PEER REVIEWED REVISED AQUATIC BIODIVERSITY COMPLIANCE STATEMENT

PROPOSED WATER TREATMENT WORKS ON ERF RE/557 AND ERF 672 HEIDELBERG

Enviro-EAP
Environmental Consultants

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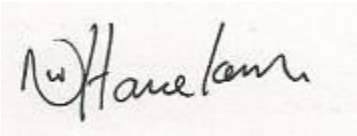
ORIGINALLY COMPILED SEPTEMBER 2026
1st REVISION FEBRUARY 2026

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
    - ~~am not independent, but another specialist (the "Review Specialist") that meets the general requirements set out in Regulation 13 of the NEMA EIA Regulations has been appointed to review my work (Note: a declaration by the review specialist must be submitted);~~
- 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 **26 February 2026**
Signature of the ~~EAP~~/ Specialist: Date:

Enviro-EAP (Pty) Ltd
Name of company (if applicable):

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1. INTRODUCTION

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 (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 as confirmed by SACNASP in an email on 1 August 2025 below.

From: Phutiane Letsoalo <Phutiane.Letsoalo@sacnasp.org.za>
Sent: Friday, 01 August 2025 12:55
To: Nicolaas Hanekom <nicolaas@enviro-eap.co.za>
Cc: SACNASP Registrations <registrations@sacnasp.org.za>
Subject: RE: Guidance on which registration category or field will be required to conduct Freshwater specialist conducting aquatic biodiversity assessments.

Dear Nicolaas,

A freshwater specialist conducting aquatic biodiversity assessments would typically register under **Ecological Science field of practice** or Aquatic Sciences, depending on the specific job that the Scientist is carrying out. Ecological Science field mainly covers professionals who work on ecosystems, biodiversity, and environmental assessments, including freshwater ecosystems. Sometimes as alluded above, depending on the task/job that the Scientist carries out, it might fall under Aquatic Science or a related field within Conservation Sciences.

The following are typical tasks that a freshwater specialist conducting aquatic biodiversity assessments can be involved in:

1. Surveying and sampling freshwater ecosystems (rivers, lakes, wetlands, etc.) to collect data on species presence, abundance, and diversity.
2. Identifying aquatic species, including fish, macroinvertebrates, algae, and plants.
3. Assessing ecosystem health and water quality by analysing biological indicators.
4. Evaluating impacts of environmental changes or developments on freshwater biodiversity.
5. Compiling reports and data summaries to inform conservation decisions, environmental impact assessments (EIAs), or resource management plans.

6. Recommending mitigation measures or conservation strategies based on assessment results.
7. Compliance and regulation work related to freshwater biodiversity protection laws and policies.

I hope you find all in order.

Kind Regards,

Mr. Phutiane Letsoalo Pr.Sci.Nat
Scientific Advisor

SACNASP
South African Council for Natural Scientific Professions
Integrity in science

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1.2 Scope and Objectives

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.

1 Published in Government Notice No. 320 GOVERNMENT GAZETTE 43110 20 MARCH 2020. This gazette is also available free online at www.gpwonline.co.za

1.3. Terms of Reference

Step 1: Site Sensitivity Verification Report

Prior to beginning the assessment, the current use of the land and the potential environmental sensitivity of the site as identified by the national web based environmental screening tool must be confirmed by undertaking an Initial Site Sensitivity Verification. The Initial Site Sensitivity Verification must be undertaken by an environmental assessment practitioner or a registered specialist with expertise in the relevant environmental theme being considered. The Initial Site Sensitivity Verification must be undertaken through the use of:

(a) a desk top analysis, using satellite imagery;
(b) a preliminary on-site inspection to;
(c) any other available and relevant information.

The outcome of the Initial Site Sensitivity Verification must be recorded in the form of a report that:

(a) confirms or disputes the current use of the land and the environmental sensitivity as identified by the screening tool, such as new developments or infrastructure, the change in vegetation cover or status etc.;
(b) contains a motivation and evidence (e.g. photographs) of either the verified or different use of the land and environmental sensitivity; and
(c) is submitted together with the relevant assessment report prepared in accordance with the requirements of the Environmental Impact Assessment Regulations.

The outcome of the site sensitivity verification report concerning aquatic sensitivity of proposed development site and surrounds can be summarised as below:

The Department of Environmental Affairs screening report from the national web based environmental screening tool reported a "low sensitivity for Aquatic Biodiversity". The site sensitivity verification and the specialist assessment do not differ from the designation of "low" aquatic biodiversity. This statement report presents the findings of the Freshwater Ecological features verification and site survey that was conducted by Nicolaas Hanekom. Figure 1 depicts the aquatic sensitivity theme map produced by the

DEA screening tool of the proposed development area and surrounds.

MAP OF RELATIVE AQUATIC BIODIVERSITY THEME SENSITIVITY

Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
			X

Sensitivity Features:

Sensitivity	Feature(s)
Low	Low sensitivity

Figure 1: Aquatic sensitivity map generated by the national web based environmental screening tool for proposed Heidelberg Water Treatment Works.

Step 2: Aquatic Impact Compliance Statement

This compliance/impact statement report the findings of the aquatic sensitivity verification and site survey that was conducted by Nicolaas Hanekom.

The compliance statement must:

- be applicable to the preferred site and proposed development footprint;
- confirm that the site is of “low” sensitivity for aquatic biodiversity; and
- indicate whether or not the proposed development will have an impact on the

aquatic features.

