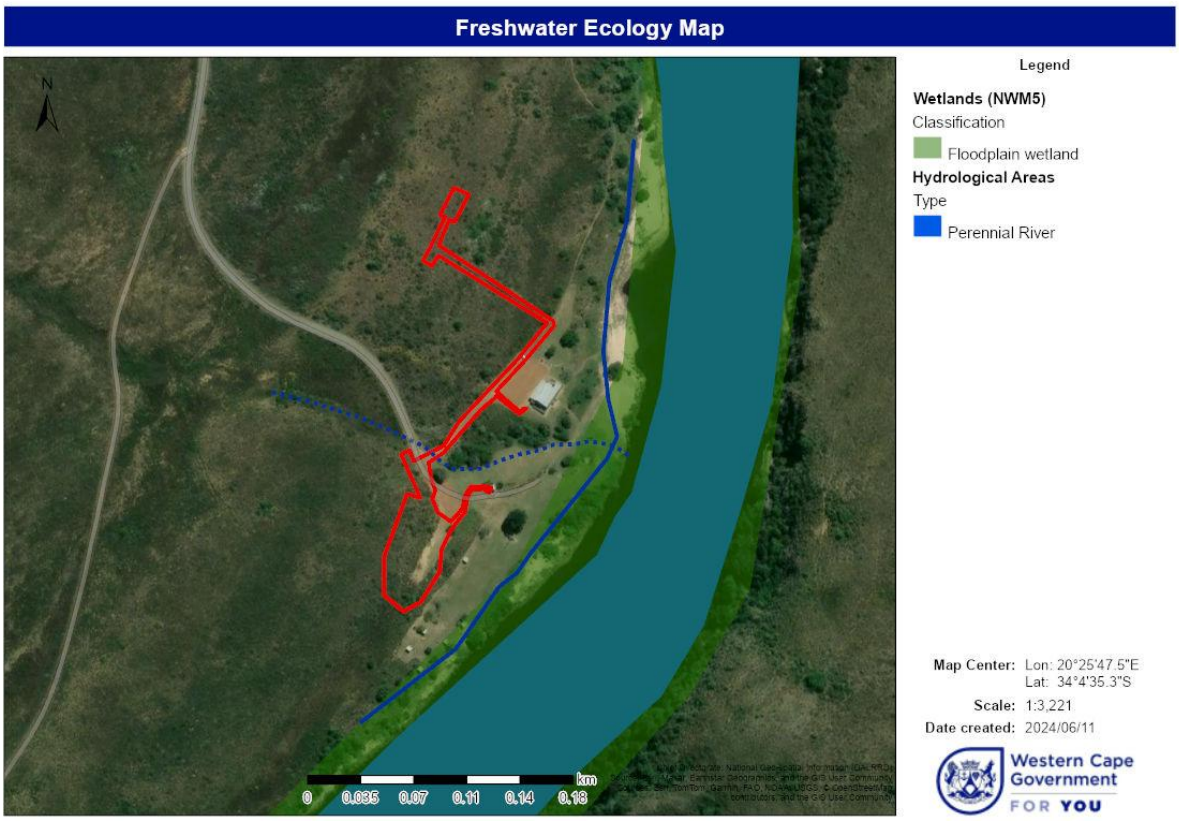


Figure 4: Non-perennial drainage line and 1:100 year floodline of the Breerivier tributary in relation to the proposed development area at the Die Stroom picnic site within the Bontebok National Park.

Two sets of conservation mapping results are of relevance to the national and provincial identification of the biodiversity conservation importance that has been attributed to the freshwater features in the study area. The Western Cape's Biodiversity Spatial Plan (WCBSP) that contains Critical Biodiversity Areas (CBA) which is a product of the Provincial Fine Scale mapping process, as well as the National Freshwater Ecosystem Priority Areas (FEPA) map. FEPAs are intended to provide strategic spatial priorities for conserving South Africa's freshwater ecosystems and supporting sustainable use of water resources.

The Breede River and its floodplain which is outside the development footprint and impact area, were mapped as CBA. The development impact areas were mapped as protected area in the WCBSP

NFEPA wetlands were mapped associated with the Breede river and its flood plain.

Photo 1: View toward the Breerivier tributary from the proposed swimming pool development site (photo taken 17 August 2022)

Photo 2: Downstream view of non-perennial drainage line where the existing road crosses the drainage line along which the sewer, water and power lines will be laid. (photo taken 17 August 2022)

Photo 3: Upstream view of non-perennial drainage line where the existing road crosses the drainage line along which the sewer, water and power lines will be laid. (photo taken 17 August 2022)

Photo 4: Existing soakaway site where an additional soakaway is proposed to be installed. (photo taken 17 August 2022)

Photo 5: Upstream view of non-perennial drainage line crossing the proposed development and existing the Die Stroom picnic site. (photo taken 17 August 2022)

Photo 6: Location of stormwater inlet underneath the existing road where the non-perennial drainage line goes underneath the existing road through the existing picnic site and eventually feeds into the Breerivier tributary (photo taken 17 August 2022)

The information gathered from the site survey does not differs from the Environmental Screen report. The development of the site as per the proposed development will have a **low negative** impact on aquatic biodiversity.

4.5. The threat status of the ecosystem and species as identified by the screening tool

The National Vegetation Map of South Africa (2018) identifies the natural vegetation which would have occurred within the area as Swellendam Silcrete Fynbos (Endangered Ecosystem Status).

4.6. An indication of the national and provincial priority status of the aquatic ecosystem, including a description of the criteria for the given status (i.e. if the site includes a wetland or a river freshwater ecosystem priority area or sub catchment, a strategic water source area, a priority estuary, whether or not they are free-flowing rivers, wetland clusters, a critical biodiversity or ecologically sensitivity area); and

NFEPA wetlands were mapped associated with the Breede river and its flood plain. The delineated wetlands are all located within the 1:100 year flood line and not on the development area.

