

TERRESTRIAL BIODIVERSITY IMPACT ASSESSMENT

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



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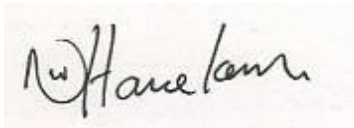
Original Report Compiled September 2025
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DECLARATION OF THE SPECIALIST

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

28 February 2026

Signature of the EAP/ Specialist:

Date:

Enviro-EAP (Pty) Ltd

Name of company (if applicable):

COMPLIANCE WITH THE DEPARTMENT OF ENVIRONMENTAL AFFAIRS SCREENING TOOL (GOVERNMENT NOTICE NO. 648, GOVERNMENT GAZETTE 45421: 10 MAY 2019)

| Department of Environmental Affairs screening Tool (Government Notice No. 648, GOVERNMENT GAZETTE 45421: 10 MAY 2019) | 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 | Section 1.8 |
| 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 |
| 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 |

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1. INTRODUCTION AND METHODOLOGY

The Department of Environmental Affairs screening report from the national web based environmental screening tool reported a Very High sensitivity for Terrestrial Biodiversity” sensitivity based on mapped CBA: Terrestrial and endangered Eastern Ruens Shale Renosterveld. The site sensitivity verification and the specialist assessment does differ from the designation of “very high” terrestrial biodiversity and do not agree with the findings of the national web based environmental screening tool. The existing access road that will be used were incorrectly mapped as CBA and the proposed infrastructure is located outside mapped CBA. The Eastern Scale Renosterveld are degraded due to existing Eucalyptus tree plantation and portions of the proposed development footprint were levelled previously. No species of conservation concern were recorded. A terrestrial biodiversity impact assessment was conducted. This report presents the findings of the Terrestrial Biodiversity Impact Assessment that was prepared by Nicolaas Hanekom as part of the EIA for the proposed Water Treatment Works development.

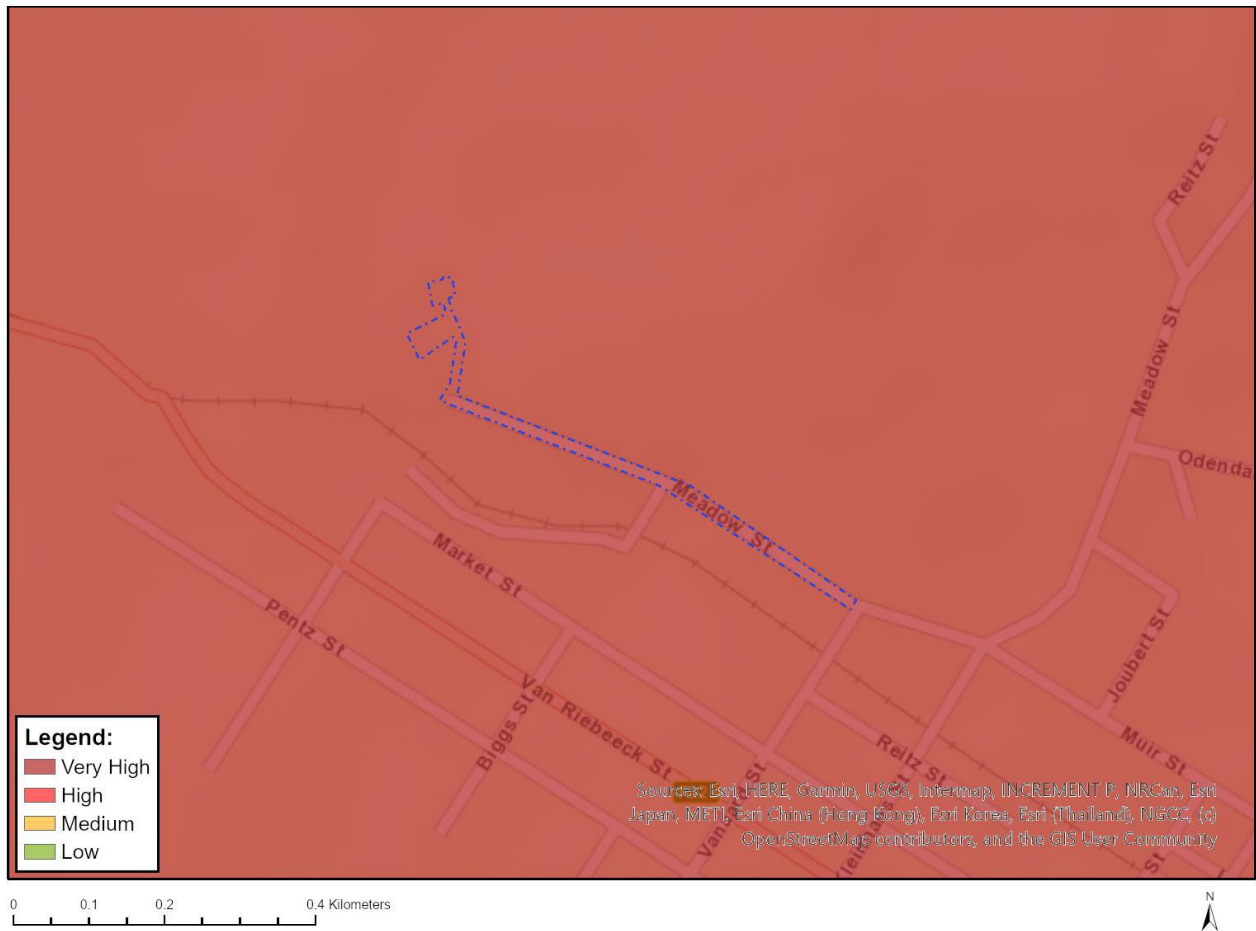


Figure 1: Project Area Of Influence (PAOI) map relevant to Terrestrial Biodiversity as per the environmental screen tool report.

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”), (Ecology field) 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 protocol¹ provides the criteria for the reporting of requirements for the assessment and reporting of impacts on terrestrial 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 terrestrial biodiversity on the national web based environmental screening tool must submit a Terrestrial 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” terrestrial biodiversity sensitivity from the national web based environmental screening tool and it is found to be of a “low” sensitivity, then a terrestrial biodiversity impact assessment is not required. Should this apply, a Terrestrial Biodiversity Compliance Statement is to be provided.

1.4. Methodology 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. The description of the preferred site must include the following aspects, as a minimum and must be considered in the baseline description:

- A description of the ecological drivers/processes of the system and how the proposed development will impact these;

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

- Ecological functioning and ecological processes (e.g. fire, migration, pollination, etc.) that operate within the proposed development site;
- The ecological corridors that the development would impede including migration and movement of flora and fauna;
- The description of any significant landscape features (including rare or important flora/faunal associations, presence of Strategic Water Source Areas (SWSAs) or Freshwater Ecosystem Priority Areas (FEPA) sub-catchments);
- The description of the terrestrial biodiversity and ecosystems on the proposed development site must include:
 - Main vegetation types;
 - Threatened ecosystems, including Listed Ecosystems as well as locally important habitat types identified;
 - Ecological connectivity, habitat fragmentation, ecological processes and fine-scale habitats; and
 - Species, distribution, important habitats (e.g. feeding grounds, nesting sites, etc.) and movement patterns identified.

The assessment must 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. The Terrestrial Biodiversity Impact Assessment must be based on the results of a site inspection undertaken on the preferred development site and must identify:

The assessment report must describe Terrestrial Critical Biodiversity Areas (CBAs), including:

- The reasons why an area has been identified as a CBA;
- An indication of whether or not the development is consistent with maintaining the CBA in a natural or near natural state or in achieving the goal of rehabilitation;
- The impact on species composition and structure of vegetation with an indication of the extent of clearing activities;
- The impact on ecosystem threat status;
- The impact on explicit subtypes in the vegetation;
- The impact on overall species and ecosystem diversity of the site; and
- The impact on populations of species of special concern in the CBA.

The assessment report must describe Terrestrial Ecological Support Areas, including:

- The impact on the ecological processes that operate within or across the site;
- The extent the development will impact on the functionality of the ESA; and
- Loss of ecological connectivity (on site, and in relation to the broader landscape) due to the degradation and severing of ecological corridors or introducing barriers that impede migration and movement of flora and fauna.

The assessment report must describe Protected Areas as defined by the National Environmental Management: Protected Areas Act, 2004 including an opinion on whether the proposed development aligns with the objectives/purpose of the Protected Area and the zoning as per the Protected Area Management Plan.

The assessment report must describe Priority Areas for Protected Area Expansion, including the way in which in which the development will compromise or contribute to the expansion of the protected area network.

The assessment report must describe Strategic Water Source Areas (SWSA) including:

- The impact(s) on the terrestrial habitat of a Strategic Water Source Area, and
- The impacts of the development on the SWSA water quality and quantity (e.g. describing potential increased runoff leading to increased sediment load in water courses).

The assessment report must describe Freshwater Ecosystem Priority Area (FEPA) sub catchments, including the impacts of the development on habitat condition and/or species in the FEPA sub catchment, including National wetland map 5.

The assessment report must describe Indigenous Forests, including:

- Impact on the ecological integrity of the forest;
- Extent of natural or near natural indigenous forest area lost.

The findings of the Terrestrial Biodiversity Impact Assessment must be written up in a Terrestrial Biodiversity Impact Assessment Report. This report must include 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;
- Duration, date and season of the site inspection and the relevance of the season to the outcome of the assessment;
- A description of 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;
- Impact management actions and impact management outcomes proposed by the specialist for inclusion in the EMPr;
- A motivation why 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 were not considered stating reasons why these were not being not considered; and
- 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.

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 on 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 terrestrial plants within this region is between August and end October months. The sampling and analysis of the site inside the optimum season (7 August 2025), provides suitable data and results to present an informed decision on the local 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.

1.6. Assumptions and limitations

The presence of flora and fauna must be evaluated based on the literature and available databases but in many cases, these databases are not intended for fine-scale use and the reliability and adequacy of these data sources relies heavily on the extent to which the area has been sampled in the past. Many areas have not been well sampled with the result that the species lists derived for the area do not always adequately reflect the actual fauna and flora present at the site. This is acknowledged as a limitation of the study, however it is substantially reduced through extracting the species lists for a substantially larger area than the site and through the inclusion of information from previous experience in the wider area. The overall condition of the vegetation and habitat on the impact areas can still be determined with a high degree of confidence. An accurate idea of the priority conservation areas, animals and botanical species was gained, due to the use of a combined habitat and species-based approach, and confidence in the accuracy of the findings is high. The comprehensive assessment of conservation value (or ecological importance/sensitivity) can pose a significant challenge, particularly when considering SCC and threatened vegetation types. The inherent difficulty stems from the multi-dimensional nature of “value”, encompassing ecological functionality, distinctiveness/uniqueness, cultural significance, and even the provision of ecosystem services. Quantifying these diverse facets is frequently hampered by data deficiencies, especially concerning the population dynamics, distributional ranges, and specific habitat requirements of many rare or elusive species. Furthermore, the complex interdependencies between species often result in unforeseen ecological cascades, making the prediction of long-term conservation outcomes difficult. The evaluation of conservation value is further complicated in transition zones, or ecotones. These areas, characterized by their inherent dynamic nature, serve as critical ecological interfaces. The simultaneous presence of diverse species from adjacent ecosystems, even though they might be common within the broader landscape, exacerbates the challenge of prioritizing conservation efforts for such areas. The overall confidence in the completeness and accuracy of the terrestrial biodiversity findings at this point in time is considered to be good. A follow-up survey is not considered essential for decision-making.