The aquatic biodiversity compliance statement, must contain, as a minimum, the following information:

- Contact details and curriculum vitae of the specialist including SACNASP registration number and field of expertise; - **Refer to cover page, section 1.1. and Appendix A of this report**
- A signed statement of independence by the specialist; **Refer to page 2 of this** report
- A statement on the duration, date and season of the site inspection and the relevance of the season to the outcome of the assessment; **Refer to section 2**.
- a baseline profile description of biodiversity and ecosystems of the site; **Refer to section 2.**
- the methodology used to verify the sensitivities of the aquatic biodiversity features on the site including the equipment and modelling used where relevant; **Refer to section 3**
- in the case of a linear activity, confirmation from the aquatic biodiversity specialist that, in their opinion, based on the mitigation and remedial measures proposed, the land can be returned to the current state within two years of completion of the construction phase; **NA**
- where required, proposed impact management outcomes or any monitoring requirements for inclusion in the EMPr; **Refer to Section 4**
- a description of the assumptions made as well as any uncertainties or gaps in knowledge or data; and **Refer to Section 5**
- any conditions to which this statement is subjected. **Refer to Sections 4 and 6**

Step 3: Reporting
A signed copy of the compliance statement must be appended to the Basic Assessment Report or Environmental Impact Assessment Report.

2. BASELINE PROFILE DESCRIPTION OF BIODIVERSITY AND ECOSYSTEMS, INCLUDING THE DURATION, DATE AND SEASON OF THE SITE INVESTIGATION AND THE RELEVANCE OF THE SEASON TO THE OUTCOME OF THE ASSESSMENT

Project and site description - The Hessequa Municipality proposes to construct a Water Treatment Works ("WTW") on the erven 672 and RE/557 just below the southern wall of the Bloekombos Dam at Heidelberg – Western Cape. Water will be pumped from the Bloekombos Dam and treated at the proposed Treatment Works from where it will be pumped along a new pipeline to be laid within the road reserve along Muir Street from where it will connect with existing bulk distribution system in Heidelberg. The proposed development site is accessed off Muir Street.

The expected footprint for the WTW infrastructure will be approximately 0.5ha and consist of the following:

- WTW package plant with maximum capacity of 3 000m³/day (3Ml/day) 120m²

footprint.

- Surface abstraction by floating pumps from Bloekombos Dam on a variable demand basis along an 60m long x 200mm uPVC pipeline above ground where it goes over and along the dam wall and below ground from the foot of the dam wall to the WTW.
- 2 x Sludge settling ponds (27m x 12m x 1.8m deep with 518m³ capacity each) for backwash water collections and sludge settlement.
- 1 x Artificial reed bed pond (27x 12m x 1.8m deep with 518m³ capacity) with all the backwash water from the two settling ponds passing through the reed bed and returned to the Bloekombos Dam via the canal.
- The proposed cut and fil construction of the three ponds will have 3m high support embankments with a total 1200m² footprint.
- A collector sump and pumps for return flow of supernatant from sludge dams back into Bloekombos dam via the canal to optimise water use. Return flow water to be pumped along an underground 170mm x 110m long uPVC pipe to the canal inlet point at the Dam.
- A pump station and 200mm x 620m uPVC pipeline for final water distribution from the WTW into the bulk distribution system in Heidelberg via Muir Street.
- Vehicle parking and materials storage area 280m²
- Stormwater Pipeline to western non-perennial drainage line of 85m x 450mm concrete class 100D outlet headwall within non-perennial drainage line. Only the site rainwater runoff will be piped into the non-perennial drainage line.
- Widening and re-alignment of existing 3m wide access road from Muir Street by 1m (84m long x 4m wide), and three 4m access roads total distance 72m to sludge dams.
- A 3 phase 400/230V nominal supply at 50hz from nearest transformer with 55m long underground cable.

The area just below the Bloekombos Dam where development is proposed contains disturbed pioneer indigenous vegetation species originally part of Endangered - Eastern Ruens Shale Renosterveld. A small portion of the proposed development area, mostly falling within the proposed road widening and realignment section, is mapped as Terrestrial CBA. It is expected that the development will lead to the clearance of ±1 200m² indigenous vegetation. The Boekombos Dam is identified as partially artificial and partially natural NFEPA wetland, however the western non-perennial drainage line has not been mapped as a NFEPA wetland. Significant transformation of the original natural features of the site and surrounds, including the non-perennial drainage line has taken place historically as significant encroachment and dense stands of Eucalyptus trees is present within the immediate site and its surrounds most likely caused due to previous agricultural crop planting, plantation and dam construction and maintenance activities.

Figure 2: Location of proposed Heidelberg Water Treatment Works (in yellow) just below immediately south of the Bloekombos Dam, Western Cape.

