

Appendix C.3

AQUATIC BIODIVERSITY SSVR

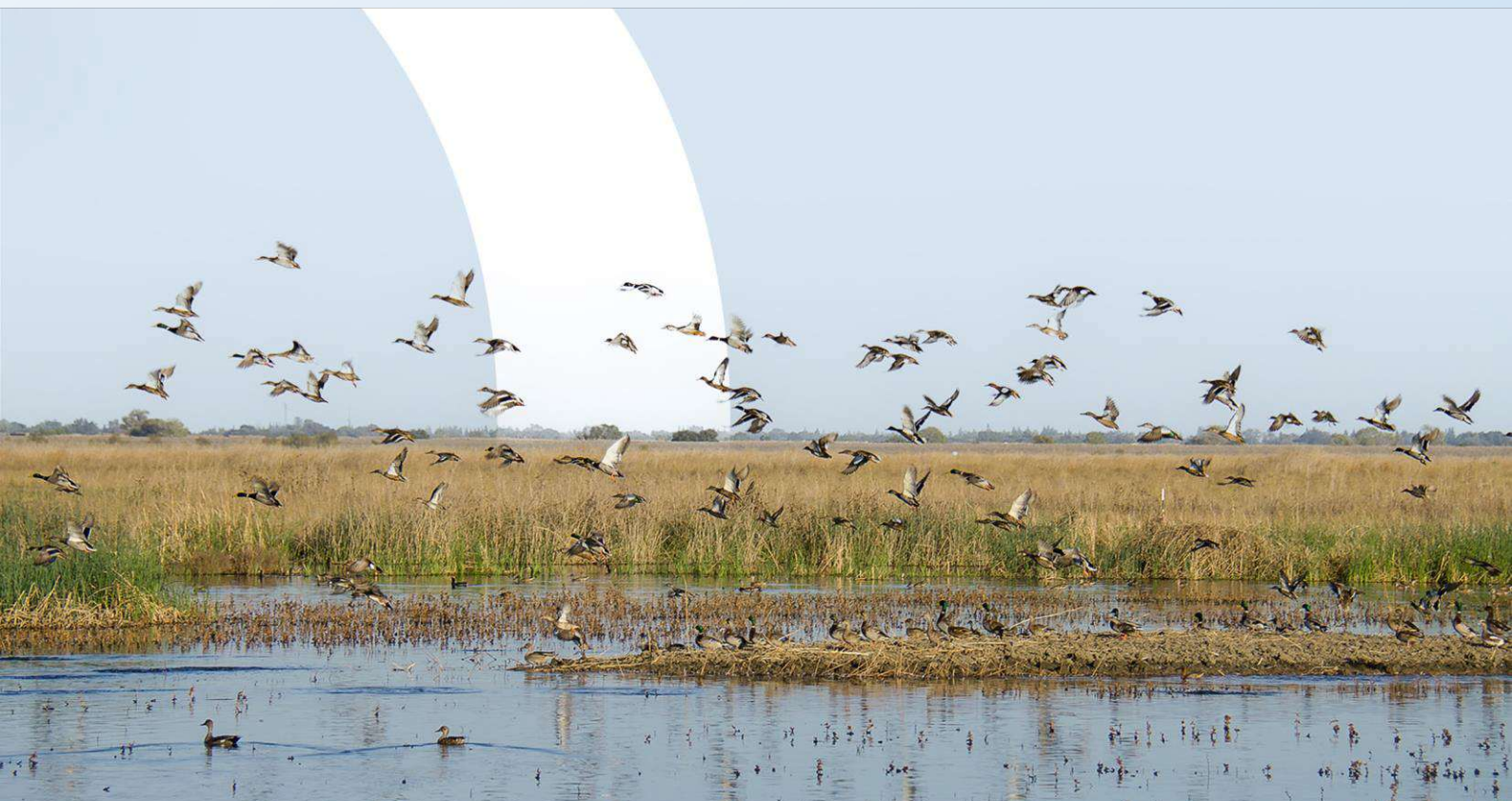




Sasol South Africa Ltd

AQUATIC BIODIVERSITY (INCLUSIVE OF RIVERS AND WETLANDS) SCOPING REPORT

Sasol Secunda Gas to Power Project





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Sasol Secunda Gas to Power Project

