PROCESS WATER DAMS -
ENHANCED EVAPORATION PROJECT AT SASOL SECUNDA OPERATIONS, MPUMALANGA

BASIC ASSESSMENT REPORT

DRAFT

OCTOBER 2026

PREPARED FOR:



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TITLE AND APPROVAL PAGE

Project Name:	Process Water Dams - Enhanced Evaporation Project at Sasol Secunda Operations, Mpumalanga
Report Title:	Basic Assessment Report
Report Status:	Draft

Project Proponent:	Sasol

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Report Reference:	10830-20261008-Draft BAR		R-PRO-REP|20170216

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EXECUTIVE SUMMARY

A. INTRODUCTION

Nemai Consulting (Pty) Ltd was appointed by MegChem (Pty) Ltd on behalf of Sasol (the Applicant) as the independent Environmental Assessment Practitioner (EAP) to apply for Environmental Authorisation by taking a Basic Assessment for the proposed Process Water Dams – Enhanced Evaporation Project at Sasol, Secunda, Mpumalanga (the Project), in terms of the National Environmental Management Act (Act No. 107 of 1998) (NEMA).

Based on the nature of the associated activities in Government Notice (GN) R983 (Listing Notice 1), a Basic Assessment Process is being undertaken. This document serves as the draft Basic Assessment Report (BAR) for the proposed project.

B. PROJECT LOCATION

The Project, together with the associated culvert upgrades for a temporary entrance road, is situated at Sasol Secunda Operations (Farm: Portions 1 and 2 of Farm Sasolkraal 289 IS), approximately 5 km southwest of the town of Secunda. The site falls within the Govan Mbeki Local Municipality (LM) and the Gert Sibande District Municipality (DM) in the Mpumalanga Province. The nearest urban centre is Secunda, located to the northeast of the site.

C. PROJECT DESCRIPTION

Sasol Secunda Operations (SO) proposes the installation of a forced evaporation system at the Process Water Dams (PWD) within the Water Recovery (WR) facility to enhance evaporation and improve effluent level management. The PWDs currently function as storage facilities for excess process effluent and rely primarily on natural evaporation. However, increasing wastewater volumes and rainfall, as well as regulatory requirements under the National Environmental Management Act (NEMA) and the National Water Act (NWA) have created the need for supplementary evaporation capacity. The project involves developing a detailed engineering design for a mechanical evaporation system capable of achieving a total evaporation capacity of 6 Mℓ/day. Implementation will occur in phases, with Phase One delivering 2 Mℓ/day at 95th percentile water quality and 95% operational availability using temporary power (diesel or solar), followed by Phase Two, which will expand capacity by an additional 2 Mℓ/day under the same performance criteria.

The PWD system comprises primary dams (Dams 1–4) and secondary dams (Dams 6A & B, 7A & B, 8, 9, and 10A–C). Process water flows through the primary dams by gravity and is pumped either back to the plant or to secondary dams. Dam 10A has been identified as the optimal location for the project and is licensed under a Water Use Licence issued by the Department of Water and Sanitation. It serves as an effluent storage dam with strictly regulated operational levels to meet dam safety (SANCOLD) and dirty water control requirements. Naturally, Dam 10A achieves an average annual evaporation rate of approximately 12 Mℓ/day.

The proposed system will mechanically enhance evaporation by pumping water from Dam 10A to evaporator units positioned at the dam's north-eastern corner. Water will be sprayed through nozzles to create fine droplets, significantly increasing surface area and evaporation rates. Droplet fallout will be contained within the dam to prevent environmental contamination, with a spray distance of approximately 50–60 m depending on wind direction. The selected FlowCentric system will consist of 12 trains, each including a high-pressure pump and an enhanced evaporator equipped with a fan producing airflow velocities of 17.4 m/s. The system is designed to handle a pH range of 2.5 to 12 and can be coated for corrosion resistance. Seasonal efficiency is estimated at approximately 50% in spring and summer and at least 30% in autumn and winter, with operational hours varying by season. Estimated evaporation rates range from 4.8 Mℓ/day in autumn to 7.3 Mℓ/day in spring.

D. LEGISLATION AND GUIDELINES CONSIDERED

Pertinent legislation that may have a bearing on the Project is briefly discussed in the BAR.

The relationship between the Project and the following key pieces of environmental legislation is also explained:

- National Environmental Management Act (Act No. 107 of 1998);
- National Water Act (Act No. 36 of 1998);
- National Environmental Management: Waste Act (Act No. 59 of 2008);
- National Environmental Management: Air Quality Act (Act No. 39 of 2004);
- National Environmental Management: Biodiversity Act (Act No. 10 of 2004); and
- National Heritage Resources Act (Act No. 25 of 1999).

E. BASIC ASSESSMENT PROCESS

The BA Process for the proposed Project was initially completed in accordance with the EIA Regulations, including the undertaking of the public participation process, consideration of comments received from registered I&APs and commenting authorities, and submission of the Final BAR and associated application for EA to the DARDLEA, as the Competent Authority, for decision-making. During the Competent Authority's consideration of the application, comments were received from the relevant GSDM air quality authority requesting further assessment of the potential air quality impacts associated with the proposed enhanced evaporation system. In response, the Applicant elected to withdraw the application for EA to allow an AQIA to be undertaken and to ensure that the potential impacts were adequately identified, assessed and addressed before a decision was made.

A new application for EA (this Application) has consequently been initiated, and the findings and recommendations of the AQIA have been incorporated into this revised BAR and the associated EMPr. The revised draft BAR is undergoing a further public participation process to afford I&APs and relevant commenting authorities an opportunity to review and comment on the updated assessment. Following consideration of the comments received, the Final BAR and associated application for EA will be submitted to the DARDLEA for decision-making in accordance with the EIA Regulations.

An outline of the Basic Assessment Process for the Project is provided below.

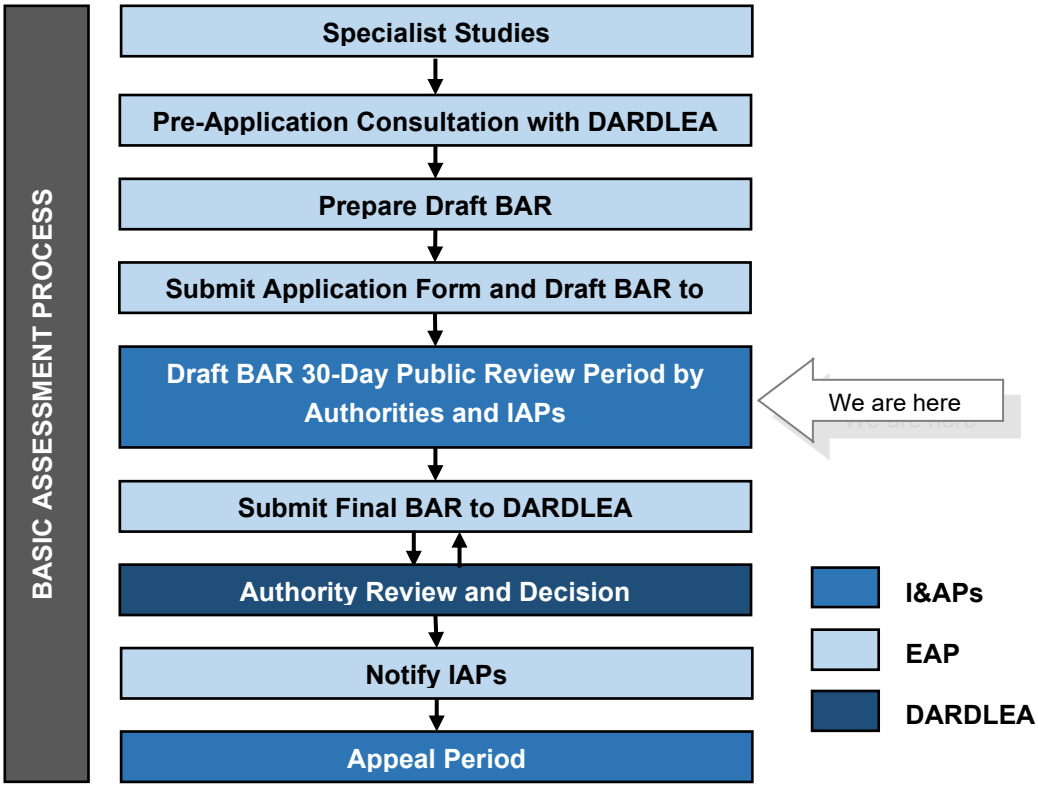


Figure A: Outline of Basic Assessment Process

F. PROFILE OF THE RECEIVING ENVIRONMENT

The BAR provides a general description of the *status quo* of the receiving environment in the proposed Enhanced Evaporation Project area. This serves as the environmental and social baseline and further provides the context within which the Basic Assessment was conducted. It also allows for an appreciation of sensitive environmental features and possible receptors of the effects of the proposed Project.

The receiving environment is explained in terms of the following features:

- ❑ Climate
- ❑ Geology
- ❑ Soils
- ❑ Topography
- ❑ Surface water
- ❑ Terrestrial biodiversity
- ❑ Land cover and land use
- ❑ Socio-economic environment
- ❑ Air quality
- ❑ Visual quality
- ❑ Noise
- ❑ Planning
- ❑ Agriculture
- ❑ Heritage and palaeontological features

G. SPECIALIST STUDIES

The following specialist studies were identified by the DFFE Screening Tool, and undertaken as part of the Basic Assessment Process:

- Archaeological and Cultural Heritage Impact Assessment;
- Terrestrial Biodiversity Impact Assessment (fauna and flora);
- Wetland Delineation and Impact Assessment; and
- Desktop Palaeontological Impact Assessment.

Based on the Site Sensitivity Verification (SSV) undertaken by the EAP, the following specialist assessments identified by the Screening Tool were not deemed to be necessary:

- Landscape/ Visual Impact Assessment;
- Socio-Economic Assessment;
- Agricultural Impact Assessment; and
- Civil Aviation Assessment.

Additionally, based on the comments that were received from the Gert Sibande DM during the initial Basic Assessment Process, an Air Quality Impact Assessment (AQIA) was undertaken to understand the risks posed by the proposed evaporators.

The information obtained from the respective specialist studies was incorporated into the BAR in the following manner:

- The assumptions and limitations identified in each study were included;
- The information was used to complete the description of the receiving environment in a more detailed and site-specific manner;
- A summary of each specialist study is provided, focusing on the approach to each study, key findings and conclusions drawn;
- The specialists' impact assessments and identified mitigation measures (as relevant) were included in the overall project impact assessment; and
- Specialist input was obtained to address comments made by Interested and Affected Parties (I&APs) that related to specific environmental features pertaining to each specialist discipline (as necessary).

H. IMPACT ASSESSMENT

The BAR's scope and level of detail are commensurate with the potential impacts associated with the Project.

The potential environmental and social risks and impacts associated with the Project were identified through an appraisal of the following:

- Legal context;
- Nature and profile of the receiving environment, including potential sensitive features and receptors;

- Findings of specialist studies;
- International and national case studies;
- Outcomes from stakeholder engagement; and
- Input received from authorities and the project team.

The criteria used to assess the potential environmental and social impacts associated with the Project included the extent, magnitude, duration, probability and significance. Suitable measures were identified to manage the identified environmental and social risks and impacts according to the mitigation hierarchy. The assessment considered the significance ratings before and after mitigation and also determined the residual impacts. Following the implementation/application of the suggested mitigation measures, the residual impacts on environmental and social features were manageable.

The table to follow provides a summary of the potential environmental and social risks and impacts associated with the Project, as identified during the Basic Assessment, for which mitigation measures were proposed in the Environmental Management Programme (EMPr).

Table A: Summary of potential environmental & social impacts associated with the Project

Environmental Factor	Construction Phase Potential Issues / Impacts	Operational Phase Potential Issues / Impacts
Land Use	▪ Nuisance and disruptions caused by noise.	▪ Nuisance and disruptions caused by noise. ▪ Nuisance associated with the odour associated with the process.
Geology and Geohydrology	▪ Erosion, if stormwater is not management properly. ▪ Use of heavy equipment during the construction phase may result in compaction of soil. ▪ Soil could be contaminated through inadequate storage and handling of hazardous materials, spillages from equipment and poor management of waste, wastewater and cement mixing. ▪ Groundwater could be contaminated through inadequate storage and handling of hazardous materials, spillages from equipment, and poor management of waste, wastewater and cement mixing.	▪ Erosion, if stormwater is not continuously managed properly.
Soil	▪ Erosion, if stormwater is not adequately managed. ▪ Use of heavy equipment during the construction phase could lead to soil compaction. ▪ Soil contaminated through poor construction practices. ▪ Loss of topsoil. ▪ Impacts associated with the sourcing of construction material.	▪ Erosion may take place due to inadequate stormwater management. ▪ Soil contamination through inadequate operation and maintenance activities. ▪ Heavy equipment and structures associated with the Enhanced Evaporation Project can compact soil and affect the stability of the ground. This can potentially cause stability issues.

Environmental Factor	Construction Phase Potential Issues / Impacts	Operational Phase Potential Issues / Impacts
Surface Water	▪ Surface water could be contaminated through inadequate storage and handling of hazardous materials, spillages from equipment, and poor management of waste, wastewater and cement mixing. This could end up affecting the quality of the watercourses identified in the Project Area of Influence (PAOI).	▪ The development of the Project will alter the drainage on the site and could cause an increase in the runoff. This could affect the watercourses in the PAOI should the stormwater not be managed properly.
Terrestrial Biodiversity	▪ Destruction, fragmentation and degradation of habitats and ecosystems. ▪ Spread and/or establishment of alien and/or invasive species due to the existing alien species onsite. ▪ Ongoing displacement and direct mortality of fauna due to disturbance of traffic including noise, dust and vibrations. ▪ Environmental pollution due to water runoff, spills from vehicles and erosion. ▪ Disruption/alteration of ecological life cycles (breeding, mitigation, feeding) due to noise and dust from construction vehicles moving around. ▪ Staff and others interacting directly with fauna (potentially dangerous) and flora or poaching of animals and plants. ▪ Contribution to cumulative habitat loss, especially in the ecological corridors such as the wetlands which will also have an impact on the water resource and ecological processes in the region.	▪ Spread and/or establishment of alien and/or invasive species due to the existing alien species onsite. ▪ Reduced dispersal/migration of fauna due to internal roads and the overhead powerline (OHL) cutting off migratory routes. ▪ Environmental pollution due to water runoff, spills from vehicles and erosion. ▪ Disruption/alteration of ecological life cycles (breeding, mitigation, feeding) due to noise of the evaporation systems. ▪ Staff and others interacting directly with fauna (potentially dangerous) and flora or poaching of animals and plants. ▪ Contribution to cumulative habitat loss, especially in the ecological corridors such as the wetlands which will also have an impact on the water resource and ecological processes in the region.
Socio-Economic Environment	▪ Influx of people seeking employment and associated impacts. ▪ Safety and security of local community during construction. ▪ Use of local road network by construction vehicles. ▪ Nuisance from dust, noise, vibration and light pollution. ▪ Increased industrial development in the industrial zoned area (positive impact).	▪ Noise and odour nuisance from the operation of the proposed Project.
Air Quality	▪ Increased nuisance dustfall and fine particulate matter concentrations due to vegetation clearing, earthworks, material handling, vehicle movement on unpaved roads and other construction activities. ▪ Potential exceedances of the applicable dustfall and PM_{10} thresholds within approximately 700 m and 900 m of active construction areas, respectively,	▪ Increased dustfall and fine particulate matter concentrations associated with the dispersion and deposition of residual salts following evaporation of the process water droplets. ▪ Potential nuisance odour and health impacts associated with the release of H_2S, particularly under conservative high sulfide conditions.

Environmental Factor	Construction Phase Potential Issues / Impacts	Operational Phase Potential Issues / Impacts
	if emissions are not adequately controlled. ▪ Combustion-related particulate and gaseous emissions from construction vehicles, equipment, machinery and temporary power generation. ▪ Contribution to the existing particulate matter loading within an airshed where baseline PM_{10} and $PM_{2.5}$ concentrations are already elevated.	▪ Potential nuisance odour associated with VOC emissions, although impacts are expected to be localised and below health-effect screening levels. ▪ Potential deposition of partially evaporated droplets and dissolved salts within the vicinity of the evaporator units, with possible effects on surrounding vegetation, soil, water bodies and infrastructure. ▪ Contribution to cumulative air quality impacts within an already impacted airshed, particularly in relation to fine particulate matter and H_2S odour.
Visual	▪ Clearing of vegetation. ▪ Construction-related activities. ▪ Inadequate waste management and housekeeping. ▪ Inadequate reinstatement and rehabilitation of areas affected by construction activities, outside of the permanent development footprint.	▪ Visual impact associated with building a large building. ▪ Inadequate housekeeping and waste management during operations.
Noise	▪ Localised increases in noise may be caused by: ○ Construction equipment, machinery and vehicles; ○ Construction material delivery vehicles; ○ General activities at the construction camp; and ○ Noise created by the labour force.	▪ Some noise is produced from the water evaporation systems themselves. Personal Protective Equipment is recommended while working at the proposed Enhanced Evaporation Project.
Agriculture	▪ Based on the location of the site within an industrial estate and the zoning of the land, no impacts are expected from an agricultural perspective	
Waste	Should inadequate waste management occur, the following environmental impacts could occur: ▪ Risk to human health (occupational and community health and safety); ▪ Soil pollution (spillages); ▪ Surface and groundwater pollution (spillages); ▪ Air pollution (e.g. smoke if set alight); ▪ Odours; ▪ Compromised aesthetics (e.g., poor storage, windblown litter); and ▪ Vermin.	Should inadequate waste management occur, the following environmental impacts could occur: ▪ Risk to human health (occupational and community health and safety); ▪ Soil pollution (spillages); ▪ Surface and groundwater pollution (spillages); ▪ Air pollution (e.g. smoke if set alight); ▪ Odours; ▪ Compromised aesthetics (e.g., poor storage, windblown litter); and ▪ Vermin.
Transportation	▪ Increase in traffic from the transportation of materials and construction personnel to site. ▪ Traffic disruptions caused by abnormal load vehicles. ▪ Speeding and reckless driving by construction personnel.	▪ Transportation of maintenance materials, and operational and maintenance staff, to the proposed Project.

Environmental Factor	Construction Phase Potential Issues / Impacts	Operational Phase Potential Issues / Impacts
Historical and Cultural Features	▪ Possible direct impacts on heritage resources because of ground disturbance.	-
Health	▪ Hazards related to construction work with potential occupational injuries and diseases, as well as risks to community health and safety. ▪ Increased levels of dust and particulate matter. ▪ Increased levels of noise. ▪ Water (surface and ground) contamination. ▪ Poor water and sanitation. ▪ Communicable diseases. ▪ Psychosocial disorder (e.g. social disruptions) ▪ Safety and security. ▪ Lack of suitable health services.	▪ Hazards related to operation and maintenance work. ▪ Risks posed by hazardous components of the Enhanced Evaporation Project.

Possible cumulative impacts were identified in the BAR terms of water resources, soil, terrestrial biodiversity, cultural heritage and the socio-economic environment.

I. ANALYSIS OF ALTERNATIVES

The following alternatives are discussed in this BAR:

- ❑ Site alternatives –
  - Dam 10A was identified during the feasibility phase as the most suitable Process Water Dam for the proposed Project, based on the operational requirements of the existing PWD system and the ability to integrate the enhanced evaporation infrastructure with existing water-management facilities. As a result, no alternative Project locations were taken forward for assessment.
- ❑ Layout alternative –
  - Alternative 6.6 kV overhead power line routes were assessed during the feasibility stage. Based on technical considerations and potential environmental impacts, a 22 kV overhead power line connecting to the existing Eskom overhead line was identified as the preferred layout and was assessed in the BAR.
- ❑ Technology alternative –
  - A range of enhanced evaporation technologies and complementary process-water management measures were considered. These included solar-powered floating fountains, optimisation of natural evaporation and dam operating levels, transfers to Halvepan, dredging to recover storage capacity, reinstatement of Pump Station 3, spraying water onto exposed dam liners, the Unit 352 Water Treatment Plant and alternative mechanical or rapid evaporation systems identified through market enquiries. The liner-spraying option was screened out because of risks to dam-wall integrity, while expansion of the Unit 352 Water Treatment Plant was constrained by the available plot space. The existing measures remain important components of the broader process-water management strategy but cannot provide the controllable supplementary evaporation

capacity required under all operating and climatic conditions. Mechanically enhanced evaporation was therefore selected as the preferred technology because it can be operated intermittently in response to the process-water balance, integrated with the existing Dam 10A infrastructure and implemented without reliance on a permanent downstream water user.

- ❑ No-go alternative –
  - Under the "no-go" alternative, the Project would not proceed, and the existing process-water management measures would remain in place. This would avoid the immediate environmental impacts associated with constructing and operating the proposed Project, but would not provide the additional controllable evaporation capacity required to manage the PWD water balance effectively. The system would remain exposed to reduced storage capacity, dam levels entering the flood-buffer zone and a continued risk of loss of containment, with potential environmental and legal compliance implications under the NWA and NEMA duty-of-care requirements. Local employment, training and business opportunities associated with the Project would also not be realised. Although the potential adverse impacts of the preferred alternative require management, these impacts are considered manageable through implementation of the mitigation measures contained in the BAR and EMPr.

J. PUBLIC PARTICIPATION

The BAR provides the details of the following tasks that form part of the public participation process:

- ❑ Compiling the database of I&APs.
- ❑ Review of the draft BAR –
  - Period to review the draft BAR;
  - Notification of review of the draft BAR;
  - Accessing the draft BAR; and
  - Commenting on the draft BAR.

K. CONCLUSIONS

The following key tasks were undertaken to date during the Basic Assessment Process for the proposed Project:

- ❑ Specialist studies were undertaken, and the findings were incorporated into the BAR in terms of understanding the environmental *status quo* and sensitive features, assessing the potential impacts and establishing concomitant mitigation measures;
- ❑ Potentially significant impacts pertaining to the Project were identified and assessed, and mitigation measures were provided;
- ❑ Alternatives for achieving the objectives of the Project were considered; and
- ❑ Authorities and I&APs were identified and notified of the review of the draft BAR.

Following the implementation of the mitigation and management measures proposed in the BAR and EMPr, the residual environmental impacts associated with the proposed Project are generally

assessed as low and manageable. The assessment indicates that the Project is not expected to result in significant residual impacts that would preclude authorisation.

Notwithstanding the above, certain environmental themes, particularly air quality, occur within a receiving environment that is already substantially influenced by existing industrial and regional emission sources. As a result, cumulative impact ratings for pollutants such as $PM_{2.5}$ and H_2S remain elevated at a regional scale. These elevated cumulative ratings primarily reflect existing baseline conditions within the Highveld Priority Area and should not be interpreted as being attributable to the proposed Project alone.

The proposed Enhanced Evaporation Project is expected to make a comparatively small incremental contribution to these cumulative conditions, and the AQIA concluded that the Project's specific impacts would remain localised and manageable, provided that the recommended operational controls, monitoring measures and mitigation requirements are implemented..

AMENDMENTS PAGE

Date	Nature of Amendment	Amendment No.
April 2026	Draft for Public Review	0
May 2026	Final for Authorities	1
October 2026	Draft for Authority and Public Review	2

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LIST OF ACRONYMS & ABBREVIATIONS

AEL	Atmospheric Emission Licence
AQIA	Air Quality Impact Assessment
BAR	Basic Assessment Report
CBA	Critical Biodiversity Area
CR	Critically Endangered
CRR	Comments and Responses Report
CV	Curriculum Vitae
DARDLEA	Mpumalanga Department of Agriculture, Rural Development, Land & Environmental Affairs
DFFE	Department of Forestry, Fisheries and the Environment
DOM	Dissolved Organic Matter
DWS	Department of Water and Sanitation
EA	Environmental Authorisation
EAP	Environmental Assessment Practitioner
EIA	Environmental Impact Assessment
EMEP/EEA	European Monitoring and Evaluation Programme of the European Environmental Agency
EMPr	Environmental Management Programme
EN	Endangered
ESA	Ecological Support Area
FEPA	Freshwater Ecosystem Priority Area
GA	General Authorisation
GBLM	Govan Mbeki Local Municipality
GIS	Geographical Information System
GN	Government Notice
GPS	Global Positioning System
GSDM	Gert Sibande District Municipality
HIA	Heritage Impact Assessment
HIV/AIDS	Human Immunodeficiency Virus, Acquired Immunodeficiency Syndrome
HMI	Human-Machine Interface
HPA	Highveld Priority Area
H_2S	Hydrogen Sulphide
I&APs	Interested and Affected Parties
IDP	Integrated Development Plan
LC	Least Concern
MBSP	Mpumalanga Biodiversity Sector Plan
MHRA	Mpumalanga Heritage Resource Agency
NAAQS	National Ambient Air Quality Standards
NBA	National Biodiversity Assessment
NDCR	National Dust Control Regulations
NEM:AQA	National Environmental Management: Air Quality Act (Act No. 39 of 2004)
NEM:BA	National Environmental Management: Biodiversity Act (Act 10 of 2004)
NEM:PAA	National Environmental Management: Protected Areas Act (Act No. 57 of 2003)

NEM:WA	National Environmental Management: Waste Act (Act No. 59 of 2008)
NEMA	National Environmental Management Act (No. 107 of 1998)
NFEPA	National Freshwater Ecosystem Priority Area
NHRA	National Heritage Resources Act (Act No. 25 of 1999)
NPAES	National Protected Area Expansion Strategy
NR	National Road
NWA	National Water Act (Act No. 36 of 1998)
NWM	National Wetland Map
OHL	Overhead Line
OHS	Occupational Health and Safety
PAES	Protected Area Expansion Strategy
PAOI	Project Area of Influence
PDA	Palaeontology Desktop Assessment
PLC	Programmable Logic Controller
PPE	Personal Protective Equipment
PWD	Process Water Dam
QC	Quaternary Catchment
R	Rand
RAM	Risk Assessment Matrix
RAT	Range, Alarm and Trip
SA	South Africa
SABAP	South African Bird Atlas Project
SACAA	South African Civil Aviation Authority
SACAD	South Africa Conservation Areas Database
SAHRA	South African Heritage Resources Agency
SAHRIS	South African Heritage Resources Information System
SANBI	South African National Biodiversity Institute
SANEDI	South African National Energy Development Institute
SANS	South African National Standard
SAPAD	South African Protected Areas Database
SCC	Species of Conservation Concern
SDF	Spatial Development Framework
SO	Secunda Operations
SOTER	Soil and Terrain
SQR	Sub-Quaternary Reach
SSV	Site Sensitivity Verification
SWSA	Strategic Water Source Areas
TOPS	Threatened or Protected Species
US EPA	United States Environmental Protection Agency
VOC	Volatile Organic Compounds
VOCMA	Vaal-Orange Catchment Management Agency
VU	Vulnerable
WMA	Water Management Area
WML	Waste Management Licence
WR	Water recovery

UNITS OF MEASUREMENT

%	Percentage
°	Degrees
°C	Degrees Celsius
dB	Decibel
Hz	Hertz
km	Kilometre
km^2	Square Kilometre
kW	kilowatt
kV	kilovolt
m	Metre
m^2	Square metre
m^3	Cubic metre
mm	Millimetre
mm/s	Millimetres per second
ms	Milliseconds
Mℓ	Megalitre
Mℓ/day	Megalitres per day
µg/m^3	Micrograms per cubic metre
µm	Micrometre
s	Seconds

1 PURPOSE OF THIS DOCUMENT

Nemai Consulting (Pty) Ltd (hereinafter referred to as Nemai Consulting) was appointed by MegChem (Pty) Ltd on behalf of **Sasol (the Applicant)** to undertake the Basic Assessment Process for the **Process Water Dams – Enhanced Evaporation Project at Sasol, Secunda** (the Project).

The Basic Assessment is being undertaken according to the process prescribed in the Environmental Impact Assessment (EIA) Regulations of 2014, published under Government Notice (GN) No. 982 in Gazette No. 38282 of 4 December 2014 and amended by GN 326 of 7 April 2017 published in Gazette No. 40772 (the "EIA Regulations"). The EIA Regulations were promulgated in terms of the National Environmental Management Act (Act No. 107 of 1998) (NEMA).

This document serves as the **draft Basic Assessment Report (BAR)** for the proposed Project. According to the EIA Regulations, the objectives of the Basic Assessment Process are to undertake the following, through a consultative process:

(a) Determine the policy and legislative context within which the proposed activity is located and how the activity complies with and responds to the policy and legislative context;
(b) Identify the alternatives considered, including the activity, location, and technology alternatives;
(c) Describe the need and desirability of the proposed alternatives;
(d) Through the undertaking of an impact and risk assessment process, inclusive of cumulative impacts which focused on determining the geographical, physical, biological, social, economic, heritage, and cultural sensitivity of the sites and locations within sites and the risk of impact of the proposed activity and technology alternatives on these aspects to determine:
    (i) The nature, significance, consequence, extent, duration, and probability of the impacts occurring to; and
    (ii) The degree to which these impacts can be reversed, may cause irreplaceable loss of resources, and can be avoided, managed, or mitigated.
(e) Through a ranking of the site sensitivities and possible impacts the activity and technology alternatives will impose on the sites and location identified through the life of the activity to -
    (i) Identify and motivate a preferred site, activity and technology alternative;
    (ii) Identify suitable measures to avoid, manage or mitigate identified impacts; and
    (iii) Identify residual risks that need to be managed and monitored.

The draft BAR will be made available to Interested and Affected Parties (I&APs) for a 30-day review period from **16 October 2026 to 16 November 2026**. All comments received will be addressed in the final BAR and included in the Comments and Responses Report (CRR). The final BAR will then be submitted to the Mpumalanga Department of Agriculture, Rural Development, Land & Environmental Affairs (DARDLEA), which is the Competent Authority in respect of this proposed development in terms of NEMA, for review and decision-making.

2 DOCUMENT ROADMAP

As a minimum, this BAR aims to satisfy the requirements stipulated in Appendix 1 of the EIA Regulations. **Table 1** below presents the document's composition in terms of the aforementioned regulatory requirements.

Table 1: Document Roadmap for BAR

Chapter	Title	Correlation with Appendix 1 of GN No. R 982	
1	Purpose of this Document	–	–
2	Document Roadmap	–	–
3	Project Background and Motivation	–	–
4	Project Location	3(1)(b)	The location of the activity, including; (i) the 21-digit Surveyor General code of each cadastral land parcel; (ii) where available, the physical address and farm name; (iii) where the required information in items (i) and (ii) is not available, the coordinates of the boundary of the property or properties;
		3(1)(c)	a plan which locates the proposed activity or activities applied for as well as associated structures and infrastructure at an appropriate scale; or, if it is - (i) a linear activity, a description and coordinates of the corridor in which the proposed activity or activities is to be undertaken; or (ii) on land where the property has not been defined, the coordinates within which the activity is to be undertaken;
5	Project Description	3(1)(d)	a description of the scope of the proposed activity, including (ii) a description of the activities to be undertaken including associated structures and infrastructure.
		3(1)(q)	where the proposed activity does not include operational aspects, the period for which the environmental authorisation is required, the date on which the activity will be concluded, and the post-construction monitoring requirements finalised;
6	Legislation and Guidelines Considered	3(1)(d)	a description of the scope of the proposed activity, including (i) all listed and specified activities triggered and being applied for; and
		3(1)(e)	a description of the policy and legislative context within which the development is proposed including (i) an identification of all legislation, policies, plans, guidelines, spatial tools, municipal development planning frameworks, and instruments that are applicable to this activity and have been considered in the preparation of the report; and (ii) how the proposed activity complies with and responds to the legislation and policy context, plans, guidelines, tools frameworks, and instruments;
7	Basic Assessment Process	3(1)(a)	details of (i) the EAP who prepared the report; and (ii) the expertise of the EAP, including a curriculum vitae;
8	Assumptions and Limitations	3(1)(o)	a description of any assumptions, uncertainties, and gaps in knowledge which relate to the assessment and mitigation measures proposed;
9	Need and Desirability	3(1)(f)	a motivation for the need and desirability for the proposed development including the need and desirability of the activity in the context of the preferred location;
10	Profile of the Receiving Environment	3(1)(h)	a full description of the process followed to reach the proposed preferred alternative within the site, including (iv) the environmental attributes associated with the alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects;
11	Summary of Specialist Studies	3(1)(k)	where applicable, a summary of the findings and impact management measures identified in any specialist report complying with Appendix 6

Chapter	Title	Correlation with Appendix 1 of GN No. R 982	
			to these Regulations and an indication as to how these findings and recommendations have been included in the final report;
		3(1)(m)	based on the assessment, and where applicable, impact management measures from specialist reports, the recording of the proposed impact management outcomes for the development for inclusion in the EMPr;
12	Impact Assessment	3(1)(h)	a full description of the process followed to reach the proposed preferred alternative within the site, including (v) the environmental attributes associated with the alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects; (vi) the impacts and risks identified for each alternative, including the nature, significance, consequence, extent, duration and probability of the impacts, including the degree to which these impacts a. can be reversed; b. may cause irreplaceable loss of resources; and c. can be avoided, managed or mitigated; (vii) the methodology used in determining and ranking the nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks associated with the alternatives; (viii) positive and negative impacts that the proposed activity and alternatives will have on the environment and on the community that may be affected focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects; (ix) the possible mitigation measures that could be applied and level of residual risk;
		3(1)(i)	a full description of the process undertaken to identify, assess and rank the impacts the activity will impose on the preferred location through the life of the activity, including (i) a description of all environmental issues and risks that were identified during the environmental impact assessment process; and (ii) an assessment of the significance of each issue and risk and an indication of the extent to which the issue and risk could be avoided or addressed by the adoption of mitigation measures;
		3(1)(j)	an assessment of each identified potentially significant impact and risk, including (i) cumulative impacts; (ii) the nature, significance and consequences of the impact and risk; (iii) the extent and duration of the impact and risk; (iv) the probability of the impact and risk occurring; (v) the degree to which the impact and risk can be reversed; (vi) the degree to which the impact and risk may cause irreplaceable loss of resources; and (vii) the degree to which the impact and risk can be avoided, managed or mitigated;
		3(1)(m)	based on the assessment, and where applicable, impact management measures from specialist reports, the recording of the proposed impact management outcomes for the development for inclusion in the EMPr;
13	Analysis of Alternatives	3(1)(g)	a motivation for the preferred site, activity and technology alternative;
		3(1)(h)	a full description of the process followed to reach the proposed preferred alternative within the site, including (i) details of all the alternatives considered; (ix) the outcome of the site selection matrix; (x) if no alternatives, including alternative locations for the activity were investigated, the motivation for not considering such; and (xi) a concluding statement indicating the preferred alternatives, including preferred location of the activity;
14	Public Participation	3(1)(h)	a full description of the process followed to reach the proposed preferred alternative within the site, including: (ii) details of the public participation process undertaken in terms of regulation 41 of the regulations, including copies of the supporting documents and inputs;

Chapter	Title	Correlation with Appendix 1 of GN No. R 982	
			(iii) a summary of the issues raised by interested and affected parties, and an indication of the manner in which the issues were incorporated, or the reasons for not including them;
15	Conclusions & Recommendations	3(1)(l)	an environmental impact statement which contains (i) a summary of the key findings of the environmental impact assessment; (ii) a map at an appropriate scale which superimposes the proposed activity and its associated structures and infrastructure on the environmental sensitivities of the preferred site indicating any areas that should be avoided, including buffers; and (iii) a summary of the positive and negative impacts and risks of the proposed activity and identified alternatives;
		3(1)(n)	any aspects which were conditional to the findings of the assessment either by the EAP or specialist which are to be included as conditions of authorisation;
		3(1)(p)	a reasoned opinion as to whether the proposed activity should or should not be authorised, and if the opinion is that it should be authorised, any conditions that should be made in respect of that authorisation;
16	References	-	-
Appendix G		3(1)(r)	an undertaking under oath or affirmation by the EAP in relation to (i) the correctness of the information provided in the reports; (ii) the inclusion of comments and inputs from stakeholders and I&APs; (iii) the inclusion of inputs and recommendations from the specialist reports where relevant; and (iv) any information provided by the EAP to interested and affected parties and any responses by the EAP to comments or inputs made by interested and affected parties; and
N/A		3(1)(t)	any specific information that may be required by the competent authority; and
N/A		3(1)(u)	any other matters required in terms of section 24(4)(a) and (b) of the Act.
N/A		3(2)	Where a government notice gazetted by the Minister provides for the basic assessment process to be followed, the requirements as indicated in such a notice will apply.

3 PROJECT BACKGROUND AND MOTIVATION

3.1 Operational Context

Sasol Secunda Operations (SO) operates as a zero-liquid discharge site, where process water and excess effluents generated from the factory are managed within the Process Water Dam (PWD) system. The PWDs serve as a key containment and management system for process effluent and rely primarily on evaporation, together with other operational water management measures, to reduce water volumes within the system.

Effective management of the PWD system is essential to maintaining adequate operational storage capacity and preventing uncontrolled releases to the environment. Sasol regards loss of containment from the PWD system as an undesirable environmental event because an overflow or uncontrolled discharge could trigger environmental, legal, operational, and reputational consequences.

The proposed Project is therefore motivated by the need to maintain sustainable process water management at SO and reduce the risk of loss of containment from the PWD system.

3.2 Process Water Dam Capacity and Overflow Risk

The PWD system is experiencing long-term net sludge accumulation due to the inherent nature of the process water being managed. This accumulation reduces the effective storage capacity of the dams and limits the ability of the system to manage predicted rainfall and operational inflows while maintaining the required flood buffer.

Water balance modelling for the PWD system indicates insufficient available capacity to sustainably manage the predicted annual rainfall of approximately 978 mm under current and forecast operating conditions. Previous modelling identified a potential risk of overflow from the Financial Year (FY) 24 rainy season onwards, and the risk remains relevant given future rainfall predictions, ongoing operational inflows, and planned changes to factory operations.

The overflow risk during the FY23 rainy season was managed through a controlled release approved by the Department of Water and Sanitation (DWS). However, controlled releases have not been granted since FY24 and therefore cannot currently be relied upon as a continued operational management measure. This has increased the need for additional sustainable water management measures to reduce water volumes in the PWD system and maintain dam levels below the required flood buffer zone.

3.3 Environmental and Regulatory Compliance Driver

Potential overflow from the PWD system could result in uncontrolled discharge to the environment, with possible implications for surface water quality, downstream receptors, infrastructure, operations and regulatory compliance. The Project is therefore primarily motivated by environmental risk reduction and compliance support.

The proposed Project supports Sasol's obligations under applicable environmental and water legislation, including the National Water Act (Act No. 36 of 1998) (NWA), particularly in relation to the prevention and remedying of pollution, and the NEMA, including the duty of care to prevent, minimise and remediate environmental harm.

In this context, the Project is not proposed merely as an operational efficiency intervention, but as an additional measure to reduce the likelihood of loss of containment and support the continued lawful and responsible management of process water at SO.

3.4 Project Motivation

Given the identified storage capacity constraints, sludge accumulation, rainfall-related risk, and limitations on controlled releases, additional water management levers are required to support the sustainable operation of the PWD system. Enhanced evaporation has been identified as one such medium- to long-term measure to reduce process water volumes and assist in managing the risk of potential overflow.

The proposed Project entails installing enhanced evaporation infrastructure at Dam 10A, the preferred location due to its larger surface area, controllable inflows, and suitability for maximising evaporation efficiency. The Project is intended to provide supplementary evaporation capacity of approximately 6 megalitres per day (Mℓ/day), thereby assisting Sasol to reduce process water volumes within the PWD system and maintain operational levels within acceptable limits. Furthermore, the system should be designed to allow for a phased execution as detailed below:

- **Phase One:** procurement and construction of a system that can achieve 2 Mℓ/day effective evaporation at 95th percentile water quality and 95% operational availability. This phase also involves a temporary power supply system (diesel generator/solar system).
- **Phase Two:** expansion of the evaporation system with an additional capacity of 2 Mℓ/day effective evaporation at 95th percentile water quality and 95% operational availability.

The detailed description of the proposed evaporation system, associated infrastructure, layout and project components is provided in **Section 5** of this BAR.

4 PROJECT LOCATION

The Project, together with the associated culvert upgrades for a temporary entrance road, is situated at Sasol Secunda Operations, approximately 5 km southwest of the town of Secunda.

The site falls within the Govan Mbeki Local Municipality and the Gert Sibande District Municipality (DM) in the Mpumalanga Province. The nearest urban centre is Secunda, located to the northeast of the site. Please refer to the locality map in **Figure 1** below.

The details of the property affected by the footprint of the Project are provided in **Table 2** below.

Table 2: Details of Affected Property

Farm Name	21-digit Surveyor General No.
Portion 1 of Farm Sasolkraal 289 IS	T0IS00000000028900001
Portion 2 of Farm Sasolkraal 289 IS	T0IS00000000028900002

The layout map is contained in **Appendix A**.

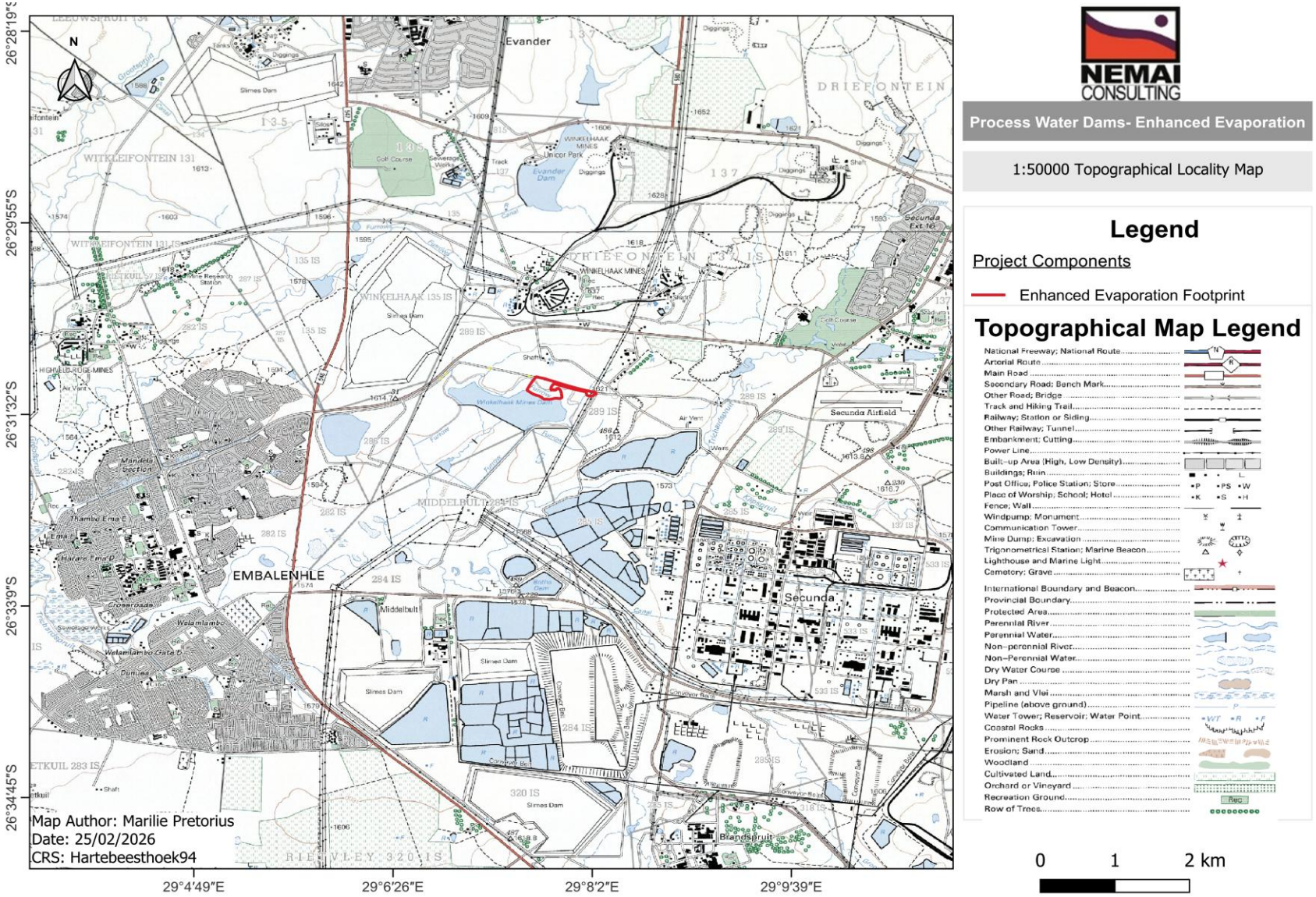


Figure 1: 1:50 000 Topographical map and the proposed Project footprint in red

The coordinates of the project components are provided in **Table 3** and shown in **Figure 2** to **Figure 4** below.

Table 3: Project component coordinates

Point	Latitude	Longitude
Buildable/Footprint Area		
B1	26°31'21.15"S	29°8'4.34"E
B2	26°31'21.59"S	29°8'4.17"E
B3	26°31'22.97"S	29°8'1.8"E
B4	26°31'22.42"S	29°7'59.68"E
B5	26°31'20.74"S	29°7'59.35"E
B6	26°31'16.52"S	29°7'43.66"E
B7	26°31'18.06"S	29°7'42.55"E
B8	26°31'19.56"S	29°7'42.16"E
B9	26°31'19.66"S	29°7'43.37"E
B10	26°31'19.71"S	29°7'44.51"E
B11	26°31'18.99"S	29°7'45.36"E
B12	26°31'18.94"S	29°7'45.96"E
B13	26°31'19.98"S	29°7'46.97"E
B14	26°31'21.13"S	29°7'47.31"E
B15	26°31'23.56"S	29°7'47.67"E
B16	26°31'23.93"S	29°7'46.95"E
B17	26°31'24.04"S	29°7'45.99"E
B18	26°31'23.93"S	29°7'45.24"E
B19	26°31'23.92"S	29°7'44.28"E
B20	26°31'24.16"S	29°7'43.22"E
B21	26°31'24.35"S	29°7'42.46"E
B22	26°31'24.51"S	29°7'41.37"E
B23	26°31'24.34"S	29°7'40.6"E
B24	26°31'24.38"S	29°7'38.87"E
B25	26°31'24"S	29°7'38.27"E
B26	26°31'23.36"S	29°7'37.78"E
B27	26°31'23.19"S	29°7'37"E
B28	26°31'22.68"S	29°7'36.13"E
B29	26°31'22.4"S	29°7'35.38"E
B30	26°31'22.04"S	29°7'34.25"E
B31	26°31'21.7"S	29°7'33.49"E
B32	26°31'21.02"S	29°7'32.43"E
B33	26°31'19.83"S	29°7'30.6"E
B34	26°31'16.29"S	29°7'32.67"E
B35	26°31'13.06"S	29°7'35.15"E
B36	26°31'17.37"S	29°7'49.83"E
B37	26°31'20.07"S	29°7'59.73"E
Temporary Access Road		
TAR1	26°31'14.38"S	29°7'39.29"E

Point	Latitude	Longitude
TAR2	26˚31'14.38"S	29˚7'38.14"E
TAR3	26˚31'16.55"S	29˚7'36.68"E
Temporary Access Route – Veld Route		
VR1	26˚31'5.1"S	29˚7'45.35"E
VR2	26˚31'13.8"S	29˚7'43.59"E
VR3	26˚31'13.88"S	29˚7'35.75"E
Access Road		
A1	26˚31'14.4"S	29˚7'35.56"E
A2	26˚31'15.52"S	29˚7'34.8"E
A3	26˚31'15.95"S	29˚7'34.14"E
A4	26˚31'17.76"S	29˚7'32.54"E
A5	26˚31'18.86"S	29˚7'32.27"E
A6	26˚31'20.7"S	29˚7'34.63"E
A7	26˚31'21.43"S	29˚7'36.82"E
A8	26˚31'21.27"S	29˚7'37.91"E
A9	26˚31'22.55"S	29˚7'40.69"E
A10	26˚31'22.99"S	29˚7'41.33"E
A11	26˚31'21.64"S	29˚7'36.8"E
A12	26˚31'22.64"S	29˚7'38.95"E
A13	26˚31'23.2"S	29˚7'41.12"E
A14	26˚31'22.73"S	29˚7'43.6"E
A15	26˚31'21.53"S	29˚7'46.87"E
O&M Area		
O&M1	26˚31'20.73"S	29˚7'39.17"E
O&M2	26˚31'21.35"S	29˚7'40.44"E
O&M3	26˚31'22.6"S	29˚7'39.71"E
O&M4	26˚31'21.99"S	29˚7'38.43"E
Laydown Area		
LA1	26˚31'18.91"S	29˚7'35.33"E
LA2	26˚31'19.68"S	29˚7'36.89"E
LA3	26˚31'21.11"S	29˚7'36.02"E
LA4	26˚31'20.32"S	29˚7'34.44"E
Culvert Upgrades		
C1	26˚31'13.81"S	29˚6'48.73"E
C2	26˚31'11.41"S	29˚6'51.3"E
C3	26˚31'8.87"S	29˚7'12.85"E
C4	26˚31'12.77"S	29˚7'31.71"E
Overhead Powerline		
OHL1	26˚31'20.78"S	29˚8'0.24"E
OHL2	26˚31'15.69"S	29˚7'42.85"E
OHL3	26˚31'21.36"S	29˚7'39.61"E
Cable Trench		
CT1	26˚31'19.42"S	29˚7'32.3"E
CT2	26˚31'20.58"S	29˚7'33.94"E

Point	Latitude	Longitude
CT3	26˚31'21.09"S	29˚7'34.88"E
CT4	26˚31'21.52"S	29˚7'36.03"E
CT5	26˚31'21.93"S	29˚7'37.01"E
CT6	26˚31'22.75"S	29˚7'38.73"E
CT7	26˚31'22.05"S	29˚7'39.12"E
CT8	26˚31'23.29"S	29˚7'40.07"E
CT9	26˚31'23.33"S	29˚7'41.55"E
CT10	26˚31'22.91"S	29˚7'43.56"E
CT11	26˚31'22.66"S	29˚7'45.4"E
Evaporator Systems		
E1	26˚31'19.54"S	29˚7'32.14"E
E2	26˚31'20.14"S	29˚7'33"E
E3	26˚31'20.74"S	29˚7'33.88"E
E4	26˚31'21.27"S	29˚7'34.83"E
E5	26˚31'21.66"S	29˚7'35.9"E
E6	26˚31'22.1"S	29˚7'36.94"E
E7	26˚31'22.6"S	29˚7'37.93"E
E8	26˚31'23.05"S	29˚7'38.95"E
E9	26˚31'23.45"S	29˚7'40.02"E
E10	26˚31'23.51"S	29˚7'41.52"E
E11	26˚31'23.09"S	29˚7'43.54"E
E12	26˚31'22.84"S	29˚7'45.31"E



Figure 2: Location of coordinates for the Culverts, Veld Access Route and Overhead Powerline

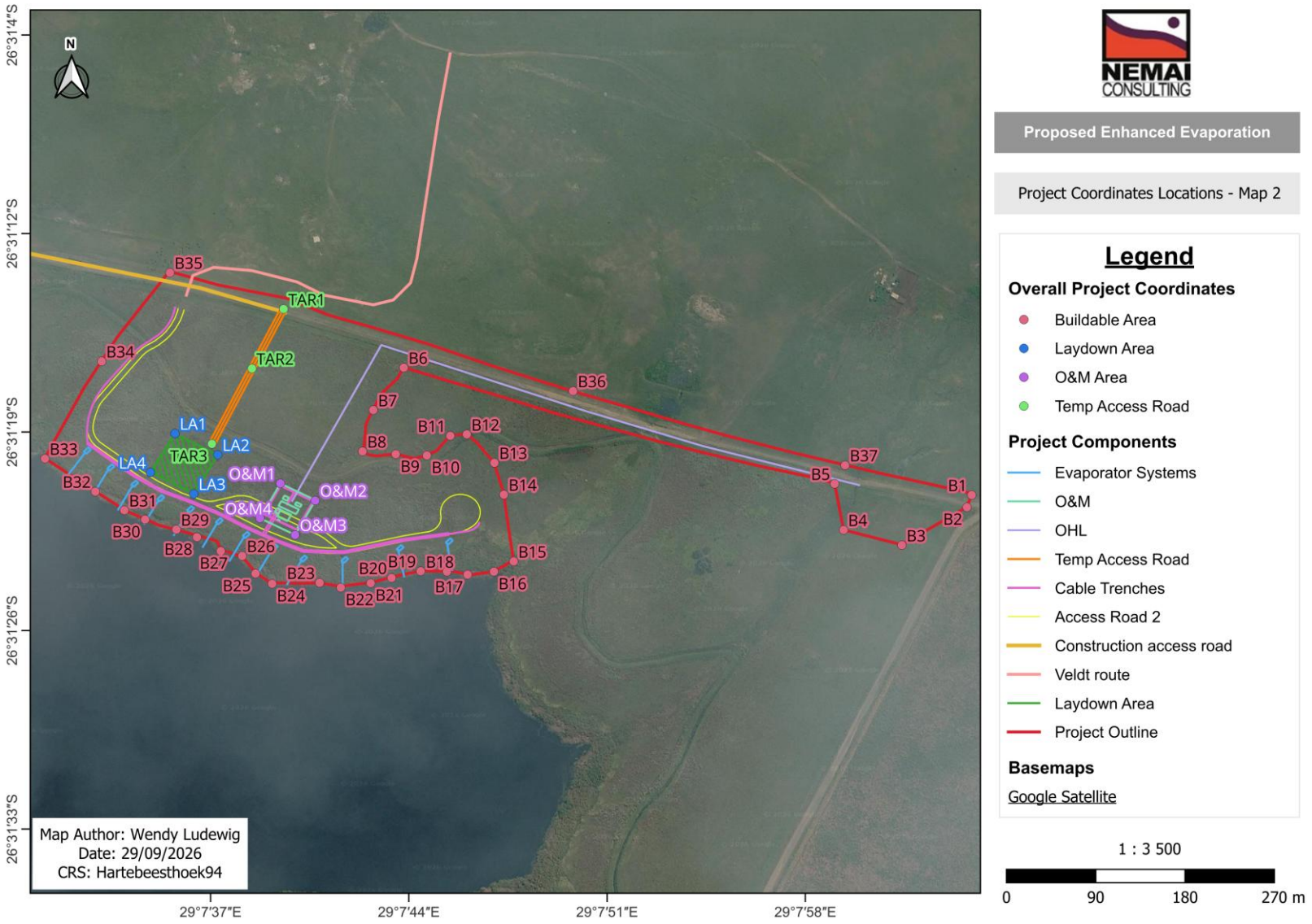


Figure 3: Location of coordinates for the Buildable Area, O&M Area, Laydown Area and Temporary Access Route

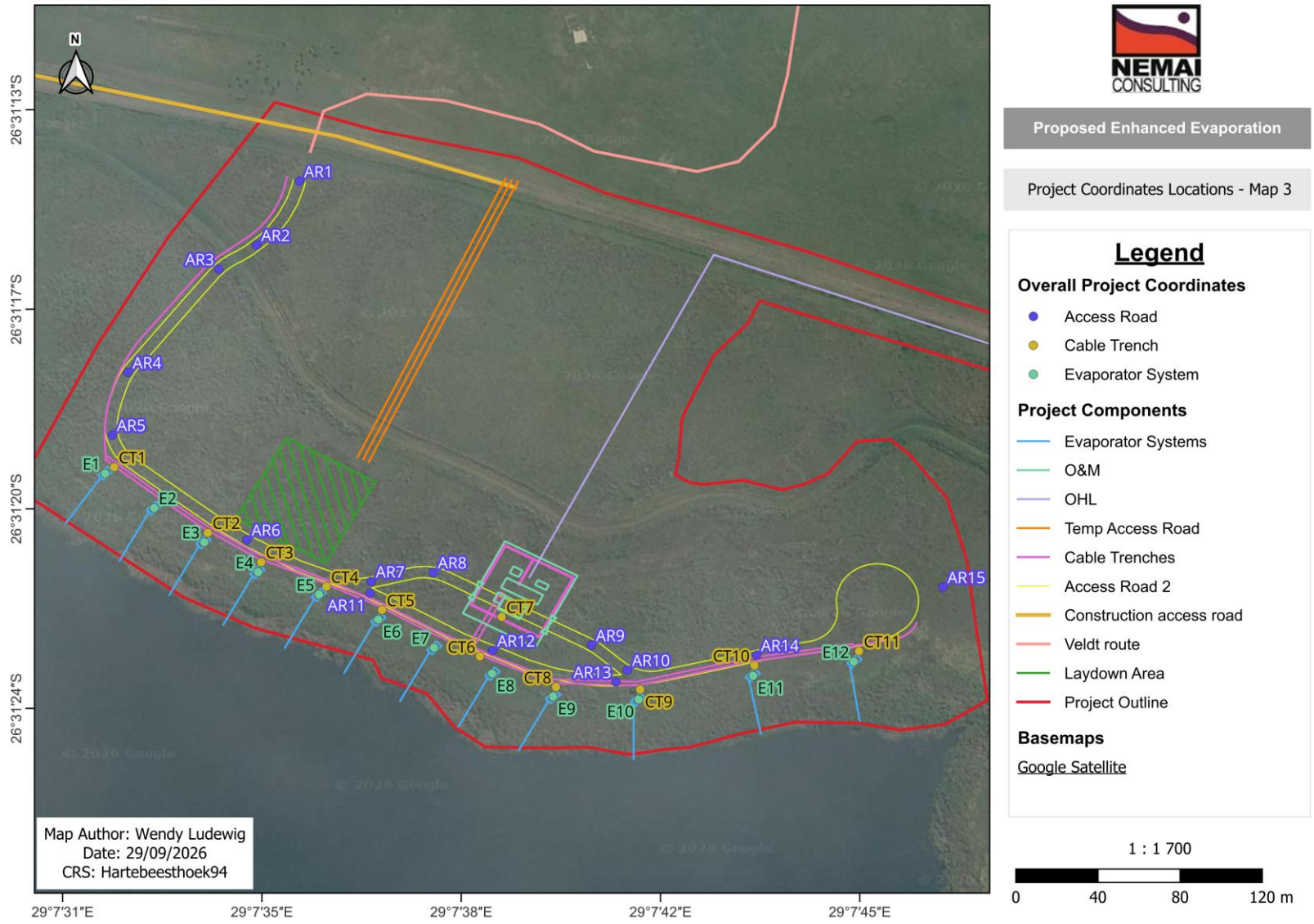


Figure 4: Location of coordinates for the Access Road, Cable Trench and Evaporator Systems

5 PROJECT DESCRIPTION

5.1 Current Process Description

SO operates as a zero-liquid discharge site, where process water and excess effluents generated from the factory are managed within onsite water management and containment systems. The PWDs form an integral part of this system and serve as the holding and management area for excess process water generated from Water Recovery (WR), Unit 2(52), within SO.

Under the current operating arrangement, the PWDs rely primarily on natural evaporation, together with operational water transfers and other water management measures, to reduce process water volumes and maintain adequate storage capacity. Effective management of the PWD system is therefore important to maintain sufficient freeboard, manage operational inflows and rainfall, and reduce the risk of uncontrolled releases from the system.

5.1.1 Dam Systems & Current Evaporation System

The PWD system consists of two overall sections, namely the primary and secondary dam systems. The primary dam system contains Dams 1, 2, 3 and 4, while the secondary dam system consists of Dams 6A & B, 7A & B, 8, 9,10A, 10B and 10C as depicted in **Figure 1**.

The dams operate as an integrated system. Process water from WR enters the dams through Dam 1. When Dam 1 becomes full, water flows through an overflow channel into Dam 2. Dam 2 can overflow to Dam 3, and Dam 3 can overflow to Dam 4. A pump station located in the common wall of Dams 2, 4 and 7 is used to pump water back to the plant or to Dams 8 and 10, depending on operational requirements and dam capacity. Dams 6A/B and 7A/B are filled through pipelines from Dams 8, 9 and 10A/B/C.

The PWDs are required to maintain sufficient capacity to accommodate operational inflows and rainfall events, including the 1:50-year rainfall event. Maintaining adequate freeboard and flood buffer capacity is therefore an important part of the current process water management system.



