# Appendix G.3

## AQUATIC ASSESSMENT

Public

# AQUATIC BIODIVERSITY AND SPECIES SPECIALIST ASSESSMENT: ENVIRONMENTAL IMPACT ASSESSMENT PROCESS FOR THE PROPOSED ABO UVEMVANE WIND ENERGY FACILITY 1 (WEF1) AND ASSOCIATED INFRASTRUCTURE NEAR HEIDELBERG IN THE GAUTENG AND MPUMALANGA PROVINCES

AUGUST 2026

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**Prepared By**:

Ms Toni Belcher

BlueScience (Pty) Ltd

Tel: 082 883 8055

Email: toni@bluescience.co.za

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## LIST OF ABBREVIATIONS

| | |
|---|---|
| BA | Basic Assessment |
| BESS | Battery Energy Storage System |
| CBA | Critical Biodiversity Area |
| CSIR | Council for Scientific and Industrial Research |
| DEA | Department of Environmental Affairs |
| DFFE | Department of Forestry, Fisheries and the Environment |
| DWA(F) | Department of Water Affairs (and Forestry) |
| DWS | Department of Water and Sanitation |
| EIA | Environmental Impact Assessment |
| EI&ES | Ecological Importance and Ecological Sensitivity |
| EMPr | Environmental Management Programme |
| ESA | Ecological Support Area |
| GA | General Authorisation |
| GG | Government Gazette |
| GIS | Global Information System |
| GPS | Global Positioning System |
| GN | Government Notice |
| ha | hectare |
| HI | Habitat Integrity |
| IUCN | International Union for Conservation of Nature |
| km | kilometer |
| kV | kilovolt |
| kW | kilowatt |
| m | meter |
| mS | milliSiemens |
| mm | millimeter |
| MTS | Main Transmission Substation |
| MW | megawatt |
| O&M | Operation and Maintenance |
| OHL | Overhead Powerline |
| ONA | Other Natural Areas |
| NEMA | National Environmental Management Act (Act No. 107 of 1998) |
| NFEPA | National Freshwater Ecosystem Priority Area |
| NWA | National Water Act (Act 36 of 1998) |
| NWM | National Wetland Map |
| PA | Protected Area |
| PES | Present Ecological Status |
| REC | Recommended Ecological Condition |
| REDZ | Renewable Energy Development Zone |
| REEA | Renewable Energy Environmental Impact Assessment Applications |
| SANBI | South African National Biodiversity Institute |
| SCC | Species of Conservation Concern |
| WEF | Wind Energy Facility |
| WMA | Water Management Area |
| WUL | Water Use License |
| WULA | Water Use License Application |

# GLOSSARY

| Definitions | |
|---|---|
| Aquifer | A geological formation that has structures or textures that hold water or permit appreciable water movement through them. |
| Catchment | The area from which any rainfall will drain into the watercourse or watercourses or part of a watercourse, through a surface flow to a common point or common points |
| Critical Biodiversity Areas | Areas that are required to meet biodiversity targets for species, ecosystems or ecological processes and infrastructure. |
| Drainage feature | A minor channel down which surface water naturally concentrates and flows, that is poorly defined and usually does not contain any distinctive riparian and aquatic vegetation or habitat. |
| Ecological Importance and Sensitivity | The rating of any given wetland or river reaches that provides an indication of the ecological importance of the aquatic system using criteria such as conservation-needy habitat or species, protected ecosystems or unique habitat observed. The sensitivity is then derived by assessing the resilience the habitat exhibits under stress as a result of changes in flow or water quality. |
| Ecological Support Areas | Areas that are not essential for meeting biodiversity targets, but that play an important role in supporting the functioning of Protected Areas or Critical Biodiversity Areas and are often vital for delivering ecosystem services. |
| Other Natural Areas | Areas that have not been identified as a priority in the biodiversity spatial plans but retain most of their natural character and perform a range of biodiversity and ecological infrastructure functions. Although they have not been prioritised for meeting biodiversity targets, they are still an important part of the natural ecosystem. |
| Perennial / non-perennial rivers | Perennial rivers are those rivers that exhibit a continuous flow of water throughout the year, except during extreme drought conditions. Non-perennial rivers are those rivers that have no flow for at least part of the year. These rivers are seasonal. |
| Present Ecological State | The current ecological condition of a watercourse as measured against the deviation from the natural or pre-impacted condition of the system |
| Protected Areas | Areas that are formally protected by law and recognised in terms of the National Environmental Management: Protected Areas Act (Act 57 of 2003). This includes gazetted private Nature Reserves and Protected Environments concluded via a stewardship programme. |
| Riparian habitat | The physical structure and associated vegetation of the areas associated with a watercourse, which are commonly characterised by alluvial soils, and which are inundated or flooded to an extent and with a frequency sufficient to support vegetation of species with composition and physical structure distinct from those of adjacent land areas |
| River NFEPA | Rivers currently in a good condition (A or B ecological category) that have been identified to achieve biodiversity targets for river ecosystems and threatened/near-threatened fish species. They should remain in good condition to contribute to the biodiversity goals of the country. |
| Watercourse | (a) a river or spring; (b) a natural channel in which water flows regularly or intermittently; (c) a wetland, lake or dam into which, or from which, water flows; and (d) any collection of water which the Minister of DWS may, by notice in the Gazette, declare to be a watercourse, and a reference to a watercourse includes, where relevant, its bed and banks; |
| Water management area | An area established as a management unit in the national water resource strategy, within which a catchment management agency will conduct the protection, use, development, conservation, management and control of water resources |
| Wetland | Land which is transitional between terrestrial and aquatic systems, where the water table is usually at or near the surface, or the land is periodically covered with shallow water, and which land in normal circumstances supports or would support vegetation typically adapted to life in saturated soil. |
| Wetland NFEPA | Wetlands currently in good condition (A or B ecological category) that have been identified to achieve biodiversity targets for river ecosystems and threatened/near-threatened fish species. They should remain in good condition to contribute to the biodiversity goals of the country. |

*EXECUTIVE SUMMARY*

*The aquatic features occurring within the proposed development area for ABO Uvemvane Wind Energy Facility 1 (WEF 1) are the Suikerbosrant tributary of the Vaal River and its associated tributaries and wetland areas. These watercourses range from being largely natural on the higher-lying areas of the site to being moderately to largely modified ecological condition in their middle and lower reaches. The watercourses have moderate ecological importance but are of high sensitivity. They provide corridors for the movement of water and biota through the site and are particularly sensitive to flow, water quality and habitat modification due to the associated wetland habitat along many of the watercourses.*

*A buffer of 50m is recommended for the watercourses while the associated wetland habitats should be protected by a 100m buffer. Services could be placed through these aquatic habitats and buffer areas but must be kept to a minimum and adequately mitigated.*

*The findings of this assessment largely agree with the DFFE screening tool for aquatic biodiversity sensitivity mapping, in that most of the site has low aquatic sensitivity. The watercourses are, however, considered of high sensitivity and should be avoided by the proposed ABO Uvemvane WEF 1. Below is a summary table of the site sensitivity verification findings:*

| *Sensitivity Theme: Aquatic* | | |
|---|---|---|
| *Screening Tool Site Sensitivity* | *Specialist Site Sensitivity* | *Reasons why the Screening Tool Sensitivity is ~~disputed~~ / confirmed* |
| *Most of the site comprises low Aquatic Biodiversity Sensitivity in terms of the DFFE screening tool mapping with the watercourses and wetlands within the site being of very high sensitivity. The site does not lie within a National Freshwater Ecosystem Priority Area River Sub catchment or a Strategic Water Source Area. The wetlands are mapped in the National Wetland Map version 5 and the 2014 Mpumalanga Highveld Wetlands Map.* | *Low for the widespread area and High for the watercourses and wetlands within the site. A medium sensitivity has been applied to the adjacent buffers.* | *The Screening Tool indicated the site to be in an area mapped as being of Low Aquatic Biodiversity Sensitivity but with the aquatic features mapped as very high sensitivity. This assessment found the watercourses and wetlands on the site to be of high sensitivity. Buffer zones of 50m on either side of the watercourses and 100m from the wetlands are deemed sufficient to protect these aquatic ecosystems from any impact arising from the proposed ABO Uvemvane WEF1.* |

*Given the distance of any aquatic ecosystem features from the proposed development footprint, the potential aquatic ecosystem impacts associated with the proposed ABO Uvemvane WEF1 are likely to be **very low**. There is thus no reason from an aquatic ecosystem perspective why the proposed development should not be approved. That is, provided the recommended mitigation measures are implemented.*

*<u>Recommended mitigation measures:</u>*

- *The recommended buffer of at least 50m from the larger watercourse and wetland corridors along the western and eastern proposed development area boundaries and the proposed project activities should be maintained.*
- *Clearing of indigenous vegetation should be avoided and should not take place within the aquatic features and the recommended buffers. Any disturbed areas should be revegetated with suitable vegetation to minimise the risk of erosion and sedimentation of aquatic habitats following rainfall events. The existing road infrastructure should be utilised as far as possible to minimise the overall disturbance.*
- *There are 10 watercourse crossings associated with the internal roads for the final proposed layout. Six of these crossings are associated with existing informal farm roads, and three new watercourse crossings are proposed. In terms of the proposed new crossings:*

- *The crossing to WT08 is over a minor seasonal watercourse in the northern section. A small low-water crossing over this small watercourse would be acceptable*
- *There are two proposals for a crossing to WT14 and WT17. Both crossings are on a small stream, located between an upstream and downstream dam. There is an existing road crossing near the upstream point. It is recommended that this road and crossing be realigned to the new proposed road. This crossing would have less impact than the downstream one as it is close to the existing disturbance at the road and a fenceline. The downstream road alignment alternative is in a wider wetland area.*
- *Two alternative crossings are proposed over a small watercourse to access WT 24. The downstream (southern) one aligns with an existing road over a small dam wall but will need upgrading. Use of this road alignment is preferred as the watercourse is already disturbed at this location.*

- *During the construction phase, proper site management must be undertaken to address on-site stormwater management and prevention of pollution measures from any potential pollution sources during construction activities, such as hydrocarbon spills. Any stormwater that arises within the construction site must be managed appropriately to trap sediment and reduce flow velocities. Any water supply, sanitation, and solid waste management services required for the proposed project should preferably be provided by an off-site service provider.*
- *Any disturbance during the operation phase should be limited to the approved footprint and disturbance of the soil and natural vegetation cover should be avoided.*
- *Stormwater run-off infrastructure must be designed to mitigate both the flow and water quality impacts of any stormwater leaving the developed areas. The runoff should rather be dissipated over a broad area covered by natural vegetation or managed using appropriate channels and swales.*
- *Invasive alien plant growth and signs of erosion within the project area should be monitored on an ongoing basis to ensure that the disturbed areas do not become infested with invasive alien plants. Should any erosion features develop, they should be stabilised as soon as possible.*
- *With regard to the 33kV overhead/underground line to connect the northern and southern parts of the facility, disturbance of the watercourse/wetland corridor crossings must be minimised and disturbance of the wetland habitats avoided as far as possible. It may be necessary to use overhead lines where disturbance of wetland habitat cannot be avoided.*
- *During decommissioning, disturbance to the freshwater ecosystems should be limited as far as possible. Disturbed areas may need to be rehabilitated and revegetated.*
- *Proper site management must be undertaken during decommissioning to address on-site stormwater management and prevention of pollution measures from any potential pollution sources during decommissioning activities, such as hydrocarbon spills. Any stormwater that arises within the works must be managed appropriately to trap sediment and reduce flow velocities.*
- *Mitigation and follow-up monitoring of residual impacts (alien vegetation growth and erosion), post decommissioning, may be required.*

*The risk assessment determined that the proposed ABO Uvemvane WEF1 and its associated infrastructure, if mitigated as recommended, pose a low risk of impacting aquatic habitat, water flow and water quality. Based on the risk assessment findings, the water-use activities associated with the proposed project could be authorised under the general authorisations for Section 21(c) and (i) water uses. Water use authorisations may also be required for any raw water abstraction and use of conservancy tanks for storage of domestic sewage, should the*

*facility not be linked to the services of the local authority; however, the volumes tend to be relatively low and would likely be within the general authorisation limits for these water use activities (Section 21(g) water use). The General Authorisation limit for the abstraction of groundwater for this area is 75 $m^3$/ha/a for the associated property extent where the borehole is located. It may be possible that any groundwater abstraction for the proposed development could be within the General Authorisation for Section 21(a) water use.*

# 1. SPECIALIST DETAILS, EXPERTISE AND DECLARATION

## 1.1. QUALIFICATIONS OF SPECIALIST CONSULTANT

**Name**: Antonia Belcher
**Contact details:** 53 Dummer St, Somerset West, 7130; Phone: 082 883 8055;
Email: toni@bluescience.co.za
**Profession**: Aquatic Scientist (P. Sci. Nat. 400040/10)
**Fields of Expertise**: Specialist in freshwater assessments, monitoring and reporting
**Years in Profession**: 35+ years

Toni Belcher worked for the Department of Water Affairs and Forestry for more than 17 years. During this period, she worked for the Directorate Water Quality Management, the Institute for Water Quality Studies and the Western Cape Regional Office and has built up a wide skills base on water resource management and water resource quality for rivers, estuaries and the coastal marine environment. Since leaving the Department in 2007, she has been working in her private capacity and was co-owner of BlueScience (Pty) Ltd, working in the field of water resource management and has been involved in more than 500 aquatic ecosystem assessments for environmental impact assessment and water use authorisation purposes. In 2006 she was awarded a Woman in Water award for Environmental Education and was a runner up for the Woman in Water prize for Water Research.

**Professional Qualifications**:

1984 Matriculation Lawson Brown High School
1987 B.Sc. – Mathematics, Applied Mathematics University of Port Elizabeth
1989 B.Sc. (Hons) – Oceanography University of Port Elizabeth
1998 M.Sc. – Environmental Management (cum laude) Potchefstroom University

**Key Skills**: Areas of specialisation: Aquatic ecosystem assessments, Monitoring and evaluation of water resources, Water resource legislation and authorisations, River classification and Resource Quality Objectives, River Reserve determination and implementation, Water Quality Assessments, Biomonitoring, River and Wetland Rehabilitation Plans, Catchment management, River maintenance management, Water education.

**Summary of Experience**:

| | |
|---|---|
| 1987 – 1988 | Part-time field researcher, Department of Oceanography, University of Port Elizabeth |
| 1989 – 1990 | Mathematics tutor and administrator, Master Maths, Randburg and Braamfontein Colleges, Johannesburg |
| 1991 – 1995 | Water Pollution Control Officer, Water Quality Management, Department of Water Affairs, Pretoria |
| 1995 – 1999 | Hydrologist and Assistant Director, Institute for Water Quality Studies, Department of Water Affairs and Forestry, Pretoria |
| 1999 – 2007 | Assistant and Deputy Director, Water Resource Protection, Western Cape Regional Office, Department of Water Affairs, Cape Town |
| 2007 – 2012 | Self-employed – Aquatic Specialist |
| 2013 – 2020 | Senior Aquatic Specialist and part-owner, BlueScience |
| 2020 – 2025 | Self-employed– Aquatic Specialist |
| present | Senior Aquatic Specialist and part-owner, BlueScience |

## 1.2. DECLARATION OF INDEPENDENCE

I, **Antonia Belcher,** as the appointed specialist hereby declare/affirm the correctness of the information provided or to be provided as part of the application, and that I:

- in terms of the general requirement to be independent:
  - other than fair remuneration for work performed/to be performed in terms of this application, have no business, financial, personal or other interest in the activity or application and that there are no circumstances that may compromise my objectivity; or
  - ~~am not independent, but another specialist that meets the general requirements set out in Regulation 13 of GN No. 326 have been appointed to review my work (Note: a declaration by the review specialist must be submitted);~~
- in terms of the remainder of the general requirements for a specialist, am fully aware of and meet all of the requirements and that failure to comply with any the requirements may result in disqualification;
- have disclosed/will disclose, to the Applicant, the Department and registered interested and affected parties, all material information that have 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;
- have ensured/will ensure that information containing all relevant facts in respect of the application was/will be distributed or was/will be made available to interested and affected parties and the public and that participation was/will be facilitated in such a manner that all interested and affected parties were/will be provided with a reasonable opportunity to participate and to provide comments;
- have ensured/will ensure that the comments of all interested and affected parties were/will be considered, recorded and submitted to the Department in respect of the application; and
- am aware that a false declaration is an offence in terms of Regulation 48 of the NEMA EIA Regulations, 2014 (as amended).

**Date**: 5 August 2026

**Name of company**: BlueScience (Pty) Ltd

**Signature of the specialists**:

# 2. INTRODUCTION

## 2.1. SCOPE OF STUDY

This aquatic biodiversity specialist report comprises an aquatic ecosystem assessment of the proposed wind energy farm and associated infrastructure referred to as the ABO Uvemvane Wind Energy Facility 1 (WEF1). The assessment is based on a desktop analysis of existing data and mapping available for the area as well as a site visit and field assessment undertaken on 26 January 2024. The development is proposed to consist of a WEF of up to 170 MWac and its associated grid connection. The area assessed for the entire site's development footprint comprises 6000ha across several properties, with a total development footprint of approx. 67.2 ha. The properties are located approximately 16 km to the southeast of Heidelberg and 10km west of Balfour.