4.7. A description of the ecological importance and sensitivity of the aquatic ecosystem including:
(a) the description (spatially, if possible) of the ecosystem processes that operate in relation to the aquatic ecosystems on and immediately adjacent to the site (e.g. movement of surface and subsurface water, recharge, discharge, sediment transport, etc.); and

There are no aquatic biodiversity features in the development area. The closest is the non-perennial river which is in a high ecological state. However, the non-perennial river is traversed by the existing access roads at two locations and inundated next to the Breede River. The electrical cable and potable water and wastewater pipelines will be located within the disturbance footprint of the access road which traverses the non-perennial river. Existing culverts under the roads allow for adequate flow of water under the roads. The one parking area is the closest to the non-perennial river and riparian area. The parking lot avoids the watercourse and an appropriate buffer is between the non-perennial river and parking lot.

PRESENT ECOLOGICAL STATE (PES)

Table 11: Results of PES assessments for the potentially affected aquatic ecosystems on the study area.

Criteria	Non-Perennial River	
	Score	**Confidence**
INSTREAM		
Water abstraction	0	H
Flow Modification	13	H
Bed modification	13	H
Channel modification	13	H
Water Quality	0	H

Inundation	10	H
Presence of exotic macrophytes	0	H
Presence of exotic fauna	0	H
Presence of solid waste	0	H
RIPARIAN		H
Vegetation removal	13	H
Alien encroachment	0	H
Bank erosion	0	H
Water abstraction	0	H
Flow modifications	10	H
Channel modifications	12	H
Inundation	13	H
FINAL PES SCORES & CATEGORIES	**Non-perennial river**	
Instream	51%	
	PES Category D	
Riparian	50%	
	PES Category D	

Criteria	Breede Perennial River	
	Score	**Confidence**
INSTREAM		
Water abstraction	6	H
Flow Modification	0	H
Bed modification	0	H
Channel modification	0	H
Water Quality	0	H
Inundation	0	H
Presence of exotic macrophytes	0	H
Presence of exotic fauna	0	H
Presence of solid waste	0	H
RIPARIAN		H
Vegetation removal	6	H
Alien encroachment	0	H
Bank erosion	0	H
Water abstraction	0	H
Flow modifications	0	H
Channel modifications	0	H

Water Quality	0	H
Inundation	0	H
FINAL PES SCORES & CATEGORIES	**Non-perennial river**	
Instream	94%	
	PES Category A	
Riparian	94%	
	PES Category A	

ECOLOGICAL IMPORTANCE AND SENSITIVITY (EIS)

The result of the **EIS** assessments that were completed for the affected watercourse is presented in Table 12.

Table 12: Results of the EIS assessment

Channel type	1	Non-Perennial River
Conservation context	0	NFEPA River
Vegetation and habitat Integrity	2	The non-perennial river is traversed by the existing access roads at two locations and inundated next to the Breede River.
Connectivity	5	Connected
Threat Status of Vegetation Type	4	Vegetation has endangered conservation status
EIS Category	**2.4**	**High**

Channel type	5	Breede Perennial River
Conservation context	5	NFEPA River
Vegetation and habitat Integrity	5	Floodplain modified
Connectivity	5	Connected
Threat Status of Vegetation Type	4	Vegetation has endangered conservation status
EIS Category	**4.8**	**Very High**

RESULTS OF THE PES AND EIS

The result of the PES and EIS assessments that were completed for the aquatic ecosystem that could potentially be affected by the proposed development is reflected in table above.

Non-perrenial Rivers which is a tributary of the Breede river.
Quaternaries/delineations that are considered to be unique on a national scale based on their biodiversity (habitat diversity, species diversity, unique species, rare and endangered species). These rivers (in terms of biota and habitat) may be sensitive to flow modifications but in some cases may have substantial capacity for use.
Breede River

Unmodified, natural.

(b) the historic ecological condition (reference) as well as present ecological state of rivers (in-stream, riparian and floodplain habitat), wetlands and/or

The result of the PES and EIS assessments that were completed for the aquatic ecosystem that could potentially be affected by the proposed development is reflected in table above.

Non-perrenial Rivers which is a tributary of the Breede river.
Quaternaries/delineations that are considered to be unique on a national scale based on their biodiversity (habitat diversity, species diversity, unique species, rare and endangered species). These rivers (in terms of biota and habitat) may be sensitive to flow modifications but in some cases may have substantial capacity for use.
Breede River
Unmodified, natural.

4.8. The assessment must identify alternative development footprints within the preferred site which would be of a "low" sensitivity as identified by the screening tool and verified through the site sensitivity verification and which were not considered appropriate.

No alternative area is required. The proposed development site is appropriate and will not affect the status of the aquatic biodiversity features identified on site as a result of its location outside the 1:100 year flood line area. The buffer in between the development and Breede river floodplain wetland and non-perennial river is sufficient.

4.9. Related to impacts, a detailed assessment of the potential impacts of the proposed development on the following aspects must be undertaken to answer the following questions:

4.9.1. is the proposed development consistent with maintaining the priority aquatic ecosystem in its current state and according to the stated goal?

Yes. It will not affect the status of the aquatic biodiversity features identified as a result of its location outside the 1:100 year flood line area and delineated wetlands, provided that the management and mitigation measures are adhered to.

4.9.2. is the proposed development consistent with maintaining the resource quality objectives for the aquatic ecosystems present?

Yes. It will not affect the status of the aquatic biodiversity features identified as a result of its location outside the 1:100 year flood line area and delineated wetlands, provided that the management and mitigation measures are adhered to.

4.9.3. how will the proposed development impact on fixed and dynamic ecological processes that operate within or across the site? This must include: (a) impacts on hydrological functioning at a landscape level and across the site which can arise from changes to flood regimes (e.g.

suppression of floods, loss of flood attenuation capacity, unseasonal flooding or destruction of floodplain processes);

The proposed development will not impact fixed and dynamic ecological processes which operate within or across the site. It will not alter the hydrological functioning at a landscape level and across the site and will not lead to changes to flood regimes. The development is located outside the 1:100 year flood line. Stormwater from site will be controlled and release into the existing hydrological systems.

(b) will the proposed development change the sediment regime of the aquatic ecosystem and its sub-catchment (e.g. sand movement, meandering river mouth or estuary, flooding or sedimentation patterns);

The proposed development will not result in changes to the sediment regime of the aquatic ecosystem and its sub-catchment.