Figure 5: Secunda Operations Process Water Dams – Aerial View (Sasol, 2026)

The Dam selected as most optimal for the proposed Project is Dam 10A (26°31'30.00" S; 29°7'20.00" E), for which a Water Use Licence (WUL) was granted by the DWS in terms of Chapter 4 of the NWA.

Dam 10A serves as a storage dam for effluent. As a result, the following operational levels of the proposed dam were chosen to satisfy both dam safety conditions (SANCOLD: 1990 & SANCOLD: 1991) as well as the requirements for dirty water control (DWA: 1999):

- The maximum operational level at which the dam may be operated (RL 1 595.98 m, 3430 Mℓ) is set at 0.200 m below the full supply level (FSL) (RL 1 596.18 m, 566 Mℓ). The dam must under no circumstances other than during rainfall events at the dam itself be operated at levels higher than the maximum operational level.

Once the effluent reaches Dam 10A, it naturally evaporates at a rate of 12 Mℓ/day annually. A simplified process diagram can be seen in **Figure 6** below.



Figure 6: Current evaporation system of Dam 10A (Magobo, 2024)

5.1.2 Current Process Water Quality

The below **Table 4** indicates the parameters for the current process water/effluent quality (Sampled and analysed October 2025).

Table 4: Process Water Quality 2026

Component	Units	Measurement
Temperature	ºC	23
pH	-	7,13
Chemical Oxygen Demand (COD)	mg/L	662
Conductivity	µS/cm	3690
Suspended Solids (SS)	mg/L	58
Calcium	mg/L	19,76
Magnesium	mg/L	37,43
Sodium	mg/L	493
Potassium	mg/L	73,04
Boron	mg/L	9,78
Cadmium	mg/L	<0.1
Cobalt	mg/L	<0.1
Chromium	mg/L	0,137
Copper	mg/L	<0.1
Mercury	mg/L	<0.1
Nickel	mg/L	<0.1
Lead	mg/L	<0.1
Zinc	mg/L	0,202
Selenium	mg/L	0,24
Arsenic	mg/L	0,54
Sulphate	mg/L	988,4
Chloride	mg/L	201
Fluoride	mg/L	173,8
Nitrite and Nitrate	mg N/L	8,36
Phosphate	mg/L	4,35
Ammonia	mg N/L	228,3
Silica	mg/L	75,67

Groundwater quality is being monitored on a regular basis via a monitoring borehole in **Figure 7** (Magobo, 2024).



Figure 7: Groundwater Monitoring Borehole for Dam 10A

5.1.3 Current Operating Constraints

The current PWD system is affected by long-term net sludge accumulation, which results from the inherent nature of the process water being managed. This reduces the effective storage capacity of the dams and limits the system's ability to manage predicted rainfall and operational inflows while maintaining the required flood buffer.

Water balance modelling has indicated that the PWD system has insufficient available capacity to sustainably manage the predicted annual rainfall of approximately 978 mm under current and forecast operating conditions. Operational inflows and broader operational changes at SO also influence the risk of overflow, as they may affect water recovery and process water volumes entering the PWD system.

Controlled releases were previously used as a management measure during the FY23 rainy season under a directive approved by the DWS. However, controlled releases have not been granted since FY24 and cannot currently be relied upon as an ongoing operational management measure. The current process water management system therefore depends on natural evaporation, operational transfers and available onsite management measures to maintain dam levels within acceptable operating limits.

5.2 Proposed Process Description

Proper wastewater management is a key focus for SO, particularly in light of the environmental and regulatory requirements set by NEMA and NWA. The PWDs function as storage areas for the surplus effluent generated during the facility's operations, depending on natural evaporation to regulate water levels. However, due to the increasing volumes of industrial wastewater, there is a

growing need for an improved evaporation technique to complement natural processes and maintain consistent effluent management (Veldman, 2025).

To ensure the Recovery Water manage the increased flow of process water from SOs with their current storage capacity within the PWDs it would be advantageous to increase the evaporation rate from the dams using a mechanical system. This enhancement can be achieved by using mechanical forced evaporators to drive the evaporation process. The supply to Dam 10A and its water level management will follow the current standard operating procedures.

Water is drawn from Dam 10A via a pump to the evaporation system. The water is then circulated through a water spray ring on the fan of the evaporator, which blows the water droplets over Dam 10A from the North-eastern corner of the dam (See **Figure 8** below). The droplets produced by the evaporators are small, increasing the total surface area available for evaporation and resulting in higher evaporation rates. However, not all the water supplied to the mechanical evaporators evaporates, and some falls back into Dam 10A. The system is designed so fallout droplets do not fall outside Dam 10A and contaminate the surrounding environment. The water spray distance is approximately 50 m to 60 m, depending on wind direction (for example, whether the wind is from behind the fan or in front of it). The rate of evaporation also depends on other seasonal weather conditions such as temperature and humidity (Magobo, 2024).



Figure 8: Proposed Project footprint in north-eastern corner of Dam 10A

During the feasibility phase, it was determined that a FlowCentric system would be the preferred installation choice. This system consists of 12 trains, each comprising a high-pressure pump (052PC-XX1 to XX12) and an enhanced evaporator (052EV- XX1 to XX12). The high-pressure pump will draw water from Dam 10A and transfer it to the enhanced evaporator, where the water is distributed through a series of nozzles to create fine droplets. The evaporators are equipped with a fan that generates a powerful airflow at a velocity of 17.4 m/s (62.5 km/h).

The evaporation efficiency is estimated at 50% of the throughput during spring and summer seasons and at a minimum of 30% during autumn and winter seasons. The system will operate during the day for 10 hours in summer, 9 hours in autumn, 8 hours in winter, and 9 hours in spring. The evaporation rates will be 7.1 Mℓ/day in summer, 4.8 Mℓ/day in autumn, 5.5 Mℓ/day in winter, and 7.3 Mℓ/day in spring. A Programmable Logic Controller (PLC) located near the Dam 10A area will automatically control the enhanced evaporation system

The equipment is capable of handling a pH range between 2.5 and 12, and respective coatings can be applied to prolong the lifespan of the equipment. Currently, similar equipment from FlowCentric is installed at Secunda Nitro Operations (Magobo, 2024).

A simplified process diagram for the proposed Project can be seen in **Figure 9** below.

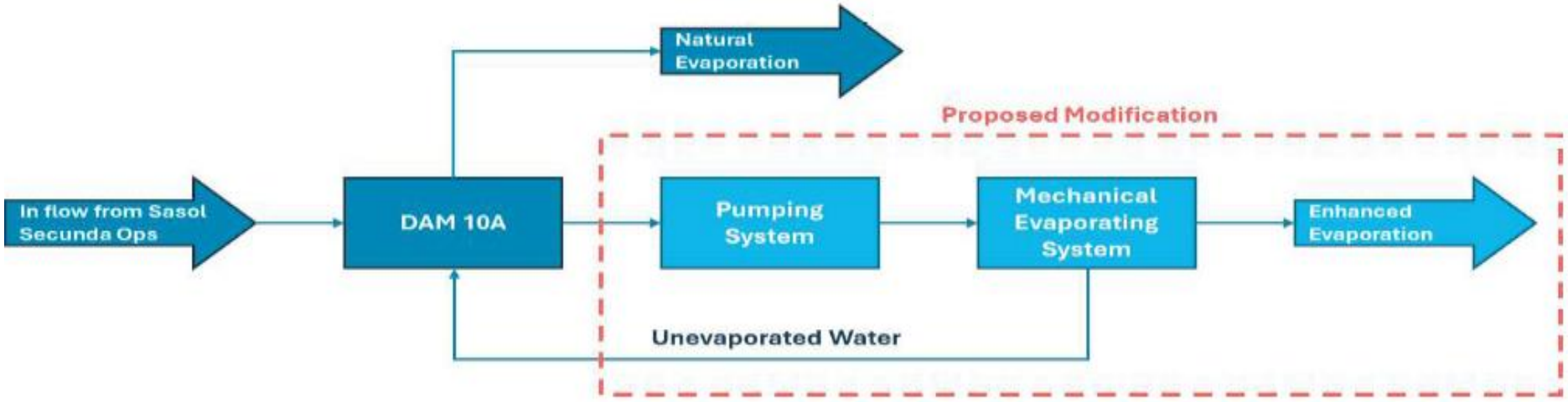


Figure 9: Proposed Enhanced Evaporation System for Dam 10A (Magobo, 2024)

5.3 Enhanced Evaporation

5.3.1 Basic Principles of Enhanced Evaporation

Enhanced Evaporation systems (also commonly referred to as *fog cannons* or *mechanical evaporators*) are industrial devices that convert liquid into a very fine mist of droplets and project this mist into the air. This greatly increases the surface area of the liquid while exposing it to ambient air conditions. This process enhances the rate at which water evaporates compared to stagnant large surfaces. A powerful fan (or similar means) propels these droplets into the environment. This helps droplets stay suspended longer in the air, interact with wind, temperature, and humidity conditions and evaporate before returning to the liquid surface (https://watermanaustralia.com/fog-cannon-technology-for-wastewater-evaporation-in-mining-industry-mechanical-evaporators).

Compared with passive evaporation or thermal evaporation systems, evaporation cannons have several practical advantages including operation time for between 10 to 12 hours every day, low maintenance as each machine is designed to specification and designed to prioritise cost-effectiveness and environmental sustainability (https://flowcentric-mining.com/mechanical-evaporation/).



Figure 10: Example of a mechanical evaporation cannon while operating (https://flowcentric-mining.com/mechanical-evaporation/)

5.3.2 Equipment

The 110 kW evaporation system has a 6 Mℓ/day throughput per operational unit. The equipment is locally manufactured and is the EOM of the equipment, and provides maintenance support for the equipment.

Certain key features of the Project identified in the information received include the following (FlowCentric Mining Technology, n.d.):

- Existing and new equipment will operate within the design capacity.
- An electrical motor drives the mechanical evaporator and features a 10-blade fan running at 960 rpm. The equipment also includes an end suction pump that operates at 9.5 bar and pumps different volumes depending on the model. **Figure 11** below provides a side view of the proposed 55 kW evaporation units.

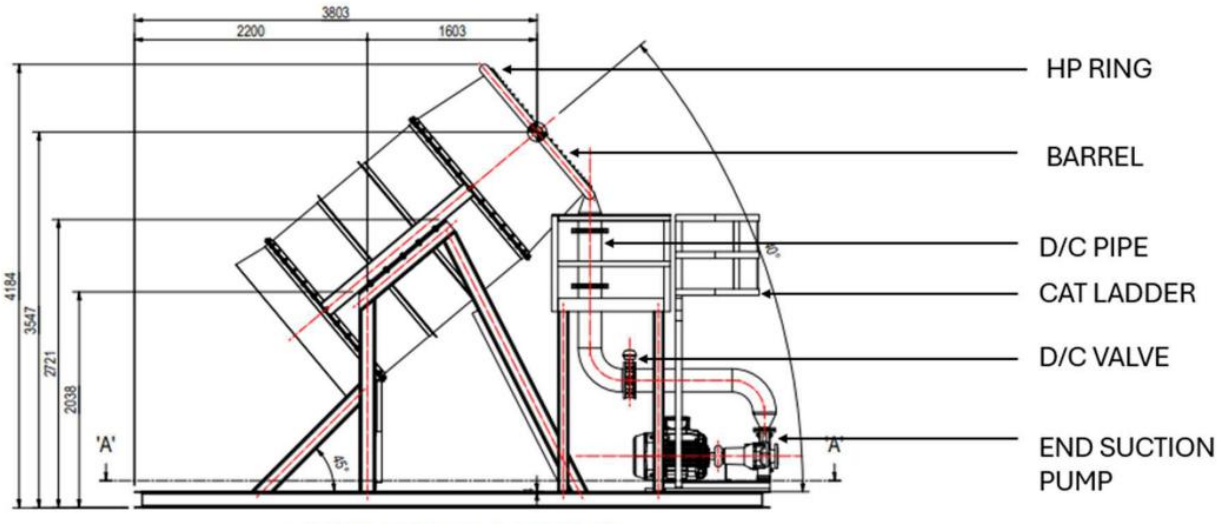


Figure 11: Side view of the proposed 55 kW mechanical evaporation unit from FlowCentric (FlowCentric Mining Technology, n.d.)

- To achieve the goal of evaporating 6 Mℓ per day (1100 kW per hour total for all motors at 525 V), the equipment in **Table 5** will be required.

Table 5: Equipment required for the operation of the evaporation system

Unit description	Quantity
55kW Evaporators	12
Booster pumps 55 kW (130 m^3 per hour throughput each pump)	12
Flow sensors	12
MCC containerised and automated with HMI & PLC	2
Isolator Panels - E stops	20
Weather station with wind and rain sensors	2
Downstream cable from MCC to Pumps	1

Unit description	Quantity
Downstream cable from MCC to Evaporators	1
Instrumentation cable	2
Cable racking & Cable ladders (2 x systems)	2
Discharge - Stainless steel	12
Pipework - Elephant hose (30 m including suction)	12
Flotations	12
Foot valves	12
Specialised Skids	12
MCC Slabs	14
Access road	167,98 m

- This Project will not influence the Safety, Health, and Environment (SHE) specifications of the existing system.
- The following derivatives are expected for this Project during normal operation –
  - Spray distance of 50 m to 70 m under normal conditions.
  - Droplet return from the spray in a 200 m radius of each unit.
  - The system is equipped with a “weather station” in the MCC, and if the wind conditions are unfavourable or might pose a risk of droplet return falling outside Dam 10A, the units will switch off. This will prevent any pollution and damage to the vegetation and other natural resources surrounding Dam 10A.
- This Project will require a 22 kV OHL to be built for electrical reticulation and to tie in with an existing Eskom OHL.

5.3.3 Proposed Shut-Off Conditions

A PLC located near the Dam 10A area will automatically control the enhanced evaporation system. A weather station will support the system by continuously monitoring wind speed, wind direction, humidity, and temperature, as well as rainfall with a rain sensor. These measurements will be used by the PLC to determine whether conditions are suitable for operation and to automatically start, stop or prevent operation of the evaporator trains, as required. The weather station shutdown values are design values and are also specified on the Range, Alarm and Trip (RAT) system. The commissioning period and the first six months after start-up will be used as a test and optimisation period to evaluate system performance under actual site and seasonal conditions. During this period, operational data from the weather station and PLC will be reviewed, and the shutdown settings may be refined, where required, to optimise system performance while maintaining environmental compliance.

The system will be shut down whenever maintenance, inspection, testing or repair work is required. Any evaporator train placed in maintenance mode will be excluded from the automatic start-up sequence until it has been returned to service.

The system will automatically shut down under any of the following weather-based conditions:

- Wind speed greater than 10.8 m/s where the wind direction is towards Dam 10A;

- Wind direction between 180° and 270°, together with wind speed greater than 1.94 m/s;
- Relative humidity greater than 75%;
- Rainfall detected by the weather station; and
- Temperature below 5°C.

The wind direction range between 180° and 270° represents winds blowing from the south to west sectors. Under these wind conditions, water droplets may be transported away from Dam 10A. The system will therefore automatically shut down when wind direction falls within this range, and wind speed exceeds 1.94 m/s. The system will also not start when rainfall is detected. If rainfall occurs while the system is operating, all evaporator trains will automatically shut down. Once rainfall has stopped and weather conditions return to acceptable limits, the PLC will automatically restart the system in accordance with the normal operating sequence.

The evaporators are positioned to spray water back towards Dam 10A so that unevaporated droplets fall back into the dam. Automatic shutdown based on wind speed, wind direction, humidity and rainfall is included as a key operational control to minimise the risk of droplet carry-over beyond the Dam 10A boundary. The effectiveness of these controls will be assessed during commissioning and the first six months of operation and optimised where required.

Based on the current information available for Dam 10A, Hydrogen Sulphide (H_2S) and Volatile Organic Compound (VOC) emissions are not expected to be a concern, and no dedicated shutdown conditions have therefore been defined for these parameters. The enhanced evaporation system does not introduce new chemicals or process streams. Environmental performance will be monitored during commissioning and the initial operating period, and additional controls can be implemented if required.

All weather station readings, alarms, trips, start-ups and shutdowns will be monitored and recorded by the PLC. The data will be available on the Human-Machine Interface (HMI) and stored for future review and verification. For every automatic shutdown event, the PLC will record the date and time of the shutdown, cause of the shutdown, measured weather conditions at the time of the shutdown, equipment status before the shutdown, and date and time of automatic restart. These event logs will provide a verifiable record of automatic shutdown events and will support ongoing optimisation of the system during commissioning and normal operation.

5.4 Alternatives

This assessment identifies the selected FlowCentric system as the preferred technological alternative. It also designates Dam 10A as the proposed water source, with the adjacent land earmarked as the development footprint for the upgraded evaporator, forming the preferred site alternative. During the feasibility stage, alternatives for OHL routes were assessed, and the most environmentally and technically feasible option was included in the current proposed Project layout. Please refer to **Section 13** of the BAR for the analysis of alternatives.

5.5 Project Layout

The Project Layout is shown in the Plot Plan in **Figure 12** below. Additionally, in **Figure 13** the layout has been adjusted to accommodate the environmental sensitivities identified by the various specialists, such as 30 m wetland buffers and a 40 m buffer around the sighting of *Tyto Capensis*.

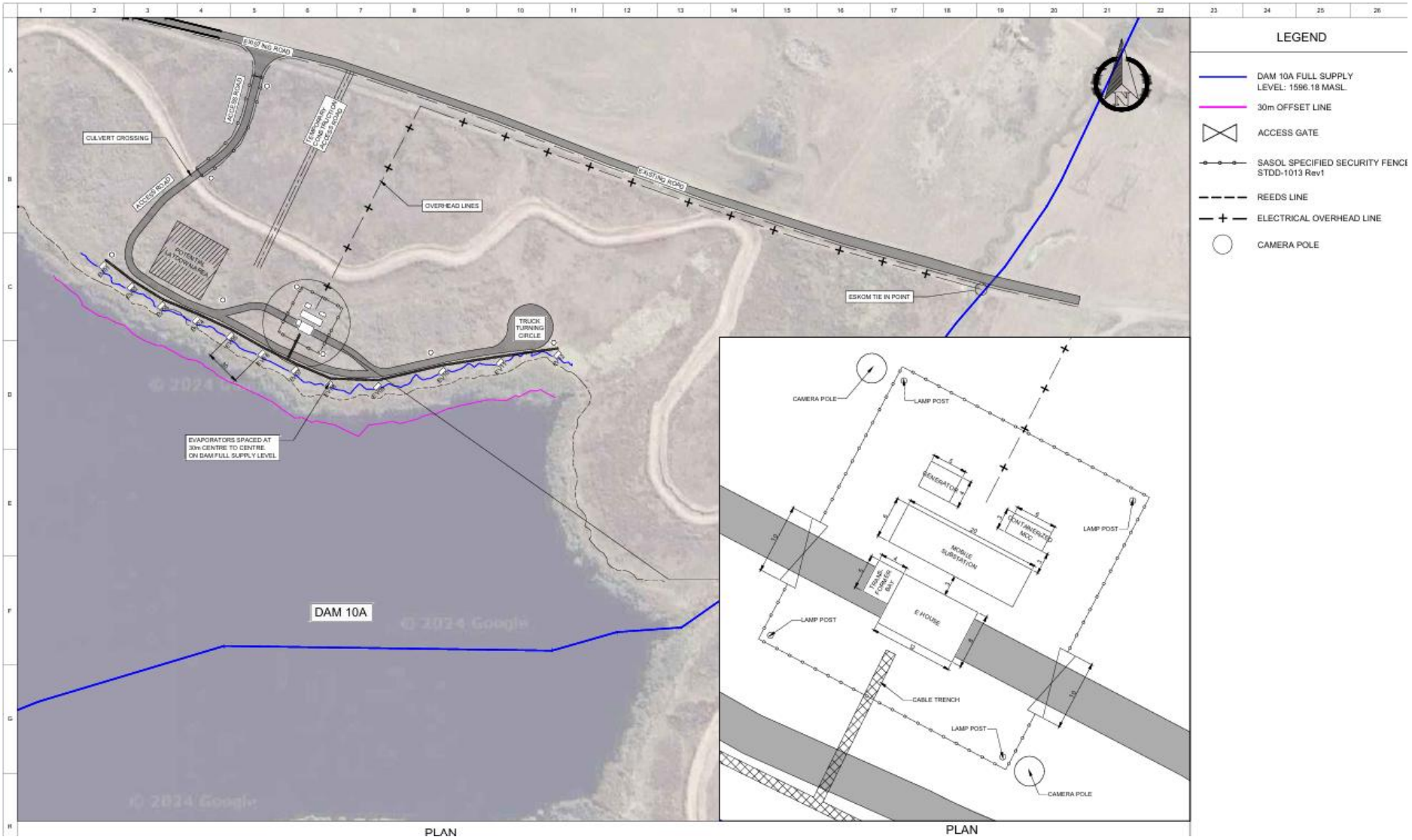


Figure 12: Plot Plan for the proposed Enhanced Evaporation Project (KBK Engineers, 2026)

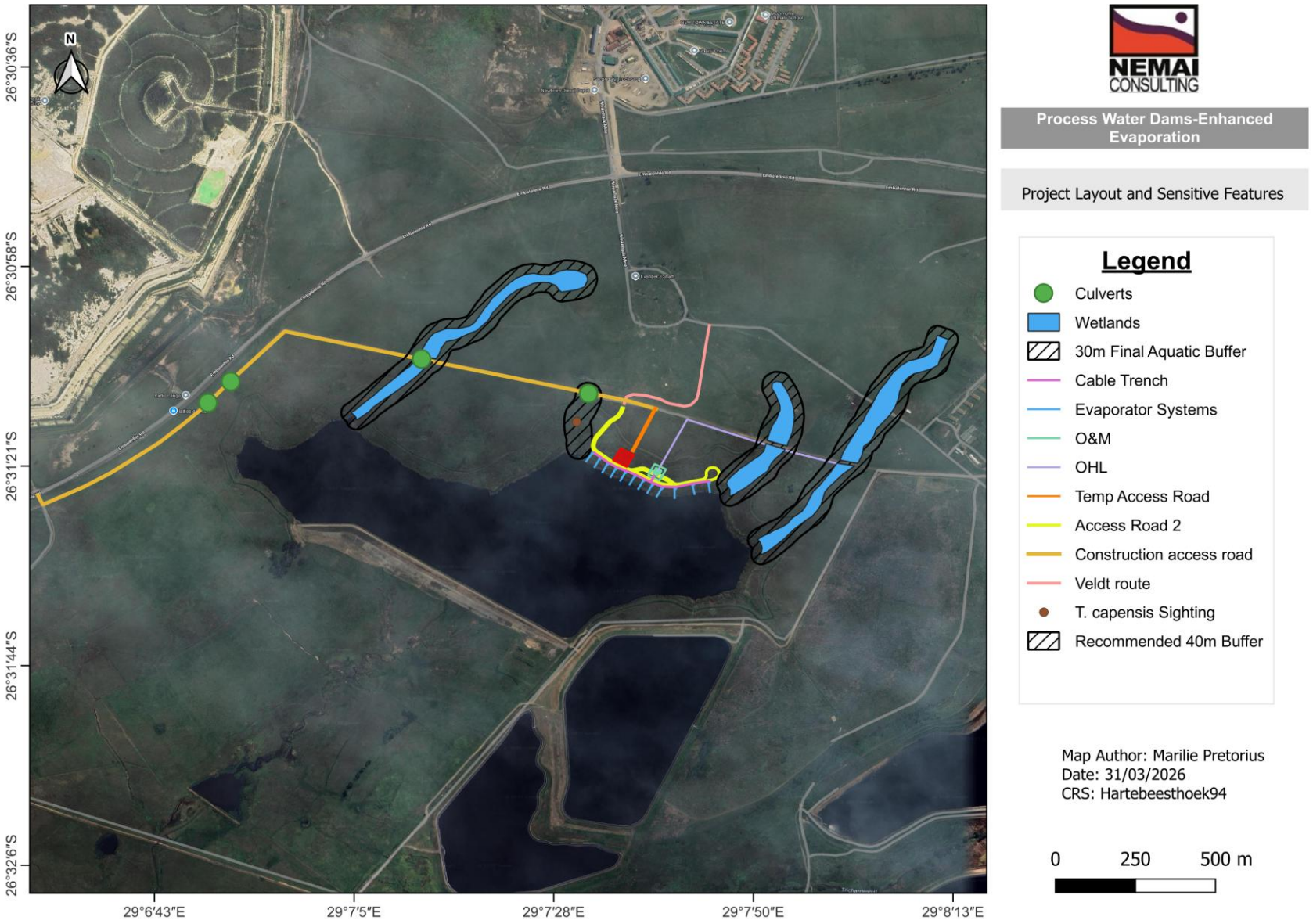


Figure 13: Proposed Project Components Layout Incorporating Environmental Sensitivities *(excluding closest air quality receptors due to scale)*

5.6 Project Life Cycle

The project life-cycle for a typical Enhanced Evaporation System includes the following primary activities (based on a high-level outline only):

- Project Initiation & Needs Assessment -
  - Identify the water balance issue.
  - Define objectives, such as reducing dam volume, complying with regulations, or avoiding infrastructure expansion.
  - Confirm constraints (site climate patterns, electricity availability, environmental impact limits).
- Feasibility, Concept & Preliminary Design -
  - Feasibility studies on whether fog/evaporation cannons are suitable, considering climate (temperature, humidity, wind), dam geometry, and liquid properties.
  - Evaporation modelling to estimate achievable evaporation rate improvement versus natural conditions.
  - Environmental Screening.
- Detailed Engineering & Specification -
  - Equipment sizing (fans, pumps, nozzle arrays) and structural design (skids/trailers).
  - Controls and automation specification.
  - Electrical/instrumentation plans, safety measures.
  - Environmental compliance through Environmental Authorisation.
  - Risk and reliability analysis.
- Procurement & Contracting -
  - Tendering/supplier selection for evaporation cannons, pumps, control panels.
  - Delivery lead-time coordination (dry season planning is often critical for operational success).
- Installation & Construction -
  - Site preparation and civil works as needed (pads, power infrastructure).
  - Installation of evaporation cannons, piping, pumps, control equipment.
  - Integration of weather instrumentation (windspeed/direction) and safety interlocks.
  - Quality checks on mechanical/electrical finishes.
- Commissioning & Start-Up -
  - Functional testing of components (pump/fan operations).
  - Control system calibration — ensure automated responses to weather triggers are correct.
  - Performance validation on initial operating days (e.g., comparing measured evaporation against predictions).
- Operation, Monitoring and Optimisation -

- Daily or seasonal operation based on weather (relative humidity and wind impact evaporation potential).
- Routine maintenance (nozzle inspection, pump/fan servicing).
- Control system monitoring.
- Data logging (evaporation rates, power use, environmental conditions).
- Performance reviews against targets.
- Control logic tweaks (e.g., wind shutdown thresholds).

❑ Decommissioning / Upgrade (Long-Term) -

- Lifespan is estimated to be > 10 years.
- May require equipment replacement or system upgrades.
- Safe decommissioning at end of use.

5.7 Temporary Components

An existing access road from Embalenhle Road will be temporarily utilised to access the proposed site during the construction phase (**Figure 14**). To utilise the existing road by construction vehicles and equipment, upgrades will be made to the associated culverts.



Figure 14: Temporary access road with culverts planned to be utilised for the construction phase

In addition, a temporary access route has been identified to transport components that will be too heavy to utilise the above temporary road. This route will be accessed from an existing gravel road to the Sasol security fence to facilitate the transport of the e-house and mobile sub into the site (**Figure 15**). A road will not be constructed; instead, a section of the fence at this location will be temporarily removed to allow access, and the truck will cross the open veld to the proposed project location. Three trips are anticipated for this route.

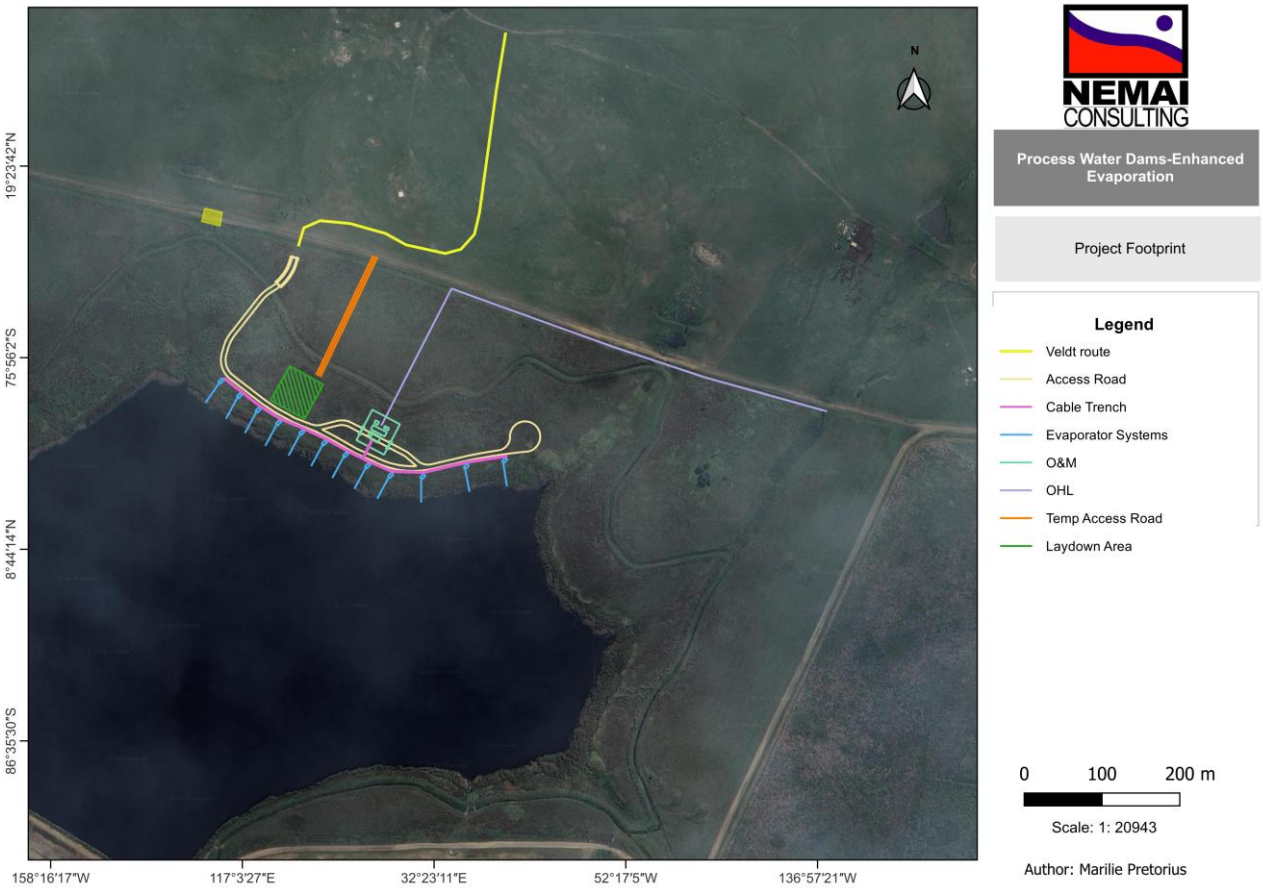


Figure 15: Temporary access route (veldt route in yellow) through adjacent property

5.8 Resources and Services Required for Construction and Operation

This section briefly outlines the resources and services that will be required to execute the proposed Project. Note that provision is made in the Environmental Management Programme (EMPr) (contained in **Appendix H**) to manage impacts associated with the aspects listed below, as relevant.

5.8.1 Raw Materials

Construction

Raw materials required for construction purposes, including fencing and construction material (e.g., cement, sand, aggregate, etc.), will be sourced from suitable suppliers, and locally where possible. The components for the Grid Connection will also be sourced from accredited suppliers.

Operation

During the operational phase, few raw materials will be required, given the limited operational requirements of the Grid Connection Infrastructure. Material such as consumable spares will be used for the operation of the facility.

5.8.2 Water

Construction

During the construction phase, the proposed development will use water for activities such as cleaning of equipment, drinking, cement mixing, etc. As Sasol SO is an existing industrial complex, water will be utilised from already approved sources.

Operation

Water use requirements for the proposed Project during the operational phase are minimal and will mostly be utilised for domestic use such as sanitation and consumption by the staff.

5.8.3 Sanitation

Construction

Sanitation services will be required for construction workers in the form of chemical toilets, which will be serviced at regular intervals by the supplier.

Operation

No sanitation services are expected to be necessary during operation.

5.8.4 Waste

Construction

Solid waste generated during the construction phase will be temporarily stored at suitable locations (e.g., at the construction camp) and will be removed at regular intervals and disposed of at licenced waste disposal sites.

The types of solid waste to be generated during the construction phase include the following:

- Waste generated from site preparations (e.g. plant material from land clearing);
- Domestic waste from construction personnel;
- Surplus and used building material/rubble; and
- Hazardous waste (e.g. chemicals, oils, soil contaminated by spillages, diesel rags).

Wastewater, which refers to any water adversely affected in quality through construction-related activities and human influence, will include the following:

- Sewage;
- Water used for washing purposes (e.g., equipment, staff); and
- Drainage over contaminated areas (e.g., workshop, equipment storage areas).

Suitable measures will be implemented to manage all wastewater generated during the construction period.

The operational Secunda Landfill Site can be utilised during the construction phase for waste disposal.

Hazardous waste will be removed by a waste service provider and will be disposed of at a licensed waste disposal site, such as Holfontein (licensed Class A waste disposal facility located in Benoni).

Operation

No operational waste is expected.

5.8.5 Electricity

Construction

The Engineering, Procurement, and Construction (EPC) Contractor will be responsible for the supply of electricity during construction. The electricity supply will be obtained from diesel generators and/or a temporary supply via cables from the site power grid.

Operation

The operational electrical requirements for the proposed Project will be supplied through access to an Eskom OHL.

5.8.6 Stormwater

Construction

Best environmental practices will be implemented during construction to manage stormwater.

Operation

Stormwater will be managed on the surface and dispersed into already existing drainage routes.

5.8.7 Laydown Areas

Construction

A laydown area will be required during the construction phase. The proposed laydown area of approximately 0,248 ha will be located next to the access road on the western side of the proposed project footprint.

5.8.8 Staff

Construction

The number of construction staff utilised will be subject to the Contractor's discretion. The skills split would be in line with applicable procurement requirements.

Operation

Operational staff will be Sasol staff members. The skills split would be in line with applicable procurement requirements.

5.9 Environmental Authorisation Validity Period & Construction Duration

It is requested that the Environmental Authorisation remain valid for a period of 10 years. It is expected that the construction duration will be approximately 12 months.

6 LEGISLATION AND GUIDELINES CONSIDERED

6.1 Legislation

6.1.1 Environmental Statutory Framework

The legislation that has a possible bearing on the Project from an environmental perspective is captured in **Table 6** below. Note that this list does not attempt to provide an exhaustive explanation but rather represents an identification of some general as well as appropriate sections from pertinent pieces of legislation.

Table 6: Environmental Statutory Framework for the Project

Legislation	Description and Relevance	
Constitution of the Republic of South Africa (No. 108 of 1996)	▪ Chapter 2 – Bill of Rights. ▪ Section 24 – Environmental Rights.	
National Environmental Management Act (Act No. 107 of 1998) (NEMA)	▪ Key sections (amongst others): ○ Section 2 – Principles. ○ Section 24 – EA (control of activities which may have a detrimental effect on the environment). ○ Section 28 – Duty of care and remediation of environmental damage. ▪ Authorisation type – EA (*required for the Project*). ▪ Authorities – DARDLEA (*Competent Authority*).	
GN No. 326 of 7 April 2017	▪ Purpose - regulate the procedure and criteria as contemplated in Chapter 5 of NEMA relating to the preparation, evaluation, submission, processing and consideration of, and decision on, applications for EA's for the commencement of activities, subjected to EIA, to avoid or mitigate detrimental impacts on the environment, and to optimise positive environmental impacts, and for matters pertaining thereto.	
GN No. 327 of 7 April 2017 (Listing Notice 1)	▪ Purpose - identify activities that would require EAs before the commencement of that activity and identify competent authorities in terms of sections 24(2) and 24D of NEMA. ▪ The investigation, assessment and communication of the potential impact of activities must follow a Basic Assessment process, as prescribed in regulations 19 and 20 of GN No. R 982 of 4 December 2014 (as amended). ▪ See below for listed activities in Listing Notice 1 that are triggered by the Project.	
	GN No. R.983 – Activity 12 The development of - (i) dams or weirs, where the dam or weir, including infrastructure and water surface area, exceeds 100 square metres; or (ii) infrastructure or structures with a physical footprint of 100 square metres or more; where such development occurs— (a) within a watercourse; (b) in front of a development setback; or (c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse;	The physical footprint of the Project will exceed 100 square meters. The evaporator systems will be within 32 meters of Dam 10A. Culvert upgrades will be within 32 meters of delineated wetlands.
	GN No. R.983 – Activity 14 The development and related operation of facilities or infrastructure, for the storage, or for the storage and handling, of a dangerous good, where such storage occurs in containers with a combined capacity of 80 cubic metres or more but not exceeding 500 cubic metres.	It is expected that dangerous goods in the form of diesel will be stored on site (construction / operational phases). The combined capacity will be more than 80 cubic metres but not exceed 500 cubic metres.
	GN No. R.983 – Activity 19 The infilling or depositing of any material of more than 10 cubic metres into, or the dredging, excavation, removal	Construction for Project components, including the culvert upgrades, OHL and

Legislation	Description and Relevance	
	or moving of soil, sand, shells, shell grit, pebbles or rock of more than 10 cubic metres from a watercourse;	evaporator systems, will take place in proximity to watercourses, resulting in the removal of more than 10 cubic metres of material from a watercourse.
	GN No. R.983 – Activity 25 The development and related operation of facilities or infrastructure for the treatment of effluent, wastewater or sewage with a daily throughput capacity of more than 2 000 cubic meters but less than 15 000 cubic meters.	Twelve 110 kW evaporator systems will target a total of 6 000 cubic meters of water evaporated per day.
GN No. 325 of 7 April 2017 (Listing Notice 2)	▪ Purpose - identify activities that would require EAs prior to commencement of that activity and to identify competent authorities in terms of sections 24(2) and 24D of NEMA. ▪ The investigation, assessment and communication of the potential impact of activities must follow an S&EIR Process, as prescribed in regulations 21 - 24 of GN No. R 982 of 4 December 2014 (as amended). ▪ *No activities under Listing Notice 2 are relevant to this Project.*	
GN No. 324 of 7 April 2017 (Listing Notice 3)	▪ Purpose - list activities and identify competent authorities under sections 24(2), 24(5) and 24D of NEMA, where EA is required prior to the commencement of that activity in specific identified geographical areas only. ▪ The investigation, assessment and communication of the potential impact of activities must follow a Basic Assessment process, as prescribed in regulations 19 and 20 of GN No. R 982 of 4 December 2014 (as amended). However, according to Regulation 15(3) of GN No. R 982 (as amended), S&EIR must be applied to an application if the application is for two or more activities as part of the same development for which S&EIR must already be applied in respect of any of the activities. ▪ *No activities under Listing Notice 3 are relevant to this Project.*	
National Water Act (Act No. 36 of 1998) (NWA)	▪ Key sections (amongst others): o Chapter 3 – Protection of water resources. o Section 19 – Prevention and remedying effects of pollution. o Section 20 – Control of emergency incidents. o Chapter 4 – Water use. ▪ Authorisation type – General Authorisation (GA) / Water Use Licence (WUL) (*required for the Project*). ▪ Authority – Department of Water and Sanitation (DWS) / Vaal-Orange Catchment Management Agency (VOCMA).	
National Environmental Management Air Quality Act (Act No. 39 of 2004) (NEM:AQA)	▪ Key sections (amongst others): o Chapter 2 – National Framework and National, Provincial and Local Standards. o Chapter 4 – Air Quality Management Measures. o Chapter 5 – Licensing of Listed Activities. ▪ Authorisation type – Atmospheric Emission Licence (AEL) (*not required for this Project*) ▪ Authority – Department of Forestry, Fisheries and the Environment (DFFE) (national), DARDLEA (provincial) and Gert Sibande District Municipality (local).	
National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) (NEM:BA)	▪ Management and conservation of the country's biodiversity. ▪ Key sections (amongst others): o Section 7 – National environmental management principles. o Section 40 – Bioregions and bioregional plans. o Chapter 4 – Threatened or Protected Ecosystems and Species. o Chapter 5 – Species and Organisms Posing Potential Threats to Biodiversity. o Chapter 7 – Permits. ▪ Authorisation type – Permit (*will be required for the removal of protected species if they cannot be avoided*). ▪ Authority – DFFE (national) and Mpumalanga Tourism and Parks Agency (MTPA) (provincial).	
National Environmental Management: Protected Areas Act (Act No. 57 of 2003) (NEM:PAA)	▪ Protection and conservation of ecologically viable areas representative of SA's biological diversity and natural landscapes. ▪ There are no formally protected areas in proximity to the project area.	
National Environmental Management: Waste Act (Act No. 59 of 2008) (NEM:WA)	▪ Key sections (amongst others): o Part 2 – General duty on the holder of waste in respect of waste management. o Part 3 – Reduction, re-use, recycling and recovery of waste. o Part 4 – Regulation of waste management activities.	

Legislation	Description and Relevance
	○ Part 5 – Storage, collection and transportation of waste. ○ Part 6 – Treatment, processing and disposal of waste. ○ Part 8 – Legal mechanism for managing contaminated land. ▪ Authorisation type – Waste Management Licence *(not required for this Project).* ▪ Authority - DFFE (national) and DARDLEA (provincial)
National Forests Act (Act No. 84 of 1998)	• Supports sustainable forest management and the restructuring of the forestry sector, as well as protection of indigenous trees in general. • Key sections (amongst others): o Chapter 3 – Special Measures to Protect Forests and Trees. ▪ Authorisation type – Licence *(not required for this Project).* ▪ Authority – DFFE.
Minerals and Petroleum Resources Development Act (Act No. 28 of 2002)	▪ Equitable access to and sustainable development of the nation's mineral and petroleum resources and to provide for matters related thereto. ▪ Key sections (amongst others): ○ Chapter 4 – Mineral and Environmental Regulation. ○ Chapter 6 – Petroleum Exploration and Production ▪ Authorisation type – Mining Permit / Mining Right *(not required for this Project).* ▪ Authority – Department of Mineral and Petroleum Resources (DMPR).
Occupational Health & Safety Act (Act No. 85 of 1993)	▪ Provisions for Occupational Health & Safety. ▪ Authority – Department of Employment and Labour (DEL). ▪ Relevant regulations, such as Electrical Installation Regulations, Construction Regulations, etc.
National Heritage Resources Act (Act No. 25 of 1999) (NHRA)	▪ Key sections: ○ Section 34 – protection of structure older than 60 years. ○ Section 35 – protection of heritage resources. ○ Section 36 – protection of graves and burial grounds. ○ Section 38 – Heritage Impact Assessment for linear development exceeding 300m in length, development exceeding 5 000m^2 in extent, etc. ▪ Authorisation type – Permit *(not required for this Project).* ▪ Authority – South African Heritage Resources Agency (SAHRA) and Provincial Heritage Resources Authority-Mpumalanga (MHRA).
Conservation of Agricultural Resources Act (Act No. 43 of 1983)	▪ Control measures for erosion. ▪ Control measures for alien and invasive plant species. ▪ Authority – Department of Agriculture.

The relationship between the proposed Project and certain key pieces of environmental legislation is discussed in the subsections to follow.

6.1.2 The Constitution of SA, 1996

6.1.2.1 Overview

Section 24 of South Africa's (SA) Constitution (108 of 1996) deals with Environmental Rights and gives the right to all citizens: *"to an environment that is not harmful to their health and well-being; and to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that:*

- ❑ *Prevent pollution and ecological degradation;*
- ❑ *Promote conservation; and*
- ❑ *Secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development".*

The Constitution provides the overarching framework for sustainable development. It provides for the protection of natural resources while promoting economic and social development.

6.1.2.2 Relevance to the Project

The Project must comply with the provisions of the Constitution, including the safeguarding of environmental rights (amongst others).

6.1.3 National Environmental Management Act, 1998

6.1.3.1 Overview

NEMA is the framework legislation regulating the environment in SA, and it provides for cooperative governance and establishes principles for decision-making on matters affecting the environment, such as:

- People and their needs must be placed at the forefront of environment management;
- Development must be sustainable and therefore requires avoidances of pollution and degradation of the environment, disturbances of landscapes and sites of cultural heritage;
- The integrated nature of the environment and the responsibility for environmental management exists throughout the life cycle of an activity (from cradle to grave);
- Public participation;
- Transparent decision making; and
- Intergovernmental co-ordination and harmonisation of policies, legislation and actions.

Some key definitions from NEMA include:

- "Environment" - the surroundings within which humans exist and that are made up of –
  (i) The land, water and atmosphere of the earth;
  (ii) Micro-organisms, plant and animal life;
  (iii) Any part or combination of (i) and (ii) and the interrelationships among and between them; and
  (iv) The physical, chemical, aesthetic and cultural properties and conditions of the foregoing that influence human health and well-being.
- “Pollution" - any change in the environment caused by –

  (i) substances;
  (ii) radioactive or other waves; or
  (iii) noise, odours, dust or heat;
  emitted from any activity, including the storage or treatment of waste or substances, construction and the provision of services, whether engaged in by any person or an organ of state, where that change has an adverse effect on human health or well-being or on the composition, resilience and productivity of natural or managed ecosystems, or on materials useful to people, or will have such an effect in the future.

Section 2(4)(p) of NEMA requires that costs of remedying pollution, environmental degradation and consequent adverse health effects and of preventing, controlling or minimising further pollution,

environmental damage or adverse health effects are paid for by those responsible for harming the environment.

Section 28(1) of NEMA imposes a duty of care and remediation for environmental damage and requires that "*every person who causes, has caused or may cause significant pollution or degradation of the environment must take reasonable measures to prevent such pollution or degradation from occurring, continuing or recurring, or, in so far as such harm to the environment is authorised by law or cannot reasonably be avoided or stopped, to minimise and rectify such pollution or degradation of the environment*".

Section 24 of NEMA provides for the consideration, investigation, assessment and reporting of the potential consequences for, or impacts on, the environment of listed activities (or specified activities) to the Competent Authority (CA). The EIA Regulations were promulgated to regulate the procedure and criteria as contemplated in Section 24 of NEMA relating to the preparation, evaluation, submission, processing and consideration of, and decision on, applications for EAs for the commencement of activities, subjected to an EIA, in order to mitigate detrimental impacts on the environment, and to optimise positive environmental impacts. The EIA Regulations were published under GN No. 982 in Gazette No. 38282 of 4 December 2014 and amended by GN 326 of 7 April 2017 published in Gazette No. 40772.

The EIA Regulations consist of the following:

- GN No. 326 of 7 April 2017 – EIA procedure;
- GN No. 327 of 7 April 2017 (Listing Notice 1) – activities that need to be subjected to a Basic Assessment process, as prescribed in Regulations 19 and 20 of the EIA Regulations;
- GN No. 325 of 7 April 2017 (Listing Notice 2) – activities that need to be subjected to a Scoping and Environmental Impact Reporting (S&EIR) Process, as prescribed in Regulations 21 - 24 of the EIA Regulations; and
- GN No. 324 of 7 April 2017 (Listing Notice 3) – activities in specific identified geographical areas that need to be subjected to a Basic Assessment process, as prescribed in Regulations 19 and 20 of the EIA Regulations.

6.1.3.2 Relevance to the Project

This Project triggers an activity under Listing Notice 1 and thus needs to be subjected to a Basic Assessment Process. The listed activities are explained within the context of the Project in **Section 6.1** above.

The Project must comply with all other relevant provisions of NEMA, such as the duty of care imposed in Section 28(1) to prevent environmental pollution and degradation.

6.1.4 National Water Act, 1998

6.1.4.1 Overview

The purpose of the NWA is to ensure that the nation's water resources are protected, used, developed, conserved, managed and controlled in ways that take into account the following:

- Meeting the basic human needs of present and future generations;
- Promoting equitable access to water;
- Redressing the results of past racial and gender discrimination;
- Promoting the efficient, sustainable and beneficial use of water in the public interest;
- Facilitating social and economic development;
- Providing for growing demand for water use; protecting aquatic and associated ecosystems and their biological diversity;
- Reducing and preventing pollution and degradation of water resources;
- Meeting international obligations;
- Promoting dam safety; and
- Managing floods and droughts.

Some key definitions from the NWA include:

- “Pollution” – the direct or indirect alteration of the physical, chemical or biological properties of a water resource so as to make it (a) less fit for any beneficial purpose for which it may reasonably be expected to be used; or (b) harmful or potentially harmful;
- “Reserve" means the quantity and quality of water required:
  - To satisfy basic human needs by securing a basic water supply, as prescribed under the Water Services Act (Act No. 108 of 1997), for people who are now or who will, in the reasonably near future, be relying upon, taking water from or being supplied from, the relevant water resource; and
  - To protect aquatic ecosystems in order to secure ecologically sustainable development and use of the relevant water resource.
- “Waste” – includes any solid material or material that is suspended, dissolved or transported in water (including sediment) and which is spilled or deposited on land or into a water resource in such volume, composition or manner as to cause, or to be reasonably likely to cause, the water resource to be polluted; and
- “Water resource” – includes a watercourse, surface water, estuary, or aquifer.
- “Watercourse” –
  - A river or spring;
  - A natural channel in which water flows regularly or intermittently;
  - A wetland, lake or dam into which, or from which, water flows; and
  - Any collection of water which the Minister may, by notice in the Gazette, declare to be a watercourse, and a reference to a watercourse includes, where relevant, its bed and banks.

The Department of Water and Sanitation (DWS) is the custodian of SA's water resources.

Section 19 of the NWA deals with pollution prevention, and in particular, the situation where pollution of a water resource occurs or might occur as a result of activities on land. The person who owns, controls, occupies or uses the land in question is responsible for taking measures to prevent pollution of water resources.

Section 20 of the NWA addresses pollution of water resources following an emergency incident, such as an accident involving the spilling of a harmful substance that may find its way into a water resource. The responsibility for remedying the situation rests with the person responsible for the incident or the substance involved.

Section 21 of the NWA lists the eleven types of water uses, which include taking and storing water, activities which reduce stream flow, waste discharges and disposals, controlled activities (activities which impact detrimentally on a water resource), altering a watercourse, removing water found underground for certain purposes, and recreation.

The regulated area of a watercourse for Section 21(c) and (i) water uses is defined as follows in Government Gazette No. 40229 of 26 August 2016:

- The outer edge of the 1 in 100 year flood line and /or delineated riparian habitat, whichever is the greatest distance, measured from the middle of the watercourse of a river, spring, natural channel, lake or dam;
- In the absence of a determined 1 in 100 year flood line or riparian area the area within 100m from the edge of a watercourse where the edge of the watercourse is the first identifiable annual bank fill flood bench (subject to compliance to Section 144 of the NWA); or
- A 500 m radius from the delineated boundary (extent) of any wetland or pan.

The following definitions apply to Section 21(c) water use, in accordance with Government Gazette No. 40229 of 26 August 2016:

- "Construction" means any works undertaken to initiate or establish impeding or diverting or modifying resource quality, for the first time, including vegetation removal, site preparation and ground levelling;
- "Diverting" means to, in any manner, cause the instream flow of water to be rerouted temporarily or permanently; and
- "Impeding" means to, in any manner, hinder or obstruct the instream flow of water temporarily or permanently, but excludes the damming of flow so as to cause storage of water.

Section 21(i) water use means any change affecting the resource quality of a watercourse, which constitutes the following:

- The quantity, pattern, timing, water level and assurance of instream flow;

- The water quality, including the physical, chemical and biological characteristics of the water;
- The character and condition of the instream and riparian habitat; and
- The characteristics, condition and distribution of the aquatic biota.

6.1.4.2 Relevance to the Project

The proposed Project will entail activities that constitute water uses in terms of Section 21 of the NWA. The project footprint encroaches into the regulated areas of watercourses, and Section 21(c) water use (*impeding or diverting the flow of water in a watercourse*) and Section 21(i) water use (*altering the bed, banks, course or characteristics of a watercourse*) are thus triggered. Based on the outcome of the Risk Assessment Matrix (RAM) undertaken by the aquatic specialist and discussions with DWS/VOCMA, it was determined that the Project falls under the requirements of a General Authorisation (GA). Therefore, a General Authorisation Application will be undertaken for this Project.

The project must comply with all other relevant provisions of the NWA, such as preventing pollution of water resources which is imposed in Section 19 of this Act. Provision is made in the EMPr (contained in **Appendix H**) to protect water resources from the proposed Project.

6.1.5 National Environmental Management: Waste Act, 2008

6.1.5.1 Overview

Amongst others, the purpose of the National Environmental Management: Waste Act (Act No. 59 of 2008) (NEM:WA) includes the following:

1. To reform the law regulating waste management in the country by providing reasonable measures for the prevention of pollution and ecological degradation and for securing ecologically sustainable development;
2. To provide for institutional arrangements and planning matters;
3. To provide for specific waste management measures;
4. To provide for the licensing and control of waste management activities;
5. To provide for the remediation of contaminated land; and
6. To provide for compliance and enforcement.

"Waste" is defined in NEM:WA as "*any substance, material or object, that is unwanted, rejected, abandoned, discarded or disposed of, or that is intended or required to be discarded or disposed of, by the holder of that substance, material or object, whether or not such substance, material or object can be re-used, recycled or recovered and includes all wastes as defined in Schedule 3 to this Act*".

Schedule 3 of the NEM:WA groups waste into two categories, namely hazardous waste and general waste. The classification of waste determines the associated management and licensing requirements. ''Hazardous waste'' is defined as "*any waste that contains organic or inorganic*

elements or compounds that may, owing to the inherent physical, chemical or toxicological characteristics of that waste, have a detrimental impact on health and the environment and includes hazardous substances, materials or objects within business waste, residue deposits and residue stockpiles".

GN No. R. 921 of 29 November 2013 (as amended) contains a list of waste management activities that have, or are likely to have, a detrimental impact on the environment. If any of the waste management activities are triggered in Category A and Category B, a Waste Management Licence (WML) is required. Activities listed in Category C need to comply with the relevant National Norms and Standards.

6.1.5.2 Relevance to the Project

The proposed Project will not require a WML in terms of NEM:WA, as no waste management activities will be triggered. The EMPr (contained in **Appendix H**) makes suitable provision for waste management, including the storage, handling and disposal of waste that may be generated.

6.1.6 National Environmental Management: Air Quality Act, 2004

6.1.6.1 Overview

The purpose of the National Environmental Management: Air Quality Act (Act No. 39 of 2004) (NEM:AQA) is to reform the law regulating air quality by providing measures for the prevention of pollution and ecological degradation and for securing ecologically sustainable development. This Act aims to promote justifiable economic and social development; to provide for national norms and standards regulating air quality monitoring, management and control by all spheres of government, and for specific air quality measures.

Some key definitions from this Act include:

- "Air pollution" – any change in the composition of the air caused by smoke, soot, dust (including fly ash), cinders, solid particles of any kind, gases, fumes, aerosols and odorous substances.
- "Atmospheric emission" or "emission" – any emission or entrainment process emanating from a point, non-point or mobile source that results in air pollution.
- "Non-point source" – a source of atmospheric emissions which cannot be identified as having emanated from a single identifiable source or fixed location, and includes veld, forest and open fires, mining activities, agricultural activities and stockpiles.
- "Point source" – single identifiable source and fixed location of atmospheric emission, and includes smoke stacks and residential chimneys.

Section 21 of the NEM:AQA provides for the listing of activities which result in atmospheric emissions that pose a threat to health or the environment, which are contained in GN 893 of 22

November 2013. No person may, without an Atmospheric Emission Licence (AEL), conduct any such listed activity.

National Dust Control Regulations (GN No. R. 827 of 1 November 2013), as amended, were gazetted in terms of NEM:AQA. The purpose of the regulations is to prescribe general measures for the control of dust in all areas. The regulations prescribe acceptable dust fallout rates.

6.1.6.2 Relevance to the Project

The proposed Project will not entail any activities that require an AEL. However, it is noted that the Project falls within the Highveld Priority Air Quality Area (Department of Environmental Affairs (DEA), 2011).

Based on a review of the activities contained in GN 893 of 22 November 2013, the Project will not trigger the need for an AEL. However, based on the nature of the project, which includes the evaporation of effluent to the atmosphere and the associated baseline environment, including the Project occurring within the Highveld Priority Air Quality Area, an Air Quality Impact Assessment (AQIA) was undertaken by an Air Quality Specialist to assess the potential risks associated with the project (**Section 11** below, and **Appendix C5**).

The EMPr (contained in **Appendix H**) makes suitable provision for managing any potential impacts in terms of air quality (e.g., dust and tailpipe emissions).

6.1.7 National Environmental Management: Biodiversity Act, 2004

6.1.7.1 Overview

The purpose of the National Environmental Management: Biodiversity Act (Act No. 10 of 2004) (NEM:BA) is to provide for the management and conservation of SA's biodiversity within the framework of NEMA.

The NEM:BA allows for the publication of provincial and national lists of ecosystems that are threatened and in need of protection. The list should include:

- Critically Endangered Ecosystems, which are ecosystems that have undergone severe ecological degradation as a result of human activity and are at extremely high risk of irreversible transformation.
- Endangered Ecosystems, which are ecosystems that, although they are not critically endangered, have nevertheless undergone ecological degradation as a result of human activity.
- Vulnerable Ecosystems, which are ecosystems that have a high risk of undergoing significant ecological degradation.
- Protected Ecosystems, which are ecosystems that are of a high conservation value or contain indigenous species at high risk of extinction in the wild in the near future.

Similarly, the NEM:BA allows for the listing of endangered species, including critically endangered species, endangered species, vulnerable species and protected species. A person may not carry out a restricted activity (including trade) involving listed threatened or protected species without a permit.

Some key definitions from the NEM:BA include:

- "Alien species" –
  - A species that is not an indigenous species; or
  - An indigenous species translocated or intended to be translocated to a place outside its natural distribution range in nature, but not an indigenous species that has extended its natural distribution range by natural means of migration or dispersal without human intervention.
- "Biological diversity" or "biodiversity" – the variability among living organisms from all sources including, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part and also includes diversity within species, between species, and of ecosystems.
- "Indigenous species" – a species that occurs, or has historically occurred, naturally in a free state in nature within the borders of the Republic, but excludes a species that has been introduced in the Republic as a result of human activity.
- "Invasive species" – any species whose establishment and spread outside of its natural distribution range -
  - Threaten ecosystems, habitats or other species or have demonstrable potential; and
  - May result in economic or environmental harm or harm to human health.
- "Species" – a kind of animal, plant or other organism that does not normally interbreed with individuals of another kind, and includes any sub-species, cultivar, variety, geographic race, strain, hybrid or geographically separate population.

6.1.7.2 Relevance to the Project

The implications of NEM:BA for the proposed Project include, inter alia, the requirements for protecting threatened species (if encountered). The EMPr (contained in **Appendix H**) includes measures to safeguard the biodiversity in the project area.

A Wetland Delineation and Impact Assessment and Terrestrial Biodiversity Impact Assessment were undertaken for the Project, and the findings are included in **Section 11** below.

6.1.8 *National Heritage Resources Act, 1999*

6.1.8.1 *Overview*

The purpose of the National Heritage Resources Act (Act No. 25 of 1999) (NHRA) is to protect and promote good management of SA's heritage resources, and to encourage and enable communities to nurture and conserve their legacy so it is available to future generations.

Some key definitions from this Act include:

- ''Cultural significance'' – aesthetic, architectural, historical, scientific, social, spiritual, linguistic or technological value or significance.
- ''Development'' – any physical intervention, excavation, or action, other than those caused by natural forces, which may in the opinion of a heritage authority in any way result in a change to the nature, appearance or physical nature of a place, or influence its stability and future well-being, including -
  - Construction, alteration, demolition, removal or change of use of a place or a structure at a place;
  - Carrying out any works on or over or under a place;
  - Subdivision or consolidation of land comprising, a place, including the structures or airspace of a place;
  - Constructing or putting up for display signs or hoardings;
  - Any change to the natural or existing condition or topography of land; and
  - Any removal or destruction of trees, or removal of vegetation or topsoil.
- ''Heritage resource'' – any place or object of cultural significance.