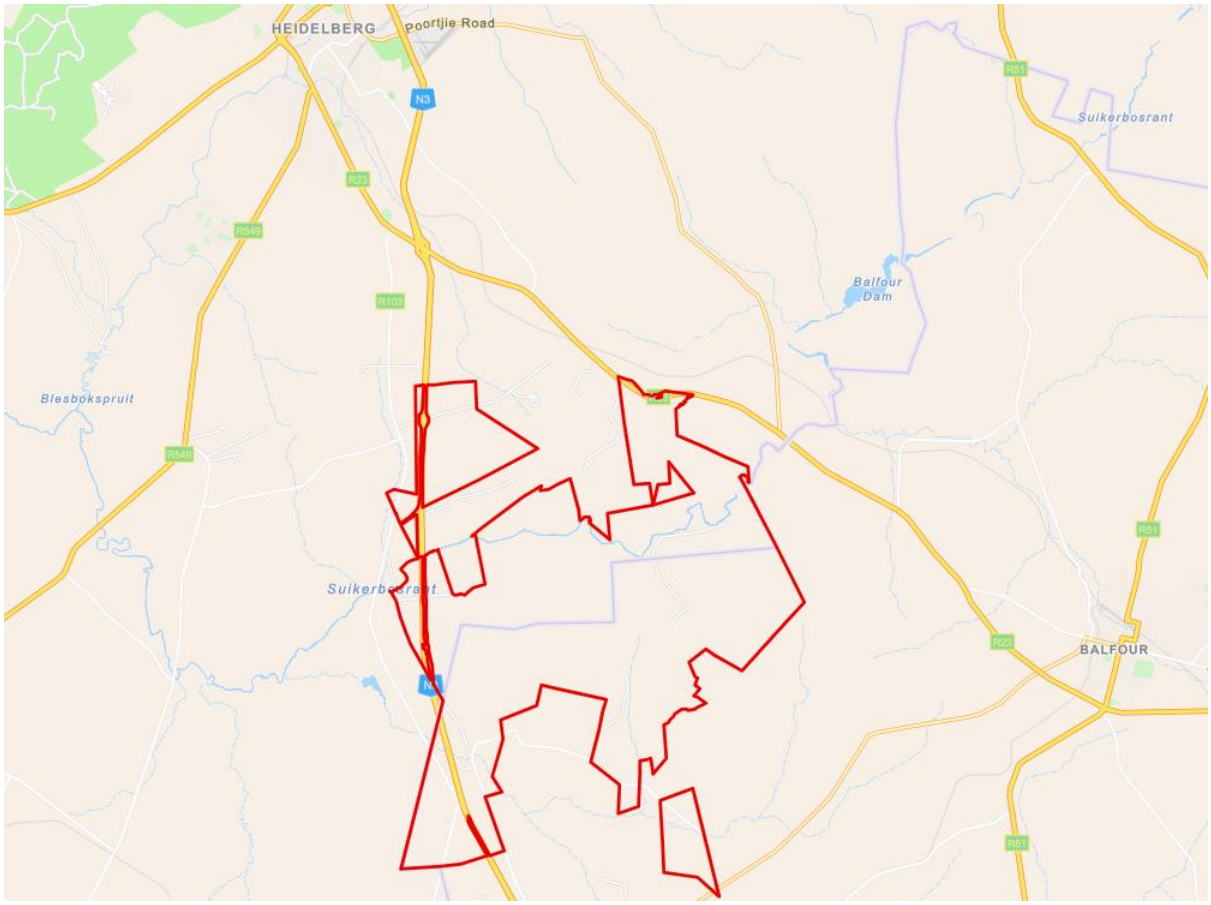


**Figure 1. A topographical map of the study area, indicating the locality of the full area assessed for this project (red polygons). This area was subsequently reduced to the proposed development shown later in this report.**

The proposed development area lies in the Suikerbosrant River Catchment in the larger Vaal-Orange River System. Details of the watercourses at the site are provided in Table 1.

**Table 1. Water resource information related to the site assessed**

| Descriptor | Name / Details | Notes |
|---|---|---|
| Water Management Area | Vaal-Orange | |
| Catchment Area | Suikerbosrant Tributary | Tributary of the Vaal River |
| Quaternary Catchment | C21C | |
| Present Ecological State | Suikerbosrant Tributary: B Category (largely natural) | DWA 2024 |
| Ecological Importance and Ecological Sensitivity | High Ecological Importance and Moderate Ecological Sensitivity | |

MAP OF RELATIVE AQUATIC BIODIVERSITY THEME SENSITIVITY

**Figure 2. DFFE Screening Map for the full assessment area (and a 500m buffer) in terms of Aquatic Biodiversity Combined Sensitivity. This area was subsequently reduced to the proposed development shown later in this report.**

| Very High sensitivity | High sensitivity | Medium sensitivity | Low sensitivity |
|---|---|---|---|
| X | | | |

**Sensitivity Features:**

| Sensitivity | Feature(s) |
|---|---|
| Low | Low Sensitivity |
| Very High | CBA: Wetlands |
| Very High | ESA: Wetlands |
| Very High | Wetlands_Channelled valley-bottom |
| Very High | Wetlands_Depression |
| Very High | Wetlands_Floodplain |
| Very High | Wetlands_Seep |
| Very High | Wetlands_Unchannelled valley-bottom |
| Very High | Rivers |

The DFFE screening tool mapping (Figure 2) indicates the area assessed for the proposed development is located within an area considered of Low Aquatic Biodiversity Sensitivity with areas of very high sensitivity associated with watercourses and wetlands within the project area of influence. The site does not lie within a National Freshwater Ecosystem Priority Area (FEPA) River Sub catchment or Strategic Water Source Areas for groundwater or surface water. The wetlands are mapped in the National Wetland Map and the 2014 Mpumalanga Highveld Wetlands mapping and are mapped as Aquatic Critical Biodiversity Areas (CBAs) and Ecological Support Areas (ESAs) in the Mpumalanga Biodiversity Sector Plan. The aquatic conservation mapping is discussed in Section 3.2 of this report.

## 2.2. TERMS OF REFERENCE

The specialist study must include the following:

Site Sensitivity Verification Report (SSVR):

- Site sensitivity verification assessment which references the DFFE Screening Tool outcomes and the specialist verification on the site sensitivity.
- Identification of sensitive features on-site and any no-go areas that may be applicable. Prove Google Earth files of all sensitive features identified. Sensitivity zones must be clearly defined in terms of what infrastructure may be developed in each zone.

Scoping phase:

- Preliminary Impact Assessment for construction, operation and decommissioning phases based on the project description detailed below. The supplied methodology must be used.
- Provide potential mitigation measures for each impact.
- Ensure that reference is made to the applicable specialist protocol that was followed.
- Include a table of the relevant Protocol or Appendix 6 requirements with relevant report cross references.
- Update the sensitive features on-site and any no-go areas post detailed studies (if necessary).
- Include a short statement regarding the no-go alternative.
- Include a short statement regarding cumulative impacts.
- Include Plan of Study for EIA.

EIA Phase

- Impact Assessment for construction, operation and decommissioning phases based on the project description detailed below. The methodology supplied must be used.
- Provide site-specific mitigation measures for each impact
- Include any recommendations for the EMPr or conditions to be included in the Environmental Authorisation.
- Ensure that reference is made to the applicable specialist protocol that was followed.
- Include a table of the Protocol or Appendix 6 requirements (as applicable) in the report with relevant report cross references.
- Include the site sensitivity verification as an Appendix to your study – update if required.
- Update the sensitive features on-site and any no-go areas post detailed studies (if necessary). Please send updated Google Earth files if required.
- Assessment of the alternatives provided.

— Assess the cumulative impact based on the projects identified. The impact assessment methodology must be applied.

— Include a concluding impact statement on whether the proposed project should go ahead.

— Include any recommendations that should be included as EA conditions.

This report is the SSVR deliverable for aquatic ecosystems at the site.

## 2.3. METHODOLOGY AND LIMITATIONS OF THE STUDY

Input into this report was informed by a desktop assessment of the study area, as well as field verification undertaken on 26 January 2024. The timing of the site visit was deemed suitable for the assessment, as the area has summer rainfall and the visit fell within the rainfall period. No further fieldwork will be required for the projects.

The field assessment comprised delineation, characterisation and integrity assessments of the aquatic habitats within the proposed project area of influence. Mapping of the freshwater features was undertaken using GPS Tracker and mapped in PlanetGIS and Google Earth Professional.

The 1:50000 topographical river cover was used as a basis for the aquatic constraints mapping. It was refined based on knowledge of the aquatic features in the area, as well as Satellite imagery. The SANBI Biodiversity GIS, Cape Farm Mapper, Freshwater Biodiversity Information System, and iNaturalist websites were consulted to identify any aquatic constraints and features of aquatic biodiversity conservation importance within the area. This information/data was used to inform the resource protection-related recommendations.

The following techniques and methodologies were utilised to undertake the assessments:

- The guideline document, “A Practical Field Procedure for the Identification and Delineation of Wetlands and Riparian Areas”, was followed for the delineation of the aquatic habitats;
- The present ecological condition of the watercourses and wetlands was determined using the National River Health Programme and Wet-Health methodologies;
- The ecological importance and ecological sensitivity (EI&ES) assessment of the wetlands and watercourses was conducted according to the guidelines developed by DWS;
- Recommendations are made concerning the adoption of buffer zones within the project area of influence based on the watercourse and wetland functioning and site characteristics; and
- The potential impacts identified in this specialist study have been assessed based on the criteria and methodology outlined in the Appendices of this report.

## 2.4. INFORMATION SOURCES USED IN THIS ASSESSMENT

A summary of the main information sources used in this assessment is provided in Table 2 below:

**Table 2. Information Sources for the Aquatic Biodiversity Assessment**

| Data / Information | Source | Date | Type | Description |
|---|---|---|---|---|
| Satellite imagery | Google Earth | December 2003 to June 2025 | Spatial | Recent history of aerial imagery for the site |
| 2023 Mpumalanga Biodiversity Sector Plan (MBSP) | South African National Biodiversity Institute (SANBI), obtained from Biodiversity GIS | 2023 | Report and mapping | Systematic biodiversity planning assessment that delineates Critical Biodiversity Areas (CBAs) and Ecological Support Areas (ESAs) |
| 2024 Gauteng Critical Biodiversity Area (CBA) Map | SANBI | 2024 | Report and mapping | Systematic biodiversity planning assessment that delineates CBAs and ESAs |
| National Screening Tool | Department of Forestry, Fisheries and the Environment | 2025 | Report and spatial | National environmental screening tool |
| National Biodiversity Assessment | South African National Biodiversity Institute (SANBI), obtained from Biodiversity GIS | 2018 | Report and Spatial | Latest assessment of South African biodiversity & ecosystems, including wetlands and rivers. |
| National Vegetation Map | SANBI, obtained from CapeFarmMapper | 2024 | Report and Spatial | Latest national vegetation type mapping |
| South African Atlas of Climatology and Agrohydrology | R.E. Schulze, obtained from CapeFarmMapper | 2009 | Spatial | Climate data |
| Aquifer classification and Groundwater Resource Assessment informatio n | Department of Water and Sanitation, obtained from CapeFarmMapper | 2005, 2012 and 2013 | Spatial | Mapping of aquifer class, type, yields, susceptibility and Vulnerability as well as depths, recharge and quality |
| National Soil types | ENPAT, obtained from CapeFarmMapper | | Spatial | Mapping of soil types |
| National Freshwater Ecosystem Priority Areas (NFEPA) | CSIR, obtained from CapeFarmMapper and Biodiversity GIS | 2011 | Report and spatial | Mapping of areas of aquatic ecosystem conservation importance |
| National River Present Ecological Status, Ecological Importance and Ecological Sensitivity | DWS | 2024 | Spreadsheet and spatial | River reach assessments of ecological importance, sensitivity and condition |
| National Wetland Map (NWM) 5 | CSIR and SANBI - South African National Biodiversity Assessment 2018 obtained from CapeFarmMapper | 2018 | Spatial | Mapping of wetland habitats |
| NWM6 (beta) | Freshwater Biodiversity Information System | 2025 | Spatial | Mapping of wetland habitats |
| Freshwater Biodiversity Information System (FBIS) | Freshwater Research Centre, SANBI and JRS Biodiversity Foundation | 2025 | Spatial | Mapping of aquatic biodiversity (fish, invertebrates and algae) |
| iNaturalist | National Geographic Society and California Academy of Sciences | 2025 | Spatial | Mapping of aquatic and terrestrial fauna and flora |

## 2.5. ASSUMPTIONS, KNOWLEDGE GAPS AND LIMITATIONS

The following should be noted in terms of the assumptions, knowledge gaps and limitations associated with the project:

- Limitations and uncertainties often exist within the various techniques adopted to assess the condition of aquatic ecosystems. The methodologies and techniques used in this assessment have been developed nationally. They are typically of a rapid nature, as is required for this freshwater impact assessment.
- No baseline long-term monitoring was undertaken as part of this assessment. There is also very little existing information available for the aquatic features within the study area. Data was utilised from adjacent aquatic ecosystems where available, and the site visit and field assessment were undertaken for this project.
- The nature of the proposed activities allows them to be placed some distance (these are referred to as the recommended buffer areas) from any mapped aquatic features, such that the likely impacts would be very low.
- It is usually the associated infrastructure that has the potential to have a greater impact on the aquatic features. The impacts of roads and powerlines on aquatic features are, however, well understood and can be effectively mitigated to keep them low.
- The preferred mitigation measure is to limit the disturbance to aquatic features as far as possible by avoiding and minimising the number of crossings and providing adequate buffer areas. This will also ensure that the cumulative impacts will remain low.
- The level of aquatic assessment undertaken was considered to be adequate for this study.
- No further fieldwork will be required. The ground-truthing of aquatic features was undertaken at the end of the rainy season, when vegetation could be used as an indicator.
- As it was not possible to cover the entire project area of influence in a high level of detail, extrapolation of the areas ground-truthed to those not covered was done using the latest available aerial imagery for the project area of influence.
- Cumulative impacts of the proposed project were assessed by reviewing all available documentation for the other renewable energy facilities within a 30 km radius of the development footprint, particularly in terms of the aquatic features occurring in and adjacent to the development footprint; the proposed mitigation measures and the indicated potential impacts to these ecosystems as well as the association of these ecosystems with those within the study area.

## 2.6. CONSULTATION PROCESSES UNDERTAKEN

Limited consultation was undertaken with landowners during the development footprint visit, noting that this report would be subject to public review during the public participation process for the environmental application, and that any comments received would be addressed in the next iteration of the report.

## 2.7. USE OF THIS REPORT

This report reflects the professional judgment of its author. The full and unedited content of this report should be presented to the regulatory authority. Any summary of these findings should only be produced in consultation with the author.

# 3. DESCRIPTION OF THE PROPOSED PROJECT

The proposed ABO Uvemvane WEF1 has a development footprint of approximately 67.2 ha that will include the following infrastructure (shown in Figure 3):

- Up to 20 turbines with the following maximum specifications: maximum hub height 180 m; maximum blade length 100 m; maximum rotor diameter 200 m; maximum capacity per turbine 10 MW; a transformer at the base of each turbine; concrete turbine foundations up to 1 ha each; and turbine, crane, and blade hardstands (included in the abovementioned 1 ha).

- Primary/main access roads as well as an internal road reticulation (note that existing roads/disturbed areas would be used as far as possible, and for the proposed roads, a corridor of up to 12 m wide may be temporarily impacted upon during construction and be rehabilitated to up to 10 m wide after construction), inclusive of stormwater infrastructure where relevant. Five access points are proposed; four of these are off existing unnamed farm roads (originating from the D1220 and P243/1), and one is off Lagerspoort Road (R23).
- Electrical Infrastructure Hub of up to 7 ha, consisting of:
    - On-site substation and associated infrastructure,
    - Additional step-up/ transformation/ collector/switchyard infrastructure,
    - Auxiliary buildings (including, but not limited to, Operation and Maintenance (O&M) building/s, admin building/s, workshop/s, gatehouse/s, security building/s, control centre/s, office/s, visitor centre/s, warehouse/s, etc.),
    - May include the installation of a communications tower and lighting mast on site with a maximum height of 32 m and 25m respectively, and/or
    - BESS.

- Four Temporary laydown areas/ construction compounds (including concrete batching), totalling up to 15 ha, would be fenced with access control.

- Associated internal electrical reticulation/ cabling (i.e., low- and medium voltage powerlines), underground as far as is feasible, and to run within the proposed road footprint/route as far as possible.

- A 33kV overhead/underground line to connect the northern and southern portions of the facility.

The associated grid connection options are still under investigation and will be assessed and applied for as part of a separate Scoping and Environmental Impact Assessment (S&EIA) process. The maximum development scenario for the associated Electrical Grid Infrastructure (EGI) that is considered in the cumulative impact assessment for the project is as follows:

- Voltage of overhead transmission powerlines between the substation hubs and any 132 kV powerline: up to 132 kV;

- Voltage of interlinking overhead transmission powerlines between the substation hubs in the case of multiple projects: up to 132kV;

- Access: Lines would have an up to 4m wide jeep track beneath them where access is required.

The operations of the proposed facility would require some servicing, with the operational electrical requirements being nominal and supplied on-site by the facility. Water would be required for sanitation use by operational staff (drinking, washing hands, food, etc.), for cleaning equipment, for scheduled internal cleaning of the building, and for dust control on internal roads (where needed). Water would ideally be sourced from the local municipality under a Service Level Agreement between the Municipality and the Proponent. If this is not possible, then further options, such as sourcing water from a private services provider, will be investigated.

Where required, a storage tank (i.e., a Jo-Jo tank) of up to approximately 10,000 L may be used on site for temporary water storage. Sanitation requirements would be minimal, given that there would not be many operational staff.

Sanitation for auxiliary buildings would be connected to the existing municipal sewage system. If the Municipality does not approve, or has capacity for, such a connection, sewage would be stored in the conservancy tank and collected either by a honey-sucker truck or by a service provider (Contractor) for treatment at a licensed disposal site. Alternatively, a standalone system (e.g., porta-loos) would be used and regularly serviced by an independent contractor. Note that it is **not** intended to make use of soakaways or on-site treatment solutions. Refuse/solid waste produced would also be nominal (approximately two wheelie bins per week) and would ideally be removed by the Municipality; however, if this is not possible, the Operator would employ private contractors to remove the refuse and dispose of it appropriately.