DRAFT SCOPING REPORT (VERSION A) CONFIDENTIAL

PROJECT NO. WSP-ZA0068671.2768

DATE: JULY 2026

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LIST OF ABBREVIATIONS

Abbreviation	Full name
CBA	Critical Biodiversity Area
CVB	Channelled Valley Bottom
DO	Dissolved Oxygen
DWS	Department of Water and Sanitation
EC	Electrical Conductivity
EMPr	Environmental Management Programme
ESA	Ecological Support Area
FSA	Fish Support Areas
IBL	Inside Battery Limit
IHI	Index for Habitat Integrity
IUCN	International Union for Conservation of Nature
LNG	Liquefied Natural Gas
MBSP	Mpumalanga Biodiversity Sector Plan
MRG	Methane Rich Gas
NEM:BA	National Environmental Management: Biodiversity Act
NEMA	National Environmental Management Act
NFEPA	National Freshwater Ecological Priority Areas
NWA	National Water Act
NWM5	National Wetland Map Version 5
OBL	Outside Battery Limit
ONA	Other Natural Areas
PA	Protected Areas
PES	Present Ecological State
SASS5	South African Scoring System version 5
SQR	Sub-quaternary Reach



SWSA	Strategic Water Source Area
UVB	Unchannelled Valley Bottom
WMA	Water Management Area
WSP	WSP Group Africa

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SPECIALIST DECLARATION

DECLARATION OF INDEPENDENCE BY SPECIALIST

I, **Mandlenkosi Nkala**, declare that I –

- Act as the independent specialist in this application;
- Do not have and will not have any financial interest in the undertaking of the activity, other than remuneration for work performed;
- Do not have nor will have a vested interest in the proposed activity proceeding;
- Have no, and will not engage in, conflicting interests in the undertaking of the activity; and undertake to disclose, to the competent authority, any information that have or may have the potential to influence the decision of the competent authority or the objectivity of any report, plan or document.

Signed:

I, **Alpheus Moalosi**, declare that I –

- Act as the independent specialist in this application;
- Do not have and will not have any financial interest in the undertaking of the activity, other than remuneration for work performed;
- Do not have nor will have a vested interest in the proposed activity proceeding;
- Have no, and will not engage in, conflicting interests in the undertaking of the activity; and undertake to disclose, to the competent authority, any information that have or may have the potential to influence the decision of the competent authority or the objectivity of any report, plan or document.

Signed:

DECLARATION OF INDEPENDENCE BY SPECIALIST

I, **Bhavna Ramdhani**, declare that I –

- Act as the independent specialist in this application;
- Do not have and will not have any financial interest in the undertaking of the activity, other than remuneration for work performed;
- Do not have nor will have a vested interest in the proposed activity proceeding;
- Have no, and will not engage in, conflicting interests in the undertaking of the activity; and undertake to disclose, to the competent authority, any information that have or may have the potential to influence the decision of the competent authority or the objectivity of any report, plan or document.

Signed:

1 INTRODUCTION

WSP Group Africa (WSP) has been appointed by Sasol South Africa Limited (Sasol) to undertake the necessary specialist assessments in support of the scoping, baseline and impact assessment phases of the environmental regulatory process for the proposed Gas to Power Facility. The proposed infrastructure footprint is located at the Sasol Secunda Factory in Mpumalanga, South Africa.

1.1 PURPOSE OF THE REPORT

This report describes the baseline aquatic biodiversity of the study area, including wetlands and riparian habitats, and presents the findings of the site sensitivity verification undertaken through a desktop assessment supplemented by a wet-season field survey conducted in April 2026. The report further provides a scoping-level assessment of potential impacts associated with the proposed project.

This report has been drafted in accordance with the Procedures for the Assessment and Minimum Criteria for Reporting on Identified Environmental Themes in Terms of Sections 24(5)(a) and (h) and 44 of NEMA (GN 320 of 20 March 2020) – Protocol for the specialist assessment and minimum report content requirements for environmental impacts on aquatic biodiversity.

1.2 PROJECT BACKGROUND

The Secunda Gas to Power project aims to generate electricity through Liquefied Natural Gas (LNG) (methane rich gas being considered as back-up feed), with the objective to provide power to the national grid, supporting South Africa's growing energy needs.

The Inside Battery Limit (IBL) scope includes the main equipment for generating electricity, which will be proposed by the vendor. The Outside Battery Limit (OBL) scope will focus on the external infrastructure and utilities required to support the Secunda Gas to Power project (integration into the Secunda Facility). The electrical scope will cover the reconfiguration of the electrical network. The installation of transmission lines, along with the routing of high-voltage cables through existing servitudes, will also be considered.