In terms of Section 38 of the NHRA, certain listed activities require authorisation from provincial agencies, which include the following:

- The construction of a road, wall, powerline, pipeline, canal or other similar form of linear development or barrier exceeding 300 m in length;
- The construction of a bridge or similar structure exceeding 50 m in length;
- Any development or other activity which will change the character of a site exceeding 5 000 m^2 in extent, or involving three or more existing erven or subdivisions thereof; and
- The re-zoning of a site exceeding 10 000 m^2 in extent.

6.1.8.2 *Relevance to the Project*

A Heritage Impact Assessment and a desktop Palaeontology Impact Assessment were undertaken for the Project and the findings are included in **Section 11** below.

6.2 Guidelines

The following guidelines were considered during the preparation of the BAR:

- Guideline on Alternatives, EIA Guideline and Information Document Series (DEA&DP, 2010);
- Guideline on Need and Desirability (DEA, 2017); and
- Guidelines for Involving Specialists in the EIA Processes Series (Brownlie, 2005).

6.3 Provincial and Municipal Plans

The following plans were considered during the preparation of the BAR (amongst others):

- Provincial –
  - Mpumalanga Biodiversity Sector Plan (MBSP).
- District and Local Municipalities –
  - Spatial Development Frameworks (SDFs); and
  - Integrated Development Plans (IDPs).

7 BASIC ASSESSMENT PROCESS

7.1 Competent Authority

Section 24C of NEMA provides the procedure for identifying the CA that is responsible for granting environmental authorisations in respect of listed activities. The CA for this environmental assessment is DARDLEA. As explained in **Section 6** above, there are various authorities with jurisdiction over elements of the receiving environment or project activities (e.g., duty of care, activities that lead to environmental incidents, etc.). These authorities will be consulted during the course of the Basic Assessment (BA) Process. Refer to the database of Interested and Affected Parties (I&APs) contained in **Appendix E** for a list of the relevant government departments.

7.2 Environmental Assessment Practitioner

Nemai Consulting was appointed as the independent Environmental Assessment Practitioner (EAP) to undertake the Basic Assessment Process for the Project. In accordance with Appendix 1, Section 2(1)(a) of the EIA Regulations, this section provides an overview of Nemai Consulting and the company's experience with EIA's, as well as the details and experience of the EAP's that form part of the Basic Assessment (BA) team.

Nemai Consulting is an independent, specialist environmental, social development and Occupational Health and Safety (OHS) consultancy. The company is a 100% black female owned company, with a level 1 BBBEE rating. The company is directed by a team of experienced and capable environmental engineers, scientists, and specialists. The company has offices in Randburg (Gauteng) and Durban (KZN).

The core members of Nemai Consulting who are involved with the BA process for the Project are listed below, and their respective *Curricula Vitae* are contained in **Appendix F** and the oath of the EAP in **Appendix G.**

Table 7: Basic Assessment Core Team Members

Name	Qualifications	Role
N. Naidoo	BSc Eng (Chem)	Director
D. Henning (EAP – Reg no. 2020/1217)	MSc (River Ecology)	Environmental Assessment Practitioner (EAP)
W.L. Ludewig (Candidate EAP – Reg. No. 2024/8548)	MSc (GIS and Remote Sensing)	Assisting the EAP
M. M. Pretorius (Candidate EAP – Reg No. 2024/8345)	PhD (Aquatic Parasitology - Zoology)	Assisting the EAP

7.3 Environmental Screening

According to GN 960 of 5 July 2019, an application for EA must be accompanied by a report generated by the National Web-Based Environmental Screening Tool ("Screening Tool"), as contemplated in Regulation 16(1)(b)(v) of the EIA Regulations.

The aims of the Screening Tool include the following:

- To screen a proposed site for any environmental sensitivity;
- To provide site-specific EIA process and review information;
- To identify related exclusions and/or specific requirements including specialist studies applicable to the proposed site and/or development, based on the national sector classification and the environmental sensitivity of the site; and
- To allow for a Screening Report to be generated.

A Screening Report was compiled for the Project, and it is contained in **Appendix B**.

7.4 Environmental Assessment Triggers

The process for seeking authorisation under NEMA is undertaken in accordance with the EIA Regulations, promulgated in terms of Chapter 5 of NEMA. Based on the type of activity involved, the requisite environmental assessment for the Project is a BA Process. Refer to **Section 6** for the Project's legal framework and specifically the activity triggered by the Project in terms of Listing Notice 1 of the EIA Regulations.

7.5 Basic Assessment Process

7.5.1 Formal Process Outline

The BA Process for the proposed Project was initially completed in accordance with the EIA Regulations, including the undertaking of the public participation process, consideration of comments received from registered I&APs and commenting authorities, and submission of the Final BAR and associated application for EA to the DARDLEA, as the Competent Authority, for decision-making. During the Competent Authority's consideration of the application, comments were received from the relevant GSDM air quality authority requesting further assessment of the potential air quality impacts associated with the proposed enhanced evaporation system. In response, the Applicant elected to withdraw the application for EA to allow an AQIA to be undertaken and to ensure that the potential impacts were adequately identified, assessed and addressed before a decision was made.

A new application for EA has consequently been initiated, and the findings and recommendations of the AQIA have been incorporated into this revised BAR and the associated EMPr. The GSDM

air quality authority approved the AQIA methodology approach; the letter containing this approval is in **Appendix J**. The revised draft BAR is undergoing a further public participation process to afford I&APs and relevant commenting authorities an opportunity to review and comment on the updated assessment. Following consideration of the comments received, the Final BAR and associated application for EA will be submitted to the DARDLEA for decision-making in accordance with the EIA Regulations.

An outline of a general BA Process is provided in **Figure 16** below. The objectives of the BA Process, based on the EIA Regulations, are captured in **Section 1**.

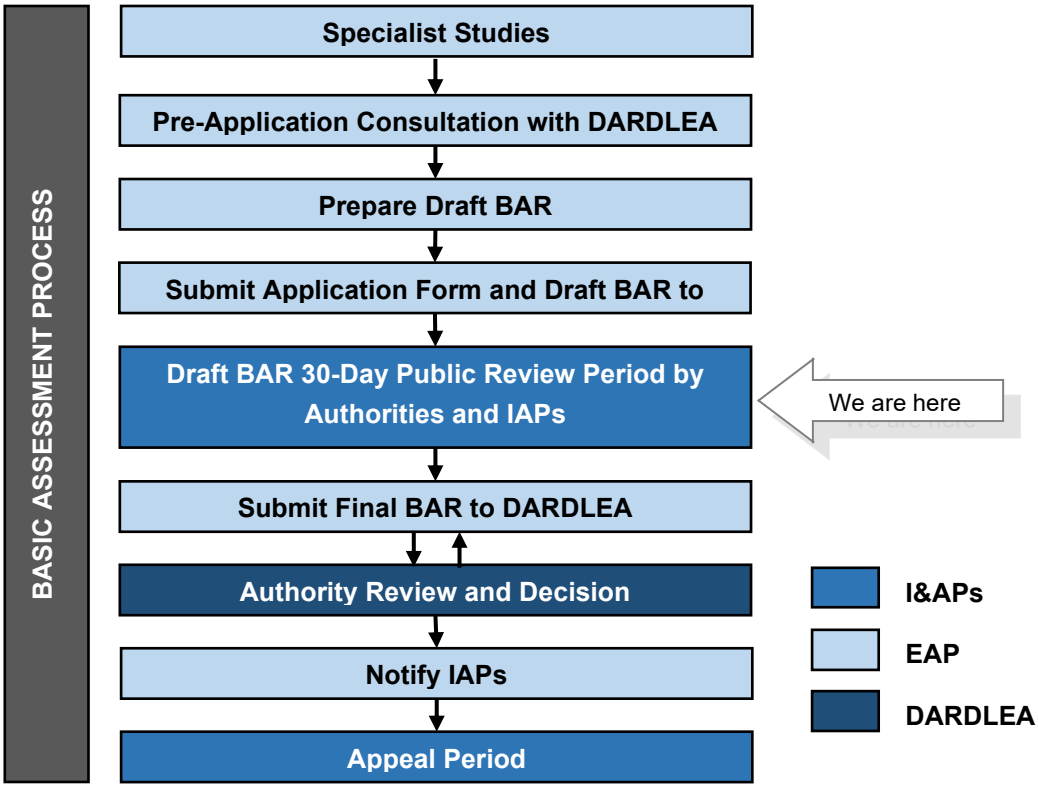


Figure 16: Basic Assessment Process outline

7.5.2 Pre-Application Consultation

A Pre-Application Meeting was held with DARDLEA on 30 January 2026. Refer to the Application Form in **Appendix A**.

The purpose of the meeting included the following:

- To present an overview of the Project to DARDLEA;
- To seek clarification regarding certain matters that pertain to the Basic Assessment Process; and
- To determine DARDLEA's requirements.

7.5.3 Application Form

A copy of the Application Form is provided in **Appendix A**.
The Application Form makes provision for all the activities associated with the Project's life-cycle.

The activities triggered in terms of Listing Notices under the EIA Regulations were confirmed based on the following:

- An understanding of the project description and the receiving environment;
- The findings from the National Web-Based Environmental Screening Tool;
- Discussion held with DARDLEA during the pre-application meeting; and
- Technical input received from the Applicant and project team.

8 ASSUMPTIONS AND LIMITATIONS

The following assumptions and limitations are noted:

- The Basic Assessment was undertaken based on the information provided by the technical team. Any future changes to the description of the project activities, or additional relevant information that may come to light during the design and implementation of these activities, may affect the findings of the Basic Assessment. The implications of any significant changes should be screened against the environmental legal framework and be evaluated against the Basic Assessment and EA (if granted) to determine whether any additional mitigation, management or monitoring measures are required.
- Regardless of the analytical and predictive method employed to determine the potential impacts associated with the proposed Project, the impacts are only predicted on a probability basis. The accuracy of the predictions is largely dependent on the availability of environmental data and the degree of understanding of the environmental features and their related attributes.
- Wetland Delineation and Impact Assessment (Hoosen, 2026) –
  - The fieldwork component of the assessment comprised of one (1) assessment, during the wet season, on the 28 January 2026.
  - The term “study area” refers to the entire application area and its 500 m surrounding area, also known as PAOI.
  - The study focused on the identification, delineation and functional assessment of watercourses found within/along the project footprint area. Although all watercourses occurring within 500 m of the activities were mapped at a desktop level in fulfilment of Regulation GN4167 of the NWA, the field assessment was confined to only the identified and possibly impacted watercourses.
  - The assessment was conducted on the portions of the study area as originally defined by the client, any changes in the project boundary subsequent to this may negatively impact the robustness of this report.
  - Formal vegetation sampling was not done by the specialist as it is not a requirement. All vegetation information recorded was based on the on-site visual observations of the author. Furthermore, only dominant and noteworthy plant species were recorded. Thus, the vegetation information provided has limitations for true botanical applications.
  - Hydrological mechanisms and processes are difficult to observe (let alone measure) in the field because they are dynamic in nature with strong temporal and spatial variation, hence interpretation is often dependent on the expertise of the scientists undertaking the study.
  - All data has limitations to accuracy. Regarding the GIS mapping in this study, all efforts were made to ensure accuracy and reliability. However, some inaccuracies may persist and are here intended for graphic representation. Furthermore, much of the information

displayed in the maps have been acquired from varied sources, with each dataset having their own limitations.

- The impact of the proposed activities on wetland ecosystems, river ecosystems, and drainage areas was conducted for the construction, operational and decommissioning phases.
- Description of the depth of the regional water table and geohydrological processes falls outside the scope of the current assessment.
- Deriving a 100% factual report based on field collecting and observations can only be done over several years and seasons to account for fluctuating environmental conditions and migrations. Since environmental impact studies deal with dynamic natural systems additional information may come to light at a later stage.
- Findings, recommendations, and conclusions provided in this report are based on the authors' best scientific and professional knowledge and information available at the time of compilation. The methods used for monitoring often require the author to make a predicted estimation based on prior knowledge and learning. These are, however, the accepted methods in the field of aquatic ecology.
- The specialist responsible for this study reserves the right to amend this report, recommendations and/or conclusions at any stage should any additional or otherwise significant information come to light.
- The realistic good mitigation scenario for the impact assessment assumes that all the mitigation measures recommended will be adhered to.

❑ Terrestrial Biodiversity Impact Assessment (Paul, 2026) –

- Based on the surrounding terrestrial habitat, a 500 m Project Area of Influence (PAOI) has been used.
- Surveys were undertaken over only one season and over one (1) day.
- Only accessible portions of the study area were assessed by the specialist. Some areas within the 500 m PAOI were not accessible due to fencelines and being located on private property. The specialist assessed these areas from a vantage point.
- No nocturnal assessments were conducted, as this was not deemed to be required based on the observations made during the site verification process.
- The baseline avifaunal assessment only included the assessment of habitat which was observable from within the study area. Surveys were not conducted from boats or using drones.
- The vegetation units identified at a desktop level will differ to those observed *in-situ* as portions of the site have historically been transformed.
- Plant species display a range of morphological and physiological attributes that determine their growth, reproduction and survival. It is, therefore, unlikely that all plant species identified on site will remain the same over temporal and spatial scales, or that all the species present on site were identified over a single survey.

- Evaluation of the significance of impacts with mitigation considers mitigation measures provided in this report and standard mitigation measures included in the project-specific EMPr.

❑ Heritage Impact Assessment (Kitto, 2026) –

- This assessment assumes that all the information provided by the client and the EAP regarding the project footprint is correct and current.
- The majority of the project footprint area was covered in extremely dense and long vegetation which meant that archaeological and heritage visibility was relatively low. However, the footprint area has been subject to considerable previous disturbance by the construction of the dam (Dam 10A) located immediately south and an associated substantial ditch and berm which runs across the entire footprint. Therefore, the possibility that some heritage resources have not been identified, specifically, informal graves or burial sites and demolished building remains, is considered to be very low.

❑ Desktop Palaeontological Impact Assessment (Butler, 2026) –

- The geology of the area is the focal point of geological maps, and the sheet explanations of the Geological Maps were not intended to focus on palaeontological heritage. Many inaccessible areas of South Africa have never been examined by palaeontologists, and data is typically dependent solely on aerial pictures. Locality and geological information in museums and university databases is out of date, and data acquired in the past is not always adequately documented.
- To address these gaps, comparable Assemblage Zones and geological formations from better-studied regions are often referenced to infer the potential for fossil presence in previously undocumented areas. In desktop studies, it is typically assumed that fossil heritage may be present where similar stratigraphy is exposed.

❑ Air Quality Impact Assessment (Bird and Burger, 2026b) –

- The assessment is dependent on available process water quality information and the operational design parameters provided at the time of the study.
- Predicted H_2S emissions are subject to uncertainty associated with sulfide generation, water quality variability, pH, temperature, biological activity and stratification within PWD10A.
- Three H_2S scenarios (Low, Central and Conservative High Case) were assessed to account for uncertainty and variability in process water quality.
- Confidence in the assessment would be improved through additional seasonal and depth-resolved water quality monitoring.
- The modelling framework incorporates conservative assumptions to avoid underestimating potential impacts.
- Predicted impacts are dependent on implementation of the proposed operational controls, including meteorological shut-off conditions.

9 NEED AND DESIRABILITY

This section serves to expand on the motivation for the proposed Project that is provided in **Section 3** above. The format contained in the Guideline on Need and Desirability (DEA, 2017) was used in **Table 8** below.

Table 8: Need for and desirability of the proposed Project

Question No.	Response
1. How will this development (and its separate elements/aspects) impact on the ecological integrity of the area? *1.1. How were the following ecological integrity considerations taken into account?:* *1.1.1. Threatened Ecosystems.* *1.1.2. Sensitive, vulnerable, highly dynamic or stressed ecosystems, such as coastal shores, estuaries, wetlands, and similar systems require specific attention in management and planning procedures, especially where they are subject to significant human resource usage and development pressure.* *1.1.3. Critical Biodiversity Areas ("CBAs") and Ecological Support Areas ("ESAs").* *1.1.4. Conservation targets.* *1.1.5. Ecological drivers of the ecosystem.* *1.1.6. Environmental Management Framework.* *1.1.7. Spatial Development Framework.* *1.1.8. Global and international responsibilities relating to the environment (e.g. RAMSAR sites, Climate Change, etc.).*	The following specialist studies were undertaken to assess the impacts of the project on the ecological integrity of the area: ▪ Wetland Delineation and Impact Assessment; and ▪ Terrestrial Biodiversity Impact Assessment. The findings of the above studies are presented in **Section 11.3** and Section 11.4. Management requirements (including mitigation measures) are presented in the BAR and EMPr to safeguard the sensitive ecological features.
1.2. How will this development disturb or enhance ecosystems and/or result in the loss or protection of biological diversity? What measures were explored to firstly avoid these negative impacts, and where these negative impacts could not be avoided altogether, what measures were explored to minimise and remedy (including offsetting) the impacts? What measures were explored to enhance positive impacts?	The potential adverse impacts from a terrestrial biodiversity perspective are listed in **Section 12.12.** See response to question no. 1.1 above.
1.3. How will this development pollute and/or degrade the biophysical environment? What measures were explored to firstly avoid these impacts, and where impacts could not be avoided altogether, what measures were explored to minimise and remedy (including offsetting) the impacts? What measures were explored to enhance positive impacts?	The project may cause surface water, groundwater, soil, air, noise and light pollution during the construction and operational phases (see **Section12**). Management requirements (including mitigation measures) are presented in the BAR and EMPr to safeguard the biophysical environment from pollution associated with the proposed Project.
1.4. What waste will be generated by this development? What measures were explored to firstly avoid waste, and where waste could not be avoided altogether, what measures were explored to minimise, reuse and/or recycle the waste? What measures have been explored to safely treat and/or dispose of unavoidable waste?	The waste to be generated by the Project will be dealt with in the following manner (amongst others): ▪ Construction – o Waste generated during construction will be stockpiled in skips and disposed of by a licensed operator at a licenced landfill. This will be a contractor's responsibility. ▪ Operation – o It is not expected that waste be generated during the operational phase of the proposed Project.

Question No.	Response
	Mitigation measures to manage all waste and wastewater generated during the construction phase will be included in the EMPr.
1.5. How will this development disturb or enhance landscapes and/or sites that constitute the nation's cultural heritage? What measures were explored to firstly avoid these impacts, and where impacts could not be avoided altogether, what measures were explored to minimise and remedy (including offsetting) the impacts? What measures were explored to enhance positive impacts?	The potential adverse impacts in terms of cultural heritage and visual resources are discussed in **Section 12.16**. A Heritage Impact Assessment was undertaken (refer to **Section 11.5**).
1.6. How will this development use and/or impact on non-renewable natural resources? What measures were explored to ensure responsible and equitable use of the resources? How have the consequences of the depletion of the non-renewable natural resources been considered? What measures were explored to firstly avoid these impacts, and where impacts could not be avoided altogether, what measures were explored to minimise and remedy (including offsetting) the impacts? What measures were explored to enhance positive impacts?	The proposed Project will be supplied with electricity by connecting to the existing infrastructure which is electricity that is supplied by Eskom. Therefore, no non-renewable resources will be used to generate electricity for the Project
1.7. How will this development use and/or impact on renewable natural resources and the ecosystem of which they are part? Will the use of the resources and/or impact on the ecosystem jeopardise the integrity of the resource and/or system taking into account carrying capacity restrictions, limits of acceptable change, and thresholds? What measures were explored to firstly avoid the use of resources, or if avoidance is not possible, to minimise the use of resources? What measures were taken to ensure responsible and equitable use of the resources? What measures were explored to enhance positive impacts? *1.7.1. Does the proposed development exacerbate the increased dependency on increased use of resources to maintain economic growth or does it reduce resource dependency (i.e. de-materialised growth)? (note: sustainability requires that settlements reduce their ecological footprint by using less material and energy demands and reduce the amount of waste they generate, without compromising their quest to improve their quality of life).* *1.7.2. Does the proposed use of natural resources constitute the best use thereof? Is the use justifiable when considering intra- and intergenerational equity, and are there more important priorities for which the resources should be used (i.e. what are the opportunity costs of using these resources this the proposed development alternative?)* *1.7.3. Do the proposed location, type and scale of development promote a reduced dependency on resources?*	The proposed Project will be supplied with electricity by connecting to the existing infrastructure which is electricity that is supplied by Eskom.
1.8. How were a risk-averse and cautious approach applied in terms of ecological impacts? *1.8.1. What are the limits of current knowledge (note: the gaps, uncertainties and assumptions must be clearly stated)?*	Refer to response to question no. 1.1 above.

Question No.	Response
1.8.2. What is the level of risk associated with the limits of current knowledge? *1.8.3. Based on the limits of knowledge and the level of risk, how and to what extent was a risk-averse and cautious approach applied to the development?*	
1.9. How will the ecological impacts resulting from this development impact on people's environmental right in terms following: *1.9.1. Negative impacts: e.g. access to resources, opportunity costs, loss of amenity (e.g. open space), air and water quality impacts, nuisance (noise, odour, etc.), health impacts, visual impacts, etc. What measures were taken to firstly avoid negative impacts, but if avoidance is not possible, to minimise, manage and remedy negative impacts?* *1.9.2. Positive impacts: e.g. improved access to resources, improved amenity, improved air or water quality, etc. What measures were taken to enhance positive impacts?*	Refer to responses to question no. 1.1 and 1.2 above. Potential impacts of the project on the people's environmental rights may include the following (amongst others): ▪ Air quality deterioration; ▪ Visual impacts; ▪ Noise during construction and operations; and ▪ Impacts on traffic during construction. The following related specialist studies were undertaken: ▪ Air Quality Impact Assessment Mitigation measures to manage impacts to the social environment are included in the BAR (see **Section 12**) and EMPr.
1.10. Describe the linkages and dependencies between human wellbeing, livelihoods and ecosystem services applicable to the area in question and how the development's ecological impacts will result in socio-economic impacts (e.g. on livelihoods, loss of heritage site, opportunity costs, etc.)?	Refer to responses to question no. 1.1 and 1.9 above. The proposed Project site is located within an industrial-zoned area.
1.11. Based on all of the above, how will this development positively or negatively impact on ecological integrity objectives/targets/considerations of the area?	Refer to the response to question no. 1.1 above regarding the ecological integrity of the area.
1.12. Considering the need to secure ecological integrity and a healthy biophysical environment, describe how the alternatives identified (in terms of all the different elements of the development and all the different impacts being proposed), resulted in the selection of the "best practicable environmental option" in terms of ecological considerations?	Project options are presented in **Section 13**.
1.13. Describe the positive and negative cumulative ecological/biophysical impacts bearing in mind the size, scale, scope and nature of the project in relation to its location and existing and other planned developments in the area?	Potential cumulative impacts are discussed in **Section 12.23**.
2.1. What is the socio-economic context of the area, based on, amongst other considerations, the following considerations?: *2.1.1. The IDP (and its sector plans' vision, objectives, strategies, indicators and targets) and any other strategic plans, frameworks of policies applicable to the area,* *2.1.2. Spatial priorities and desired spatial patterns (e.g. need for integrated of segregated communities, need to upgrade informal settlements, need for densification, etc.),* *2.1.3. Spatial characteristics (e.g. existing land uses, planned land uses, cultural landscapes, etc.), and* *2.1.4. Municipal Economic Development Strategy ("LED Strategy").*	The socio-economic environment is discussed in **Section 10.9**.

Question No.	Response
2.2. Considering the socio-economic context, what will the socio-economic impacts be of the development (and its separate elements/aspects), and specifically also on the socio-economic objectives of the area? *2.2.1. Will the development complement the local socio-economic initiatives (such as local economic development (LED) initiatives), or skills development programs?*	Refer to the responses to question no. 1.9 and 2.1 above.
2.3. How will this development address the specific physical, psychological, developmental, cultural and social needs and interests of the relevant communities?	
2.4. Will the development result in equitable (intra- and inter-generational) impact distribution, in the short- and long-term? Will the impact be socially and economically sustainable in the short- and long-term?	
2.5. In terms of location, describe how the placement of the proposed development will: *2.5.1. result in the creation of residential and employment opportunities in close proximity to or integrated with each other,* *2.5.2. reduce the need for transport of people and goods,* *2.5.3. result in access to public transport or enable non-motorised and pedestrian transport (e.g. will the development result in densification and the achievement of thresholds in terms public transport),* *2.5.4. compliment other uses in the area,* *2.5.5. be in line with the planning for the area,* *2.5.6. for urban related development, make use of underutilised land available with the urban edge,* *2.5.7. optimise the use of existing resources and infrastructure,* *2.5.8. opportunity costs in terms of bulk infrastructure expansions in non-priority areas (e.g. not aligned with the bulk infrastructure planning for the settlement that reflects the spatial reconstruction priorities of the settlement),* *2.5.9. discourage "urban sprawl" and contribute to compaction/densification,* *2.5.10. contribute to the correction of the historically distorted spatial patterns of settlements and to the optimum use of existing infrastructure in excess of current needs,* *2.5.11. encourage environmentally sustainable land development practices and processes,* *2.5.12. take into account special locational factors that might favour the specific location (e.g. the location of a strategic mineral resource, access to the port, access to rail, etc.),* *2.5.13. the investment in the settlement or area in question will generate the highest socio-economic returns (i.e. an area with high economic potential),* *2.5.14. impact on the sense of history, sense of place and heritage of the area and the socio-cultural and cultural-historic characteristics and sensitivities of the area, and* *2.5.15. in terms of the nature, scale and location of the development promote or act as a catalyst to create a more integrated settlement?*	2.5.1. The development of the proposed Project will result in increased economic activity, as well as increased opportunities for employment during the construction phase. 2.5.2. Not deemed to be relevant, due to the nature of the Project. 2.5.3. Not deemed to be relevant, due to the nature of the Project. 2.5.4. This site is located in an industrial-zoned area and is surrounded by other industrial developments. Therefore, the Project is consistent with the area's planning. 2.5.5. The Project will occur in an Industrial-zoned area and is surrounded by other industrial developments. 2.5.6. Not deemed to be relevant, due to the nature of the Project. 2.5.7. The resources and services required for construction and operation are discussed in Section 5. The proposed Project will also connect to the existing infrastructure. 2.5.8. Not deemed to be relevant, due to the nature of the Project. 2.5.9. Not deemed to be relevant, due to the nature of the Project. 2.5.10. Not deemed to be relevant, due to the nature of the Project. 2.5.11. Provision has been made in the EMPr to manage the impacts associated with the Project. 2.5.12. Locational factors that favour the proposed site include the preferred site alternative and the current process description. 2.5.13. The site is located in an industrial-zoned area and is surrounded by other industrial developments. 2.5.14. Refer to question 1.5 above. 2.5.15. Refer to the response to question no. 2.1. above regarding planning.
2.6. How were a risk-averse and cautious approach applied in terms of socio-economic impacts?	Refer to **Sections 10** and **11** for the findings of the Socio-Economic Environment.

Question No.	Response
2.6.1. What are the limits of current knowledge (note: the gaps, uncertainties and assumptions must be clearly stated)? *2.6.2. What is the level of risk (note: related to inequality, social fabric, livelihoods, vulnerable communities, critical resources, economic vulnerability and sustainability) associated with the limits of current knowledge?* *2.6.3. Based on the limits of knowledge and the level of risk, how and to what extent was a risk-averse and cautious approach applied to the development?*	
2.7. How will the socio-economic impacts resulting from this development impact on people's environmental right in terms following: *2.7.1. Negative impacts: e.g. health (e.g. HIV-Aids), safety, social ills, etc. What measures were taken to firstly avoid negative impacts, but if avoidance is not possible, to minimise, manage and remedy negative impacts?* *2.7.2. Positive impacts. What measures were taken to enhance positive impacts?*	Refer to the responses to question no. 1.9 and 2.1 above. Refer to **Sections 10** and **11** for the findings of the Socio-Economic Environment.
2.8. Considering the linkages and dependencies between human wellbeing, livelihoods and ecosystem services, describe the linkages and dependencies applicable to the area in question and how the development's socio-economic impacts will result in ecological impacts (e.g. over utilisation of natural resources, etc.)?	Refer to responses to question no. 1.1 and 1.9 above.
2.9. What measures were taken to pursue the selection of the "best practicable environmental option" in terms of socio-economic considerations?	The Best Practicable Environmental Option (BPEO) was identified, taking into consideration of the specialists' findings, sensitive environmental aspects of the receiving environment, and technical considerations.
2.10. What measures were taken to pursue environmental justice so that adverse environmental impacts shall not be distributed in such a manner as to unfairly discriminate against any person, particularly vulnerable and disadvantaged persons (who are the beneficiaries and is the development located appropriately)? *Considering the need for social equity and justice, do the alternatives identified, allow the "best practicable environmental option" to be selected, or is there a need for other alternatives to be considered?*	
2.11. What measures were taken to pursue equitable access to environmental resources, benefits and services to meet basic human needs and ensure human wellbeing, and what special measures were taken to ensure access thereto by categories of persons disadvantaged by unfair discrimination?	Refer to the responses to question no. 1.7, 1.9, and 2.1 above.
2.12. What measures were taken to ensure that the responsibility for the environmental health and safety consequences of the development has been addressed throughout the development's life cycle?	Mitigation measures (as contained in the EMPr) will be implemented to manage the impacts throughout the life cycle of the proposed Project.
2.13. What measures were taken to: *2.13.1. ensure the participation of all interested and affected parties,* *2.13.2. provide all people with an opportunity to develop the understanding, skills and capacity necessary for achieving equitable and effective participation,* *2.13.3. ensure participation by vulnerable and disadvantaged persons,* *2.13.4. promote community wellbeing and empowerment through environmental education, the raising of environmental awareness, the sharing of*	Section 14 provides an overview of the public participation process undertaken to date, which includes the following: ▪ Compiling the database of I&APs; ▪ Notification provided during the Announcement Phase; ▪ Notification of review of the draft BAR; ▪ Means of accessing the draft BAR; and ▪ Commenting on the draft BAR. Comments received from authorities and I&APs during the review period will be included in the final BAR.

Question No.	Response
knowledge and experience and other appropriate means, *2.13.5. ensure openness and transparency, and access to information in terms of the process,* *2.13.6. ensure that the interests, needs and values of all interested and affected parties were taken into account, and that adequate recognition were given to all forms of knowledge, including traditional and ordinary knowledge, and* *2.13.7. ensure that the vital role of women and youth in environmental management and development were recognised and their full participation therein were be promoted?*	
2.14. Considering the interests, needs and values of all the interested and affected parties, describe how the development will allow for opportunities for all the segments of the community (e.g.. a mixture of low-, middle-, and high-income housing opportunities) that is consistent with the priority needs of the local area (or that is proportional to the needs of an area)?	Refer to **Sections 10 and 11** for the findings of the Socio-Economic Environment. Also refer to the responses to question no. 1.9, 2.1 and 2.5 above.
2.15. What measures have been taken to ensure that current and/or future workers will be informed of work that potentially might be harmful to human health or the environment or of dangers associated with the work, and what measures have been taken to ensure that the right of workers to refuse such work will be respected and protected?	Health and safety-related risks associated with the Project during the construction and operational phases have been addressed through mitigation measures included in the EMPr. Additional management requirements will be included in the Project's Occupational Health and Safety system.
2.16. Describe how the development will impact on job creation in terms of, amongst other aspects: *2.16.1. the number of temporary versus permanent jobs that will be created,* *2.16.2. whether the labour available in the area will be able to take up the job opportunities (i.e. do the required skills match the skills available in the area),* *2.16.3. the distance from where labourers will have to travel,* *2.16.4. the location of jobs opportunities versus the location of impacts (i.e. equitable distribution of costs and benefits), and* *2.16.5. the opportunity costs in terms of job creation (e.g. a mine might create 100 jobs, but impact on 1000 agricultural jobs, etc.).*	The Project will have a beneficial impact on local employment during the construction and operational phases. Please also refer to **Section 5**.
2.17. What measures were taken to ensure: *2.17.1. that there were intergovernmental coordination and harmonisation of policies, legislation and actions relating to the environment, and* *2.17.2. that actual or potential conflicts of interest between organs of state were resolved through conflict resolution procedures?*	The relevant legislation and guidelines that were considered of outlined in **Section 6** above. The BA Process and the associated specialist studies aim to consider the various policies, strategies, plans, and programmes that bear on the Project. Various organs of state, as listed in the I&AP Database, will be notified of the Project and have the opportunity to comment on the Project during the review of the draft BAR.
2.18. What measures were taken to ensure that the environment will be held in public trust for the people, that the beneficial use of environmental resources will serve the public interest, and that the environment will be protected as the people's common heritage?	Impacts to the receiving environment were assessed during the Basic Assessment. The intention is for the mitigation measures contained in the BAR and EMPr to be realistic and for the residual risks to be managed to an acceptable level.
2.19. Are the mitigation measures proposed realistic and what long-term environmental legacy and managed burden will be left?	
2.20. What measures were taken to ensure that the costs of remedying pollution, environmental degradation and consequent adverse health effects and	

Question No.	Response
of preventing, controlling or minimising further pollution, environmental damage or adverse health effects will be paid for by those responsible for harming the environment?	
2.21. Considering the need to secure ecological integrity and a healthy bio-physical environment, describe how the alternatives identified (in terms of all the different elements of the development and all the different impacts being proposed), resulted in the selection of the best practicable environmental option in terms of socio-economic considerations?	The BPEO was identified taking into consideration of the specialists' findings, sensitive environmental aspects of the receiving environment, and technical considerations
2.22. Describe the positive and negative cumulative socio-economic impacts bearing in mind the size, scale, scope and nature of the project in relation to its location and other planned developments in the area?	Potential cumulative impacts are discussed in **Section 12.23**.

10 PROFILE OF THE RECEIVING ENVIRONMENT

10.1 Introduction

This section provides a general description of the *status quo* of the receiving environment in the proposed Project area. This serves as the environmental and social baseline and further provides the context within which the Basic Assessment was conducted. It also allows for an appreciation of sensitive environmental features and possible receptors of the effects of the proposed Project.

The reader is referred to **Section 11** below for more elaborate explanations provided through the specialist studies and their findings for specific environmental features. The potential impacts to the receiving environment are discussed in Section 12 below.

10.2 Climate

Secunda experiences a generally warm, temperate climate. Rainfall is much more limited in winter than in the summer months. According to the Köppen–Geiger system (**Figure 17**), this climate is classified as Cwb, meaning temperate, highland-type climate with dry winters and warm summers (https://en.climate-data.org/africa/south-africa/mpumalanga/secunda-565/). Additionally, the proposed Project area falls within the Highveld Priority Area (HPA), which was declared in terms of section 18(1)(a) and (b) of the National Environmental Management: Air Quality Act, 2004 (Act No. 39 of 2004).

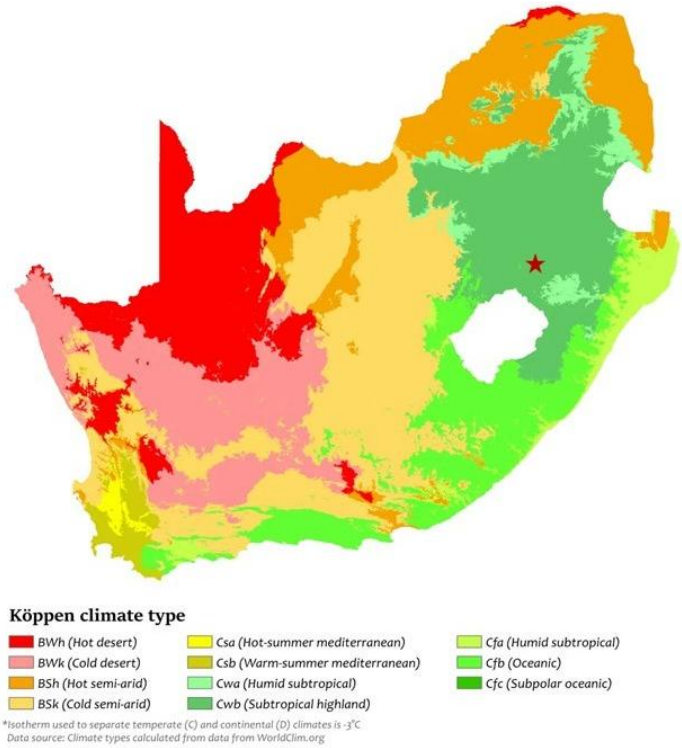


Figure 17: Köppen-Geiger Climate Classification Map of SA (site indicated with a red star)

10.2.1 Temperature and Rainfall

Meteorological Data for the Sasol Secunda Site is shown in the tables below.

Table 9: Temperature data for designs dependent on dry bulb temperature (Magobo, 2024)

		Design Dry Bulb Temperature	Corresponding Wet Bulb Temperature	Corresponding Relative Humidity
UoM		**°C**	**°C**	**%**
Annual	**Min**			
	Avg	16	12	63
	Max			
Summer	**Min**			
	Avg	19	15	66
	Max	27	18	42
Winter	**Min**	-1	-2	82
	Avg	11	6	47
	Max			
Temperature Extremes	**Lowest**	-9*		
	Highest	34		
*This is the overall condition extreme temperature, however for Minimum Design Metal Temperature (MDMT) for vessels and piping mechanical selected -6°C.				

Table 10: Average rainfall evaporation rate (Magobo, 2024)

Month	UoM	Average Rainfall
January	mm	174
February	mm	99
March	mm	79
April	mm	32
May	mm	18
June	mm	14
July	mm	2
August	mm	12
September	mm	15
October	mm	77
November	mm	98
December	mm	117

10.2.2 Wind Conditions

Prevailing wind conditions play a crucial role in determining the efficiency and durability of evaporator installations. In the Enhanced Evaporation of Industrial Water – U052 Process Baseline Report (Magobo, 2024) the direction and speed of prevailing winds were assessed to see if the natural airflow would suit the efficiency of the evaporators at the proposed Project site. Sites that benefit from steady, moderate winds are particularly advantageous, as they can reduce the energy input needed for evaporation. The following was determined:

- The dominant wind directions were found to be north/north-east to north east and south/south-west to south west (See **Figure 18** below);
- Wind speed (km/h) was determined to be a mode of 3-4 km/h (95 % of the time) and a maximum of >7 km/h (5 % of the time).

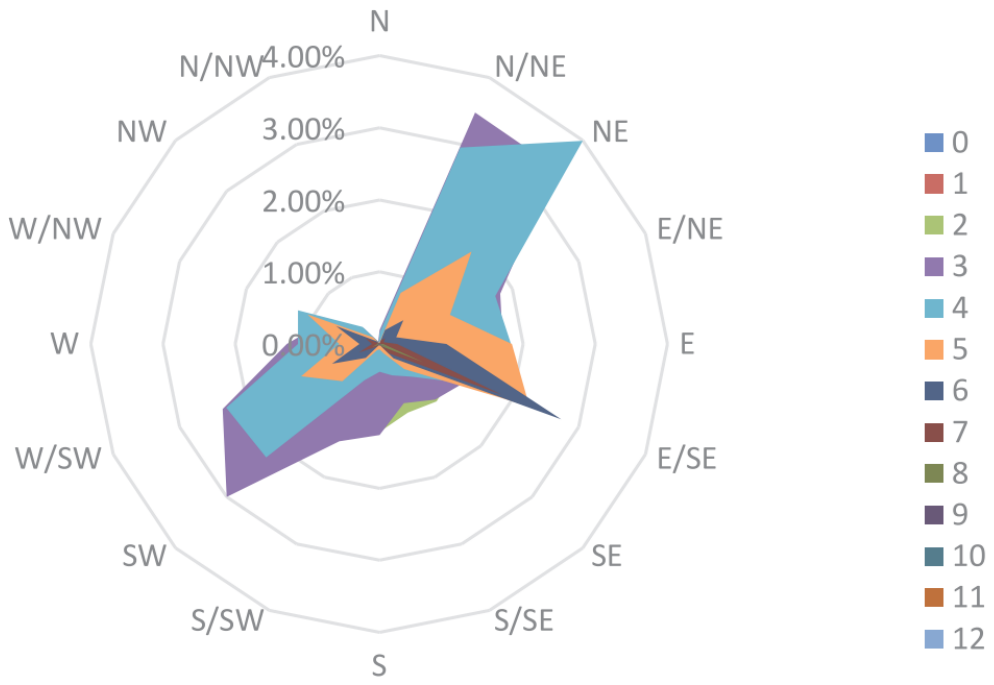


Figure 18: Proposed site wind direction and speed derived from weather data (Magobo, 2024)

10.3 Land Use and Cover

The dominant land uses in the general region include coal and gold mining and agriculture, with scattered towns. The project area is located in the Sasol Secunda Complex, which is a heavily industrialised site that has been developed since 1975/76.

The existing Dam 10A was constructed in the 1980s, and the immediate project area features a substantial ditch and berm that run across the site to contain any overflow from the dam (Kitto, 2026).

Only one (1) national vegetation type will be directly affected by the proposed development, namely the Soweto Highveld Grassland (**Figure 19**), which is listed as Vulnerable by the National Threatened Ecosystem Dataset.

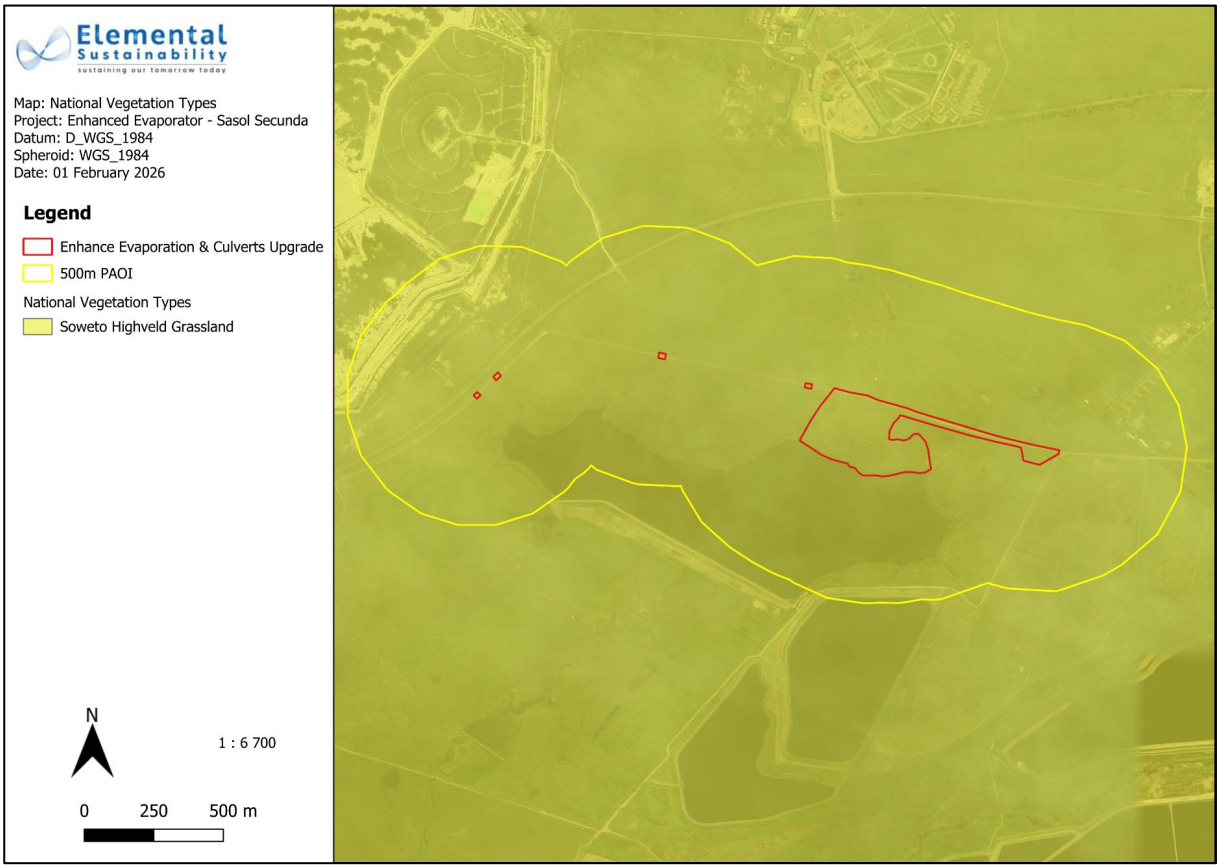


Figure 19: National Vegetation Type in relation to the proposed Project (Paul, 2026)

The study area and great surrounds include a total of eleven (11) visible national landcover classes. Most of the proposed project footprint, however, overlaps with the following classes (**Figure 20**):

- Natural Grassland;
- Artificial Dams (including canals);
- Artificial Flooded Mine Pits;
- Herbaceous Wetlands;
- Fallow Land and Old Fields (Grass);
- Residential Formal (Low Veg / Grass);
- Village Scattered (Bare and Low Veg / Grass;
- Commercial;
- Mines: Surface Infrastructure;
- Mines: Extraction Pits and Quarries;
- Mine: Tailings and Resource Dumps; and
- Other Bare.

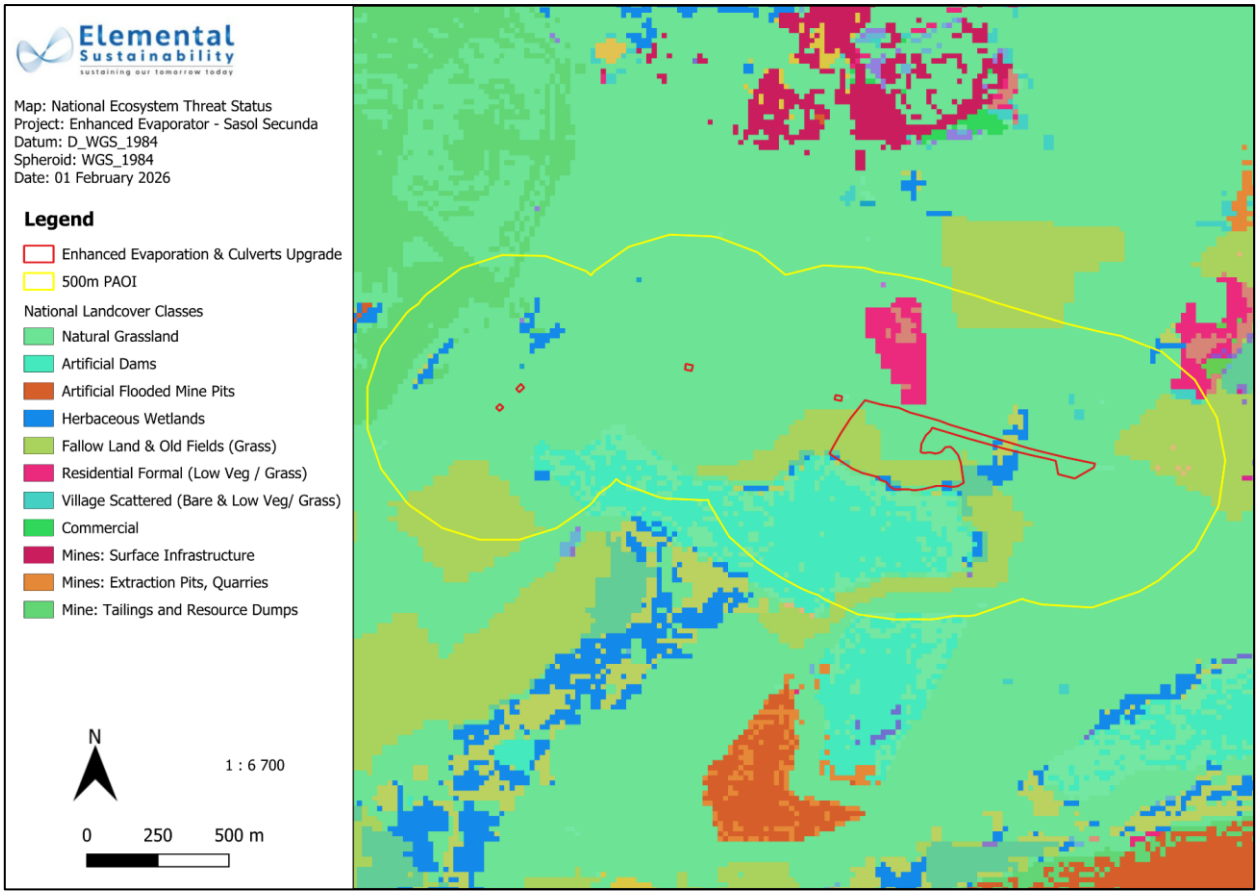


Figure 20: National Land Cover Map (Paul, 2026)

10.4 Geology

Secunda is situated on the Highveld plateau in Mpumalanga at an elevation of approximately 1,619 m above sea level. The landscape is generally flat with minor undulations, influencing both drainage and local climatic conditions.

The proposed study area is entirely underlain by dolerite intrusions of the Karoo Igneous Province (**Figure 21**), as mapped on the 1:250 000 East Rand 2628 Geological Map (Council for Geosciences, Pretoria).

The Karoo Igneous Province is a major continental flood basalt (CFB) province, comprising extensive intrusive and extrusive igneous rocks (Duncan *et al*., 2006). Flood basalts here were emplaced through fissure eruptions, forming widespread sub-horizontal lava flows (sills and dykes). These flows once covered much of southern Africa, with preserved remnants today estimated at ~140,000 km², compared to an original extent of ~2,000,000 km² (Cox, 1970, 1972).

In addition to basaltic units, the province contains significant silicic volcanic rocks, including rhyodacite and rhyolite, exposed along the Lebombo monocline. Some units extend up to 60 km and exhibit pyroclastic features, classified as rheoignimbrites. Basal lavas generally overlie the

Clarens Formation, though localised sandstone erosion preceded volcanism. Evidence from the Eastern Cape (Lock *et al*., 1974) indicates early magma–groundwater interaction, producing volcaniclastic deposits and phreatomagmatic features. Further studies (Eales *et al*., 1984) identified pillow lavas, hyaloclastite breccias, and interbedded fluviatile sandstones, confirming aqueous environments during initial eruptions.

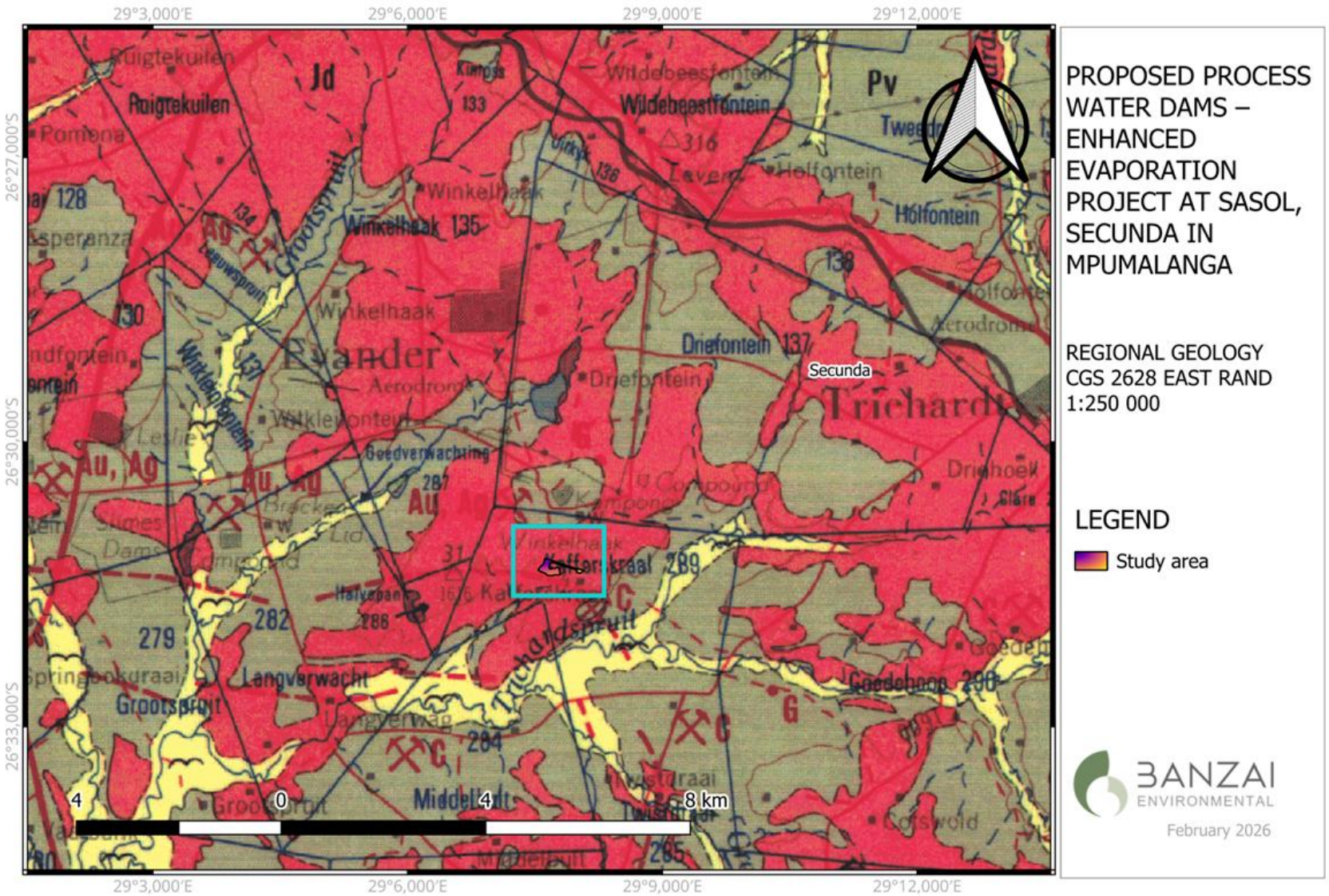


Figure 21: Extract of the 1:250 000 East Rand 2628 Geological Map (Council for Geosciences, Pretoria) indicates that the study area is underlain by dolerite (Jd, red) of the Karoo Igneous Province. Adjacent geology includes that of the Vryheid Formation (Pv) and Quaternary alluvium (Butler, 2026)

10.5 Soil

The site is located in the Grassland Biome and Highveld Ecoregion of SA, with Soweto Grassland being the main vegetation cover.

According to the Soil and Terrain (SOTER) databases, the entire proposed project area is characterised by D1 soil (https://isric.org/explore/soter). This soil type can be described as black and red, strongly structured clayey soils with high base status (association of Vertisols, Phaozems, Kastanozems and Nitisols). Additionally, one or more of the following may be present: Leptosols, Calcisols, and Cambisols.

Threats to soil conditions in the proposed project area include overgrazing and erosion.

10.6 Topography

The project area is situated on relatively flat land within the Highveld plateau, which makes it suitable for large-scale industrial development. The SOTER landform GIS layer confirms that the entire proposed project area is plain at high level.

The elevation profile from north to south shows an elevation gain of 19.3 m. From east to west a elevation gain of 12.7 is seen (**Figure 23** and **Figure 24)**.



Figure 22: Level land character of the project area

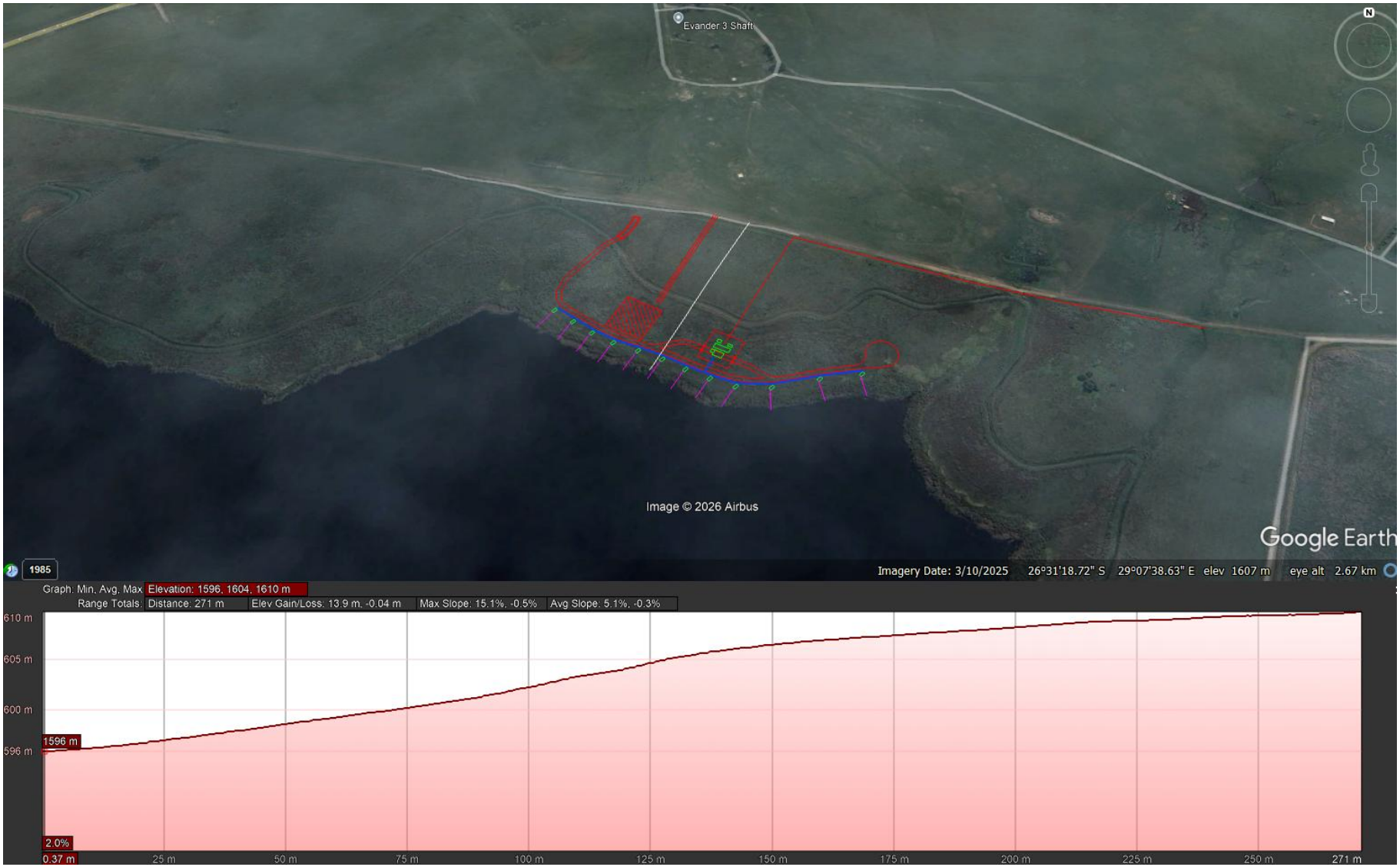


Figure 23: North to South elevation profile of the proposed site

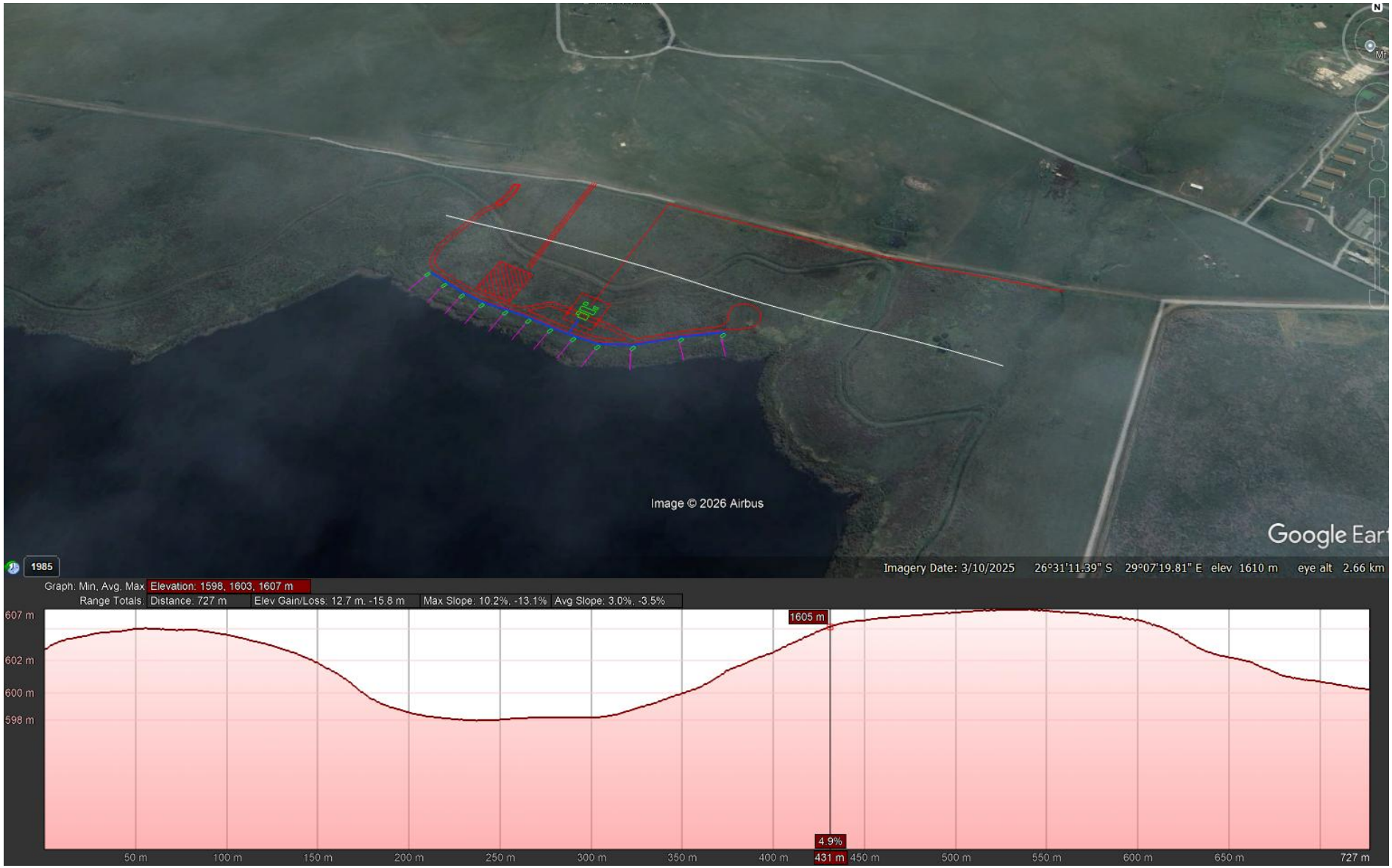


Figure 24: East to West elevation profile of the proposed site

10.7 Surface Water

The information contained in the sub-sections to follow was partly extracted from the Wetland Delineation and Impact Assessment (Hoosen, 2026). Refer to **Section 11.3** below for a synopsis of the study. The specialist report is contained in **Appendix C1**.