The construction phase would also require water and sanitation, which are the Contractor's primary responsibility. However, it would be preferable to source water from the local Municipality (where available), with alternative arrangements (for example, bringing in water by truck) made where necessary. Solid waste would also be produced and managed in accordance with the requirements of the Environmental Management Programme (EMPr).

Stormwater drainage systems may be constructed on-site to ensure that stormwater runoff is appropriately managed. Water from these systems is unlikely to contain any chemicals or hazardous substances and would be released into the surrounding environment in accordance with the natural drainage contours.

Temporary water pipelines may be installed on site during construction to supply water, inter alia, to the concrete batching plant and the O&M building complex for domestic use and sanitation. On-site groundwater abstraction for the batching plant could be considered if required, subject to any applicable legal requirements. There would be no other specific stormwater and/or landscaping initiatives undertaken as part of the proposed WEF, other than any interventions prescribed by the relevant specialist/s through the S&EIA process.

**Alternatives**:

The proposed development as described above has been assessed with the following alternatives:

1) 33kV overhead/underground line to connect northern and southern parts of the facility within a 100 m assessment corridor. The actual servitude width would only be 22m. The line is approximately 8km long, and a conservative average span length of 100 m can be assumed for assessment purposes. However, actual spans may be longer (depending on the final engineering design and terrain). Two route alternatives are assessed.

2) BESS Technology: About the proposed BESS, the technology thereof is dynamic, and so the specific type/technology to be developed would be selected based on market demands and technology availability at the time of construction. Therefore, both Lithium-ion and redox-flow are assessed as technological alternatives, with Lithium-ion currently the preferred technology.

3) The No-go alternative has also been assessed, noting that the property does hold existing development rights (i.e., Agriculture) and so, not developing the proposed development does not necessarily mean that there would be no changes or impacts on the site.

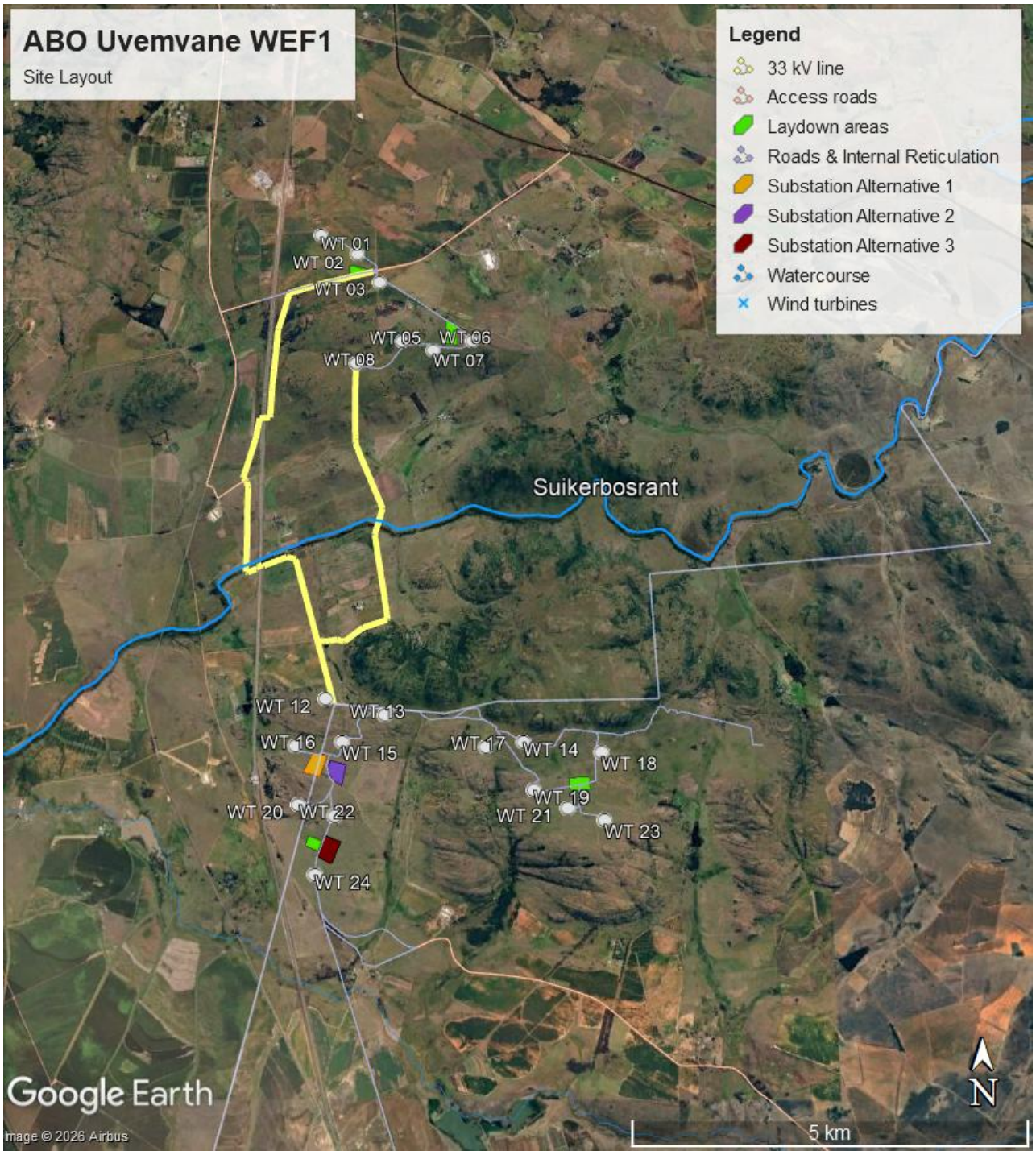


**Figure 3. Google Earth image with the proposed layout for ABO Uvemvane WEF1, shown together with the main rivers in the area.**

# 4. DESCRIPTION OF THE PROPOSED PROJECT AREA OF INFLUENCE

## 4.1. GENERAL OVERVIEW

The site is situated within the Savanna Biome, characterized by low hills and valleys interspersed with tributaries and wetland areas of the Suikerbosrant/Blesbokspruit River System (Figure 5). The primary drainage direction is towards the west, where the Suikerbosrant River drains into the Vaal River. The Blesbokspruit River originates in Benoni to the east of Johannesburg and flows in a southerly direction past Nigel and Heidelberg to join the Suikerbosrant River to the west of the site. The Suikerbosrant River arises near Leandra and Impumelo to the northeast of the site and flows for approximately 70 to its confluence with the Blesbokspruit River and then another 35km south-westward to its confluence with the Vaal River.

The area normally receives about 678mm of rain per year, mostly during summer. Typically, very little to no rain falls between May and September and the highest rainfall (112mm) occurs in January (Figure 4). As a result of the very low rainfall in winter, the smaller watercourses at the site are, under natural conditions, seasonally flowing rivers.

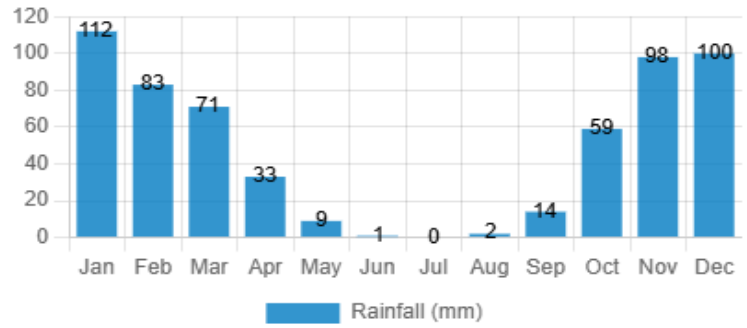


**Figure 4. Average monthly rainfall for the area (SA Atlas of Climatology and Agrohydrology, R.E. Schulze, 2009 – obtained from CapeFarmMapper, 2022)**

As mentioned, the area does not lie in a strategic water source area for ground or surface water. A minor fractured aquifer occurs within the wider area, with the water table typically at depths of about 10 m below ground level and a yield of between 0.5 and 2 litres per second. Surface and groundwater quality is generally very good, with natural electrical conductivity below 70 mS/m. Aquifer recharge is good, estimated at about 45 mm/a. The aquifer has a medium-to-high susceptibility and vulnerability to contamination.

The geology for most of the site is characterised by tholeiitic basalt of the Klipriviervberg Group (Randian Ventersdorp Supergroup), while the central higher-lying area comprises quartzite and conglomerate of the Turfontein and Johannesburg Subgroups (Randian Witwatersrand Supergroup). Weathering of these basalt gives rise to shallow, rocky, clayey soils of mainly Mispah and Glenrosa soil forms. Soils in the higher-lying areas are shallow, gravel lithosols.

The natural vegetation of the study area is mapped as comprising Andesite and Gold Reef Mountain Bushveld on the higher-lying northeastern portion of the site while Soweto Highveld and Tsakane Clay Grasslands occur on the lower-lying southern and western extents. The bushveld vegetation types are still largely intact and well protected that they are of Least Concern conservation status while the grassland vegetation is more impacted and impacted by cultivation and urban sprawl such that they are considered to be Endangered vegetation types. The typical land cover comprises a mix of open natural bushveld, grassland, wetlands and cultivated areas. Several dams have been constructed in the watercourses within the project area of influence. A vegetation assessment has been undertaken for the site and more detail on the terrestrial vegetation cover is included in that specialist assessment.

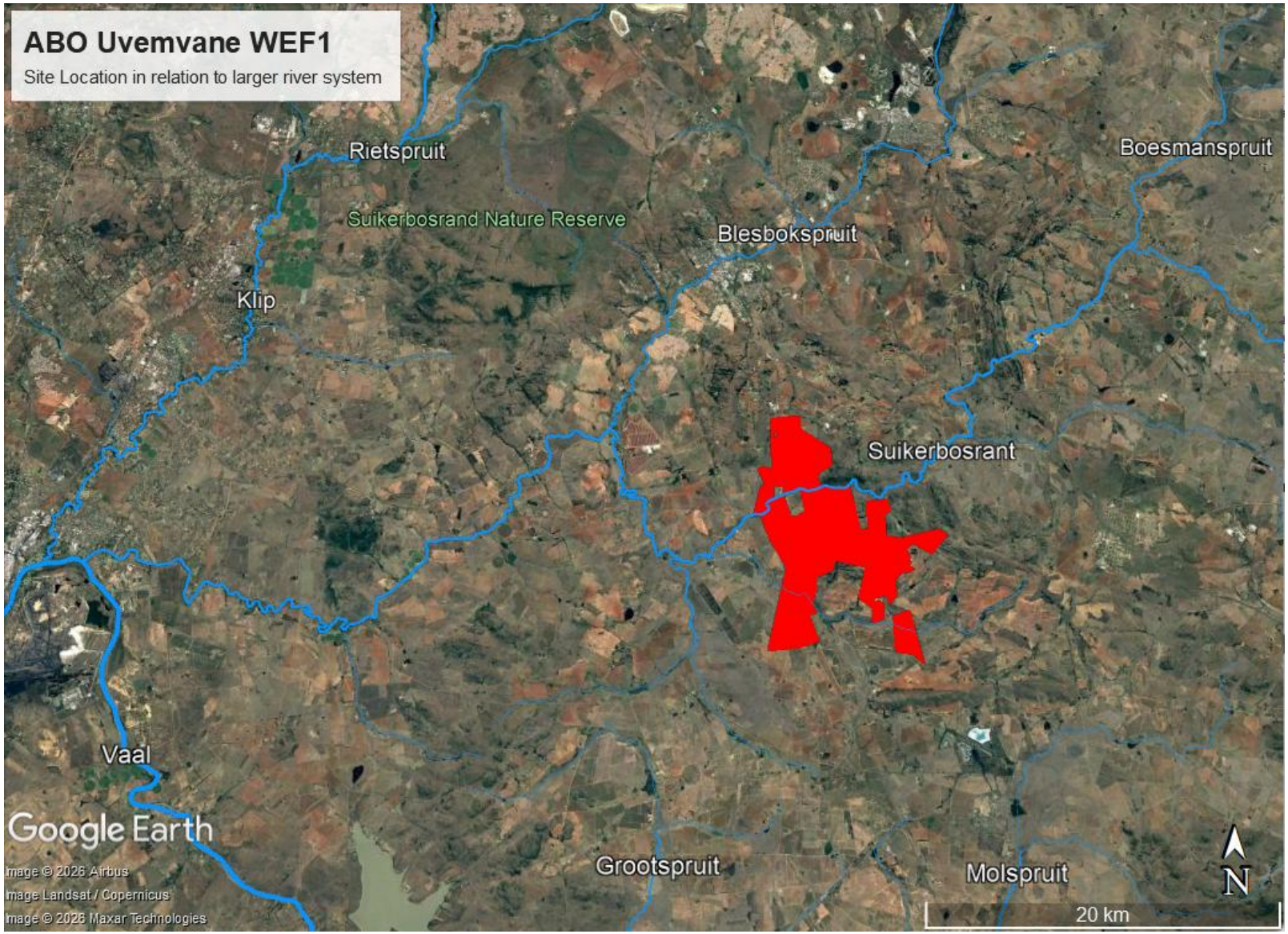


**Figure 5. Rivers map for study site (red polygon represents the study boundaries), shown in Google Earth.**

## AQUATIC BIOTA

Amphibian species occurring in the wider area are the Giant African bullfrog (*Pyxicephalus adspersus*), African red toad (*Schimsmaderma carens*), Raucous toad (*Sclerophrys capensis*), guttural toad (*Sclerophrys gutturalis*), striped stream frog (*Strongylopus fasciatus*), common river frog (*Amietia delalandii*), Senegal running frog (*Kassina senegalensis*), Bowettger's dainty frog (*Cacosterum boettgeri*), and the African clawed frog or platanna (*Xenoplus laevis*). Nearly all the amphibian species are listed by the International Union for the Conservation of Nature as being of Least concern. Many of the amphibians are widespread and found in many different habitats, including grasslands, shrublands, wetlands and artificial environments and breeds in temporary and permanent sources of water. Platannas are aquatic amphibians and only leave the water when they need to migrate to new water bodies during droughts or because of other disturbances. The Giant African bullfrog (although listed as Least Concern) is of concern due to its declining population associated with habitat loss.

Native fish species recorded in the Suikerbosrand River include the following:

| Taxon | Endemism | Cons. Status (Global) |
|---|---|---|
| *Labeobarbus aeneus* (Burchell, 1822) | Unknown | Least Concern |
| *Labeobarbus marequensis* (Smith, 1841) | Unknown | Least Concern |
| *Labeo capensis* (Smith, 1841) | Unknown | Least Concern |
| *Labeo umbratus* (Smith, 1841) | Unknown | Least Concern |
| *Enteromius paludinosus* (Peters, 1852) | Widespread | Least Concern |
| *Labeobarbus aeneus* (Burchell, 1822) | Unknown | Least Concern |
| *Pseudocrenilabrus philander* (Weber, 1897) | Unknown | Least Concern |
| *Tilapia sparrmanii* (Smith, 1840) | Unknown | Least Concern |

Source: Freshwater Biodiversity Information System

## 4.2. CONSERVATION VALUE OF AQUATIC FEATURES

Three sets of conservation mapping at national, provincial, and local scales are relevant to the identification of aquatic features of ecological and biodiversity conservation importance. These are the National Freshwater Ecosystem Priority Areas (NFEPA) map, the National Wetland Map version 5 (NWMv5), and the provincial Conservation Plans for Gauteng and Mpumalanga.

National FEPAs are intended to provide strategic spatial priorities for conserving South Africa's freshwater ecosystems and supporting the sustainable use of water resources. FEPAs were determined through a process of systematic biodiversity planning and identified using a range of criteria to serve the ecosystems and associated biodiversity of rivers, wetlands and estuaries. The river and wetland FEPAs must be maintained in a largely natural ecological state, while Fish Support Areas should not be allowed to degrade relative to their existing ecological condition. In terms of Freshwater Ecosystem Biodiversity Areas mapped within the study area, the site does not lie within a FEPA River Sub-catchment (Figure 6).

Some mapped FEPA wetland areas occur within or adjacent to the site and are mostly associated with dams. The only natural wetlands are in the southwestern extent of the site, which are depression wetlands (Figure 7).