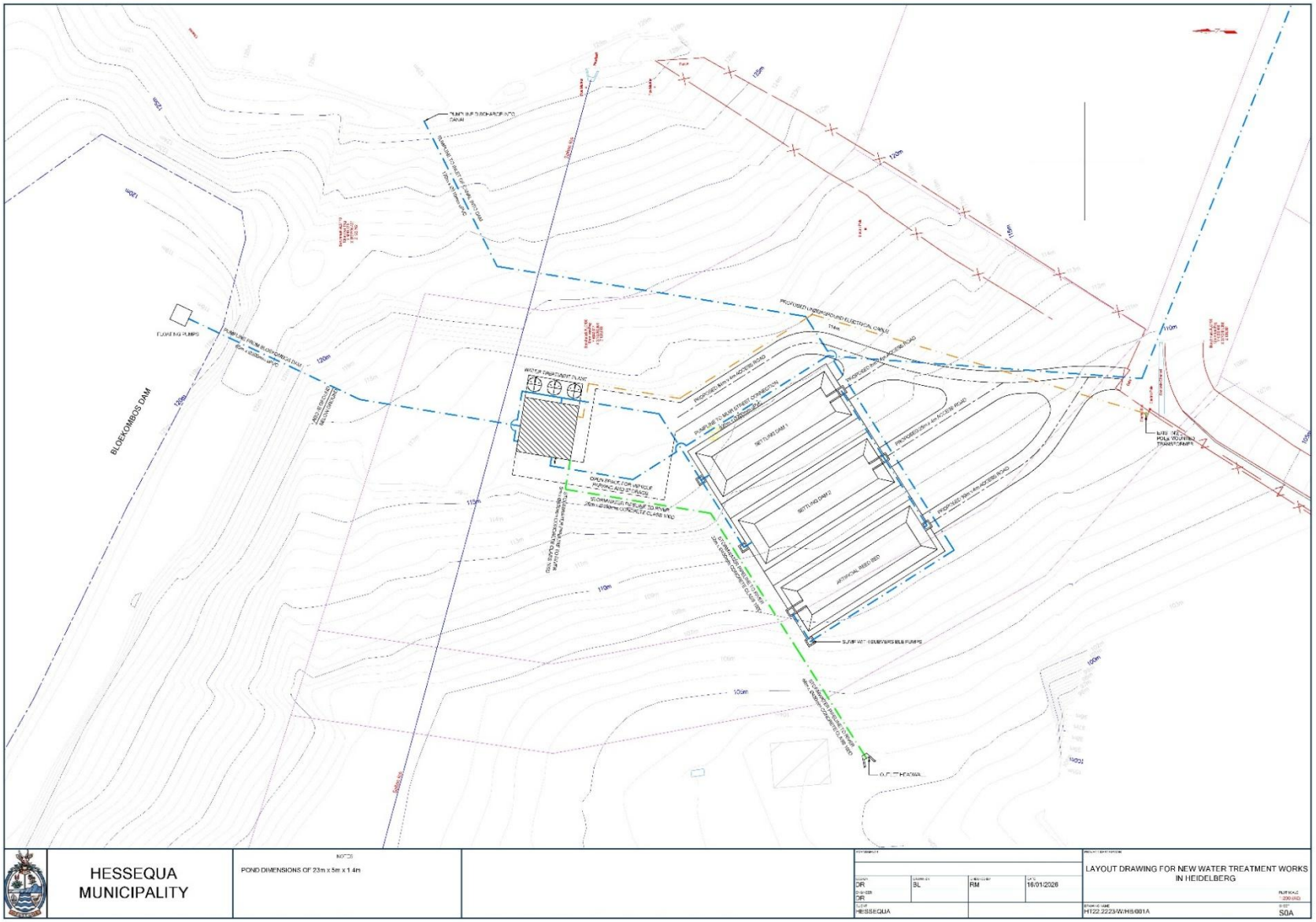

Figure 3: Proposed Heidelberg Water Treatment Works layout plan

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The site was visited on 7 August 2025 for approximately two hours. This is an optimum time for freshwater ecological features assessment.

H80C, in which the proposed site falls is potentially impacted by a non-perennial river which originates approximately 700m upstream to the north of the dam on agricultural property and flows into the dam. The non-perennial river is located approximately 16m west of the proposed infrastructure and flows underneath the railway line through a culvert. The damning of the non-perennial river at the railway line resulted in the development of a pond with associated wetland vegetation.

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, 2024) that contains Critical Biodiversity Areas (CBA) 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 impact site in terms of CapeNature Spatial Biodiversity Plan (CapeNature. 2024).

Biodiversity Priorities	**Hectares Lost**	**Is the proposed development aligned with the land management objectives**	**Proximity to Biodiversity Priority Area**
CBA1	0 ha will be permanently loss. 338.21m^2 was incorrectly mapped as CBA. This mapped area is located within the existing road. 0 ha of NFEPA wetland will be lost.	Yes, because the existing road will be used, the CBA management objectives will not be impacted or affected.	On site
~~CBA2~~			
~~ESA1~~			
~~ESA2~~			
~~PA~~			
Forest			
~~River NFEPA including 32m buffer~~			
Wetland NFEPA			

including 32m buffer			
~~Strategic water source area~~			
~~Threatened species and Red Data listed species~~			