In addition to the electrical work, the OBL scope will involve the installation and routing of various pipelines. These will include pipelines for LNG, Methane Rich Gas (MRG) and any required utilities such as cooling water, raw water, firewater, instrument air, and any effluent. Depending on the IBL requirements, raw water treatment will also be included to achieve the necessary water quality specifications.

The overview of the Gas to Power Facility is indicated in (Figure 1-1) below. Currently two configurations are being evaluated, open cycle gas turbines indicated in blue and combined cycle gas turbines indicated in blue, yellow and red.

Figure 1-2 illustrates the possible pipe routings of the LNG from the pressure protection station to the brownfield plot as proposed by the gas infrastructure team. There are two routings being considered, one through the primary area and the other in the secondary area around the south eastern side of the factory. The final pipe routing will be selected as the project develops.

The MRG routing for the east and west identified during the screening activities is also shown in Figure 1-2. The pipe routing is from gas circuit to the brownfield site and runs through the primary area. This proposed pipe routing might change if an alternate routing is identified. Both east and west MRG pipe routings still need to be confirmed.

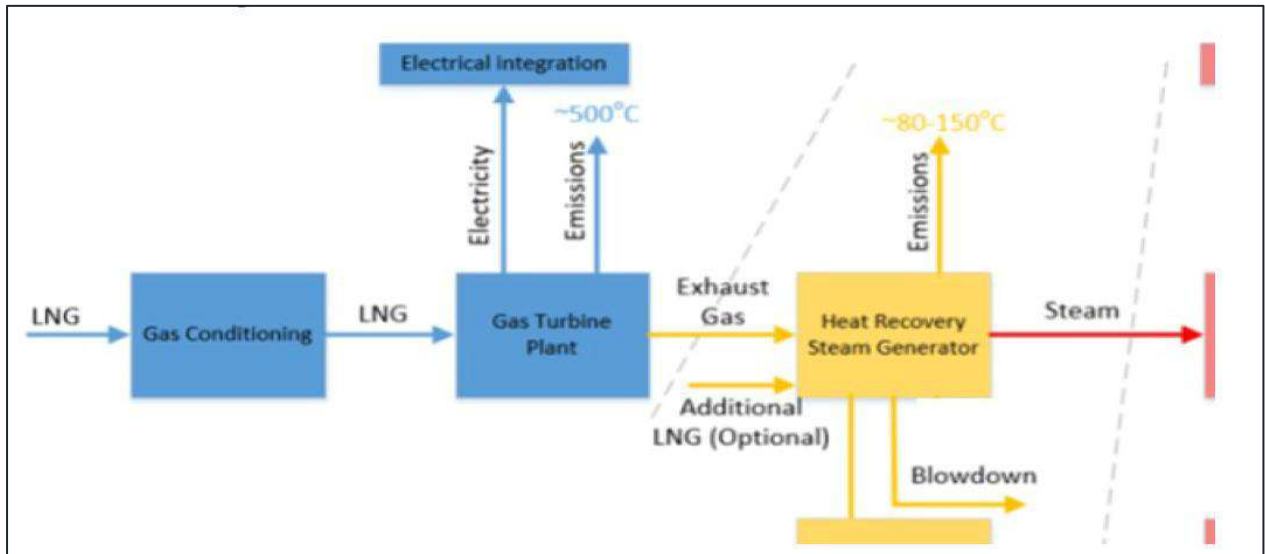
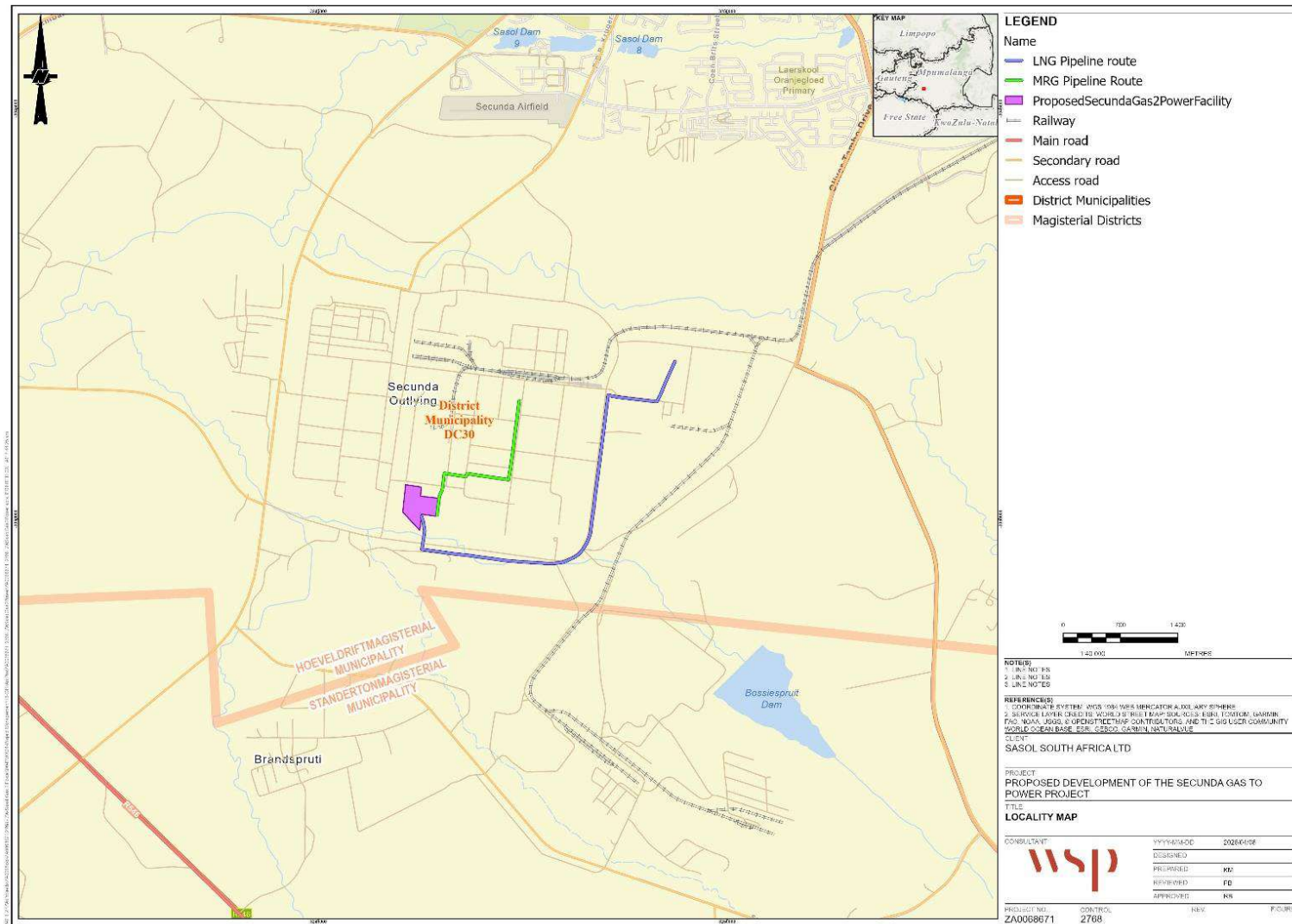