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).
- Information on plant and animal species recorded for the Quarter Degree Squares (QDS) was extracted from the SABIF/SIBIS database hosted by SANBI.
- The IUCN conservation status of the species in the list was also extracted from the database and is based on the Threatened Species Programme, Red List of South African Plants (2011).
- Threatened Ecosystem data was extracted from the National List of Threatened Ecosystems 2022.
- 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 7 August 2025 for approximately 2 hours in the optimal season. The site was visited late afternoon. It was partly clouded with a light northwestern wind and 16°C during the survey. During the site visit, the different biodiversity features, habitat, vegetation and landscape units present were identified and surveyed. Adjacent Eastern Ruens Renosterveld in good ecological condition was also surveyed to obtain a comparison of good quality habitat for comparison purposes. Walk-through-surveys were conducted of representative habitats and impact areas in search of Species of conservation concern or the species listed in the environmental screen tool report. None were recorded.

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 Environmental Management: Biodiversity Act (Act 10 of 2004)
- The National Forest Act (Act 84 of 1998)
- Invasive species are controlled by the National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) - Alien and Invasive Species (AIS) Regulations which became law on 1 October 2014

The potential applicability of the abovementioned acts to the subject site is provided below:

The National Environmental Management: Biodiversity Act (Act 10 of 2004)

This Act serves to control the disturbance and land utilisation within certain habitats, as well as the planting and control of certain exotic species. The effective disturbance and removal of species identified above, as well as possible other species (i.e. Threatened or Protected Species (TOPS) species), will require specific permission from the applicable authorities. In addition, the planting and management of exotic plant species on site, if and where required, will be governed by the Alien and Invasive Species (AIS) regulations, which were gazetted in 2014. These regulations compel landowners to manage exotic weeds on land under their jurisdiction and control.

The National Forest Act (Act 84 of 1998)

The National Forest Act (Act 84 of 1998) governs the removal, disturbance, cutting or damage and destruction of identified “protected trees”. No listed species were encountered or recorded on site and an application for the “clearing of a *natural forest*”, as defined within the Act, will not be required on the site in question.

Invasive species are controlled by the National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) - Alien and Invasive Species (AIS) Regulations which became law on 1 October 2014.

Notably most listed alien invasive species are propagated and driven by the disturbance of land during and following construction. The planting and management of exotic plant species on site, if and where required, will be governed by the Alien and Invasive Species (AIS) regulations. Should alien invasive species during operational phase be recorded on site it must be cleared over time from the site.

3. DESCRIPTION OF PROJECT ASPECTS RELEVANT TO TERRESTRIAL BIODIVERSITY FEATURES

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 (3MI/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 aal 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 fill 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.

4. DESCRIPTION OF THE AFFECTED ENVIRONMENT.

4.1. Locality

The site is located below the Bloekombos dam using the existing access road and Muir Street to connect the pipeline with the bulk water network of Heidelberg, Western Cape.



Figure 2: Locality Map

4.2. Topography

Topographically the site has a low slope from north to south.

4.3. Geology and Soils

Broad Soils Classification (ENPAT)

Soil Type: Prismaeutanic and/or pedocutanic diagnostic horizons dominant. In addition, one or more of: vertic, melanic, red structured diagnostic horizons

Geology: Conglomerate, sandstone and mudstone of the Uitenhage Group as well as shale of the Bokkeveld Group, occasionally overlain by Tertiary silcrete.

Land Types

Land Type: Dc32

Description: In addition, one or more of: vertic, melanic, red structured diagnostic horizons

Class: PRISMACUTANIC AND/OR PEDOCUTANIC DIAGNOSTIC HORIZONS
DOMINANT

Soil Types

Symbol: CA

Class: Soils with a strong texture contrast

Description: Soils with a marked clay accumulation, strongly structured and a non-reddish colour. In addition one or more of vertic, melanic and plinthic soils may be present

Depth: < 450 mm

Clay: < 15%

Soil Erodibility

Erodibility: Moderate

Erodibility Factor: 0.49

Soil Clay & Depth

Symbol: CA
 Class: Soils with a strong texture contrast
 Description: Soils with a marked clay accumulation, strongly structured and a non-reddish colour. In addition one or more of vertic, melanic and plinthic soils may be present
 Depth: < 450 mm
 Clay: < 15%
 Source: CapeFarmMapper dated 1 September 2025.

4.4. Description of The Ecological Drivers/Processes, Functioning, Ecological Corridors that the Development Would Impede Including Migration and Movement of Flora and Fauna, and Description of any Significant Landscape Features

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 on the existing road and pipeline route that will be used. | Yes, because the existing road will be used, the CBA management objectives will not be impacted or affected. | On site |
| CBA2 | 0ha of NFEPA wetland will be lost. | | |
| 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 | | | |
|--|--|--|--|

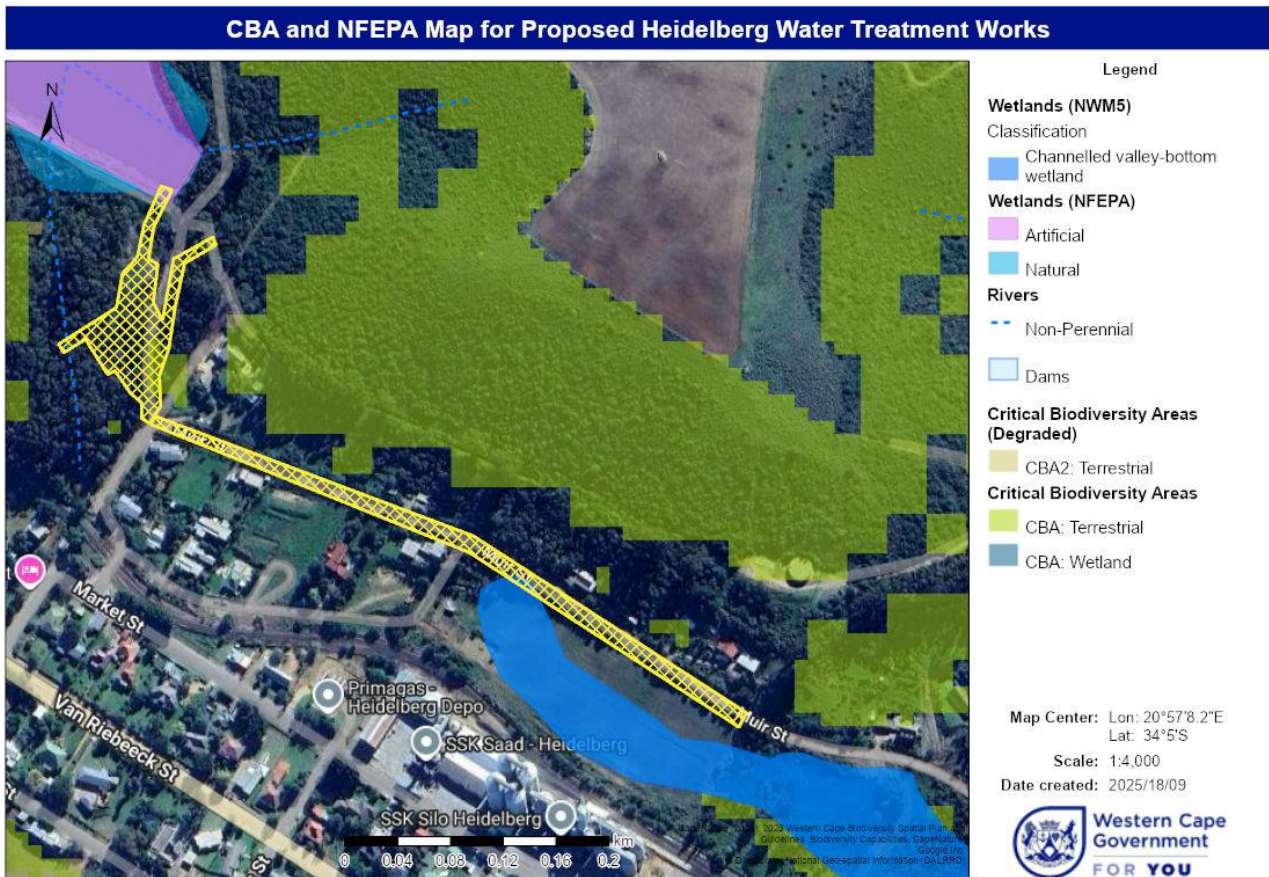


Figure 3: WCBSP 2023 CBA and NFEPA Map for Heidelberg Water Treatment Works at the Bloekombos Dam.

4.5. Description of the Terrestrial Biodiversity and Ecosystems

4.5.1. Main Vegetation Types

The National Vegetation Map of South Africa (2018) identifies the remnants of natural vegetation occurring within the area as Eastern Ruens Shale Renosterveld, endangered (EN). During the site visit, it was evident that these remaining remnants have been significantly transformed due to existing roads, earth moved platforms and Eucalyptus tree plantation.

4.5.2. Threatened Ecosystems, Including Listed Ecosystems

The vegetation type is classified as endangered and has been significantly impacted by transformation.

4.5.3. Ecological Connectivity, Habitat Fragmentation, Ecological Processes and Fine-Scale Habitats

The National Vegetation Map of South Africa (2018) identifies the remnants of natural vegetation occurring within the area as Eastern Ruens Shale Renosterveld, endangered (EN). During the site visit, it was evident that these remaining remnants have been significantly transformed due to existing roads, earth moved platforms and Eucalyptus tree plantation. No Species of Conservation Concern was recorded. The following plant species were recorded on site during the survey on the development footprint. *Searsia glauca*, *Aloe forex*, *Asparagus burchellii*, *Ledebouria revoluta*, *Felicia amoena*, *Helichrysum patulum*, *Hypochaeris radicata*, *Aspalathus laricifolia* subsp. *Canescens*, *Oxalis pes-caprae*, *Digitaria eriantha* and *Haemanthus sp.*

Disturbed pioneer indigenous vegetation present of which a few species observed are listed above were recorded on the impact site. The vegetation would not be considered as representative of Eastern Ruens Shale Renosterveld. The earliest historical Google Earth imagery (2003) indicates the presence of a gum stand and fallow lands on the footprint indicating that the disturbance and invasion of aliens is not recent, as does the name of Bloekombos Dam from which water is abstracted. Areas subjected to longer periods of disturbance have reduced remnants indigenous species (including propagules) and lower restoration potential.

4.5.4. Species, Distribution, Important Habitats

Vegetation Characteristics and Description

The vegetation impacted by the proposed development area is characterized and dominated by pioneer grasses and does not represent the vegetation structure of Eastern Ruens Shale Renosterveld. The vegetation was impacted by previous levelling of a portion of the site and roads (mapped as very low sensitivity) and the rest of the area by Eucalyptus tree plantation and consist mainly of pioneer plants. The following plant species were recorded on site during the survey on the development footprint. *Searsia glauca*, *Aloe forex*, *Asparagus burchellii*, *Ledebouria revoluta*, *Felicia amoena*, *Helichrysum patulum*, *Hypochaeris radicata*, *Aspalathus laricifolia* subsp. *Canescens*, *Oxalis pes-caprae*, *Digitaria eriantha* and *Haemanthus sp.*

Disturbed pioneer indigenous vegetation present of which a few species observed are listed above were recorded on the impact site. The vegetation would not be considered as representative of Eastern Ruens Shale Renosterveld. The earliest historical Google Earth imagery (2003) indicates the presence of a gum stand and fallow lands on the footprint indicating that the disturbance and invasion of aliens is not recent, as does the name of Bloekombos Dam from which water is abstracted. Areas subjected to longer periods of disturbance have reduced remnants indigenous species (including propagules) and lower restoration potential.