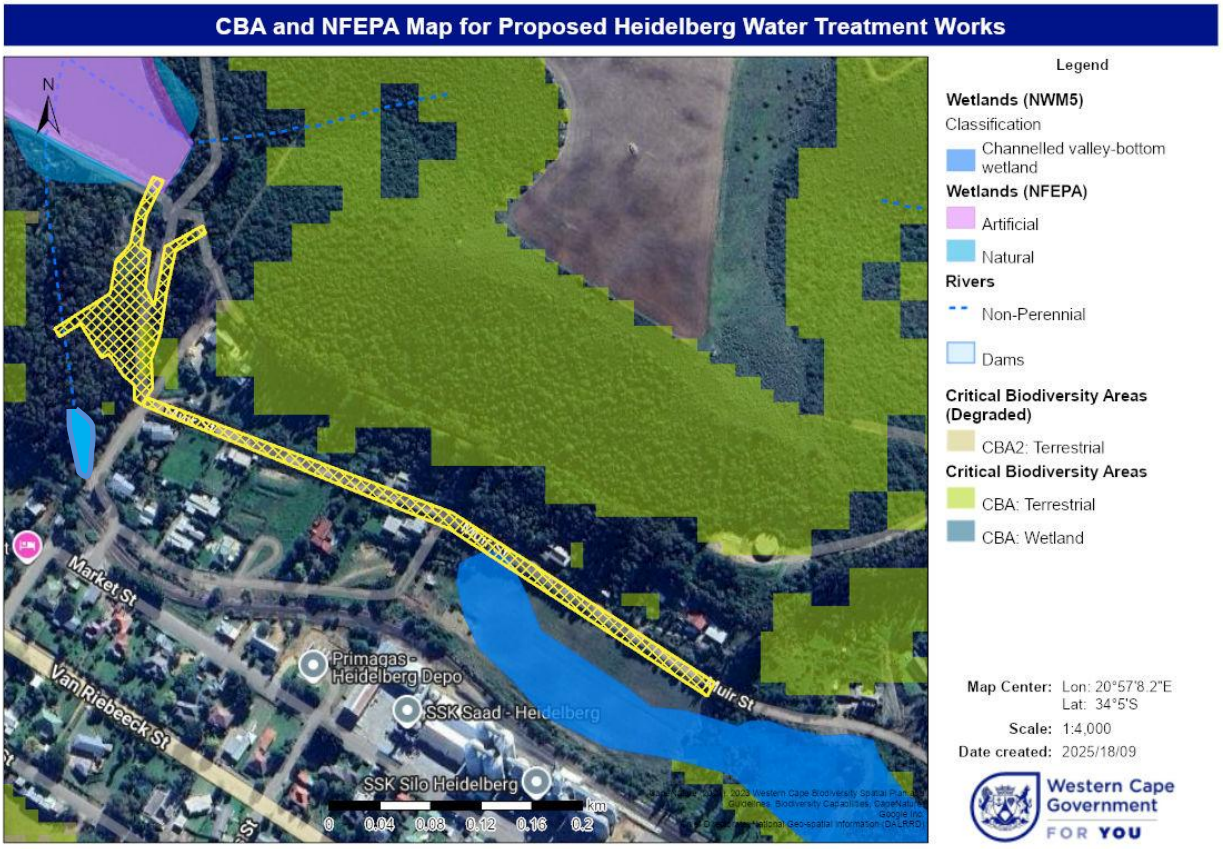


Figure 4: WCBSP 2023 CBA Map and NFEPA Map for Heidelberg Water Treatment Works at the Bloekombos Dam. Blue dotted line western non-perennial drainage line with associated delineated valley bottom wetland at the bottom southern end of the site.