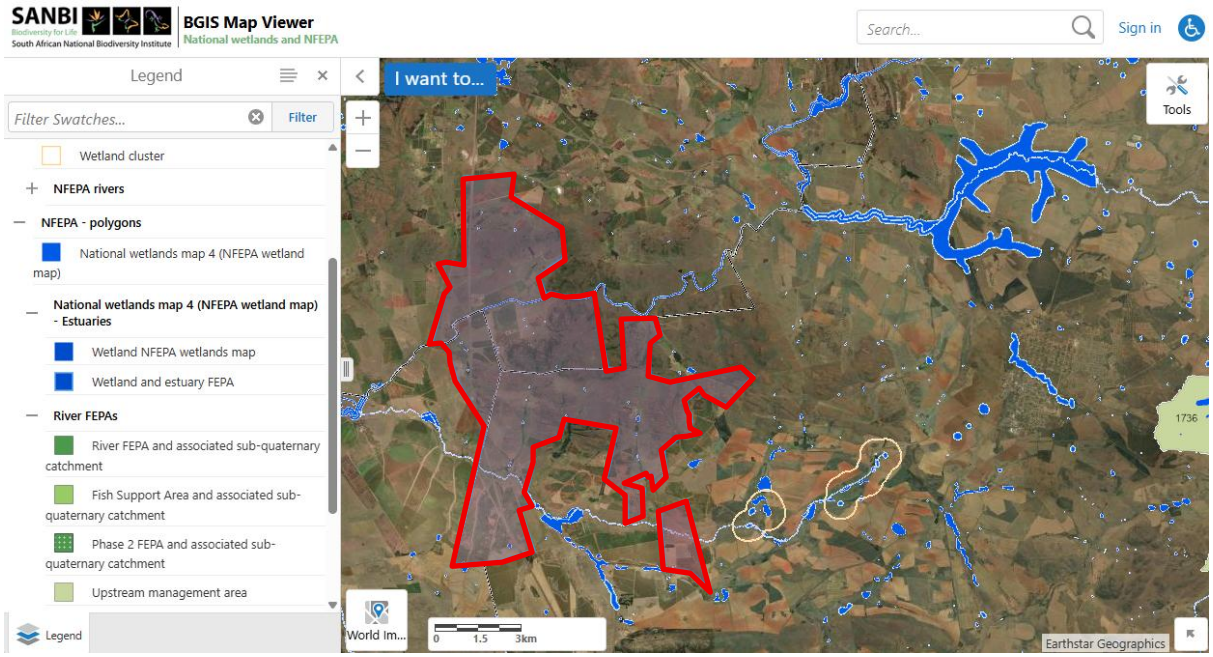


**Figure 6. National Freshwater Ecosystem Priority Areas for the study site, where the red polygons indicate the property boundaries associated with the proposed ABO Uvemvane WEF1 (SANBI Biodiversity GIS, 2026)**

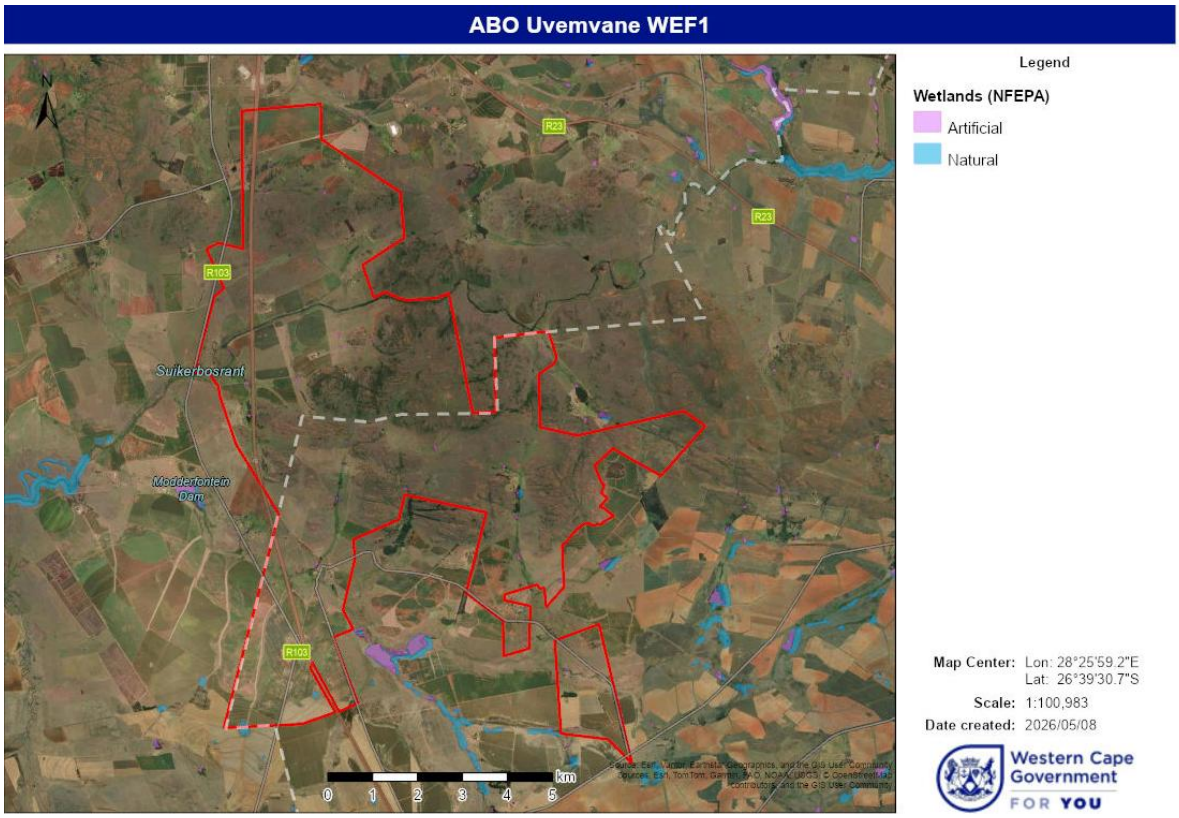


**Figure 7. National Freshwater Ecosystem Priority Areas map for the study site, where the red polygon indicates the property boundaries associated with the proposed ABO Uvemvane WEF1 (CapeFarmMapper, 2026)**

In the NWM5, there are several wetland features mapped within and adjacent to the site which are listed below and shown in Figure 8:

- Riverine wetland (light blue/white areas in Figure 8) associated with the Suikerbosrant River that drains through the northern portion of the site;

- Unchanneled valley bottom wetland (light green area) associated with a minor tributary of the Suikerbosrant River that drains into the river from the north; and
- Seeps (upper reaches – orange areas), channelled valley bottom (middle reaches – blue areas) and floodplain (lower reaches – dark green areas) wetland areas associated with tributaries of the Suikerbosrant River that drain into the river from the south.

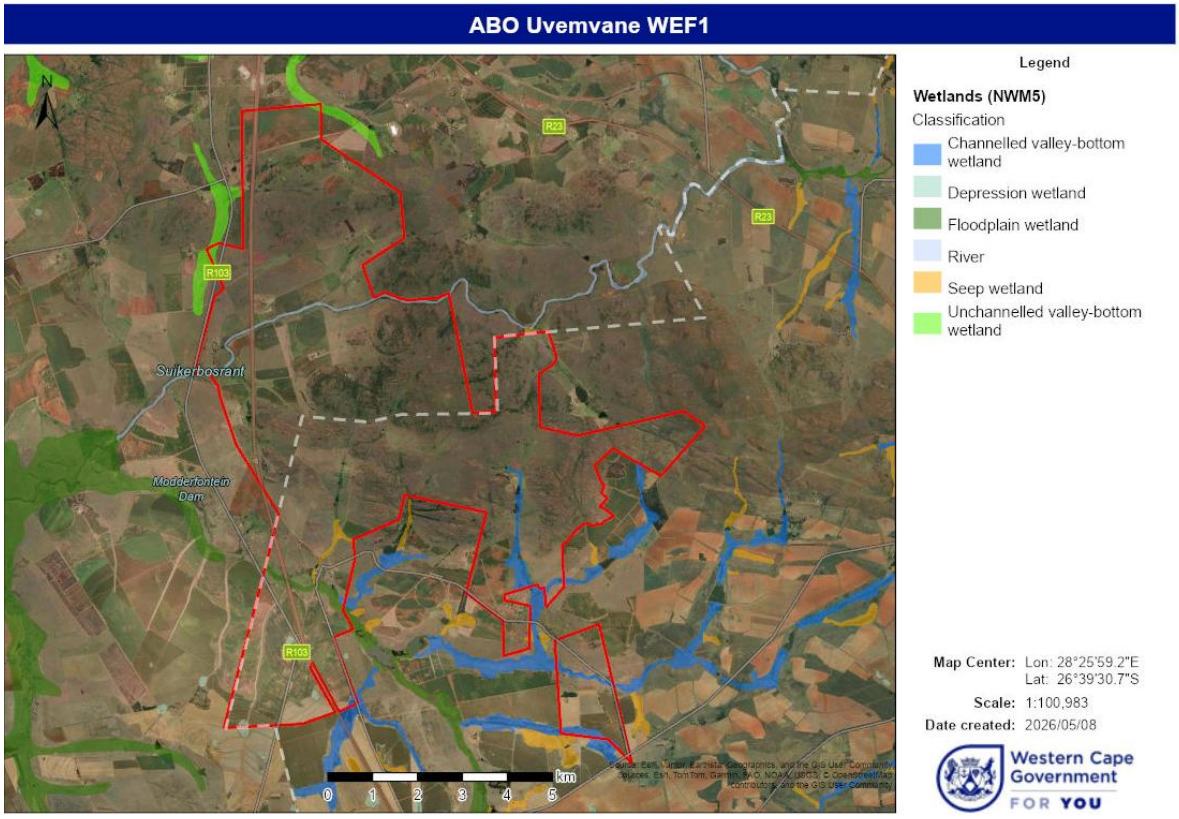


**Figure 8. National Wetland map for the study site, where the red polygon indicates the property boundaries associated with the proposed ABO Uvemvane WEF1 (CapeFarmMapper, 2027)**

In the Mpumalanga Biodiversity Sector Plan, FEPA wetland mapping has been applied to aquatic features in the area, with natural FEPA wetlands mapped as aquatic Ecological Support Areas. The surrounding terrestrial areas comprise a mix of transformed and natural areas.

The 2024 Gauteng CBA Map is only applicable to the northern portion of the site (Figure 9, top). The mapping primarily reflects terrestrial biodiversity planning and comprises terrestrial Critical Biodiversity Areas and Ecological Support Areas that are not aligned with aquatic habitats.

The latest Mpumalanga Biodiversity Sector Plan (MBSP 2023) (shown in Figure 10, bottom) incorporates the 2014 Highveld wetlands mapping (Figure 9), which is similar to the NWM5 mapping, showing the wider seep, valley-bottom, and floodplain wetlands along the watercourses. This mapping is thus also similar to the aquatic biodiversity sensitivity mapping as per the DFFE Screening Tool. Within the site, there are only some smaller ESA wetlands, with the more important CBA wetlands occurring to the south of the site. These wetlands are not essential for meeting targets, but they play an important role in supporting the functioning of the CBA wetlands which deliver important ecosystem services

Of most importance in all of the above-mentioned conservation mapping, from an aquatic perspective, are the features included in the NWM5 mapping which have been carried through to the DFFE Screening Tool mapping for aquatic biodiversity sensitivity as being of Very high sensitivity. The NWM 6 (beta) is unchanged from the NWM5 for the wetland features mapped within the project area of influence.

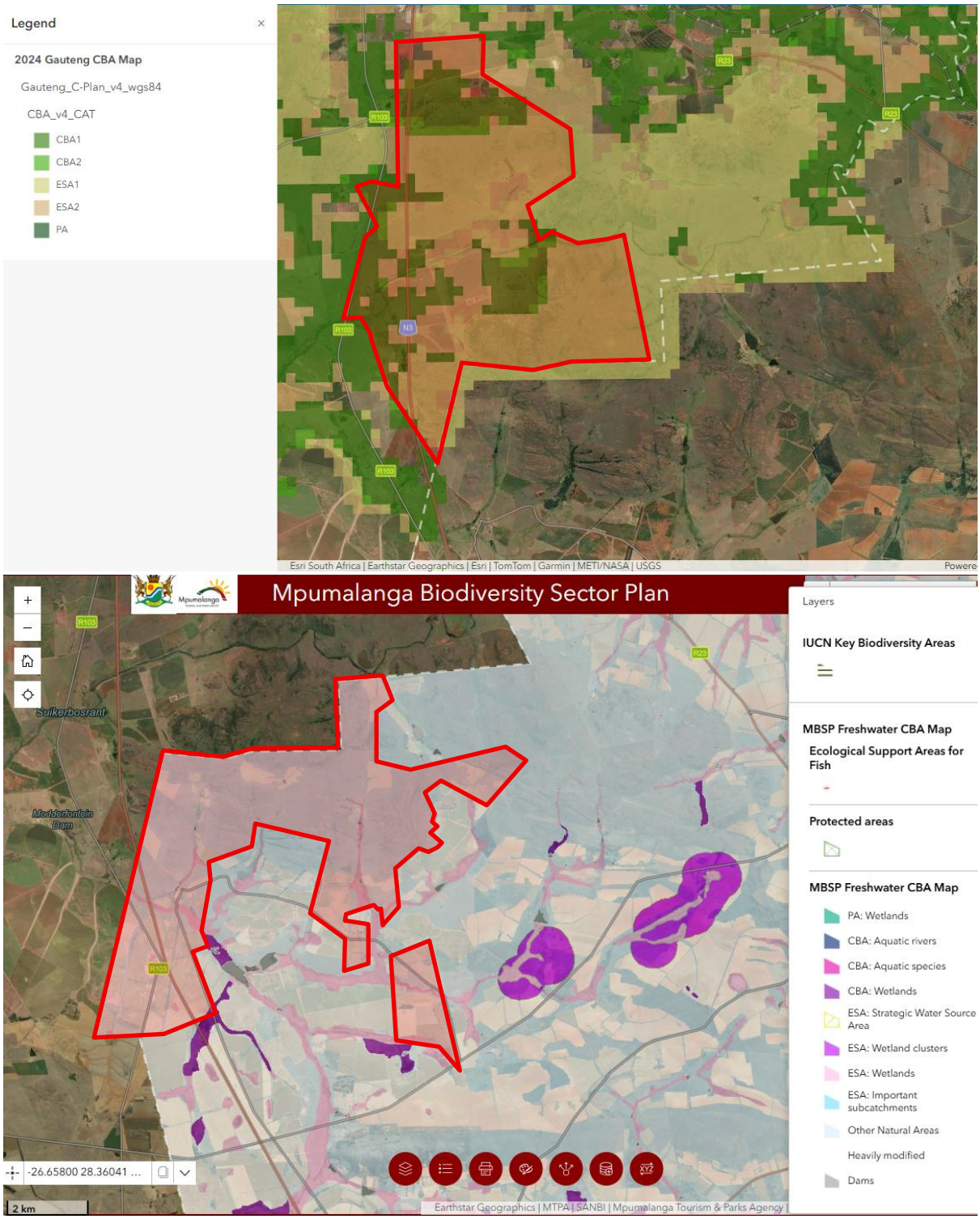


**Figure 9. Provincial Biodiversity and Conservation Plans for the study site, where the top image is for the 2024 Gauteng CBA Map (sourced from SANBI BiodiversityGIS, 2026) and the bottom image is the 2023 Mpumalanga Biodiversity Sector Plan (sourced from rom MBSP, 2026).**

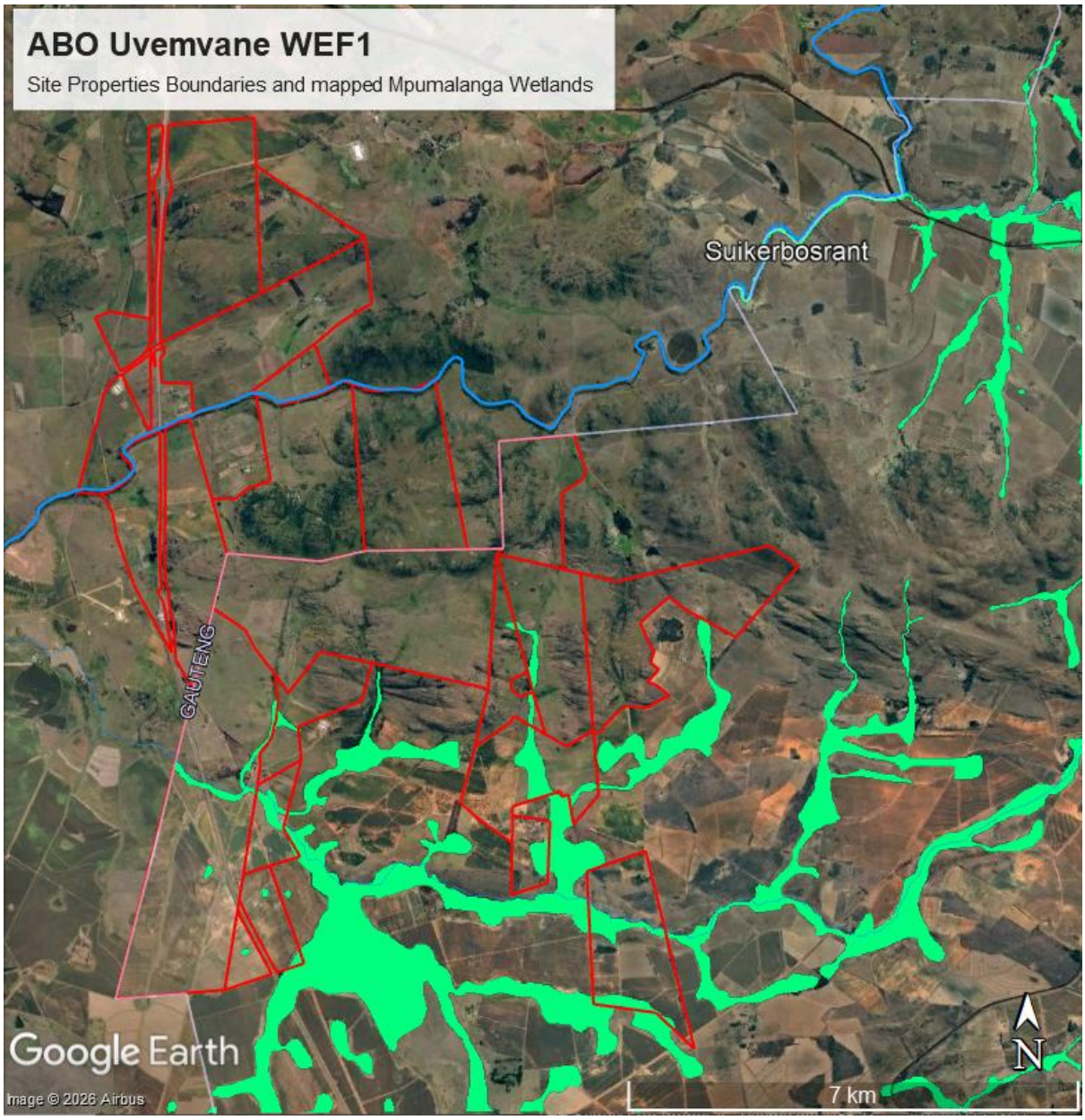


**Figure 10. 2014 Mpumalanga Highveld Wetland mapping for the project area, overlain in Google Earth.**

## 5. SITE VERIFICATION OUTCOMES

The aquatic features occurring within the site are the Suikerbosrant tributary of the Vaal River and its associated tributaries and wetland areas. These watercourses range from being largely natural on the higher-lying areas of the site to being moderately to largely modified ecological condition in their middle and lower reaches. The watercourses have moderate ecological importance but are of high sensitivity. They provide corridors for the movement of water and biota through the site and are particularly sensitive to flow, water quality and habitat modification due to the associated wetland habitat along many of the watercourses.