(c) what will the extent of the modification in relation to the overall aquatic ecosystem be (e.g. at the source, upstream or downstream portion, in the temporary / seasonal / permanent zone of a wetland, in the riparian zone or within the channel of a watercourse, etc.); and

The extent of the overall aquatic ecosystem will not be modification.

(d) to what extent will the risks associated with water uses and related activities change;

Water Use Risk Assessment conducted is available upon request. The risk is assessed to be low the BGCMA has confirmed the proposed development can be authorised under the requirement of a General Authorisation.

4.9.4. ***how will the proposed development impact on the functioning of the aquatic feature? This must include:***

(a) base flows (e.g. too little or too much water in terms of characteristics and requirements of the system);

Base flows will not be altered.

(b) quantity of water including change in the hydrological regime or hydroperiod of the aquatic ecosystem (e.g. seasonal to temporary or permanent; impact of over-abstraction or instream or off-stream impoundment of a wetland or river);

No changes in quantity of water including change in the hydrological regime or hydroperiod of the aquatic ecosystem will occur.

(c) change in the hydrogeomorphic typing of the aquatic ecosystem (e.g. change from an unchannelled valley-bottom wetland to a channelled valley-bottom wetland);

No change in the hydrogeomorphic typing of the aquatic ecosystem will occur.

(d) quality of water (e.g. due to increased sediment load, contamination by chemical and/or organic effluent, and/or eutrophication);

The proposed development is not expected to impact on the quality of the surface or groundwater water if property managed. The depth of the groundwater on site is 31.15 meters below ground level (mbgl). The Aquifer is classified as a minor aquafer with ground water quality of EC (mS/m) 370 – 520. The soils are shallow (< 450 mm) on hard or weathering rock, with or without intermittent diverse soils. Lime generally present in part or most of the landscape. The clay content of these soils is < 15%. The soakaway will be located next to the existing soakaway. It will be above the groundwater level, which is approximately 31 mbgl with a significant buffer area and protected by impermeable hard weathered rock. The seep of the overflow of the soakaway will flow above the impermeable hard weathered rock with a subservice hydrological flow in the in the subsurface shallow (< 450 mm) Glenrosa and/or Mispah soil layer.

(e) fragmentation (e.g. road or pipeline crossing a wetland) and loss of ecological connectivity (lateral and longitudinal); and

The proposed development will not result in further fragmentation.

(f) the loss or degradation of all or part of any unique or important features associated with or within the aquatic ecosystem (e.g. waterfalls, springs, oxbow lakes, meandering or braided channels, peat soils, etc.);

The loss or degradation of all or part of any unique or important features associated with or within the aquatic ecosystem will not occur as a result of the proposed development.

4.10. how will the proposed development impact on key ecosystems regulating and supporting services especially:

(a) flood attenuation;

None required.

(b) streamflow regulation;

None required.

(c) sediment trapping;

None required.

5. SITE SENSITIVITY ASSESSMENT

The ecological sensitivity of the development site is rated as low (transformed areas) to medium (immediate areas in good condition, but small footprint of development).

6. IMPACT ASSESSMENT

6.1. Assessment & Significance Criteria

The assessment criteria used in the assessment are drawn from the EIA Regulations, published by the Department of Environmental Affairs and Tourism (April 1998) in terms of the Environmental Conservation Act No. 73 of 1989, in terms of the National Environmental Management: Biodiversity Act (2004) as well as Brownlie (2005).

6.2. Assessment of Potential Impacts

The impacts identified are assessed below, before and after mitigation as well as during construction.

The impact assessment which follows is based on the site sensitivity and any deviations from the site sensitivity map as provided may invalidate the results of the assessment.

6.3. Risk Assessment Criteria

Below is the assessment methodology utilized in determining the significance of the potential mining impacts on the biophysical environment, and where applicable the possible alternatives. The methodology is broadly consistent with that described in the Department of Environmental Affairs' Guideline Document on the EIA Regulations (1998).

For each potential impact, the significance is determined by specified factors as in Table 1. Significance is described prior to mitigation as well as with the most effective mitigation measure(s) in place.

The mitigation described in the document represents the full range of plausible and pragmatic measures that must be implemented.

Despite the attempts at providing a completely objective and impartial assessment of the environmental implications of proposed activities, the specialist can never completely escape the subjectivity inherent in attempting to define significance.

Recognising this, potential subjectivity in the current process is addressed as follows:

- Be clear about the difficulty of being completely objective in the determination of significance;
- Develop an explicit methodology for assigning significance to impacts and outlining this methodology in detail. Having an explicit methodology not only forces the assessor to come to terms with the various facets contributing toward determination of significance, thereby avoiding arbitrary assignment, but also provides the reader of the report with a clear summary of how the assessor derived the assigned significance; and
- Wherever possible, differentiating between the likely significance of potential environmental impacts as experienced by the various affected parties.

Although these measures may not totally eliminate subjectivity, they do provide an

explicit context within which to review the assessment of impacts.