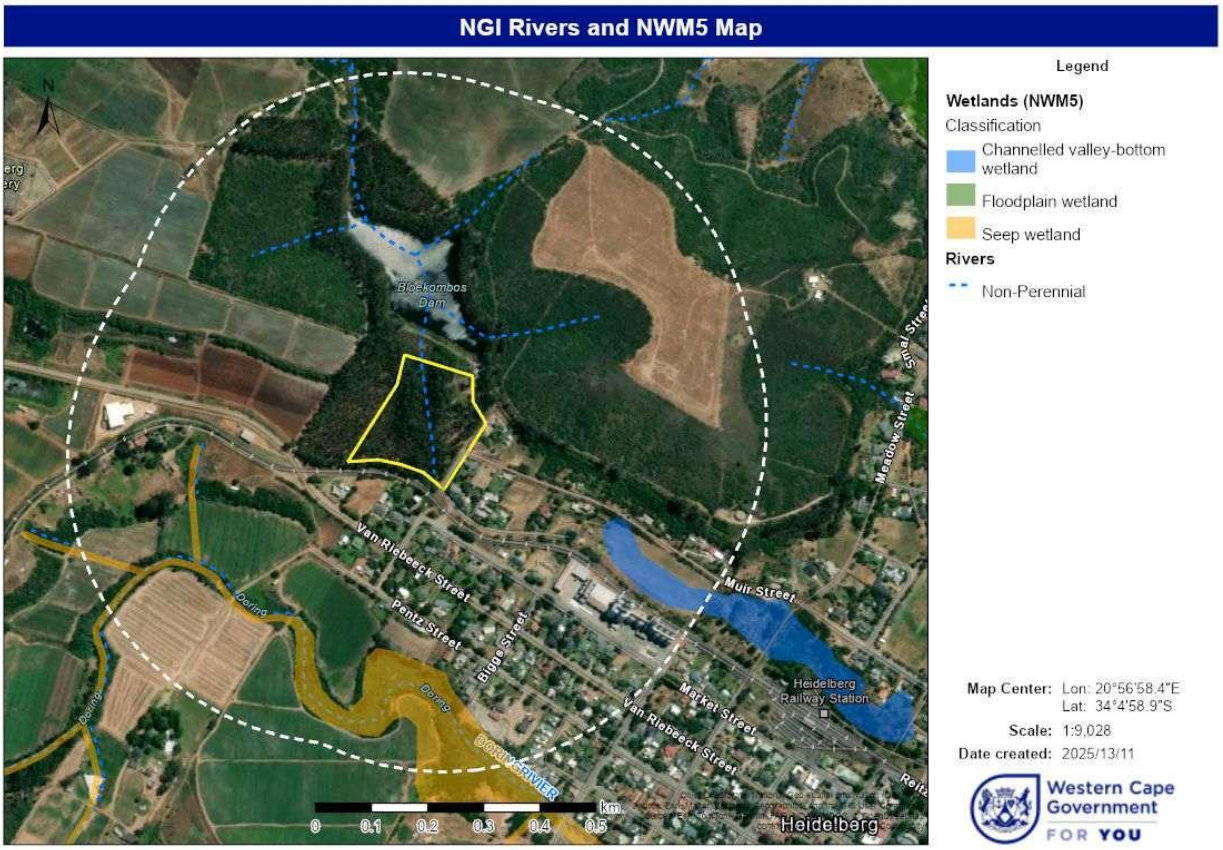


Figure 5: NGI Rivers and NWM5 Map

The main Water Treatment Works are located outside NFEPA mapped wetlands. The aquatic plant species that were recorded in the western non-perennial river were *Phragmites australis, Juncus kraussii*, Typha capensis and *Pennisetum alopecuroides*.

The non-perennial river is located approximately 16m west of the main Water Treatment Works and flows underneath the railway line through a culvert. The damning of the non-perennial river at the railway line resulted in the development of a pond with associated wetland vegetation.

The development will not have a significant impact on the non-perennial river and its associate wetland. The only potential negative impacts on the aquatic functioning of the non-perennial river are the discharge of stormwater into the non-perennial drainage line and the potential overflow of backwash water from the WTW into the non-perennial drainage line. The proposal to treat overflow in the settling dams and incorporate an artificial reed bed from where the overflow will be pumped back into the Bloekombos dam is preferred from an aquatic perspective. This aspect of the proposed WTW is intended to eliminate risks to the non-perennial river/unchanneled valley bottom wetland which otherwise would have received the overflows thereby altering the flow regime and potentially causing water quality impairment in these downstream receiving freshwater ecosystems.

Photograph 1: Bloekombos dam.

Photograph 2: Pond with wetland vegetation at Railway line culvert.

Photograph 3: Ecological condition of the non-perennial river west of proposed infrastructure.

Photograph 4: Ecological condition of the non-perennial river west of proposed infrastructure.

Photograph 5: View of the dam overflow into the non-perennial river.

Table 1: Classification of inland aquatic ecosystems in South Africa (Ollis* et al*, 2013).

Wetland Name	**Level 1**	**Level 2**	**Level 3**	**Level 4: HGM Unit**			**Level 5**
	System	DWA Ecoregion/s	Landscape Unit	4A	4B	4C	5A&B
Channeled Valley-bottom Wetlands mapped associated with the non-perennial river.	INLAND (high)	Southern Coastal Belt (high)	Valley floor (high)	Channeled wetland (high)	n/a	n/a	Seasonally and permanently inundated

PRESENT ECOLOGICAL STATE (PES)

Table 2: Results of PES assessments for the potentially affected aquatic ecosystems on the study area.

Criteria	**Channeled Valley Bottom Wetland and non-perennial river west of WTW**	
	Score	**Confidence**
INSTREAM		
Water abstraction	14	H
Flow modifications	13	H
Bed modifications	13	H
Channel modifications	13	H
Water Quality	0	H
Inundation	10	H
Presence of exotic macrophytes	7	H
Presence of exotic fauna	0	H
Presence of solid waste	0	H
RIPARIAN		
Vegetation removal	13	H
Alien encroachment	12	H
Bank erosion	0	H
Water abstraction	12	H
Flow modifications	13	H
Channel modifications	11	H
Water quality	0	H
Inundation	13	H
FINAL PES SCORES & CATEGORIES		
Instream	30%	
	PES Category E	
Riparian	39%	
	PES Category E	

The result of the PES assessments that were completed for the aquatic ecosystem that could potentially be affected by the development is presented in Tables above. These rapid assessments were conducted following the IHI assessment method.

ECOLOGICAL IMPORTANCE AND SENSITIVITY (EIS)

The result of the **EIS** assessments that were completed for the affected watercourse is presented in Table 3.

Table 3: Results of the EIS assessment

Channel type	3	5	Non-perennial river West of WTW.
Conservation context	0	5	Non-FEPA River
Vegetation and habitat Integrity	2	5	Very poor
Connectivity	0	5	Not connected
Threat Status of Vegetation Type	4	5	Vegetation has endangered conservation status
EIS Category	**1.8**		**Moderate**

RESULTS OF THE PES AND EIS

The non-perennial river with its associated wetlands west of the WTW has a PES of E: The loss of natural habitat, biota and basic ecosystem functions is extensive and the EIS is moderate.

Department of Water and Sanitation (DWS) 2015 publication: Section 21 (c) and (i) water use Risk Assessment Protocol (excel spreadsheet) is used to assess the sensitivity of the proposed WTW on the mapped and delineated freshwater ecological features and is also used by the DWS to determine if the proposed development requires authorization and what type of authorisation either General Authorisation or Water Use License.