Dominant plant species in the bushveld and grassland areas include common buffalo thorn (*Ziziphus mucronata*), current-rhus (*Searsia pyroides*), ribbed kunirhus (*Searsia pallens*), ouhout *(Leucosidea sericea),* African boxwood *(Myrsine africana*), gwarrie (*Euclea crispa)*, shiny leaf *(Rhamnus prinoides),* mountain cabbagetree *(Cussonia paniculata)*, grassveld bitterbush (*Selago densiflora*), and natal grass (*Melinis repens*). Within the wetter areas, Orange River swamplily (*Crinum bulbospermum*), pennywort (Centella asiatica), arum lilies (*Zantedeschia*

*albomaculata*), sedges such as *Cyperus congestus,* common reeds (*Phragmites australis*) and bulrushes (*Typha capensis*) occur. Invasive alien plants occur in the disturbed areas such as silver wattle (*Acacia dealbata*), prickly pear (*Opuntia ficus-indica*) and pampas grass (*Cortaderia selloana).*

**Figure 11. Views of Suikerbosrant River upstream (top) and downstream (bottom) of the site**

**Figure 12. Views of some of the tributaries of the Suikerbosrant River within the site.**

All of the streams within the study area are non-perennial lower foothill streams, with the exception of the Suikerbosrant River which is perennial. The watercourses drain from the higher-lying hills within the centre of the site, either northwards towards the Suikerbosrant River or towards the south and into an unnamed tributary of the river. On the hillslopes the watercourses are largely natural, becoming increasingly disturbed in their lower reaches where they drain through farmlands and both the terrestrial and aquatic vegetation has been modified. From the Site Characterisation assessments, the geomorphological and physical characteristics of the watercourses can be classified as shown in Table 3.

**Table 3. Geomorphological and Physical features**

| River | Suikerbosrant River | Unnamed tributaries |
|---|---|---|
| Geomorph Zone | Lower foothill zone | Upper to Lower foothill zones |
| Lateral mobility | Relatively unconfined | Confined in places due to topography, becoming unconfined |
| Channel pattern | Single/multiple thread, moderate/low sinuosity | Single thread with relatively low sinuosity |
| Channel modification | High modification (irrigated, cultivated areas) | Little modification of upper reaches, becoming increasingly modified |
| Hydrological type | Perennial | Seasonal |
| Ecoregion | Highveld | |
| DWS catchment | C21B and C21C (Upper Vaal River System) | |
| Vegetation type | Andesite Mountain Bushveld on high-lying areas, Soweto Highveld Grassland on low-lying areas | |
| Rainfall region | Summer | |

The evaluation of Index of Habitat Integrity (IHI) provides a measure of the degree to which a river has been modified from its natural state. The methodology involves a qualitative assessment of the number and severity of anthropogenic perturbations on a river and the damage they potentially inflict upon the system. These disturbances include both abiotic and biotic factors, which are regarded as the primary causes of degradation of a river. The severity of each impact is ranked using a scale from 0 (no impact) to 25 (critical impact). The IHI assessment contains an evaluation of the impacts of two components of the rivers, the riparian zone and the instream habitat. The watercourses within the study area are still in a moderately to largely modified ecological condition, with a modification of the habitat occurring because of the surrounding farming activities.

**Table 4. Index of Habitat Integrity Assessment results and criteria assessed of the watercourses.**

| Instream Criteria | Suikerbosrant | Tributaries | Riparian Zone Criteria | Suikerbosrant | Tributaries |
|---|---|---|---|---|---|
| Water abstraction | 14 | 9 | Water abstraction | 12 | 7 |
| Flow modification | 12 | 7 | Inundation | 7 | 5 |
| Bed modification | 9 | 7 | Flow modification | 10 | 6 |
| Channel modification | 7 | 6 | Water quality | 8 | 6 |
| Water quality | 9 | 6 | Indigenous vegetation removal | 10 | 9 |
| Inundation | 7 | 5 | Exotic veg encroachment | 8 | 7 |
| Exotic macrophytes | 7 | 6 | Bank erosion | 8 | 6 |
| Exotic fauna | 6 | 5 | Channel modification | 7 | 6 |
| Solid waste disposal | 7 | 4 | | | |
| Category | C/D | C | Category | C/D | C |

The wetland areas within the wider study area can be classified as either valley bottom, seep or depression wetlands. The wetland features within the study area have the characteristics described in Table 5.

**Table 5: Classification of wetland areas within the wider study area**

| Name | Valley bottom wetlands | Seeps | Depression wetlands |
|---|---|---|---|
| System | Inland | | |
| Ecoregion | Highveld | | |
| Landscape setting | On the valley floor along watercourse | On hillslopes adjacent to watercourse | Isolated depressions on a plain |
| Longitudinal zonation | Lower foothill | Foothills | Not applicable |
| Drainage | Drainage in and out associated with watercourse | Groundwater inflow and outflow to watercourse | Inflow from surrounding runoff; no outflow |
| Seasonality | Seasonal | Mostly seasonal | Naturally seasonal |
| Anthropogenic influence | Moderate levels of modification (irrigated, cultivated areas) | | |

| | |
|---|---|
| Geology and soils | Kliprivierberg Group basalt that form shallow, rocky, clayey soils of mainly Mispah and Glenrosa soil forms. |
| Vegetation | Andesite Mountain Bushveld on higher-lying areas and Soweto Highveld Grassland on lower-lying areas |
| Salinity | Fresh |

The Present Ecological Status (PES) Method (DWAF 2005) was used to establish the integrity of the wetlands in the project area of influence and was based on the modified Habitat Integrity approach developed by Kleynhans (DWAF, 1999; Dickens *et al*, 2003). Table 6 shows the criteria and results from the assessment of the habitat integrity of the wetlands. These criteria were selected based on the assumption that anthropogenic modification of the criteria can generally be regarded as the primary causes of the ecological integrity of a wetland.

**Table 6. Habitat integrity assessment criteria for palustrine wetlands (Dickens *et al*, 2003)**

| Criteria | Valley bottom wetlands | Seeps | Depression wetlands |
|---|---|---|---|
| Hydrologic | | | |
| Flow Modification | 3.2 | 3.8 | 1.5 |
| Permanent Inundation | 3.5 | 4.0 | 1.0 |
| Water Quality | | | |
| Water Quality Modification | 2.5 | 4.0 | 2.0 |
| Sediment Load Modification | 2.0 | 3.7 | 1.5 |
| Hydraulic/Geomorphic | | | |
| Canalisation | 3.0 | 3.8 | 1.5 |
| Topographic Alteration | 2.8 | 4.5 | 1.0 |
| Biota | | | |
| Terrestrial Encroachment | 2.5 | 3.2 | 1.0 |
| Indigenous Veg Removal | 2.0 | 3.0 | 1.0 |
| Invasive Plant Encroachment | 2.5 | 3.5 | 2.0 |
| Alien Fauna | 2.5 | 3.5 | 2.0 |
| Over utilisation | 2.5 | 3.8 | 1.0 |
| **Category** | **C** | **B** | **E** |

The wetlands in the project area of influence are subject to physical habitat, flow, and water quality modifications due to surrounding farming activities. In terms of the current ecological state of the wetlands, the seeps are the least impacted, and in a largely natural ecological state; the valley bottom wetlands are slightly more impacted (moderately modified), while the depression wetlands are seriously modified, with most of their natural habitat and functionality lost.

The Ecological Importance and Sensitivity (EIS) assessment for both watercourses and wetlands considers several biotic and habitat determinants surmised to indicate either importance or sensitivity. In addition, the assessment of wetland areas includes an evaluation of the ecosystem services they provide (divided into Hydrological Functional Importance and Direct Human Benefits). The results of the EIS assessment for the watercourses are provided in Table 7 and for the wetlands in Table 8.

**Table 7. Results of the EIS assessment for the watercourses**

| Biotic Determinants | Suikerbosrant | Tributaries |
|---|---|---|
| Rare and endangered biota | 2 | 2 |
| Unique biota | 2 | 1 |
| Intolerant biota | 2.5 | 2.5 |
| Species/taxon richness | 2 | 1.5 |
| Aquatic Habitat Determinants | | |
| Diversity of aquatic habitat types or features | 3 | 2.5 |
| Refuge value of habitat type | 2.5 | 2 |
| Sensitivity of habitat to flow changes | 2.5 | 2.5 |
| Sensitivity of flow related water quality changes | 2.5 | 2.5 |
| Migration route/corridor for instream and riparian biota | 3 | 1.5 |
| National parks, wilderness areas, Nature Reserves, Natural Heritage sites, Natural areas, | 1 | 1 |
| **EIS CATEGORY** | **High** | **High/Moderate** |

**Table 8: Results of the EIS assessment for the wetlands**

| **EIS for the Valley Bottom wetlands** | | | |
|---|---|---|---|
| Ecological Importance | Score | Ecological Importance | Score |
| Biodiversity support | 2.0 | Flood attenuation | 2.8 |
| Presence of Red Data species | 2.5 | Streamflow regulation | 2.7 |
| Populations of unique species | 1.5 | Sediment trapping | 2.7 |
| Migration/breeding/feeding sites | 2.0 | Phosphate assimilation | 2.5 |
| Landscape scale | 1.6 | Nitrate assimilation | 2.7 |
| Protection status of the wetland | 2.0 | Toxicant assimilation | 1.5 |
| Protection status of the vegetation type | 1.0 | Erosion control | 2.8 |
| Regional context of the ecological integrity | 2.0 | Carbon storage | 1.8 |
| Size and rarity of the wetland type/s present | 1.5 | Hydrological/Functional Importance | 2.38 |
| Diversity of habitat types | 1.5 | Water for human use | 2.5 |
| Sensitivity of the wetland | 2.5 | Harvestable resources | 1.5 |
| Sensitivity to changes in floods | 2.5 | Cultivated foods | 1.5 |
| Sensitivity to changes in low flows/dry season | 2.5 | Cultural heritage | 1.5 |
| Sensitivity to changes in water quality | 2.5 | Tourism and recreation | 1.5 |
| | | Education and research | 1.5 |
| Ecological Importance & Sensitivity | 2.5 | Importance of Direct Human Benefits | 1.67 |
| **OVERALL IMPORTANCE: VALLEY BOTTOM WETLANDS** | | **MODERATE** | |
| **EIS for the Seeps** | | | |
| Ecological Importance | Score | Ecological Importance | Score |
| Biodiversity support | 1.67 | Flood attenuation | 2.5 |
| Presence of Red Data species | 1.5 | Streamflow regulation | 3.0 |
| Populations of unique species | 1.5 | Sediment trapping | 2.0 |
| Migration/breeding/feeding sites | 2.0 | Phosphate assimilation | 2.5 |
| Landscape scale | 1.72 | Nitrate assimilation | 2.5 |
| Protection status of the wetland | 2.0 | Toxicant assimilation | 1.5 |
| Protection status of the vegetation type | 1.0 | Erosion control | 2.5 |
| Regional context of the ecological integrity | 2.0 | Carbon storage | 1.5 |
| Size and rarity of the wetland type/s present | 1.8 | Hydrological/Functional Importance | 2.25 |
| Diversity of habitat types | 1.8 | Water for human use | 2.5 |
| Sensitivity of the wetland | 2.5 | Harvestable resources | 1.3 |
| Sensitivity to changes in floods | 1.5 | Cultivated foods | 1.0 |
| Sensitivity to changes in low flows/dry season | 2.5 | Cultural heritage | 1.0 |
| Sensitivity to changes in water quality | 2.5 | Tourism and recreation | 1.0 |
| | | Education and research | 1.0 |
| Ecological Importance & Sensitivity | 2.5 | Importance of Direct Human Benefits | 1.25 |
| **OVERALL IMPORTANCE: SEEPS** | | **MODERATE** | |
| **EIS for the Depressions** | | | |
| Ecological Importance | Depress | Ecological Importance | Depress |
| Biodiversity support | 1 | Flood attenuation | 1 |
| Presence of Red Data species | 1 | Streamflow regulation | 0 |
| Populations of unique species | 1 | Sediment trapping | 0 |
| Migration/breeding/feeding sites | 1 | Phosphate assimilation | 0 |
| Landscape scale | 0.2 | Nitrate assimilation | 0 |
| Protection status of the wetland | 0 | Toxicant assimilation | 0 |
| Protection status of the vegetation type | 1 | Erosion control | 0 |
| Regional context of the ecological integrity | 0 | Carbon storage | 0 |
| Size and rarity of the wetland type/s present | 0 | Hydrological/Functional Importance | 1.3 |
| Diversity of habitat types | 0 | Water for human use | 0 |
| Sensitivity of the wetland | 1 | Harvestable resources | 0 |

| | | | |
|---|---|---|---|
| Sensitivity to changes in floods | 1 | Cultivated foods | 0 |
| Sensitivity to changes in low flows/dry season | 1 | Cultural heritage | 0 |
| Sensitivity to changes in water quality | 1 | Tourism and recreation | 0 |
| | | Education and research | 0 |
| Ecological Importance & Sensitivity | 1.00 | Importance of Direct Human Benefits | 0 |
| **OVERALL IMPORTANCE: DEPRESSIONS** | | **LOW** | |

The watercourses with their associated seep and valley bottom wetlands are of moderate to high ecological importance and sensitivity, while the very degraded depression wetlands are of low ecological importance and sensitivity.

A buffer of 50m is recommended for the watercourses while the associated wetland habitats should be protected by a 100m buffer. Services could be placed through these aquatic habitats and buffer areas but must be kept to a minimum and adequately mitigated.

The findings of this assessment thus largely agree with the DFFE screening tool for aquatic biodiversity sensitivity mapping in that most of the site is of low aquatic sensitivity. The watercourses are however considered to be of high sensitivity and should be avoided by the proposed WEF facilities, as recommended above.

If the above-recommended buffers and the proposed mitigation measures in the impact assessment are implemented, the risk to the aquatic ecosystems is likely to be low such that the General Authorisations for Section 21(c) and (i) water uses under the National Water Act (Act 36 of 1998) would apply.

The following table summarises the findings of the site verification assessment in terms of aquatic ecosystem sensitivity:

| Sensitivity Theme: Aquatic | | |
|---|---|---|
| Screening Tool Site Sensitivity | Specialist Site Sensitivity | Reasons why the Screening Tool Sensitivity is ~~disputed~~ / confirmed |
| Most of the site comprises low Aquatic Biodiversity Sensitivity in terms of the DFFE screening tool mapping with the watercourses and wetlands within the site being of very high sensitivity. The site does not lie within a National FEPA River Sub catchment or a SWSA. The wetlands are mapped in the National Wetland Map5 and the 2014 Mpumalanga Highveld Wetlands Map. | Low for the widespread area and High to moderate for the watercourses and wetlands within the site. A medium sensitivity has been applied to the adjacent buffers. | The Screening Tool indicated the site to be in an area mapped as being of Low Aquatic Biodiversity Sensitivity but with the aquatic features mapped as very high sensitivity. This assessment found the watercourses and wetlands on the site to be of high sensitivity. Buffer zones of 50m on either side of the watercourses and 100m from the wetlands are deemed sufficient to protect these aquatic ecosystems from any impact arising from the proposed WEF. |

## 6. AQUATIC CONSTRAINTS MAPPING AND AQUATIC SENSITIVITY

In the aquatic sensitivity mapping, the watercourses have been mapped as being of high sensitivity, with the restrictions as mentioned for infrastructure components. In addition, to protect aquatic habitats, buffer zones of 50m on either side of the watercourses and 100m from the wetland areas have been mapped as medium sensitivity. Figure 13 shows the mapped aquatic features together with the recommended buffers for the proposed site and Figure 14 shows the sensitivity mapping within the site.

The potential aquatic ecosystem impacts of the proposed wind facility are likely to take place during the construction phase.

The potential aquatic ecosystem impacts of the proposed activities during construction include:

- Disturbance and possibly loss of aquatic habitats within the watercourses with the associated impact on sensitive aquatic biota;

- The removal of indigenous riparian and instream vegetation that has the potential to reduce the ecological integrity and functionality of the watercourses;
- Demand for water for construction could place stress on the existing available water resources;
- Road crossing structures, if not adequately designed, could impede flow in the watercourses;
- Alien vegetation infestation within the aquatic features due to disturbance; and
- Increased sedimentation and risks of contamination of surface water runoff during construction.

During the operational phase for all the proposed works, the potential impacts would include:

- Ongoing disturbance of aquatic features and associated vegetation along access roads or adjacent to the infrastructure that needs to be maintained;
- Modified runoff characteristics from hardened surfaces that have the potential to result in erosion of the watercourses; and
- Possible increase in water consumption and potential for water quality impacts (such as contamination from sewage generated onsite) as a result of the operation of the site.

During the decommissioning phase, the potential impacts would largely be associated with an increased disturbance of aquatic habitat due to the increased activity on the site. Increased sedimentation and risks of contamination of surface water runoff may also occur.