Table 1: Assessment criteria for the evaluation of impacts

Criteria	Description		
Nature	a description of what causes the effect, what will be affected, and how it will be affected.		
	Type	**Score**	**Description**
Extent (E)	None (No)	1	Footprint
	Site (S)	2	On site or within 100 m of the site
	Local (L)	3	Within a 20 km radius of the centre of the site
	Regional (R)	4	Beyond a 20 km radius of the site
	National (Na)	5	Crossing provincial boundaries or on a national / land wide scale
Duration (D)	Short term (S)	1	0 – 1 years
	Short to medium (S-M)	2	2 – 5 years
	Medium term (M)	3	5 – 15 years
	Long term (L)	4	> 15 years
	Permanent(P)	5	Will not cease
Magnitude (M)	Small (S)	0	will have no effect on the environment
	Minor (Mi)	2	will not result in an impact on processes
	Low (L)	4	will cause a slight impact on processes
	Moderate (Mo)	6	processes continuing but in a modified way
	High (H)	8	processes are altered to the extent that they temporarily cease
	Very high (VH)	10	results in complete destruction of patterns and permanent cessation of processes.
Probability (P) the likelihood of the impact actually occurring. Probability is estimated on a scale, and a score assigned	Very improbable (VP)	1	probably will not happen
	Improbable (I)	2	some possibility, but low likelihood
	Probable (P)	3	distinct possibility
	Highly probable (HP)	4	most likely
	Definite (D)	5	impact will occur regardless of any prevention measures
Significance (S)	Determined through a synthesis of the characteristics described above: **S = (E+D+M) x P** Significance can be assessed as low, medium or high		
Low: < 30 points:	The impact would not have a direct influence on the decision to develop in the area		
Medium: 30 – 60 points:	The impact could influence the decision to develop in the area unless it is effectively mitigated		
High: < 60 points:	The impact must have an influence on the decision process to develop in the area		
No significance	When no impact will occur or the impact will not affect the environment		
Status	Positive (+)		Negative (-)
The degree to which the impact can be reversed	Completely reversible (R)	90-100%	The impact can be mostly to completely reversed with the implementation of the correct mitigation and rehabilitation measures.
	Partly reversible (PR)	6-89%	The impact can be partly reversed providing that mitigation measures as stipulated in the EMP are implemented and rehabilitation measures are undertaken
	Irreversible (IR)	0-5%	The impact cannot be reversed, regardless of the mitigation or rehabilitation measures taking place
The degree to which the impact may cause irreplaceable loss of resources	Resource will not be lost (R)	1	The resource will not be lost or destroyed provided that mitigation and rehabilitation measures as stipulated in the EMP are implemented
	Resource may be partly destroyed (PR)	2	Partial loss or destruction of the resources will occur even though all management and mitigation measures as stipulated in the EMP are implemented
	Resource cannot be replaced (IR)	3	The resource cannot be replaced no matter which management or mitigation measures are implemented.
The degree to which the impact can be avoided	Completely avoidable (CA)	1	The impact can be completely avoided providing that all management and mitigation measures as stipulated in the EMP are implemented
	Partly avoidable (PA)	2	The impact cannot be completely avoided even though all management and mitigation measures as stipulated in the EMP are implemented. Implementation of these measures will provide a measure of mitigatibility
	Un-avoidable (UA)	3	The impact cannot be avoided no matter which management or mitigation measures are implemented.
	Complete	1	The impact can be completely managed providing that all

Criteria	Description		
The degree to which the impact can managed/mitigated	manageable		management and mitigation measures as stipulated in the EMP are implemented
	Partly manageable	2	The impact cannot be completely managed even though all management and mitigation measures as stipulated in the EMP are implemented. Implementation of these measures will provide a measure of mitigatibility
	Unmanageable	3	The impact cannot be managed no matter which management or mitigation measures are implemented.

AQUATIC BIODIVERSITY IMPACTS ASSESSMENT

(a) Impacts that may result from the planning, design and **construction phases** (briefly describe and compare the impacts (as appropriate), significance rating of impacts, proposed mitigation and significance rating of impacts after mitigation that may occur as a result of the planning, design and construction phases.

Nature of impact:
Increase in and accumulation of storm water runoff

Discussion:
Removal of vegetated areas may cause an increase in storm water runoff and excavations may lead to accumulation/damming thereof on the site and surrounds.

Cumulative impacts:
Increase in storm water runoff could cause erosion and/or damming of water which may lead to additional negative impacts like further habitat degradation and transformation.

Mitigation:

- Undertake storm water management measures as recommended in the environmental management program.
- Monitor for erosion. Should erosion be present, undertake maintenance activities to rectify and prevent further erosion.
- Demarcate no-go areas before construction commences and maintain demarcation throughout construction phase.
- All roads need to be maintained and monitored. Visible signs of possible erosion must be immediately rehabilitated.
- Monitor impacted areas for erosion and accumulation of water on an ongoing basis and implement mitigation measures as and if required.
- Stormwater discharge flow must be managed and restricted in such a manner that it does not cause erosion.
- Rehabilitate or stabilise eroded areas immediately to prevent increase/spread of erosion.
- Appropriate and effective storm water management measures must be put in place to ensure that erosion and environmental degradations outside of the proposed development footprint area does not occur, but the storm water measures implemented must not impede storm water flow to such an extent that it is completely stopped. Current hydrological processes outside of the proposed development footprint area must continue to function as is.
- Conduct and complete construction activities as far as possible during the dry summer months.
- Only excavate materials from proposed construction sites as according to approved layout plans.
- Do not remove any plant or soil materials from outside of the development areas.
- Do not create any additional access routes.

Criteria	Layout Alternative 1 Without Mitigation	With Mitigation			No-Go Alternative Without Mitigation	With Mitigation
Extent	2	1			Neutral (Site remains as is)	
Duration	5	2				
Magnitude	10	6				
Probability	5	3				

Significance	85 - High	27 – Low			
Status	High negative significance if not mitigated	Low negative significance if mitigated			
Reversibility	100%				
Irreplaceable loss of resources	2 Partly – While increase in storm water runoff is inevitable erosion can still be prevented and mitigated if required.				
Can impacts be mitigated?	2 Partly – While increase in storm water runoff is inevitable erosion can still be prevented and mitigated if required.				

Nature of potential impact:
Impacts of construction activities on the hydrological functioning of the site and surrounds which includes the Breerivier and a non-perennial tributary

Discussion:
Construction activities may temporarily impact hydrological processes i.e. stormwater runoff.

Cumulative impacts:
Due to removal of indigenous vegetation stormwater runoff on the exposed surfaces may lead to erosion of the site and surrounds and stormwater runoff may follow "new" flow paths altering the current hydrological processes of the site and surrounds

Mitigation:

- Clearance of indigenous vegetation must be kept to a minimum clearly demarcating the proposed development area before construction commencement, maintaining the demarcation throughout the construction phase and only clearing the area required for the development.
- Construction activities must be completed as quickly as possible to limit disturbance caused ecology as far as possible.
- All unused construction materials must be removed from site immediately after construction completion.
- No concrete/cement mixing may take place on any permeable soil surface and must at all times be contained within an impermeable mixing area and no mixing waste water may enter the environment.
- No waste pollution may occur due to the construction activities and all waste must be contained and disposed of at the municipal landfill site on a daily basis.
- Revegetation of the impacted undeveloped areas must be done as soon as possible after construction completion and only indigenous vegetation species may be used for rehabilitation and landscaping.