Figure 1-1 - Overview of the Gas to Power Facility

1.3 PROJECT LOCATION AND EXTENT

This proposed infrastructure footprint for the Secunda Gas to Power Facility is located at the Sasol Secunda Operations in the Govan Mbeki Local Municipality, within the Gert Sibande District Municipality, in the Mpumalanga province, South Africa (Figure 1-2).

Figure 1-2 - Project locality and proposed layout



1.4 STUDY LIMITATIONS

The following limitations and assumptions are expressed as part of this study:

- Wetland delineations were informed by existing baseline data presented in the recent wetland monitoring report by Linström et al., (2024) and were verified and updated where possible during the April 2026 field survey.
- Areas that were inaccessible due to health and safety constraints or access limitations were assessed using aerial imagery, supported by available desktop datasets and observations from accessible adjacent areas.
- This Site Sensitivity Verification (SSV) and scoping report was informed by a combination of desktop review, available national and provincial datasets, previous specialist studies, satellite imagery and site-based verification.
- The results of any specialist reports reviewed and referenced are assumed to be accurate.
- This assessment represents a once-off assessment of the aquatic environment and can only reflect the conditions observed at the time of the survey, with some interpretation of historical conditions based on field evidence and satellite imagery. As vegetation, flow conditions, wetland expression and aquatic habitat availability vary temporally and spatially, certain features may not have been present or detectable during the site visit.
- The assessment techniques applied are intended to standardise and objectify the assessment of aquatic ecosystem condition, function, potential impacts and ecosystem services. However, some aspects of the assessment remain dependent on the specialist's professional judgement, field experience and interpretation of available evidence. The assessor will, if additional information or counter arguments are provided and verified, hold the right to amend the report if need be.