The DWS Risk Assessment confirmed the aquatic impact risks to be Low. Refer to the completed DWS Risk Assessment table below.

PROJECT:		**PROPOSED HEIDELBERG WTW DEVELOPMENT**			
RISK ASSESSMENT MATRIX for Section 21 (c) and (i) Water Use activities - Version 2.1.1					
Name of Assessor:		Nicolaas Willem Hanekom	**Signature:**		
SACNASP Registration Number:		4415			
Date of assessment:		Sept-25			
Risk to be scored for all relevant phases of the project (**factoring in specified control measures**). MUST BE COMPLETED BY SACNASP PROFESSIONAL MEMBER REGISTERED IN AN APPROPRIATE FIELD OF EXPERTISE.					

Phase	Activity	Impact	Potentially affected watercourses		
			Name/s	PES	Overall Watercourse Importance
CONSTRUCTION	The expected footprint for the WTW infrastructure will be approximately 0.5ha and consist of the following: •WTW package plant with maximum capacity of 3 000m³/day (3Ml/day) 120m² footprint. •Surface abstraction by floating pumps from Bloekombos Dam on a variable demand basis along an 60m long x 200mm uPVC pipeline above ground where it goes over and along the dam wall and below ground from the foot of the dam wall to the WTW. •2 x Sludge settling ponds (27m x 12m x 1.8m deep with 518m³ capacity each) for backwash water collections and sludge settlement. •1 x Artificial reed bed pond (27x 12m x 1.8m deep with 518m³ capacity) with all the backwash water from the two settling ponds passing through the reed bed and returned to the Bloekombos Dam via the canal. •The proposed cut and fil construction of the three ponds will have 3m high support embankments with a total 1200m² footprint. •A collector sump and pumps for return flow of supernatant from sludge dams back into Bloekombos dam via the canal to optimise water use. Return flow water to be pumped along an underground 170mm x 110m long uPVC pipe to the canal inlet point at the Dam. •A pump station and 200mm x 620m uPVC pipeline for final water distribution from the WTW into the bulk distribution system in Heidelberg via Muir Street. •Vehicle parking and materials storage area 280m² •Stormwater Pipeline to western non-perennial drainage line of 85m x 450mm concrete class 100D outlet headwall within non-perennial drainage line. Only the site rainwater runoff will be piped into the non-perennial drainage line. •Widening and re-alignment of existing 3m wide access road from Muir Street by 1m (84m long x 4m wide), and three 4m access roads total distance 72m to sludge dams. •A 3 phase 400/230V nominal supply at 50hz from nearest transformer with 55m long underground cable.	Construction of the facility impact on Non -perenial river with its associated valley bottom wetlands west of WTW	Non -perenial river with its associated valley bottom wetlands west of WTW	E	Low / Very low
	•	Connection pipelines of approximately 190m			
OPERATIONAL	Operation of WTW.	Possible spillages of chemicals into non-perrenial river and silt into water course	Non -perenial river with its associated valley bottom wetlands west of WTW	E	Low / Very low

Intensity of Impact on Resource Quality					Overall Intensity (max = 10)	Spatial scale (max = 5)	Duration (max = 5)	Severity (max = 20)	Importance rating (max = 5)	Consequence (max = 100)	Likelihood (Probability) of impact	Significance (max = 100)	Risk Rating	Confidence level
Abiotic Habitat (Drivers)			Biota (Responses)											
Hydrology	Water Quality	Geomorph	Vegetation	Fauna										
0	0	0	0	0	**0**	2	5	**7**	**2**	**14**	80%	**11,2**	**L**	High
0	-3	0	-3	-5	**0**	2	5	**7**	**2**	**14**	20%	**2,8**	**L**	High

3. METHODOLOGY USED TO VERIFY THE SENSITIVITIES OF THE AQUATIC BIODIVERSITY ON THE NATIONAL WEB BASED ENVIRONMENTAL SCREENING

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. The following databases was consulted:

- National Geospatial Information and Vector data for rivers (NGI Rivers database, available on Cape Farm Mapper);
- The National Wetlands Map Vers. 5 (CSIR, 2018, available on Cape Farm Mapper); and
- The Western Cape Biodiversity Spatial Plan (WCBSP, 2023, also available on Cape Farm Mapper).

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.
- Additional random sample points were selected from other sites surrounding the proposed impacted areas for comparative purposes.

4. METHODOLOGY USED TO UNDERTAKE THE SITE SURVEY AND PREPARE THE COMPLIANCE STATEMENT, INCLUDING EQUIPMENT AND MODELLING USED WHERE RELEVANT

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.

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.

[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).

- **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 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.

No aquatic ecosystems were delineated within the footprint of the proposed WTW and therefore the site has a LOW aquatic biodiversity sensitivity. The risk matrix assessment also came out as low sensitivity. For activities to trigger Section 21(c) or (i) of the National Water Act, they must occur within the regulated area of a watercourse and pose a risk to the water resource. The proposed activity is unlikely to pose a risk to the watercourse, provided that it is operated as planned and therefore no Section 21(c) or (i) water use activities are likely to be triggered.

Figure 6: Map showing the proposed development in relation to a confirmed watercourse shown as a blue line and polygon (wetland) as delineated by Enviro-EAP. Note the proximity of the proposed WTW to the watercourse.