Criteria	**Layout Alternative 1**				**No-Go Alternative**	
	Without Mitigation	**With Mitigation**			**Without Mitigation**	**With Mitigation**
Extent	2	1			Not Applicable (No construction activities to take place during the No-Go Alternative)	
Duration	1	1				
Magnitude	6	2				
Probability	5	2				
Significance	45 - Medium	8 – Low				
Status	Medium Negative Significance without Mitigation	Low Negative Significance with Mitigation				
Reversibility	100% Reversible					
Irreplaceable loss of resources	2 – Partly, some loss of indigenous vegetation will occur but will be limited.					
Can impacts be mitigated?	2 – Partly, some loss of indigenous vegetation will occur but will be limited.					

(b) Impacts that may result from the **operational phase** (briefly describe and compare impacts (as appropriate), significance rating of impacts, proposed mitigation and significance rating of impacts after mitigation that are likely to occur as a result of the operational phase.

Nature of impact: Increase in storm water runoff due to removal of vegetation and hardening of surfaces which may lead to erosion of surrounding areas
Discussion: Due to the removal of vegetation and hardening of surfaces the stormwater discharge may lead to erosion of surrounding environments if not mitigated.
Cumulative impacts: Erosion may lead to loss in topsoil and impact on surrounding undeveloped natural areas.
Mitigation: • Stormwater discharge flow must be managed and restricted in such a manner that it does not cause erosion. • Rehabilitate or stabilise eroded areas immediately to prevent increase/spread of erosion. • Stormwater infrastructure must not cause erosion of the surrounding remaining undeveloped areas, but still allow current hydrological processes to continue as is. • Park management must maintain all stormwater infrastructure on a regular basis to ensure that it is working effectively and is not blocked with waste and is not causing erosion.

Criteria	**Layout Alternatives 1**				**No-Go Alternative**	
	Without Mitigation	**With Mitigation**			**Without Mitigation**	**With Mitigation**
Extent	3	1			Neutral (Site remains as is)	
Duration	5	1				
Magnitude	6	2				
Probability	4	2				
Significance	56 - Medium	8 - Low				
Status	Medium negative significance if not mitigated	Low negative significance if mitigated				
Reversibility	100%					
Irreplaceable loss of resources	2 Partly – While increase in storm water runoff is inevitable erosion can still be prevented and mitigated if required.					
Can impacts be mitigated?	2 Partly – While increase in storm water runoff is inevitable erosion can still be prevented and mitigated if required.					

Nature of potential impact: Impacts of operational activities on the hydrological functioning of the site and surrounds
Discussion: Operational activities may impact hydrological processes i.e. stormwater runoff within the non-perennial drainage line.
Cumulative impacts: Due to removal of indigenous vegetation stormwater runoff on the exposed areas may lead to erosion of the site and surrounds and stormwater runoff may follow "new" flow paths altering the current hydrological processes of the site and surrounds
Mitigation:

- The discharge of stormwater must not lead to waste pollution of the surrounding environments.
- Discharge of stormwater must be controlled and must be done in such a manner that it does not cause erosion of the site or surrounds, should any erosion be detected this must be rectified immediately and prevention measures must be put in place.
- All stormwater infrastructure must be maintained in a good condition not leading to any environmental degradation.

Criteria	Layout Alternative 1 Without Mitigation	With Mitigation			No-Go Alternative Without Mitigation	With Mitigation
Extent	2	1			Not Applicable (No construction activities to take place during the No-Go Alternative)	
Duration	5	1				
Magnitude	6	2				
Probability	5	2				
Significance	65 - High	8 – Low				
Status	High Negative Significance without Mitigation	Low Negative Significance with Mitigation				
Reversibility	100% Reversible					
Irreplaceable loss of resources	2 – Partly, some loss of indigenous vegetation will occur but will be limited.					
Can impacts be mitigated?	2 – Partly, some loss of indigenous vegetation will occur but will be limited.					

Nature of potential impact:

Impacts of operational activities of the picnic site, swimming pool, ablution facilities and associated soakaway on surface and groundwater resources.

Discussion:

As far as possible the proposed development has been placed on already cleared and impacted areas and along existing roads and pipeline routes to minimise impacts on the natural watercourses. The proposed development is also to be located behind the existing picnic area, outside of the 1:100 year floodline area of the Breerivier and the soakaway is proposed adjacent to the existing soakaway away from the Breerivier tributary and non-perennial drainage line crossing the site.

The proposed development is not expected to impact on the quality of the surface or groundwater water if property managed. The depth of the groundwater on site is 31.15 meters below ground level (mbgl). The Aquifer is classified as a minor aquafer with ground water quality of EC (mS/m) 370 – 520. The soils are shallow (< 450 mm) on hard or weathering rock, with or without intermittent diverse soils. Lime generally present in part or most of the landscape. The clay content of these soils is < 15%. The soakaway will be located next to the existing soakaway. It will be above the groundwater level, which is approximately 31 mbgl with a significant buffer area and protected by impermeable hard weathered rock. The seep of the overflow of the soakaway will flow above the impermeable hard weathered rock with a subservice hydrological flow in the in the subsurface shallow (< 450 mm) Glenrosa and/or Mispah soil layer.

Cumulative impacts:

Cumulative impacts of the operational activities of the picnic site and associated infrastructure are related to polluted discharge from the new facilities which may cause pollution of the groundwater and surface water resources within the area.