2 APPLICABLE LEGISLATION, POLICY AND STANDARDS

This SSV and scoping assessment report took cognisance of the requirements of specific applicable national and provincial legislation and associated regulations that are pertinent to aquatic biodiversity. These were used to guide this assessment, and include:

- **National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA)** – Section 24 (1)(a) and (b) states that “the potential impact on the environment and socio-economic conditions of activities that require authorisation or permission by law and which may significantly affect the environment must be considered, investigated and assessed before their implementation and reported to the organ of state charged by law with authorizing, permitting, or otherwise allowing the implementation of an activity.
- **National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) (NEM:BA)** – The NEM:BA regulates the management and conservation of the biodiversity of South Africa within the framework provided under NEMA. This Act regulates the protection of species and ecosystems that require national protection and considers the management of alien and invasive species.
- **National Water Act (Act 36 of 1998)** – Part 5 of chapter 3 deals with pollution of water resources following an emergency incident, such as an accident involving the spilling of a harmful substance that finds or 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. If there is a failure to act, the relevant catchment management agency may take the necessary steps and recover the costs from every responsible person.
- **National Water Amendment Act (Act No. 27 of 2014) (NWA)** – The NWA aims to protect, use, develop, conserve, manage and control water resources including rivers, dams, wetlands, the surrounding land, groundwater, as well as human activities that influence them. The NWA intends to protect these water resources against over exploitation and to ensure that there is water for social and economic development and water for the future. The National Water Amendment Act amends the National Water Act, 1998 to integrate water use licensing for mining and production activities with environmental, mineral resource, and water legislation. It aligns authorisation processes, updates Department designations, and clarifies appeal procedures.
- **Mpumalanga Biodiversity Sector Plan (MBSP) (2024)** – Aims to integrate biodiversity conservation into development by identifying and protecting Critical Biodiversity Areas (CBAs) and Ecological Support Areas (ESAs), ensuring sustainable land use, meeting national targets, and building climate resilience for water security and economic sectors like tourism and mining

3 METHODOLOGY

The aquatic biodiversity baseline description and preliminary impact assessment took cognisance of Government Notice No. 320, published in 2020 under the National Environmental Management Act (1998) concerning '*Procedures for the Assessment and Minimum Criteria for Reporting on Identified Environmental Theme in terms of Sections 24(5)(a) and (h) and 44 of the National Environmental Management Act (1998), when applying for Environmental Authorisation*'.

In line with the assessment and reporting requirements set out in the protocol, this scoping level assessment included two main study components; a desktop literature review and a site sensitivity verification (SSV) assessment. The findings of the desktop review were supplemented by information obtained during the SSV site visits, which collectively informed the impact assessment phase of the project in line with the NEMA protocols. The objectives and associated tasks for each component are described below.

a desktop literature review and then it was supplemented with information gathered during SSV site visits to inform the project impact assessment stage, in line with the NEMA protocols. The objectives and tasks associated with these components are described below.

3.1 STUDY AREA

The project study area was defined as the proposed Gas to Power Plant footprint, the associated pipeline routes (preferred/alternative) and a 500 m buffer around project footprint. The inclusion of the 500 m buffer within the assessment area ensures that any water bodies (including wetlands and rivers) surrounding the project footprint, and their associated regulated areas, are adequately considered, as required by the Revised GA 4167. This approach allows for the identification of any potential overlap between the project footprint and the regulated area of nearby wetlands, thereby supporting appropriate screening of potential watercourse related sensitivities and regulatory requirements (Figure 3-1).

3.2 DESKTOP LITERATURE REVIEW

A desktop study was initially undertaken to gather as much prior understanding of the general physiographic characteristics of the study area as possible.

All available relevant GIS data, such as data on the topographical layout, fluvial hydrology, Freshwater Ecosystem Priority Areas (FEPA), CBAs, and National Wetland Map Version 5 (NWM5) for the study area were evaluated as part of the desktop literature review. This information provided a baseline understanding of aquatic biodiversity constraints within the study area and allowed for the aquatic biodiversity and sensitivity ratings for the project to be verified.

A review and consolidation of the existing baseline biodiversity literature and datasets was conducted, supplemented by a detailed desktop delineation of wetlands and watercourses based on available satellite imagery (Google Earth®) and further informed by information gathered during the site visit.