Photograph 1: Proposed development area.



Photograph 2: Proposed development area.



Photograph 3: Proposed development area.



Photograph 4: Proposed development area.



Photograph 5: Proposed development area and access road



Photograph 6: Proposed pipeline connection route.



Photograph 7: Proposed pipeline connection route.



Photograph 8: View of a representative of vegetation structure of Eastern Ruens Shale Renosterveld that is located northeast of the development site. The representative and ecological vegetation structure between the development area (photographs above) and this area is clear and the degraded nature of the development area mapped as low sensitivity is clearly visible.

4.6. *Terrestrial Critical Biodiversity Areas (CBAs) and Ecological Support Areas (ESAs)*

0 ha of terrestrial CBA will be permanently lost. 338.21m² was incorrectly mapped as terrestrial CBA. This mapped area is located on the existing road to be used for proposed pipeline.

4.7. *Protected Areas and Priority Areas for Protected Area Expansion*

Not close to any protected area.

4.8. *Strategic Water Source Areas (SWSA)*

The site does not fall inside a SWSA.

4.9. *Freshwater Ecosystem Priority Area (FEPA) and Freshwater Ecological features*

The site does not fall inside a FEPA. The NFEPA wetland mapped south of Muir Street was incorrectly mapped.



Photograph 9: View of cultivated and disturbed area mapped as NFEPA

5. SITE SENSITIVITY ASSESSMENT (Site Ecological Importance)²

Methodology used to determine Site Ecological Importance (SEI)

Where the site-specific assessment produces lower or higher SEI classification than the 'environmental sensitivity' output of the screening tool for that particular site, it is the responsibility of the specialist to provide a clear and defensible justification for the difference. SEI is considered to be a function of the biodiversity importance (BI) of the receptor (e.g. species of conservation concern, the vegetation/fauna community or habitat type present on the site and its resilience to impacts (receptor resilience [RR]) as follows:

$$SEI = BI + RR$$

BI in turn is a function of conservation importance (CI) and the functional integrity (FI) of the receptor as follows:

² South African National Biodiversity Institute (SANBI). 2020. *Species Environmental Assessment Guideline. Guidelines for the implementation of the Terrestrial Fauna and Terrestrial Flora Species Protocols for environmental impact assessments in South Africa*. South African National Biodiversity Institute, Pretoria. Version 3.1. 2022.

$$BI = CI + FI$$

Conservation importance (CI) is evaluated in accordance with recognised established internationally acceptable principles and criteria for the determination of biodiversity-related value, including the IUCN Red List of Species, Red List of Ecosystems and Key Biodiversity Areas (KBA; IUCN [2016]).

Conservation importance is defined here as:

“The importance of a site for supporting biodiversity features of conservation concern present, e.g. populations of IUCN threatened and Near Threatened species (CR, EN, VU and NT), Rare species, range-restricted species, globally significant populations of congregatory species, and areas of threatened ecosystem types, through predominantly natural processes.”

These criteria are defined as follows:

IUCN threatened and Near Threatened species (CR, EN, VU and NT) are defined as either the global or national assessments of the risk of extinction as evaluated by a dedicated panel of species specialists according to the criteria of the International Union for The Conservation of Nature (www.iucnredlist.org). Where the global and national assessments differ for the same taxon, the national evaluation of status should be used in calculating SEI unless the global assessment is both more recent and of a more threatened category. It is important to note that the specialist is required to have a firm understanding of the IUCN Red List Categories and Criteria (IUCN 2012) in order to appropriately apply these for the evaluation of SEI. This criterion can be assessed using confirmed occurrences of species or the suitability of the habitat to support these species.

Rare species are those included on South Africa’s National Red List as Rare or Critically Rare or Extremely Rare. These are highly restricted species that are currently not declining. However, should any development impact on a population of these species they will immediately qualify under one of the IUCN categories of threat.

Range-restricted species – the presence of terrestrial flora, vertebrate and invertebrate fauna with a global population extent of occurrence (EOO) of 10 000 km² or less.

Globally significant populations of congregatory species – a roughly estimated proportion (%) of the global population of a fauna species that congregate for breeding/feeding/hibernation/other reasons.

Significant areas of threatened vegetation types – this is a function of both the area (size) being considered in relation to the total extent of that vegetation type (i.e. proportion) and how threatened (CR, EN, VU) the vegetation types are.

Natural processes – natural unmanaged areas with low levels of ecological disturbance have largely intact natural processes such as pollination, seed dispersal and migration, and thus have greater intrinsic conservation importance than those that are modified through ecological disturbance.

While most of the features that will be included in the CI will be provided by the screening tool, it is important to note that CI is evaluated at a much finer spatial scale and based on

fieldwork data collection and comprehensive desktop analyses performed by the specialist during the EA process. As a minimum requirement, CI needs to be determined for each identified habitat within the project footprint/PAOI, but best practice recommendation is that it should be determined for all habitats within the entire PAOI.

Fulfilling criteria to evaluate CI do not rely on a single specific threshold for each of the above defining characteristics but can act in combination or in isolation, providing a more robust evaluation of CI as per table below.

| Conservation importance | Fulfilling criteria |
|--------------------------------|--|
| Very high | <p>Confirmed or highly likely occurrence of CR, EN, VU or Extremely Rare or Critically Rare species that have a global EOO of < 10 km².</p> <p>Any area of natural habitat of a CR ecosystem type or large area (> 0.1% of the total ecosystem type extent) of natural habitat of EN ecosystem type.</p> <p>Globally significant populations of congregatory species (> 10% of global population).</p> |
| High | <p>Confirmed or highly likely occurrence of CR, EN, VU species that have a global EOO of > 10 km². IUCN threatened species (CR, EN, VU) must be listed under any criterion other than A, if listed as threatened only under Criterion A, include if there are less than 10 locations or < 10 000 mature individuals remaining.</p> <p>Small area (> 0.01% but < 0.1% of the total ecosystem type extent) of natural habitat of EN ecosystem type or large area (> 0.1%) of natural habitat of VU ecosystem type.</p> <p>Presence of Rare species.</p> <p>Globally significant populations of congregatory species (> 1% but < 10% of global population).</p> |
| Medium | <p>Confirmed or highly likely occurrence of populations of NT species, threatened species (CR, EN, VU) listed under Criterion A only and which have more than 10 locations or more than 10 000 mature individuals.</p> <p>Any area of natural habitat of threatened ecosystem type with status of VU.</p> <p>Presence of range-restricted species.</p> <p>> 50% of receptor contains natural habitat with potential to support SCC.</p> |
| Low | <p>No confirmed or highly likely populations of SCC.</p> <p>No confirmed or highly likely populations of range-restricted species.</p> <p>< 50% of receptor contains natural habitat with limited potential to support SCC.</p> |
| Very low | <p>No confirmed and highly unlikely populations of SCC.</p> <p>No confirmed and highly unlikely populations of range-restricted species.</p> <p>No natural habitat remaining.</p> |

Furthermore, while CI is most likely to be assessed based on data collected during the fieldwork survey, it can also be an assessment of the suitability of the receptor to support populations conforming to the fulfilling criteria. As can be seen from the worked example below, each of these evaluations of the fulfilling criteria demand necessary justification.

Functional integrity (FI) of the receptor (e.g. the vegetation/fauna community or habitat type) is defined here as the receptors' current ability to maintain the structure and functions that define it, compared to its known or predicted state under ideal conditions. Simply stated, FI is:

'A measure of the ecological condition of the impact receptor as determined by its remaining intact and functional area, its connectivity to other natural areas and the degree of current persistent ecological impacts.'

These criteria can be defined as:

- Connectivity to other natural areas – connectivity, which can also be measured conversely as the degree of habitat fragmentation, refers to how connected habitat patches are to each other, which has a significant influence on numerous ecological process, such as migration and dispersal opportunities of biota and therefore genetic exchange between populations. Connectivity to other similar habitats becomes more important as the remaining intact and functional area of a habitat decreases, mainly because population sizes decrease and are therefore at greater risk from ecological perturbations and inbreeding effects. The degree of connectivity between habitat patches varies greatly with the dispersal ability of the taxon or taxon group (e.g. fossorial reptiles) in question.
- Degree of current persistent negative ecological impacts – persistent negative impacts such as uncontrolled spread of alien and invasive flora effectively decreases both the remaining intact area and ecosystem functioning of a particular habitat.
- Remaining intact and functional area – the proportion of the receptor that supports natural habitat with intact ecological processes – small areas are less likely to withstand ecological degradation compared to large areas, and the latter are therefore better able to maintain structure and function allowing for intact ecological processes.

$$SEI = BI + RR$$

BI in turn is a function of conservation importance (CI) and the functional integrity (FI) of the receptor as follows:

Biodiversity Importance of the proposed Development Site:

Recalling that biodiversity importance (BI) is a function of conservation importance (CI) and the functional integrity (FI) of a receptor, BI can be derived from a simple matrix of CI and FI as per table below.

| Biodiversity importance | | Conservation importance | | | | |
|-------------------------|-----------|-------------------------|-----------|----------|----------|----------|
| | | Very high | High | Medium | Low | Very low |
| Functional integrity | Very high | Very high | Very high | High | Medium | Low |
| | High | Very high | High | Medium | Medium | Low |
| | Medium | High | Medium | Medium | Low | Very low |
| | Low | Medium | Medium | Low | Low | Very low |
| | Very low | Medium | Low | Very low | Very low | Very low |

Disturbed and previously levelled area-

CI = **very low**. Reason be that no natural habitat remaining.

FI= **very low**. Reason be that no natural habitat remaining.

$$BI = CI + FI$$

Therefore, using table above, the BI was assessed to be **very low** (CI **very low** = and FI = **very low**)

Area covered by Eucalypts tree plantation-

CI = **low**. Reason be that the vegetation was impacted by the Eucalyptus tree plantation and consist mainly of pioneer plants. < 5% of receptor contains natural habitat with limited potential to support SCC.

FI= **low**. Reason be that the vegetation structure is compromised and consist of mostly pioneer plants.

$$BI = CI + FI$$

Therefore, using table above, the BI was assessed to be **low** (CI **low** = and FI = **low**)

Receptor Resilience (RR) of the proposed Development Site

Receptor resilience (RR) is defined here as:

‘The intrinsic capacity of the receptor to resist major damage from disturbance and/or to recover to its original state with limited or no human intervention.’