Mitigation:

- Clearance of indigenous vegetation and physical disturbance on site must be kept to a minimum clearly demarcating the proposed development area before construction commencement, maintaining the demarcation throughout the construction phase and only clearing the area required for the development.
- All unused construction materials must be removed from site immediately after construction completion.
- No waste pollution may occur due to the construction activities and all waste must be contained and disposed of at the municipal landfill site on a daily basis.
- All landscaping of undeveloped and areas disturbed during construction must be done with indigenous vegetation.
- Grass for landscaping must be limited to Cynodon dactylon (kweekgras) or Panicum maximum (buffelsgras), no kikuyu grass (Pennisetum clandestinum) may be used or planted for landscaping of disturbed areas.
- Planted grass such as for the proposed picnic area must be prevented from encroaching further into the remaining and rehabilitating indigenous vegetation landscaped and undeveloped areas.
- The discharge of stormwater must not lead to waste pollution or erosion of surrounding undeveloped areas.
- Ongoing monitoring of erosion within and around the development site and should any signs of erosion be detected immediate rectification and further prevention measures must be put in place under the guidance of a qualified ecological specialist so as to prevent any additional cumulative impacts on the environment.
- The impacted site must be monitored for alien vegetation encroachment and should alien vegetation encroach on the impacted site it must be removed and monitored in accordance with parks alien vegetation management plan.
- All infrastructure and developments must be maintained in a good working condition not leading to any environmental degradation.
- Swimming pool water and sewage may not be discharged into the environment and must be managed in a closed system which must be maintained and monitored for leakages.
- No high intensity lights may be left on during the night that shines outwards as this will lead to light pollution impacting on especially nocturnal aquatic animal and bird species.
- Use only existing access roads and do not create any new access roads to proposed development sites especially through the drainage line.
- No pollution of surface water or ground water resources may occur due to activities on the property and soakaway discharge must monitored and if any signs of pollution is detected rectification measures must be implemented.

Criteria	**Layout Alternative 1**				**No-Go Alternative**	
	Without Mitigation	**With Mitigation**			**Without Mitigation**	**With Mitigation**
Extent	2	1			Not Applicable (No construction activities to take place during the No-Go Alternative)	
Duration	5	5				
Magnitude	4	2				
Probability	5	2				
Significance	55 – Medium	16 – Low				
Status	Medium Negative Significance	Low Negative Significance				

	without Mitigation	with Mitigation			
Reversibility	100% Reversible				
Irreplaceable loss of resources	2 – Partly, some disturbance will occur but will be limited.				
Can impacts be mitigated?	2 – Partly, some disturbance will occur but will be limited.				

Cumulative Impacts

Cumulative impacts arise from the combined presence of several similar developments within an area which affect aquatic biodiversity and ecological processes operating at broader scales or which each have a small impact which becomes significant when combined. There are other developments that also represents a source of disturbance and habitat loss, which when combined with the proposed development would result in some cumulative impact. However, when taken in context of the broader landscape, the cumulative impacts are not likely to be highly significant given the aquatic biodiversity features of the area.

7. CONCLUSION AND RECOMMENDATIONS

Enviro-EAP (Pty) Ltd was appointed to undertake a Present Ecological State (PES) and Ecological Importance and Sensitivity (EIS) analysis of the freshwater and riparian resources.

NFEPA wetlands were mapped associated with the Breede river and its flood plain. The delineated wetlands are all located within the 1:100 year flood line and not on the development area. There are no aquatic biodiversity features in the development area. The closest is the non-perennial river which is in a high ecological state. However, the non-perennial river is traversed by the existing access roads at two locations and inundated next to the Breede River. The electrical cable and potable water and wastewater pipelines will be located within the disturbance footprint of the access road which traverses the non-perennial river. Existing culverts under the roads allow for adequate flow of water under the roads. The one parking area is the closest to the non-perennial river and riparian area. The parking lot avoids the watercourse and an appropriate buffer is between the non-perennial river and parking lot.

The proposed development is not expected to impact on the quality of the surface or groundwater water if property managed. The depth of the groundwater on site is 31.15 meters below ground level (mbgl). The Aquifer is classified as a minor aquafer with ground water quality of EC (mS/m) 370 – 520. The soils are shallow (< 450 mm) on hard or weathering rock, with or without intermittent diverse soils. Lime generally present in part or most of the landscape. The clay content of these soils is < 15%. The soakaway will be

located next to the existing soakaway. It will be above the groundwater level, which is approximately 31 mbgl with a significant buffer area and protected by impermeable hard weathered rock. The seep of the overflow of the soakaway will flow above the impermeable hard weathered rock with a subservice hydrological flow in the in the subsurface shallow (< 450 mm) Glenrosa and/or Mispah soil layer.

The information gathered from the site survey does not differ from the Environmental Screen report. The development of the site as per the proposed development will have a **low negative** impact on aquatic biodiversity due to the transformed nature of the site.

The following mitigation measures is proposed to avoid impacts and where avoidance is not possible to mitigate the significance of the potential impacts on surface and groundwater resources:

- Undertake storm water management measures as recommended in the environmental management program.
- Monitor for erosion. Should erosion be present, undertake maintenance activities to rectify and prevent further erosion.
- Demarcate no-go areas before construction commences and maintain demarcation throughout construction phase.
- All roads need to be maintained and monitored. Visible signs of possible erosion must be immediately rehabilitated.
- Monitor impacted areas for erosion and accumulation of water on an ongoing basis and implement mitigation measures as and if required.
- Stormwater discharge flow must be managed and restricted in such a manner that it does not cause erosion.
- Rehabilitate or stabilise eroded areas immediately to prevent increase/spread of erosion.
- Appropriate and effective storm water management measures must be put in place to ensure that erosion and environmental degradations outside of the proposed development footprint area does not occur, but the storm water measures implemented must not impede storm water flow to such an extent that it is completely stopped. Current hydrological processes outside of the proposed development footprint area must continue to function as is.
- Conduct and complete construction activities as far as possible during the dry summer months.
- Only excavate materials from proposed construction sites as according to approved layout plans.
- Do not remove any plant or soil materials from outside of the development areas.
- Do not create any additional access routes.
- Clearance of indigenous vegetation and physical disturbance on site must be kept to a minimum clearly demarcating the proposed development area before

construction commencement, maintaining the demarcation throughout the construction phase and only clearing the area required for the development.