The existing available datasets that were reviewed and consolidated to assess the aquatic biodiversity systems include:

- National Freshwater Ecological Priority Areas (NFEPA)
- National Wetland Map version 5 (NWM5)

- Threatened Ecosystems, and national protected area expansion strategy, provide a regional/national context for assessing the biodiversity significance of the site.
- The Mpumalanga Biodiversity Sector Plan (MBSP) technical report (MBSP) (2024)
- DWS. 2014. A Desktop Assessment of the Present Ecological State, Ecological Importance and Ecological Sensitivity per Sub Quaternary Reaches for Secondary Catchments in South Africa. Compiled by RQIS-RDM: <https://www.dwa.gov.za/iwqs/rhp/eco/peseismodel.aspx>
- DWS. 2023. Quaternary catchments and sub-quaternary reach data for South Africa.

In addition, previous specialist studies completed for the study area were reviewed. Most relevant to this assessment is the following:

- Linström, A., Grobler, R., Pretorius, L. and Rossouw, T. 2024. Wetland Survey: Sasol Synfuels (Pty) Ltd – SSIC. Wet Earth Eco-Specs (Pty) Ltd, Lydenburg.

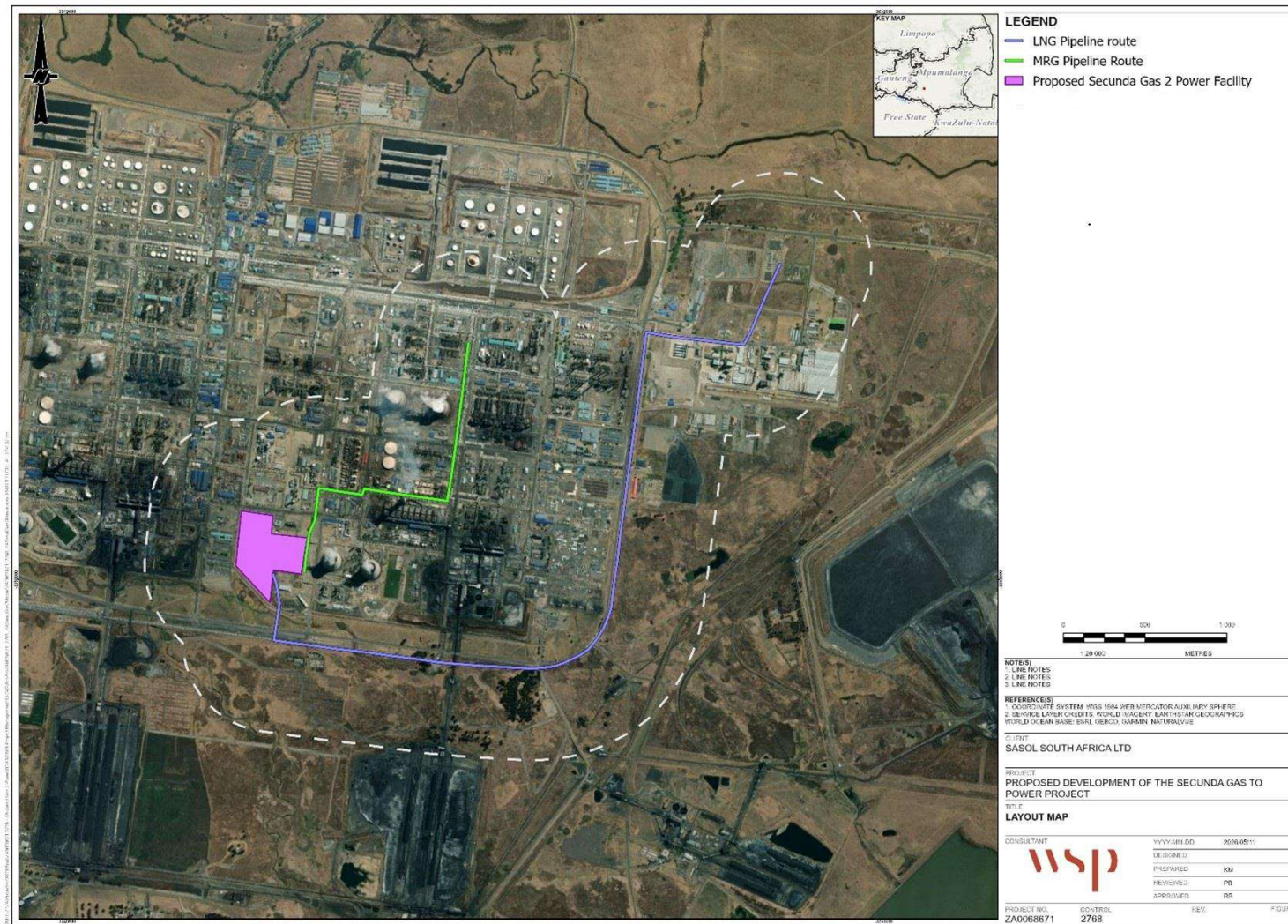


Figure 3-1 – Extent of the proposed Gas to Power footprint in relation to the study area