10.7.1 High-Level Hydrological Setting

The hydrological setting of the survey area, in terms of the Water Management Areas (WMAs), Sub-Quaternary Catchment Reaches (SQRs), and Quaternary Catchments (QCs), is shown in **Figure 25** and **Table 11** below.

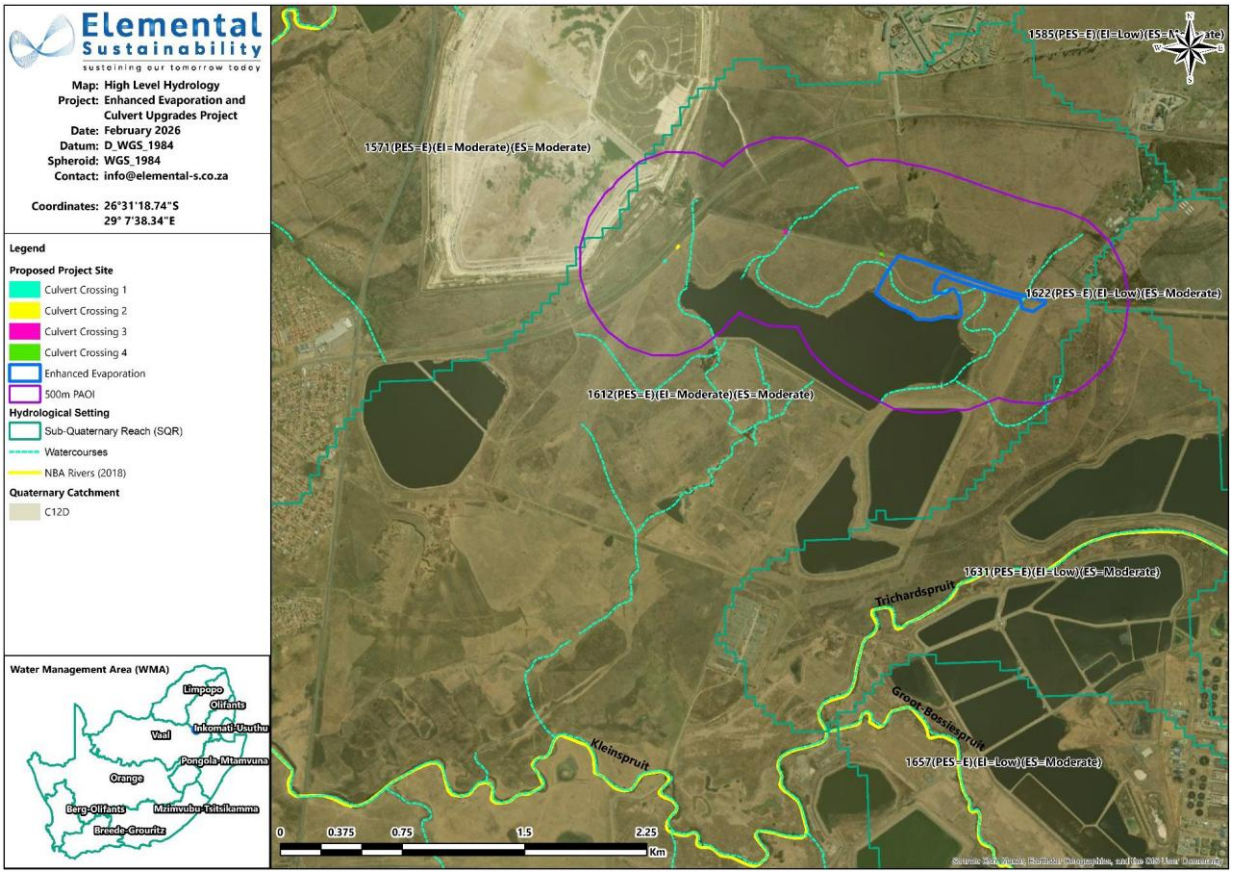


Figure 25: Hydrological Setting of the proposed project area showing WMAs, SQRs and QCs

Table 11: High-level Hydrological Setting Summary

WMA	Vaal (WMA#5)	
Quaternary Catchment Area	C12D	
SQR	SQ Reach	C12D-01612 (RQIS)
	Reach Code NBA 2018	C12D610000
	SQR Name	Kleinspruit
	PES Category	E: Seriously Modified Class E – Seriously Modified (NBA PES 2018)
	Ecological Importance	Moderate
	Ecological Sensitivity	Moderate

10.7.2 Surface Water in the Project Area

The Kleinspruit River, identified within the POA, is Perennial. The study area drains southwards via local drainage features and wetlands towards the Kleinspruit, which is identified as an NBA river within the regional catchment. Surface runoff and subsurface flows originating within the Project Area of Influence are therefore hydrologically connected to the Kleinspruit system, either directly or indirectly through intermediary wetlands and artificial impoundments.

The Kleinspruit River forms part of a broader freshwater network that supports downstream ecological functioning, including flow regulation, sediment transport, and water quality maintenance. Wetlands within the study area act as ecological support areas by attenuating flows and filtering runoff before water enters the river system. See below **Figure 26** for the Project area in relation to surface water.

Several artificial waterbodies, including process water dams and associated impoundments, are present within and adjacent to the PAOI. These features are classified as artificial dams and flooded mine-related areas and represent highly modified aquatic systems. Their presence has altered local hydrological patterns and contributes to permanent open water conditions in areas that were likely historically seasonally saturated systems.

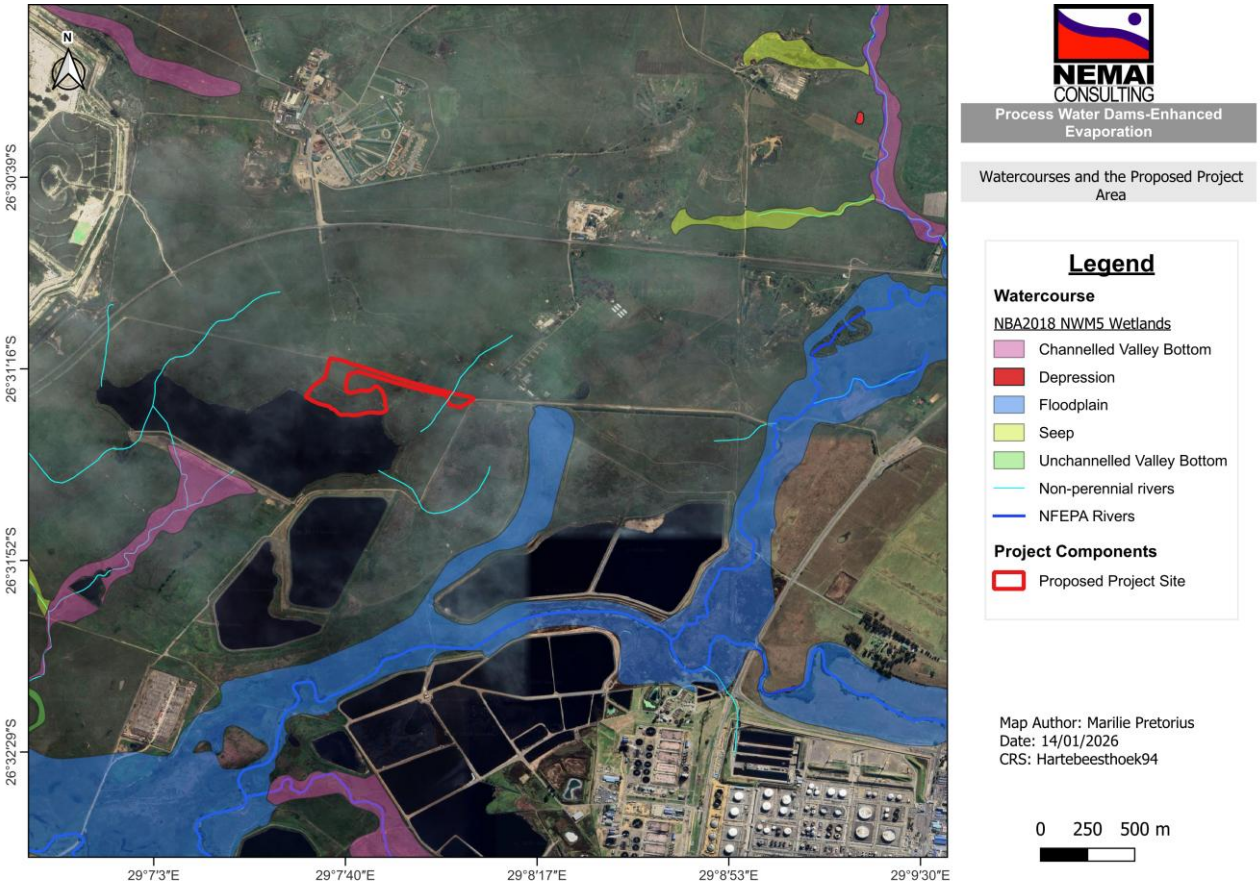


Figure 26: The proposed Project footprint in relation to watercourses in the area

10.7.3 Ecoregions

According to Kleynhans *et al*. (2005), ecological classification or typing allows for the grouping of rivers according to similarities based on a top-down nested hierarchical approach. Based on attributes such as physiography, climate, rainfall, geology and potential natural vegetation, 31 Level I ecoregions were identified for SA.

The ecoregion in relation to the proposed Project is identified as Highveld (11). The terrain morphology can be described as dominated by Plains; Low Relief; Plains; Moderate Relief. Vegetation can further be classified as dominantly Dry Sandy Highveld Grassland and Moist Cool Highveld Grassland (**Figure 27**). Furthermore, this ecoregion is characterised by 1100-2300 meters above mean sea level, mean annual precipitation between 400-1000 mm, with the most rain being received during early to late summer months. Mean annual temperature ranges between 12 ºC and 20 ºC.

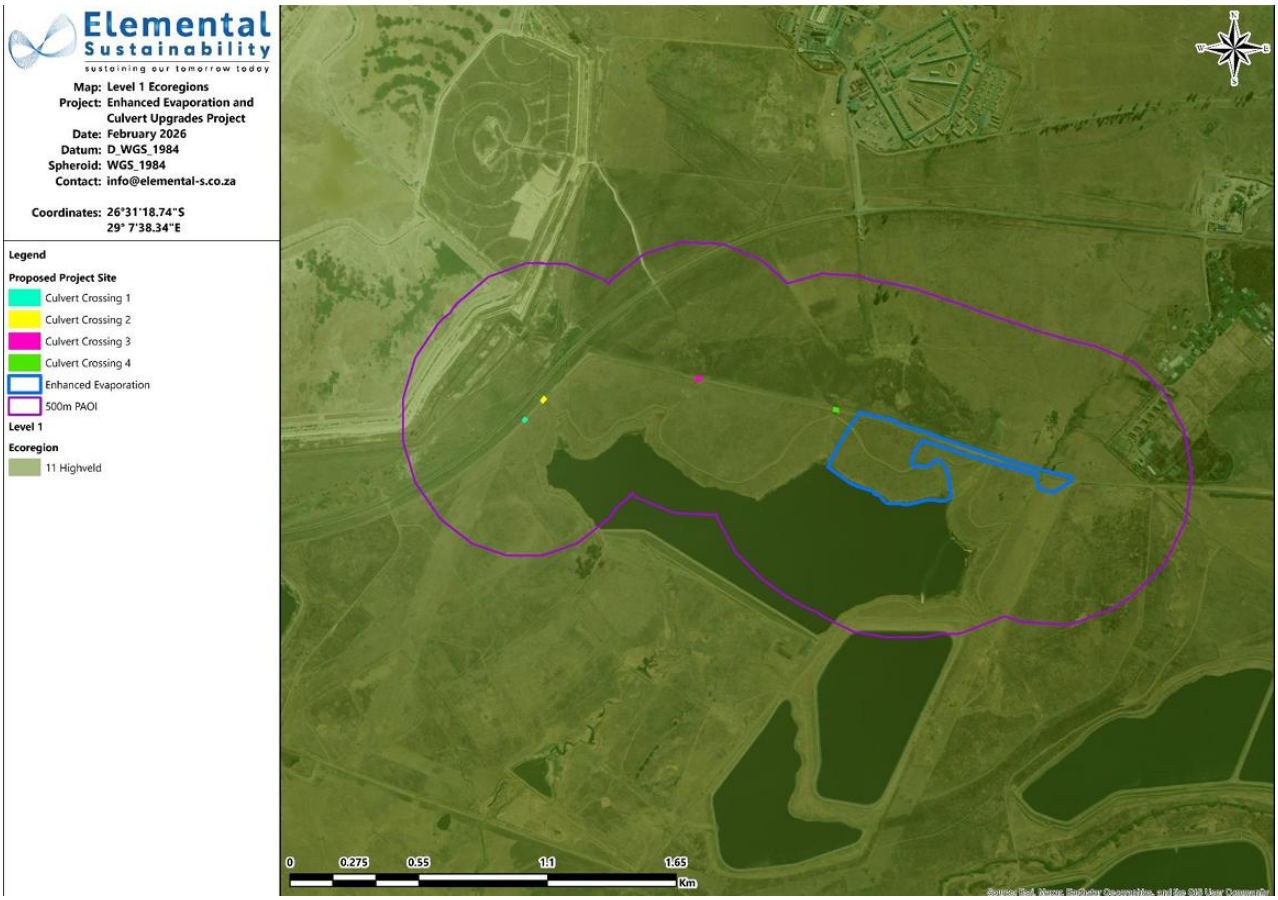


Figure 27: Highveld ecoregion in relation to the proposed Project area (Hoosen, 2026)

10.7.4 National Biodiversity Assessment, 2018

According to the National Biodiversity Assessment (NBA) 2018 spatial data, the study area drains southwards via local drainage features and wetlands towards the Kleinspruit, which is identified as an NBA river within the regional catchment. Surface runoff and subsurface flows originating within

the Project Area of Influence are therefore hydrologically connected to the Kleinspruit system, either directly or indirectly through intermediary wetlands and artificial impoundments.

Given this hydrological linkage, any alterations to surface drainage patterns, wetland integrity, or water quality within the project footprint may have downstream implications for the Kleinspruit River (**Figure 25**).

10.7.5 National Freshwater Ecosystem Priority Areas

The National Freshwater Ecosystem Priority Areas (NFEPAs) represent areas within which rivers and wetlands were identified that are currently in a good condition and should remain in such a condition to achieve biodiversity targets.

The study area forms part of an upstream Freshwater Ecosystem Priority Area (FEPA), indicating that local wetlands and drainage features play an important supporting role for downstream priority freshwater ecosystems. Surface runoff and subsurface flows from the study area ultimately contribute to the Kleinspruit system, highlighting the importance of maintaining wetland functionality and hydrological connectivity

Based on the NFEPA dataset, the Kleinspruit is classified as a NFEPA river. This classification indicates that the Kleinspruit is considered a priority freshwater system at a national scale due to its ecological importance and role in supporting downstream biodiversity and hydrological functioning.

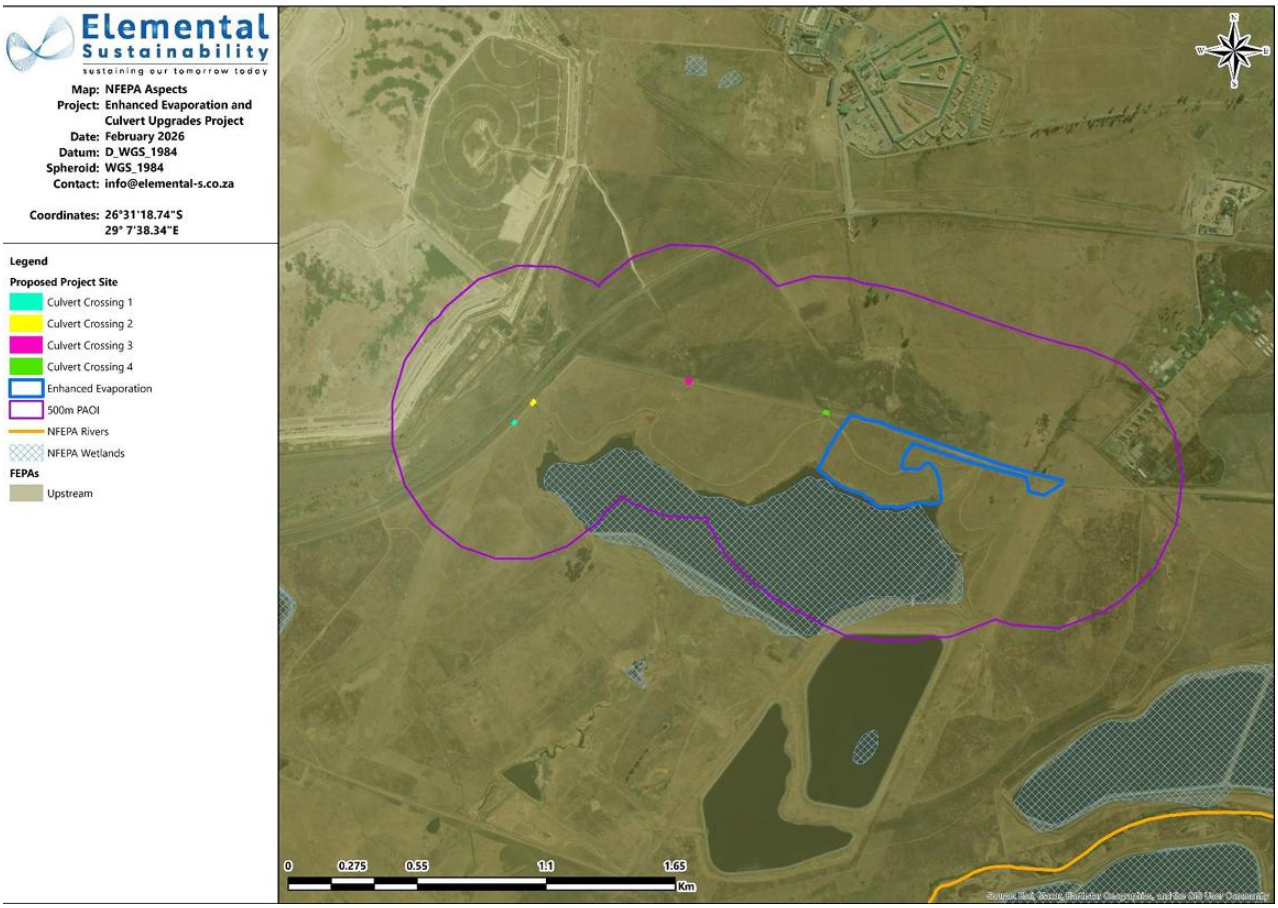


Figure 28: NFEPAs in relation to the proposed Project area (Hoosen, 2026)

In addition to the Kleinspruit NFEPA river, NFEPA wetlands are also present within the PAOI, with mapped features occurring primarily in low-lying areas associated with existing impoundments and downstream drainage pathways. These wetlands are classified as NFEPA wetlands, indicating their importance for supporting hydrological regulation, sediment retention, and downstream water quality.

10.7.6 National Wetland Map Version 5 (NWM5)

The NWM5 provides a national scale, desktop-based representation of wetlands derived from remote sensing, terrain analysis, and supporting datasets and is used to inform early-stage planning and specialist assessment requirements.

According to the NWM5, several wetland systems occur within and adjacent to the PAOI (**Figure 29**). These wetlands are primarily associated with low lying areas, drainage pathways, and artificial impoundments linked to existing process water dams. The mapped wetland types within the PAOI include the following:

- Channelled valley bottom wetlands, associated with defined drainage features and concentrated surface flow;

- Floodplain wetlands, occurring along broader, lower gradient valley floors downstream of impoundments; and
- Seep wetlands, linked to localised groundwater discharge zones on gentle slopes.

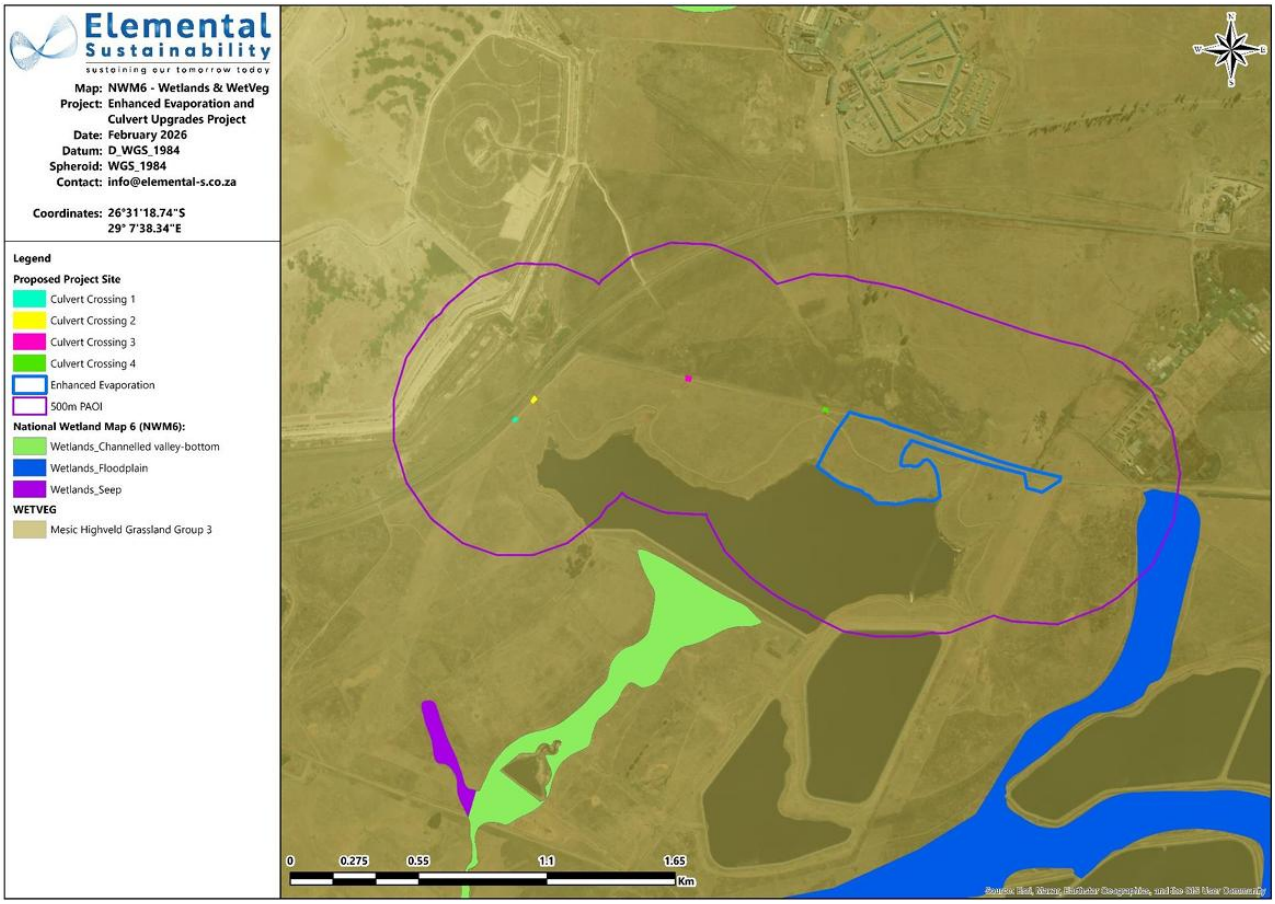


Figure 29: NWM5 wetland areas in relation to the proposed Project area (Hoosen, 2026)

Although the Project footprint does not directly affect NWM5 wetlands, the PAOI intersects NWM5 wetland polygons (**Figure 29**). In particular, wetland features are mapped downstream and adjacent to existing dams and along drainage lines that are crossed by proposed culvert infrastructure.

10.7.7 Wetland Vegetation (WetVeg)

The WetVeg dataset provides a national-scale classification of wetland vegetation based on floristic composition, moisture regime, and regional ecological setting.

According to the WetVeg dataset, wetlands within the study area are classified as Mesic Highveld Grassland Group 3. This wetland vegetation group is characteristic of the central Highveld region and is typically associated with seasonally saturated valley bottoms, seepage zones, and low-lying drainage features occurring on gently undulating terrain. Mesic Highveld Grassland Group 3 wetlands are generally dominated by grass and sedge species adapted to periodic waterlogging, with vegetation structure reflecting seasonal fluctuations in soil moisture. These systems commonly provide important ecological functions, including flow attenuation, sediment trapping, nutrient

assimilation, and support for downstream freshwater ecosystems. The occurrence of this wetland vegetation group within the PAOI is consistent with the regional topography, drainage patterns, and soil moisture conditions identified during desktop screening and field assessment.

10.7.8 Strategic Water Source Area (SWSA)

A Strategic Water Source Area (SWSA) refers to either (a) areas that supply an uneven (large quantity) amount of mean annual surface water runoff in relation to their size and are therefore considered to be nationally important or (b) have high groundwater recharge and where the groundwater forms nationally important resource or (c) areas that meat both criteria (a) and (b) (Nel *et al*., 2013; Le Maitre *et al*., 2018). Areas that supply these disproportionate amounts of water can be because of climatic conditions such as high rainfall, or physical properties (ability of the soils and underlying weathered material and rocks to store water as groundwater) (Le Maitre *et al*., 2018). In SA, 22 SWSA surface water and 37 SWSA groundwater areas have been identified to be strategically important at the national level for water and economic security (Le Maitre *et al*., 2018).

Desktop analysis of the Project Area and its 500 m PAOI confirmed that the site does not fall within a mapped Strategic Water Source Area.

10.7.9 Aquatic Biodiversity

Considering the fauna species that may be present in the proposed Project area, an estimated seven (7) fish species are expected to occur in this reach, all classified as Least Concern (LC), including:

- *Labeobarbus aeneus*;
- *Enteromius anoplus*;
- *Clarias gariepinus*;
- *Labeo capensis*;
- *Labeo umbratus*;
- *Pseudocrenilabrus philander;* and
- *Coptodon sparrmanii.*

In addition to the above, the following invertebrate Taxa is also expected: Turbellaria, Oligochaeta, Hirudinea, Potamonautidae, Hydracarina, Baetidae 1 Sp, Caenidae, Coenagrionidae, Gomphidae, Libellulidae, Belostomatidae, Corixidae, Gerridae, Hydrometridae, Naucoridae, Nepidae, Notonectidae, Pleidae, Veliidae/Mesoveliidae, Dytiscidae, Gyrinidae, Hydrophilidae, Ceratopogonidae, Chironomidae, Culicidae, Muscidae, Psychodidae, Simuliidae, Syrphidae, Tabanidae and Tipulidae

The below summary in **Table 12** of Riparian-Wetland Vegetation and Vertebrates (not including fish) can also be utilised to estimate the diversity and abundance of aquatic biodiversity in the proposed Project area

Table 12: Summary of Riparian-Wetland Vegetation and Vertebrates (not including fish) (Hoosen, 2026)

	Ratings	Habitat	Rating
Ecological Importance: Riparian-Wetland Instream Vertebrates (Ex Fish) Rating	High	Habitat Diversity Class	Low
Riparian-Wetland Natural Veg Rating Based on % Natural Veg in 500m (100%=5)	Moderate	Habitat Size Class (Length)	Very Low
Riparian-Wetland Natural Veg Importance Based on Expert Rating	Very Low	Instream Migration Link (Class)	Low
Ecological Importance: Riparian-Wetland Veg Comments	-	Riparian-Wetland Zone Migration Link	Low
		Riparian-Wetland Zone Habitat Integrity Class	Moderate
		Instream Habitat Integrity (Class)	Very Low

10.7.10 DFFE Screening Tool

According to the DFFE National Web-Based Environmental Screening Tool (Screening Tool) (refer to the Screening Report contained in **Appendix B**), the Aquatic Biodiversity Combined Theme indicates a mixed sensitivity profile across the study area. Portions of the development footprint and PAOI are classified as Low Aquatic Biodiversity Sensitivity, while discrete areas, primarily associated with mapped wetlands and river corridors, are classified as Very High Aquatic Biodiversity Sensitivity. The areas of very high sensitivity are linked to the presence of freshwater ecosystems, including wetlands and associated ecological support areas, which are considered important for maintaining hydrological and ecological functioning at a local and catchment scale.

The screening results indicate that the majority of the proposed project footprint falls within a broader zone of low ecological sensitivity. However, portions of the footprint intersect with, and are situated close to, areas of very high aquatic sensitivity. These include wetland systems and drainage features within the Project Area of Influence (PAOI), where potential impacts could arise from associated infrastructure such as culvert upgrades, access routes, and linear service installations.

Because of the presence of highly sensitive aquatic features within the PAOI, the Screening Tool identifies the need for a Wetland Delineation and Impact Assessment. This process is intended to confirm the extent, classification, and ecological condition of wetlands on site, and to evaluate both direct and indirect impacts linked to the proposed development activities.

To refine the screening outputs, site-specific fieldwork was undertaken by a Freshwater Specialist. This included delineating wetlands in line with nationally accepted methodologies and developing appropriate mitigation measures and buffer requirements. The approach followed is consistent with the provisions of Government Notice 320 of 2020, the Environmental Impact Assessment

Regulations (2014, as amended), and the requirements of the Water Use Licence Application process under Section 21(c) and Section 21(i) of the National Water Act (Act No. 36 of 1998).

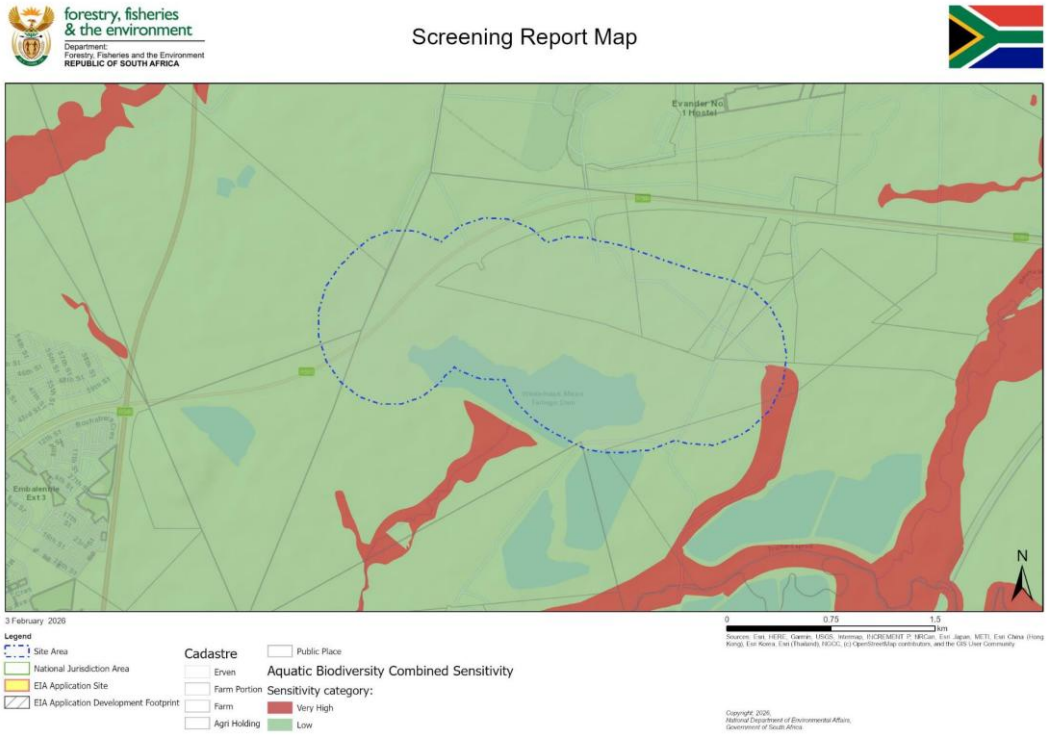


Figure 30: Map of relative Aquatic Biodiversity Theme Sensitivity in the Proposed Project area (Screening Tool, 2026; Hoosen, 2026)

10.8 Terrestrial Biodiversity

The information contained in the sub-sections to follow was partly extracted from the Terrestrial Biodiversity Impact Assessment (Paul, 2026). Refer to **Section 11.4** below for a synopsis of the study. The specialist report is contained in **Appendix C2**.

10.8.1 DFFE Screening Tool

The Screening Tool has classified the proposed Project site and its immediate surroundings as Very High Sensitivity due to the project footprint comprising Vulnerable Soweto Highveld Vegetation.

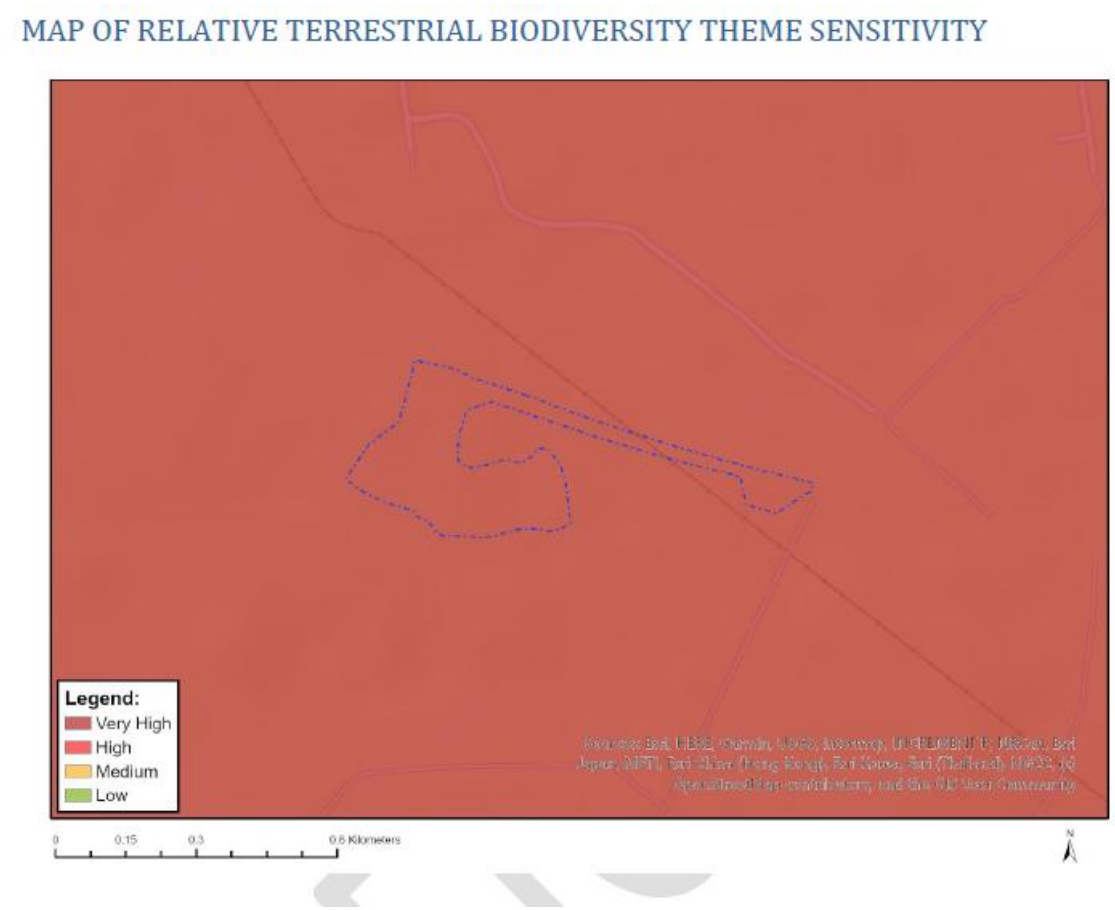


Figure 31: Very High Sensitivity Classification for the Relative Terrestrial Biodiversity Theme as per the Screening Tool (2026)

10.8.2 Biomes

The Proposed Project is located in the Grassland Biome and Highveld Ecoregion of South Africa, with Soweto Grassland being the main vegetation cover (**Figure 32**). This ecosystem is listed as Vulnerable in NEM:BA. National land cover data show that Soweto Highveld Grassland has experienced extensive spatial declines of approximately 61 % since 1750. Soweto Highveld Grassland is narrowly distributed with high rates of habitat loss in the past 28 years (1990-2018), placing the ecosystem type at risk of collapse.

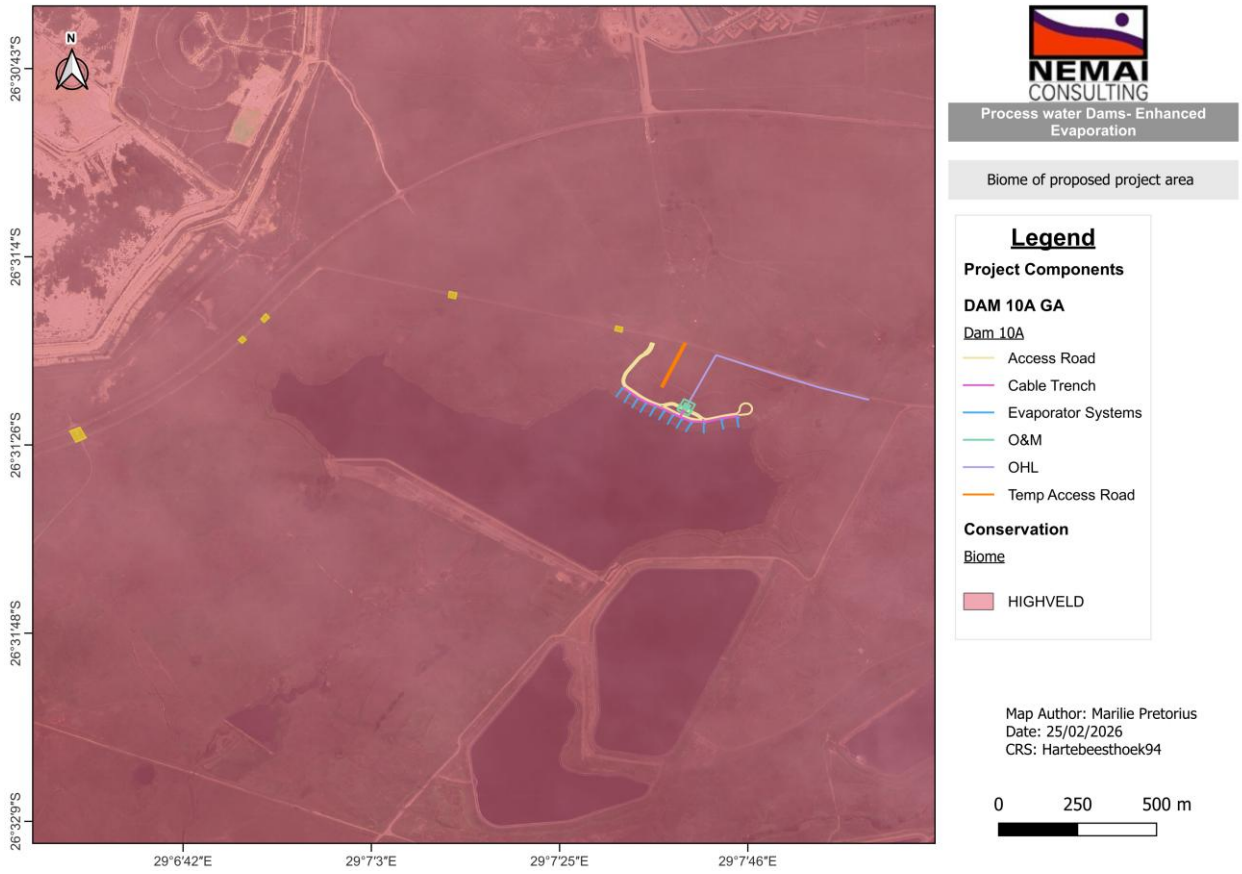


Figure 32: The proposed Project area in relation to biomes

10.8.3 Ecoregions

The ecoregions in the proposed project areas are discussed in **Section 10.7.3** above and shown in **Figure 27**. These ecoregions, from a terrestrial biodiversity perspective, are further discussed in the sub-sections to follow.

10.8.4 Vegetation Types

According to the national vegetation dataset compiled by Mucina and Rutherford (2006, version 2018), the site is associated with only one (1) national vegetation type, namely the Soweto Highveld Grassland.

10.8.4.1 Soweto Highveld Grassland

This vegetation type occurs on the gently rolling to moderately uneven terrain of the Highveld plateau. It consists mainly of dense, tufted grasslands ranging from short to medium height, with *Themeda triandra* as the dominant species. Other grasses commonly present include *Elionurus muticus, Eragrostis racemosa, Heteropogon contortus, and Tristachya leucothrix*. In undisturbed areas, the grassland cover is largely continuous, broken only by scattered small wetlands, narrow stream valleys, pans, and occasional rocky ridges or outcrops.

The following important taxa are used to define this vegetation type:

Graminoids:

Andropogon appendiculatus, Brachiaria serrata, Cymbopogon pospischilii, Cynodon dactylon, Elionurus muticus, Eragrostis capensis, E. chloromelas, E. curvula, E. plana, E. planiculmis, E. racemosa, Heteropogon contortus, Hyparrhenia hirta, Setaria nigrirostris, S. sphacelata, Themeda triandra, Tristachya leucothrix, Andropogon schirensis, Aristida adscensionis, A. bipartita, A. congesta, A. junciformis subsp. galpinii, Cymbopogon caesius, Digitaria diagonalis, Diheteropogon amplectens, Eragrostis micrantha, E. superba, Harpochloa falx, Microchloa caffra, Paspalum dilatatum.

Herbs:

Hermannia depressa, Acalypha angustata, Berkheya setifera, Dicoma anomala, Euryops gilfillanii, Geigeria aspera var. aspera, Graderia subintegra, Haplocarpha scaposa, Helichrysum miconiifolium, H. nudifolium var. nudifolium, H. rugulosum, Hibiscus pusillus, Justicia anagalloides, Lippia scaberrima, Rhynchosia effusa, Schistostephium crataegifolium, Selago densiflora, Senecio coronatus, Vernonia oligocephala, Wahlenbergia undulata.

Geophytic Herbs:

Haemanthus humilis subsp. hirsutus, H. montanus.

Herbaceous Climber:

Rhynchosia totta.

Low Shrubs:

Anthospermum hispidulum, A. rigidum subsp. pumilum, Berkheya annectens, Felicia muricata, Ziziphus zeyheriana.

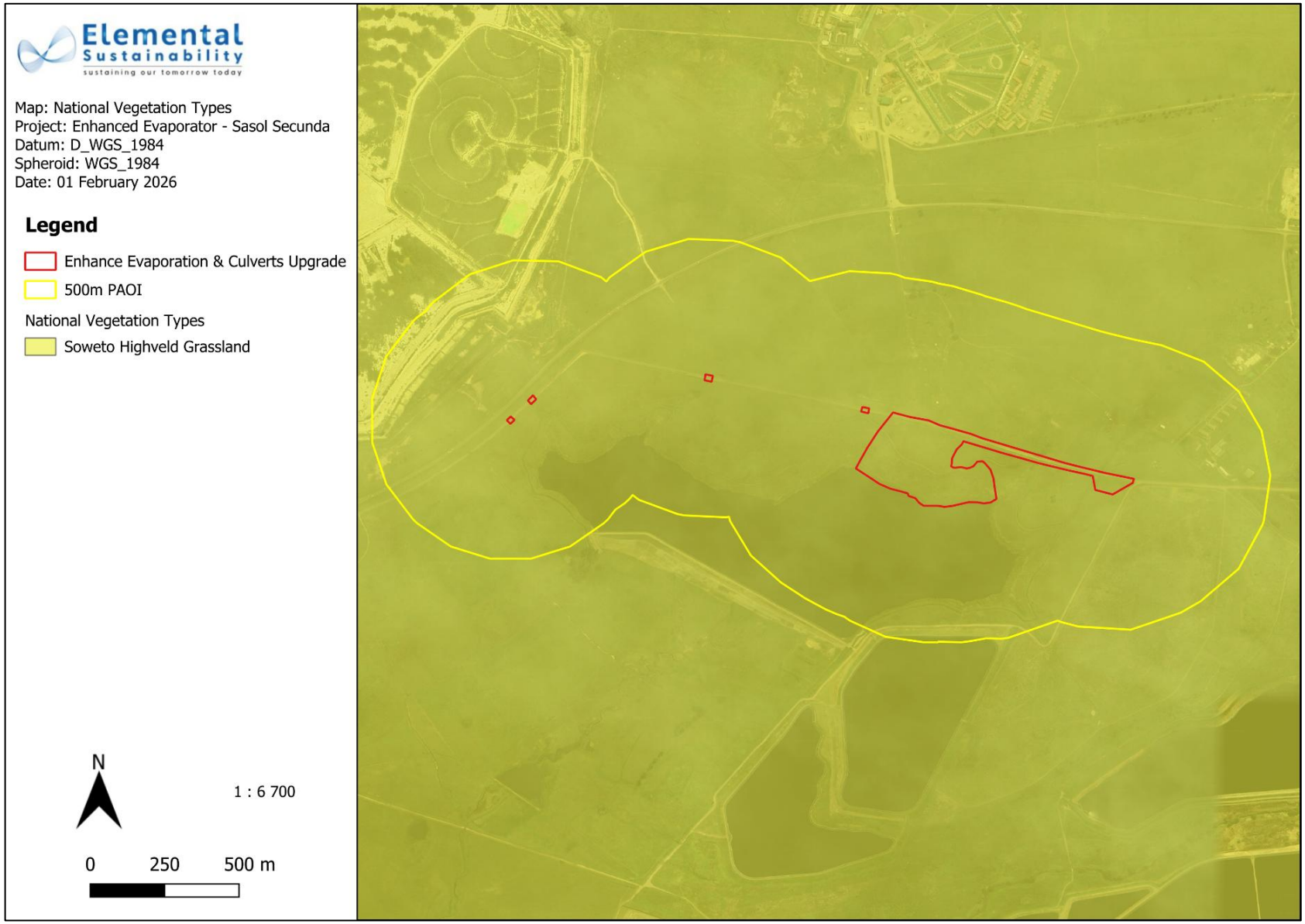


Figure 33: Vegetation type within the proposed Project area (Paul, 2026)

10.8.5 Threatened Ecosystems

According to the latest (remnant) version of the National Threatened Ecosystem dataset, parts of the proposed footprint intercept an ecosystem with a threat status of Vulnerable (Soweto Highveld Grassland).

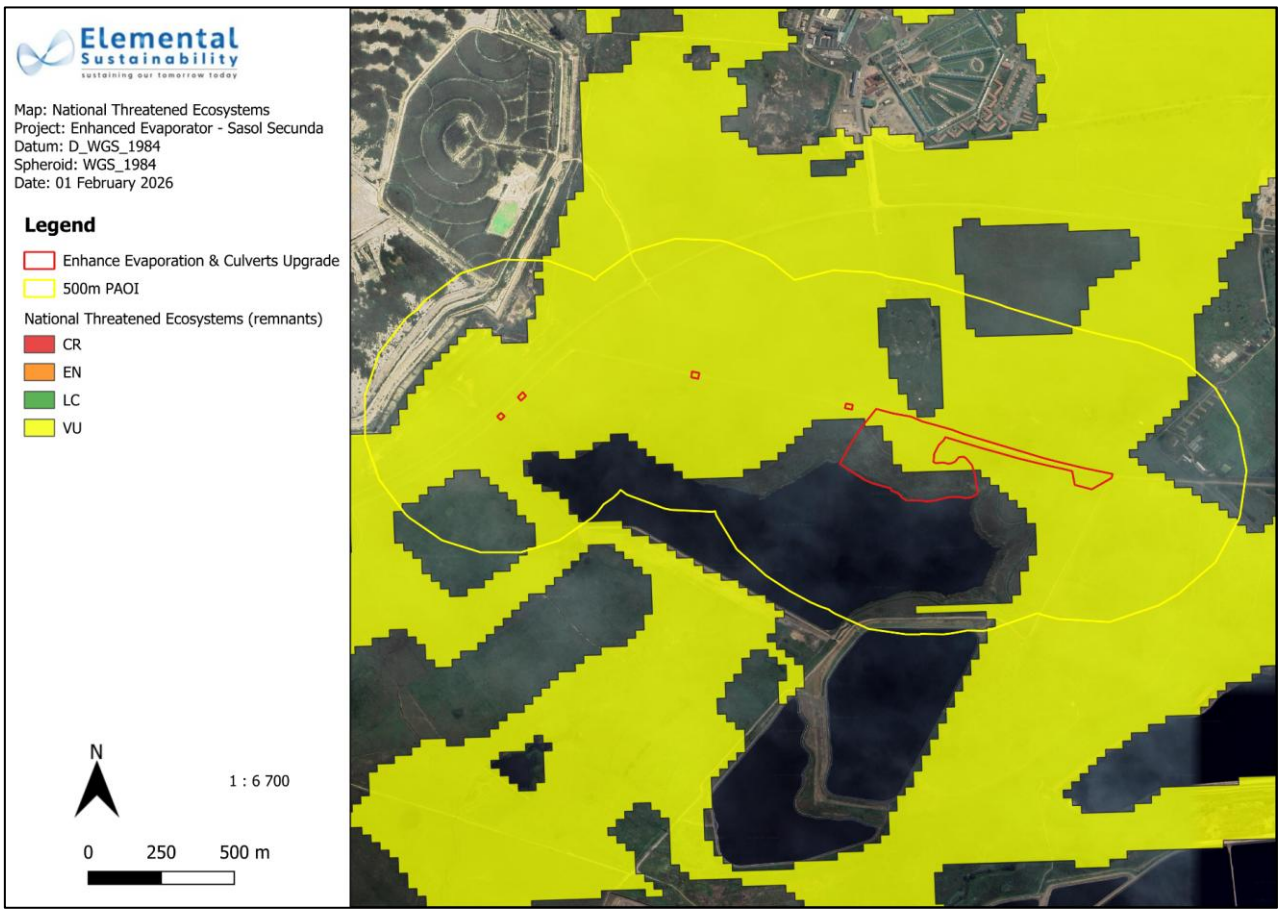


Figure 34: Proposed Project area in relation to threatened ecosystems

10.8.6 Protected Areas

According to the South Africa Protected Areas Database (SAPAD_OR_2025_Q3), no protected areas occur within the proposed Project area.

Additionally, according to the South Africa Conservation Areas Database (SACAD_OR_2024_Q3), the proposed Project will not take place within any protected areas.

10.8.7 National Protected Area Expansion Strategy

The National Protected Area Expansion Strategy (NPAES) presents the best opportunities in SA for meeting the ecosystem-specific protected area targets and was designed with strong emphasis on climate change resilience and requirements for protecting freshwater ecosystems.

As shown in **Figure 35** below, no NPAES Priority Focus Areas are located in the proposed Project area. The closest priority focus area is located ± 900 m from the proposed Project area.

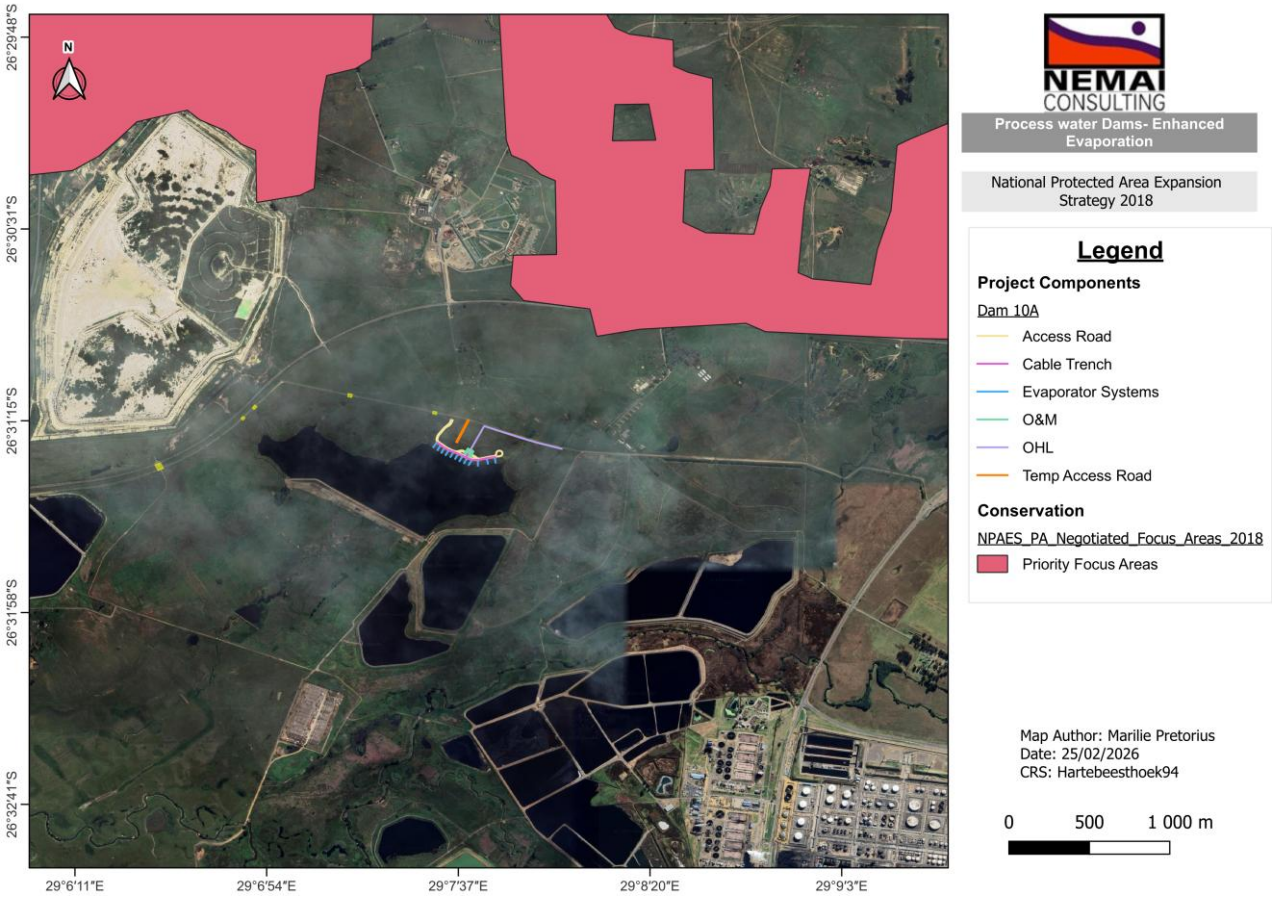


Figure 35: Proposed Project area in relation to NPAES

10.8.8 Critical Biodiversity Areas and Ecological Support Areas

The Mpumalanga Government has developed the Mpumalanga Biodiversity Sector Plan (MBSP), which serves as the province's most comprehensive and current biodiversity planning tool.

The main purpose of a biodiversity sector plan is to ensure that the most recent and best quality spatial biodiversity information can be accessed and used to inform land-use and development planning, environmental assessments and authorisations, and natural resource management. A biodiversity sector plan achieves this by providing a CBA map (or maps) of terrestrial and freshwater areas that are important for conserving biodiversity patterns and ecological processes – these areas are called Critical Biodiversity Areas (CBAs) and Ecological Support Areas (ESAs).

The CBA map delineates Critical Biodiversity Areas (CBAs), Ecological Support Areas (ESAs), Other Natural Areas (ONAs), Protected Areas (PAs), and areas that have been irreversibly modified from their natural state. In **Figure 36** and **Figure 37** below it is shown that no Terrestrial and Aquatic CBA's are located in the Proposed Project area.