- Construction activities must be completed as quickly as possible to limit disturbance caused ecology as far as possible.
- No concrete/cement mixing may take place on any permeable soil surface and must at all times be contained within an impermeable mixing area and no mixing waste water may enter the environment.
- No waste pollution may occur due to the construction activities and all waste must be contained and disposed of at the municipal landfill site on a daily basis.
- Revegetation of the impacted undeveloped areas must be done as soon as possible after construction completion and only indigenous vegetation species may be used for rehabilitation and landscaping.
- All unused construction materials must be removed from site immediately after construction completion.
- No waste pollution may occur due to the construction activities and all waste must be contained and disposed of at the municipal landfill site on a daily basis.
- All landscaping of undeveloped and areas disturbed during construction must be done with indigenous vegetation.
- Grass for landscaping must be limited to Cynodon dactylon (kweekgras) or Panicum maximum (buffelsgras), no kikuyu grass (Pennisetum clandestinum) may be used or planted for landscaping of disturbed areas.
- Planted grass such as for the proposed picnic area must be prevented from encroaching further into the remaining and rehabilitating indigenous vegetation landscaped and undeveloped areas.
- The discharge of stormwater must not lead to waste pollution or erosion of surrounding undeveloped areas.
- Ongoing monitoring of erosion within and around the development site and should any signs of erosion be detected immediate rectification and further prevention measures must be put in place under the guidance of a qualified ecological specialist so as to prevent any additional cumulative impacts on the environment.
- The impacted site must be monitored for alien vegetation encroachment and should alien vegetation encroach on the impacted site it must be removed and monitored in accordance with parks alien vegetation management plan.
- All infrastructure and developments must be maintained in a good working condition not leading to any environmental degradation.
- Swimming pool water and sewage may not be discharged into the environment and must be managed in a closed system which must be maintained and monitored for leakages.
- No high intensity lights may be left on during the night that shines outwards as this will lead to light pollution impacting on especially nocturnal aquatic animal and bird species.

- Use only existing access roads and do not create any new access roads to proposed development sites especially through the drainage line.
- No pollution of surface water or ground water resources may occur due to activities on the property and soakaway discharge must monitored and if any signs of pollution is detected rectification measures must be implemented.
- Discharge of stormwater must be controlled and must be done in such a manner that it does not cause erosion of the site or surrounds, should any erosion be detected this must be rectified immediately and prevention measures must be put in place.
- All stormwater infrastructure must be maintained in a good condition not leading to any environmental degradation.

8. REFERENCES

CapeNature. 2024. 2023 Western Cape Biodiversity Spatial Plan and Guidelines Overview V2.0. Unpublished Report.

Driver, Nel, Snaddon, Murray, Roux, Hill (2011). Implementation Manual for Freshwater Ecosystem Priority Areas. Draft Report for the Water Research Commission.

DWAF, 2009. Rapid Habitat Assessment Model Manual. Report no RDM/ Nat/00/CON/0707. Authors: D Louw & CJ Kleynhans Submitted by Water for Africa.

KEMPER, N. 1999: Intermediate habitat integrity assessment for use in the rapid and intermediate assessments. IWR Environmental.

Kleynhans C.J., Thirion C. and Moolman J. 2005. *A Level 1 Ecoregion Classification System for South Africa, Lesotho and Swaziland*. Report No. N/0000/00/REQ0104. Resource Quality Services, Department of Water Affairs and Forestry, Pretoria
Kleynhans CJ, Louw MD. 2007. Module A: EcoClassification and EcoStatus determination in River EcoClassification: Manual for EcoStatus Determination (version 2). Joint Water Research Commission and Department of Water Affairs and Forestry report. WRC Report No.

Kleynhans CJ, Mackenzie J, Louw MD. 2007. Module F: Riparian Vegetation Response Assessment Index in River Eco Classification: Manual for EcoStatus Determination (version 2). Joint Water Research Commission and DWA and Forestry report.

Mucina L and Rutherford M. C (eds.) (2004) Vegetation map of South Africa, Lesotho and Swaziland. *Strelitzia* 18. South African National Biodiversity Institute, Pretoria.

SANBI Biodiversity GIS 2016. http://bgis.sanbi.org/WCBF14/additional.asp

APPENDIX A
SPECIALIST CV

CURRICULUM VITAE – NICOLAAS WILLEM HANEKOM

Profession: Environmental Scientist and Environmental Assessment Practitioner

Date of Birth: 01/02/1967

BIOGRAPHICAL SKETCH

Nicolaas Hanekom is a registered Professional Natural Scientist in the ecological science field with the South African Council for Natural Scientific Professions ("SACNASP"), Pri Sci Nat (Reg. No. 004415) Ecological Science (Pri.Sci.Nat); Aquatic Science & Conservation Science (Cand.Sci.Nat) and a qualified registered Environmental Assessment Practitioner ("EAP") who holds a Masters Technologiae, Nature Conservation ("Vegetation Ecology and Biodiversity Assessment") degree from the Cape Peninsula University of Technology (Refer to Appendix A, CV). Nicolaas Hanekom is suitably qualified SACNASP registered specialist.

He has also completed the suite of Greener Governance courses with certificates in;

- An Overview of Environmental Management at the Local Government Level, Centre for Environmental Management, North-West University;
- Greener Governance for Local Authorities, Centre for Environmental Management, North-West University;
- Tools for Integrated Environmental Management and Governance, Centre for Environmental Management, North-West University.

He further attended and obtained a certificate on Integrated Protected Area Planning at the Centre for Environmental Development, University of Kwa Zulu Natal and a certificate in Project Management (Theory and Practical), through CS Holdings. Nicolaas has lectured in two subjects at the Cape Peninsula University of Technology. He has 26 years of environmental planning experience, working for Free State and Western Cape departments of environmental affairs, where he reviewed and commented on development (EIA) applications, in the West Coast Region.

He has, as practising EAP been responsible for many environmental impact assessments and EIA applications, waste license and atmospheric emission license applications.

He has also been involved in the implementation of several environmental management systems. He has engaged successfully with various clients as set out below.