3.3 FIELD SURVEY

A field survey of the study area was conducted on 23 and 24 April 2026, representative of a wet season field survey. The objectives of the aquatic biodiversity surveys were to:

- Confirm the habitat condition of accessible areas mapped as very high sensitivity aquatic features.
- Confirm the extent and condition of accessible wetland and watercourse features that could be impacted by the proposed project.
- Identify priority areas/sensitive habitats that should be avoided during project development and operation.

3.3.1 WETLAND ASSESSMENT

The National Water Act, Act 36 of 1998, defines watercourses and wetlands as follows:

Wetlands:

“Land which is transitional between terrestrial and aquatic systems where the water table is usually at or near the surface, or the land is periodically covered with shallow water, and which land in normal circumstances supports or would support vegetation typically adapted to life in saturated soil.”

The boundaries of the wetlands were originally delineated by Linstrom et al., (2024) and subsequently updated as part of the current study. The delineation process adhered to the methodology outlined in “A Practical Field Procedure for the Identification and Delineation of Wetlands and Riparian Areas,” as detailed by DWAF (2005). Using this methodology, wetlands were identified and delineated using the Terrain Unit Indicator, the Soil Form Indicator, the Soil Wetness Indicator and the Vegetation Indicator.

WSP undertook a field survey in April 2026 to verify the previous study findings and document any significant changes in wetland condition and current levels of disturbance. The current report reflects the consolidated findings of the past assessment and the most recent survey.

3.3.2 RIPARIAN/RIVERINE ECOSYSTEMS

3.3.2.1 Study approach

To enable an adequate description of the aquatic environment and the determination of the present ecological state, the following stressor, habitat and response indicators were evaluated:

Water Quality

- *In situ* water quality assessment including temperature, pH, electrical conductivity (EC), dissolved oxygen (DO) and comparison to applicable guideline values and identification of variables of potential concern.

Habitat Indicators

- General habitat assessment including site location (GPS coordinates), site photographs and surrounding features such as land uses, potential sources of pollution, erosion, etc;
- Aquatic macroinvertebrate biotope evaluation.

Response Indicators

- Aquatic macroinvertebrate assessment
- Ichthyological assessment

3.3.2.2 Sampling sites

The selection of sampling sites was primarily guided by the planned development areas for the project, including the IBL, which encompasses the main equipment for generating electricity, and the OBL, which involves external infrastructure and utilities necessary to support the project, such as pipelines for LNG and MRG. Additionally, the presence of appropriate habitats for aquatic fauna, including fish and aquatic macroinvertebrates, was also a key consideration in the site selection process.

A total of five sites were assessed during the current study, comprising four sites along the Groot-Bossiespruit and one additional site, GBT, located at an artificial canal discharging into the Groot-Bossiespruit near GB3, from Sasol Secunda Operations. Site names, GPS coordinates and brief descriptions are provided in Table 3-1 and a map of the project area showing the location of the sampling sites is presented Figure 3-2.

Table 3-1 - Sampling locations

Site Name	Description	Coordinates
GB1	Located at a road crossing upstream of the Sasol Secunda Factory. This site serves as the upstream reference point.	26°34'4.95"S; 29°10'49.61"E
GB2	Located at a road crossing upstream of the proposed area for the Sasol Secunda Gas to Power Facility.	26°33'58.68"S; 29° 9'48.85"E
GB3	Located at a road crossing adjacent the proposed area for the Sasol Secunda Gas to Power Facility.	26°33'53.48"S; 29° 9'34.25"E
GB4	Located at a road crossing, downstream of the proposed area for the Sasol Secunda Gas to Power Facility. This site serves as the most downstream site of the project.	26°33'52.16"S; 29° 9'26.74"E
GBT	Located in an artificial canal discharging from Sasol Secunda Operations area into the Groot-Bossiespruit just before site GB3	26°33'51.01"S; 29° 9'35.78"E