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 4 and Table 5 respectively.

Table 4: 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 5: 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 flow	FEPA river	River FEPA	Protected	Unmodified / natural habitat	Very high	Critically Endangered

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 features present in the vicinity of the proposed development.

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).

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).

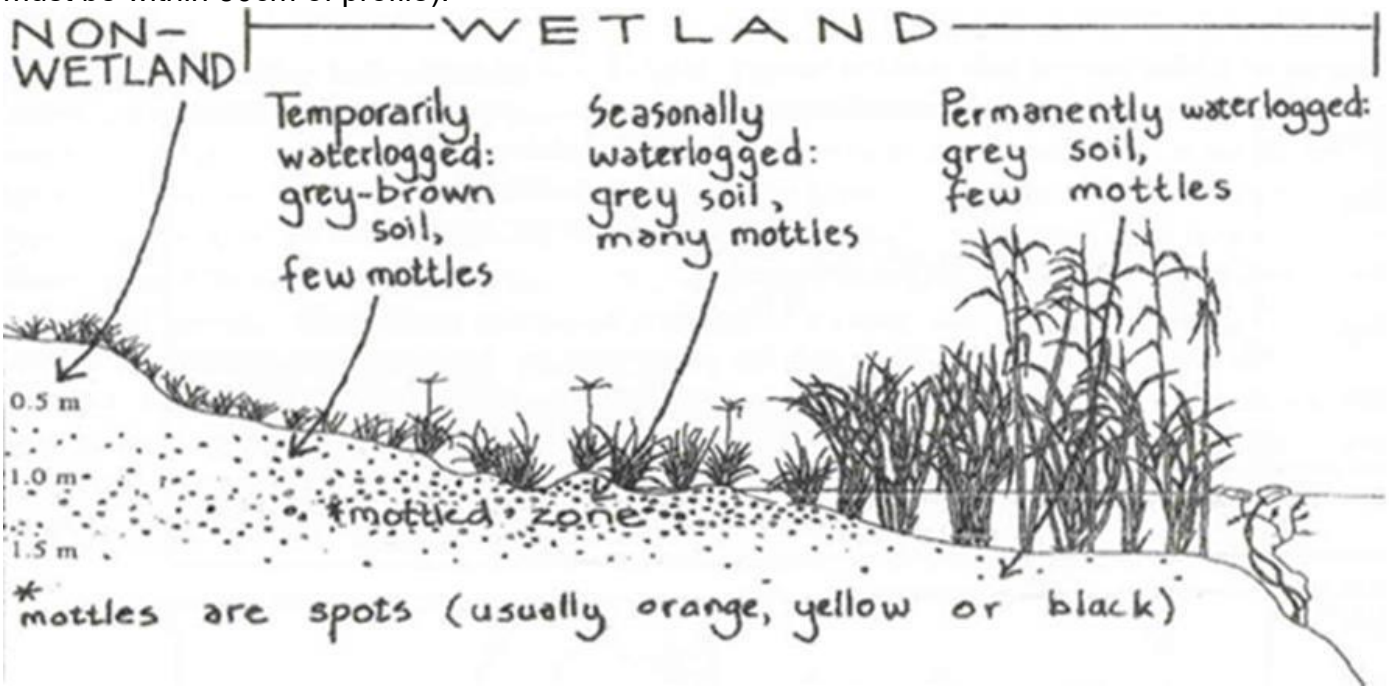


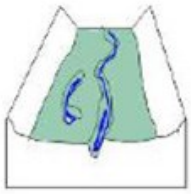
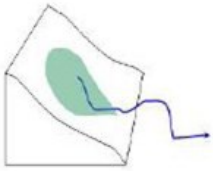
Figure 5: Wetland illustration

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

Hydro-geomorphic types	Description	Source of water maintaining wetland [1]	
		Surface	Sub-surface

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

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.	*	***
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

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

Sensitivity Mapping and Assessment

An aquatic biodiversity and ecological sensitivity map, including wetland delineation of the site was produced by integrating the information collected on- site with the available ecological and biodiversity information available in the literature and various spatial databases. This includes delineating the different vegetation and habitat units identified in the field and assigning sensitivity values to the units based on their ecological properties, conservation value and the potential presence of species of conservation concern. The sensitivity of the aquatic biodiversity features to be impacted is done in terms of the 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).

RISK ASSESSMENT KEY

TABLE 7 – 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 8- 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 9 – 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 10 – 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 11 – 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 12: 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 13: 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

5. WHERE REQUIRED, PROPOSED IMPACT MANAGEMENT OUTCOMES OR ANY MONITORING REQUIREMENTS FOR INCLUSION IN THE EMPR

Developments can have both direct and indirect impacts on aquatic features such a surface or groundwater resources even if on site nor within the immediate vicinity of the development. Direct impacts are those that pollute or transform groundwater or surface water resources. Indirect impacts are those that may overtime lead to degradation or transformation of aquatic features such as erosion.

The proposed prospecting activities can have the following potential impacts on aquatic features:

- Erosion
- Groundwater pollution
- Increased sediment loads
- Surface water resources pollution
- Transformation and degradation

The Department of Environmental Affairs screening report from the national web based environmental screening tool reported a “low sensitivity for Aquatic Biodiversity”. The site sensitivity verification and the specialist assessment do not differ from the designation of “low” aquatic biodiversity.