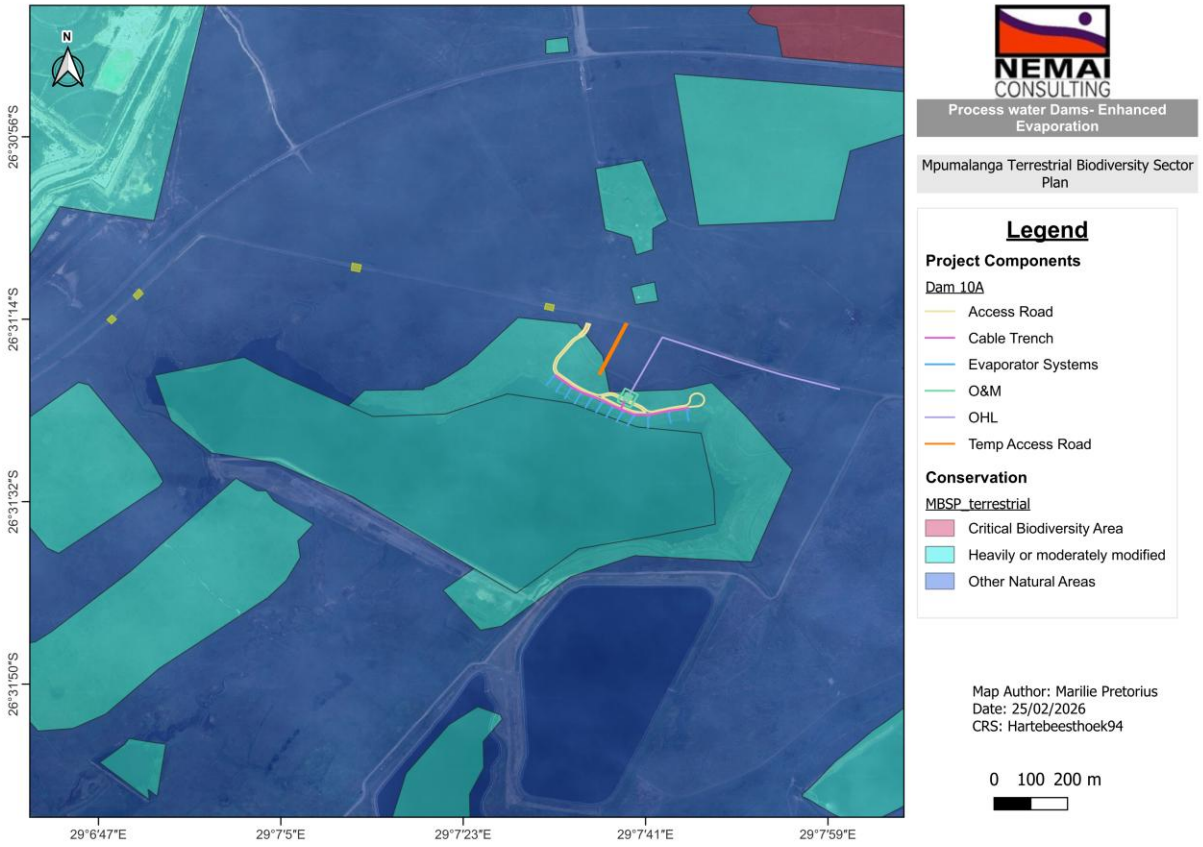


Figure 36: The proposed Project area in relation to the Terrestrial MBSP

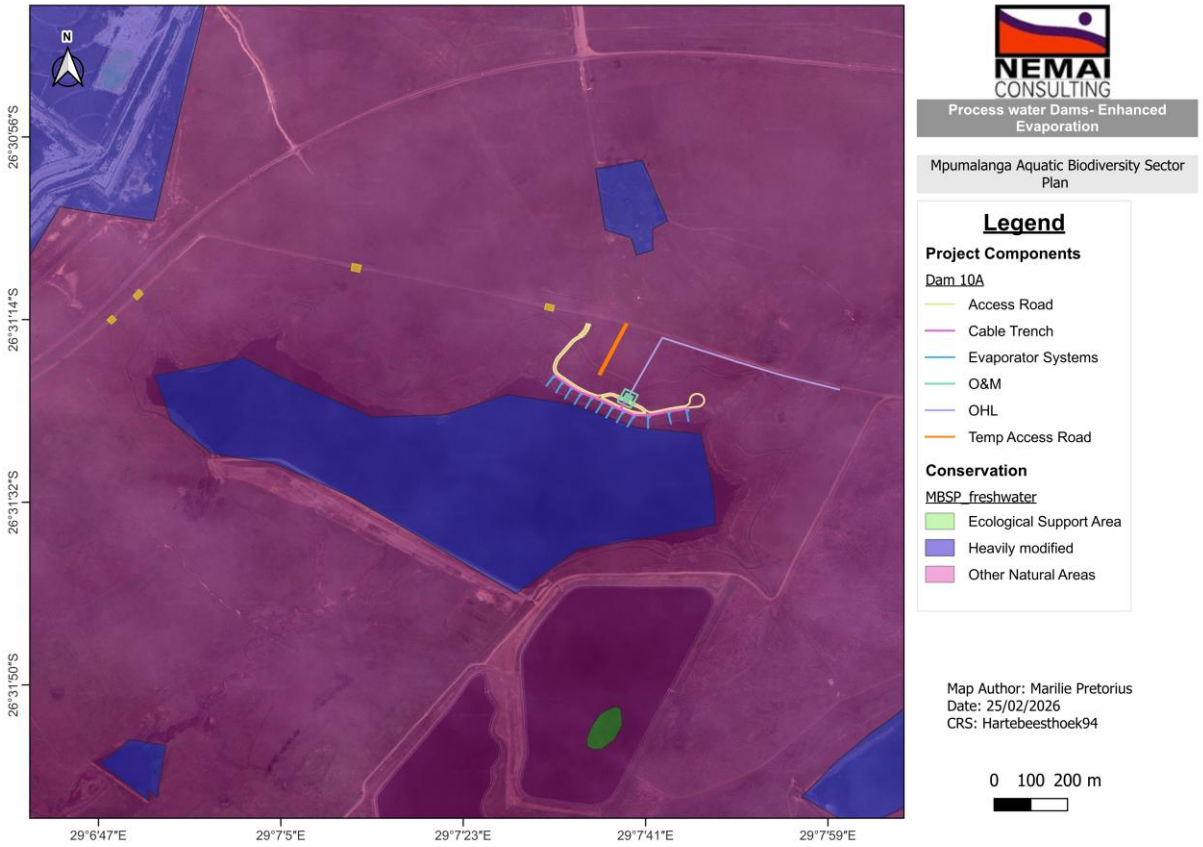


Figure 37: The proposed Project area in relation to the Aquatic MBSP

10.8.9 Important Bird and Biodiversity Areas (IBA)

The proposed Project is ± 23 km away from the nearest IBA, which is known as the Devon Grassland area.

10.8.10 Floral Assessment

10.8.10.1 DFFE Screening Tool

According to the Screening Tool Report, the study area as a whole has been afforded a combined "Plant Species Theme Sensitivity" of Medium. As illustrated in **Figure 38** below, the study area consists largely of areas which have a medium sensitivity and nearby areas of low sensitivity.

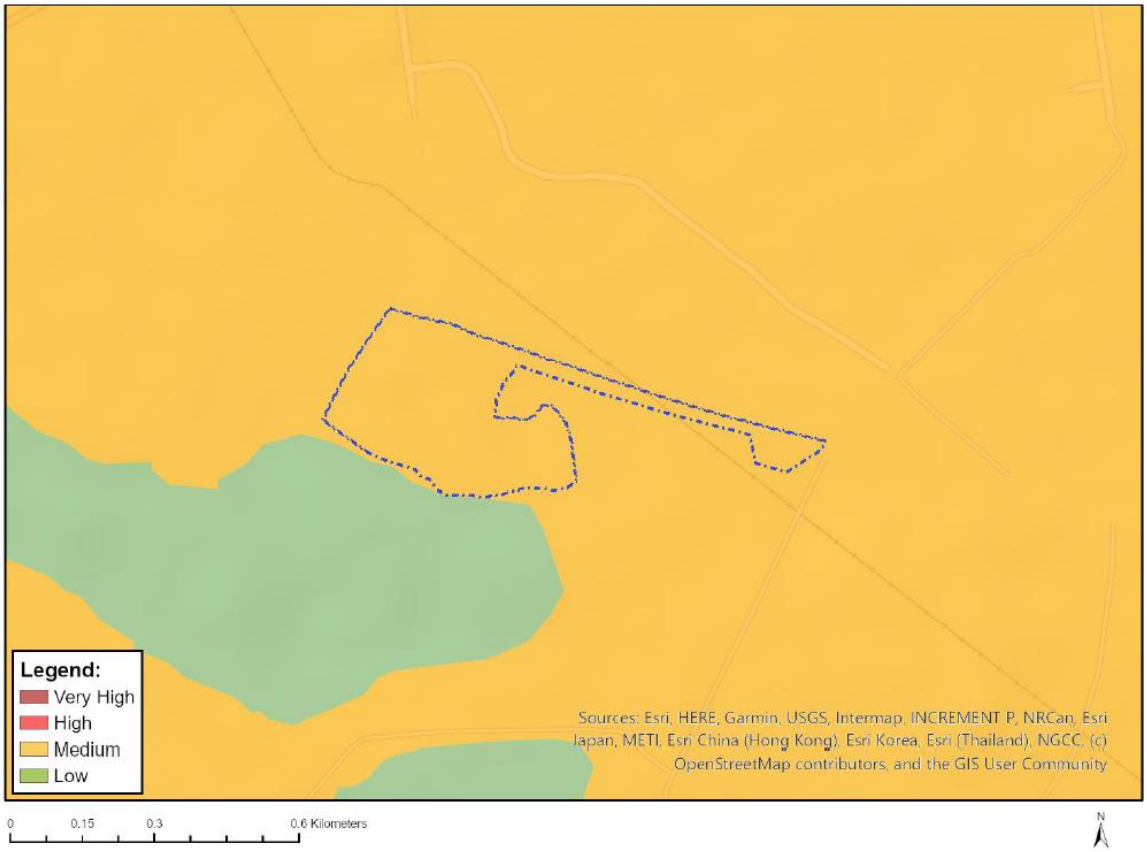


Figure 38: Illustration of the Plant Species Sensitivity Found within the Study Area and Greater Surrounds (DFFE, 2026)

None of the Plant Species sensitivity features identified by the Screening Tool (*Pachycarpus suaveolens* (Vulnerable), Sensitive species 691 (Vulnerable), Sensitive species 1252 (Vulnerable)) was observed during the site survey.

10.8.10.2 Floral Species

Section 10.8.4 provides a list of taxa that can be utilised to define the Soweto Highveld Grassland Vegetation type. During the site survey, habitat units (HU) were identified within the broader vegetation type (**Figure 39**).

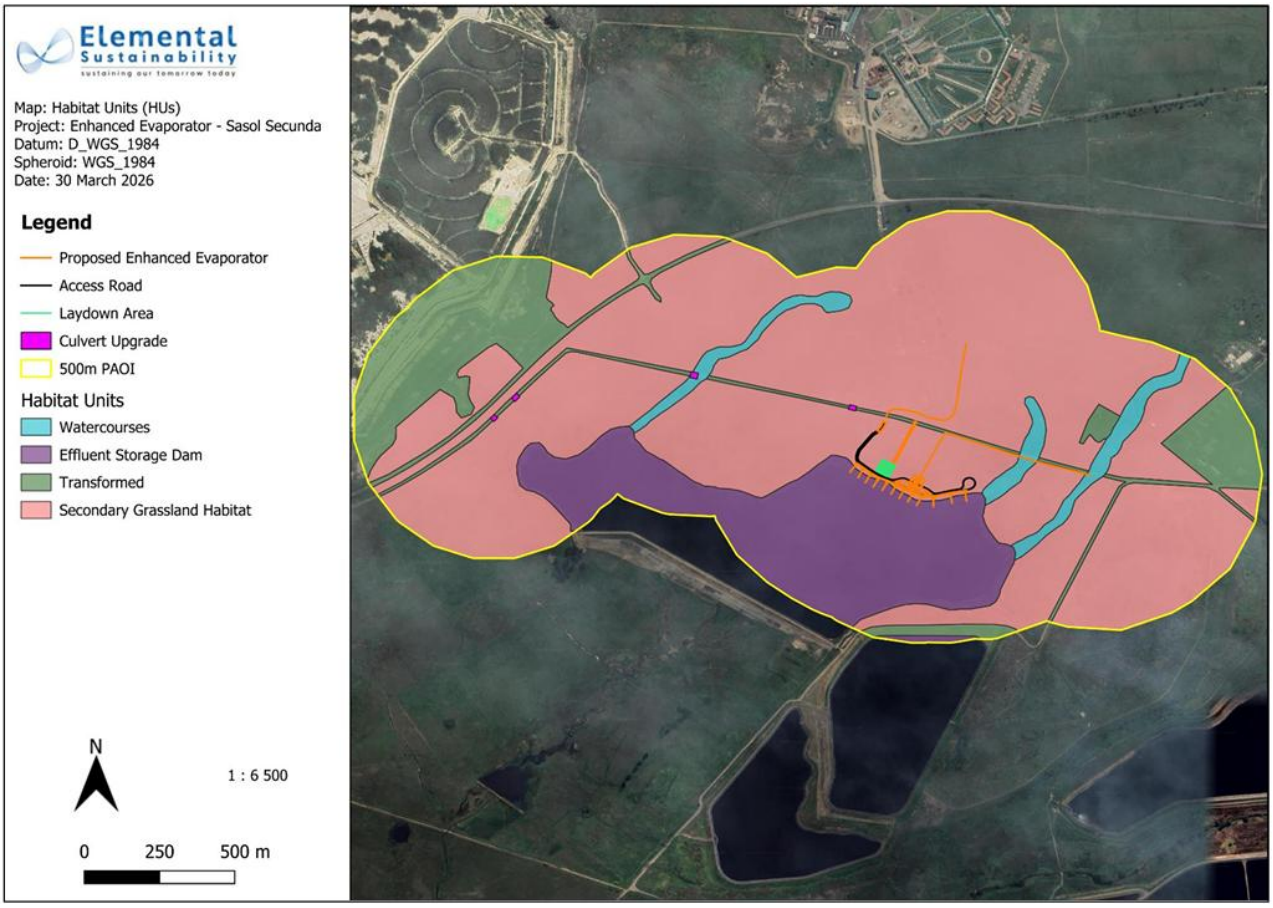


Figure 39: Habitat Unit Map of the proposed Project PAOI (Paul, 2026)

With respect to these identified habitat units, the following was observed:

- Watercourses:
  - A total of three (3) watercourses are found within the study area and extend from outside of the Sasol property through to the effluent storage dam. As part of the stormwater management plan for this site, surface water flow (specifically during peak flows) has been drastically altered by a stormwater berm, which channels freshwater around the effluent storage dam and into a natural system again. As sub-surface and groundwater still feed these wetlands, they have persisted and provide habitat for both fauna and flora.
  - The wetland habitat consisted of communities dominated by Typha capensis in the more permanent zones to naturally occurring sedges and grasses tolerant of wetter conditions. Species such as *Persicaria glabra* were also observed in varying abundance along these habitats.
- Secondary Grassland habitat:
  - This habitat unit is the most prominent within the study area and accounts for approximately 90 to 95% of the proposed development footprint. The assessment found that whilst many of these areas have recruited natural species (mostly grasses), they are not expected to function in the same way that natural grassland would, often being dominated by a few species, exhibiting an overall low species diversity.

- This category varies significantly across the study area, with some sections being more natural, while others are heavily dominated by alien invasive species and weedy ruderals that have taken advantage of the poor, disturbed conditions on site.
- The following is a list of the common plant species associated with this habitat unit:
  - *Aristida junciformis subsp. galpinii* - Uncommon, but found on site
  - *Berkheya setifera* (Buffalo-tongue thistle) – A common species throughout most of the study area
  - *Brachiaria serrata* (Velvet Signal Grass) – Common in areas of this HU
  - *Cirsium vulgare* (Scotch Thistle) – A common alien invasive species found across most of the site.
  - *Cosmos bipinnatus* (Cosmos) – A common exotic species found throughout the study area
  - *Cymbopogon caesius* – Very common in parts of the study area
  - *Cymbopogon pospischilii* (Bitter Turpentine Grass)
  - *Cynodon dactylon* (couch grass) – A common grass within wetter and disturbed areas
  - *Digitaria eriantha* (Pangola grass)
  - *Helichrysum miconiifolium* – A common species, especially within the proposed development footprint.
  - *Hyparrhenia hirta* (Common Thatching Grass) – A dominant species in areas
  - *Melinis repens* (Natal Red Top) – Common across more disturbed sections of the study with limited cover and recent disturbances (e.g. stormwater channel).
  - *Paspalum dilatatum* (Dallis Grass) – A common species within the ecotone between wetland and terrestrial habitat.
  - *Solanum elaeagnifolium* (Silverleaf Nightshade) – A very common invasive species found across most of the study area.
  - *Tamarix ramosissima* (Pink Tamarisk) – At least three stands of this alien invasive plant species were seen within the proposed development footprint.
  - *Themeda triandra* (Red Grass) – Common, but only found within more natural sections of this HU.
- A clump of approximately fifteen (15) *Gladiolus crassifolius* was observed within the study area, and part of the development footprint (26°31'19.74"S; 29° 7'39.75"E). This species is specifically protected under Schedule 11 of the Mpumalanga Nature Conservation Act, No. 10 of 1998. The preferred management approach is avoidance through demarcation and in situ protection. If avoidance is not feasible, the necessary permits must be obtained before any disturbance, removal, or relocation.

❑ Transformed Areas:

- The transformed areas on site are limited to the existing access roads that pass through the proposed site, the nearby tailings dam outside of the Sasol property and the agricultural buildings (polytunnels and cattle-related structures/enclosures).
- For the proposed Project, the existing road may be widened to accommodate the plant. Although a portion of the road traverses a watercourse, it is unlikely that post-

construction impacts will have a lasting impact on the ecological functionality of this area. Fringe vegetation adjacent to the roads (approximately 10 m) is of low value and is dominated by species tolerant of poor growing conditions.

- ❑ Effluent Storage Dam:
  - Banks of *Phragmites australis* are located on the side of Dam 10 A, where the evaporator systems are to be placed. This species is dominant, rapidly growing, and resilient, and sections are planned for clearing to promote pump performance. The population of this species should remain largely unaffected, with only minor clearing expected. As with many other HUs, vegetation clearance within this artificial habitat unit will have little impact on the receiving environment.

10.8.11 Faunal Assessment

10.8.11.1 DFFE Screening Tool

According to the Screening Tool (refer to the Screening Report contained in **Appendix B**), the sensitivity of the proposed Project in terms of Fauna is classified as Medium Sensitivity (**Figure 40**).

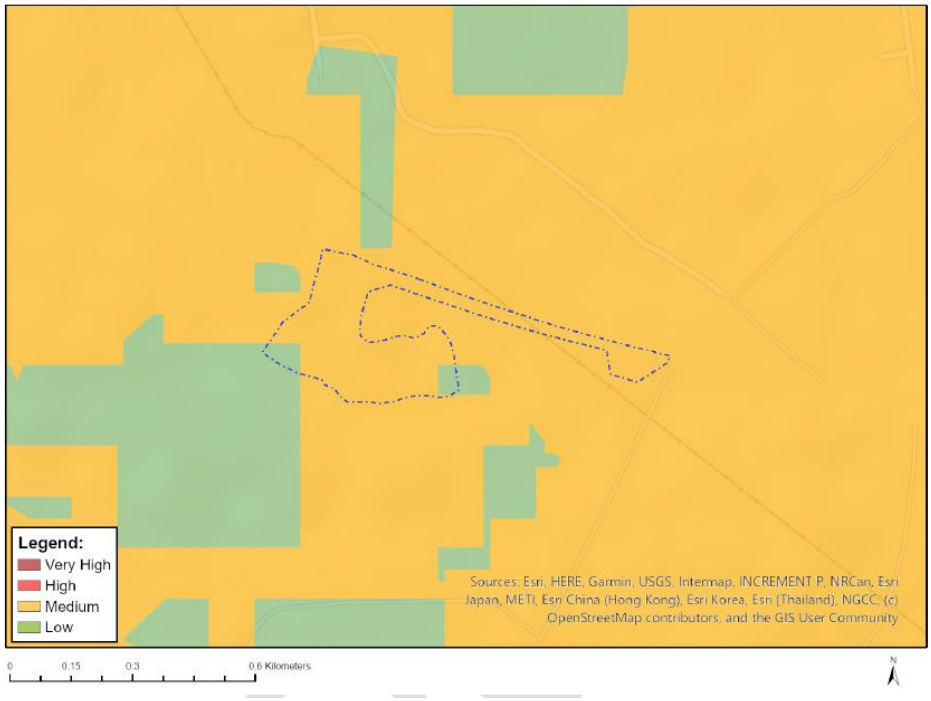


Figure 40: Illustration of the Animal Species Sensitivity Found within the Study Area and Greater Surrounds (DFFE, 2026)

This sensitivity classification was given due to the following sensitivity features:

- ❑ *Hydroprogne caspia*;
- ❑ *Sagittarius serpentarius*;
- ❑ *Eupodotis senegalensis*;
- ❑ *Tyto capensis*; and
- ❑ *Lepidochrysops procera.*

10.8.11.2 Fauna Species

The Terrestrial Impact Assessment considered the available microhabitats in the POA, in conjunction with the most recent faunal species distribution data.

- Mammals:
  - According to the records found for Evander and Secunda, it is unlikely that any mammal species of conservation concern occur within the Sasol Secunda facility, as well as the proposed development site. This is owed to the existing fencelines and the disturbed nature of the site. One unexpected observation of *Redunca arundinum* was made.
  - Spoor was observed of common duiker (*Sylvicapra grimmia*) and it is likely that other smaller mammal species do occasionally occur on site. With frequent records of snakes in the area, it is also likely that there is a healthy rodent population within the area, which may also influence the frequency of smaller bird of prey sightings.
- Herpetofauna:
  - According to the records found for Evander and Secunda, it is unlikely that any reptile or frog species of conservation concern occur on site. Although no observation were made during the survey, the following common species may be frequently observed by staff, especially during the wet season:
    - *Amietia delalandii,*
    - *Boaedon capensis,*
    - *Cacosternum boettgeri,*
    - *Causus rhombeatus,*
    - *Crotaphopeltis hotamboeia,*
    - *Hemachatus haemachatus,*
    - *Kassina senegalensis,*
    - *Lycodonomorphus laevissimus,*
    - *Sclerophrys gutturalis,*
    - *Trachylepis capensis, and*
    - *Trachylepis varia.*
- Invertebrates:
  - During the field assessment, active searching was undertaken for invertebrates. Whilst several different species were observed, no SCC were identified during the field assessment. *Lepidochrysops procera* was identified as a butterfly species that may occur in this region. The overall lack of habitat, as well as its known larval host plant (*Ocimum obovatum*) would make observations within this study area unlikely.
- Avifauna:
  - According to the records found on the Southern African Bird Atlas Project (SABAP2) database and Screening Tool Report, a total of 120 species were recorded. Of the species recorded, only six (6) were bird Species of Conservation Concern (SCC):
    - *Eupodotis senegalensis* -White-bellied bustard;
    - *Falco biarmicus* - Lanner Falcon;

- *Phoenicopterus roseus* - Greater Flamingo;
- *T. capensis* - African Grass Owl;
- *Hydroprogne caspia* - Caspia Tern; and
- *Sagittarius serpentarius* - Secretary bird

- Of the above species *T. capensis* - African Grass Owl, was observed during the site survey. The Specialist further states that no nesting areas were observed on site, and it is likely that the specimen observed was roosting in the tall grassy undergrowth just outside of the site.

10.9 Socio-Economic Environment

10.9.1 Municipal Profile

The proposed Project is located in Ward No.10 of Govan Mbeki Local Municipality (GBLM), within the Gert Sibande District Municipality (GSDM).

GSDM is the largest of the three Districts in Mpumalanga Province at 31,841 km², covering 40% of the Mpumalanga Province's land mass. The western portion of the district mostly comprises typical Highveld vegetation and climate, with the eastern end of the District being more mountainous and characterised by extensive forestry and rural settlements and villages (IDP, 2022-2027).

Govan Mbeki Municipality is one of the 7 local municipalities under the jurisdiction of Gert Sibande District. The Govan Mbeki area is mainly agricultural / rural with 3 urban conglomerates, namely: Leandra (Leslie, Lebohang and Eendracht) in the western edge, the Greater Secunda (Trichardt, Evander, Kinross and Secunda / Embalenhle) conurbation in the central part and Bethal / Emzinoni in the east. Govan Mbeki has the most diversified economy within the Gert Sibande District, dominated by the petrochemical industry (the Sasol II and III complexes) and coal and gold mining.

Both the District Development Plan and Local Municipal Development Plan is aligned with the National Development Plan (NDP) 2030 with the broad goal of this plan is to reduce unemployment, alleviate poverty and reduce inequality by 2030.

In line with the principles of the NDP, the Mpumalanga Vision (MPV) 2030 the following socio-economic outcomes are highlighted as priorities:

- ❑ Employment and economic growth
- ❑ Education and training
- ❑ Health care for all
- ❑ Social protection

Key statistics for GBLM, are presented in **Table 13** below. According to Stats SA's Census 2022, Govan Mbeki's population increased from 294 538 in 2011 to 310 117 people in 2022 – 7th largest in Mpumalanga in 2022. The youth population (0-34 years) formed 62.1% of the local municipal area's population & the elderly population (60+ years) 8.3%. In 2022, the female population's share

was 49.9% and that of males 50.1%. The population increased by 15 579 between 2011 and 2022, a population growth rate of only 0.5% per annum, which was slightly higher than the corresponding economic contraction of 0.2% p.a. Surprisingly low, but official figures from Stats SA that will be used by National Treasury for many years to come. The number of households in Govan Mbeki increased from 83 869 in 2011 to 103 864 households in 2022 – an increase of 19 995 households & a growth rate of 2.1% p.a. Govan Mbeki's share of Mpumalanga's households declined from 7.8% in 2011 to 7.3% in 2022. The household size declined from 3.5 in 2011 to 3.0 in 2022. One of the lower sizes in the province.

Table 13: Key Statistics for GMLM (IDP, 2024/2025)

	2022	2011
Total population	310 117	294 538
Young children (0-14 years)	25,40%	26,90%
Working age population (15-64 years)	69,80%	69,40%
Elderly (65+ years)	4,70%	3,70%
Dependency ratio	43,2	44
Sex ratio	100,3	106,9
No schooling (20+ years)	7,10%	7,90%
Higher education (20+ years)	8,10%	11,80%
Number of households	103 864	83 869
Average household size	3	3,5
Formal dwellings	86,40%	71,00%
Flush toilets connected to sewerage	92,00%	90,40%
Weekly refuse disposal service	85,20%	91,70%
Access to piped water in the dwelling	66,40%	56,50%
Electricity for lighting	92,80%	90,30%

It is noted in the GMLM IDP that the LM links with economic interventions in GSDM through enhancing the manufacturing sector in Gert Sibande, with the planned Petro-Chemical Technology Park in Secunda, as part of the Mpumalanga Industrial Development Plan (MIDP).

10.10 Air Quality

The proposed Project Area does fall into the HPA declared in terms of section 18(1)(a) and (b) of NEM:AQA. Air quality sensitive receptors are those locations where the impact of the project is typically assessed, and they include residential areas, schools, hospitals and clinics. Within close proximity of the Sasol Secund Operations and focusing on the proposed project at PWD 10A (~6 km), 67 sensitive receptors were identified (27 of which occur within the area depicted in **Figure 41**). The closest receptor - a school - is approximately 1.5 km to the north of the project location, while the nearest residential area is approximately 3.5 km to the southwest of the project location.

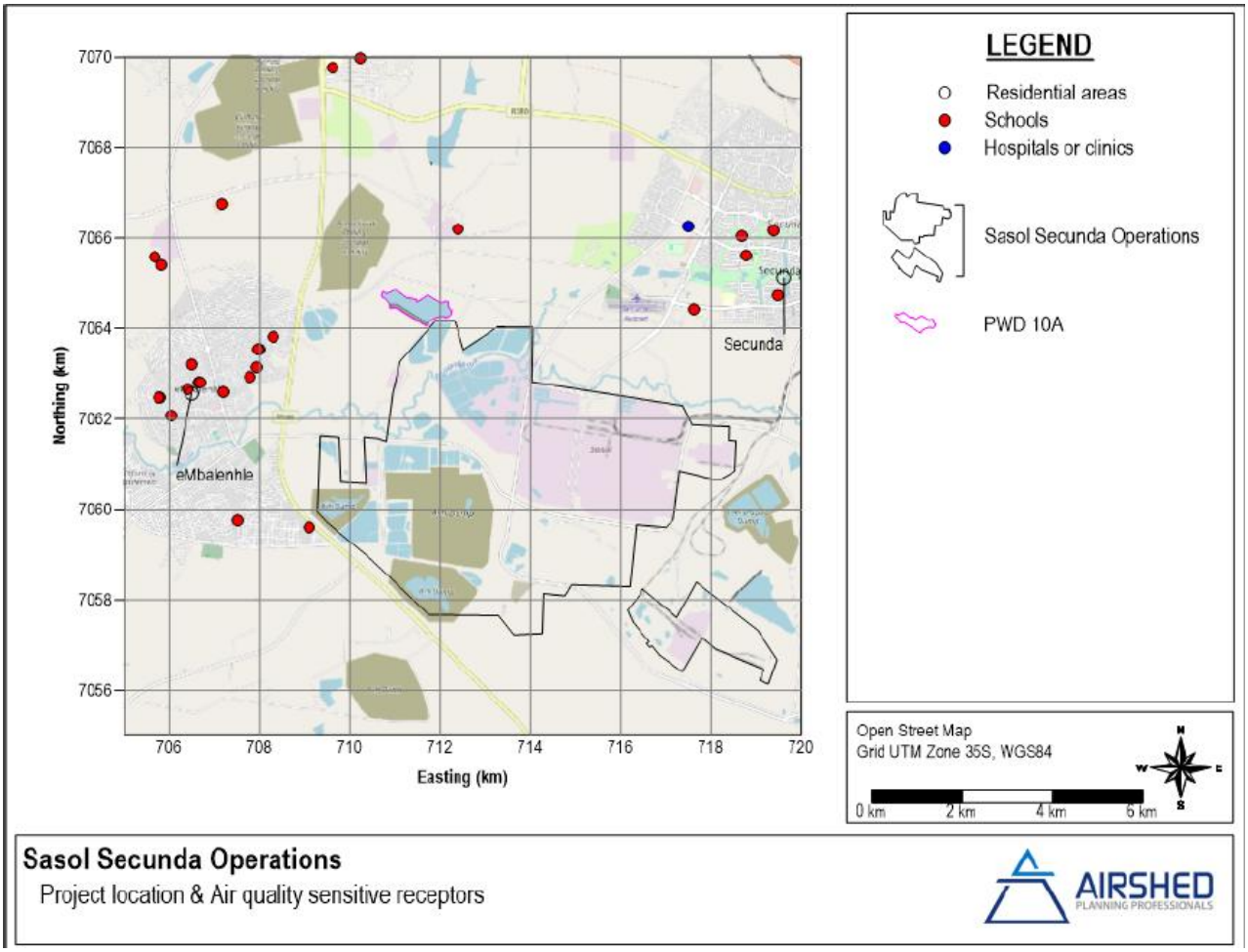


Figure 41: The project location in relation to the Sasol Secunda Operations and nearby air quality receptors (Bird, 2026)

Additionally, the wind field of the area is predominated by east-northeasterly winds followed by a high frequency of north-northwesterly winds; southerly winds are rare. Windspeeds are commonly (40%) above 3 m/s (a light breeze), with high wind speed events (above 6 m/s) being as common as calm conditions (~10%). North-westerly flow is more common during the daytime, and northeasterly flow at nighttime, where wind speeds are lower.

Existing air quality within the study area is influenced by SO, mining activities, vehicle emissions and fugitive dust sources. Monitoring data reviewed as part of the AQIA (Bird and Burger, 2026) indicated that PM_{10} and $PM_{2.5}$ concentrations are already elevated at several monitoring stations within the surrounding area. The AQIA also identified elevated short-term H_2S concentrations associated with nuisance odour. The pollutants considered most relevant to the proposed Project include particulate matter, dustfall, H_2S and VOCs. The AQIA therefore assessed both project-specific and cumulative air quality impacts (refer to **Section 11.7** and **Section 12.14**).

10.11 Visual Quality

The Project site is located within an area with PWDs in a built-up industrial complex. Furthermore, the Project site is characterised by disturbed vegetation. Please refer to **Figure 42** below for a overview of the visual character of the proposed site. As the site is surrounded by industrial development, this development is expected to fit in with its surroundings. This agrees with the findings of the SSV (**Appendix I**).



Figure 42: Visual character of the proposed site (A: Overhead Powerline, B: Service roads for PWDs, C: Disturbed vegetation)

10.12 Noise

In terms of the local acoustical environment, the background noise levels are typical of a rural area with an industrial influence. Noise in the area emanates primarily from anthropogenic sources such as vehicles on the surrounding road network, farming operations, including a nearby chicken farm, and cattle in surrounding camps. In enhanced evaporation, the spraying of wastewater into the air can create mechanical noise from pumps and dispersal equipment, as well as aerodynamic noise from droplets interacting with air currents.

Sensitive receptors to noise include the neighbouring chicken farm, sensitive faunal species, and livestock. However, it should be noted that already existing agricultural activities (chicken farm and cattle) may generate sound levels between 60–90 decibels (dB). Continuous operation may raise background noise levels in industrial or residential areas, potentially affecting human comfort and wildlife.

10.13 Agriculture

10.13.1 DFFE Screening Tool

The Screening Tool indicated a High sensitivity for Agriculture due to 08. Moderate and 07. Low-Moderate land capability.

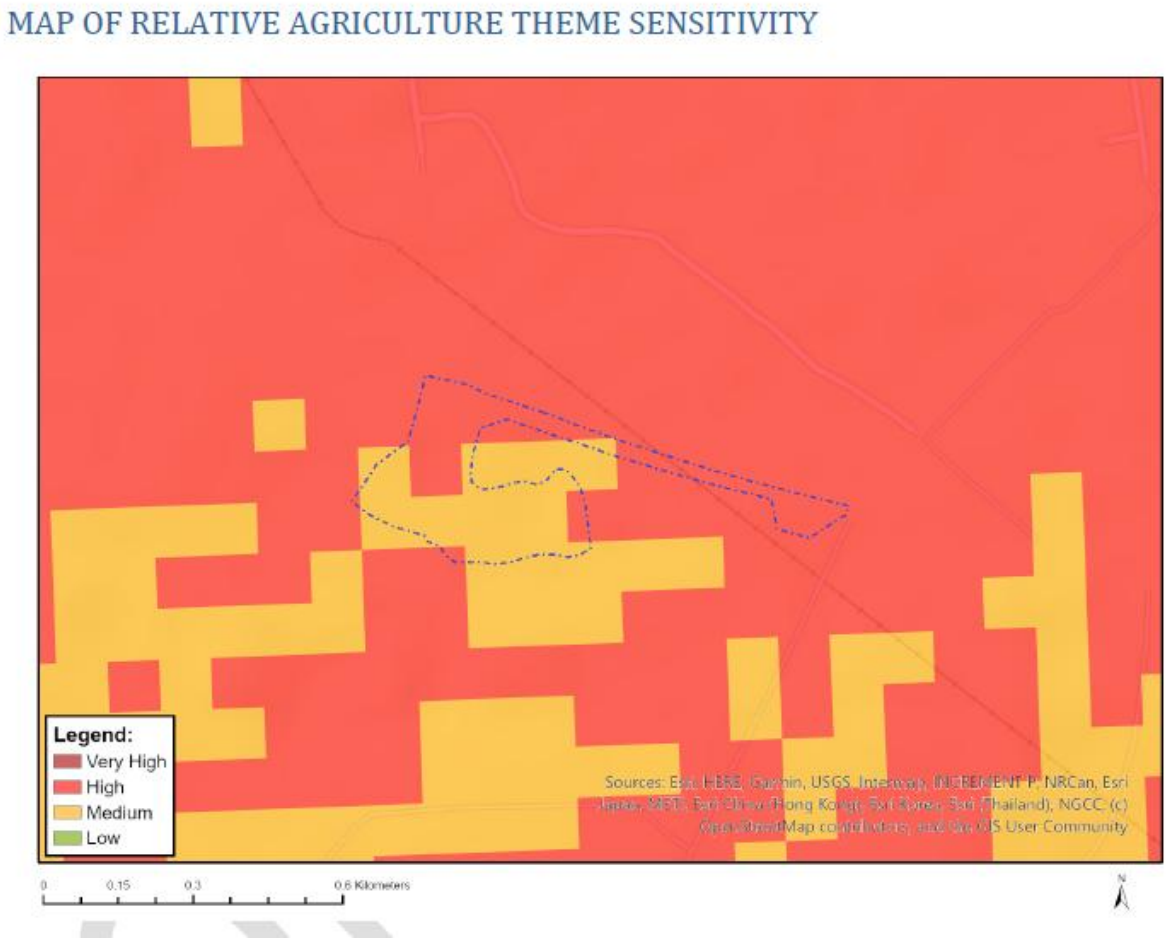


Figure 43: Relative Agriculture Theme Sensitivity in the proposed Project Area

The most current agricultural practice in the proposed Project area is cattle farming. It is, however, important to note that the proposed Project area falls within an industrial complex where the main activities are of an industrial nature. Although it is indicated in the National Land Cover Map (**Figure 19**) above that, the proposed Project Area contains Fallow Land and Old Fields (Grass). No other evidence of agricultural activity was observed during the SSV, other than cattle farming.

10.14 Planning

According to the municipal IDP (GBLM, 2024/2025), the management of future growth and associated change is guided by Development Strategies that will manage the Spatial Development Concept and Strategic Focus Areas that enhance the efficient utilisation of land and infrastructure,

supported by management decisions over ad-hoc and dispersed forms of development, resulting in a highly sustainable pattern of development.

Six (6) strategic objectives were identified providing Spatial Strategic Focus Areas (areas of intervention at a local level):

- Strategic Objective 1: Economic development and job creation supporting and guiding development;
- Strategic Objective 2: Promoting education, training and innovation;
- Strategic Objective 3: Accommodating urbanisation and transforming human settlements;
- Strategic Objective 4: Promote the development of the rural areas within Govan Mbeki that can support sustainable economic, social and engineering infrastructure;
- Strategic Objective 5: Protect biodiversity, water and agricultural resources; and
- Strategic Objective 6: Infrastructure Investment.

10.15 Heritage

The information contained in this section was extracted from the Scoping Heritage Impact Assessment (Kitto, 2026). Refer to Section 11.5 below for a synopsis of the study. The specialist report is contained in **Appendix C3**.

10.15.1 DFFE Screening Tool

As shown in **Figure 44** below, the Screening Tool shows The Screening Tool was accessed for information on the cultural-heritage sensitivity of the general region. This indicates that the archaeological and cultural heritage sensitivity of the project area is low.

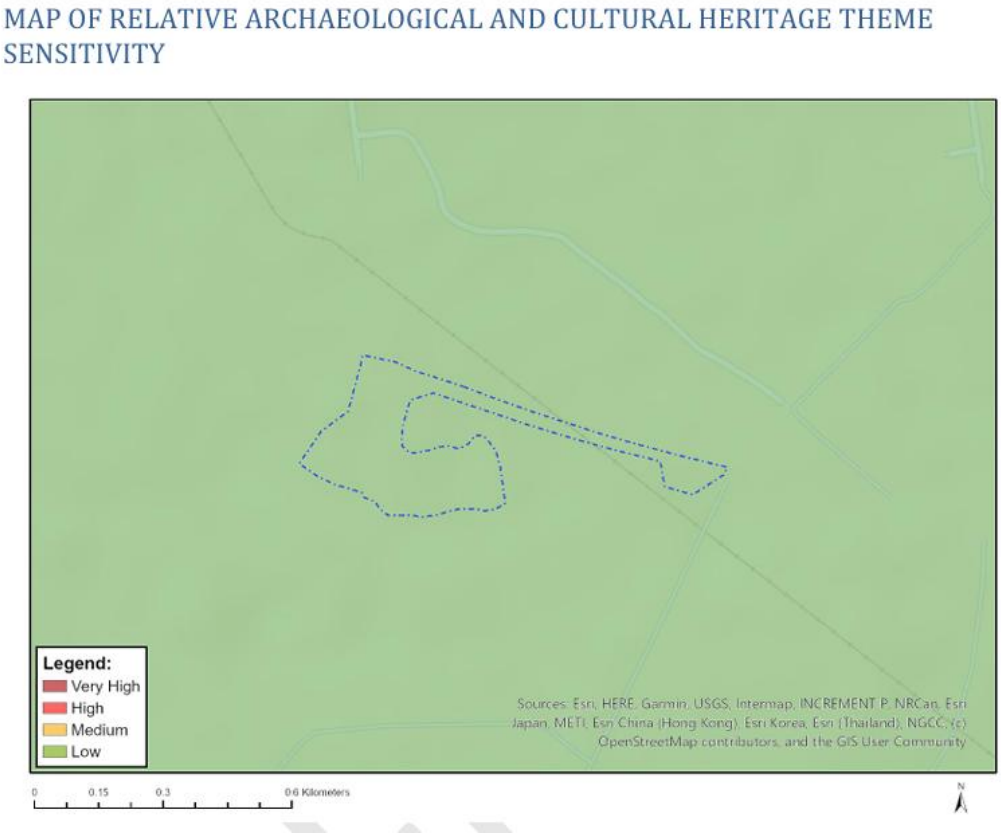


Figure 44: Map of relative Archaeological and Cultural Theme Sensitivity (Screening Tool, 2026)

10.15.2 Historical Background of the Surrounding Region

The Heritage Impact Assessment Report contains information related to the historical background of the surrounding region (based on an archaeological and historical literature survey). The study area forms part of a region with a long and complex history of human occupation, spanning from the Early Stone Age to the modern industrial era.

Archaeological evidence indicates that human activity in southern Africa dates back approximately 2 million years, beginning with the Earlier Stone Age (ESA), characterised by Oldowan and Acheulian stone tool industries (Esterhuysen & Smith, 2007). Although no ESA sites are known in the immediate study area, Middle Stone Age (MSA) occupation is well documented regionally, including at Bushman Rock Shelter (c. 40 000–27 000 BP) (Esterhuysen & Smith, 2007; Wadley, 2013). The Later Stone Age (LSA), from approximately 20 000 years ago, is associated with San hunter-gatherers and early Khoekhoe pastoralists, microlithic technologies, and rock art traditions (Deacon & Deacon, 1999). Numerous rock painting sites have been recorded in the broader region, including recent documentation of 31 sites near Carolina and surrounding towns (Smith & Zubieta, 2007; Maseko, 2020).

The Early Iron Age (c. AD 500–1100) marks the arrival of Bantu-speaking farming communities practising mixed agriculture and metallurgy (Esterhuysen & Smith, 2007). During the Late Iron Age (AD 1600–1840), extensive stone-walled settlements developed in the region, reflecting increased population and socio-political complexity (Delius, 2006; Huffman, 2007). Ceramic traditions such

as the Uitkomst (AD 1650–1820) and Buispoort (AD 1700–1840) facies are documented regionally, although no such sites are recorded within the immediate study area (Huffman, 2007).

Historically, the region was shaped by the migration and settlement of the Transvaal Ndebele, who moved northwards from KwaZulu-Natal between c. 1650 and 1700 (Esterhuysen, 2008; Skhosana, 2010). The upheavals of the Difaqane/Mfecane in the late 18th and early 19th centuries caused widespread displacement of communities, including the Pedi and Sotho groups (Makhura, 2007; Kitto, 2015). Swazi expansion under King Sobhuza subsequently reshaped settlement patterns in Mpumalanga (Bonner, 1983).

European settlement began in the 1830s, with Voortrekker migration and the establishment of Lydenburg in 1845 (Bergh, 1999). The South African War (1899–1902) affected the broader region, notably the Battle of Bakenlaagte (30 October 1901), although no direct conflict is recorded in the Secunda area (Birkholtz, 2017).

Twentieth-century development transformed the region through mining and industrialisation. The Winkelhaak Gold Mine, established in 1955, marked the beginning of major gold mining on the Evander field (Union Corporation Ltd, 1974). The town of Secunda was proclaimed in 1976 following the establishment of Sasol Two, developed in response to the 1973 oil crisis. Sasol's expansion created one of the world's largest petrochemical complexes (Sasol; Mpumalanga.com). During the liberation struggle, Sasol's strategic importance made it a target for Umkhonto weSizwe (MK). The 1980 bombings of Sasol I and II by the "Sasol Three" and subsequent actions by Patrick Chamusso form a significant part of the region's political history (SA History Online). These events underscore Secunda's role in South Africa's broader struggle history.

Overall, the region reflects continuous occupation and transformation, from early hunter-gatherer societies and Iron Age farming communities to colonial settlement, industrial mining, petrochemical development, and liberation struggle activity.

10.15.3 Site Survey

During the fieldwork by the Heritage Specialist, the findings of the desktop study were confirmed, as it identified the demolished remains of the livestock enclosure just outside the footprint boundary. The inspection of the area that was surveyed identified no heritage resources within the project footprint and only one heritage resource adjacent to the footprint boundary.

Figure 45 below shows the overgrown and sparse remains of a livestock enclosure. It is located approximately 12 m south of the access road/southeastern boundary.



Figure 45: View of the remains of the livestock enclosure, showing a metal entrance as well as dense and long vegetation cover



Figure 46: Heritage resource identified in the Project area (Kitto, 2026)

10.16 Palaeontology

The information contained in this section was extracted from the Desktop Palaeontological Impact Assessment (Butler, 2026). Refer to Section 11.6 below for a synopsis of the study. The specialist report is contained in **Appendix C4**.

The proposed study area is entirely underlain by Dolerite of the Karoo Igneous Province. The South African Heritage Resources Information System (SAHRIS) Palaeontological Sensitivity Map classifies the area as having Zero Palaeontological Sensitivity (Almond & Pether, 2009; Almond et al., 2013; Groenewald et al., 2014). However, the Screening Tool Report identifies the broader study area as falling within a Medium Palaeontological Sensitivity.

10.16.1 Geological and Palaeontological Background of the Surrounding Region

Secunda lies on the Highveld plateau of Mpumalanga at about 1,619 m above sea level, with a landscape of gently sloping plains that shape its climate and drainage. The natural vegetation belongs to the Highveld Grassland biome, dominated by tufted grasses such as *Themeda triandra* and *Eragrostis* species, with limited shrubs in wetter areas. Much of this flora has been altered by urbanisation and agriculture, although remnants still include grasslands, wetlands, and low-shrub patches typical of the Soweto, Eastern, and Rand Highveld Grassland types. Geologically, the area is underlain by dolerite intrusions of the Karoo Igneous Province, a vast continental flood basalt system formed by successive fissure eruptions that once covered much of southern Africa. These rocks, including dolerite sills and dykes, have little palaeontological sensitivity as they do not preserve fossils, and their heat often destroys fossil material in adjacent sediments. While some surrounding sedimentary units may retain fossils, overall palaeontological sensitivity is considered low.

10.16.2 DFFE Screening Tool and SAHRIS Paleo Map

As shown in **Figure 47** below, the Screening Tool indicates the proposed project footprint to be of medium sensitivity. The SAHRIS Paleo Map indicates a “insignificant/zero” palaeontological sensitivity as per underlain sediments for the proposed Project footprint (**Figure 48**).

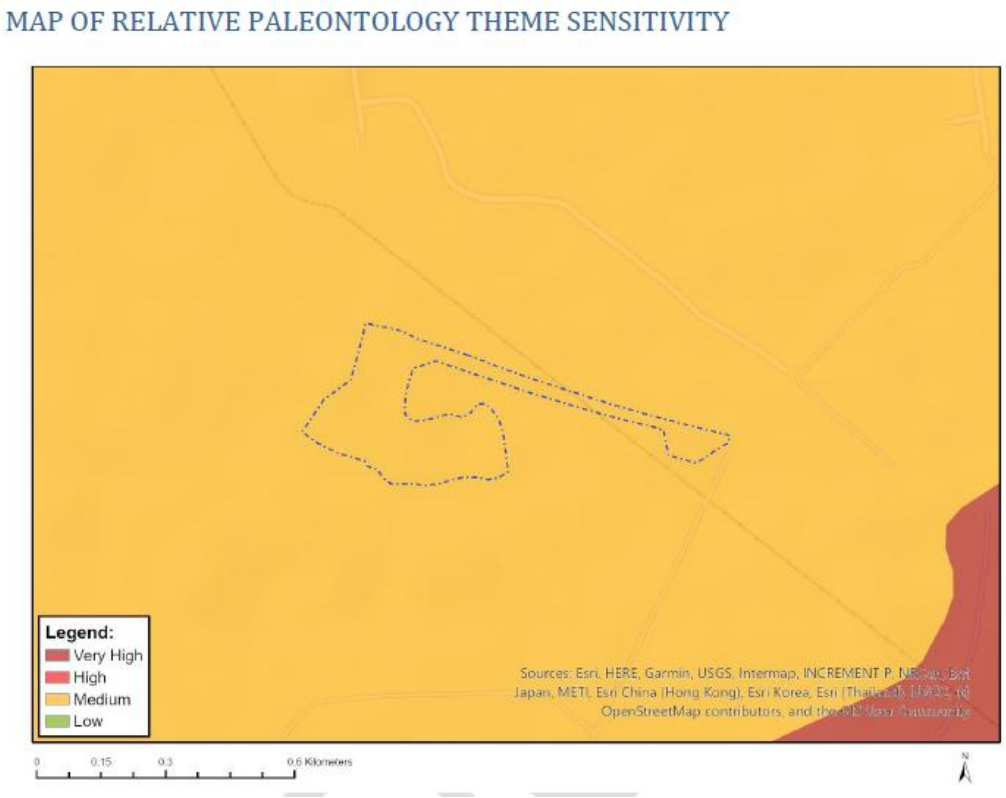


Figure 47: Paleontological Sensitivity of the proposed study area by the National Environmental Web-based Screening Tool indicates a Medium (orange) Palaeontological Sensitivity.

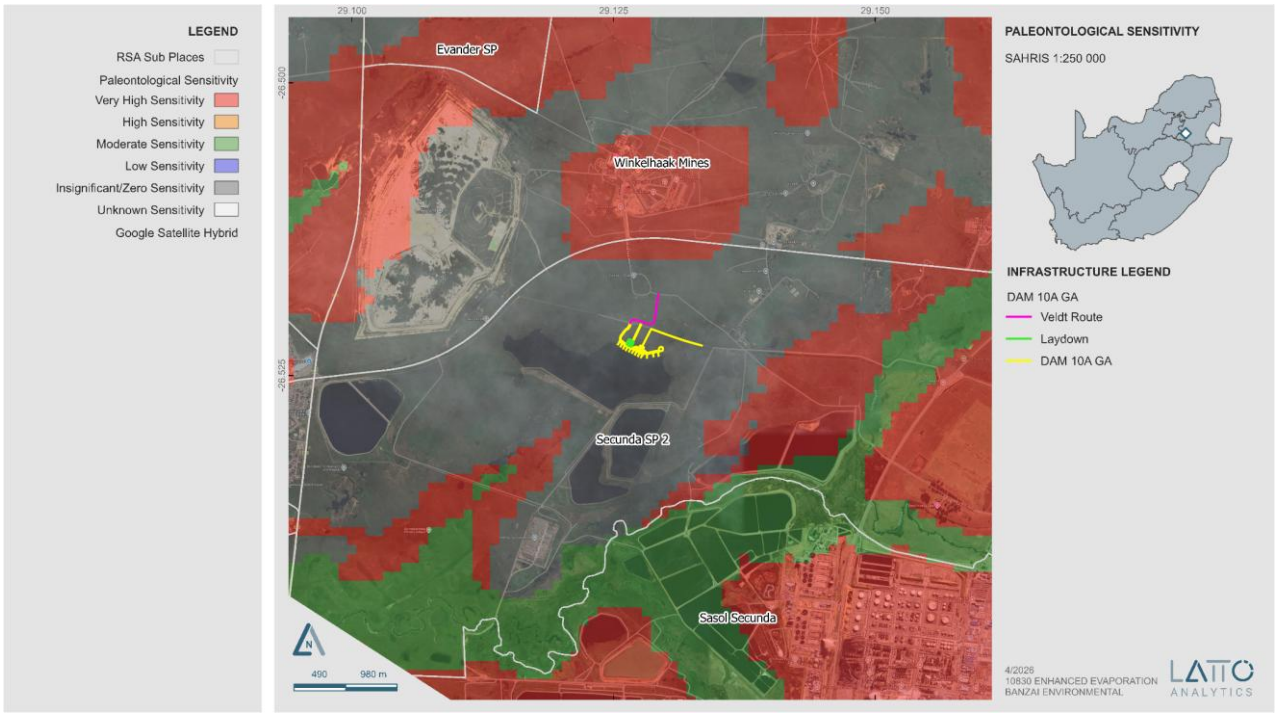


Figure 48: Extract of the SAHRIS PalaeoMap (Council for Geosciences, Pretoria) indicating that the study area is entirely underlain with sediments with a Zero (grey) Palaeontological Sensitivity.

10.16.3 Desktop Screening

This desktop-based assessment, drawing on National Palaeontological Databases and published literature, indicates that fossil heritage of scientific or conservation significance within the development footprint is rare.

Consequently, a low significance has been assigned to potential Palaeontological impacts associated with the Construction Phase of the Project. No field-based palaeontological site investigation was undertaken, and the assessment therefore relies on desktop data; however, the available information indicates that the development area is of low Palaeontological Significance.

11 SUMMARY OF SPECIALIST STUDIES

11.1 Specialist Studies undertaken as part of the Basic Assessment

According to Münster (2005), a 'trigger' for a specialist study is "*a particular characteristic of either the receiving environment or the proposed project which indicates that there is likely to be an issue and/or potentially significant impact associated with that proposed development that may require specialist input.*"

One of the objectives of the Screening Tool is to identify specialist studies applicable to a proposed site and/or development, based on the national sector classification and the environmental sensitivity of the site.

Considering the nature of the proposed Project and its receiving environment, the following specialist studies were undertaken during the Basic Assessment process:

1. Wetland Delineation and Impact Assessment;
2. Terrestrial Biodiversity Impact Assessment;
3. Heritage Impact Assessment;
4. Desktop Palaeontological Impact Assessment; and
5. Air Quality Impact Assessment.

11.2 Incorporating the Findings from Specialist Studies

The information obtained from the respective specialist studies was incorporated into the BAR in the following manner:

- The assumptions and limitations identified in each study were included in **Section 8** above;
- The information was used to complete the description of the receiving environment (**Section 10**) in a more detailed and site-specific manner;
- A summary of each specialist study is contained in the sub-sections to follow , focusing on the approach to each study, key findings and conclusions drawn;
- The specialists' impacts assessments and identified mitigation measures (as relevant) were included in the overall project impact assessment contained in **Section 12** below; and
- Specialist input was obtained to address comments made by I&APs that related to specific environmental features pertaining to each specialist discipline (as necessary).

11.3 Wetland Delineation and Impact Assessment

A summary of the Wetland Delineation and Impact Assessment (Hoosen, 2026) follows. The specialist report is contained in **Appendix C1**.

11.3.1 Objectives of the Study

The primary purpose of this study was to delineate all watercourses (wetlands and riverine ecosystems) within the proposed Project area and identify those watercourses that may be at risk of being impacted by the proposed Project.

The scope of the study included the following:

- ❑ Desktop Assessment
  - Review of available spatial and environmental data, including Bioregional Conservation Plans, NFEPA, and regional hydrological datasets.
  - Desktop delineation of wetlands, rivers, and drainage features within the project footprint and extended PAOI.
- ❑ Field-Based Delineation and Classification
  - Site visit to delineate watercourses and wetlands in accordance with the DWAF Wetland Delineation Guidelines (DWAF, 2005; 2008).
  - Classification of wetlands and rivers according to their hydro-geomorphic (HGM) setting using the modified classification system by Ollis et al. (2013).
- ❑ Ecological Condition and Health Assessment
  - Determination of the Present Ecological State (PES) of wetlands using WET-Health Version 2 (Macfarlane *et al*., 2020).
- ❑ Functional Assessment and Ecological Importance and Sensitivity (EIS)
  - Rapid functional assessment of wetlands and riparian zones using the WET-EcoServices Tool (Version 2) (Kotze *et al*., 2020) to determine ecosystem services and landscape-level functions.
  - Determination of EIS based on combined Ecological Importance (EI) and Ecological Sensitivity (ES) scoring.
- ❑ Impact and Risk Assessment
  - Identification and description of existing anthropogenic impacts within and around the delineated watercourses.
  - Completion of a RAM in accordance with GN 4167 of 2023 to assess risk significance for regulated water uses.
  - Completion of an Impact Assessment in accordance with the EIA Regulations, including cumulative impact considerations.
- ❑ Mitigation, Management and Reporting
  - Development of appropriate mitigation and management measures to reduce, avoid, or offset impacts to watercourses and sensitive aquatic features.
  - Compilation of a comprehensive Wetland Impact Assessment Report, including delineation maps, classification outputs, impact ratings, risk findings, and recommendations to inform the EA and WULA processes.

11.3.2 Methodology

11.3.2.1 Project Area of Influence (PAOI)

A 500 m PAOI was deemed appropriate for this study by the Aquatic Specialist. A more detailed methodology than that outlined below is provided in Appendix A of the Wetland Delineation and Impact Assessment.

11.3.2.2 Desktop Assessment

A desktop assessment was undertaken of all available data. This involved investigating aerial photography, Geographical Information System (GIS) databases, government records, and previous studies, including literature reviews pertaining to the study area, to determine the theoretical importance and sensitivity of the terrestrial and aquatic ecosystems involved. The study area was mapped using ArcGIS to better understand the layout and structure of the surrounding environment.

The desktop study was guided by the most up-to-date GIS datasets and satellite imagery, which included (but not limited to) the following:

- Vegetation Map of South Africa, Lesotho, and Swaziland;
- Ecoregions;
- South African Inventory of Inland Aquatic Ecosystems (SAIIAE), 2018 – River Ecosystems;
- Mpumalanga Province Biodiversity Sector Plan;
- National Biodiversity Assessment (NBA) – Inland Aquatic / Freshwater Realm;
- National Freshwater Ecosystem Priority Area (NFEPA) maps and database;
- National Biodiversity Assessment (NBA) - List of Threatened Ecosystems;
- National Wetland Map (NWM) Version 5;
- South African Protected Areas Database (SAPAD);
- South African Conservation Areas Database (SACAD);
- National Protected Area Expansion Strategy (NPAES); and
- Google Earth Pro™ Imagery.

11.3.2.3 Field Survey

A field assessment was conducted on 28 January 2026 to supplement and confirm the findings of the desktop analysis. A walkover field survey of the site was conducted where accessible. Verification of the watercourses identified during the desktop assessment, and their current status, was also included.

The following assessment tools were implemented where relevant:

- DWAF Wetland Delineation Guidelines (2005; 2008);
- Ollis *et al*. (2013) Wetland Classification;
- WET-Health (Version 2);
- WET-EcoServices (Version 2); and

- Ecological Importance and Sensitivity (EIS)

11.3.3 Key Findings of the Study

The description of the receiving environment in terms of surface water resources and aquatic biodiversity, as determined through this study, is provided in **Section 10.7** above.

Watercourses within the study area were identified at a desktop level and confirmed during the field assessment. During delineation, three wetlands (Seep01, Seep02, Seep03) were identified within the 500 m PAOI (**Figure 49**). Classified as seepage wetlands, they were deemed 'at-risk' from the proposed development and assessed further in this report. See the below summary of the identified wetlands in **Table 14** below.

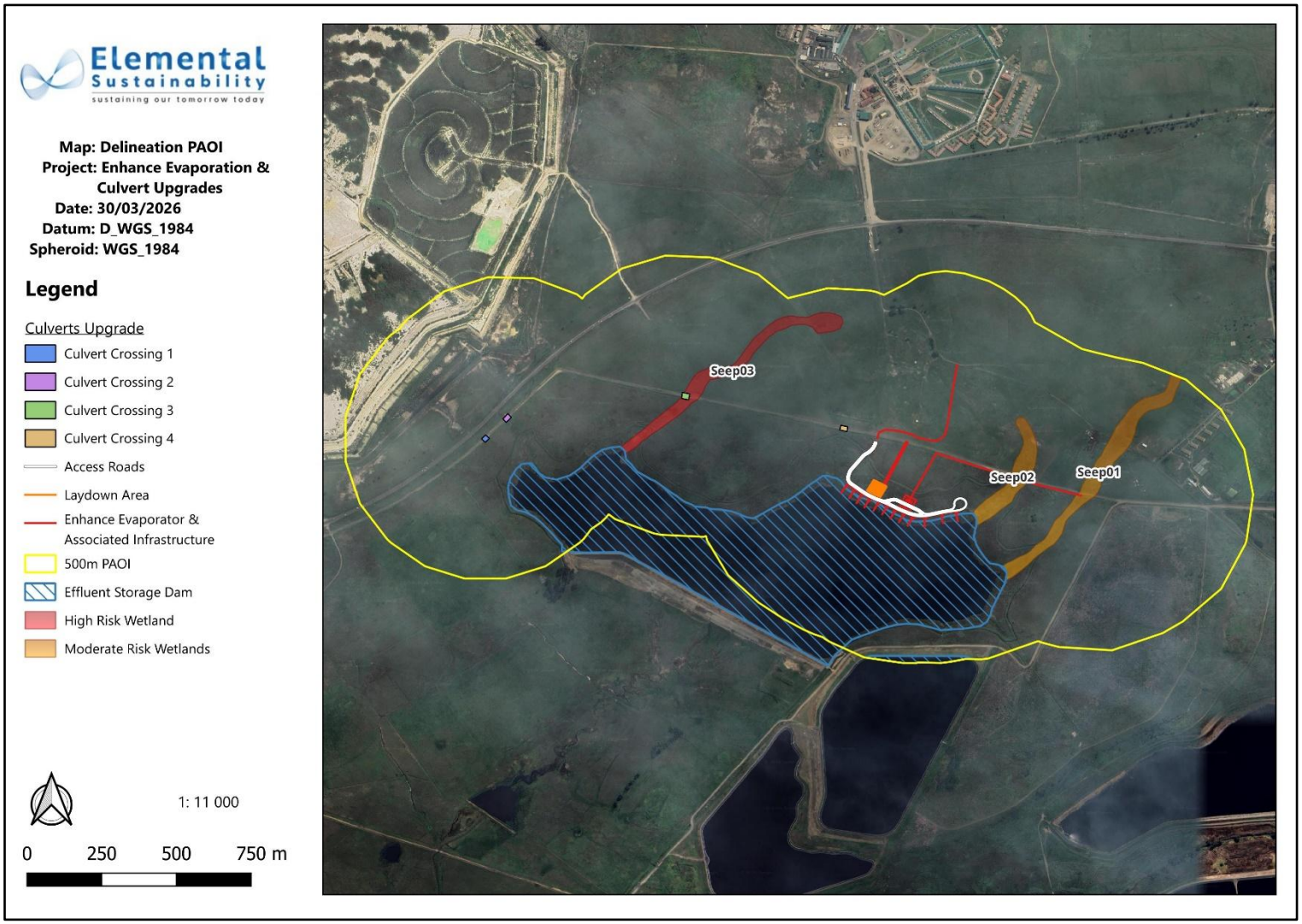


Figure 49: Illustration of the delineated watercourses within the 500 m study area (Hoosen, 2026)

Table 14: Presentation of the classification of the 'at-risk' wetland to level 5 of Ollis *et al.* (2013) (Hoosen, 2026).