The fulfilling criteria to evaluate RR are based on the estimated recovery time required to restore an appreciable portion of functionality to the receptor (refer to table below) and will require justification by the specialist. The specialist needs to bear in mind that resilience will often be linked to a particular disturbance or impact, or even time of year, and needs to be

described in relation to these factors. Receptor resilience needs to be evaluated by the specialist and justification for each evaluation must be provided in the report.

| Resilience | Fulfilling criteria |
|-------------------|---|
| Very high | Habitat that can recover rapidly (~ less than 5 years) to restore > 75% of the original species composition and functionality of the receptor functionality, or species that have a very high likelihood of remaining at a site even when a disturbance or impact is occurring, or species that have a very high likelihood of returning to a site once the disturbance or impact has been removed. |
| High | Habitat that can recover relatively quickly (~ 5–10 years) to restore > 75% of the original species composition and functionality of the receptor functionality, or species that have a high likelihood of remaining at a site even when a disturbance or impact is occurring, or species that have a high likelihood of returning to a site once the disturbance or impact has been removed. |
| Medium | Will recover slowly (~ more than 10 years) to restore > 75% of the original species composition and functionality of the receptor functionality, or species that have a moderate likelihood of remaining at a site even when a disturbance or impact is occurring, or species that have a moderate likelihood of returning to a site once the disturbance or impact has been removed. |
| Low | Habitat that is unlikely to be able to recover fully after a relatively long period: > 15 years required to restore ~ less than 50% of the original species composition and functionality of the receptor functionality, or species that have a low likelihood of remaining at a site even when a disturbance or impact is occurring, or species that have a low likelihood of returning to a site once the disturbance or impact has been removed. |
| Very low | Habitat that is unable to recover from major impacts, or species that are unlikely to remain at a site even when a disturbance or impact is occurring, or species that are unlikely to return to a site once the disturbance or impact has been removed. |

Disturbed and previously levelled area-

The RR = **very high**. Reason being that the transformed areas are ecosystems which are present as a result of high levels of historical disturbance and are therefore both highly resilient ecosystems.

Area covered by Eucalypts tree plantation-

The RR = **very high**. Reason being that the gum stand areas are ecosystems which are present as a result of high levels of historical disturbance and are therefore both highly resilient ecosystems.

Site Ecological Importance of the Proposed Development Site:

Finally, after the successful evaluation of both BI and RR as described above, it is possible to evaluate SEI from the final matrix below.

SEI should be described in the above manner for each impact receptor within the PAOI and clearly mapped in relation to the proposed development activities and infrastructure. Interpretation of SEI in the context of the proposed development activities as per table below must be provided by the specialist. It is very important to note that SEI is specific to the proposed development activities and cannot be meaningfully compared between different proposed projects with different associated activities on the same spatial location. However, SEI for the same proposed development with multiple alternative layouts and/or locations may be compared within the same study.

| Site ecological importance | | Biodiversity importance | | | | |
|----------------------------|-----------|-------------------------|-----------|----------|----------|----------|
| | | Very high | High | Medium | Low | Very low |
| Receptor resilience | Very low | Very high | Very high | High | Medium | Low |
| | Low | Very high | Very high | High | Medium | Very low |
| | Medium | Very high | High | Medium | Low | Very low |
| | High | High | Medium | Low | Very low | Very low |
| | Very high | Medium | Low | Very low | Very low | Very low |

Guidelines for interpreting SEI in the context of the proposed development activities.

| Site ecological importance | Interpretation in relation to proposed development activities |
|----------------------------|--|
| Very high | Avoidance mitigation – no destructive development activities should be considered. Offset mitigation not acceptable/not possible (i.e. last remaining populations of species, last remaining good condition patches of ecosystems/ unique species assemblages). Destructive impacts for species/ecosystems where persistence target remains. |
| High | Avoidance mitigation wherever possible. Minimisation mitigation – changes to project infrastructure design to limit the amount of habitat impacted; limited development activities of low impact acceptable. Offset mitigation may be required for high impact activities. |
| Medium | Minimisation and restoration mitigation – development activities of medium impact acceptable followed by appropriate restoration activities. |
| Low | Minimisation and restoration mitigation – development activities of medium to high impact acceptable followed by appropriate restoration activities. |
| Very low | Minimisation mitigation – development activities of medium to high impact acceptable and restoration activities may not be required. |

Disturbed and previously levelled area-

SEI (very low) = BI (very low) + RR (very high)

Area covered by Eucalypts tree plantation-

SEI (very low) = BI (low) + RR (very high)

The proposed development area is therefore classified as a site with **very low Site Ecological Sensitivity** within the Projected Area of Influence.



Figure 4: Site Sensitivity Map. Yellow – very low sensitivity transformed, previously levelled area with Eucalyptus trees infestations.

6. IMPACT ASSESSMENT

6.1. Assessment & Significance Criteria

The assessment criteria used in the assessment are drawn from the protocol for the specialist assessment and minimum report content requirements for environmental impacts (published in Government Notice no. 320 in Government Gazette 43110 20 March 2020) were used.

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

Step 1: Determine the **PROBABILITY** of the impact by calculating the average between the Frequency of the Aspect, the Availability of a pathway to the receptor and the availability of the receptor (thus: Sum of the three column scores below ÷ 3)

| Frequency of Aspect / Unwanted Event | Score | Availability of pathway from the source to the receptor | Score | Availability of receptor | Score |
|--|--------------|---|--------------|---|--------------|
| Never known to have happened, but may happen | 1 | A pathway to allow for the impact to occur is never available | 1 | The receptor is never available | 1 |
| Known to happen in industry | 2 | A pathway to allow for the impact to occur is almost never available | 2 | The receptor is almost never available | 2 |
| < once a year | 3 | A pathway to allow for the impact to occur is sometimes available | 3 | The receptor is sometimes available | 3 |
| Once per year to up to once per month | 4 | A pathway to allow for the impact to occur is almost always available | 4 | The receptor is almost always available | 4 |
| Once a month - Continuous | 5 | A pathway to allow for the impact to occur is always available | 5 | The receptor is always available | 5 |

Step 2: Determine the **MAGNITUDE** of the impact by calculating the average of the factors below (thus: Sum of all six column ratings below ÷ 6)

| Source | | | | | | Receptor | | | | | |
|---|-------|---|-------|--|-------|--|-------|--|-------|---|-------|
| Duration of impact | Score | Extent | Score | Volume / Quantity / Intensity | Score | Toxicity / Destruction Effect | Score | Reversibility | Score | Sensitivity of environmental component | Score |
| Lasting days to a month | 1 | Effect limited to the site. (metres); | 1 | Very small quantities / volumes / intensity (e.g. < 50L or < 1Ha) | 1 | Nontoxic (e.g. water) / Very low potential to create damage or destruction to the environment | 1 | Bio-physical and/or social functions and/or processes will remain unaltered. | 1 | Current environmental component(s) are largely disturbed from the natural state. Receptor of low significance / sensitivity | 1 |
| Lasting 1 month to 1 year | 2 | Effect limited to the activity and its immediate surroundings. (tens of metres) | 2 | Small quantities / volumes / intensity (e.g. 50L to 210L or 1Ha to 5Ha) | 2 | Slightly toxic / Harmful (e.g. diluted brine) / Low potential to create damage or destruction to the environment | 2 | Bio-physical and/or social functions and/or processes might be negligibly altered or enhanced / Still reversible | 2 | Current environmental component(s) are moderately disturbed from the natural state. No environmentally sensitive components. | 2 |
| Lasting 1 – 5 years | 3 | Impacts on extended area beyond site boundary (hundreds of metres) | 3 | Moderate quantities / volumes / intensity (e.g. > 210 L < 5000L or 5 – 8Ha) | 3 | Moderately toxic (e.g. slimes) Potential to create damage or destruction to the environment | 3 | Bio-physical and/or social functions and/or processes might be notably altered or enhanced / Partially reversible | 3 | Current environmental component(s) are a mix of disturbed and undisturbed areas. Area with some environmental sensitivity (scarce / valuable environment etc.). | 3 |
| Lasting 5 years to Life of Organisation | 4 | Impact on local scale / adjacent sites (km's) | 4 | Very large quantities / volumes / intensity (e.g. 5000 L – 10 000L or 8Ha– 12Ha) | 4 | Toxic (e.g. diesel & Sodium Hydroxide) | 4 | Bio-physical and/or social functions and/or processes might be considerably altered or enhanced / potentially irreversible | 4 | Current environmental component(s) are in a natural state. Environmentally sensitive environment / receptor (endangered species / habitats etc.). | 4 |

| Source | | | | | | Receptor | | | | | |
|---|-------|---|-------|---|-------|------------------------------------|-------|--|-------|---|-------|
| Duration of impact | Score | Extent | Score | Volume / Quantity / Intensity | Score | Toxicity / Destruction Effect | Score | Reversibility | Score | Sensitivity of environmental component | Score |
| Beyond life of Organization / Permanent impacts | 5 | Extends widely (nationally or globally) | 5 | Very large quantities / volumes / intensity (e.g. > 10 000 L or > 12Ha) | 5 | Highly toxic (e.g. arsenic or TCE) | 5 | Bio-physical and/or social functions and/or processes might be severely/substantially altered or enhanced / Irreversible | 5 | Current environmental component(s) are in a pristine natural state. Highly Sensitive area (endangered species, wetlands, protected habitats etc.) | 5 |

Step 3: Determine the **SEVERITY** of the impact by plotting the averages that were obtained above for Probability and Magnitude in the table below.

| ENVIRONMENTAL IMPACT RATING / PRIORITY | | | | | |
|--|------------|----------|-------------|-----------|------------|
| | MAGNITUDE | | | | |
| PROBABILITY | 1 Minor | 2 Low | 3 Medium | 4 High | 5 Major |
| 5 Almost Certain | Low | Medium | High | High | High |
| 4 Likely | Low | Medium | High | High | High |
| 3 Possible | Low | Medium | Medium | High | High |
| 2 Unlikely | Low | Low | Medium | Medium | High |
| 1 Rare | Low | Low | Low | Medium | Medium |

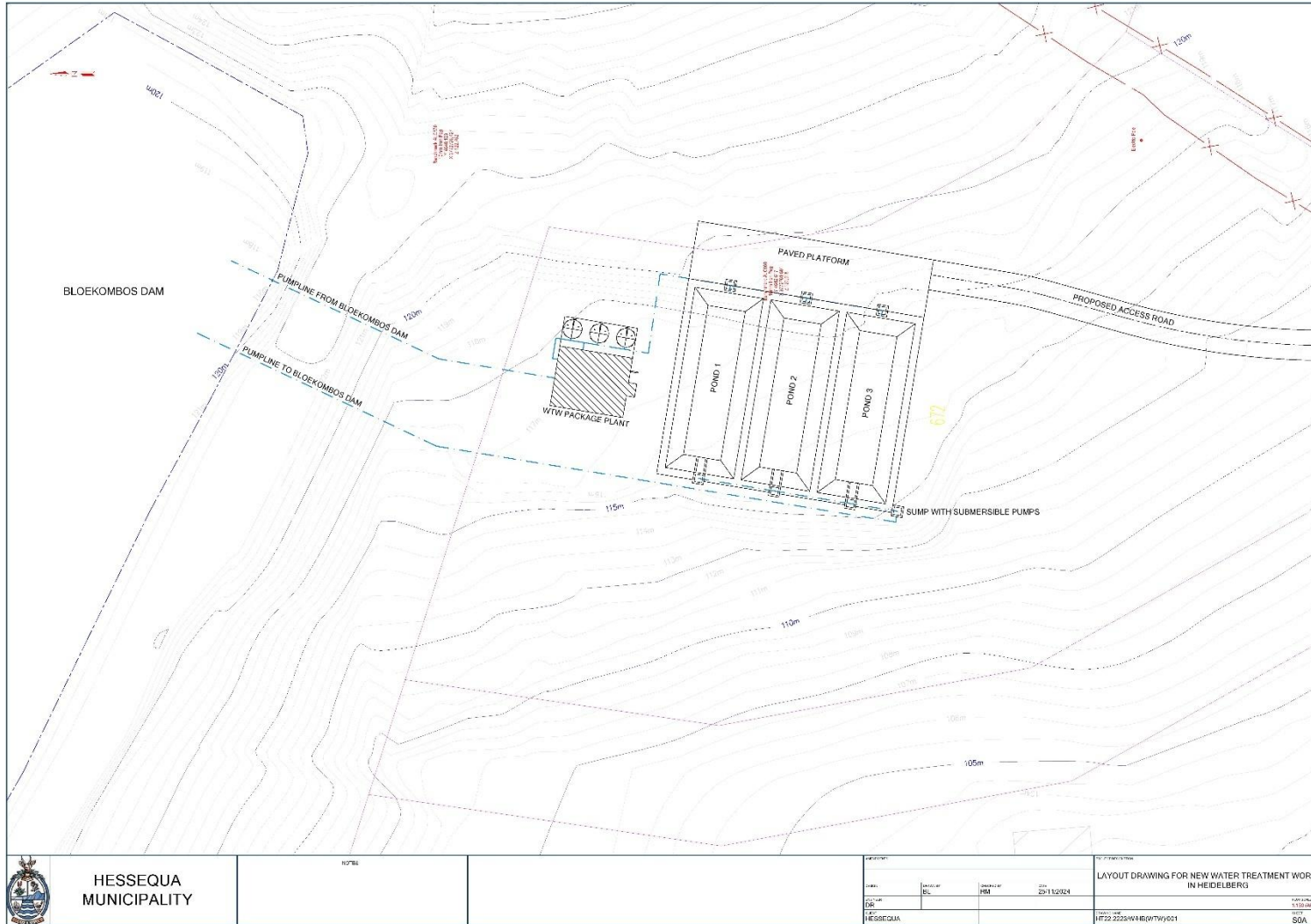
Alternatives Assessed:

Three layout/design alternatives were assessed as per the descriptions and layout maps provided below

Layout/design Alternative 1:

- WTW package plant with maximum capacity of 3 000m³/day (3MI/day) 100m² footprint
- Surface abstraction by floating pumps from Bloekombos Dam on a variable demand basis along an 46m 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.
- 3 x Sludge settling ponds (23m x 5m x 1.4m with a freeboard of 400mm and 150m³ capacity each) for backwash water collections and sludge settlement 1100m² footprint
- A collector sump, pumps and pipeline for return flow of supernatant from sludge dams directly back into Bloekombos dam to optimise water use.
- A pump station and 200mm x 650m uPVC pipeline for final water distribution from the WTW into the bulk distribution system in Heidelberg via Muir Street.
- Paved platform for vehicle parking and materials storage area 150m²
- Widening and re-alignment of existing 3m wide access road from Muir Street by 1m (80m long x 4m wide)

Total expected development footprint of 0.4ha.



Layout/design Alternative 1

Layout/design Alternative 2:

- 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.
- 3 x Sludge settling ponds (27m x 12m x 1.8m deep with 518m³ capacity each) for backwash water collections and sludge settlement. The proposed cut and fill construction of the three sludge settling lagoon, 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 110mm x 187m long uPVC pipe to the canal inlet point at the Dam
- A pump station and 200mm x 650m 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 260m²
- Stormwater Pipeline of 68m x 450mm concrete class 100D and Sludge dams overflow pipeline 34m x 110uPVC with outlet headwall within 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
Total expected development footprint of 0.5ha.

Layout/design Alternative 3:

- WTW package plant with maximum capacity of 3 000m³/day (3MI/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 fill 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.
- Total expected development footprint of 0.5ha.

TERRESTRIAL BIODIVERSITY

Terrestrial biodiversity is a combination of animal and plant species and their associated habitats, hence below included and assessed potential terrestrial animal and plant species 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.

| Impacts on biological aspects: | | |
|--|---|--|
| | Layout/design Alternative 1 | Layout/design Alternative 2 |
| Nature of impact: | Impacts of construction activities on the terrestrial animal and bird life populations and their associated habitats. | |
| Extent, duration and magnitude of impact: | E – On site or within 100m of the site (2) D – Short term 0-1 year (1) M – Moderate (6) | E – On site or within 100m of the site (2) D – Short term 0-1 year (1) M – Moderate (6) |
| Probability of occurrence: | P - Definite (5) | P - Definite (5) |
| Degree to which the impact can be reversed: | Partly reversible (PR) | Partly reversible (PR) |
| Degree to which the impact may cause irreplaceable loss of resources: | Resource may be partly destroyed (PR) | |
| Cumulative impact prior to mitigation: | This survey did not identify the study area as a regionally important specific site from an animal species point of view, as it does not lie within priority animal species corridors, habitat or home ranges. None of the species listed in the environmental screen report are expected to be affected by the proposed development. | This survey did not identify the study area as a regionally important specific site from an animal species point of view, as it does not lie within priority animal species corridors, habitat or home ranges. None of the species listed in the environmental screen report are expected to be affected by the proposed development. |
| Significance rating of impact prior to mitigation (Low, Medium, Medium-High, High, or Very-High) | Medium (45) | Medium (45) |
| Degree to which the impact can be mitigated: | Partly- mitigatable (PM) | Partly- mitigatable (PM) |
| Proposed mitigation: | <p>Mitigation measures that must be implemented -</p> <ul style="list-style-type: none"> Development activities must be limited to identified and demarcated development footprint areas and only existing roads may be used to gain access to the site. Invasive vegetation to be removed during construction activities to be disposed of at landfill site in such a manner that seeds must not be able to spread from the disposal site or during transportation. No trapping or hunting of any fauna or avifauna species may take place on the property. Any tortoises or fauna or avifauna species present on the site when construction activities are taking place must be safely moved to the northeastern indigenous vegetation areas not to be impacted upon. This must be done in a manner not to harm the animals/birds and any relocation must be recorded and reported to the Environmental Control Officer. No disturbance should be allowed outside of the proposed 0.5ha development area. This includes no excavations; no storage of topsoil no new or widened roads, and all forms of temporary disturbance. Implement erosion and storm water runoff management measures to prevent (or if prevention is not | <p>Mitigation measures that must be implemented -</p> <ul style="list-style-type: none"> Development activities must be limited to identified and demarcated development footprint areas and only existing roads may be used to gain access to the site. Invasive vegetation to be removed during construction activities to be disposed of at landfill site in such a manner that seeds must not be able to spread from the disposal site or during transportation. No trapping or hunting of any fauna or avifauna species may take place on the property. Any tortoises or fauna or avifauna species present on the site when construction activities are taking place must be safely moved to the northeastern indigenous vegetation areas not to be impacted upon. This must be done in a manner not to harm the animals/birds and any relocation must be recorded and reported to the Environmental Control Officer. |

| | | |
|--|---|--|
| | <p>possible limit) any erosion from occurring on the development areas and surrounds.</p> <ul style="list-style-type: none"> Should areas outside of the proposed development footprint area be disturbed this must be actively rehabilitated with indigenous vegetation. | <ul style="list-style-type: none"> No disturbance should be allowed outside of the proposed 0.5ha development area. This includes no excavations; no storage of topsoil no new or widened roads, and all forms of temporary disturbance. Implement erosion and storm water runoff management measures to prevent (or if prevention is not possible limit) any erosion from occurring on the development areas and surrounds. Should areas outside of the proposed development footprint area be disturbed this must be actively rehabilitated with indigenous vegetation. |
| Cumulative impact post mitigation: | Minimal impact on terrestrial animal and birdlife during construction. | Minimal impact on terrestrial animal and birdlife during construction. |
| Significance rating of impact after mitigation (Low, Medium, Medium-High, High, or Very-High) | Low negative | Low negative |
| Layout/design Alternative 3 | | |
| Extent, duration and magnitude of impact: | E – On site or within 100m of the site (2) D – Short term 0-1 year (1) M – Moderate (6) | |
| Probability of occurrence: | P - Definite (5) | |
| Degree to which the impact can be reversed: | Partly reversible (PR) | |
| Degree to which the impact may cause irreplaceable loss of resources: | Resource may be partly destroyed (PR) | |
| Cumulative impact prior to mitigation: | This survey did not identify the study area as a regionally important specific site from an animal species point of view, as it does not lie within priority animal species corridors, habitat or home ranges. None of the species listed in the environmental screen report are expected to be affected by the proposed development. | |
| Significance rating of impact prior to mitigation (Low, Medium, Medium-High, High, or Very-High) | Medium (45) | |
| Degree to which the impact can be mitigated: | Partly- mitigatable (PM) | |
| Proposed mitigation: | <p>Mitigation measures that must be implemented -</p> <ul style="list-style-type: none"> Development activities must be limited to identified and demarcated development footprint areas and only existing roads may be used to gain access to the site. Invasive vegetation to be removed during construction activities to be disposed of at landfill site in such a manner that seeds must not be able to spread from the disposal site or during transportation. No trapping or hunting of any fauna or avifauna species may take place on the property. Any tortoises or fauna or avifauna species present on the site when construction activities are taking place must be safely moved to the northeastern indigenous vegetation areas not to be impacted upon. This must be done in a manner not to harm the animals/birds and any relocation must be recorded and reported to the Environmental Control Officer. No disturbance should be allowed outside of the proposed 0.5ha development area. This includes no excavations; no storage of topsoil no new or widened roads, and all forms of temporary disturbance. Implement erosion and storm water runoff management measures to prevent (or if prevention is not | |

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| | <p>possible limit) any erosion from occurring on the development areas and surrounds.</p> <ul style="list-style-type: none"> Should areas outside of the proposed development footprint area be disturbed this must be actively rehabilitated with indigenous vegetation. |
| Cumulative impact post mitigation: | Minimal impact on terrestrial animal and birdlife during construction. |
| Significance rating of impact after mitigation (Low, Medium, Medium-High, High, or Very-High) | Low negative |

| Impacts on biological aspects: | | |
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| | Layout/design Alternative 1 | Layout/design Alternative 2 |
| Nature of impact: | Impacts of construction activities on terrestrial indigenous vegetation as part of Endangered Eastern Ruens Shale Renosterveld | |
| Extent, duration and magnitude of impact: | E – On site or within 100m of the site (2) D – Permanent. Will not cease (5) M – Low (4) | E – On site or within 100m of the site (2) D – Permanent. Will not cease (5) M – Low (4) |
| Probability of occurrence: | P - Definite (5) | P - Definite (5) |
| Degree to which the impact can be reversed: | Partly reversible (PR) | Partly reversible (PR) |
| Degree to which the impact may cause irreplaceable loss of resources: | Resource may be partly destroyed (PR) | |
| Cumulative impact prior to mitigation: | 338.21m ² was incorrectly mapped as CBA. This mapped area is located on the existing road and pipeline route that will be used. Approximately 1200m ² degraded endangered vegetation with a medium ecological sensitivity will be permanently cleared. | 338.21m ² was incorrectly mapped as CBA. This mapped area is located on the existing road and pipeline route that will be used. Approximately 1200m ² degraded endangered vegetation with a medium ecological sensitivity will be permanently cleared. |
| Significance rating of impact prior to mitigation (Low, Medium, Medium-High, High, or Very-High) | Medium (55) | Medium (55) |
| Degree to which the impact can be mitigated: | Partly- mitigatable (PM) | Partly- mitigatable (PM) |
| Proposed mitigation: | <p>Mitigation measures that must be implemented -</p> <ul style="list-style-type: none"> • 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 placement of the underground powercable. Undertake construction activities only in identified and specifically demarcated areas. • 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. • Construction activities must be controlled to ensure that the adjacent vegetated areas are not negatively impacted. • Invasive vegetation to be removed during construction to be disposed of at landfill site in such a manner that seeds must not be able to spread from the disposal site or during transportation. | <p>Mitigation measures that must be implemented</p> <ul style="list-style-type: none"> • 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 construction. • 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. • Construction activities must be controlled to ensure that the adjacent vegetated areas are not negatively impacted. • Invasive vegetation to be removed during construction to be disposed of at landfill site in such a manner that seeds must not be able to spread from the disposal site or during transportation. |
| Cumulative impact post mitigation: | Minimal impact on indigenous terrestrial vegetation during construction. | Minimal impact on indigenous terrestrial I vegetation during rehabilitation. |
| Significance rating of impact after mitigation (Low, Medium, Medium-High, High, or Very-High) | Low negative | Low negative |
| Layout/design Alternative 3 | | |
| Extent, duration and magnitude of impact: | E – Footprint (1) D – Short to Medium term (2) M – Low (4) | |