The main Water Treatment Works are located outside NFEPA mapped wetlands. The aquatic plant species that were recorded in the western non-perennial river were Phragmites australis, Juncus kraussii, Typha capensis and Pennisetum alopecuroides. The non-perennial river is located approximately 16m west of the main Water Treatment Works and flows underneath the railway line through a culvert. The damning of the non-perennial river at the railway line resulted in the development of a pond with associated wetland vegetation. The development will not have a significant impact on the non-perennial river and its associate wetland. The only potential negative impacts on the aquatic functioning of the non-perennial river are the discharge of stormwater into the non-perennial drainage line and the potential overflow of backwash water from the WTW into the non-perennial drainage line. The proposal to treat overflow in the settling dams and incorporate an artificial reed bed from where the overflow will be pumped back into the Bloekombos dam is preferred from an aquatic perspective. This aspect of the proposed WTW is intended to eliminate risks to the non-perennial river/unchanneled valley bottom wetland which otherwise would have received the overflows thereby altering the flow regime and potentially causing water quality impairment in these downstream receiving freshwater ecosystems.

The non-perennial river with its associated wetlands west of the WTW has a PES of E: The loss of natural habitat, biota and basic ecosystem functions is extensive, and the EIS is moderate. Department of Water and Sanitation (DWS) 2015 publication: Section 21 (c) and (i) water use Risk Assessment Protocol (excel spreadsheet) is used to assess the sensitivity of the proposed WTW on the mapped and delineated freshwater ecological features and is also used by the DWS to determine if the proposed development requires authorization and what type of authorisation either General Authorisation or Water Use License. The DWS Risk Assessment confirmed the aquatic impact risks to be Low.

The following impact management measures must be implemented and included in the EMPr, and should they be implemented the proposed development activities should not have any significant

negative impacts on any aquatic features such surface or groundwater resources or their hydrological functioning:

- Undertake development activities only in identified and specifically demarcated areas. The impact area is the WTW infrastructure and a 2m wide buffer allowing for safe construction activities which will then allow for a no-go area outside this demarcated area and a buffer between the construction area and any freshwater ecological features of at least 14m to protect the identified features. The delineated feature and its buffer is considered as No-Go areas and if any construction activities are required within the No-Go areas then this should only be permissible via an ECO-approved method statement.
- Storm water and erosion control measures must be implemented during the construction phase and monitored to prevent siltation, flooding or erosion.
- All roads need to be maintained and monitored. Visible signs of possible erosion must be immediately rehabilitated.'
- Construction and operational activities of the development must not lead to environmental pollution and waste management measures must be implemented in accordance with an Environmental Management Programme.
- Stormwater discharge into the non-perennial drainage line must not cause erosion and this should be monitored on a regular basis and especially after heavy rains. The stormwater outlet should be constructed from energy dissipating structures (such as gabions and /or reno mattresses) to slow down the velocity of water inflow and allow to seep through the buffer area and not be discharged directly into the non-perennial stream.
- The Water Treatment Works and its associated stormwater discharge point within the non-perennial drainage line must be monitored and aquatic state of the non perennial drainage line and its associated wetland ecosystem recorded on a 6 monthly basis by an Environmental Control Officer during the operational phase. Should any leakage, erosion or environmental degradation be noticed during monitoring this must be addressed by the ECO by providing the municipality with the appropriate rectification and prevention measures to be implemented.

6. A DESCRIPTION OF THE ASSUMPTIONS MADE AND ANY UNCERTAINTIES OR GAPS IN KNOWLEDGE OR DATA

The site visit was carried out on 7 August 2025. No assumptions were made, and the author is confident that there were no uncertainties or gaps in knowledge or data in order to make an informed recommendation. A follow-up survey is not considered essential for decision-making.

7. ANY CONDITIONS TO WHICH THE COMPLIANCE STATEMENT IS SUBJECTED

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. 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.

It was concluded that should the proposed mitigation measures as listed under point 5 above be implemented that the overall significance of the development impacts on aquatic features will be of overall low negative significance. All of the mitigation and monitoring measures as listed under point above must he included as part of the Environmental Management Programme conditions to be adhered to during construction and operational activities.

8. REFERENCES

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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 qualified Environmental Assessment Practitioner (”EAP”) who holds a Masters Technologiae, Nature Conservation (“Vegetation Ecology and Biodiversity Assessment”) degree from the Cape Peninsula University of Technology. Nicolaas is certified in terms of section 20(3)(a) of the Natural Scientific Professions Act, 2003 (Act 27 of 2003), as a Professional Natural Scientist Ecological Science (Pri.Sci.Nat); Registration Number: 004415. He further qualified in Environmental Management Systems ISO 14001:2004, at the Centre for Environmental Management, North-West University, as well as Environmental Management Systems ISO 14001:2004 Audit: Internal Auditors Course to ISO 19011:2003 level, from the Centre for Environmental Management, North-West University qualifying him to execute audits to ISO/SANS environmental compliance and EMS standards.

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 29 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,	• South African Council for Natural Scientists Professions Pri.Sci.Nat (Ecological Science)

accreditations and courses	• 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

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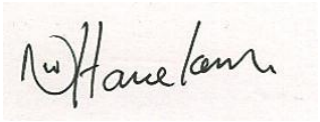
CERTIFICATION

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



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