HGM Units	Level 2: Regional Setting	Level 3: Landscape Unit	Level 4: HGM Unit			Level 5: Hydrological Regime			Level 6: Descriptors
			A- HGM Unit	B- Longitudinal Zonation/Landform/ Outflow Drainage	C- Landform/Inflow Drainage	A- Inundation Periodicity	B- Saturation Periodicity (within 0.5 m of soil surface)	C – Inundation depth class	Natural vs. Artificial
Seep01	Mesic Highveld Grassland Group 3 (CR)	Slope	Seep	Without channelled outflow	N/A	Seasonally inundated	Permanently saturated	N/A	Natural
Seep02		Slope	Seep	Without channelled outflow	N/A	Seasonally inundated	Permanently saturated	N/A	Natural
Seep03		Slope	Seep	Without channelled outflow	N/A	Seasonally inundated	Permanently saturated	N/A	Natural

PES and EIS ratings for all three were D (Largely Modified) and Low, respectively. Given the degraded catchment and existing land uses, a REC of D was considered appropriate. Despite the transformation from infrastructure, informal housing, industry, and mining, these wetlands still provide valuable supporting and regulating services, though provisioning and cultural services were negligible. Please see the Wetland Delineation and Impact Assessment for a detailed review of the ratings allocated (**Appendix C1**)

In a catchment that has been extensively transformed by industrial infrastructure, linear developments, mining and historical land disturbance, the identified wetlands continue to provide valuable regulating and supporting ecosystem services. These include sediment trapping, phosphate assimilation, nitrate assimilation, toxicant assimilation and streamflow attenuation. Provisioning and cultural ecosystem services were generally assessed as very low due to the limited utilisation of the wetlands for water abstraction, harvesting, grazing or cultural purposes.

Using the Bredin & Macfarlane (2016) buffer tool, a 30 m buffer was calculated (**Figure 50** below). The only acceptable intrusion is the culvert upgrade through Seep03, which will improve flow and support rehabilitation of geomorphic and vegetation integrity.

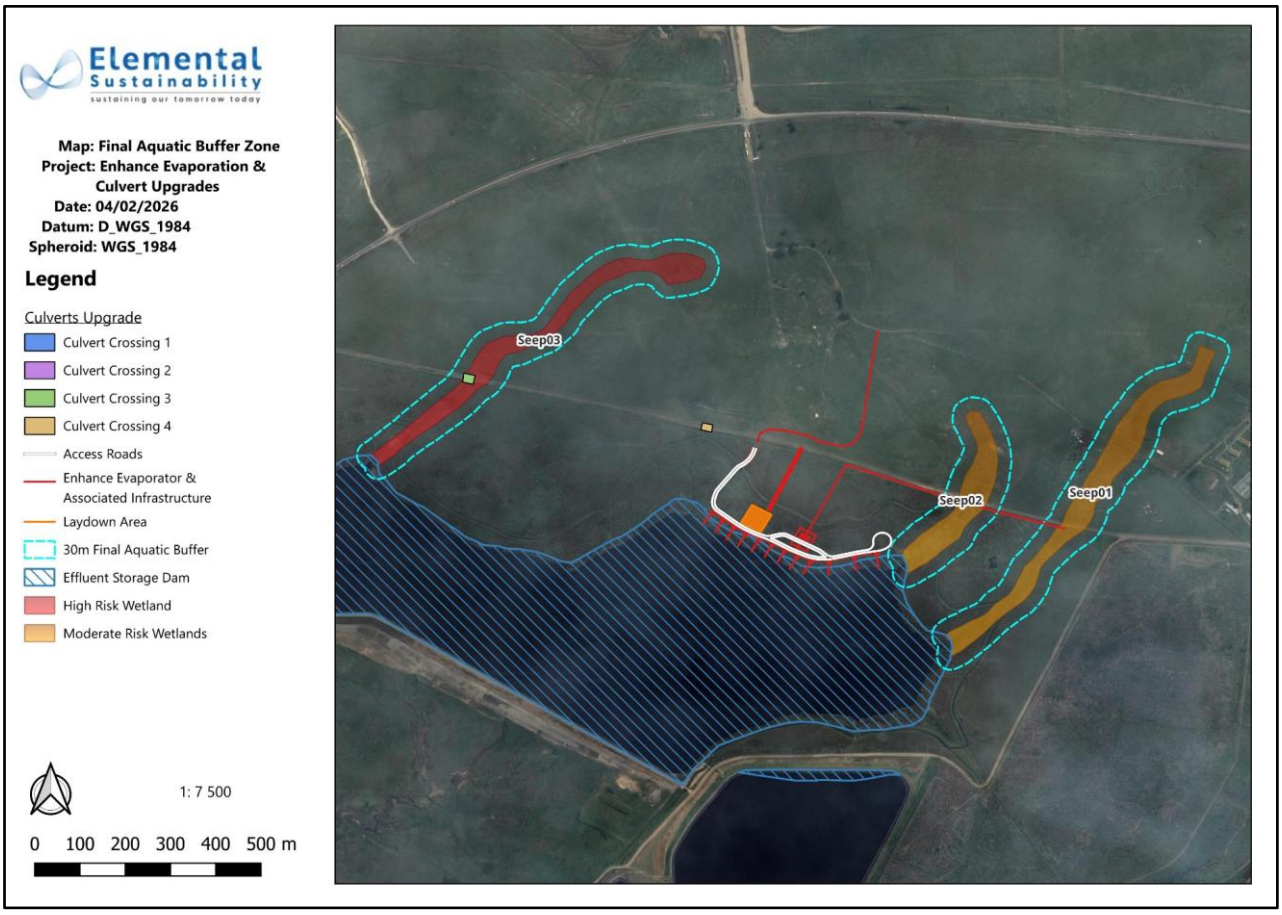


Figure 50: Calculated buffer zones for the identified "at-risk" wetlands in the proposed Project Area

The NEMA Impact Assessment found impacts to be moderate–low without mitigation and low–very low with mitigation. Due to the degraded state of the catchment and limited development footprint, cumulative impacts are expected to remain low. Please see the Wetland Delineation and Impact Assessment for a detailed review of the ratings allocated (**Appendix C1**).

The RAM in **Table 15** below confirmed the three wetlands as 'at-risk' within regulated areas under GN 4167 of the NWA. Although all aspects are rated low risk, GN 4167 excludes Section 21(c) and (i) water use involving hazardous material from General Authorisation. However, the specialist notes that discussions with DWS during site engagement confirmed that the proposed activities fall within the ambit of a GA, and therefore supports authorisation through the applicable GA process.

11.3.4 Conclusion

Three seepage wetlands (Seep01–03) were identified within the project area and classified as "at-risk" due to proposed development. They are in a largely degraded state, with low ecological importance and sensitivity, though they still provide valuable regulating ecosystem services. A 30m buffer zone was recommended, with only a culvert upgrade through Seep03 considered acceptable, as it would improve flow and aid rehabilitation. A RAM was undertaken in accordance with GN 4167 of the NWA. Impact assessments found potential effects to be moderate to low without mitigation and low to very low with mitigation, with cumulative impacts expected to remain low given the degraded catchment and limited development footprint. The specialist notes that discussions with DWS during site engagement confirmed that the proposed activities fall within the ambit of a GA, and therefore supports authorisation through the applicable GA process.

Table 15: Risk Assessment Matrix (RAM)

Phase	Activity	Impact	Potentially affected watercourses			Significance (max = 100)	Risk Rating	Confidence level
			Name/s	PES	Overall Watercourse Importance			
CONSTRUCTION	Establishment of site camps and access roads in terrestrial habitats	Alteration of surface flow	Seeo01, Seep02, Seep03	D	Low / Very low	**5,6**	**L**	Medium
		Increased opportunity for proliferation of AIPs	Seeo01, Seep02, Seep03	D	Low / Very low	**6,4**	**L**	Medium
		Increased opportunity of erosion and sedimentation	Seeo01, Seep02, Seep03	D	Low / Very low	**5,6**	**L**	Medium
	Construction of overhead powerline in terrestrial habitat and over portions of wetland habitats.	Alteration of surface flow	Seep01, Seep02	D	Low / Very low	**12**	**L**	Medium
		Increased opportunity for proliferation of AIPs	Seep01, Seep02	D	Low / Very low	**12**	**L**	Medium
		Increased opportunity of erosion and sedimentation	Seep01, Seep02	D	Low / Very low	**12**	**L**	Medium
	Upgrade of existing culvert within wetland habitat.	Increased risk of foreign material and litter in wetland	Seep03	D	Low / Very low	**16**	**L**	Medium
		Increased opportunity for proliferation of AIPs	Seep03	D	Low / Very low	**19,2**	**L**	Medium
		Hydrocarbon contamination of soils	Seep03	D	Low / Very low	**12**	**L**	Medium
	Construction of enhance evaporation infrastructure in terrestrial area	Decrease in wetlands integrity and functionality	Seep01, Seep02	D	Low / Very low	**4**	**L**	Medium
		Alteration of surface flow	Seep01, Seep02	D	Low / Very low	**5,6**	**L**	Medium

		Increased opportunity of erosion and sedimentation	Seep01, Seep02	D	Low / Very low	**9,6**	**L**	Medium
		Increased risk of foreign material and litter into wetland	Seep01, Seep02	D	Low / Very low	**5,6**	**L**	Medium
OPERATION	Daily operation and maintenance of overhead powerline in terrestrial habitat and over portions of wetland habitats.	Alteration of surface flow	Seep01, Seep02	D	Low / Very low	**12**	**L**	Medium
		Increased opportunity for proliferation of AIPs	Seep01, Seep02	D	Low / Very low	**12**	**L**	Medium
		Increased opportunity of erosion and sedimentation	Seep01, Seep02	D	Low / Very low	**12**	**L**	Medium
	Daily operation and maintenance of upgraded culvert within wetland habitat.	Increased channelized flow	Seep03	D	Low / Very low	**14,4**	**L**	Medium
		Increased opportunity for proliferation of AIPs	Seep03	D	Low / Very low	**13,2**	**L**	Medium
		Increased opportunity of erosion and sedimentation	Seep03	D	Low / Very low	**12**	**L**	Medium
	Daily operation and maintenance of the enhance evaporation and associated infrastructure in	Spraying of waste water reducing soil and water quality	Seep01, Seep02	D	Low / Very low	**22,4**	**L**	Medium
		Increased opportunity for proliferation of AIPs	Seep01, Seep02	D	Low / Very low	**19,2**	**L**	Medium
		Increased opportunity of erosion and sedimentation	Seep01, Seep02	D	Low / Very low	**14,4**	**L**	Medium
REHB AILIT ATIO		Reduced opportunity for pollution to occur.	Seep01, Seep02, Seep03	D	Low / Very low	**-26**	**+**	Medium

	Removal of all equipment and material once construction is concluded	Removal of contaminants from terrestrial area which could transport to watercourse	Seep01, Seep02, Seep03	D	Low / Very low	**-26**	+	Medium
	Removal of all equipment and material once construction is concluded	Reduced opportunity for pollution to occur.	Seep01, Seep02, Seep03	D	Low / Very low	**-26**	+	Medium
		Removal of contaminants from terrestrial area which could transport to watercourse	Seep01, Seep02, Seep03	D	Low / Very low	**-26**	+	Medium
	Tillage of areas of bare-soil, replacement of topsoil and revegetation using a mixture species native to the area	Increased groundcover and thus surface flow friction and biodiversity	Seep01, Seep02, Seep03	D	Low / Very low	**-18**	+	Medium
		Increase biodiversity	Seep01, Seep02, Seep03	D	Low / Very low	**-18**	+	Medium
	Tillage of areas of bare-soil, replacement of topsoil and revegetation using a mixture species native to the area	Increased groundcover and thus surface flow friction and biodiversity	Seep01, Seep02, Seep03	D	Low / Very low	**-18**	+	Medium
		Increase biodiversity	Seep01, Seep02, Seep03	D	Low / Very low	**-18**	+	Medium
	Alien invasive plant control	Reduced AIPS population	Seep01, Seep02, Seep03	D	Low / Very low	**-15,6**	+	Medium
	Alien invasive plant control	Reduced AIPS population	Seep01, Seep02, Seep03	D	Low / Very low	**-15,6**	+	Medium

Risk Assessment Matrix Completed By:
Suheil Malek Hoosen
Pr.Sci.Nat. 120 680



11.4 Terrestrial Biodiversity Impact Assessment

A summary of the Terrestrial Biodiversity Impact Assessment (Paul, 2026) follows. The specialist report is contained in **Appendix C2**.

11.4.1 Objectives of the Study

The Terrestrial Biodiversity Impact Assessment was undertaken in line with the "Procedures for the Assessment and Minimum Criteria for Reporting on Identified Environmental Themes" in terms of Sections 24(5)(A) and 44 of NEMA. The Protocol for the specialist assessment and impacts on terrestrial biodiversity applies.

The Terms of Reference (ToR) for this study included the following:

- Undertake a desktop study of the biophysical environment, with specific focus on the conservation importance and sensitivity of the study area. The most up-to-date GIS datasets and literature must be presented in maps and discussed.
- Conduct field surveys of the study area in the dry season and wet (flowering) season for the region during which time all plant and animal species must be identified.
- Identify all flora and fauna Species of Conservation Concern (SCC) and Threatened and/or Protected Species (TOPS) within the study area and marked them using a GPS. The GPS coordinates and representative images of the SCC and TOPS must be presented in the report.
- Compile species lists of fauna and flora per HU and report on their current conservation statuses. All Alien and Invasive Species (AIS) must be indicated as such, and their listed Category presented as stipulated in the Alien and Invasive Species Lists (DEA, 2020).
- Provide a general overview of the study area in terms of connectivity, corridors, rivers and streams and ecological viability in relation to the surrounding region with relevant information.
- Describe the ecological drivers or processes of the systems present within the study area and comment on how the proposed project may influence these.
- Determine whether the study area is situated within a Strategic Water Management Area (SWMA), Freshwater Ecosystem Priority Area (FEPA), Protected Area and expansions thereof, or a Threatened Ecosystem. Comment on the perceived influence of the proposed project on these features should the study area occur within one or more.
- Determine the Site Ecological Importance (SEI) of each HU using the Species Environmental Assessment Guideline methodology (SANBI, 2020) and present the results in a sensitivity map. Indicate which sections of the study area should be considered no-go areas (if any) where development should not occur.
- Conducted a quantitative impact assessment in accordance with the DEA (2104) methodology in which the perceived direct, indirect, cumulative and residual (if any) impacts of the proposed project and associated infrastructure on the receiving terrestrial environment are analysed and reported on.

- Compose a draft report for submission to the Client for review prior to finalisation.
- Shapefiles of HUs, site sensitivity, buffer zones (if applicable) and all GPS points of SCCs and/or TOPS must be provided to the Client at project closure.

11.4.2 Methodology

11.4.2.1 Desktop Assessment

The desktop assessment involved the investigation of aerial photography, GIS databases, government records and previous studies, including literature reviews pertaining to the study area to determine the theoretical importance and sensitivity of the terrestrial ecosystems involved. The study area was mapped using Geographical Information Systems (GIS) (e.g. QGIS) to better understand the layout and structure of the surrounding environment.

The following most up to date data sources and GIS information were utilised:

- Latest and Historic Google Earth ™ imagery;
- Vegetation Map of South Africa, Lesotho and Swaziland;
- The South African Protected Areas Database;
- The South Africa Conservation Areas Database;
- DEA National Landcover;
- National Freshwater Ecosystem Priority Area (NFEPA) maps and database;
- National Biodiversity Assessment (NBA) - List of Threatened Ecosystem;
- NBA - Formal Protected Areas; and
- National Wetland Map (NWM) Version 5

11.4.2.2 Field Survey

The assessment was conducted concurrently with the site verification and covered the following environmental themes: Plant Species Theme, Animal Species Theme, and Terrestrial Biodiversity Theme.

The assessment has been carried out within the recommended season and timing made by the Species Environmental Assessment Guideline (SANBI, 2020). The site was first surveyed at a desktop level using Google Earth imagery, and then divided into areas of specific vegetation communities according to a stratified random sampling methodology. Each of these vegetation communities was assessed during the field assessment. For sampling of flora and fauna, timed meanders were used until no new species were recorded within each community, as guided by rapid assessment best practise. The entire site was accessible on foot, and therefore, no access-related limitations were recorded.

For the purposes of this study, faunal data collected during the field assessment makes use of opportunistic sightings as well as evidence of faunal activity (where applicable):

- Spoor (tracks),

- Dung,
- Burrows, and
- Alarm and/or breeding calls.

The survey was conducted in the late morning, with clear, hot conditions recorded on site.

11.4.3 Key Findings of the Study

11.4.3.1 Desktop Assessment

During the desktop assessment, the following key ecological findings were recorded:

- The site falls outside of any Critical Biodiversity Areas (CBAs) and Ecological Support Areas (ESAs).
- The entire proposed project footprint falls within a vulnerable vegetation type (Soweto Highveld Grassland.
- Sections of the proposed development footprint overlapped with one (1) National Threatened Ecosystem (Soweto Highveld Grassland), with a threat status of Vulnerable, which aligns with the latest National Landcover dataset (Vulnerable),
- The study does not form part of a Strategic Water Source Area (SWSA),
- No known protected areas are found within 10 km of the proposed project footprint, and
- NPAES focus areas do occur within the 5 km of the site. However, as the proposed development does not intercept any of the area, it is unlikely to impact connectivity between protected areas, for which the focus areas serve to protect.

11.4.3.2 Field Survey

The terrestrial biodiversity impact assessment was undertaken during the wet season for this region and vegetation type (grassland). During the assessment, the entire proposed footprint was assessed. A PAOI of 500 m was also assessed and considered in both the habitat analysis and sensitivity assessment found within this report. During the assessment, four (4) landcover classes were identified and briefly described according to structure and ecological significance within this landscape.

During the assessment, the impacts associated with the proposed project were split amongst three (3) themes, namely the floral, faunal and ecological themes and assessed separately. Based on the impact assessment, distinct ecological impacts were identified, which may be caused by the proposed project. The impacts ranged from medium to low. After the implementation of mitigation techniques, each impact's significance could be reduced, although the clearance of indigenous vegetation and loss of connectivity, ecosystem function and the fringe impacts associated with the proposed project area are inevitable. The key considerations when assessing the ability of mitigation techniques to reduce these impacts were the following:

- The proposed footprint is located within the Sasol Secunda property and adjacent to an existing effluent dam.

- ❑ The overall footprint is small, with limited additional permanent impacts expected to occur after the initial construction activities. This is particularly important, as the nearby dam is an effluent dam.
- ❑ The site is not in a pristine condition, and it has been modified and is impacted.
- ❑ No plant SCC were found at the time of completing the survey.

11.4.3.3 Site Ecological Importance and Sensitivity

The following table (**Table 16**) provides a summary of the Site Ecological Importance (SEI), which was assessed using the latest assessment methodology prescribed by SANBI (2022).

Table 16: Summary of the Combined (Flora, Fauna and Terrestrial Biodiversity) Site Ecological Importance (SEI) assessment

Habitat	Combined Conservation Importance (CI)	Functional Integrity (FI)	Biodiversity Importance (BI)	Receptor Resilience (RR)	Combined Ecological Importance (SEI)
Transformed Areas	Very Low	Very Low	Very Low	High	Very Low
Secondary Grassland Habitat	Medium	Low	Low	Medium	Low
Effluent Dam	Medium	Low	Low	Medium	Low
Watercourses	High	Medium	Medium	Low	High

Additionally, please see the visual representation of the SEI below (**Figure 51**).



Figure 51: Site Ecological Importance (SEI) for the Study Area (Paul, 2026)

11.4.4 Conclusion

The specialist concluded that the study area is already associated with significant anthropogenic disturbance related to agricultural activities, historical infrastructure development and operation of the adjacent effluent dam system. The proposed development footprint is relatively limited in extent, does not occur within a Critical Biodiversity Area or Ecological Support Area, and is not expected to create significant barriers to ecological connectivity. Most adjacent habitat will remain available to support ecological processes and species movement.

Therefore, the specialist is of the opinion that the proposed project should receive a favourable outcome for the Environmental Application lodged with the CA, provided the Applicant carefully implements the conditions and mitigation techniques set out in the Terrestrial Biodiversity Impact Assessment throughout the Project Lifecycle.

11.5 Heritage Impact Assessment

A summary of the Heritage Impact Assessment (Kitto, 2026) follows. The specialist report is contained in **Appendix C3**.

11.5.1 Objectives of the Study

The objectives of this study included the following:

- Undertake a Heritage Impact Assessment in accordance with the NHRA;
- Identify and map all heritage resources in the area affected, as defined in **Section 2** of the NHRA, including archaeological sites on or near the proposed development;
- Assess the significance of such resources in terms of the heritage assessment criteria as set out in the regulations;
- Assess the impacts of the Project on such heritage resources;
- Prepare a heritage sensitivity map (GIS-based), based on the findings of the study.
- Identify heritage resources to be monitored; and
- Comply with specific requirements and guidelines of Mpumalanga Provincial Heritage Resources Authority (MPHRA) and SAHRA.

11.5.2 Methodology

A historical desktop study was undertaken to provide information on the archaeological and historical heritage background of the general region and project area. This included investigating published sources, past Heritage Impact Assessment reports for the surrounding area and an examination of historical 1:50 000 topographical maps and/or archival maps (if available) for the project footprint, as well as an examination of satellite imagery using Google Earth.

A physical Site Inspection or Field Survey was conducted of the project area, predominantly by vehicle, with selected areas traversed on foot, by an experienced heritage specialist, with the client. This focused on identifying and documenting heritage resources situated within and immediately adjacent to the proposed project area footprint, such as graves, historical structures or remains and archaeological sites or material.

The final step involved the recording and documentation of the identified heritage resources, the assessment of such resources in terms of heritage significance and impact assessment criteria, producing a heritage sensitivity map and compiling the heritage impact assessment report with constructive recommendations for mitigation, if required.

11.5.3 Key Findings of the Study

The description of the receiving environment in terms of historical features, as determined through this study, is provided in **Section 10.15** above.

The general overview from the historical desktop study has shown that various archaeological and historical resources can be expected to occur in the Project footprint area. The examination of the earliest edition (1964) of the 1:50 000 topographical maps produced by overlaying the maps with satellite Imagery (Google Earth) has shown that no heritage features are depicted within the project

footprint, with an old kraal and a few mine-related structures situated just outside the footprint boundary.

The physical inspection (28 January 2026) of the area that was surveyed identified no heritage resources within the project footprint and only one heritage resource adjacent to the footprint boundary (See **Table 17** below).

Table 17: Identified Heritage Sites

Site Name	EVAP-01
GPS Coordinates	-26.522359° , 29.132382°
Site Description	Structure ruin
Approximate Age	Probably modern/recent. Depicted on the 1984 map sheet, but not the 1964 sheet.
NHRA, No. 25	N/A
Field Grading and Ratings	
Site context and description	The site comprises the overgrown and sparse remains of a livestock enclosure. It is located approximately 12 m south of the access road/southeastern boundary.
Site Density	N/A
Uniqueness	Low
Heritage Significance	Low- GP.C/ NCW
Mitigation	No mitigation is required.

11.5.4 Conclusion

The considered opinion of the heritage specialist is that no fatal flaws with respect to heritage resources have been identified during this HIA study. Therefore, there are no objections to the proposed project from a heritage perspective, provided that the recommendations and mitigation measures contained in this report and in the recommended palaeontological assessment are implemented where necessary.

11.6 Desktop Paleontological Impact Assessment

A summary of the Desktop Palaeontological Impact Assessment (Butler, 2026) is provided below. The specialist report is contained in **Appendix C4**.

11.6.1 Objectives of the Study

The aim of the study is to identify palaeontological sites/sensitivity that may occur in the proposed project area. The Palaeontology Desktop Assessment (PDA) aims to inform the Environmental Impact Assessment (EIA) to assist the developer in managing the discovered heritage resources

in a responsible manner, in order to protect, preserve, and develop them within the framework provided by the National Heritage Resources Act (Act 25 of 1999) as amended (NHRA).

Furthermore, the PDA's goals are to:

1) identify the palaeontological significance of the rock formations in the footprint;
2) evaluate the palaeontological magnitude of the formations;
3) clarify the impact on fossil heritage; and
4) make recommendations for how the developer might protect and minimize potential harm to fossil heritage, according to the "SAHRA APM Guidelines: Minimum Standards for the Archaeological and Palaeontological Components of Impact Assessment Reports".

11.6.2 Methodology

This assessment was conducted as a desktop study. The evaluation focused on determining the palaeontological state of the underlying rock units and the potential impact of the proposed development on fossil heritage. Key factors considered included the palaeontological status of the rocks, the type of development, and the anticipated extent of bedrock removal.
To inform this desktop-level analysis, the following resources were consulted:

- The Provisional Screening Tool
- The SAHRIS Palaeosensitivity Map
- Existing Palaeontological Impact Assessment (PIA) reports for the same area
- Google Earth imagery
- Topographical and geological maps
- Relevant academic literature on fossil specimens and Assemblage Zones associated with the development area

These sources provided sufficient information to evaluate the likely fossil sensitivity of the site without the need for direct fieldwork. In cases where Very High Palaeontological Sensitivity is identified, a field-based assessment would normally be required. However, in this instance, the sensitivity was not high enough to justify such measures.

During a site investigation, a palaeontologist examines the local development and the quantity and variety of fossils found there. This can be demonstrated by looking at representative fossiliferous rock exposures (most igneous and metamorphic rocks are not fossiliferous, whereas sedimentary rocks contain fossil heritage). Examined rock exposures frequently contain a sizeable portion of the stratigraphic unit, which is primarily made up of recently exposed (unweathered) rock. These exposures may be man-made (such as quarries, open building excavations, even railway and road cuttings) or natural (such as cliffs, and dongas as well as rocky outcrops along stream or river banks). It is usual practice for palaeontologists to record well-preserved fossils (GPS, and stratigraphic data) during field assessment examinations.

The desktop study approach acknowledges that construction activities, particularly excavation, may alter the terrain and potentially destroy or permanently encase fossil material. While mitigation measures such as fossil collection and documentation are typically recommended when fossiliferous bedrock is exposed. Any mitigation would require a permit from SAHRA, with collected material curated at an authorised repository.

Although mitigation is often done prior to construction, it may take place if potentially fossiliferous bedrock is revealed. Fossil collection and documentation are examples of mitigation. A permit from SAHRA must be obtained before beginning any fossil excavation, and the material must be stored at an authorised facility. When mitigation is properly used, it is possible to have a positive impact by raising awareness of the palaeontological past of the area.

By physically evaluating bedrock outcrops to determine their lithology and fossil richness and crisscrossing the development footprint, one can assess an area's fossil potential. Because the presence of fossils at the surface is so unexpected, an average sample size of the region is investigated.

11.6.3 Key Findings of the Study

The proposed study area is entirely underlain by Dolerite of the Karoo Igneous Province. The SAHRIS Palaeontological Sensitivity Map classifies the area as having Zero Palaeontological Sensitivity (Almond & Pether, 2009; Almond *et al*., 2013; Groenewald *et al*., 2014). However, the Screening Tool Report identifies the broader study area as falling within a Medium Palaeontological Sensitivity.

This desktop-based assessment, drawing on National Palaeontological Databases and published literature, indicates that fossil heritage of scientific or conservation significance within the development footprint is rare. Consequently, a low significance has been assigned to potential Palaeontological impacts associated with the Construction Phase of the Project. No field-based palaeontological site investigation was undertaken, and the assessment therefore relies on desktop data; however, the available information indicates that the development area is of low Palaeontological Significance. Additionally, J. Kitto states that the addition of the temporary access road should not affect the above significance, as the property affected has been used for mining activities since at least the early 1950s

It is therefore considered that the proposed development will not lead to damaging impacts on the palaeontological resources of the area. The development may thus be permitted in its whole extent, as the development footprint is not considered sensitive in terms of palaeontological resources. It is consequently recommended that no further palaeontological heritage studies, ground truthing and/or specialist mitigation are required, pending the discovery of newly discovered fossils.

11.6.4 Conclusion

The desktop-based palaeontological assessment, which relied on national databases and published literature rather than field investigations, found that fossils of scientific or conservation importance within the project's development footprint are rare. As a result, the potential impacts during construction are considered to be of low significance, and the area itself is assessed as having low palaeontological sensitivity. Consequently, the development is deemed permissible across its full extent without the need for further heritage studies, site verification, or specialist mitigation, unless new fossil discoveries are made during the course of development.

11.7 Air Quality Impact Assessment

A summary of the AQIA (Bird and Burger, 2026b) follows. The specialist report is contained in **Appendix C5**.

11.7.1 Objectives of the Study

The following tasks were completed in fulfilment of the terms of reference for this study:

- Review available project information and design details for the proposed enhanced evaporation system.
- Characterise the receiving air quality environment, including meteorology, ambient air quality, air quality sensitive receptors and existing emission sources.
- Identify applicable regulatory requirements, standards, guidelines and assessment criteria relevant to the project.
- Develop an atmospheric emissions inventory for the construction and operational phases of the project.
- Quantify potential air quality impacts associated with particulate matter, dustfall, H_2S and VOCs.
- Undertake atmospheric dispersion modelling and compliance screening against applicable standards and guidelines.
- Assess cumulative impacts associated with the proposed Project and the existing air quality environment.
- Recommend suitable mitigation, monitoring and management measures.

11.7.2 Methodology

The assessment was conducted through the following tasks (amongst others):

- Review of the Project information, operational parameters and process water quality data.
- Desktop review of applicable legislation, standards and assessment criteria, including the National Ambient Air Quality Standards (NAAQS), National Dust Control Regulations (NDCR), World Health Organisation guidelines and international health-effect screening levels.

- Identification of air quality sensitive receptors, ambient monitoring stations and surrounding emission sources.
- Analysis of meteorological information for 2023 to 2025, including wind speed, wind direction, temperature, humidity, rainfall, and atmospheric stability.
- Review and analysis of existing ambient air quality, VOC and dustfall monitoring data.
- Estimation of construction-phase emissions using recognised United States Environmental Protection Agency (US EPA) and European Monitoring and Evaluation Programme of the European Environmental Agency (EMEP/EEA) methodologies.
- Development of a bespoke numerical modelling framework to simulate droplet evaporation, contaminant transport and deposition associated with the enhanced evaporation system.
- Application of a probabilistic sulfide-generation model and Monte Carlo simulations to evaluate potential H_2S generation within PWD10A.
- Atmospheric dispersion modelling using AERMOD to assess operational air quality impacts and compliance with applicable assessment criteria.
- Assessment of cumulative impacts and determination of impact significance.

The GSDM air quality authority approved the AQIA methodology approach; the letter containing this approval is in **Appendix J**.

11.7.3 Key Findings of the Study

11.7.3.1 Baseline Air Quality Environment

The study area is located within the HPA and is influenced by a range of existing emission sources, including SO, mining activities, vehicle emissions and fugitive dust sources. Air quality sensitive receptors identified within the study area include residential areas, schools and healthcare facilities (**Figure 52**). A total of 67 discrete receptors were included in the air quality assessment. The closest school is approximately 1.5 km north of the proposed Project, and the nearest residential area is approximately 3.5 km southwest of the site.

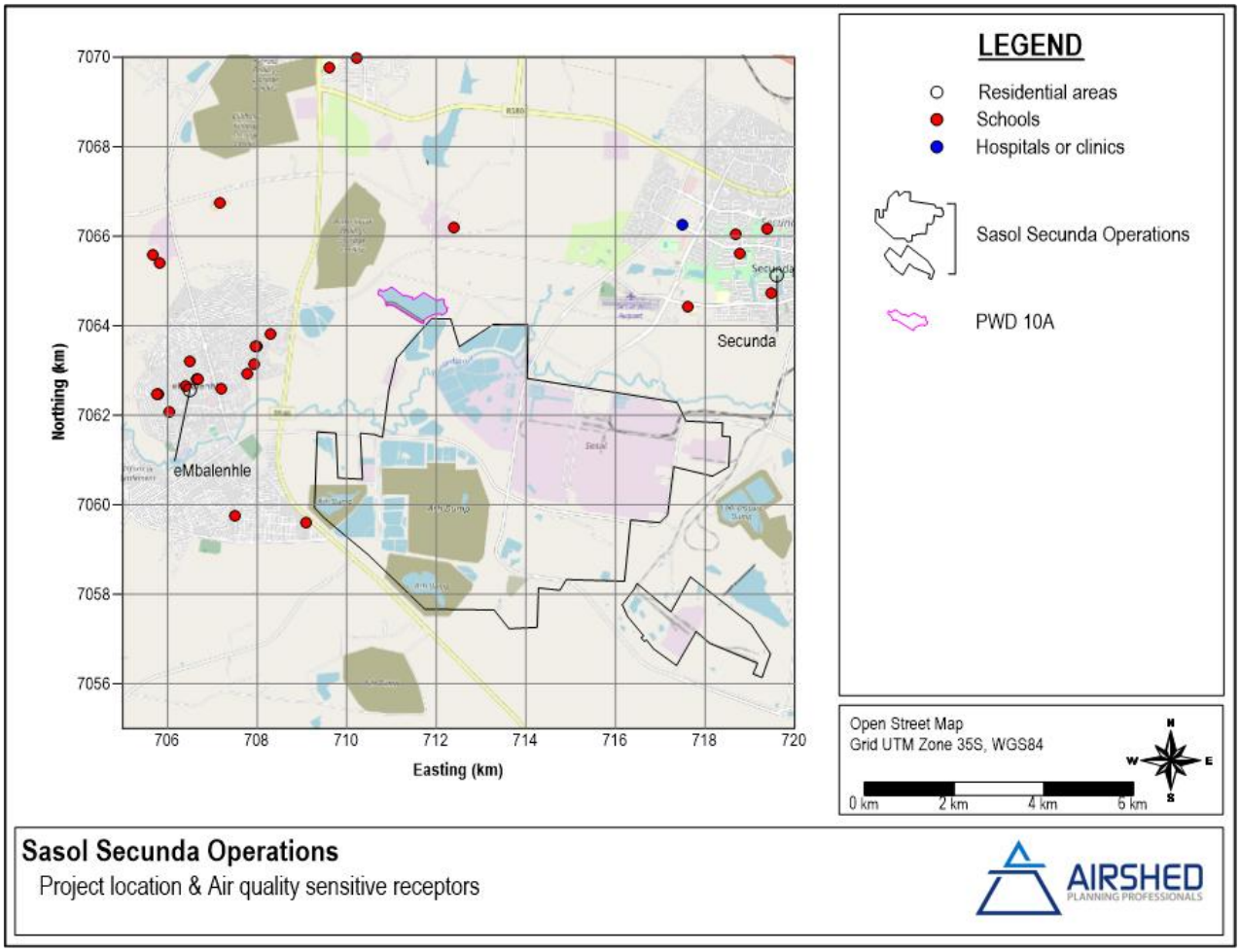


Figure 52: Project location in relation to air quality sensitive receptors (Bird and Burger, 2026b)

Meteorological conditions were assessed using measured data collected between 2023 and 2025. It was determined that daytime winds predominantly come from the northwest and southwest, while night-time winds generally come from the northeast (**Figure 53**). These wind conditions influence the direction of pollutant dispersion within the study area.

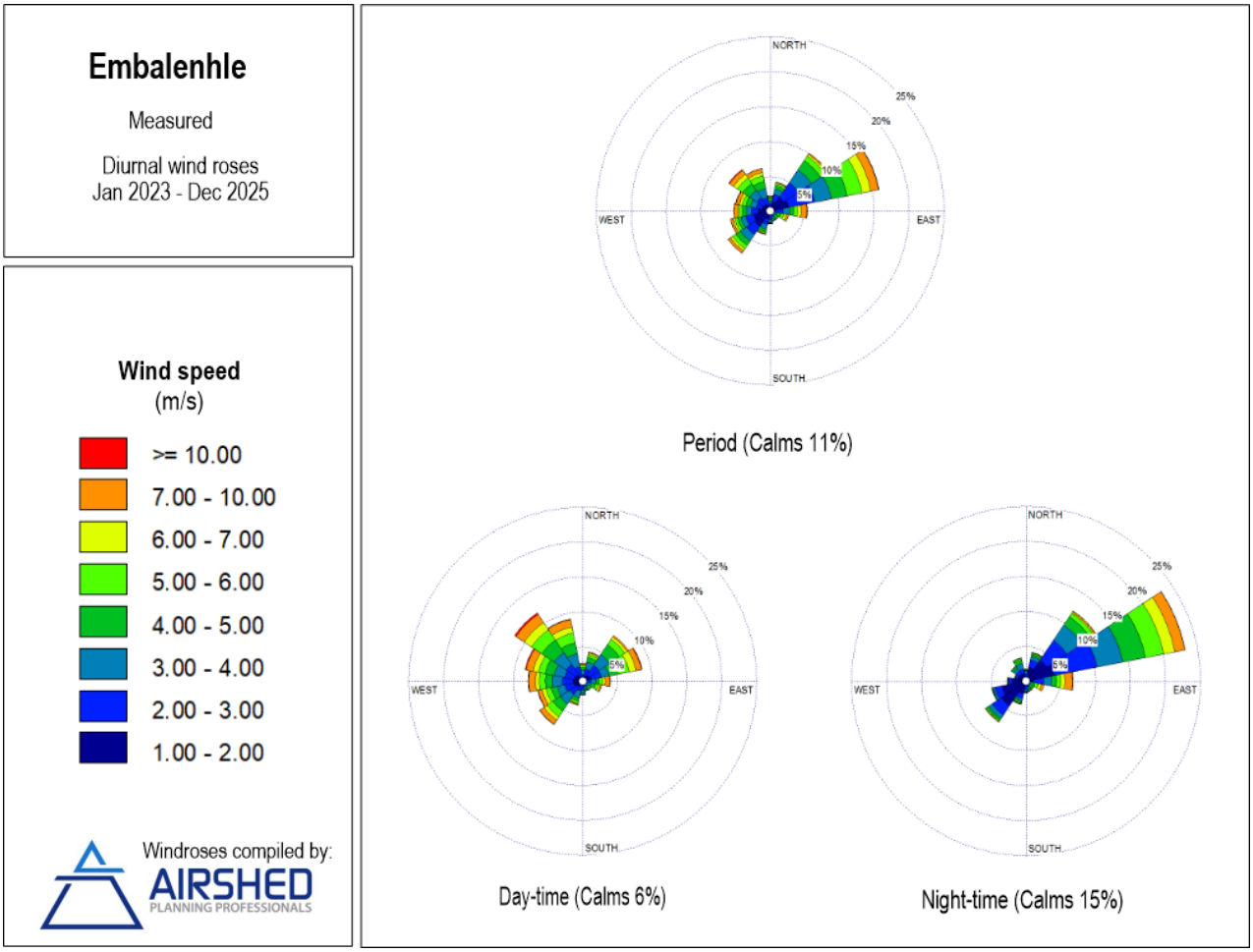


Figure 53: Period, day- and night-time wind rose for the period 2023 - 2025 (measured data) (Bird and Burger 2026b)

The review of ambient monitoring data indicated that air quality within the broader study area is already influenced by existing industrial and regional emission sources. Monitoring results showed elevated particulate matter concentrations at several monitoring stations, while H_2S concentrations associated with odour were also recorded within the area. The pollutants most relevant to the proposed Project include particulate matter, dustfall, H_2S, and VOCs. **Table 18** shows the pollutants that were assessed as part of the AQIA for the Construction and Operation Phases of the Project.

Table 18: Pollutants assessed as part of the AQIA (Bird and Burger, 2026b)

Project Phase	Pollutants Assessed
Construction Phase	Dustfall, Total Suspended Particulates (TSP), PM
Operation Phase	Dustfall, PM, H_2S and VOCs

11.7.3.2 Assessment Findings

The assessment found that the primary construction-phase air quality impacts relate to temporary dust generation and particulate emissions associated with site clearing, earthworks, vehicle movement and general construction activities. The specialist concluded that these impacts can be

effectively managed through the implementation of standard dust suppression and construction management measures.

Dispersion modelling indicated that operational dustfall rates would remain below 200 mg/m²/day across the modelling domain and below 10 mg/m²/day within 800 m of the proposed evaporators. Daily PM concentrations were predicted to decrease to below 2 µg/m³ within 2 km of the project footprint. H_2S impacts were assessed using Low, Central and Conservative High Case scenarios. Under the Conservative High Case scenario, nuisance odour impacts could extend up to approximately 1.7 km from the evaporator systems, predominantly toward the southeast and within the Sasol operational area. VOC-related impacts were predicted to remain localised and below health-effect screening thresholds. The operational phase was accordingly classified as a Low Acceptable Negative Impact.

The study also assessed cumulative air quality conditions, recognising that the project is located within an area already influenced by existing industrial and regional emission sources. The specialist concluded that the proposed project would contribute incrementally to the existing air quality environment and that cumulative air quality conditions are primarily influenced by existing background sources.

11.7.3.3 Monitoring and Management Recommendations

The specialist recommended implementing a monitoring and management programme to verify operational performance and ensure air quality impacts remain within acceptable limits.

Key recommendations include:

- Implementation of dust suppression measures during construction activities.
- Ongoing dustfall monitoring near the project area.
- Regular monitoring of process water quality parameters.
- Monitoring and investigation of odour complaints, should these occur.
- Periodic review of operational performance and environmental monitoring results to verify specialist assumptions and identify any adaptive management requirements.

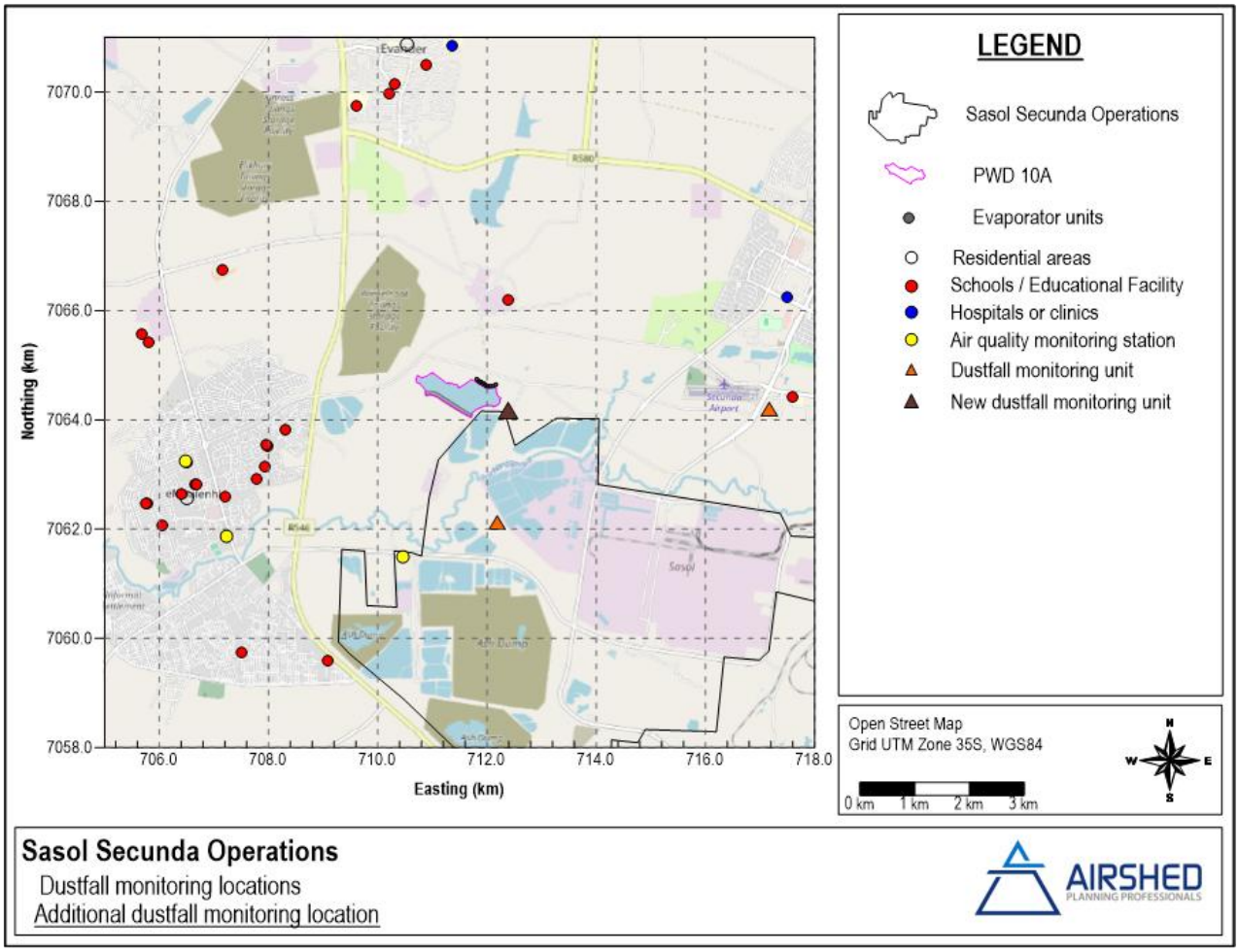


Figure 54: Proposed monitoring network for the proposed Project area (Bird and Burger, 2026b)

11.7.4 Conclusion

The AQIA concluded that the proposed enhanced evaporation project can be undertaken from an air quality perspective, provided that the recommended mitigation, monitoring and management measures are implemented. The assessment found that the project is not expected to result in unacceptable air quality impacts at surrounding sensitive receptors and that no fatal flaws were identified. The specialist therefore concluded that there are no air quality-related reasons why the proposed development should not proceed.

12 IMPACT ASSESSMENT

12.1 Introduction

This section considers and evaluates the likely impacts associated with the proposed Project in quantitative terms (to the extent possible). In addition, mitigation measures are established and residual negative impacts that cannot be mitigated are identified.

The BAR's scope and level of detail are commensurate with the potential impacts associated with the proposed Enhanced Evaporation Project. In the case of this project, which involves specifically the identified physical elements, aspects, and facilities that are likely to generate impacts, the environmental and social risks and impacts were identified in the context of the PAOI. The PAOI encompasses the area likely to be directly or indirectly affected by the activities of the proposed Project. The PAOI also considers the cumulative impacts that may result from the incremental impacts of the proposed Project and from other existing, planned or reasonably defined developments relative to the space and time of the project.

The following definitions apply to the impact assessment:

- 'Environmental and social aspects' are regarded as those activities related to the project that are likely to interact with environmental and social features and cause an impact; and
- 'Impact' refers to the change to the environmental and social features resulting from an environmental and social aspect (or activity), whether desirable or undesirable. An impact may be the direct or indirect consequence of an activity.

12.2 Predicting Potential Impacts

The potential environmental and social risks and impacts associated with the proposed Project were identified through an appraisal of the following:

- Legal context;
- Activities associated with the proposed enhanced evaporation;
- Nature and profile of the receiving environment, including potential sensitive features and receptors;
- Findings of specialist studies;
- Outcomes from stakeholder engagement; and
- Input received from authorities and the project team.

12.3 Impacts Associated with Listed Activities

As mentioned, the Project requires Environmental Authorisation for certain activities listed in the EIA Regulations of 2014 (as amended), which serve as triggers for the Basic Assessment. The potential impacts associated with the key listed activities are broadly stated in **Table 19** below. The potential impacts were elaborated on in the specialist studies that were undertaken as part of the Basic Assessment.

Table 19: Potential Impacts associated with the key listed activities

Legislation	Description and Relevance	Potential Impact Overview
GN No. 327 of 7 April 2017 (Listing Notice 1)	***GN No. R.983 – Activity 12*** The development of - (i) dams or weirs, where the dam or weir, including infrastructure and water surface area, exceeds 100 square metres; or (ii) infrastructure or structures with a physical footprint of 100 square metres or more; where such development occurs— (a) within a watercourse; (b) in front of a development setback; or (c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse;	• Impacts associated with the footprint of the physical infrastructure within 32 m of a watercourse (e.g. wetlands), as well as rehabilitation of wetlands. • Adverse effects to resource quality associated with working alongside watercourses. • Loss of watercourse vegetation within the construction domain. • Destabilisation of affected watercourses. • Reduction in water quality of receiving watercourses due to improper management of storm water, hazardous material and sanitation. • Altering the drainage of the site.
	GN No. R.983 – Activity 14 The development and related operation of facilities or infrastructure, for the storage, or for the storage and handling, of a dangerous good, where such storage occurs in containers with a combined capacity of 80 cubic metres or more but not exceeding 500 cubic metres.	• Reduction in water and soil quality of the receiving due to improper management of hazardous material.
	GN No. R.983 – Activity 19 The infilling or depositing of any material of more than 10 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 10 cubic metres from a watercourse;	• Construction activities (including bulk earthworks) to be undertaken within watercourses for physical infrastructure. • Adverse effects to resource quality associated with working in-stream and alongside the watercourses. • Destabilisation of affected watercourses.
	GN No. R.983 – Activity 25 The development and related operation of facilities or infrastructure for the treatment of effluent, wastewater or sewage with a daily throughput capacity of more than 2 000 cubic meters but less than 15 000 cubic meters.	• Clearance of indigenous vegetation. • Soil destabilisation and subsequent erosion. • Odour impact from reduced sulfides and volatile organic compounds • Deposition of aerosolised salts in the surrounding environment

12.4 Project Activities

In order to understand the impacts related to the Project, it is necessary to unpack the activities associated with the project life-cycle, which is done in the sub-sections to follow.

12.4.1 Project Phase: Pre-construction

Some of the main Project activities, as well as high-level environmental activities, to be undertaken in the pre-construction phase are listed in **Table 20** below.

Table 20: Simplified List of Activities associated with Pre-construction Phase

Project Phase: Pre-construction
Project Activities
• Negotiations and agreements with the affected landowners, custodians of existing infrastructure, stakeholders and authorities (as relevant).
• Registration of power line servitude.
• Detailed engineering design.
• Detailed geotechnical investigations.
• Survey and map topography for determination of post-construction landscape, rehabilitation and shaping (where necessary).
• Procurement process for Contractor.
• Review Contractor's method statements (as relevant).
• Identify access roads and undertake selective improvements to existing access roads to facilitate the delivery of construction plant and materials.
• The building of a site office and ablution facilities.
• Confirmation of the location and condition of all structures and infrastructure.
• Determining and documenting the conditions of the roads to be used during construction.
High-Level Environmental Activities
• Diligent compliance monitoring of the EMPr, Environmental Authorisation, and other relevant environmental legislation.
• Pre-construction environmental survey if recommended by an ecologist.
• Develop Environmental Monitoring Programme (e.g. air quality, water quality, noise, traffic, social, as relevant).
• Barricading/signage of sensitive environmental features (e.g. watercourses)
• Obtain permits for impacts to Species of Conservation Concern (SCC), if avoidance is not possible
• Ongoing consultation with I&APs
• Other activities as per EMPr

12.4.2 Project Phase: Construction Phase

Some of the main Project activities, as well as high-level environmental activities, to be undertaken in the construction phase are listed in **Table 21** below.

Table 21: Simplified List of Activities associated with the Construction Phase

Project Phase: Construction
Project Activities
• Site establishment
• Relocation of existing structures and infrastructure (as relevant)
• Prepare access roads
• Establish a construction laydown area
• Delivery of construction material
• Transportation of equipment, materials and personnel

Project Phase: Construction
• Storage and handling of material
• Construction employment
• Site clearing (as necessary)
• Excavation
• Concrete Works
• Mechanical and Electrical Works
• Electrical supply
• Material delivery and offloading
• Construction of Enhanced Evaporation infrastructure
• Stockpiling
• Waste and wastewater management
High-Level Environmental Activities
• Diligent compliance monitoring of the EMPr, EA, GA and other relevant environmental legislation
• Implement Environmental Monitoring Programme (air quality, noise, aquatic, terrestrial, geomorphological)
• Reinstatement and rehabilitation of the construction domain (as necessary)
• Other activities as per EMPr for Construction Phase

12.4.3 Project Phase: Operational

Some of the main Project activities, as well as high-level environmental activities, to be undertaken in the operational phase are listed in **Table 22** below.

Table 22: Simplified List of Activities associated with Operational Phase

Project Phase: Operation
Project Activities
• Testing and commissioning the Project's components.
• Cleaning of evaporation systems.
• Servitude access arrangements and requirements.
• Routine maintenance inspections of power lines and servitudes.
• Controlling vegetation.
• Managing stormwater.
• Conducting preventative and corrective maintenance.
• Monitoring of the enhanced evaporation facility's performance.
• Ongoing consultation with directly affected parties.
High-Level Environmental Activities
• Ongoing consultation with I&APs.
• Diligent compliance monitoring of the EMPr, EA and GA.
• Other activities as per EMPr for Operational Phase.

12.5 Environmental Aspects

Environmental aspects are regarded as those components of the Project's activities that are likely to interact with the environment and cause an impact.

The environmental aspects that have been identified for the Project, which are linked to the project activities (refer to **Section 12.4** above), are provided in **Table 23** below. Note that only high-level aspects are provided.

Table 23: Environmental Aspects associated with Project Life-Cycle

Project Phases and Associated Possible Environmental Aspects
Project Phase: Pre-Construction
• Inadequate consultation with affected parties, stakeholders and authorities.
• Inadequate environmental and compliance monitoring.
• Poor construction site planning and layout.
• Site-specific environmental issues that are not fully understood.
• Land occupancy by temporary buildings, provisional on-site facilities and storage areas.
• Absence of relevant permits (if required).
• Lack of barricading/signage of sensitive environmental features.
• Poor waste management
• Absence of ablution facilities.
Project Phase: Construction
• Inadequate environmental and compliance monitoring.
• Lack of environmental awareness creation.
• Indiscriminate site clearing.
• Poor site establishment
• Disruptions to traffic.
• Poor transportation practices
• Poor fencing arrangements.
• Erosion.
• Disruptions to existing services.
• Indiscriminate disturbance of topsoil.
• Poor management of excavations.
• Inadequate storage and handling of material.
• Poor maintenance of equipment and plant.
• Poor management of the labour force
• Pollution from ablution facilities.
• Inadequate management of the construction camp.
• Poor waste management practices – hazardous and general solid, liquid.
• Wastage of water.
• Poor management of pollution generation potential.
• Damage to significant flora (if encountered).
• Damage to significant fauna (if encountered).
• Environmental damage where watercourses are crossed.
• Inadequate stormwater management.
• Damage to environmentally sensitive areas.
• Damage to cultural heritage and palaeontological features (if encountered).
• Poor reinstatement and rehabilitation.
Project Phase: Operation

• Inadequate environmental and compliance monitoring.
• Inadequate management of routine maintenance and maintenance works.
• Inadequate management of vegetation.
• Inadequate management of invasive alien plants
• Inadequate stormwater management.
• Pollution caused by the cleaning of the evaporation systems.
• Pollution caused by dangerous goods (e.g. transformer oils, diesel) associated with the onsite operations.
• Failure to comply with health, safety and environmental specifications.
• Generation of odorous emissions associated with H_2S
• Generation of nuisance odours associated with VOC emissions
• Deposition of fine particulate matter and residual salts from evaporation processes
• Localised impacts on vegetation and infrastructure associated with droplet fallout and salt deposition
• Failure to comply with EA, GA and EMPr
• Failure to comply with required monitoring measures

12.6 Potentially Significant Environmental Impacts

Environmental impacts are the changes to the environment resulting from an environmental aspect, whether desirable or undesirable.

Note that it is not the intention of the impact assessment to evaluate all potential environmental impacts associated by the Project's environmental aspects, but rather to focus on the potentially **significant** direct and indirect impacts.

The potentially significant environmental impacts associated with the Project, as listed in Table 24 below, were identified through an appraisal of the following:

- ❑ Project-related components and infrastructure as well as the resources and services required;
- ❑ Activities and aspects associated with the project life-cycle (i.e. pre-construction, construction and operation);
- ❑ Nature and profile of the receiving environment and potential sensitive environmental features and attributes;
- ❑ Findings from specialist studies;
- ❑ Understanding of direct and indirect effects of the Project as a whole;
- ❑ Comments received during public participation from authorities and I&APs; and
- ❑ Legal and policy context.

Note that the list of impacts in **Table 24** below is elaborated on in the impact assessments that follow in **Sections 12.8 -12.21** below.

Table 24: Potentially Significant Environmental Issues

Environmental Factor	Construction Phase Potential Issues / Impacts	Operational Phase Potential Issues / Impacts
Land Use	• Permanent change in land use at the proposed evaporation site and along the power line route. • Setbacks / conditions associated with surrounding land and infrastructure. • Sterilisation of land. • Servitude restrictions.	• Sterilisation of land for other land use types up to the decommissioning of the Project (if applicable). • Servitude restrictions.
Geology	• Suitability of geological conditions to support the proposed infrastructure.	• Suitability of geological conditions to support the infrastructure.
Geohydrology	• Groundwater pollution due to spillages and poor construction practices.	• Groundwater pollution due to poor operation and maintenance practices.
Topography	• Visual impact. • Erosion of areas cleared for construction purposes.	• Visual impact caused by the proposed Project infrastructure and landscape transformation. • Erosion due to inadequate stormwater management.
Soil	• Soil erosion due to clearance and inadequate stormwater management. • Soil compaction. • Soil contamination due to spillages and poor construction practices. • Loss of topsoil.	• Soil erosion due to inadequate stormwater management. • Soil contamination due to poor operation and maintenance practices.
Surface Water	• Alteration of drainage over the site. • Surface water pollution due to spillages, sedimentation and poor construction practices. • Encroachment of construction activities into riparian zones and 1:100 year floodlines.	• Sedimentation through silt-laden runoff, caused by inadequate stormwater management. • Water resources could be contaminated through inadequate storage and handling of hazardous materials and poor management of waste and wastewater. • Water use requirements of the Project need to be satisfied.
Flora & Fauna	• Habitat loss / fragmentation. • Potential loss, disturbance or displacement of fauna and flora species. • Human - animal conflicts. • Noise and vibration impacts to fauna. • Night lights/security lights may affect nocturnal faunal species. • Illegal harvesting and poaching of faunal and floral species by construction workers. • Pollution of the biophysical environment from poor construction practices. • Proliferation of invasive alien species in disturbed areas.	• Habitat fragmentation (e.g. barriers to animal movement). • Risk to birds from collision with infrastructure and from electrocution. • Electrical faulting from birds. • Chemical pollution associated with cleaning the enhanced evaporation systems. • Proliferation of invasive alien species in disturbed areas. • Pollution from the use of herbicides.
Socio-economic Environment	• Influx of people seeking employment and associated impacts (e.g. foreign workforce, cultural conflicts, squatting, demographic changes). • Safety and security. • Use of the local road network. • Nuisance from dust, odour and noise. • Consideration of local labourers and suppliers in the area – stimulation of the local economy (positive impact). • Transfer of skills (positive impact).	• Direct and indirect economic opportunities as a result of the Project.
Air Quality	• Increased nuisance dustfall and fine particulate matter concentrations due to vegetation clearing, earthworks, material handling, vehicle movement on unpaved roads and other construction activities.	• Increased dustfall and fine particulate matter concentrations associated with the dispersion and deposition of residual salts following evaporation of the process water droplets.