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| Probability of occurrence: | P - Definite (5) |
| Degree to which the impact can be reversed: | Partly reversible (PR) |
| Degree to which the impact may cause irreplaceable loss of resources: | Resource may be partly destroyed (PR) |
| Cumulative impact prior to mitigation: | 338.21m ² was incorrectly mapped as CBA. This mapped area is located on the existing road and pipeline route that will be used. Approximately 1200m ² degraded endangered vegetation with a low ecological sensitivity will be permanently cleared. |
| Significance rating of impact prior to mitigation (Low, Medium, Medium-High, High, or Very-High) | Medium (35) |
| Degree to which the impact can be mitigated: | Partly- mitigatable (PM) |
| Proposed mitigation: | <p>Mitigation measures that must be implemented</p> <ul style="list-style-type: none"> • 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 construction. • 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. • Construction activities must be controlled to ensure that the adjacent vegetated areas are not negatively impacted. • Invasive vegetation to be removed during construction to be disposed of at landfill site in such a manner that seeds must not be able to spread from the disposal site or during transportation. • |
| Cumulative impact post mitigation: | Minimal impact on indigenous vegetation. |
| Significance rating of impact after mitigation (Low, Medium, Medium-High, High, or Very-High) | Low negative |

| Impacts on biological aspects: | | |
|---|---|--|
| | Layout/design Alternative 1 | Layout/design Alternative 2 |
| Nature of impact: | Impacts of construction activities on terrestrial biodiversity and ecological functioning also partially mapped as terrestrial CBA1 | |
| Extent, duration and magnitude of impact: | E – On site or within 100m of the site (2) D – Short to Medium term (2) M – Low (4) | E – On site or within 100m of the site (2) D – Short to Medium term (2) M – Low (4) |
| Probability of occurrence: | P - Definite (5) | P - Definite (5) |
| Degree to which the impact can be reversed: | Partly reversible (PR) | Partly reversible (PR) |
| Degree to which the impact may cause irreplaceable loss of resources: | Resource may be partly destroyed (PR) | |
| Cumulative impact prior to mitigation: | 338.21m ² was incorrectly mapped as CBA. This mapped area is located on the existing road and pipeline route that will be used. Approximately 1200m ² degraded endangered vegetation with a low ecological sensitivity will be permanently cleared. | 338.21m ² was incorrectly mapped as CBA. This mapped area is located on the existing road and pipeline route that will be used. |

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| | | Approximately 1200m ² degraded endangered vegetation with a low ecological sensitivity will be permanently cleared. |
| Significance rating of impact prior to mitigation (Low, Medium, Medium-High, High, or Very-High) | Medium (40) | Medium (40) |
| Degree to which the impact can be mitigated: | Partly- mitigatable (PM) | Partly- mitigatable (PM) |
| Proposed mitigation: | <p>Mitigation measures that must be implemented -</p> <ul style="list-style-type: none"> • 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 placement of the underground powercable. Undertake construction activities only in identified and specifically demarcated areas. • 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. • Construction activities must be controlled to ensure that the adjacent vegetated areas are not negatively impacted. • Invasive vegetation to be removed during construction to be disposed of at landfill site in such a manner that seeds must not be able to spread from the disposal site or during transportation. | <p>Mitigation measures that must be implemented</p> <ul style="list-style-type: none"> • 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 construction. • 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. • Construction activities must be controlled to ensure that the adjacent vegetated areas are not negatively impacted. • Invasive vegetation to be removed during construction to be disposed of at landfill site in such a manner that seeds must not be able to spread from the disposal site or during transportation. |
| Cumulative impact post mitigation: | Minimal impact on terrestrial ecosystem during construction. | Minimal impact on terrestrial ecosystem vegetation during construction |
| Significance rating of impact after mitigation (Low, Medium, Medium-High, High, or Very-High) | Low negative | Low negative |
| Layout/design Alternative 3 | | |
| Extent, duration and magnitude of impact: | E – Footprint (1) D – Short to Medium term (2) M – Low (4) | |
| Probability of occurrence: | P - Definite (5) | |
| Degree to which the impact can be reversed: | Partly reversible (PR) | |
| Degree to which the impact may cause irreplaceable loss of resources: | Resource may be partly destroyed (PR) | |
| Cumulative impact prior to mitigation: | 338.21m ² was incorrectly mapped as CBA. This mapped area is located on the existing road and pipeline route that will be used. Approximately 1200m ² degraded endangered vegetation with a low ecological sensitivity will be permanently cleared. | |
| Significance rating of impact prior to mitigation (Low, Medium, Medium-High, High, or Very-High) | Medium (35) | |
| Degree to which the impact can be mitigated: | Partly- mitigatable (PM) | |

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| Proposed mitigation: | <p>Mitigation measures that must be implemented</p> <ul style="list-style-type: none"> • 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 construction. • 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. • Construction activities must be controlled to ensure that the adjacent vegetated areas are not negatively impacted. • Invasive vegetation to be removed during construction to be disposed of at landfill site in such a manner that seeds must not be able to spread from the disposal site or during transportation. • |
| Cumulative impact post mitigation: | Minimal impact on indigenous terrestrial ecosystem during rehabilitation. |
| Significance rating of impact after mitigation (Low, Medium, Medium-High, High, or Very-High) | Low negative |

(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.

| Impacts on biological aspects: | | |
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| | Layout/design Alternative 1 | Layout/design Alternative 2 |
| Nature of impact: | Impacts of Water Treatment Works operational activities on the terrestrial animal and bird life populations and their associated habitats. | |
| Extent, duration and magnitude of impact: | E – On site or within 100m of the site (2) D – Will not cease (5) M – Low (4) | E – On site or within 100m of the site (2) D – Will not cease (5) M – Low (4) |
| Probability of occurrence: | P - Definite (5) | P - Definite (5) |
| Degree to which the impact can be reversed: | Partly reversible (PR) | Partly reversible (PR) |
| Degree to which the impact may cause irreplaceable loss of resources: | Resource may be partly destroyed (PR) | |
| Cumulative impact prior to mitigation: | Cumulative impacts of the operational activities on animal and bird life will be disturbances to local animal and bird life due to human activities causing disturbances within the area, | Cumulative impacts of the operational activities on animal and bird life will be disturbances to local animal and bird life due to human activities causing disturbances within the area, |
| Significance rating of impact prior to mitigation (Low, Medium, Medium-High, High, or Very-High) | Medium (55) | Medium (55) |
| Degree to which the impact can be mitigated: | Partly- mitigatable (PM) | Partly- mitigatable (PM) |
| Proposed mitigation: | <p>Mitigation measures that must be implemented -</p> <ul style="list-style-type: none"> • No trapping, hunting or any injury to animal or birdlife may occur during operational activities. Should any local animal or birdlife be found within the area during maintenance activities they must carefully be moved to the adjacent natural areas not to be impacted upon. • The stormwater outlets must be fitted with a grid to prevent animals and birds from nesting inside of these pipes. • The discharge of stormwater must not lead to waste | <p>Mitigation measures that must be implemented -</p> <ul style="list-style-type: none"> • No trapping, hunting or any injury to animal or birdlife may occur during operational activities. Should any local animal or birdlife be found within the area during maintenance activities they must carefully be moved to the adjacent natural areas not to be impacted upon. • The stormwater outlets must be fitted with a grid to prevent animals and birds from nesting inside of these pipes. |

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| | <p>pollution, flooding or erosion.</p> <ul style="list-style-type: none"> Waste traps must be installed at the inlet to the stormwater pipes which must be cleared of waste on a monthly basis by the municipality. Any waste at the stormwater discharge areas must also be removed by the municipality and disposed of at the municipal landfill site on a monthly basis. Ongoing monitoring of erosion at the outlet structures must be done by the municipality, 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. Discharge of stormwater must be controlled and must be done in such a manner that it does not cause erosion at the discharge point. 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 CapeNature approved alien vegetation management practices. Replacement of topsoil and revegetation of the impacted indigenous vegetation areas must be completed within one month of construction completion and under guidance of a qualified ecological specialist. Revegetation must only be done with locally sourced indigenous vegetation. Monitoring of rehabilitated areas must be done by an ECO for at least one year after construction completion on a three-monthly basis to determine success of rehabilitation and to monitor other potential impacts such as erosion. Should the ECO find that rehabilitation is not satisfactory he/she must recommend additional measures to be implemented. All services infrastructure must be maintained in a good condition by the municipality not leading to any environmental degradation or pollution. | <ul style="list-style-type: none"> The discharge of stormwater must not lead to waste pollution, flooding or erosion. Waste traps must be installed at the inlet to the stormwater pipes which must be cleared of waste on a monthly basis by the municipality. Any waste at the stormwater discharge areas must also be removed by the municipality and disposed of at the municipal landfill site on a monthly basis. Ongoing monitoring of erosion at the outlet structures must be done by the municipality, 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. Discharge of stormwater must be controlled and must be done in such a manner that it does not cause erosion at the discharge point. 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 CapeNature approved alien vegetation management practices. Replacement of topsoil and revegetation of the impacted indigenous vegetation areas must be completed within one month of construction completion and under guidance of a qualified ecological specialist. Revegetation must only be done with locally sourced indigenous vegetation. Monitoring of rehabilitated areas must be done by an ECO for at least one year after construction completion on a three-monthly basis to determine success of rehabilitation and to monitor other potential impacts such as erosion. Should the ECO find that rehabilitation is not satisfactory he/she must recommend additional measures to be implemented. All services infrastructure must be maintained in a good condition by the municipality not leading to any environmental degradation or pollution. |
| Cumulative impact post mitigation: | Minimal impact on coastal animal and birdlife during operation. | Minimal impact on coastal animal and bird life during operation. |
| Significance rating of impact after mitigation (Low, Medium, Medium-High, High, or Very-High) | Low negative | Low negative |
| Layout/design Alternative 3 | | |
| Extent, duration and magnitude of impact: | E – On site or within 100m of the site (2) D – Will not cease (5) M – Low (4) | |
| Probability of occurrence: | P - Definite (5) | |
| Degree to which the impact can be reversed: | Partly reversible (PR) | |
| Degree to which the impact may cause irreplaceable loss of resources: | Resource may be partly destroyed (PR) | |
| Cumulative impact prior to mitigation: | Cumulative impacts of the operational activities on animal and bird life will be disturbances to local animal and bird life due to human activities causing disturbances within the area, | |
| Significance rating of impact prior to mitigation (Low, Medium, | Medium (55) | |