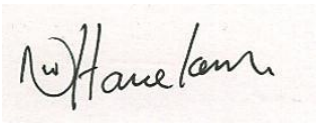
Areas of specialisation:	• Ecosystem (terrestrial and aquatic) monitoring and assessments • Design of monitoring programmes for ecosystems (terrestrial and aquatic) • Environmental Impact Assessments • River classification and environmental water requirements • Wetlands Delineation • River and Wetlands management • Water Use Authorization Applications • Water quality management • River Health Assessments
Countries of Work Experience:	South Africa (Northern Cape, Western Cape, Free State, Mpumalanga, Gauteng)
Employment Record	• Student at Bontebok National Park (1992) • Assistant Reserve Manager at Gariep Dam Nature Reserve, Free State (1993 - 1998) • Reserve Manager, Conservation Services Manager for Western Cape Nature Conservation Board (1998 - 2006) • External Lecturer at Cape Peninsula University of Technology (2003 - 2005) • Director: Environmental Management at Cape Lowlands Environmental Services (2006 – 2010) • Director, Environmental Management and lead Environmental Impact Assessment Practitioner at Eco Impact (Pty) Ltd (2010 – to August 2019) • Director, Environmental Management and lead Environmental Impact Assessment Practitioner at Enviro-EAP (Pty) Ltd (September 2019 – to date)
Professional membership, accreditations and courses	• South African Council for Natural Scientists Professions Pri.Sci.Nat (Ecological Science) • Riparian vegetation identification and health assessment. Internal Western Cape Nature Conservation short course presented by Dr C Boucher (Stellenbosch University) in 2000. • SASS5 Aquatic Biomonitoring Training Course. 2 to 5 September 2013. Ground Truth Water and Environmental Engineering consultancy in partnership with the Department of Water Affairs. • Workshop on “Section 21(c) and (i) Water Use Training: Understanding Watercourses and Managing Impacts to their Characteristics”. 10 May 2017. Presented by Dr Wietsche Roets of the Department of Water and Sanitation (Sub-Directorate: Instream Water Use).

Summary of experience	1992: South African National Parks. Student at Bontebok National Park with management and monitoring actions related to the Breede River. 1993 -1998: Free State Nature Conservation. Ecological management and monitoring actions related to the Gariep Dam, Orange and Caledon Rivers. 1998 -2006: CapeNature. Ecological management and monitoring actions related to the Berg River Estuary, Verlorenvlei, Lamberts bay's Jackalsvlei, Wadrift Soutpanne, Oliphant's River mouth, Rocherpan Nature Reserve, etc. Review and assessment of EIA applications, inclusive of Freshwater ecology. Did some site visits with Department of Water Affairs and Forestry (Hester Lyons) to confirm the presence of aquatic ecological features during EIA water use registration applications. 2006 to date: Cape Lowland Environmental Services, Eco Impact Legal Consultant and Enviro-EAP. Ecological (Freshwater and aquatic) Specialist input, assessment, monitoring and reports.
Publications and assessment reports	Just to name a few. Was involved in many Ecological Assessments, monitoring and inputs in EIA applications. • Elandskloof Farm 475 Citrusdal Biodiversity Baseline Survey. August 2010. This Biodiversity Assessment Covering Terrestrial and Aquatic Aspects to Inform Decisions Regarding The Proposed Elandskloof Weir Flood Damage Project On Farm 475, In The Citrusdal Area. • Cape Solar Energy Electricity Generation Facility. Farm 187/3 & 187/13 Kenhardt. Biodiversity And Ecological Baseline Survey. January 2011. (Included Terrestrial and aquatic ecological assessments and water use authorization applications) • Prieska Photvoltaic Power Generation Project. Prieska Commonage Northern Cape. Biodiversity And Ecological Baseline Survey. July 2011. (Included Terrestrial and aquatic ecological assessments and water use authorization applications) • Witteklip Erf 123 Extension, Vredenburg. Biodiversity Baseline Survey. Updated - October 2012 (Included Terrestrial and aquatic ecological assessments and water use authorization applications) • Baseline Biodiversity Survey And Wetland Delineation for ECCA Holdings: Cape Bentonite Mine on Erf 1412 Near Heidelberg. Prepared for: Shangoni Management Services Pry (Ltd). October 2014. • Freshwater Impact Assessment Laingsburg Flood Damage Repairs & Storm Water Infrastructure. 18 February 2016. • Ecological Assessment for Swartland Municipality - Upgrades To Voortrekker/Bokomo Road And Voortrekker/Rozenburg

	Road Intersections and Upgrade to the Diep River Bridge, Malmesbury on A Portion Of Erf 327, Malmesbury (Road) Erf 1530, Diep River Bridge Crossing, and Erf 1528, Property South of Diep River where Road Widening and Turning Circle Will Be Constructed. March 2016. (Freshwater Ecology Inputs and Water Use Registration) • Freshwater Impact Assessment. McGregor Bridge, Robertson Bridge and Willem Nels River Maintenance Management Plan. 24 June 2016. (Freshwater Ecology assessment and input as well as Water Use Registration) • Water Use Authorization Application Risk Matrix. Orange Grove Trust Vegetation Clearing and Agricultural Development on Portion 4 of Farm Glen Heatlie No 316, Worcester. 12 June 2017. (Freshwater ecological inputs in EIA process and Water Use Registration). • Water Use Authorization Application Risk Matrix Prepared For: Witzenberg Municipality Sand Mine Farm 1 Prince Alfred Hamlet. 28 March 2017. (Freshwater ecological inputs in EIA process and Water Use Registration). • Proposed Hartmanshoop Agri Vegetation Clearing Project and Irrigation on Erf 686, Laingsburg. 12 August 2017. (Freshwater ecological inputs in Water Use Registration). • County Fair: Hocraft Abattoir And Rendering Facility Waste Water Treatment Works “CF Hocraft WWTW” Mosselbank River Second Quarter 2018 Biomonitoring Report. June 2018. (Done quarterly biomonitoring for the last three years).

CERTIFICATION

I, the undersigned, certify that to the best of my knowledge and belief, these data correctly describe my qualifications, my experience, and me.



Nicolaas Hanekom Pri Sci Nat (Ecology).
Registration number 004415

SACNASP

South African Council for Natural Scientific Professions

herewith certifies that

Nicolaas Willem Hanekom

Registration Number: 004415

is a registered scientist

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

Ecological Science (Professional Natural Scientist)
Aquatic Science (Candidate Natural Scientist)
Conservation Science (Candidate Natural Scientist)
Zoological Science (Candidate Natural Scientist)

Effective **27 July 2011** Expires **31 March 2026**

Chairperson

Chief Executive Officer

To verify this certificate scan this code