Environmental Factor	Construction Phase Potential Issues / Impacts	Operational Phase Potential Issues / Impacts
	• Potential exceedances of the applicable dustfall and PM_{10} thresholds within approximately 700 m and 900 m of active construction areas, respectively, if emissions are not adequately controlled. • Combustion-related particulate and gaseous emissions from construction vehicles, equipment, machinery and temporary power generation. • Contribution to the existing particulate matter loading within an airshed where baseline PM_{10} and $PM_{2.5}$ concentrations are already elevated.	• Potential nuisance odour and health impacts associated with the release of H_2S, particularly under conservative high sulfide conditions. • Potential nuisance odour associated with VOC emissions, although impacts are expected to be localised and below health-effect screening levels. • Potential deposition of partially evaporated droplets and dissolved salts within the vicinity of the evaporator units, with possible effects on surrounding vegetation, soil, water bodies and infrastructure. • Contribution to cumulative air quality impacts within an already impacted airshed, particularly in relation to fine particulate matter and H_2S odour.
Noise	• Localised increases in noise may be caused by construction activities.	• Increase in noise due to the operation of the enhanced evaporator systems.
Agriculture	• Loss of fertile soil through land clearance. • Soil erosion. • Loss of topsoil. • Risk of harm to livestock from construction activities if the site is not secured.	• Loss of possible future agricultural land use due to direct occupation by the development footprint. • Soil erosion due to inadequate stormwater management.
Historical and Cultural Features	• Possible direct impacts on below-ground archaeological deposits and fossils as a result of ground disturbance.	• Possible impacts to the cultural landscape as a result of the introduction of incompatible structures and infrastructure to the rural landscape.
Existing Structures & Infrastructure	• Setbacks / conditions associated with the surrounding land and infrastructure.	• Setbacks / conditions associated with surrounding land and infrastructure.
Transportation	• Increase in traffic on the local road network. • Transportation of materials and construction personnel to site. • Impacts to road conditions. • Speeding and reckless driving by construction personnel. • Construction vehicles accessing and leaving the sites via national and/or provincial roads. • Use of oversized vehicles / abnormal loads, as required. • Risks to other road users.	• Transportation of maintenance materials, as well as operational and maintenance personnel, to site.
Civil Aviation	• Impact on Air Traffic Navigation and Communication. • Risks posed to aviation by obstacles (power lines).	
Aesthetics	• Landscape transformation. • Visual impacts associated with construction activities.	• Landscape transformation. • Inadequate reinstatement and rehabilitation of the construction footprint. • Light pollution. • Visual impacts.
Health	• Hazards related to construction work. • Increased levels of dust and particulate matter. • Increased levels of noise. • Water (surface and ground) contamination. • Poor water and sanitation. • Communicable diseases. • Psychosocial disorder (e.g. social disruptions). • Safety and security.	• Hazards related to operation and maintenance work.

The findings of the specialists are of particular importance for understanding the impacts of the Project and managing them throughout the project life-cycle, as these studies focused on the significant environmental issues. As can be seen from the various impact assessments conducted by the specialists, there are a number of cross-cutting impacts addressed across these studies, with particular reference to the Project's aquatic and terrestrial ecology and heritage effects.

12.7 Impact Assessment Methodology

The impacts and the proposed management thereof are first discussed in **Section 12.8** to **Section 12.24** below on a qualitative level and thereafter quantitatively assessed by evaluating the nature, extent, magnitude, duration, probability, and ultimately the significance of the impacts (refer to methodology provided in **Table 25** below). Where applicable, the impact assessments and significance ratings provided by the respective specialists are included.

In the case of the specialist studies, some of the impact assessment methodologies deviated from the approach shown in **Table 25** below. However, the quantitative basis for these specialist evaluations of the impacts to specific environmental features still satisfied the intention of the Impact Assessment.

The assessment considers impacts before and after mitigation, where in the latter instance, the residual impact following the application of the mitigation measures is evaluated.

Table 25: Quantitative Impact Assessment Methodology

Nature (/Status)	The project could have the following impacts to the environment: • Positive; • Negative; or • Neutral.
Extent	• Local - extend to the site and its immediate surroundings. • Regional - impact on the region but within the province. • National - impact on an interprovincial scale. • International - impact outside of South Africa.
Magnitude	Degree to which impact may cause irreplaceable loss of resources. • Low - natural and social functions and processes are not affected or minimally affected. • Medium - affected environment is notably altered; natural and social functions and processes continue albeit in a modified way. • High - natural or social functions or processes could be substantially affected or altered to the extent that they could temporarily or permanently cease.
Duration	• Short term - 0-5 years. • Medium term - 5-11 years. • Long term - impact ceases after the operational life cycle of the activity either because of natural processes or by human intervention. • Permanent - mitigation either by natural process or by human intervention will not occur in such a way or in such a time span that the impact can be considered transient.

Probability	• Almost certain - the event is expected to occur in most circumstances. • Likely - the event will probably occur in most circumstances. • Moderate - the event should occur at some time. • Unlikely - the event could occur at some time. • Rare/Remote - the event may occur only in exceptional circumstances.
Significance	Provides an overall impression of an impact's importance, and the degree to which it can be mitigated. The range for significance ratings is as follows- 0 - Impact will not affect the environment. No mitigation necessary. 1 - No impact after mitigation. 2 - Residual impact after mitigation / some loss of populations and habitats of non-threatened species. 3 - Impact cannot be mitigated / exceeds legal or regulatory standard / increases level of risk to public health / extinction of biological species, loss of genetic diversity, rare or endangered species, critical habitat.

12.8 Mitigation of Impacts

Suitable measures were identified to manage the identified environmental and social risks and impacts according to the following mitigation hierarchy:

1. Initial efforts strive to **avoid** the risk and resultant occurrence of the impact;
2. If this is not possible, mitigation includes measures that **reduce or minimise** the risk and the resultant significance of the impact to an acceptable level;
3. **Remediation or restoration** will take place if measures cannot suitably prevent or reduce the risks and resultant impacts, or to address the residual impacts; and
4. As a last measure, where significant residual impacts remain, **compensation or offsets** (where technically and financially feasible) will be employed as a form of mitigating the impacts associated with the project.

The proposed mitigation of the impacts associated with the proposed enhanced evaporation Project includes specific measures identified by the environmental specialists and the technical team, stipulations of environmental authorities (where relevant) and environmental best practices.

An EMPr represents a detailed plan of action prepared to ensure that recommendations for enhancing positive impacts and/or limiting or preventing negative environmental impacts are implemented during the life-cycle of a project. The EMPr for the proposed Project, which is contained in **Appendix H**, provides a comprehensive list of mitigation measures for specific elements of the proposed Project and the receiving environment. The content of the EMPr is based on Appendix 4 of the EIA Regulations.

All liability for the implementation of the EMPr (as well as the EIA findings and Environmental Authorisation, if granted) lies with the Project Proponent.

12.9 Land Use

12.9.1 Impact Description

Land is required for constructing the proposed infrastructure associated with the Project. In addition, a servitude will be required for the power line.

The dominant land use and land cover in the areas earmarked for the project infrastructure is presented in **Section 12.2** above. The proposed Project site is located on land owned by the Applicant.

12.9.2 Impact Assessment

Environmental Feature	**Land Use**					
Relevant Alternatives & Activities	**All physical infrastructure that forms part of the Project**					
Project life-cycle	**Construction & operational phases**					
Potential Aspects & Impacts	**Proposed Management Objectives / Mitigation Measures**					
• Power line servitude restrictions. • Disruptions to existing land use.	• Power line route to follow existing transmission line servitudes. • Rehabilitation post operation.					
	+/- Impacts	**Extent**	**Magnitude**	**Duration**	**Probability**	**Significance**
Before Mitigation	-	local	medium	long-term	likely	2
After Mitigation	-	local	low	short-term	unlikely	1

12.10 Soils

12.10.1 Impact Description

During the construction phase areas will be cleared of vegetation, which may lead to soil erosion. Erosion could also take place in the absence of suitable stormwater management. The EMPr includes storm water management measures to prevent the occurrence of erosion.

Soil may be polluted by poor storage or handling of material, spillages and inadequate housekeeping practices. Specific mitigation measures are contained in the EMPr, where the primary objective is the effective and safe management of materials on site, in order to minimise the impact of these materials on the biophysical environment. The same objective applies to the correct management and handling of hazardous substances (e.g. fuel, transformer oil).

12.10.2 Impact Assessment

Environmental Feature	**Soils**
Relevant Alternatives & Activities	**Construction and operational activities**
Project life-cycle	**Construction & operational phases**

Potential Aspects & Impacts	Proposed Management Objectives / Mitigation Measures
• Soil erosion • Soil compaction • Soil contamination	• Consider findings from geotechnical investigations during Project design phase and incorporate mitigation measures (as relevant). • Stabilisation of cleared areas to prevent and control erosion. • Manage drainage from sites to minimise erosion. • Reinstate and rehabilitate disturbed areas within development footprint to prevent future erosion. • See mitigation measures regarding hazardous substances & waste.

	+/- Impacts	Extent	Magnitude	Duration	Probability	Significance
Before Mitigation	-	local	medium	long-term	likely	2
After Mitigation	-	local	low	short-term	unlikely	1

12.11 Geohydrology

12.11.1 Impact Description

Groundwater may be impacted by the Project as follows:

- ❑ Possible influence on groundwater flow as a result of earthworks and building of infrastructure and structures associated with the development footprint during construction.
- ❑ Use of groundwater during construction and operational phases; and
- ❑ Potential contamination of groundwater during construction and operational phases as a result of inadequate management of wastewater and spillages of dangerous goods.

12.11.2 Impact Assessment

Environmental Feature	Geohydrology
Relevant Alternatives & Activities	**Construction and operational activities**
Project life-cycle	**Construction & operational phases**
Potential Aspects & Impacts	**Proposed Management Objectives / Mitigation Measures**
• Groundwater pollution. • Groundwater use. • Impacts to groundwater flow.	• Consider findings from geotechnical investigations during Project design phase and incorporate mitigation measures (as relevant). • Suitable protection of groundwater during excavations. • All storage tanks containing hazardous materials must be placed in bunded containment areas with impermeable surfaces. The bunded area must be able to contain 110% of the total volume of the stored hazardous material. • Provide sufficient and suitable sanitation facilities during construction and operational phases, which shall conform to all relevant health and safety standards and codes. • The intention is that water that is required for construction and operation will be sourced from the operational municipal supply.

	+/- Impacts	Extent	Magnitude	Duration	Probability	Significance
Before Mitigation	-	local	medium-high	long-term	likely	3
After Mitigation	-	local	low	long-term	unlikely	1

12.12 Surface Water

12.12.1 Impact Description

Without any mitigation or management measures in place, the following activities and aspects associated with the proposed Project may cause impacts to surface water resources in the PAOI:

- Movement of construction vehicles and equipment through watercourses and riparian zones, or wetland areas.
- Vehicle movement, especially in soft or erodible soils, can generate loose sediment that is later washed into nearby drainage lines during rainfall.
- Inadequate management of waste and wastewater.
- Spillages of fuel, oil and other dangerous goods.

12.12.1.1 Potential Adverse Impacts

The proposed Project may cause the following adverse impacts to surface water in the absence of proper mitigation:

- Damage to structure and functioning of watercourses if they are traversed by the vehicles and associated equipment, including –
  - Physical disturbances to the beds, banks or channels of affected watercourses;
  - Damage to riparian and wetland vegetation;
  - Compaction of wetland soils and erosion; and
  - Harm to or loss of species that utilise watercourses.
- Temporary increase in turbidity of watercourses from run-off over disturbed areas.
- Reduction of water quality in watercourses that receive run-off from contaminated areas (e.g., areas where an accidental spill has occurred).

12.12.1.2 Receptors

The receptors of the potential impacts in terms of surface water resources include the following:

- Resource quality (i.e., flow, in-stream and riparian habitat, aquatic biota and water quality) of affected watercourses.
- Animals that drink surface water and which utilise watercourses as habitat.

12.12.1.3 Management Objectives

Management objectives for surface water include:

- Comply with NWA, NEM:BA, and other relevant legal requirements related to surface water resources.
- Prevent contamination, alteration, or degradation of surface water resources during the construction and operation of the proposed Project.

12.12.1.4 Mitigation Measures

Ensure the safeguarding of surface water features against the Project by implementing the following mitigation measures:

- ❑ The following recommendations stem from the Wetland Delineation and Impact Assessment (Hoosen, 2026) –
  - The mitigation measures outlined in Sections 5 and 6 of the Specialist study must be implemented and monitored.
  - All monitoring requirements set out in Table 25 must be implemented.

Also adhere to the complementary mitigation measures listed in the EMPr related to hazardous substances, refuelling, sanitation facilities, wastewater management, spill response procedure, and washing of vehicles.

12.12.2 Impact Assessment

Please see Tables below:

Table 26: Alteration of the water flow regime and water input of the watercourses impact ratings (Hoosen, 2026).

Nature: Changing the quantity and fluctuation properties of the 'at-risk' wetlands by addition of hardened surfaces in the catchment.			
Activity: The sources of this impact include the compaction and excavation of soils, removal of vegetation from the catchment and within wetland habitats during the construction and operation phases, based on the overhead powerline route which will require a maintenance road and the upgrade of the culvert. However, if rehabilitation is conducted correctly, the hydrological regimes of wetlands will remain the same.			
Descriptors	**Without Mitigation**	**With Mitigation**	**Mitigation Measures**
CONSTRUCTION PHASE			– Where avoidance of wetlands is not possible, ensure engineered stormwater systems mimic natural flow patterns where possible to maintain downstream hydrological connectivity. – Incorporate energy-dissipating structures (gabions, rip-rap) at stormwater outlets to reduce concentrated flow velocity. – Design stormwater channels with gentle gradients and naturalised linings (e.g., grassed swales, rip-rap) to slow flows and promote infiltration. – Regularly inspect and maintain stormwater infrastructure to prevent erosion, blockages, and uncontrolled discharges. – Install adequately spaced cross-drains and culverts along access roads to prevent concentration of runoff and to maintain natural drainage pathways. – Apply permeable or semi-permeable surfaces where feasible to enhance infiltration. – Position dirty stockpiles outside of recommended buffer zones. – Surround stockpiles with sediment traps or containment berms to intercept runoff. – Vegetate long-period stockpiles with fast-growing indigenous grasses to enhance infiltration and reduce overland flow. – Stabilise disturbed slopes with brush-packing, geotextiles, and contour berms to reduce surface runoff. – Implement progressive rehabilitation of disturbed areas to restore
Frequency of Impact	Likely (4)	Highly unlikely (2)	
Frequency of Activity / Duration of Aspect	Infrequent (3)	Temporary (2)	
Severity	Slightly harmful (3)	Potentially harmful (2)	
Spatial Scale	Site specific (2)	Activity specific (1)	
Duration	One year to ten years (3)	One month to one year (2)	
Significance	**56 Medium – Low (-)**	**20 Very Low (-)**	
Status (positive or negative)	Negative	Negative	
OPERATIONAL PHASE			
Frequency of Impact	Unlikely (3)	Highly Unlikely (2)	
Frequency of Activity / Duration of Aspect	Infrequent (3)	Temporary (2)	

Severity	Slightly harmful (3)	Potentially harmful (2)	infiltration capacity. – Adapt stormwater management practices promptly if monitoring indicates progressive downstream degradation. – Earth berms or gabion systems to block artificial channels that drain water from or divert polluted water from the wetland, where required. – Concrete or gabion structures to stabilise head-cut or other erosion and prevent gullies, where required. – Gabion structures (mattresses, blankets or baskets) to provide a platform for the growth of desired indigenous vegetation, where required. – The re-vegetation of stabilised areas with appropriate wetland species. – The use of biodegradable or natural soil retention systems such as eco-logs, plant plugs, grass or hay bales, and brush-packing techniques.	
Spatial Scale	Site specific (2)	Site specific (2)		
Duration	One year to ten years (3)	One month to one year (2)		
Significance	**48 Low (-)**	**24 Very Low (-)**		
Status (positive or negative)	Negative	Negative		
REHABILITATION PHASE				
Frequency of Impact	Likely (4)	Highly Unlikely (2)		
Frequency of Activity / Duration of Aspect	Regularly (4)	Temporary (2)		
Severity	Harmful (4)	Potentially harmful (2)		
Spatial Scale	Site specific (2)	Site specific (2)		
Duration	Life of operation (4)	One month to one year (2)		
Significance	**80 Medium – High (-)**	**24 Very Low (-)**		
Status (positive or negative)	Negative	Negative		
Reversibility	Low	Medium	***Cumulative impacts:***	Due to the existing anthropogenic impacts coupled with the proposed development permanent structure and associated activities and given the footprint of the proposed activities being small and adjacent to an effluent storage dam, the cumulative impacts to the hydrological regime is deemed low.
Irreplaceable loss of resources?	Low	Low		
Can impacts be	Yes		***Residual***	The residual impacts of the proposed development can be

mitigated?		***Risks*:**	regarded as low as no wetlands will be directly impact in terms of their hydrological regime.

Table 27: Alteration of water quality due to pollution impact ratings (Hoosen, 2026).

Nature: Changes in water quality due to pollution.			
***Activity*:** The mishandling of hazardous substances and/or improper maintenance of machinery during construction, operation and rehabilitation phases, may cause oil and diesel leaks. This can result in the loss of sensitive biota in the wetlands and a reduction in functionality. However, proper management of construction vehicles, machinery during all of the aforementioned phases will reduce water quality impacts to minimal to negligible.			
Descriptors	**Without Mitigation**	**With Mitigation**	**Mitigation Measures**
CONSTRUCTION PHASE			– Locate stockpiles outside recommended buffer zones. – Construct impermeable bases or compacted platforms for stockpiles to limit infiltration of contaminants. – Vegetate or cover long-term stockpiles with fast-growing indigenous grasses to reduce dust and sediment transport. – Install silt traps, oil separators, and energy dissipaters at stormwater outlets before discharge. – Store all hydrocarbons, oils, and chemicals in bunded areas with a minimum of 110% containment capacity. – Provide spill kits at all fuelling and servicing points and train staff in spill response. – Conduct regular inspections and maintenance of bunds, pipelines, and tanks to detect leaks early. – Collect and dispose of oily rags, filters, and contaminated materials through licensed hazardous waste contractors. – Apply dust suppression (water bowsers, surfactants) on access roads and exposed areas to reduce particulate fallout into wetlands. – Install silt fences and berms downslope of disturbed areas to intercept sediment before it enters wetlands. – Ensure staff are trained to respond immediately to hydrocarbon or chemical spills. – Maintain emergency contact with DWS officials for reporting significant pollution events.
Frequency of Impact	Unlikely (3)	Highly unlikely (2)	
Frequency of Activity / Duration of Aspect	Infrequent (3)	Temporary (2)	
Severity	Slightly harmful (3)	Potentially harmful (2)	
Spatial Scale	Site specific (2)	Activity specific (1)	
Duration	One year to ten years (3)	One month to one year (2)	
Significance	**48 Low (-)**	**20 Very Low (-)**	
Status (positive or negative)	Negative	Negative	
OPERATIONAL PHASE			
Frequency of Impact	Likely (4)	Unlikely (3)	
Frequency of Activity / Duration of Aspect	Infrequent (3)	Temporary (2)	
Severity	Harmful (4)	Slightly harmful (3)	

Spatial Scale	Site specific (2)	Site specific (2)		
Duration	One year to ten years (3)	One month to one year (2)		
Significance	**63 Medium - Low (-)**	**48 Low (-)**		
Status (positive or negative)	Negative	Negative		
REHABILITATION PHASE				
Frequency of Impact	Likely (4)	Highly unlikely (2)		
Frequency of Activity / Duration of Aspect	Regularly (4)	Temporary (2)		
Severity	Harmful (4)	Potentially harmful (2)		
Spatial Scale	Site specific (2)	Activity specific (1)		
Duration	Life of Operation (4)	One month to one year (2)		
Significance	**70 Medium – High (-)**	**20 Very Low (-)**		
Status (positive or negative)	Negative	Negative		
Reversibility	Low	Medium	***Cumulative impacts*:**	Due to the existing anthropogenic impacts coupled with the proposed development activities and given the low risk of water quality impact to wetlands, the cumulative impacts are deemed to be low.
Irreplaceable loss of resources?	Low	Low		
Can impacts be mitigated?	Yes		***Residual Risks*:**	The residual impacts of the proposed development can be regarded as low water quality impacts will be minimal to negligible.

Table 28: Changing the physical structure of the watercourses impact ratings (Hoosen, 2026)

Nature: Potential loss and disturbance of wetland habit by direct and indirect activities from the proposed development during the construction and rehabilitation phases. However, re-establishment of the wetland habitat during the rehabilitation phase.			
Activity: The disturbance of wetland habitats during the construction and operation phase which in turn can impact on the integrity and functionality of the wetland. However, rehabilitation activities will allow for the integrity and functionality of the wetland to improve over time.			
Descriptors	**Without Mitigation**	**With Mitigation**	**Mitigation Measures**
CONSTRUCTION PHASE			– Locate stockpile areas, construction material, equipment storage areas and vehicle parking areas in designated areas of already hardened surface or disturbed areas on site, where possible. – Monitor the occurrence of erosion during the rainy season and take immediate corrective action where needed. – The handling and/or killing of any animal species present is strictly prohibited and all staff/personnel must be trained in this regard. – Wetland fauna (e.g. snakes, frogs, small mammals) that are encountered during the construction and operation phase must be relocated to other parts of the watercourse under the guidance of the ECO and relevant handling specialist. – Poaching/snaring is strictly prohibited. – Any areas of erosion noted during and after the construction should be immediately rehabilitated with infilling of topsoil and rapidly revegetating with a mixture of fast colonising indigenous grass and indigenous grass native of the area. – All disturbed areas must be reinstated by backfilling the areas with subsoil and topsoil, and thereafter revegetate with indigenous vegetation native to the area in the terrestrial and wetland areas. – Stabilise disturbed slopes with brush-packing, geotextiles, and contour berms to reduce surface runoff. – Implement progressive rehabilitation of disturbed areas to restore infiltration capacity.
Frequency of Impact	Likely (4)	Unlikely (3)	
Frequency of Activity / Duration of Aspect	Regularly (4)	Infrequent (3)	
Severity	Harmful (4)	Slightly harmful (3)	
Spatial Scale	Site specific (2)	Activity specific (1)	
Duration	One year to ten years (3)	One month to one year (2)	
Significance	**72 Medium - Low (-)**	**42 Low (-)**	
Status (positive or negative)	Negative	Negative	
OPERATIONAL PHASE			
Frequency of Impact	Unlikely (3)	Highly unlikely (2)	
Frequency of Activity / Duration of Aspect	Infrequent (3)	Temporary (2)	
Severity	Slightly harmful (3)	Potential harmful (2)	
Spatial Scale	Site specific (2)	Activity specific (1)	
Duration	One year to ten years	One month to one year	

	(3)	(2)	– Earth berms or gabion systems to block artificial channels that drain water from or divert polluted water from the wetland, where required. – Gabion structures (mattresses, blankets or baskets) to provide a platform for the growth of desired indigenous vegetation, where required. – The re-vegetation of stabilised areas with appropriate wetland species. – The use of biodegradable or natural soil retention systems such as eco-logs, plant plugs, grass or hay bales, and brush-packing techniques.	
Significance	**48 Low (-)**	**20 Very Low (-)**		
Status (positive or negative)	Negative	Negative		
REHABILITATION PHASE				
Frequency of Impact	Likely (4)	Highly unlikely (2)		
Frequency of Activity / Duration of Aspect	Regularly (4)	Temporary (2)		
Severity	Harmful (4)	Potentially harmful (2)		
Spatial Scale	Site specific (2)	Activity specific (1)		
Duration	One year to ten years (3)	One month to one year (2)		
Significance	**72 Medium - Low (-)**	**20 Very Low (-)**		
Status (positive or negative)	Negative	Negative		
Reversibility	Low	Medium	***Cumulative impacts:***	Due to the existing anthropogenic impacts coupled the proposed activities in small portions of wetlands, which will also include rehabilitation. The cumulative impact can be considered as low.
Irreplaceable loss of resources?	Low	Low		
Can impacts be mitigated?	Yes		***Residual Risks:***	The residual impacts of the proposed development can be regarded as low as there will be minimal direct impact to wetlands and rehabilitation occurring within wetlands.

Table 29: Introduction and spread of alien vegetation impact ratings (Hoosen, 2026).

Nature: Introduction and spread of alien vegetation during the construction and operation phases. Reduction in alien invasive vegetation during the rehabilitation phase.			
***Activity*:** The moving of soil and vegetation resulting in opportunistic invasions after disturbance and the introduction of seed in building materials and on vehicles. Invasions of alien plants can impact on hydrology, by reducing the quantity of water entering the wetland habitats, and outcompete natural vegetation, decreasing the natural biodiversity. Once in a system alien invasive plant can spread through the catchment. If allowed to seed before control measures are implemented alien plants can easily colonise and impact on downstream users. Thus, the spread of alien vegetation must be managed in the construction and operation phases. Whereas, eradication of alien vegetation during the rehabilitation phase must occur.			
Descriptors	**Without Mitigation**	**With Mitigation**	**Mitigation Measures**
CONSTRUCTION PHASE			– Relocate conservation-worthy species under the supervision of a botanist or horticultural specialist. – Proliferation of AIPs is expected within any disturbed areas particularly as there are alien and invasive species present within the study area. These species should be eradicated and controlled to prevent further spread beyond. – AIP control should take place throughout all phases to prevent loss of floral habitat. – Footprint areas should be kept as small as possible when removing alien plant species. – All bare surfaces across the construction site must be checked for AIPs every two (2) weeks and AIPs removed by hand pulling/uprooting and adequately disposed. – Herbicides should be utilised where hand pulling/uprooting is not possible. Herbicides must not be utilised within wetland habitats. – A suitably qualified ECO/botanist/horticulturist must supervise the handling, maintenance and planting of the plant/trees. No AIPs may be utilised during the rehabilitation process. – Rapidly germinating native indigenous species (e.g. fast growing, deep rooting, rhizomatous, stoloniferous) known to bind soils in terrestrial
Frequency of Impact	Likely (4)	Unlikely (3)	
Frequency of Activity / Duration of Aspect	Regularly (4)	Infrequent (3)	
Severity	Harmful (4)	Slightly harmful (3)	
Spatial Scale	Site specific (2)	Activity specific (1)	
Duration	One year to ten years (3)	One month to one year (2)	
Significance	**72** **Medium – Low (-)**	**36** **Low (-)**	
Status (positive or negative)	Negative	Negative	
OPERATIONAL PHASE			
Frequency of Impact	Likely (4)	Unlikely (3)	
Frequency of Activity / Duration of Aspect	Regularly (4)	Infrequent (3)	

Severity	Harmful (4)	Slightly harmful (3)	areas must be utilised where there is a strong motivation for stabilisation over reinstating similar plant communities to that being disturbed. This should be informed by a suitably qualified specialist. – Exposure of plant root systems to drying winds, high temperatures or water logging must be avoided. – Where possible, revegetation must take place at the start of the spring rains to maximise water availability and minimise the need for irrigation. This will ensure optimal conditions for germination and rapid vegetation establishment. – If this is not possible, watering of planted areas may be necessary during dry periods (external sources of water must be utilised e.g. JoJo tanks). – Water utilised for irrigation must be free of any chlorine or contaminants that may negatively affect the plant species. – The control of AIPS must be guided by a AIPS control plan to ensure compliance with the NEM:BA (Act no. 10 of 2004). This act states that all landowners must control listed AIPS on their property according to the NEMBA: Alien and Invasive Regulations (2014, as amended) and associated Alien Species List (2020).		
Spatial Scale	Site specific (2)	Activity specific (1)		
Duration	One year to ten years (3)	One month to one year (2)		
Significance	**72** **Medium – Low (-)**	**36** **Low (-)**		
Status (positive or negative)	Negative	Negative		
REHABILITATION PHASE				
Frequency of Impact	Likely (4)	Unlikely (3)		
Frequency of Activity / Duration of Aspect	Regularly (4)	Infrequent (3)		
Severity	Harmful (4)	Slightly harmful (3)		
Spatial Scale	Site specific (2)	Activity specific (1)		
Duration	Life of Operation (4)	One month to one year (2)		
Significance	**80** **Medium – High (-)**	**36** **Low (-)**		
Status (positive or negative)	Negative	Negative		
Reversibility	Low	Medium	***Cumulative impacts*:**	Expected to be low, given that the wetland and surrounding landscape is infested with AIPs. Regular monitoring should be implemented during all phases and for a minimum of three (3) years after completion of the construction activities.
Irreplaceable loss of resources?	Low	Low		
Can impacts be mitigated?	Yes		***Residual Risks*:**	Expected to be medium – low provided that effective alien invasive species management is undertaken, and the mitigation measures are implemented correctly, and

			effective rehabilitation of the site is undertaken where necessary.

Table 30: Alteration of the amount of sediment entering the water resource and associated change in turbidity impact ratings (Hoosen, 2026)

Nature: Changes in sediment entering and exiting the system may result in smothering of vegetation and habitats and lead to the loss of niche habitats. Furthermore, increased turbidity affects the oxygen concentration and temperature of the water. Sedimentation and erosion will lead to the degradation of the wetland habitats.			
***Activity*:** Construction activities consisting of earthworks and soil disturbances in terrestrial areas and small portions of wetlands, and bare areas during the operation phase will lead to loss of topsoil, sedimentation and increase in turbidity of the 'at-risk' wetlands. However, during the rehabilitation phase, backfilling and/or regrading of wetland soils, coupled with re-vegetation of hydrophilic vegetation will improve geomorphic integrity over time.			
Descriptors	**Without Mitigation**	**With Mitigation**	**Mitigation Measures**
CONSTRUCTION PHASE			– Construction activities and working within the wetland must be restricted to the dryer winter months where reasonably possible. – Remove only the vegetation where essential and do not allow any disturbance to the adjoining natural vegetation cover. – Stockpiling of soils and materials should take place outside of preferential flow paths, delineated wetlands and associated calculated buffer zone. – Ensure that erosion management and sediment controls are strictly implemented from the beginning of site clearing activities. – Monitor the occurrence of erosion during the rainy season and take immediate corrective action where needed. – Erosion control measures including silt fences, low vegetated soil berms and/or shutter boards should be put in place around the temporary site camp and laydown areas to limit sediment ladened runoff and contaminants traveling into the surrounding environment. – Sediment barriers (e.g.: silt fences/sandbags/hay bales) must be installed immediately downstream of active work areas (including soil stockpiles) as necessary to trap any excessive sediments generated during construction. – If revegetation of exposed surfaces cannot be established immediately
Frequency of Impact	Likely (4)	Unlikely (3)	
Frequency of Activity / Duration of Aspect	Regularly (4)	Infrequent (3)	
Severity	Slightly harmful (3)	Potentially harmful (2)	
Spatial Scale	Site specific (2)	Activity specific (2)	
Duration	One year to ten years (3)	One month to one year (2)	
Significance	**64 Medium – Low (-)**	**36 Low (-)**	
Status (positive or negative)	Negative	Negative	
OPERATIONAL PHASE			
Frequency of Impact	Unlikely (3)	Highly unlikely (2)	
Frequency of Activity / Duration of Aspect	Infrequent (3)	Temporary (3)	

Severity	Slightly harmful (3)	Potential harmful (2)	due to phasing issues, temporary erosion and sediment control measures must be maintained until such a time that revegetation can commence. – All temporary erosion and sediment control measures must be monitored for the duration of the construction and operation phases, and repaired immediately when damaged. All temporary erosion and sediment control structures must only be removed once vegetation cover has successfully recolonised the affected areas. – All post-construction building material and waste must be cleared in accordance with the EMPr, before revegetation of the disturbed footprints take place. – Erosion features that have developed as a result of construction related disturbances are required to be stabilised. This may also include the need to deactivate any erosion head cuts/rills/gullies that may have developed by either compacted soil infill, rock plugs, gabions or any other suitable measures. – Slopes that have been altered due to construction/operation must be reshaped to replicate the original condition and contours. – If the gradient of the banks is greater than 1:1.75, the banks must be stabilised with a biodegradable cover such as Geojute which must be secured to the steep slope with wooden (biodegradable) pegs. This will reduce soil erosion potential. – No imported soil material may be utilised for rehabilitation, unless it can be ensured that it is free of any AIPS seeds. In situ earthen material is preferred. – All alternative roads, tracks and footpaths created during the construction phase should be appropriately rehabilitated (e.g. tillage and revegetation of the affected areas). This rehabilitation should result in improved surface roughness and increased infiltration along with reduced stormwater flow and consequently reduced rill erosion.
Spatial Scale	Site specific (2)	Activity specific (1)	
Duration	One year to ten years (3)	One month to one year (2)	
Significance	**48** **Low (-)**	**25** **Very Low (-)**	
Status (positive or negative)	Negative	Negative	
REHABILITATION PHASE			
Frequency of Impact	Likely (4)	Highly unlikely (2)	
Frequency of Activity / Duration of Aspect	Regularly (4)	Temporary (3)	
Severity	Harmful (4)	Potential harmful (2)	
Spatial Scale	Site specific (2)	Activity specific (1)	
Duration	Permanent (5)	One month to one year (2)	
Significance	**88** **Medium - High (-)**	**25** **Very Low (-)**	
Status (positive or negative)	Negative	Negative	

Reversibility	Low	Medium	***Cumulative impacts:***	Due to the existing anthropogenic impacts coupled the proposed activities in small portions of wetlands, which will also include rehabilitation. The cumulative impact can be considered as low in terms of erosion and sedimentation as these impacts will be managed.
Irreplaceable loss of resources?	Low	Low		
Can impacts be mitigated?	Yes		***Residual Risks:***	The residual impacts of the proposed development can be regarded as low as there will be minimal direct impact to wetlands and rehabilitation occurring within wetlands to ensure reduce risk of erosion and sedimentation.

12.12.2.1 DWS Risk Assessment (Section 21c & i water uses)

Please refer to **Section 11.3.3** above.

12.13 Terrestrial Biodiversity

12.13.1 Impact Description

Without any mitigation or management measures in place, the following activities and aspects associated with the proposed Project may cause impacts to terrestrial biodiversity in the PAOI:

- Indiscriminate movement of vehicles and equipment through natural areas.
- Noise and vibration caused by construction and operation phases.
- Displacement of wildlife due to vibration, noise, and dust.
- Crushing or collapsing of burrows of burrowing animals.
- Vehicles potentially spreading seed of invasive alien species (carried seeds or plant fragments on tyres or undercarriages).
- Disturbances to habitats (e.g., watercourse crossings, natural areas within road reserve).
- The spread of Foot-and-mouth disease (FMD) via vehicles, equipment, and personnel.

12.13.1.1 Potential Adverse Impacts

The proposed Project may cause the following adverse impacts from a terrestrial biodiversity perspective in the absence of proper mitigation:

- Direct injury or mortality of animals from collisions with vehicles.
- Mortality/displacement of ground-living mammals due to construction and vehicles.
- Vehicle movement and vibration can affect sensitive species at the boundaries of protected areas.
- Human - animal conflicts.
- Soil compaction and impacts to plant regrowth.
- Soil erosion.
- Disruption/alteration of faunal species activities due to noise and vibration from construction and operational phases, and human presence.
- Illegal harvesting and poaching of faunal and floral species by the construction/operation crew.
- Establishment of invasive alien plants along disturbed verges.
- Pollution of the biophysical environment, with adverse effects to flora and fauna.
- Biosecurity risks related to the unintentional introduction or spread of invasive alien plant species, animal diseases (e.g., FMD), soil-borne pathogens, plant diseases or crop pests or contaminants transferred between areas via vehicle tyres or equipment.

12.13.1.2 Receptors

The receptors of the potential impacts from a terrestrial biodiversity perspective include fauna (including habitat) and flora.

12.13.2 Impact Assessment

Impacts were assessed utilising the NEMA Impact Assessment to determine significance, enabling comparisons to be made between risks/impacts and enabling authorities, stakeholders, and the client to understand the process and rationale upon which risks/impacts have been assessed. Please see the detailed methodology utilised in the Terrestrial Biodiversity Impact Assessment Report (**Appendix C2**).

Table 31 provides a summary of the impact assessment:

Table 31: Impact Assessment for the Potential Impact Identified for the Enhanced Evaporator System at Sasol Secunda (Paul, 2026)

Impact	Nature	Effect			Probability	Total Score	Significance
		Extent	Duration	Magnitude			
Clearance of Indigenous Vegetation							
Without mitigation	Direct	1	4	4	4	36	Medium (-)
With mitigation	Direct	1	3	2	4	24	Medium (-)
Displacement of Faunal Communities							
Without mitigation	Direct	2	2	6	3	30	Medium (-)
With mitigation	Direct	1	1	4	3	18	Low (-)
Reduction in Plant Species Diversity							
Without mitigation	Direct	1	3	2	3	18	Low (-)
With mitigation	Direct	1	3	2	2	12	Low (-)
Fragmentation, Loss of Ecosystem Function and Edge Effects							
Without mitigation	Direct	2	3	4	4	36	Medium (-)
With mitigation	Direct	2	2	3	2	14	Low (-)
Proliferation of Alien Invasive Plant Species							
Without mitigation	Direct	1	3	4	3	24	Medium (-)
With mitigation	Direct	1	2	2	2	10	Low (-)

The following summarises the recommended mitigation techniques and the management outcomes for each, to be included in the site-specific Environmental Management Programme (EMPr).

Table 32: Mitigation Measures and Management Outcomes (Paul, 2026)

Management Actions	Responsible Party	Phase	Monitoring Frequency
Floral Impacts			
The development footprint must not extend past the footprint assessed within the terrestrial ecological impact assessment report. All construction laydown areas should be kept the earmarked areas, or the proposed operation footprint.	Applicant and Contractor	Construction Phase	Ongoing
Existing rehabilitation and alien invasive control plans should be updated to include this proposed site.	Applicant	Construction Phase	Ongoing
All removed topsoil must be stored and not mixed with any subsoils or aggregate. Topsoil is to then be reused for rehabilitation.	Applicant and Contractor	Construction Phase	Ongoing
If any protected plant species are found within the construction footprint, permits must be applied for and received before the onset of construction on site.	Applicant	Pre-construction Phase	Once
The existing dust suppression schedule must be updated by the Applicant to include the proposed development site during operation.	Applicant and Contractor	Operational Phase	Ongoing
Faunal Impacts			
A pre-construction survey must be undertaken by a suitably qualified ecologist to ensure that no *Tyto capensis* breeding sites are located within the proposed footprint and likely area of impact (approximately 50 m). If breeding sites are found, then the ecologist must advise accordingly at the time. It would be recommended that a 170 m buffer be adopted during breeding (between February to April) and the 40 m buffer outside of this period during construction, with any permanently noise creating structures being located more than 170 m away within the same footprint. This recommendation may change depending on the mitigation measures available at the time of making this decision.	Ecologist and Applicant	Pre-construction Phase	Once

Management Actions	Responsible Party	Phase	Monitoring Frequency
Currently wetland habitat features low to moderate conditions, with several options with similar or improved habitat nearby.			
No killing or hunting of fauna must be tolerated.	Contractor / Applicant / ECO	All phases	Ongoing
The site-specific stormwater management plan must be adopted by the Contractor and Applicant and must be used to deal with stormwater related issues during construction and the operation phases, respectively, of this development.	Contractor / Applicant	Construction	Ongoing
Any excavations or holes must be checked regularly for fauna that either may have occupied the area or may fallen in accidentally. The design of deep excavations should consider nearby fauna (especially frogs and reptiles).	Contractor	Construction	Ongoing
All chemicals, herbicides and pesticides must be kept in a secure, bunded area to prevent any potential surface and/ or ground water contamination.	Contractor	All phases	Ongoing
Reed clearance must be restricted to the minimum area required for the installation, safe operation and maintenance of the enhanced evaporators. Reedbeds outside the approved clearance footprint must remain undisturbed.	Contractor/ECO	Pre-construction and Construction	Prior to clearance and throughout clearance activities
The approved reed-clearance footprint must be clearly demarcated prior to commencement. No clearance may occur outside the demarcated area.	Contractor/ECO	Pre-construction	Once-off prior to clearance and verified during clearance
Immediately prior to clearance, the affected reedbeds must be inspected by the ECO or suitably experienced environmental personnel for active bird nests and other fauna sheltering within the vegetation.	ECO/Environmental Personnel	Pre-construction/Construction	Immediately prior to each area being cleared
Where an active bird nest containing eggs or dependent young is identified, the nest and sufficient surrounding vegetation must remain undisturbed until breeding has been completed and the young have left the nest, unless otherwise authorised by the ECO.	ECO/Contractor	Construction	As encountered and until breeding is complete

Management Actions	Responsible Party	Phase	Monitoring Frequency
Reed removal must, where practicable, proceed progressively from the developed/landward side towards retained reedbed habitat to provide fauna with an unobstructed escape route. Clearance from multiple directions that could trap fauna within an isolated patch must be avoided.	Contractor/ECO	Construction	Continuous during reed clearance
Mechanical reed clearance must proceed at a controlled rate to allow mobile fauna to move away from the active working area. Personnel must remain alert for concealed or displaced fauna.	Contractor	Construction	Continuous during reed clearance
No fauna may be intentionally killed, injured, captured or collected. Fauna encountered within the clearance footprint must be afforded an opportunity to move away independently. Where an animal cannot safely leave the working area, the ECO or appropriately experienced personnel must facilitate its safe removal.	Contractor/ECO	Construction	Continuous during clearance
Personnel undertaking reed clearance must receive an environmental toolbox talk addressing potential fauna encounters, active nests, prohibited activities and the procedure to be followed when fauna are encountered.	ECO/Contractor	Pre-construction/Construction	Prior to commencement of reed clearance and for new personnel
Ecological Impacts			
A 40 m ecological buffer must be established around all wetland habitat and one (1) stormwater channel found on site. It is not necessary for the existing road to avoid this buffer, as it is already in existence and unlikely to have a lasting impact on this habitat unit.	Contractor / Applicant / ECO	All phases	Ongoing
The proposed development footprint must be kept as small as possible. All areas disturbed during construction, which are not a part of the proposed development plan must be rehabilitated.	Contractor	Construction	Ongoing
Rehabilitated sections of the site should be cornered off from gazers and/ or livestock to prevent overgrazing of new plants shoots and trampling of rehabilitated areas.	Contractor	All Phases	Ongoing

Management Actions	Responsible Party	Phase	Monitoring Frequency
Where possible ecological processes such seasonal burning of grasslands should still be permitted, provided that the application of fires do not compromise the safety of staff. Fires should not be encouraged between December to late April, considering the presence of grass owls within the vicinity and to encourage breeding within the long grass which was observed within the greater surrounds.	Contractor	All Phases	Ongoing
No dumping of cleared alien vegetation must be allowed on site. All cleared alien invasive plant species material must be appropriately disposed of at a registered landfill.	Contractor	Construction and Operational Phases	Ongoing

Also adhere to complementary mitigation measures listed in the following sections:

- Section **12.12.1.4** related to the avoidance of the buffer zones of watercourses.

12.14 Air Quality

12.14.1 Impact Description

Construction activities associated with the proposed project may temporarily deteriorate local air quality due to vegetation clearance, earthworks, vehicle movement, and other construction-related activities. The primary air quality impacts during construction are associated with dustfall and particulate matter. These impacts are expected to be localised, temporary and limited to the construction period.

During operation, the proposed enhanced evaporation system may emit particulate matter, dustfall, H_2S, and VOCs. Potential impacts include nuisance dust, odour impacts and changes to local ambient air quality. Given the project's industrial setting and the proximity of existing emission sources, the assessment focused on the proposed project's potential contribution to existing air quality conditions and its potential effects on surrounding sensitive receptors.

The project is located within the HPA where existing industrial activities already influence regional air quality. Cumulative impacts may therefore arise through the combined effect of existing emission sources and emissions associated with the proposed enhanced evaporation system.

12.14.2 Impact Assessment

12.14.2.1 Construction Phase

The AQIA assessed potential impacts from dustfall and particulate matter emissions generated during site preparation, earthworks, material handling, vehicle movement, and construction activities. Dispersion modelling indicated that dustfall and particulate matter concentrations may increase near active construction areas, particularly during dry and windy conditions. However, these impacts are expected to be temporary, localised and confined to the construction period.

The study found that construction-related emissions would decrease rapidly with distance from active work areas and that implementing standard dust suppression measures would substantially reduce potential impacts. No long-term deterioration in ambient air quality is anticipated as a result of construction activities. The AQIA therefore concluded that construction-phase air quality impacts would remain within acceptable limits and assessed the impact significance as a Low Acceptable Negative Impact (**Table 33**).

Table 33: Significance rating for the Construction Phase Impacts (Bird and Burger, 2026b)

Potential Impact	Consequence			Impact Rating
	Nature	Severity	Likelihood	
Particulate loads in exceedance of the PM10 Limit Value	Moderate-low	Low	Likely	Low/Acceptable Negative Impact
Dustfall in exceedance of the Residential Limit Value	Moderate-low	Low	Likely	Low/Acceptable Negative Impact

12.14.2.2 Operational Phase

The operational assessment considered potential emissions associated with the proposed enhanced evaporation system, including dustfall, particulate matter, H_2S and VOCs. The assessment incorporated a detailed emissions inventory, atmospheric dispersion modelling and evaluation of potential odour and health-related impacts.

The modelling results indicated that dustfall impacts associated with the enhanced evaporation system are expected to remain low and localised. Predicted dustfall rates remain below applicable dustfall guideline values and are not expected to result in unacceptable impacts at surrounding sensitive receptors (**Figure 55**). Likewise, predicted particulate matter concentrations decrease rapidly with distance from the proposed evaporator system and are not expected to result in significant off-site impacts (**Figure 56**).

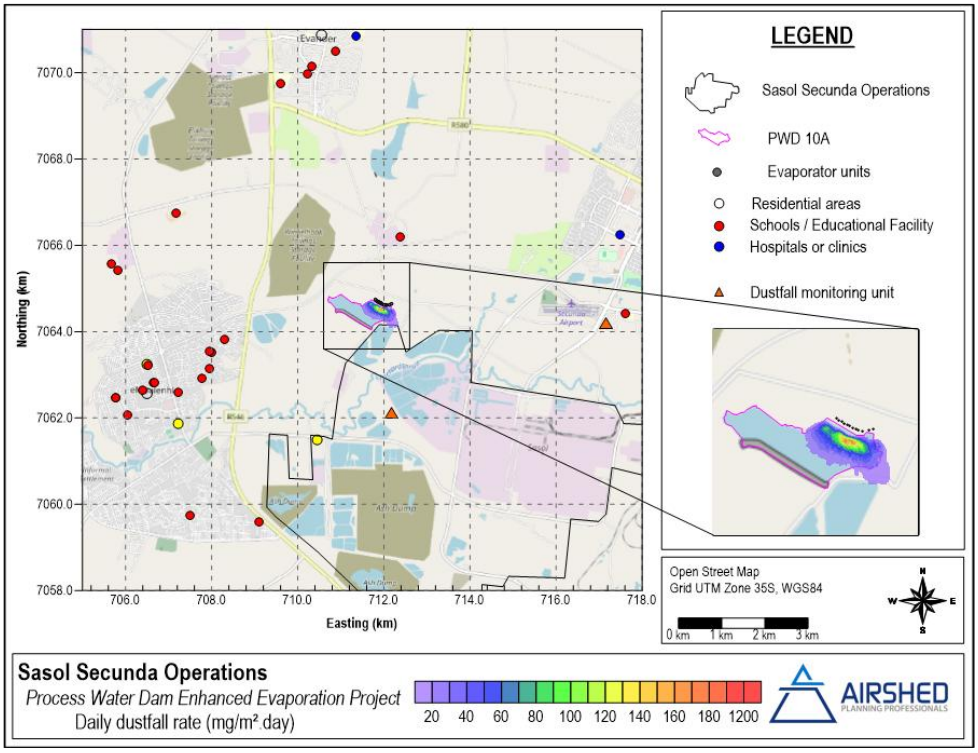


Figure 55: Simulated daily deposition (dustfall) rates as a result of the project (Bird and Burger, 2026b)

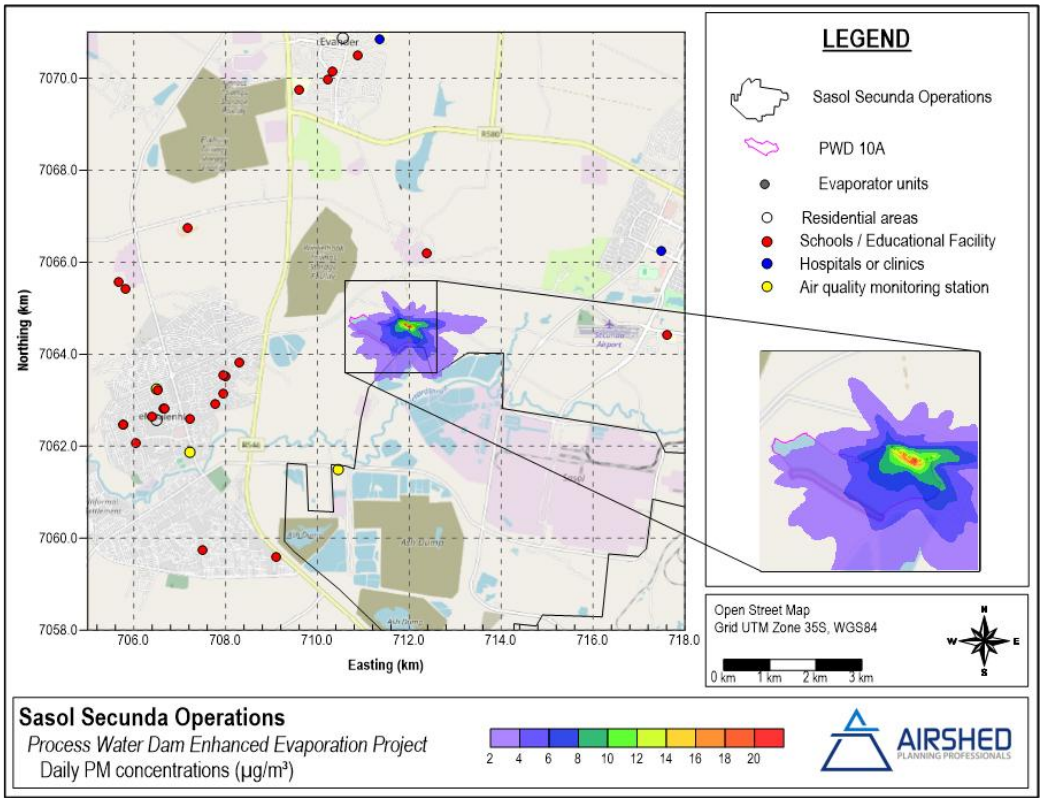


Figure 56: Simulated daily average PM concentrations as a result of the project (Bird and Burger, 2026b)

H_2S was identified as the pollutant with the greatest potential to influence air quality perceptions due to odour generation. A range of modelling scenarios was assessed to evaluate uncertainty associated with sulphide generation within the process water dam. The assessment found that, under conservative assumptions, odour impacts may extend beyond the immediate project area; however, these impacts are expected to occur predominantly within the Sasol operational area. Health-based screening assessments indicated that concentrations associated with the most realistic operating scenarios remain below applicable health-effect screening levels at surrounding receptors. **Figure 57** to **Figure 59** illustrate the simulated 98th percentile 1-hour H_2S concentrations for the conservative high, central and low case scenarios. Refer to the AQIA for the illustrations of all scenarios modelled.

Based on the probabilistic assessment of sulphide generation within PWD10A, the AQIA recommended adoption of the Central Case scenario as the operational design basis for the evaporation system. The specialist further recommended routine monitoring of water quality and sulphide-related parameters to verify that actual operating conditions remain within the assumptions applied during the assessment

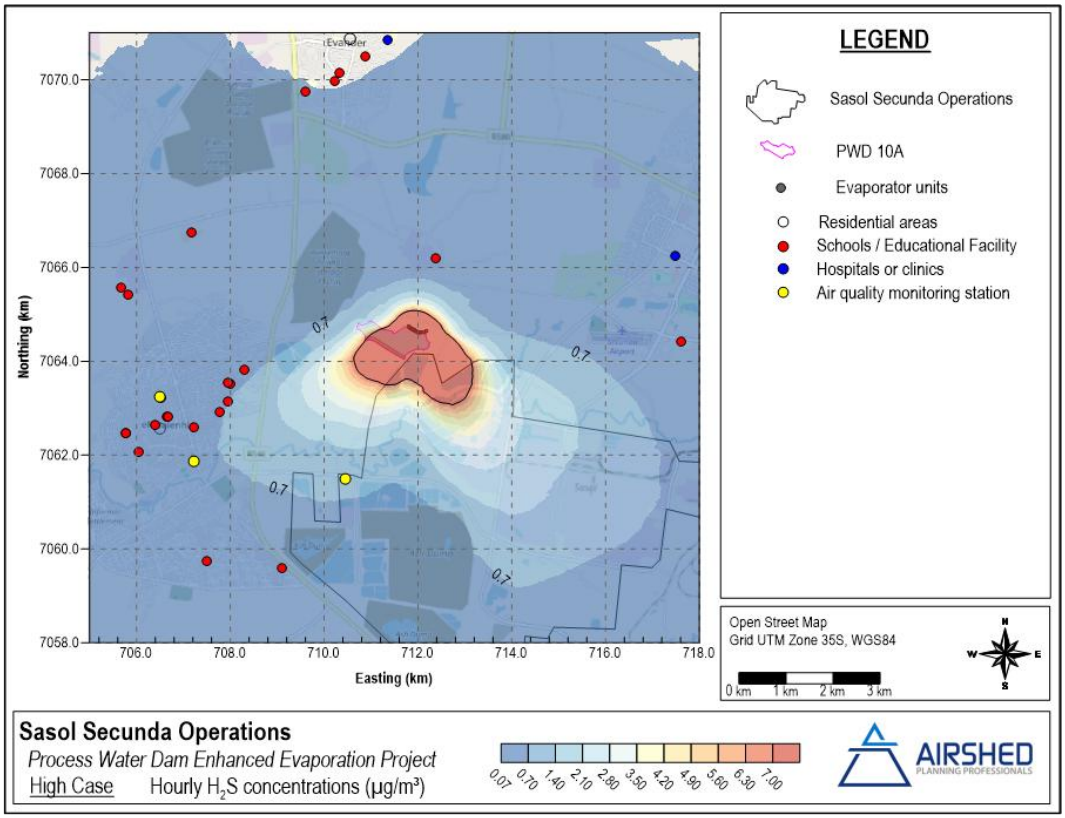


Figure 57: Simulated 98th percentile 1-hour H_2S concentrations due to the project – Conservative High Case (Bird and Burger, 2026b)

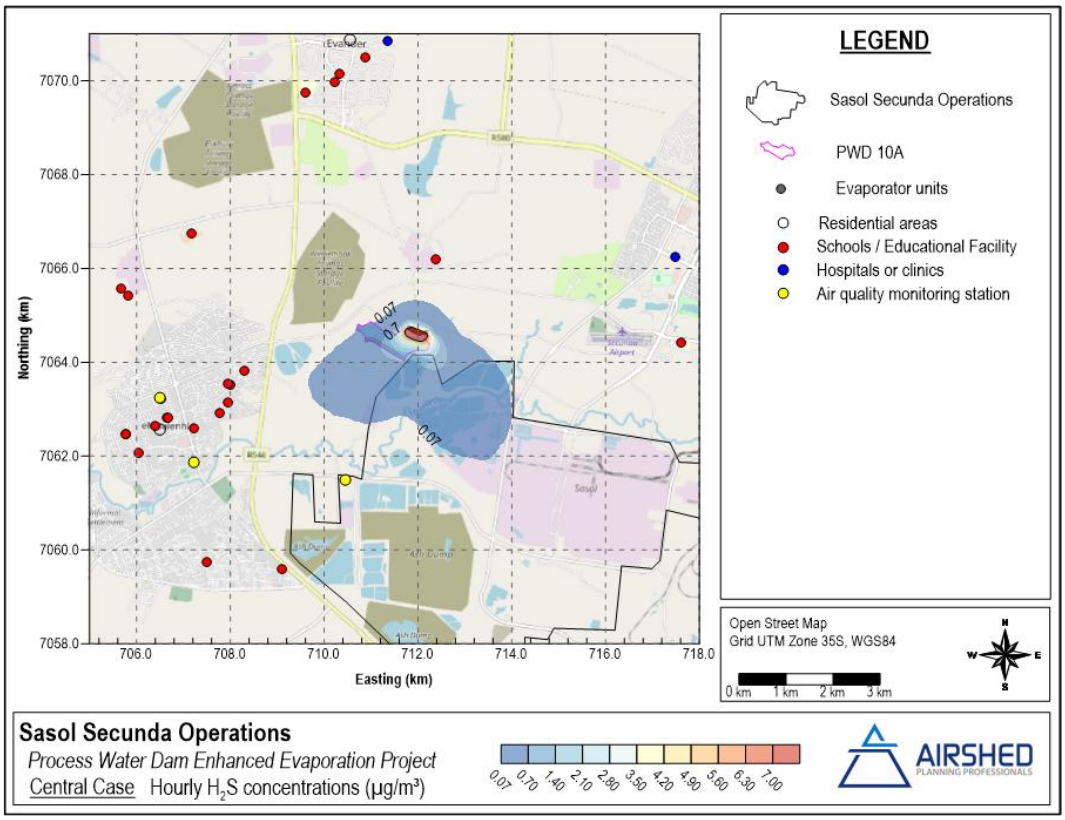


Figure 58: Simulated 98th percentile 1-hour H_2S concentrations due to the project – Central Case

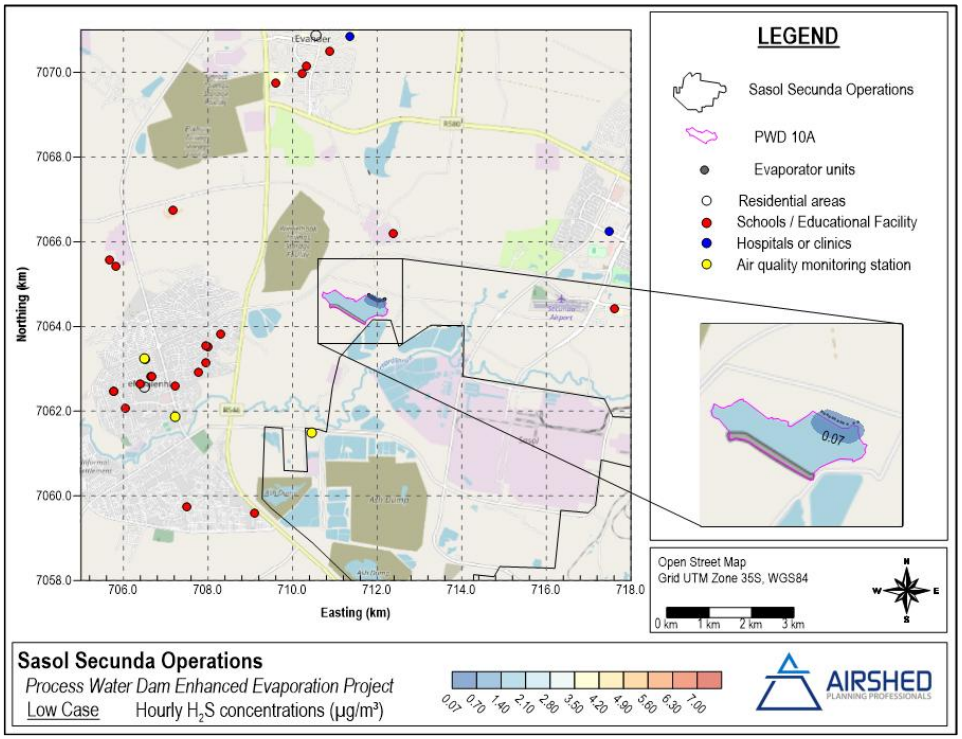


Figure 59: Simulated 98th percentile 1-hour H_2S concentrations due to the project – Low Case

VOC emissions were also assessed during the operational phase. The modelling indicated that VOC concentrations would remain low and would not result in adverse health impacts at nearby receptors. Potential odour effects associated with VOC emissions were similarly found to be localised in nature (**Figure 60**).