By implementing suitable buffers (50m along the watercourses and 100m adjacent to the wetlands) and minimising the works within the river/stream corridors, the impact of the proposed project activities would be low and unlikely to impact the integrity of the aquatic ecosystems. The recommended buffers are deemed adequate, irrespective of the proposed infrastructure.

Linear infrastructure (roads and power lines) can cross aquatic habitats and their buffers if adequately mitigated, although it is recommended that areas of high sensitivity be avoided.

The other structures/infrastructure should avoid the aquatic habitats and buffer areas. Where unavoidable, structures could be placed in the areas of medium sensitivity, with adequate mitigation.

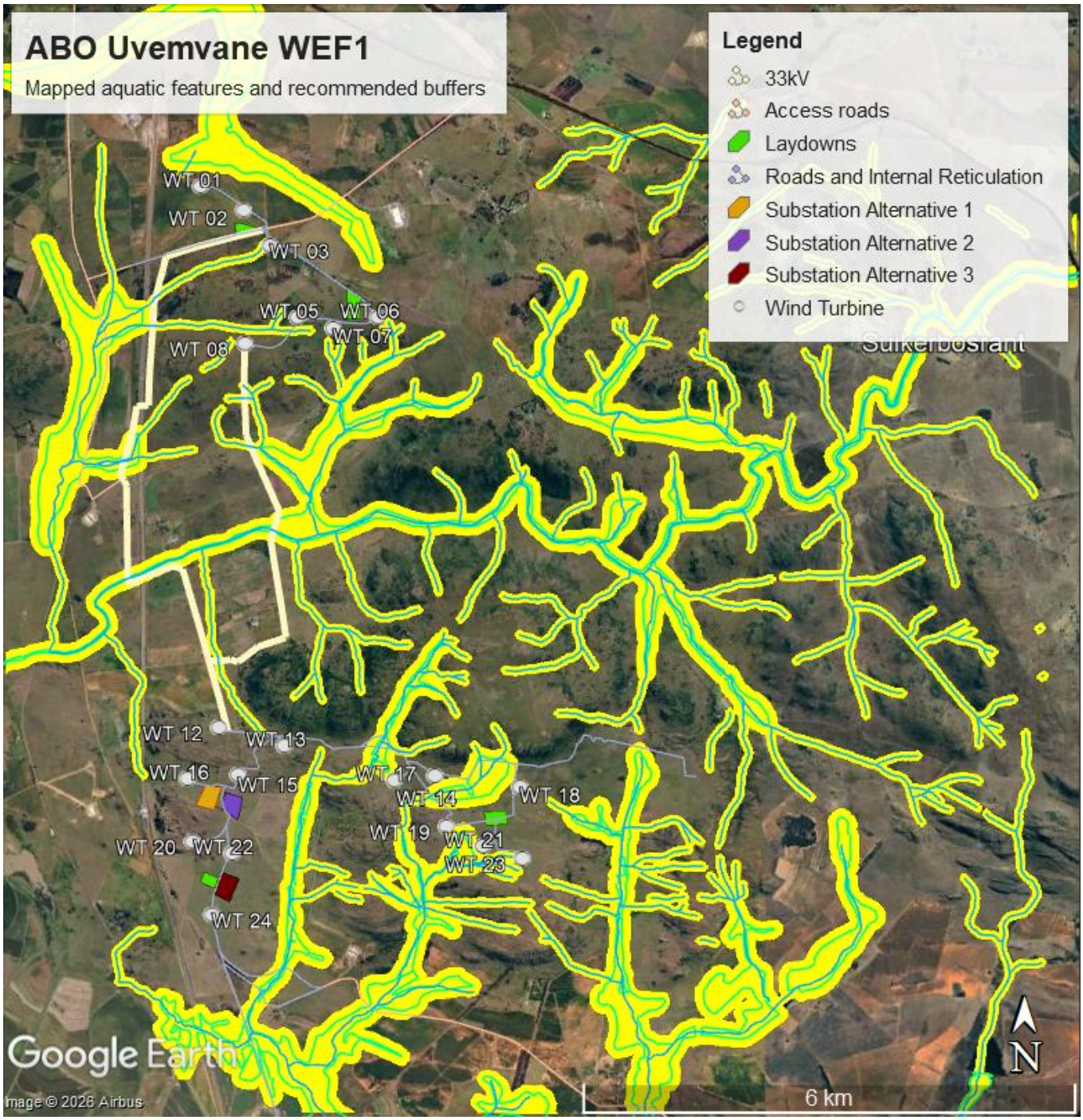


**Figure 13. Mapped aquatic features within the project area, shown in Google Earth. The recommended buffer or development setback areas are indicated by the yellow areas.**

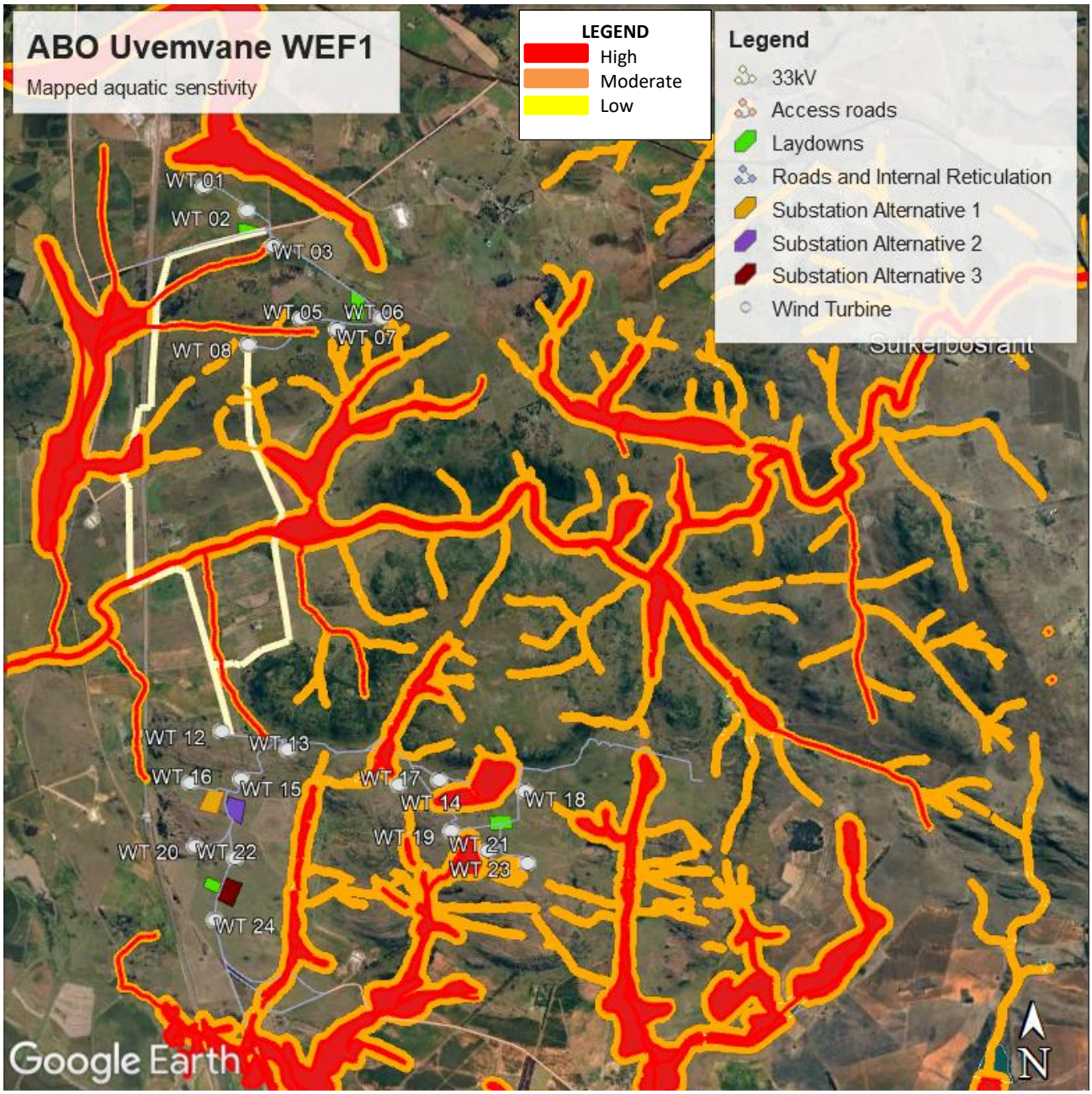


**Figure 14. Mapped sensitivity of aquatic features within the project area, shown in Google Earth.**

# 7. LEGISLATION AND RISK ASSESSMENT

## 7.1. NEMA AND ENVIRONMENTAL IMPACT ASSESSMENT REGULATIONS

National Environmental Management Act (NEMA) (No. 107 of 1998, as amended) is the overarching piece of legislation for environmental management in South Africa and includes provisions that must be considered to give effect to the general objectives of integrated environmental management. These provisions are contained in Section 24 (4)(a)(b) of the Act and will be considered during the Environmental Impact Assessment (EIA) process. Activities listed in terms of Chapter 5 of NEMA in Government Notice No. R. 983, 984 and 985, dated 4 December 2014, as amended, trigger a mandatory Basic Assessment, or even a full scoping EIA process.

Since there are aquatic features present on the proposed development site and activities will take place within 32m of a watercourse, there will be associated listed activities under Section 24 of NEMA (GN.R. 327 (as amended in 2017) Activity 12(ii)(a)(c) and possibly Activity 19 and Activity 48(i)(a)(c)). The potential aquatic ecosystem impacts of the proposed activities, if placed outside of the recommended aquatic buffers, would be low.

## 7.2. NATIONAL WATER ACT, 1998 (ACT NO. 36 OF 1998)

The purpose of the National Water Act, 1998 (NWA) is to provide a framework for the equitable allocation and sustainable management of water resources. Both surface and groundwater sources are redefined by the Act as national resources which cannot be owned by any individual and rights which are not automatically coupled to land rights, but for which prospective users must apply for authorisation and register as users. The NWA also provides measures to prevent, control and remedy the pollution of surface and groundwater sources.

The Act aims to regulate the use of water and activities (as defined in Part 4, Section 21 of the NWA), which may impact water resources through the categorisation of 'listed water uses' encompassing water abstraction and flow attenuation within catchments as well as the potential contamination of water resources, where the DWS is the administering body in this regard.

Defined water use activities require the approval of DWS in the form of a General Authorisation or Water Use Licence authorisation. There are restrictions on the extent and scale of listed activities for which General Authorisations apply. According to the preamble to Part 6 of the NWA, "*This Part established a procedure to enable a responsible authority, after public consultation, to permit the use of water by publishing general authorisations in the Gazette…*" *"The use of water under a general authorisation does not require a licence until the general authorisation is revoked, in which case licensing will be necessary…"*

The General Authorisations for Section 21 (c) and (i) water uses (impeding or diverting flow or changing the bed, banks or characteristics of a watercourse) as defined under the NWA have recently been revised in 2023 (Government Notice R4167 of 2023). The works within or adjacent to the aquatic features have the potential to change the characteristics of the associated freshwater ecosystems and may therefore require authorisation. Determining if a water use licence is required for these water uses is now associated with the risk of degrading the ecological status of a watercourse.

A risk assessment (version 2) was carried out for the proposed ABO Uvemvane WEF1 and associated infrastructure. The assessment indicates the level of risk certain activities pose to freshwater resources, where the outcomes are used to guide decisions regarding water use authorisation of the proposed activity. A summary of the potential risks can be seen in Table 9, where it was assumed that the proposed activities would be placed outside of the aquatic features and the recommended buffers.

The risk assessment determined that the proposed WEF and its associated infrastructure, if mitigated as recommended, pose a low risk of impacting aquatic habitat, water flow and water quality. With these findings of the risk assessment, the water use activities associated with the proposed project could potentially be authorised through the general authorisations for Section 21(c) and (i) water uses.

Water use authorisations may also be required for any raw water abstraction and use of conservancy tanks for storage domestic sewage, should the facility not be linked to the services of the local authority; however, the volumes tend to be relatively low and would likely be within the general authorisation limits for these water use activities (Section 21(g) water use). The General Authorisation limit for the abstraction of groundwater for this area is 75 $m^3$/ha/a for the associated property extent where the borehole is located. It may be possible that any groundwater abstraction for the proposed development could be within the General Authorisation for Section 21(a) water use.

**Table 9: Summary risk assessment for the proposed ABO Uvemvane WEF1**

| | | | |
|---|---|---|---|
| **PROJECT:** | | **ABO Uvemvane WEF1 near Balfour** | |
| **Name of assessor:** | | T Belcher | |
| **Date of assessment:** | | 2026/07/21 | |

**RISK ASSESSMENT MATRIX for Section 21 (c) and (i) Water Use activities (version 2.0): SUMMARY**

**[ASSUMING THAT ALL PROPOSED IMPACT CONTROL MEASURES (AS STIPULATED IN PROJECT SPECS) ARE EFFECTIVELY IMPLEMENTED]**

| Phase | Activity | Potentially affected watercourses | Impact | Risk Ratings |
|---|---|---|---|---|
| CONSTRUCTION | Construction works associated with WEF | Suikerbosrant River | Loss of biodiversity & habitat, impeding flow & water quality impact | L |
| | Construction works associated with WEF | Unnamed Tributaries | Loss of biodiversity & habitat, impeding flow & water quality impact | L |
| | Construction works associated with WEF | Associated wetlands | Loss of biodiversity & habitat, impeding flow & water quality impact | L |
| OPERATIONAL | Operational activities associated with WEF | Suikerbosrant River | Disturbance to aquatic habitat - Facilitation of erosion and invasion by alien plants | L |
| | Operational activities associated with WEF | Unnamed Tributaries | Disturbance to aquatic habitat - Facilitation of erosion and invasion by alien plants | L |
| | Operational activities associated with WEF | Associated wetlands | Disturbance to aquatic habitat - Facilitation of erosion and invasion by alien plants | L |
| DECOMMISSIONING | Removal of WEF infrastructure | Suikerbosrant River | Habitat disturbance and some flow and water quality impacts | L |
| | Removal of WEF infrastructure | Unnamed Tributaries | Habitat disturbance and some flow and water quality impacts | L |
| | Removal of WEF infrastructure | Associated wetlands | Habitat disturbance and some flow and water quality impacts | L |

## 8. ISSUES, RISKS AND IMPACT ASSESSMENT

This section assesses the issues, risks and potential impacts of the proposed installation and establishment of the ABO Uvemvane WEF1 and its associated infrastructure to accommodate the storage of energy, where the associated infrastructure includes an on-site substation, roads, operation and maintenance buildings, fencing

and other auxiliary infrastructure as well as a grid connection corridor. The potential impacts identified during this assessment are as follows:

| |
|---|
| Construction Phase:<br>**Direct Impacts**: Disturbance of riparian/wetland vegetation and water quality impacts (largely sedimentation) |
| Operational Phase**:**<br>**Direct Impacts:** Disturbance of riparian/wetland vegetation;<br>**Indirect Impacts:** Modification of surface water runoff and alien vegetation invasion in aquatic features |
| Decommissioning Phase**:**<br>**Direct Impacts:** Disturbance of aquatic habitats and water quality impacts. |
| Cumulative impacts**:**<br>**Indirect Impacts:** Degradation of the ecological condition of aquatic ecosystems. |

No consultation process was deemed necessary during the preparation of this aquatic specialist report. No aquatic ecosystem issues have been raised as yet.

The potential aquatic biodiversity impacts of the proposed ABO Uvemvane WEF1 and associated infrastructure are likely to be of low significance in terms of any potential impact on aquatic habitat, biota, water quality, or flow for all phases of the development, as the proposed layout has avoided the delineated aquatic features of concern and allowed for a wide buffer area. The impact assessment methodology used is captured in Appendix 2.

## 8.1. POTENTIAL IMPACTS DURING THE CONSTRUCTION PHASE

*Direct impacts*: **Disturbance of riparian/wetland vegetation and water quality impacts (largely sedimentation)**

Most of the potential aquatic ecosystem impacts of the proposed ABO Uvemvane WEF1 are likely to occur during the construction phase and will be direct, aquatic habitat disturbance-related impacts. These potential impacts and the associated issues identified include:

1. Construction activities within the riparian zone of the river could result in the disturbance or loss of sensitive habitats and any listed and/or protected plant or animal species. The construction activities are, however, largely outside of the riparian zone and the recommended buffers and thus be unlikely to have an impact of any significance.

2. Increased sedimentation and risks of contamination of surface water runoff during construction. During construction, earthworks near watercourses will expose and mobilise soil, as well as construction materials and chemicals, that may enter water resources. Any spills during transport or while works are conducted in proximity to a watercourse also have the potential to affect the surrounding biota. Given that the works are likely to be undertaken during the drier periods of the year and that the proposed works are located sufficiently far from the delineated aquatic features (i.e., outside the recommended buffer areas), they would not pose any significant risk to the aquatic features.

<u>Recommended mitigation measures:</u>

1. A buffer of 50m from the delineated edge of larger watercourses and wetland corridors should be maintained to protect these aquatic habitats. Clearing of indigenous vegetation should be avoided and should not occur within aquatic features and the recommended buffers. Any disturbed areas should be revegetated with suitable vegetation to minimise the risk of erosion and sedimentation of aquatic habitats following rainfall events. The existing road infrastructure should be utilised wherever possible to minimise overall disturbance. There are 9 watercourse crossings associated with the internal roads for the final proposed layout. Six of these crossings are associated with existing informal farm roads, and three new watercourse crossings are proposed. In terms of the proposed new crossings:

a. The crossing to WT08 is over a minor seasonal watercourse in the northern section. A small low-water crossing over this small watercourse would be acceptable
b. There are two proposals for a crossing to WT14 and WT17. Both crossings are on a small stream, located between an upstream and downstream dam. There is an existing road crossing near the upstream point. It is recommended that this road and crossing be realigned to the new proposed road. This crossing would have less impact than the downstream one as it is close to the existing disturbance at the road and a fenceline. The downstream road alignment alternative is in a wider wetland area.
c. Two alternative crossings are proposed over a small watercourse to access WT 24. The downstream (southern) one aligns with an existing road over a small dam wall but will need upgrading. Use of this road alignment is preferred as the watercourse is already disturbed at this location.