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| Medium-High, High, or Very-High) | |
| Degree to which the impact can be mitigated: | Partly- mitigatable (PM) |
| Proposed mitigation: | <p>Mitigation measures that must be implemented -</p> <ul style="list-style-type: none"> No trapping, hunting or any injury to animal or birdlife may occur during operational activities. Should any local animal or birdlife be found within the area during maintenance activities they must carefully be moved to the adjacent natural areas not to be impacted upon. The stormwater outlets must be fitted with a grid to prevent animals and birds from nesting inside of these pipes. The discharge of stormwater must not lead to waste pollution, flooding or erosion. Waste traps must be installed at the inlet to the stormwater pipes which must be cleared of waste on a monthly basis by the municipality. Any waste at the stormwater discharge areas must also be removed by the municipality and disposed of at the municipal landfill site on a monthly basis. Ongoing monitoring of erosion at the outlet structures must be done by the municipality, 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. Discharge of stormwater must be controlled and must be done in such a manner that it does not cause erosion at the discharge point. 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 CapeNature approved alien vegetation management practices. Replacement of topsoil and revegetation of the impacted indigenous vegetation areas must be completed within one month of construction completion and under guidance of a qualified ecological specialist. Revegetation must only be done with locally sourced indigenous vegetation. Monitoring of rehabilitated areas must be done by an ECO for at least one year after construction completion on a three-monthly basis to determine success of rehabilitation and to monitor other potential impacts such as erosion. Should the ECO find that rehabilitation is not satisfactory he/she must recommend additional measures to be implemented. All services infrastructure must be maintained in a good condition by the municipality not leading to any environmental degradation or pollution. |
| Cumulative impact post mitigation: | Minimal impact on terrestrial animal and birdlife during operation. |
| Significance rating of impact after mitigation (Low, Medium, Medium-High, High, or Very-High) | Low negative |

| Impacts on biological aspects: | | |
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| | Layout/design Alternative 1 | Layout/design Alternative 2 |
| Nature of impact: | Impacts of Water Treatment Works operational activities on terrestrial indigenous vegetation as part of Endangered Eastern Ruens Shale Renosterveld | |

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| Extent, duration and magnitude of impact: | E – On site or within 100m of the site (2) D – Will not cease (5) M – Low (4) | E – On site or within 100m of the site (2) D – Will not cease (5) M – Low (4) |
| Probability of occurrence: | P - Definite (5) | P - Definite (5) |
| Degree to which the impact can be reversed: | Partly reversible (PR) | Partly reversible (PR) |
| Degree to which the impact may cause irreplaceable loss of resources: | Resource may be partly destroyed (PR) | |
| Cumulative impact prior to mitigation: | Cumulative impacts of the operational activities on indigenous vegetation is related to stormwater and overflow discharge which may cause erosion and further loss of indigenous vegetation species if not done in a controlled manner, as well as potential human activities impacts on remaining adjacent indigenous vegetation areas during maintenance. Layout/alternative 1 does not accommodate proper sludge handling capacity nor stormwater management, hence is not preferred. | Cumulative impacts of the operational activities on indigenous vegetation is related to stormwater and overflow discharge which may cause erosion and further loss of indigenous vegetation species if not done in a controlled manner, as well as potential human activities impacts on remaining adjacent indigenous vegetation areas during maintenance. Layout/alternative 2 does accommodate proper sludge handling capacity and stormwater management; however sludge overflow is recommended within the adjacent drainage line which is not preferred. |
| Significance rating of impact prior to mitigation (Low, Medium, Medium-High, High, or Very-High) | Medium (55) | Medium (55) |
| Degree to which the impact can be mitigated: | Completely mitigatable (CM) | Completely mitigatable (CM) |
| Proposed mitigation: | <p>Mitigation measures that must be implemented -</p> <ul style="list-style-type: none"> The discharge of stormwater and overflow must not lead to waste pollution or erosion at discharge points. Waste traps must be installed at the inlet to the stormwater pipes which must be cleared of waste on a monthly basis by the municipality. Any waste at the stormwater discharge areas must also be removed by the municipality and disposed of at the municipal landfill site on a monthly basis. Ongoing monitoring of erosion at the outlet structures must be done by the municipality, 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 CapeNature approved alien vegetation management practices. Replacement of topsoil and revegetation of the impacted indigenous vegetation areas must be completed within one month of construction completion and under guidance of a qualified ecological specialist. Revegetation must only be done with locally sourced indigenous vegetation. Monitoring of rehabilitated areas must be done by an ECO for at least one year after construction completion on a three-monthly basis to determine success of rehabilitation and to monitor other potential impacts such as erosion. Should the ECO find that rehabilitation is not satisfactory he/she must recommend additional measures to be implemented. All services infrastructure must be maintained in a good condition by the municipality not leading to any environmental degradation or pollution. | <p>Mitigation measures that must be implemented -</p> <ul style="list-style-type: none"> The discharge of stormwater and overflow must not lead to waste pollution or erosion at discharge points. Waste traps must be installed at the inlet to the stormwater pipes which must be cleared of waste on a monthly basis by the municipality. Any waste at the stormwater discharge areas must also be removed by the municipality and disposed of at the municipal landfill site on a monthly basis. Ongoing monitoring of erosion at the outlet structures must be done by the municipality, 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 CapeNature approved alien vegetation management practices. Replacement of topsoil and revegetation of the impacted indigenous vegetation areas must be completed within one month of construction completion and under guidance of a qualified ecological specialist. Revegetation must only be done with locally sourced indigenous vegetation. Monitoring of rehabilitated areas must be done by an ECO for at least one year after construction completion on a three-monthly basis to determine success of rehabilitation and to monitor other potential impacts such as erosion. Should the ECO find that rehabilitation is not satisfactory he/she must recommend additional measures to be implemented. All services infrastructure must be maintained in a good condition by the municipality not leading to any environmental degradation or pollution. |

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| Cumulative impact post mitigation: | Minimal impact on surrounding indigenous vegetation during operation. | Minimal impact on surrounding indigenous vegetation during operation. |
| Significance rating of impact after mitigation (Low, Medium, Medium-High, High, or Very-High) | Low negative | Low negative |
| Layout/design Alternative 3 | | |
| Extent, duration and magnitude of impact: | E – Footprint (1) D – Short to Medium term (2) M – Low (4) | |
| Probability of occurrence: | P - Definite (5) | |
| Degree to which the impact can be reversed: | Partly reversible (PR) | |
| Degree to which the impact may cause irreplaceable loss of resources: | Resource may be partly destroyed (PR) | |
| Cumulative impact prior to mitigation: | <p>Cumulative impacts of the operational activities on indigenous vegetation is related to stormwater and overflow discharge which may cause erosion and further loss of indigenous vegetation species if not done in a controlled manner, as well as potential human activities impacts on remaining adjacent indigenous vegetation areas during maintenance.</p> <p>Layout/alternative 3 does accommodate proper sludge handling capacity and stormwater management; and also proposes to discharge all sludge overflow back into the Bloekombos Dam hence, it is the preferred option.</p> | |
| Significance rating of impact prior to mitigation (Low, Medium, Medium-High, High, or Very-High) | Medium (35) | |
| Degree to which the impact can be mitigated: | Partly- mitigatable (PM) | |
| Proposed mitigation: | <p>Mitigation measures that must be implemented</p> <ul style="list-style-type: none"> • The discharge of stormwater and overflow must not lead to waste pollution or erosion at discharge points. • Waste traps must be installed at the inlet to the stormwater pipes which must be cleared of waste on a monthly basis by the municipality. Any waste at the stormwater discharge areas must also be removed by the municipality and disposed of at the municipal landfill site on a monthly basis. • Ongoing monitoring of erosion at the outlet structures must be done by the municipality, 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 CapeNature approved alien vegetation management practices. • Replacement of topsoil and revegetation of the impacted indigenous vegetation areas must be completed within one month of construction completion and under guidance of a qualified ecological specialist. Revegetation must only be done with locally sourced indigenous vegetation. • Monitoring of rehabilitated areas must be done by an ECO for at least one year after construction completion on a three-monthly basis to determine success of rehabilitation and to monitor other potential impacts such as erosion. Should the ECO find that rehabilitation is not satisfactory he/she must recommend additional measures to be implemented. | |

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| | <ul style="list-style-type: none"> All services infrastructure must be maintained in a good condition by the municipality not leading to any environmental degradation or pollution. |
| Cumulative impact post mitigation: | Minimal impact on indigenous vegetation during operation. |
| Significance rating of impact after mitigation (Low, Medium, Medium-High, High, or Very-High) | Low negative |

| Impacts on biological aspects: | | |
|--|---|--|
| | Layout/design Alternative 1 | Layout/design Alternative 2 |
| Nature of impact: | Impacts of operational activities on terrestrial biodiversity and ecological functioning also partially mapped as terrestrial CBA1 | |
| Extent, duration and magnitude of impact: | E – On site or within 100m of the site (2) D – Short to Medium term (2) M – Low (4) | E – On site or within 100m of the site (2) D – Short to Medium term (2) M – Low (4) |
| Probability of occurrence: | P - Definite (5) | P - Definite (5) |
| Degree to which the impact can be reversed: | Partly reversible (PR) | Partly reversible (PR) |
| Degree to which the impact may cause irreplaceable loss of resources: | Resource may be partly destroyed (PR) | |
| Cumulative impact prior to mitigation: | <p>Cumulative impacts of the operational activities on the terrestrial ecosystem is related to stormwater and overflow discharge which may cause erosion, pollution and further loss of indigenous vegetation species if not done in a controlled manner, as well as potential human activities impacts on remaining adjacent indigenous vegetation areas during maintenance.</p> <p>Layout/alternative 1 does not accommodate proper sludge handling capacity nor stormwater management, hence is not preferred.</p> | <p>Cumulative impacts of the operational activities on the terrestrial ecosystem is related to stormwater and overflow discharge which may cause erosion, pollution and further loss of indigenous vegetation species if not done in a controlled manner, as well as potential human activities impacts on remaining adjacent indigenous vegetation areas during maintenance.</p> <p>Layout/alternative 2 does accommodate proper sludge handling capacity and stormwater management; however sludge overflow is recommended within the adjacent drainage line which is not preferred.</p> |
| Significance rating of impact prior to mitigation (Low, Medium, Medium-High, High, or Very-High) | Medium (40) | Medium (40) |
| Degree to which the impact can be mitigated: | Partly- mitigatable (PM) | Partly- mitigatable (PM) |
| Proposed mitigation: | <p>Mitigation measures that must be implemented -</p> <ul style="list-style-type: none"> The discharge of stormwater and overflow must not lead to waste pollution or erosion at discharge points. Waste traps must be installed at the inlet to the stormwater pipes which must be cleared of waste on a monthly basis by the municipality. Any waste at the stormwater discharge areas must also be removed by the municipality and disposed of at the municipal landfill site on a monthly basis. Ongoing monitoring of erosion at the outlet structures must be done by the municipality, 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 | <p>Mitigation measures that must be implemented</p> <ul style="list-style-type: none"> The discharge of stormwater and overflow must not lead to waste pollution or erosion at discharge points. Waste traps must be installed at the inlet to the stormwater pipes which must be cleared of waste on a monthly basis by the municipality. Any waste at the stormwater discharge areas must also be removed by the municipality and disposed of at the municipal landfill site on a monthly basis. Ongoing monitoring of erosion at the outlet structures must be done by the municipality, 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 |