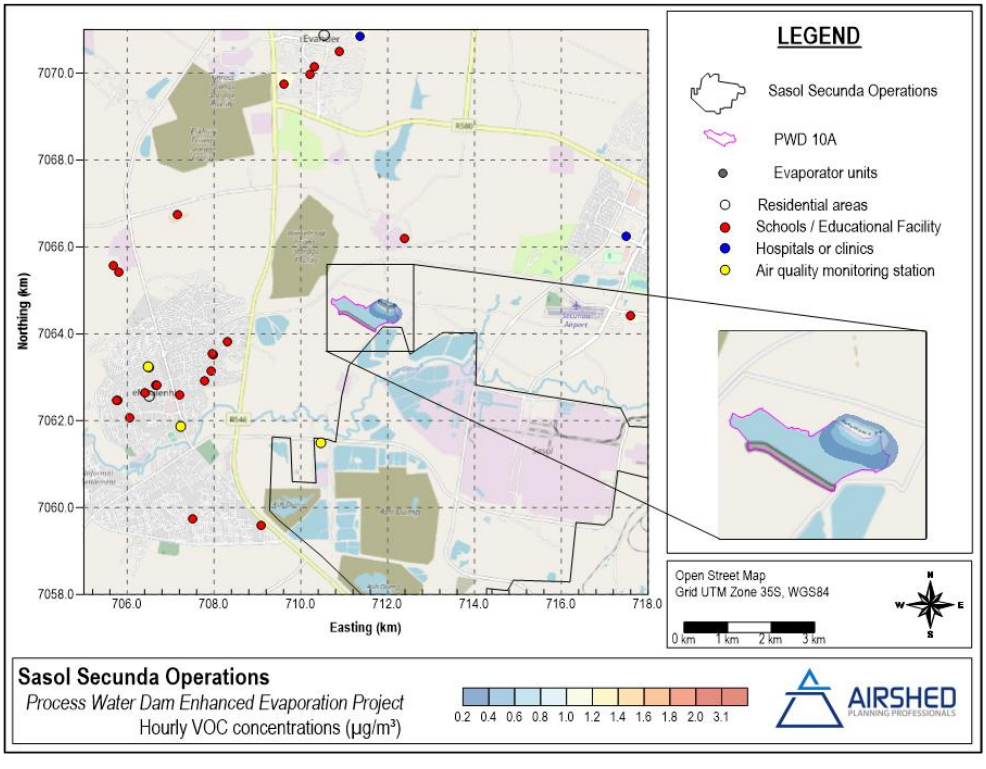


Figure 60: Simulated 98th percentile 1-hour VOC concentrations for assessment of odour impact due to the project (Bird and Burger, 2026b)

Based on the assessment findings, the AQIA concluded that operational air quality impacts associated with the proposed enhanced evaporation system would remain localised and manageable. The operational phase impact was assessed as a Low Acceptable Negative Impact (**Table 34**), provided that the recommended monitoring and management measures are implemented.

Table 34: Significance rating for the Operation Phase Impacts of the project (Bird and Burger, 2026b)

Potential Impact	Consequence			Impact Rating
	Nature	Severity	Likelihood	
Particulate loads in exceedance of the PM10 Limit Value	Moderate-low	Low	Unlikely but possible	Low/Acceptable Negative Impact
Dustfall in exceedance of the Residential Limit Value	Moderate-low	Very low	Likely	Low/Acceptable Negative Impact
H2S concentrations – odour impacts	Moderate-low	Low	Unlikely but possible	Low/Acceptable Negative Impact
H2S concentrations – health impacts	Moderate-low	Low	Unlikely but possible	Low/Acceptable Negative Impact
VOC concentrations – odour and health impacts	Moderate-low	Low	Improbable	Low/Acceptable Negative Impact

12.14.2.3 Mitigation Measures

The AQIA recommended the implementation of the following mitigation and management measures:

- Implement dust suppression measures during construction activities, particularly during dry, windy periods.
- Control vehicle speeds on unpaved roads and disturbed surfaces to minimise fugitive dust generation.
- Stabilise or rehabilitate disturbed areas as soon as practicable after construction activities.
- Construction vehicles and equipment should be maintained in good working condition to minimise unnecessary emissions.
- Existing dustfall monitoring in the vicinity of the project should continue throughout project implementation and operation.
- Routinely monitor process water quality, including parameters relevant to sulphide generation and potential H_2S formation.
- Undertake H_2S monitoring where required, and investigate and address any odour complaints through appropriate corrective actions.
- Review operational performance and environmental monitoring results regularly to confirm specialist assumptions and support adaptive management where necessary.

12.15 Noise

12.15.1 Impact Description

Sensitive receptors to noise impacts in the study area include people residing in the surrounding rural areas, as well as ecological receptors (fauna).

During construction, localised increases in noise will be caused by earthworks, establishment and operation of the site construction laydown area, construction of the proposed infrastructure, transportation of construction workers and material, activities at the construction camp, and general construction noise.

Once the proposed Project is operational the enhanced evaporator systems will emanate from the evaporator systems as the spraying of wastewater into the air will create mechanical noise from pumps and dispersal equipment, as well as aerodynamic noise from droplets interacting with air currents.

Sensitive receptors to noise include the neighbouring chicken farm, sensitive faunal species, and livestock. However, it should be noted that already existing agricultural activities (chicken farm and cattle) may generate sound levels between 60–90 decibel (dB). Continuous operation may raise background noise levels in industrial or residential areas, potentially affecting human comfort and wildlife.

During the operational phase, power lines produce an audible sound or buzz because they are producing something called a corona discharge that is interacting with the surrounding air. The corona discharge is a side-effect of the electric field the power line generates by carrying electricity. The discharge can be greater, and the buzzing louder if there is increased moisture or pollutants in the air. Under normal conditions, corona-generated noise is not audible. The noise may be audible under certain wet conditions. Conductors are selected based on factors such as audible noise, corona, and electromagnetic field mitigation. In addition, corona rings can be fitted if deemed necessary. Corona is not associated with any adverse health effects in humans or livestock.

Noise that emanates from construction and operational activities are addressed through targeted best practices in the EMPr. The associated regulated standards need to be adhered to.

Project personnel working on the construction site will experience the greatest potential exposure to the highest levels of noise and vibration. Workplace noise and vibration issues will be managed as part of the Occupational Health and Safety Management System to be employed on site, which will include specific measures aimed at preventing hearing loss and other deleterious health impacts.

12.15.2 Impact Assessment

Environmental Feature	Noise

Relevant Alternatives & Activities	Construction domain of the development footprint
Project life-cycle	**Construction and operational phase**
Potential Aspects & Impacts	**Proposed Management Objectives / Mitigation Measures**
• Noise as a result of construction activities • Noise as a result of the operation of the enhanced evaporator systems	• The provisions of SANS 10103:2008 will apply to all areas within audible distance of residents. • Construction work should take place, where possible, during normal working hours. • Construction activities generating output levels of 85 dB or more will be confined to normal working hours. • Noise preventative measures (e.g. screening, muffling, timing) to be employed.

	+/- Impacts	Extent	Magnitude	Duration	Probability	Significance
Before Mitigation	-	local	medium	Long term	Almost certain	2
After Mitigation	-	local	low	short-term	unlikely	1

12.16 Cultural Heritage & Palaeontological Features

12.16.1 Impact Description

The impact of the proposed project on protected historical structures is low, as the only heritage resource identified is the remains of an old livestock enclosure located just outside the boundary of the project footprint (EVAP-01).

As noted above, the impact of the project on graves and cemeteries is negligible to low, as no graves were identified. However, there is a low possibility that unidentified burials could be uncovered during site clearance or construction.

The impact significance of the proposed project on archaeological resources is low as no archaeological sites or material were identified. However, there is a low possibility that sub-surface material could be uncovered during site clearance or construction.

The impact and significance of the project on intangible and living heritage resources are negligible, as no living heritage resources were identified.

12.16.2 Impact Assessment and Mitigation

The following impact/mitigation tables are presented below (**Table 35**, **Table 36** and **Table 37**).

Table 35: Heritage Resources – Historical Structures Mitigation Table

Environmental Feature	Heritage resources – Historical structures
Project life cycle	Planning and Construction
Potential Impact	**Proposed Management Objectives / Mitigation Measures**

Possible damage to or destruction of extant historical structures	N/A to the project footprint area					
Possible destruction of demolished remains of historical structures (EVAP-01)	If any negative impact is anticipated on any of these resources, a permit will be required for the destruction/clearance of these resources (from MPHRA or SAHRA)					
	Nature	**Extent**	**Magnitude**	**Duration**	**Probability**	**Significance**
Before Mitigation	Negative	Local	Low	Permanent	Unlikely	1
After Mitigation	Negative	Local	Low	Short-term	Low	1
Significance of Impact and Preferred Alternatives	N/A. The livestock enclosure survives only as remains and is located outside the project footprint.					

Table 36: Heritage Resources –Unidentified Graves Mitigation Table

Environmental Feature	Heritage resources – Graves and burial grounds					
Project life cycle	Planning and Construction					
Potential Impact	**Proposed Management Objectives / Mitigation Measures**					
Potential unidentified graves	• If an unidentified grave site is uncovered during site clearance or construction activities, a buffer of at least 30m must be placed around the site to ensure that during construction, the grave/s are not damaged • The Chance Finds Procedure set out in this report must be implemented					
	Nature	**Extent**	**Magnitude**	**Duration**	**Probability**	**Significance**
Before Mitigation	Negative	Local	High	Permanent	Unlikely	3
After Mitigation	Negative	Local	Medium	Long- term	Unlikely	1
Significance of Impact and Preferred Alternatives	If human remains are uncovered, then the chance finds procedure must be implemented, in compliance with the requirements of SAHRA.					

Table 37: Palaeontological Resources- Summary of Impacts

Nature	**Loss Of Fossil Heritage By Destruction, Movement Or Sealing In Of Fossil Heritage In Or Below The Earth's Surface**							
	Site(S):							
Development Phase	Development Impact			Impact Rating		Recommended Mitigation	Is Impact Acceptable?	
	Criteria	*BM	**AM	Before Mitigation	After Mitigation		*BM	**AM
Planning Phase	Extent			No Impact	No Impact	NONE	None	None
	Probability							
	Reversibility							
	Irreplaceability							
	Duration							
	Cumulative Effect							

	Magnitude							
	Impact Significance							
Construction Phase	Extent	1	1	Negative Low impact	Negative low impact	NONE	NO	YES
	Probability	2	2					
	Reversibility	4	4					
	Irreplaceability	4	4					
	Duration	4	4					
	Cumulative Effect	2	2					
	Magnitude	1	1					
	Impact Significance	17	17					
Operational Phase	Extent	1	1	No Impact	No Impact	NONE	None	None
	Probability	1	1					
	Reversibility	1	1					
	Irreplaceability	1	1					
	Duration	1	1					
	Cumulative Effect	1	1					
	Magnitude	1	1					
	Impact Significance	6	6					
Decommissioning Phase	Extent	1	1	No Impact	No Impact	NONE	None	None
	Probability	1	1					
	Reversibility	1	1					
	Irreplaceability	1	1					
	Duration	1	1					
	Cumulative Effect	1	1					
	Magnitude	1	1					
	Impact Significance	6	6					

12.16.3 Chance Finds Procedure

The Chance Finds Procedure set out below must be implemented during site clearance and construction activities:

1. It is advisable that an information section on cultural resources be included in the Safety, Health Environment and Quality (SHEQ) training given to contractors involved in surface earthmoving activities. These sections must include basic information on:
    a. Heritage;
    b. Graves;
    c. Archaeological finds; and
    d. Historical Structure remains and Homestead remains
2. This module must be tailor made to include all possible finds that could be expected in that area of construction. Possible finds include:
    a. Unidentified graves
    b. Historical /archaeological artefacts or material

c. Remains of historical structures and homestead remains
d. Palaeontological deposits

3. In the event that a possible historical or archaeological find is discovered during site clearance or construction, all activities must be halted in the area of the discovery and a qualified heritage specialist/archaeologist contacted.
4. The heritage specialist/archaeologist needs to evaluate the finds on site and make recommendations towards possible mitigation measures.
5. If mitigation is necessary, an application for a rescue permit must be lodged with SAHRA/MPHRA.
6. After mitigation, an application must be lodged with SAHRA/MPHRA for a destruction permit. This application must be supported by the mitigation report generated during the rescue excavation. Only after the permit is issued may such a site be destroyed.
7. In the event that human remains are uncovered, or previously unknown graves are discovered, a specialised archaeologist (forensic archaeology/ human remains) needs to be contacted to conduct an evaluation of the finds.
8. If the remains are to be exhumed and relocated, the relocation procedures required by SAHRA need to be followed. This includes an extensive social consultation process.

12.17 Visual Quality

12.17.1 Impact Description

The evaporation units will add vertical and horizontal bulk and new equipment may interrupt existing sightlines from internal access routes and nearby boundary views. The Project site is part of an industrial complex with PWDs, industrial buildings and OHLs, meaning that the infrastructure of this Project will be similar to their surroundings. Therefore, the project's impact on the visual quality of the environment is expected to be minimal.

Increased clustering of industrial equipment can contribute to a more congested visual scene. Additionally, water vapor plumes, especially in cool or humid conditions, may be visible from offsite, resulting in:

- Apparent increases in industrial activity, and
- Perceived “smoke-like” emissions

12.17.2 Impact Assessment

Environmental Feature	Visual Quality
Relevant Alternatives & Activities	Construction domain of development footprint
Project life-cycle	Construction and operational phase
Potential Aspects & Impacts	Proposed Management Objectives / Mitigation Measures

• Alteration of the environment visual characterisation as a result of construction activities • Alteration of the environment visual characterisation as a result of operational activities (water vapor plume) • Inadequate waste management and housekeeping. • Inadequate reinstatement and rehabilitation of areas affected by construction activities, outside of the permanent development footprint. • Clearing of vegetation	▪ Minimise the clearing of vegetation outside the physical footprint. ▪ Always maintain the construction site in a neat and orderly condition. ▪ Ensure adequate waste management systems are in place and best-practice are implemented. ▪ Rehabilitate the construction areas back to their natural state, including the remove of alien invasive species and the plantation of native grass species, where required. • Ensure that all relevant maintenance is conducted regularly.

	+/- Impacts	Extent	Magnitude	Duration	Probability	Significance
Before Mitigation	-	local	medium	Long term	Almost certain	2
After Mitigation	-	local	low	Long term	unlikely	1

12.18 Socio-Economic Environment

12.18.1 Impact Description

Without any mitigation or management measures in place, the following activities and aspects associated with the proposed Project may possibly cause social impacts in the PAOI:

- ❑ Poor planning and communication with the affected communities in the project area.
- ❑ Contamination of air (odour and sulfide salt), soil and water (surface and groundwater).
- ❑ Poor traffic management.
- ❑ Inadequate provision for and management of security.
- ❑ Poor management of crew members.

12.18.2 Impact Assessment

Environmental Feature	Disturbance arising from the construction phase
Project life-cycle	Construction phase
Potential Impact	**Proposed Management Objectives / Mitigation Measures**
Increase in Dust	• Dust and disturbance can be mitigated through the use of appropriate dust suppression mechanisms. • Adherence to road signage can be added as an advantage and a measure to manage the increase in dust levels. • Mitigation measures management should be adhered to according to the relevant specialist studies.
Influx of workers	• All employment of locally sourced labour should be controlled on a contractual basis. • People in search of work may move into the area, however, the project will create a limited number of job opportunities. Locally

Environmental Feature	Disturbance arising from the construction phase
Project life-cycle	Construction phase
Potential Impact	**Proposed Management Objectives / Mitigation Measures**
	based people should be given opportunities and preferences over others.
Worker Health and Safety	• The provisions of the OHS Act 85 of 1993 and the Construction Regulations of 2014 should be implemented on all sites; • Contractors should establish HIV/AIDS awareness programmes at their site camps.
Security	• All contractors' staff should be easily identifiable through their respective uniforms. • A project policy on management of workers should be developed. This would include education and awareness to be conducted with regards to crime, trespassing, and not gathering outside the site could be conducted.
Noise impacts	• Construction work should take place during normal working hours when possible.
Damage to property	• The contractor is to make good and acknowledge any damage that occurs on any property as a result of construction work.

	Nature	Extent	Magnitude	Duration	Probability	Significance
Before Mitigation	Negative	Local	Medium	Short Term	Likely	2
After Mitigation	Negative	Local	Low	Short Term	Moderate	1
Significance of Impact and Preferred Alternatives	Disturbances and irritation during construction is to be expected. These can then be successfully mitigated through contractor specifications that are issued at a tender stage and through the continuous monitoring of contractor proceedings and performance during construction phase. Negative impacts owing to the construction will unfortunately be experienced irrespective of the alternatives.					

Environmental Feature	Economic Impacts (positive)
Project life-cycle	Construction and Operational Phase
Potential Impact	**Proposed Management Objectives / Mitigation Measures**
Economic	• The proposed Project will stimulate the local economy through the provision of jobs and through local procurement
Local Procurement	• Local SMMEs should be given an opportunity to participate in the operation of the project through the supply of services, material or equipment.
	• A procurement policy promoting the use of local business where possible, should be put in place and applied throughout the operational phases of the project.
Job Creation and Skills Development	• Workers should be given the opportunity to develop skills whilst in employment.

	Nature	Extent	Magnitude	Duration	Probability	Significance
Before Mitigation	Positive	local	High	Long Term	Likely	3
After Mitigation	Positive	local	High	Long Term	Likely	3

Significance of Impact and Preferred Alternatives	The proposed Project will provide economic stimulus to the regional study area for the long-term. The project should adopt policies that are supportive of local procurement and support for local enterprises.

12.19 Hazardous Materials and Waste

Improper management of hazardous substances and waste may pollute the biophysical environment (air, water and soil), and pose risks to humans, flora and fauna. It may also cause visual impacts.

12.19.1 Impact Description

Hazardous substances to be stored and used during the construction and operational phases of the Project include oil, fuel, solvents and pesticides (amongst others).

General construction waste will comprise of surplus or off-specification materials (e.g. concrete, wooden pallets, packaging paper or plastic, wood, metals, etc.) and construction debris. Domestic waste will include food waste, plastic, glass, aluminum cans and waste paper. A small proportion of the waste generated during construction phase will be hazardous and may include used oil, hydraulic fluids, waste fuel, grease and waste oil containing rags. Wastewater, including water adversely affected in quality through construction-related activities and human influence, will include sewage, water used for washing purposes (e.g. equipment, staff) and drainage over contaminated areas (e.g. workshop, equipment storage areas).

Without any mitigation or management measures in place, the following activities and aspects associated with the project's hazardous materials and waste may possibly cause impacts in the PAOI:

- ❑ Improper handling and disposal of hazardous materials and waste.
- ❑ Failure to properly segregate hazardous waste (e.g., chemical containers, contaminated soil) from non-hazardous waste can lead to cross-contamination.
- ❑ Accidental spillages.
- ❑ Release of untreated wastewater to the environment.

Provision is made in the EMPr to control and manage hazardous substances and waste.

12.19.2 Impact Assessment

Environmental Feature	**Hazardous Substances & Waste**
Relevant Alternatives & Activities	**Storage and use of hazardous substances & generation of waste**
Project life-cycle	**Construction & operational phases**
Potential Aspects & Impacts	**Proposed Management Objectives / Mitigation Measures**
• Environmental pollution caused by improper management of	• Hazardous substances shall be stored and handled in accordance with the appropriate legislation and standards, which include the Hazardous Substances Act (Act No. 15 of 1973), Occupational Health

hazardous substances and waste	and Safety Act (No. 85 of 1993), relevant associated Regulations and applicable SANS and international standards. • Prevent environmental contamination from insulating oils used in the substations' transformers. • Drip trays should be placed under construction vehicles and machinery to collect ad hoc leaks. Machinery and vehicles should be serviced and in good working condition to prevent leaks. • Storage and use of hazardous materials will be strictly controlled to prevent environmental contamination and will adhere to the requirements stipulated on the Safety Data Sheets. • In the event of spillages of hazardous substances the appropriate clean up and disposal measures shall be implemented. • Waste to be disposed of at a licenced waste disposal facility. • Wastewater to be properly disposed of. Contaminated water will not be discharged to the environment.

	+/- Impacts	Extent	Magnitude	Duration	Probability	Significance
Before Mitigation	-	local	medium-high	long-term	likely	3
After Mitigation	-	local	low	long-term	unlikely	1

12.20 Traffic

12.20.1 Impact Description

Potential impacts during the construction phase include the following:

- ❑ Transportation of materials and construction personnel to site.
- ❑ Impacts to road conditions.
- ❑ Speeding and reckless driving by construction personnel.
- ❑ Use of oversized vehicles/abnormal loads, as required.

Potential impacts during the operational phase include the following:

- ❑ Safe access.
- ❑ Transportation of maintenance materials, and operational and maintenance staff, to site.

Provision is made in the EMPr to manage impacts associated with traffic.

12.20.2 Impact Assessment

Environmental Feature	**Traffic and Access**
Relevant Alternatives & Activities	**All construction activities that may affect existing road networks**
Project life-cycle	**Construction**
Potential Aspects & Impacts	**Proposed Management Objectives / Mitigation Measures**
• Disruptions to existing road users. • Safety risks. • Increase in dust levels. • Use of road network by construction vehicles.	• Clearly demarcate all construction access roads. • Proper access control to be maintained to prevent livestock from accessing construction areas and for other unauthorised access. • Strict adherence to speed limits by construction vehicles on public roads and access roads. Appropriate speed limits need to be posted on all access roads.

	• Ensure adequate maintenance of construction vehicles. • When construction vehicles are required to cross national, provincial and district roads (as relevant) appropriate safety and traffic calming measures need to be in place. This will include flag men, speed reductions and warning signage. • Implement measures to manage dust caused by site traffic on unpaved roads.

	+/- Impacts	Extent	Magnitude	Duration	Probability	Significance
Before Mitigation	-	local	medium	short-term	moderate	2
After Mitigation	-	local	low	short-term	unlikely	1

12.21 Health and Safety

12.21.1 Impact Description

Health and safety related risks associated with the Project during the construction phase include the following:

- ❑ Hazards related to construction work;
- ❑ Increased levels of dust and particulate matter, as well as noise;
- ❑ Water (surface and ground) contamination;
- ❑ Poor water and sanitation services to construction workers;
- ❑ Communicable diseases; and
- ❑ Safety and security to the local community.

These risks are addressed through mitigation measures identified under other environmental features, such as socio-economic environment, surface water, air quality, noise, as well as best practices included in the EMPr. Additional management requirements will be included in the Project's Occupational Health and Safety system.

Other health and safety related associated with the Project during the operational phase include the following:

- ❑ Injuries to workers from operation and maintenance activities (vehicle accidents, replacement of components/parts, etc.);
- ❑ Emergency fire hazards; and
- ❑ Electrocution of workers.

12.21.2 Impact Assessment

Environmental Feature	**Health and Safety**
Relevant Alternatives & Activities	**Construction activities**
Project life-cycle	**Construction phase**
Potential Aspects & Impacts	**Proposed Management Objectives / Mitigation Measures**

• Health and safety risks during construction	• Dedicated Occupational Health and Safety system to be implemented by the Contractor. • Undertake a hazard identification and risk assessment and identify preventive and protective measures. • Conduct basic safety awareness training with construction workers. • Provide all workers with the necessary Personal Protective Equipment (PPE). • Prevent environmental contamination. • Provide potable water and sanitation services to workers. • All workers shall be clearly identifiable and to remain within construction domain during working hours. • Prepare an Emergency Response Plan. • Maintain access control to construction domain.

	+/- Impacts	Extent	Magnitude	Duration	Probability	Significance
Before Mitigation	-	local	high	short-term to permanent	likely	3
After Mitigation	-	local	low	short-term	unlikely	1

Environmental Feature	**Health and Safety**
Relevant Alternatives & Activities	**Operation and maintenance activities**
Project life-cycle	**Operational phase**
Potential Aspects & Impacts	**Proposed Management Objectives / Mitigation Measures**
• Health and safety risks posed by operation and maintenance activities	• Dedicated Occupational Health and Safety system to be implemented by the Operator of the Enhanced Evaporation plant. • Conduct basic safety awareness training with all operational staff. • Temporary Contractors to adhere to Occupational Health and Safety requirements. • Provide potable water and sanitation services to operational staff. • Prepare an Emergency Response Plan.

	+/- Impacts	Extent	Magnitude	Duration	Probability	Significance
Before Mitigation	-	local	high	long-term	likely	3
After Mitigation	-	local	low	long-term	unlikely	1

12.22 Positive Impacts

This section considers the positive impacts of the proposed Project in order to provide a balanced appraisal of the potential environmental and social consequences. The positive impacts associated with the proposed enhanced evaporation are listed in **Table 38** below.

Table 38: Positive impacts associated with the proposed enhanced evaporation

Receptor	Positive Impacts	Measures for Enhancing Positive Impacts
Socio-Economic Environment	Benefits to local community members.	• Employment opportunities will be created during the construction phase of the project

Receptor	Positive Impacts	Measures for Enhancing Positive Impacts
Environmental Baseline Knowledge and Planning	Enhances understanding of evaporation and associated weather conditions in the area	• The weather station will provide data of the environment that has not previously been obtained in such a manner. • Support integrated environmental planning.

12.23 Cumulative Impacts

12.23.1 Introduction

A cumulative impact, in relation to an activity, means the past, current and reasonably foreseeable future impact of an activity, considered together with the impact of activities associated with that activity that in itself may not be significant, but may become significant when added to the existing and reasonably foreseeable impacts eventuating from similar or diverse activities.

According to the International Finance Corporation (IFC) Good Practice Handbook (Cardinale & Greig, 2013), cumulative impacts are contextual and encompass a broad spectrum of impacts at different spatial and temporal scales. Taking into consideration the nature of the proposed Project, the following is noted:

- The spatial area of influence encompasses the geographical area impacted by the proposed Project; and
- The timescale over which the proposed Project is likely to cause impacts includes the construction and operational phases.

The potential negative cumulative impacts are listed in **Section 12.23.2** below, based on the current understanding of the project and the receiving environment. The adverse cumulative impacts are addressed through the management measures contained in the EMPr.

12.23.2 Negative Cumulative Impacts

Negative cumulative impacts can be identified by combining the potential adverse environmental implications of the proposed Project with the impacts of projects and activities that have occurred in the past, are currently occurring, or are proposed in the future within the proposed Project area.

The following is noted in terms of sources of potential negative cumulative impacts:

- Current and reasonably defined/foreseeable third-party projects –
  - At this stage, following a review of the planning document (e.g., municipal IDPs), no other third-party projects have been identified in the proposed Project area,
  - From observations made during the site inspections, no significant active construction sites or road upgrades were identified.

- Regardless of the above points, projects may be initiated or underway during the time of the construction and operation of the proposed Project, which may lead to cumulative impacts.

Possible cumulative impacts if other projects occur over the same period and in the same area include:

- **Water resources** –
  - Given the largely degraded state of the study area and surrounding greater catchment, the characteristics and sensitivity of the affected area, and the nature of the activities, the potential for cumulative impacts are expected to be an overall low, as initial impacts will occur to the wetland habitats, but due to rehabilitation, this will improve over time if managed correctly. The cumulative impacts identified for the proposed development are:
    - Alteration of the flow regime in the wetland habitats.
    - Alteration of water quality in the wetland habitats.
    - Introduction and spread of alien and invasive vegetation.
    - Alteration of the amount of sediment entering wetland habitats.
  - Given the degraded nature of the broader catchment and the relatively limited footprint of the proposed activities, cumulative impacts are expected to remain low, provided that mitigation and rehabilitation measures are effectively implemented. Rehabilitation activities associated with wetland disturbance are expected to partially offset construction-related impacts through gradual improvements in wetland integrity and stability.
- **Terrestrial biodiversity** –
  - Impacts linked to dust generation, smothering of vegetation as a result of poor stormwater management and the proliferation of alien invasive plant species and the additional clearance of vegetation will occur frequently across the greater surrounds, and therefore their cumulative impact is somewhat noteworthy.
  - It is unlikely, however, that a project of this scale will be felt past the boundaries of the existing Sasol property, and will almost certainly be contained within the grounds.
  - The proposed development will not impose access restrictions to key resources or habitat and should allow for the persistence of the species that are currently linked to the study area.
  - The proposed infrastructure is far smaller than the proposed footprint and will overtime be reduced further and have a less significant impact on the receiving environment.
- **Cultural heritage and palaeontology**–
  - The project area has been influenced by past, current, and ongoing developments. Historically, heritage resources were disturbed by the establishment of Secunda, coal and gold mining, and Sasol-related activities, as noted in previous HIA reports. Currently, the footprint is affected by Sasol's industrial operations, a major power line, and the nearby Winkelhaak/Evander gold mine. Overall, heritage impacts are assessed as low,

and even without mitigation, cumulative effects are expected to remain of low significance, though they will be long-term in nature.

- Additionally, while considering the above impacts, it is considered that the proposed development will not lead to damaging impacts on the palaeontological resources of the area.

❑ **Air Quality –**

- The AQIA assessed cumulative impacts associated with the existing regional air quality environment. The study acknowledged that the project is situated within the HPA, where ambient air quality is already influenced by multiple industrial and regional emission sources. Monitoring data reviewed during the assessment showed existing elevated particulate matter concentrations and elevated short-term H_2S concentrations within the broader study area.
- The AQIA determined that the cumulative $PM_{2.5}$ impact significance remains Very High due to existing regional baseline conditions that already exceed ambient air quality standards. Likewise, cumulative H_2S odour impacts remain Very High due to existing baseline odour levels within the surrounding airshed. However, the proposed Project contributes only a small proportion of the cumulative impact and is not the primary driver of the elevated cumulative significance ratings.

12.23.3 The Proposed Project's Contribution Towards Cumulative Impacts

The following is noted in terms of the Project's contribution towards cumulative impacts:

❑ The construction period may cause traffic-related impacts in terms of the local road network, which will be associated with heavy vehicle construction traffic for the delivery of material, transportation of construction workers and general construction-related traffic. This may compound traffic impacts if other large scale projects are planned during the same period. The EMPr includes mitigation measures to manage traffic-related impacts.

❑ The clearance of vegetative cover for the Project's development footprint will exacerbate erosion, loss of biodiversity, and impact on the functioning of wetlands. Mitigation measures to control erosion are included in the EMPr.

❑ There will be an increase in the dust levels during the construction phase, as a result of earthworks, use of haul roads and other gravel roads, stockpiles, vegetation removal, etc. Measures to manage dust are included in the EMPr.

❑ Although the existing baseline air quality is already characterised by non-compliant fine particulate matter concentrations and elevated short-term H_2S concentrations, the proposed Project's incremental contribution is limited, contributing a maximum of approximately 6.1% to cumulative $PM_{2.5}$ concentrations and 2.0% to cumulative annual H_2S concentrations at the assessed receptors. The very high cumulative impact rating is therefore primarily attributable to the existing baseline conditions rather than the proposed Project.

❑ An influx of employment seekers may cause problems such as crime, STDs, conflicts with local communities, etc.

- There is a potential for positive cumulative economic effects from the construction of multiple developments in the area. The increased creation of jobs and economic input into local businesses would provide a benefit to local communities.

Additionally, please refer to the combined sensitivity Map below (**Figure 61**) with the identified air quality receptors contained in **Figure 62**.

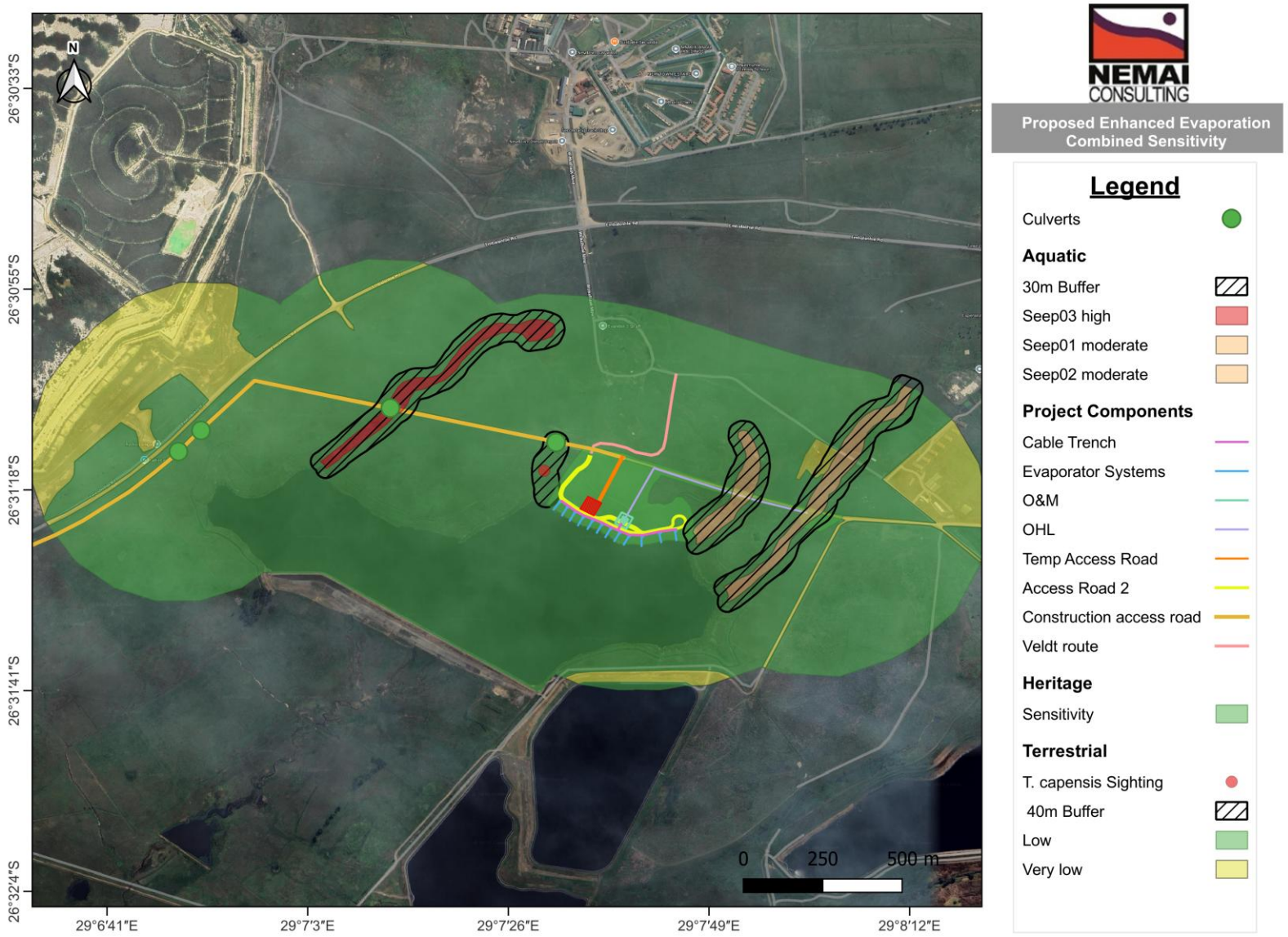


Figure 61: Combined sensitivity map of the proposed Project area

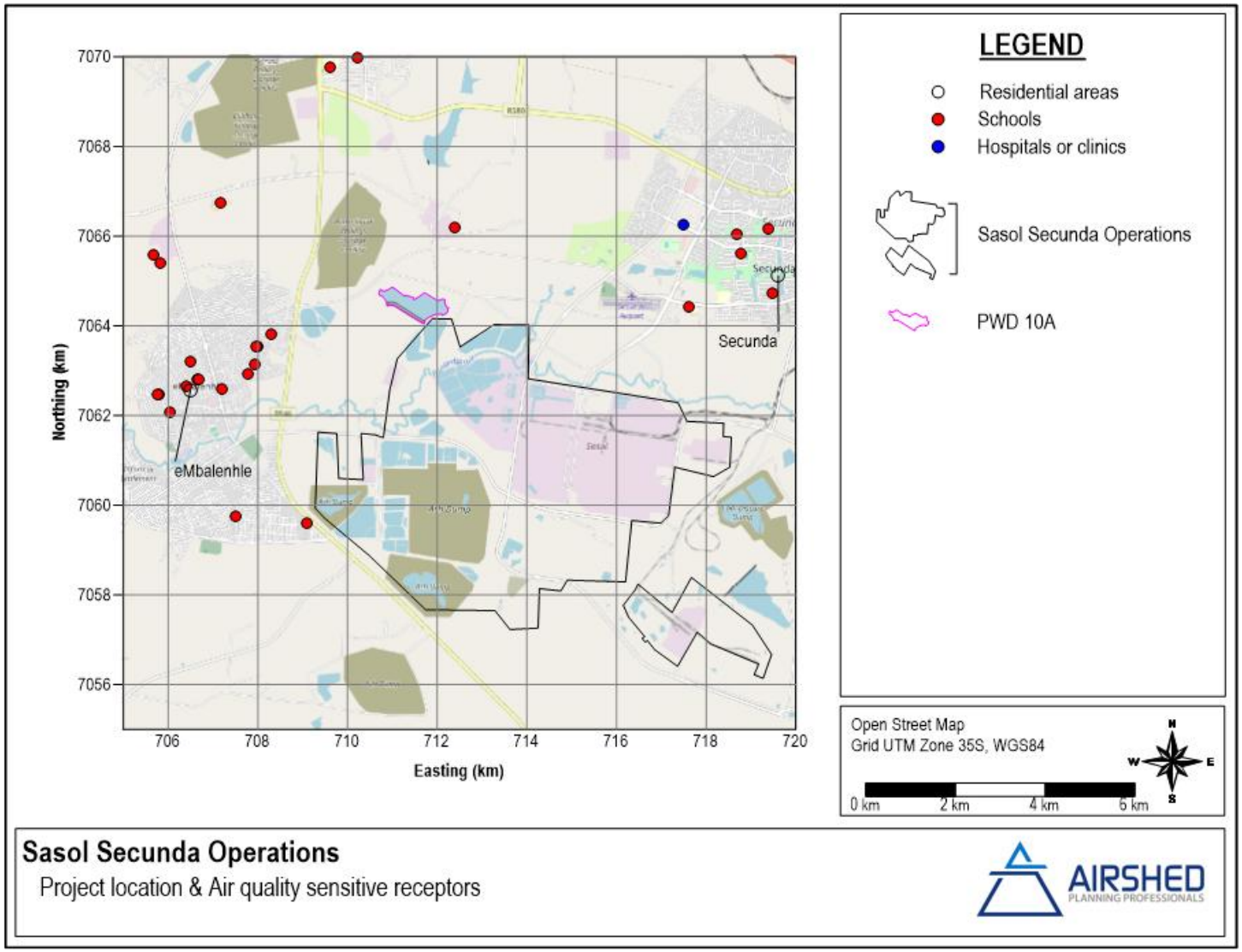


Figure 62: The Project location in relation to the nearby air quality receptors (Bird and Burger, 2026b)

13 ANALYSIS OF ALTERNATIVES

13.1 Introduction

Alternatives are the different ways in which the proposed Project can be executed to ultimately achieve its objectives. Examples could include carrying out a different type of action, choosing an alternative location or adopting a different technology or design for a project.

13.2 Project Alternatives

13.2.1 Site Alternatives

During the feasibility phase, it was determined that Dam 10A (26°31'30.00" S; 29°7'20.00" E) would be the PWD most optimal for the proposed Project. Therefore, no Project location alternatives were considered for this proposed Project.

13.2.2 Layout Alternatives

During the feasibility stage, alternatives for OHL routes were assessed, and the most environmentally and technically feasible option was included in the current proposed Project layout. In **Figure 63** and **Figure 64** below, the two initial 6.6 kV OHL routes included in the initial Environmental Screening can be seen. Based on both technical considerations and possible environmental impacts, it was decided that another option would be assessed, where a 22 kV OHL ties into the existing Eskom OHL (**Figure 65**). This option is the preferred option from an environmental and technical perspective and is included in the assessments undertaken for this BA.



Figure 63: Overhead Line (OHL) route option 1

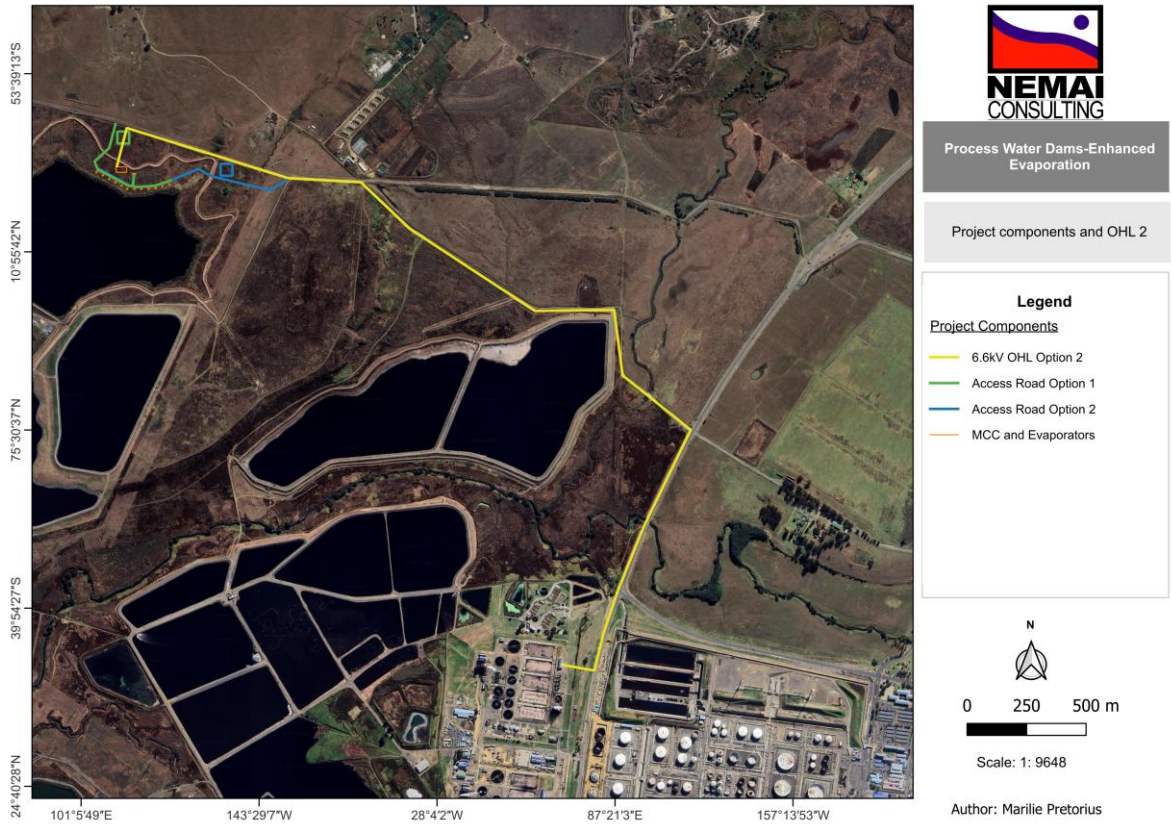


Figure 64: Overhead Line (OHL) route option 2



Figure 65: Preferred Overhead Line (OHL) route

13.2.3 Technology Alternatives

A range of technology alternatives and complementary process-water management measures were considered to address the need for additional evaporation capacity within the PWD system. The need for an enhanced evaporation solution was identified in 2018, as reliance on natural evaporation alone was not sufficient to manage dam levels during dry-season conditions. The selected technology also needed to be capable of being switched on and off in response to the process-water balance, rather than being dependent on a continuous downstream water user. Preventing loss of containment from the PWDs was another key consideration.

The technology-selection process built on Sasol's previous experience with mechanical evaporation systems, including using a turbo mister to assess the technology's efficiency in 2008 and operating turbo misters at the Nitro dams. The process also considered a range of alternative enhanced evaporation technologies and supporting water-management interventions, as discussed below.

Solar-Powered Floating Water Fountains

Solar-powered floating water fountains were investigated as an initial enhanced evaporation option in 2018. This option would have increased evaporation by circulating and spraying water above the dam surface using floating solar-powered equipment. However, the technology-selection process subsequently progressed to the investigation of alternative enhanced evaporation solutions through

formal market enquiries. The solar-powered floating fountain option was therefore not taken forward as the preferred technology.

Optimisation of Natural Evaporation and Existing Process-Water Management Measures

In 2019, the target operating levels of PWDs 10A, 10B and 10C were reviewed to maximise the available surface area and natural evaporation from the dams. The maximisation of process cooling-tower blowdown to the CAE system was also retained as an ongoing water-balance management measure.

Permission was subsequently obtained from the DWS in 2022 to use Halvepan for additional natural evaporation. Water was transferred from Dam 10A to Halvepan to maximise natural evaporation. Dredging was also undertaken between PWD 1 and PWD 8 in 2025, and between PWD 2 and PWD 8 in 2026, to recover available storage capacity. In addition, the original design intent of Pump Station 3 was reinstated to reduce reliance on mobile pumps and improve the transfer of water from the primary dams to the secondary dams, including the Dam 10 complex.

These measures remain important components of the overall process-water management strategy. However, they do not provide the controllable additional evaporation capacity required to manage the process-water balance under all operating and climatic conditions and were therefore not considered suitable as stand-alone alternatives to the proposed Project.

Spraying Water onto Exposed Dam Liners

The use of the lined dams to increase evaporation was considered in 2020. This option involved spraying or distributing water over exposed portions of the black liner to increase the wetted surface area and promote evaporation. The option was not approved because of the proximity of the proposed system to the dam walls and the associated risk to dam-wall integrity. It was therefore screened out from further consideration.

Containerised Water Treatment Plant

A containerised water treatment plant was considered as an alternative means of managing the process-water balance. Motivation for the facility commenced in 2021, and the Unit 352 Water Treatment Plant became operational in August 2022. The plant has a treatment capacity of approximately 4.8 Mℓ/day and treats water before it enters the PWD system, upgrading it to condensate quality for reuse within the factory. Although the plant was initially intended to operate for three years, future water-balance modelling resulted in it being retained as a permanent process-water management measure.

Expansion of the Unit 352 Water Treatment Plant was investigated in 2024 but was not pursued because sufficient plot space was unavailable. The existing water treatment plant therefore remains an important complementary water-balance management measure but cannot, within the available footprint, provide all the additional capacity required in place of enhanced evaporation.

Alternative Enhanced Evaporation Systems

A Request for Information was issued to the market in 2020 to identify alternative enhanced evaporation solutions, and the proposals received were evaluated. A further market enquiry was undertaken in 2022. The options considered included various mechanical and rapid evaporation systems that increase evaporation by spraying water into the air and increasing the surface area available for evaporation.

The alternatives were considered in terms of their ability to provide controllable supplementary evaporation capacity, respond flexibly to changing process-water balance requirements, operate within the existing dam system and available footprint, and avoid unacceptable risks to dam integrity and environmental containment. The ability to operate the system intermittently was particularly important because the required evaporation capacity varies with rainfall, seasonal evaporation rates, and the prevailing process-water balance.

Preferred technology

Mechanical enhanced evaporation was selected as the preferred technology for further design and environmental assessment. The preferred system can be switched on and off according to the process-water balance, provides supplementary evaporation without requiring a permanent downstream water user, and can be integrated with the existing Dam 10A infrastructure. The selection also builds on previous operational experience with mechanical evaporation technologies.

The preferred mechanical evaporation system will operate together with, rather than replace, the existing process-water management measures. These include optimisation of natural evaporation from the PWDs, transfers to Halvepan, operation of the Unit 352 Water Treatment Plant, dredging to recover storage capacity and improved transfer of water between the primary and secondary dams. The preferred technology is therefore considered the most suitable option for providing the required flexible enhanced evaporation capacity while maintaining the broader process-water management strategy.

13.3 “No-Go” Alternative

As standard practice and to satisfy regulatory requirements, the option not to proceed with the proposed Enhanced Evaporation Project is included in the alternative evaluation. The “no-go” alternative serves as the baseline scenario against which the project's impacts are evaluated.

Under the “no-go option”, the project does not go ahead, and the *status quo* remains. The option of not proceeding must be considered in light of the project's need and desirability.

Some key considerations in this regard include:

- Evaporation will not be enhanced at the Sasol PWDs, and therefore, effluent dam levels will not be managed more effectively;

- Socio-economic opportunity loss – local employment, training, and business benefits from the proposed Project would not occur; and
- The no-go alternative would not address the current risk of insufficient evaporation capacity within the PWD system. The system would continue to rely on existing evaporation and management measures, while the risk of reduced storage capacity, dam levels entering the flood buffer zone, and potential loss of containment would remain. This could have environmental and legal compliance implications under the NWA and NEMA duty-of-care requirements.

The “no-go option” avoids all immediate environmental risks associated with the proposed Project, but at the expense of the ultimate goal of managing PWD levels more effectively and preventing potential loss of containment. It preserves the ecological and social *status quo* but may delay or prevent informed land-use decisions and future development planning that the proposed Enhanced Evaporation Project may enable.

Although not proceeding with the activities associated with the proposed Project would avoid the adverse environmental impacts, these impacts are considered manageable through the provisions contained in the BAR and EMPr.

14 PUBLIC PARTICIPATION

14.1 Introduction

The purpose of public participation includes the following:

1. To provide I&APs with an opportunity to obtain information about the project;
2. To allow I&APs to express their views, issues, and concerns with regard to the project;
3. To grant I&APs an opportunity to recommend measures to avoid or reduce adverse impacts and enhance positive impacts associated with the project; and
4. To enable the project team to incorporate the needs, concerns, and recommendations of I&APs into the project, where feasible.

The BA Process for the proposed Project was initially completed in accordance with the EIA Regulations, including undertaking a public participation process, considering comments received from I&APs and commenting authorities, and submitting the Final BAR and associated application for EA to DARDLEA, as the Competent Authority, for decision-making. During the Competent Authority's consideration of the application, the relevant GSDM air quality authority provided comments requesting further assessment of the potential air quality impacts associated with the proposed enhanced evaporation system. The Applicant subsequently withdrew the application for EA to allow an AQIA to be undertaken and to ensure that the potential impacts were adequately identified, assessed and addressed before a decision was made. **Appendix D** contains the records and supporting information relating to the public participation process undertaken as part of the initial application.

A new application for EA has since been initiated, and the AQIA findings and recommendations have been incorporated into this revised BAR and the associated EMPr. The revised draft BAR will undergo a further public participation process to give I&APs and relevant commenting authorities an opportunity to review and comment on the updated assessment.

The sections below outline the public participation process to be undertaken in respect of the revised draft BAR. Proof of the activities undertaken during this further public participation process, together with the comments received and the responses provided, will be incorporated into the Final BAR. Following consideration of the comments received, the Final BAR and associated application for EA will be submitted to DARDLEA for decision-making in accordance with the EIA Regulations

Figure 66 below outlines the public participation process for the review of the draft BAR. Note that the dates reflected in the diagram may change due to the dynamic nature of the BA Process.

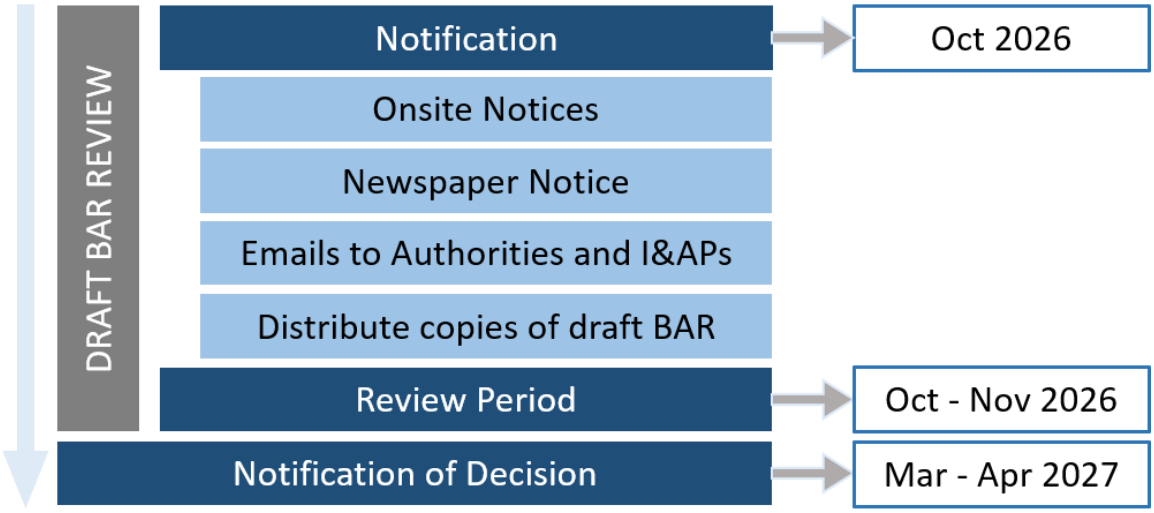


Figure 66: Outline of Public Participation Process (*note: dates are subject to change)*

14.2 Database of I&APs

A database of I&APs, including authorities, different spheres of government (national, provincial and local), parastatals, Ward Councillors, stakeholders, adjacent landowners, interest groups, and members of the general public, was prepared for the project and is contained in **Appendix E**. This database includes all registered I&APs from the first process and will continue to be updated and maintained throughout the remainder of this Basic Assessment Process.

14.3 Review of draft Basic Assessment Report

14.3.1 Period to Review the draft Basic Assessment Report

In accordance with Regulation 43(1) of the EIA Regulations, I&APs are granted an opportunity to review and comment on the draft BAR from **16 October 2026 to 16 November 2026.**

14.3.2 Notification of Review of draft Basic Assessment Report

The following notifications have been provided with regard to the review of the draft BAR (proof to be included in the Final BAR):

- Authorities and I&APs contained in the database (refer to **Appendix E**) have been notified via email;
- A notice has been placed in the Ridge Times Newspaper; and
- Site notices have been placed at relevant locations surrounding the Project site.

14.3.3 Accessing the draft Basic Assessment Report

The draft BAR can be accessed as follows:

- A hardcopy has been placed at the Secunda Public Library (1 Louwrens Muller St, Secunda, 2302); and
- An electronic copy has been uploaded to the following website for downloading purposes: https://nemai.co.za/downloads/.

14.3.4 Commenting on the draft Basic Assessment Report

Comments on the draft BAR need to be forwarded in writing to the contact person below within the review period stipulated in **Section 14.3.1** above (note that the Comment Sheet contained in **Appendix K** may be used for this purpose):

Contact Person:	*Wendy Ludewig*
Tel:	*(011) 781 1730*
Email:	*WendyL@nemai.co.za*
Postal Address:	*PO Box 1673, Sunninghill, 2157*

14.3.5 Comments Received on the draft Basic Assessment Report

Comments received on the draft BAR will be incorporated into a CRR, which will also include responses from the Applicant, technical team, EAP and environmental specialists (as relevant). The CRR will be appended to the final BAR that will be submitted to DARDLEA for decision-making.

14.3.6 Public Meeting to Present the draft Basic Assessment Report

Anyone who has an interest in attending a public meeting will need to inform Nemai Consulting in writing by **23 October 2026**. Only preregistered parties that confirmed interest will receive an invitation to the public meeting.

14.4 Notification of DARDLEA's Decision

Registered I&APs will be notified after having received written notice from DARDLEA (in terms of NEMA) on the final decision for the Project. The notification will include the appeal procedure and key reasons for the decision.

15 CONCLUSIONS & RECOMMENDATIONS

15.1 Outcomes of the Basic Assessment

The following key tasks were undertaken to date during the Basic Assessment Process for the proposed Enhanced Evaporation Project:

- Specialist studies were undertaken, and the findings were incorporated into the BAR in terms of understanding the environmental *status quo* and sensitive features, assessing the potential impacts and establishing concomitant mitigation measures;
- Potentially significant impacts pertaining to the proposed Project were identified and assessed, and mitigation measures were provided;
- Alternatives for achieving the objectives of the proposed Project were considered; and
- As part of the Public Participation Process, authorities and I&APs were notified of the project, and comments to be received during the 30-day review period will be incorporated into the final BAR.

The outcomes of these tasks are captured below.

15.2 Sensitive Environmental Features

Some of the sensitive and significant environmental features and attributes that are associated with the receiving environment of the proposed Project area are noted below, for which mitigation measures are included in the BAR and EMPr (as relevant):

- The study area falls within the Soweto Highveld Grassland ecosystem, which is listed as Vulnerable in terms of the National Environmental Management: Biodiversity Act (Act No. 10 of 2004) ecosystem threat status classification. Although the site is already substantially modified, wetlands within the area remain the most ecologically important habitat units.
- Three seepage wetlands (Seep01, Seep02 and Seep03) were identified within the Project Area of Influence. These wetlands are largely modified (PES Category D) and have low ecological importance and sensitivity ratings. Despite their modified state, they continue to provide important regulating ecosystem services, including sediment trapping, nutrient assimilation and hydrological regulation. The wetlands form part of an upstream FEPA system that contributes to the ecological functioning of the Kleinspruit catchment.
- A clump of approximately fifteen (15) *Gladiolus crassifolius* was observed within the study area, and part of the development footprint (26°31'19.74"S; 29° 7'39.75"E). This species is specifically protected under Schedule 11 of the Mpumalanga Nature Conservation Act, No. 10 of 1998 and appropriate avoidance or permitting measures are required.
- During the assessment, a single sighting of the Africa Grass Owl (*T. capensis*) was made within 500 m of the site, and precautionary pre-construction surveys and ecological buffers are recommended to protect potential breeding habitat.

- Air quality-sensitive receptors occur within an already impacted industrial airshed, where elevated fine particulate matter ($PM_{2.5}$) and short-term H_2S concentrations have been identified. These receptors are therefore sensitive to any additional atmospheric emissions associated with the proposed Project.

The sensitivity maps are provided in **Figure 61** and **Figure 62**.

15.3 Environmental Impact Statement

The BA Process undertaken for the proposed Project identified a range of environmental sensitivities and potential impacts associated with the construction and operation of the proposed infrastructure. These included impacts relating to wetlands and aquatic resources, terrestrial biodiversity, air quality, soil resources, traffic, noise, heritage resources, waste management and hazardous substances. Specialist investigations were undertaken where required and informed the project layout, impact assessment and proposed mitigation measures.

The assessment confirmed that the proposed Project is located within an existing industrial environment that has been substantially influenced by historical and ongoing industrial activities. Nevertheless, several environmentally sensitive features occur in proximity to the proposed development footprint, including seepage wetlands, wetland-associated habitat, areas of Soweto Highveld Grassland, protected plant species (*Gladiolus crassifolius*), potential grass owl habitat and air quality-sensitive receptors. Project design refinements, avoidance measures and mitigation requirements have been incorporated to minimise impacts on these sensitive features.

The specialist studies and impact assessment concluded that the identified environmental impacts can be effectively avoided, reduced or managed through the implementation of the mitigation measures and environmental controls contained in the BAR and EMPr. Following mitigation, the residual impacts directly attributable to the proposed Project are generally of low significance and are considered acceptable within the context of the receiving environment. No fatal flaws were identified during the assessment process, and no specialist concluded that the proposed Project should not proceed.

The assessment also considered cumulative impacts within the broader receiving environment. In this regard, it is recognised that certain environmental receptors, particularly air quality, are already subject to elevated cumulative pressures associated with existing industrial activities within the region. While cumulative impact ratings for certain air quality indicators remain elevated at a regional scale, these ratings largely reflect existing baseline conditions and should be distinguished from the impacts attributable to the proposed Project. The AQIA concluded that the proposed Project would contribute incrementally to the existing cumulative air quality burden and that the associated impacts would remain manageable with the implementation of the recommended operational controls, monitoring requirements and adaptive management measures.

Based on the findings of the BA Process, specialist studies and impact assessment, it is the opinion of the EAP that the proposed Project is environmentally acceptable and can be authorised, subject to the implementation of the mitigation, monitoring and management measures contained in the BAR and EMPr and compliance with all applicable legislative and authorisation requirements.

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APPENDICES