2. During the construction phase, proper site management must be undertaken to address on-site stormwater management and prevention of pollution measures from any potential pollution sources during construction activities, such as hydrocarbon spills. Any stormwater that arises within the construction site must be managed appropriately to trap sediment and reduce flow velocities. Where feasible, the water supply, sanitation services, and solid waste management services required for the proposed project should preferably be provided by an off-site service provider.

A localised, short-term impact is expected, with low overall significance for the identified aquatic ecosystems in the area. The impact table for the construction phase is included in Table 11.

## 8.2. POTENTIAL IMPACTS DURING THE OPERATIONAL PHASE

*Direct impacts*:

1. **Disturbance of riparian and wetland vegetation**: The disturbance of riparian and wetland vegetation is unlikely during the operation phase provided activities remain within the authorised project area, which would be outside of the recommended 50m buffer zones.

*Indirect impacts*:

2. **Modification of surface water runoff**: Modified runoff characteristics from hardened surfaces associated with the proposed ABO Uvemvane WEF1 have the potential to result in some erosion and sedimentation of the adjacent watercourse corridors. Limited surface hardening will occur as a result of the proposed project activities. Stormwater management measures are proposed to address areas with hardened surfaces.
3. **Erosion of aquatic features and alien riparian vegetation invasion**: Some alien plant species within the surrounding area will tend to spread with the additional disturbance of the area. Sources of alien seed should be prevented from being brought onto the site with imported materials. Monitoring post-construction for the growth of alien vegetation can mitigate this potential impact.

<u>Recommended mitigation measures:</u>

1. *Direct impacts*: Any disturbance during the operation phase should be limited to the approved footprint and disturbance of the soil and natural vegetation cover should be avoided.
2. *Indirect impacts*: Stormwater run-off infrastructure must be designed to mitigate both the flow and water quality impacts of any stormwater leaving the developed areas. The runoff should rather be dissipated over a broad area covered by natural vegetation or managed using appropriate channels and swales.

3. Invasive alien plant growth and signs of erosion within the project area should be monitored on an ongoing basis to ensure that the disturbed areas do not become infested with invasive alien plants. Should any erosion features develop, they should be stabilised as soon as possible.

The overall significance of the impact on the aquatic ecosystems, with mitigation, is expected to be very low to negligible. The impact table for the operation phase is included in Table 11.

## 8.3. POTENTIAL IMPACTS DURING THE DECOMMISSIONING PHASE

During decommissioning, the potential freshwater impacts will be very similar to those of the Construction Phase, although the potential for aquatic habitat disturbance, as well as water quality and flow-related risks, will be much lower.

*Direct impacts*:

1. **Disturbance of riparian vegetation:** During the decommissioning phase, the potential impacts would largely be associated with an increased disturbance of the riparian zone due to the increased activity on the site.
2. **Water quality impacts (largely sedimentation):** Increased sedimentation and risks of contamination of surface water runoff may occur as a result of the activities associated with the decommissioning of the infrastructure.

*Indirect impacts:*

**3. Erosion of aquatic features and alien riparian vegetation invasion:** As a result of the disturbance of aquatic habitat during decommissioning, invasive alien vegetation will have an opportunity to continue to invade disturbed areas post-decommissioning unless monitored and controlled.

Recommended mitigation measures:

1. During decommissioning, disturbance to the freshwater ecosystems should be limited as far as possible. Disturbed areas may need to be rehabilitated and revegetated.
2. Proper site management must be undertaken to address on-site stormwater management and prevention of pollution measures from any potential pollution sources during decommissioning activities, such as hydrocarbon spills. Any stormwater that arises within the works must be managed appropriately to trap sediment and reduce flow velocities.
3. Mitigation and follow-up monitoring of residual impacts (alien vegetation growth and erosion) may be required.

The overall significance of the impact on the aquatic ecosystems, with mitigation, is expected to be very low. The impact table for the decommissioning phase is included in Table 11.

## 8.4. CUMULATIVE IMPACTS

Provided the proposed ABO Uvemvane WEF1 and all its associated activities are located outside of the delineated aquatic features and the recommended buffers, the cumulative aquatic ecosystem impacts are likely to be of low significance. Other renewable energy projects and associated grid infrastructure within a 30 km radius of the proposed development are shown in Figure 14 and listed below.

**Table 10: Renewable energy facilities within a 30 km radius of the proposed development**

| Project name | Distance from study area | Proposed generating capacity (MW) | DFFE reference | EIA process | Project status |
|---|---|---|---|---|---|
| Projects included in the REEA database (August 2025) | | | | | |
| The Proposed Suikerbos PV 1-4 and Associated Infrastructure in the Midvaal Local Municipality and the Sedibeng District Municipality, near Vereeniging, Gauteng Province. | 28 km | 180<br>100<br>240<br>250 | 14/12/16/3/3/2/2599;<br>14/12/16/3/3/2/2600;<br>14/12/16/3/3/2/260114/<br>12/16/3/3/2/2624 | Scoping EIA | Approved |
| Proposed construction of a 75 MW Solar (PV) electricity installation on various portions of the Farm Grootvlei No 453 IR Dipaleseng Local Municipality, Mpumalanga Province | 6.5 km | 75 | 12/12/20/2060 | Scoping EIA | Approved |
| Proposed 75 MW Solar PV facility at Lethabo Power Station, Free State Province | 40 km | 75 | 14/12/16/3/3/2/753 | Scoping EIA | Approved |
| The 100 MW Waterval Solar Park including solar glass manufacturing, metallurgical silicone manufacturing plant and module manufacturing plant near Meyerton, Gauteng Province | 35 km | 100 | 14/12/16/3/3/2/825 | Scoping EIA | Approved |

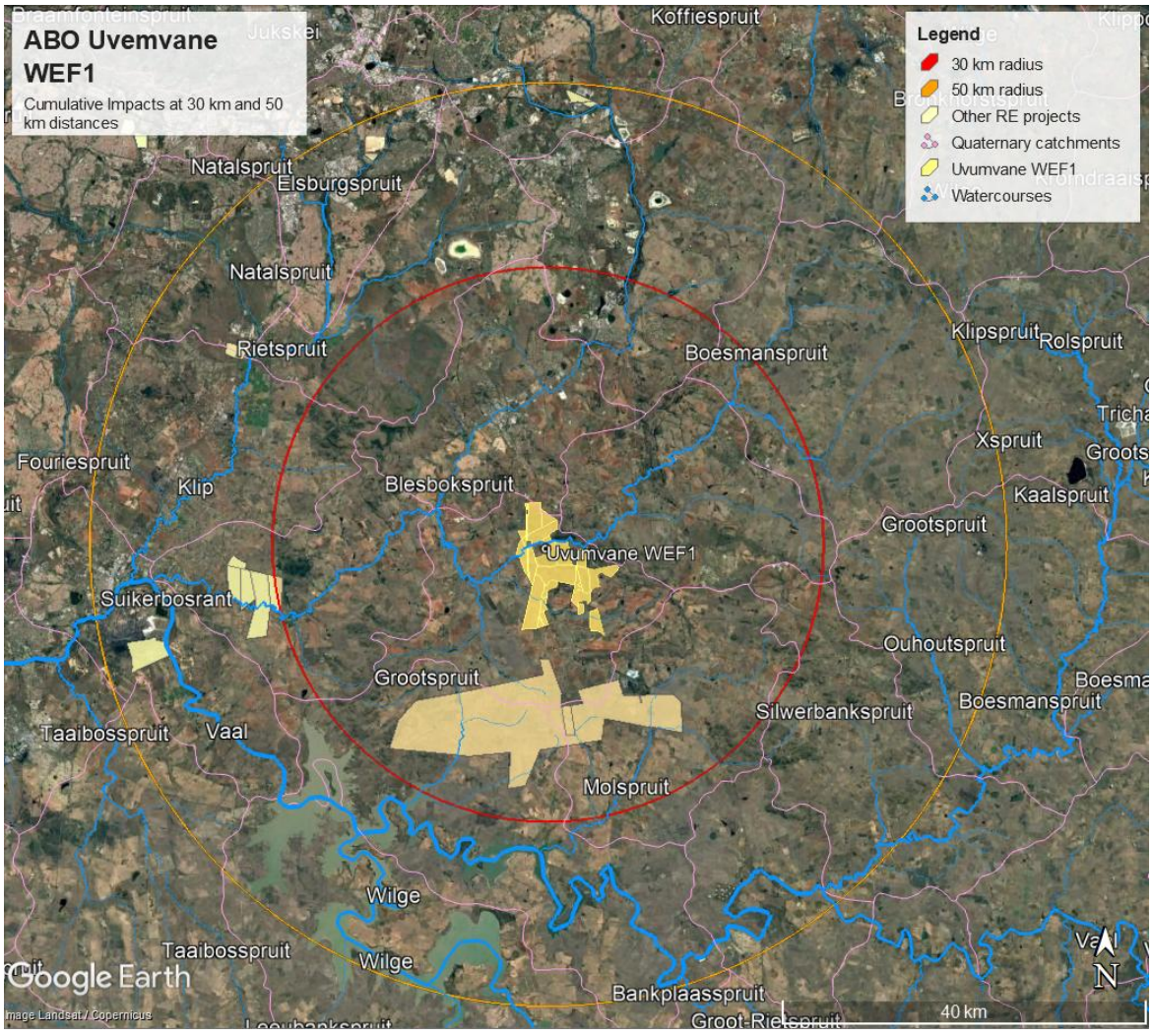


**Figure 15: Approved renewable energy facilities within a 30 km and 50 km radius of the proposed ABO Uvemvane WEF1.**

It is unclear whether other projects unrelated to renewable energy have been or are being constructed in this area, and whether any are proposed. In general, development activity in the area focuses on urban, mining, and agricultural (cultivation) activities. Future renewable energy developments may occur in the general area.

The approved Suikerbos PV 1, PV2, PV3 and PV4 are located about 28km from the ABO Uvemvane WEF1, further downstream on the Suikerbosrant River, while the other two renewable energy projects are within 30 km to 50 km of the proposed project and are within sub-catchments of the Vaal and Rietspruit Rivers. There are not likely to be any cumulative impacts, given that the other projects are located far from the site or in a different catchment. The consideration of the potential cumulative impacts for the project is included in Table 11.

## 8.5. CONSIDERATION OF ALTERNATIVES

Regarding the 33kV overhead/underground line connecting the northern and southern parts of the facility, two alternative routes are proposed. The two alternative routes are shown in the figure below. Both routes will need to cross watercourses and wetland areas and, in places, fall within the recommended buffer/setback areas. The western route has four watercourse crossings (2 minor streams and 2 larger watercourse/wetland corridors) and is mostly placed adjacent to more formal roads. In comparison, the eastern route has five crossings (4 minor crossings and a larger watercourse/wetland crossing) and mostly follows small farm roads.

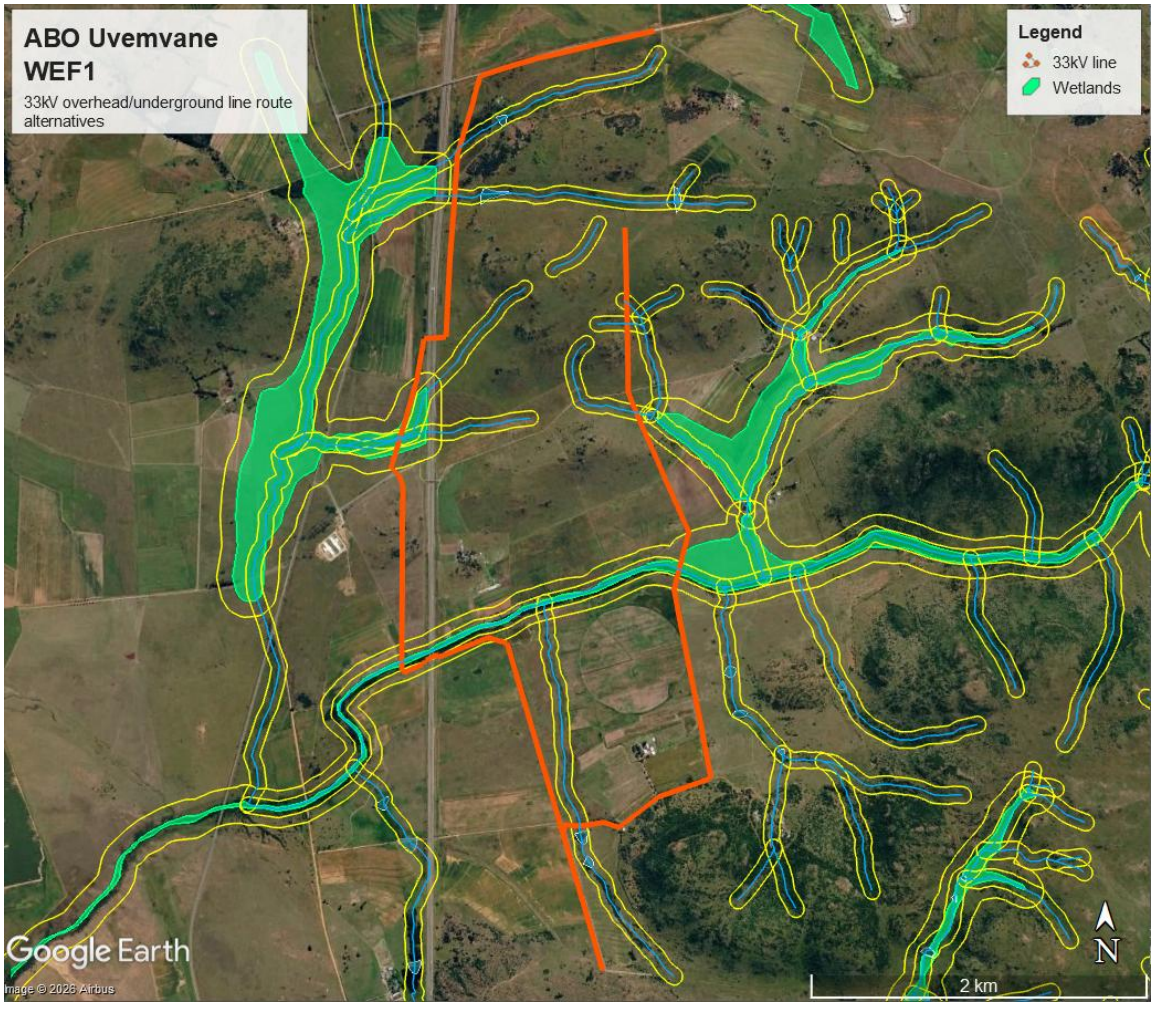


**Figure 16. Google Earth image showing the proposed 33kV overhead/underground line to connect the northern and southern parts of the facility, two alternative routes together with the mapped aquatic features and buffer areas.**

The potential aquatic ecosystem impacts are thus quite similar. Typically, the overhead powerlines can span these watercourse/wetland corridors and have negligible impacts. Underground lines will need to be laid underneath the corridors and will have short-term impacts during construction or for maintenance and decommissioning. It is thus felt that either route would have similar low significance aquatic ecosystem impacts if the watercourse/wetland corridor crossings are adequately mitigated to minimise the disturbance at the watercourse crossings and to avoid disturbance of the wetland habitats as far as possible. Either underground or overhead lines may be acceptable and have similar impacts. It may, however, be necessary to use overhead lines where disturbance of wetland habitat cannot be avoided.

The proposed BESS technology alternatives will have very similar aquatic ecosystem impacts. The no-go alternative implies that there would be no change from the current activities within the project area of influence, and thus also no change in the impacts on the aquatic ecosystems within the area of influence. The tributaries of the Suikerbosrant River and the associated wetlands within the project area would thus be expected to remain in current ecological state, with no change in aquatic ecosystem impacts from the current. The proposed project area avoids the aquatic features and allows for the recommended buffer of 50 m from the delineated watercourses and would also be unlikely to alter the current ecological condition.

## 8.6. SUMMARY OF IMPACT TABLES FOR CONSTRUCTION, OPERATION AND DECOMMISSIONING PHASES

The summary tables for the various impacts identified during the construction, operation and decommissioning phases of the proposed project are provided on the following page.