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| | <p>to prevent any additional cumulative impacts on the environment.</p> <ul style="list-style-type: none"> 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 CapeNature approved alien vegetation management practices. Replacement of topsoil and revegetation of the impacted indigenous vegetation areas must be completed within one month of construction completion and under guidance of a qualified ecological specialist. Revegetation must only be done with locally sourced indigenous vegetation. Monitoring of rehabilitated areas must be done by an ECO for at least one year after construction completion on a three-monthly basis to determine success of rehabilitation and to monitor other potential impacts such as erosion. Should the ECO find that rehabilitation is not satisfactory he/she must recommend additional measures to be implemented. All services infrastructure must be maintained in a good condition by the municipality not leading to any environmental degradation or pollution. | <p>specialist so as to prevent any additional cumulative impacts on the environment.</p> <ul style="list-style-type: none"> 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 CapeNature approved alien vegetation management practices. Replacement of topsoil and revegetation of the impacted indigenous vegetation areas must be completed within one month of construction completion and under guidance of a qualified ecological specialist. Revegetation must only be done with locally sourced indigenous vegetation. Monitoring of rehabilitated areas must be done by an ECO for at least one year after construction completion on a three-monthly basis to determine success of rehabilitation and to monitor other potential impacts such as erosion. Should the ECO find that rehabilitation is not satisfactory he/she must recommend additional measures to be implemented. All services infrastructure must be maintained in a good condition by the municipality not leading to any environmental degradation or pollution. |
| Cumulative impact post mitigation: | Minimal impact on terrestrial ecosystem during construction. | Minimal impact on terrestrial ecosystem vegetation during construction |
| Significance rating of impact after mitigation (Low, Medium, Medium-High, High, or Very-High) | Low negative | Low negative |
| Layout/design Alternative 3 | | |
| Extent, duration and magnitude of impact: | E – Footprint (1) D – Short to Medium term (2) M – Low (4) | |
| Probability of occurrence: | P - Definite (5) | |
| Degree to which the impact can be reversed: | Partly reversible (PR) | |
| Degree to which the impact may cause irreplaceable loss of resources: | Resource may be partly destroyed (PR) | |
| Cumulative impact prior to mitigation: | <p>Cumulative impacts of the operational activities on the terrestrial ecosystem is related to stormwater and overflow discharge which may cause erosion, pollution and further loss of indigenous vegetation species if not done in a controlled manner, as well as potential human activities impacts on remaining adjacent indigenous vegetation areas during maintenance.</p> <p>Layout/alternative 3 does accommodate proper sludge handling capacity and stormwater management; and also proposes to discharge all sludge overflow back into the Bloekombos Dam hence, it is the preferred option.</p> | |
| Significance rating of impact prior to mitigation | Medium (35) | |

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| (Low, Medium, Medium-High, High, or Very-High) | |
| Degree to which the impact can be mitigated: | Partly- mitigatable (PM) |
| Proposed mitigation: | <p>Mitigation measures that must be implemented</p> <ul style="list-style-type: none"> • The discharge of stormwater and overflow must not lead to waste pollution or erosion at discharge points. • Waste traps must be installed at the inlet to the stormwater pipes which must be cleared of waste on a monthly basis by the municipality. Any waste at the stormwater discharge areas must also be removed by the municipality and disposed of at the municipal landfill site on a monthly basis. • Ongoing monitoring of erosion at the outlet structures must be done by the municipality, 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 CapeNature approved alien vegetation management practices. • Replacement of topsoil and revegetation of the impacted indigenous vegetation areas must be completed within one month of construction completion and under guidance of a qualified ecological specialist. Revegetation must only be done with locally sourced indigenous vegetation. • Monitoring of rehabilitated areas must be done by an ECO for at least one year after construction completion on a three-monthly basis to determine success of rehabilitation and to monitor other potential impacts such as erosion. Should the ECO find that rehabilitation is not satisfactory he/she must recommend additional measures to be implemented. • All services infrastructure must be maintained in a good condition by the municipality not leading to any environmental degradation or pollution. |
| Cumulative impact post mitigation: | Minimal impact on indigenous terrestrial ecosystem during rehabilitation. |
| Significance rating of impact after mitigation (Low, Medium, Medium-High, High, or Very-High) | Low negative |

(c) Impacts that may result from the **No-Development Option**

If the proposed Water Treatment Works are not to proceed it is not expected that any significant detrimental impacts will occur on the indigenous terrestrial animal and plant populations of the site and surrounds and terrestrial biodiversity features of the site and surrounds and processes will continue as is.

(d) Cumulative Impacts

Cumulative impacts arise from the combined presence of several similar developments within an area which affect terrestrial biodiversity and ecological processes operating at broader scales or which each have a small impact which becomes significant when combined. These remaining remnants have been significantly transformed due to levelling of areas, Eucalyptus trees and roads. Very high ecological sensitive vegetation is intact in close proximity to the north and northeast of the dam and impact area to remain as is.

7. CONCLUSION AND RECOMMENDATIONS

The sampling and analysis of the site was optimum and provides suitable data and results to present an informed decision on the local ecology and terrestrial biodiversity features. During the site visit, the different biodiversity features, habitat, vegetation and landscape units present were identified and recorded in the field. Walk-through-surveys were conducted of representative habitats and areas of interest. Searches for listed species of conservation concern at the site were conducted, but none were observed which required the recording of their location. The presence of sensitive habitats such as wetlands or pans and unique edaphic environments, such as rocky outcrops or quartz patches, are present and therefore was recorded and mapped. The existing access road that will be used were incorrectly mapped as CBA and the proposed infrastructure is located outside mapped CBA. The Eastern Scale Renosterveld are degraded due to existing Eucalyptus tree plantation and portions of the proposed development footprint were levelled previously. No species of conservation concern were recorded.

The results of the information gathered from the site survey does differ from the Environmental Screen report result of Very High Terrestrial Sensitivity. No SCC were recorded or will be impacted. 338.21m² was incorrectly mapped as CBA. This mapped area is located on the existing road and pipeline route that will be used. The vegetation impacted by the proposed development area is characterized and dominated by pioneer grasses and does not represent the vegetation structure of Eastern Ruens Shale Renosterveld. The vegetation was impacted by previous levelling of a portion of the site and roads and the rest of the area by Eucalyptus tree plantation and consist mainly of pioneer plants. **Approximately 1200m² degraded endangered vegetation with a very low ecological sensitivity will be permanently cleared. It is therefore expected that the proposed development will have low negative terrestrial biodiversity and ecological impacts on the terrestrial biodiversity features provided that appropriate mitigation measures are included in the EMPr and adhered to.** No biodiversity offset is required in terms of the National Biodiversity offset Guidelines.

No additional survey or further assessment is in the author's view recommended.

Layout/design Alternative 3 is preferred as it includes a stormwater canal to prevent potential erosion and contamination around the WTW, it also includes an artificial reed bed system as part of the sludge management system from where all overflow will be discharge back into the Bloekombos Dam decreasing the potential to cause pollution. Potential impacts on terrestrial plant and animal species and their potential associated habitat could be sufficiently mitigated/managed by implementing the mitigation measures as proposed within this report.

To achieve this objective the following management and mitigation measures are proposed and must be incorporated into the Environmental Management Plan:

- 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 construction.
- 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.
- Construction activities must be controlled to ensure that the adjacent vegetated areas are not negatively impacted.
- Invasive vegetation to be removed during construction to be disposed of at landfill site in such a manner that seeds must not be able to spread from the disposal site or during transportation.
- The discharge of stormwater and overflow must not lead to waste pollution or erosion at discharge points.
- Waste traps must be installed at the inlet to the stormwater pipes which must be cleared of waste on a monthly basis by the municipality. Any waste at the stormwater discharge areas must also be removed by the municipality and disposed of at the municipal landfill site on a monthly basis.
- Ongoing monitoring of erosion at the outlet structures must be done by the municipality, 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 CapeNature approved alien vegetation management practices.
- Replacement of topsoil and revegetation of the impacted indigenous vegetation areas must be completed within one month of construction completion and under guidance of a qualified ecological specialist. Revegetation must only be done with locally sourced indigenous vegetation.
- Monitoring of rehabilitated areas must be done by an ECO for at least one year after construction completion on a three-monthly basis to determine success of rehabilitation and to monitor other potential impacts such as erosion. Should the ECO find that rehabilitation is not satisfactory he/she must recommend additional measures to be implemented.
- All services infrastructure must be maintained in a good condition by the municipality not leading to any environmental degradation or pollution.

Provided that activities are restricted to the property and the mitigation measures to reduce the

impacts of the activities are implanted, then the activities are not likely to result in long-term degradation of the receiving environment or significant net loss of terrestrial biodiversity.

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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); Aquatic Science & Conservation Science (Cand.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 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.

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| <p>Areas of specialisation:</p> | <ul style="list-style-type: none"> • 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 |
| <p>Countries of Work Experience:</p> | <p>South Africa (Northern Cape, Western Cape, Free State, Mpumalanga, Gauteng)</p> |
| <p>Employment Record</p> | <ul style="list-style-type: none"> • Student at Bontebok National Park (1992) • Assistant Reserve Manager at Gariiep Dam Nature Reserve, Free State (1993 - 1998) • Reserve Manager, Conservation Services Manager for Western Cape Nature Conservation Board (1998 - 2006) |

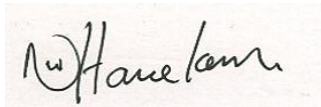
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| | <ul style="list-style-type: none"> • External Lecturer at Cape Peninsula University of Technology (2003 - 2005) • Director: Environmental Management at Cape Lowlands Environmental Services (2006 – 2010) • Director, Environmental Management and 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 | <ul style="list-style-type: none"> • 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 | <p>1992: South African National Parks. Student at Bontebok National Park with management and monitoring actions related to the Breede River.</p> <p>1993 -1998: Free State Nature Conservation. Ecological management and monitoring actions related to the Gariep Dam, Orange and Caledon Rivers.</p> <p>1998 -2006: CapeNature. Ecological management and monitoring actions related to the Berg River Estuary, Verlorenvlei, Lamberts bay’s Jackalsvlei, Wadriфт 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.</p> <p>2006 to date: Cape Lowland Environmental Services, Eco Impact Legal Consultant and Enviro-EAP. Ecological (Freshwater and aquatic) Specialist input, assessment, monitoring and reports.</p> |
| Publications and assessment reports | <p>Just to name a few. Was involved in many Ecological Assessments, monitoring and inputs in EIA applications.</p> <ul style="list-style-type: none"> • Elandskloof Farm 475 Citrusdal Biodiversity Baseline Survey. August 2010. This Biodiversity Assessment Covering Terrestrial and Aquatic Aspects to Inform Decisions Regarding The |

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| | <p>Proposed Elandskloof Weir Flood Damage Project On Farm 475, In The Citrusdal Area.</p> <ul style="list-style-type: none"> • 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 Photovoltaic 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). |
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| | <ul style="list-style-type: none">• 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). |
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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.



Nicolaas Hanekom Pri Sci Nat.
Registration number 004415