## Table 11: Impact tables for the proposed project

***Project Name: ABO Uvemvane WEF1***
**Impact Assessment**

**CONSTRUCTION**

| Impact number | Aspect | Description | Stage | Character | Ease of Mitigation | Pre-Mitigation | | | | | | | Post-Mitigation | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | (M+ | E+ | R+ | D)x | P= | S | Rating | (M+ | E+ | R+ | D)x | P= | S | Rating |
| Impact 1: | Aquatic ecosystems | Aquatic habitat disturbance/loss and short term water quality and flow impacts | Construction | Negative | Moderate to high | 2 | 2 | 3 | 3 | 3 | 30 | N2 | 2 | 1 | 1 | 2 | 2 | 12 | N1 |
| | | | | | Significance | N2 – Low | | | | | | | N1 – Very Low | | | | | | |

**OPERATIONAL**

| Impact number | Receptor | Description | Stage | Character | Ease of Mitigation | Pre-Mitigation | | | | | | | Post-Mitigation | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | (M+ | E+ | R+ | D)x | P= | S | | (M+ | E+ | R+ | D)x | P= | S | |
| Impact 1: | Aquatic ecosystems | Aquatic habitat disturbance and degradation of the ecological condition of aquatic ecosystems; modification of flow and water quality | Operational | Negative | High | 2 | 2 | 3 | 3 | 3 | 30 | N2 | 2 | 1 | 1 | 2 | 2 | 12 | N1 |
| | | | | | Significance | N2 – Low | | | | | | | N1 – Very Low | | | | | | |

**DECOMISSIONING**

| Impact number | Receptor | Description | Stage | Character | Ease of Mitigation | Pre-Mitigation | | | | | | | Post-Mitigation | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | (M+ | E+ | R+ | D)x | P= | S | | (M+ | E+ | R+ | D)x | P= | S | |
| Impact 1: | Aquatic ecosystems | Degradation of the ecological condition of aquatic ecosystems; modification of flow and water quality | Decommissioning | Negative | High | 2 | 2 | 3 | 2 | 3 | 27 | N2 | 1 | 1 | 1 | 1 | 2 | 8 | N1 |
| | | | | | Significance | N2 – Low | | | | | | | N1 – Very Low | | | | | | |
| | | | | | Significance | #N/A | | | | | | | #N/A | | | | | | |

**CUMULATIVE**

| Impact number | Receptor | Description | Stage | Character | Ease of Mitigation | Pre-Mitigation | | | | | | | Post-Mitigation | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | (M+ | E+ | R+ | D)x | P= | S | | (M+ | E+ | R+ | D)x | P= | S | |
| Impact 1: | Aquatic ecosystems | Degradation of the ecological condition of aquatic ecosystems; modification of flow and water quality | Cumulative | Negative | Moderate to high | 2 | 1 | 3 | 2 | 2 | 16 | N2 | 1 | 1 | 3 | 2 | 1 | 7 | N1 |
| | | | | | Significance | N2 – Low | | | | | | | N1 – Very Low | | | | | | |

# 9. CONCLUDING AQUATIC ECOSYSTEM IMPACT STATEMENT AND MITIGATION RECOMMENDATIONS

The aquatic features occurring within the site are the Suikerbosrant tributary of the Vaal River and its associated tributaries and wetland areas. These watercourses range from being largely natural on the higher-lying areas of the site to being moderately to largely modified ecological condition in their middle and lower reaches. The watercourses have moderate ecological importance but are of high sensitivity. They provide corridors for the movement of water and biota through the site and are particularly sensitive to flow, water quality and habitat modification due to the associated wetland habitat along many of the watercourses.

A buffer of 50m is recommended for the watercourses, while a 100m buffer should protect the associated wetland habitats. Services could be placed through these aquatic habitats and buffer areas but must be kept to a minimum and adequately mitigated.

The findings of this assessment largely agree with the DFFE screening tool for aquatic biodiversity sensitivity mapping, in that most of the site has low aquatic sensitivity. The watercourses are, however, considered to be of high sensitivity and should be avoided by the proposed WEF facilities. Below is a summary table of the site sensitivity verification findings:

| Sensitivity Theme: Aquatic | | |
|---|---|---|
| Screening Tool Site Sensitivity | Specialist Site Sensitivity | Reasons why the Screening Tool Sensitivity is ~~disputed~~ / confirmed |
| Most of the site comprises low Aquatic Biodiversity Sensitivity in terms of the DFFE screening tool mapping, with the watercourses and wetlands within the site being of very high sensitivity. The site does not lie within a National FEPA River Sub catchment or a SWSA. The wetlands are mapped in the National Wetland Mapv5 and the 2014 Mpumalanga Highveld Wetlands Map. | Low for the widespread area and High for the watercourses and wetlands within the site. A medium sensitivity has been applied to the adjacent buffers. | The Screening Tool indicated the site to be in an area mapped as being of Low Aquatic Biodiversity Sensitivity but with the aquatic features mapped as very high sensitivity. This assessment found the watercourses and wetlands on the site to be of high sensitivity. Buffer zones of 50m on either side of the watercourses and 100m from the wetlands are deemed sufficient to protect these aquatic ecosystems from any impact arising from the proposed WEF. |

Given the distance of any aquatic ecosystem features from the proposed development footprint, the potential aquatic ecosystem impacts associated with the proposed ABO Uvemvane WEF1 are likely to be **very low**. There is thus no reason from an aquatic ecosystem perspective why the proposed development should not be approved. That is, provided the recommended mitigation measures are implemented.

<u>Recommended mitigation measures:</u>

- The recommended buffer of at least 50m from the larger watercourse and wetland corridors along the western and eastern proposed development area boundaries and the proposed project activities should be maintained.
- Clearing of indigenous vegetation should be avoided and should not take place within the aquatic features and the recommended buffers. Any disturbed areas should be revegetated with suitable vegetation to minimise the risk of erosion and sedimentation of aquatic habitats following rainfall events. The existing road infrastructure should be utilised wherever possible to minimise overall disturbance.
    3. There are 9 watercourse crossings associated with the internal roads for the final proposed layout. Six of these crossings are associated with existing informal farm roads, and three new watercourse crossings are proposed. In terms of the proposed new crossings:

a. The crossing to WT08 is over a minor seasonal watercourse in the northern section. A small low-water crossing over this small watercourse would be acceptable
b. There are two proposals for a crossing to WT14 and WT17. Both crossings are on a small stream, located between an upstream and downstream dam. There is an existing road crossing near the upstream point. It is recommended that this road and crossing be realigned to the new proposed road. This crossing would have less impact than the downstream one as it is close to the existing disturbance at the road and a fenceline. The downstream road alignment alternative is in a wider wetland area.
c. Two alternative crossings are proposed over a small watercourse to access WT 24. The downstream (southern) one aligns with an existing road over a small dam wall but will need upgrading. Use of this road alignment is preferred as the watercourse is already disturbed at this location.

- During the construction phase, proper site management must be undertaken to address on-site stormwater management and prevention of pollution measures from any potential pollution sources during construction activities, such as hydrocarbon spills. Any stormwater that arises within the construction site must be managed appropriately to trap sediment and reduce flow velocities. Any water supply, sanitation, and solid waste management services required for the proposed project should preferably be provided by an off-site service provider.
- Any disturbance during the operation phase should be limited to the approved footprint and disturbance of the soil and natural vegetation cover should be avoided.
- Stormwater run-off infrastructure must be designed to mitigate both the flow and water quality impacts of any stormwater leaving the developed areas. The runoff should rather be dissipated over a broad area covered by natural vegetation or managed using appropriate channels and swales.
- Invasive alien plant growth and signs of erosion within the project area should be monitored on an ongoing basis to ensure that the disturbed areas do not become infested with invasive alien plants. Should any erosion features develop, they should be stabilised as soon as possible.
- With regard to the 33kV overhead/underground line to connect the northern and southern parts of the facility, disturbance of the watercourse/wetland corridor crossings must be minimised and disturbance of the wetland habitats avoided as far as possible. It may be necessary to use overhead lines where disturbance of wetland habitat cannot be avoided.
- During decommissioning, disturbance to the freshwater ecosystems should be limited as far as possible. Disturbed areas may need to be rehabilitated and revegetated.
- Proper site management must be undertaken during decommissioning to address on-site stormwater management and prevention of pollution measures from any potential pollution sources during decommissioning activities, such as hydrocarbon spills. Any stormwater that arises within the works must be managed appropriately to trap sediment and reduce flow velocities.
- Mitigation and follow-up monitoring of residual impacts (alien vegetation growth and erosion), post-decommissioning, may be required.

The risk assessment determined that the proposed WEF and its associated infrastructure, if mitigated as recommended, pose a low risk of impacting aquatic habitat, water flow and water quality. Based on the risk assessment findings, the water-use activities associated with the proposed project could be authorised under the general authorisations for Section 21(c) and (i) water uses. Water use authorisations may also be required for any raw water abstraction and use of conservancy tanks for storage of domestic sewage, should the facility not be linked to the services of the local authority; however, the volumes tend to be relatively low and would likely be within the general authorisation limits for these water use activities (Section 21(g) water use). The General Authorisation limit for the abstraction of groundwater for this area is 75 $m^3$/ha/a for the associated property extent where the borehole is located. It may be possible that any groundwater abstraction for the proposed development could be within the General Authorisation for Section 21(a) water use.

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## APPENDIX 1: MINIMUM CONTENT REQUIREMENT FOR AQUATIC BIODIVERSITY PROTOCOL (GN 320, 20 MARCH 2020)

| Protocol for the Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on Aquatic Biodiversity | Section where this has been addressed in the Specialist Report |
|---|---|
| The assessment must provide a baseline description of the site which includes, as a minimum, the following aspects:<br>a description of the aquatic biodiversity and ecosystems on the site, including;<br>aquatic ecosystem types; and presence of aquatic species, and composition of aquatic species communities, their habitat, distribution and movement patterns; | Section 3 |
| the threat status of the ecosystem and species as identified by the screening tool; | Section 3 |
| an indication of the national and provincial priority status of the aquatic ecosystem, including a description of the criteria for the given status (i.e., if the site includes a wetland or a river freshwater ecosystem priority area or sub catchment, a strategic water source area, a priority estuary, whether or not they are free -flowing rivers, wetland clusters, a critical biodiversity or ecologically sensitivity area); and | Section 3 |
| a description of the ecological importance and sensitivity of the aquatic ecosystem including:<br>the description (spatially, if possible) of the ecosystem processes that operate in relation to the aquatic ecosystems on and immediately adjacent to the site (e.g., movement of surface and subsurface water, recharge, discharge, sediment transport, etc.); and the historic ecological condition (reference) as well as present ecological state of rivers (in- stream, riparian and floodplain habitat), wetlands and/or estuaries in terms of possible changes to the channel and flow regime (surface and groundwater). | Section 3 and 5 |
| The assessment must identify alternative development footprints within the preferred site which would be of a "low" sensitivity as identified by the screening tool and verified through the site sensitivity verification and which were not considered appropriate. | Section 6 |
| Related to impacts, a detailed assessment of the potential impacts of the proposed development on the following aspects must be undertaken to answer the following questions:<br>Is the proposed development consistent with maintaining the priority aquatic ecosystem in its current state and according to the stated goal?<br>Is the proposed development consistent with maintaining the resource quality objectives for the aquatic ecosystems present?<br>How will the proposed development impact on fixed and dynamic ecological processes that operate within or across the site? This must include:<br>impacts on hydrological functioning at a landscape level and across the site which can arise from changes to flood regimes (e.g., suppression of floods, loss of flood attenuation capacity, unseasonal flooding or destruction of floodplain processes);<br>will the proposed development change the sediment regime of the aquatic ecosystem and its sub -catchment (e.g. sand movement, meandering river mouth or estuary, flooding or sedimentation patterns);<br>what will the extent of the modification in relation to the overall aquatic ecosystem be (e.g., at the source, upstream or downstream portion, in the temporary I seasonal I permanent zone of a wetland, in the riparian zone or within the channel of a watercourse, etc.); and<br>to what extent will the risks associated with water uses and related activities change; | Section 8 |
| how will the proposed development impact on the functioning of the aquatic feature? This must include:<br>base flows (e.g., too little or too much water in terms of characteristics and requirements of the system);<br>quantity of water including change in the hydrological regime or hydroperiod of the aquatic ecosystem (e.g. seasonal to temporary or permanent; impact of over -abstraction or instream or off stream impoundment of a wetland or river);<br>change in the hydrogeomorphic typing of the aquatic ecosystem (e.g. change from an unchanneled valley- bottom wetland to a channelled valley -bottom wetland);<br>quality of water (e.g. due to increased sediment load, contamination by chemical and/or organic effluent, and/or eutrophication);<br>fragmentation (e.g. road or pipeline crossing a wetland) and loss of ecological connectivity (lateral and longitudinal); and<br>the loss or degradation of all or part of any unique or important features associated with or within the aquatic ecosystem (e.g. waterfalls, springs, oxbow lakes, meandering or braided channels, peat soils, etc.); | Section 8 |

| | |
|---|---|
| how will the proposed development impact on key ecosystems regulating and supporting services especially: flood attenuation; streamflow regulation; sediment trapping; phosphate assimilation; nitrate assimilation; toxicant assimilation; erosion control; and carbon storage? | Section 8 |
| how will the proposed development impact community composition (numbers and density of species) and integrity (condition, viability, predator - prey ratios, dispersal rates, etc.) of the faunal and vegetation communities inhabiting the site? | Section 8 |
| In addition to the above, where applicable, impacts to the frequency of estuary mouth closure should be considered, in relation to: size of the estuary; availability of sediment; wave action in the mouth; protection of the mouth; beach slope; volume of mean annual runoff; and extent of saline intrusion (especially relevant to permanently open systems). | N/A |
| The findings of the specialist assessment must be written up in an Aquatic Biodiversity Specialist Assessment Report that contains, as a minimum, the following information: | |
| contact details of the specialist, their SACNASP registration number, their field of expertise and a curriculum vitae; | Section 1 |
| a signed statement of independence by the specialist; | Section 1 |
| a statement on the duration, date and season of the site inspection and the relevance of the season to the outcome of the assessment; | Section 2 |
| the methodology used to undertake the site inspection and the specialist assessment, including equipment and modelling used, where relevant; | Section 2 |
| a description of the assumptions made, any uncertainties or gaps in knowledge or data; | Section 2 |
| the location of areas not suitable for development, which are to be avoided during construction and operation, where relevant; | Section 6 |
| additional environmental impacts expected from the proposed development; | Section 8 |
| any direct, indirect and cumulative impacts of the proposed development on site; | Section 8 |
| the degree to which impacts and risks can be mitigated; | Section 8 |
| the degree to which the impacts and risks can be reversed; | Section 8 |
| the degree to which the impacts and risks can cause loss of irreplaceable resources; | Section 8 |
| a suitable construction and operational buffer for the aquatic ecosystem, using the accepted methodologies; | Section 5 |
| proposed impact management actions and impact management outcomes for inclusion in the Environmental Management Programme (EMPr); | Section 8 |
| a motivation must be provided if there were development footprints identified as per paragraph 2.4 above that were identified as having a "low" aquatic biodiversity sensitivity and that were not considered appropriate; | Section 9 |
| a substantiated statement, based on the findings of the specialist assessment, regarding the acceptability or not of the proposed development and if the proposed development should receive approval or not; and | Section 9 |
| any conditions to which this statement is subjected. | Section 9 |
| The findings of the Aquatic Biodiversity Specialist Assessment must be incorporated into the Basic Assessment Report or the Environmental Impact Assessment Report including the mitigation and monitoring measures as identified, that are to be included in the EMPr. | |
| A signed copy of the assessment must be appended to the Basic Assessment Report or Environmental Impact Assessment Report. | - |

## APPENDIX 2: IMPACT METHODOLOGY

The assessment of impacts and mitigation evaluates the likely extent and significance of the potential impacts on identified receptors and resources against defined assessment criteria, to develop and describe measures that will be taken to avoid, minimise or compensate for any adverse environmental impacts, to enhance positive impacts, and to report the significance of residual impacts that occur following mitigation.

The key objectives of the risk assessment methodology are to identify any additional potential environmental issues and associated impacts likely to arise from the proposed project, and to propose a significance ranking. Issues / aspects will be reviewed and ranked against a series of significance criteria to identify and record interactions between activities and aspects, and resources and receptors to provide a detailed discussion of impacts. The assessment considers direct[1], indirect[2], secondary[3] as well as cumulative[4] impacts.

A standard risk assessment methodology is used for the ranking of the identified environmental impacts pre- and post-mitigation (i.e. residual impact). The significance of environmental aspects is determined and ranked by considering the criteria[5] presented in the table below.

*Table: Impact Assessment Criteria and Scoring System*

| CRITERIA | SCORE 1 | SCORE 2 | SCORE 3 | SCORE 4 | SCORE 5 |
|---|---|---|---|---|---|
| Impact Magnitude (M) The degree of alteration of the affected environmental receptor | Very low: No impact on process | Low: Slight impact on process | Medium: Process continues in a modified way | High: Process is temporarily ceased | Very High: Permanent cessation of process |
| Impact Extent (E) The geographical extent of the impact on a given environmental receptor | Site: Site only | Local: Inside activity area | Regional: Outside activity area | National: National scope or level | International: Across borders or boundaries |
| Impact Reversibility (R) Ability of the environmental receptor to rehabilitate or restore after activity has caused environmental change | Reversible: Recovery without rehabilitation | | Recoverable: Recovery with rehabilitation | | Irreversible: Not possible despite action |
| Impact Duration (D) The length of permanence of the impact on the environmental receptor | Immediate: On impact | Short term: 0-5 years | Medium term: 5-15 years | Long term: Project life | Permanent: Indefinite |
| Probability of Occurrence (P) The likelihood of an impact occurring in the absence of pertinent environmental management measures or mitigation | Improbable | Low Probability | Probable | Highly Probability | Definite |
| Significance (S) is determined by combining the above criteria in the following formula: | $[S = (E + D + R + M) \times P]$<br>$Significance = (Extent + Duration + Reversibility + Magnitude) \times Probability$ | | | | |
| IMPACT SIGNIFICANCE RATING | | | | | |
| Total Score | 4 to 15 | 16 to 30 | 31 to 60 | 61 to 80 | 81 to 100 |
| Environmental Significance Rating (Negative (-)) | Very low | Low | Moderate | High | Very High |
| Environmental Significance Rating (Positive (+)) | Very low | Low | Moderate | High | Very High |

[1] Impacts that arise directly from activities that form an integral part of the Project.
[2] Impacts that arise indirectly from activities not explicitly forming part of the Project.
[3] Secondary or induced impacts caused by a change in the Project environment.
[4] Impacts arising from the combination of multiple impacts from existing projects, the Project and/or future projects.
[5] The definitions given are for guidance only, and not all the definitions will apply to all the environmental receptors and resources being assessed. Impact significance was assessed with and without mitigation measures in place.