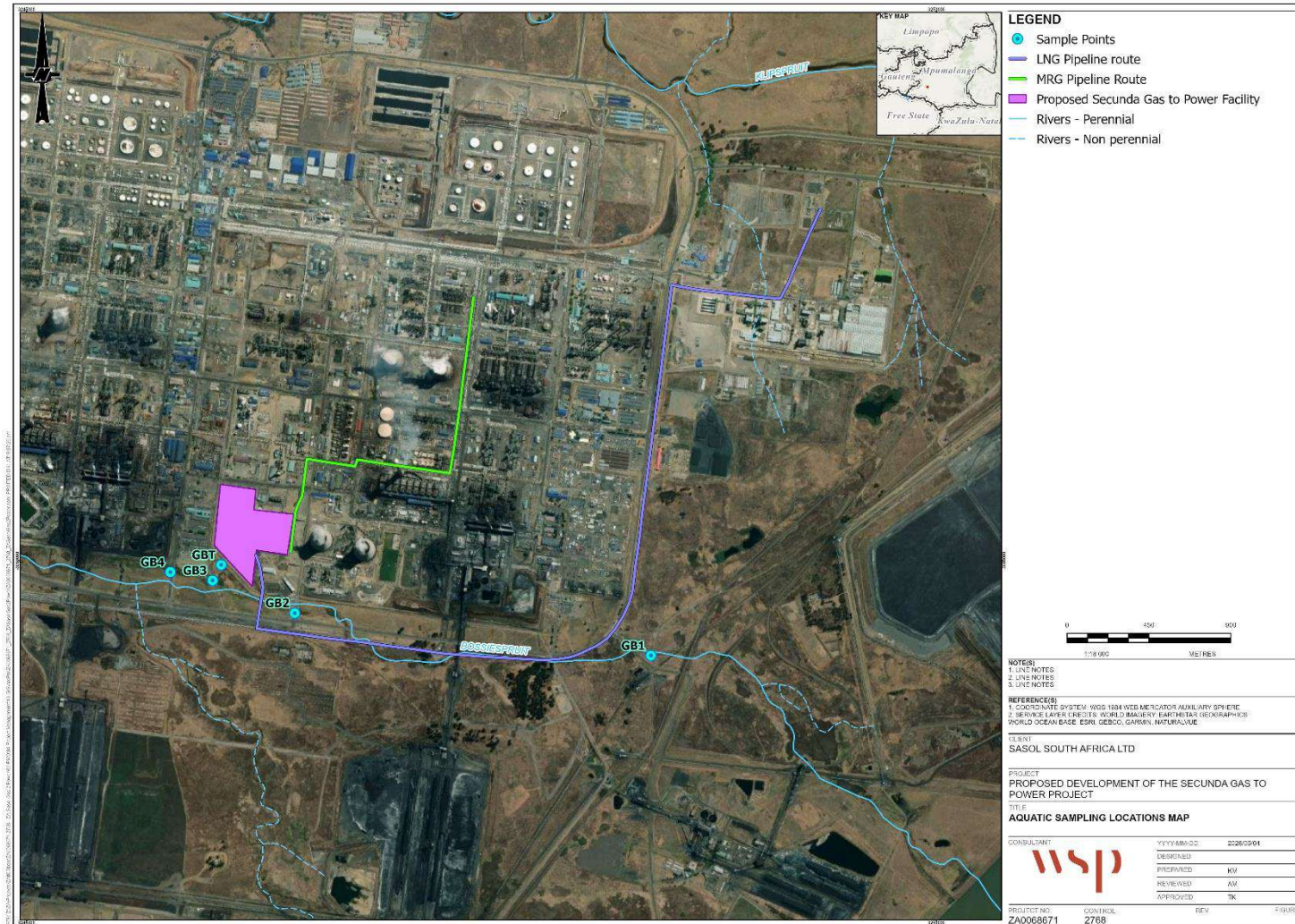


Figure 3-2 - Location of sampling points

4.2 FRESHWATER ECOREGIONS

Ecoregions are regions characterised by a relative similarity in the type of ecosystems and ecosystem components, i.e. biotic and abiotic. The study area is located within the Southern Temperate Highveld Ecoregion. This ecoregion is generally described as plains with a moderate to low relief with a variety of grassland vegetation types with moist types present towards the east and drier types towards the west and south (Kleynhans, 2007).

4.3 CATCHMENT AREA

The study area is situated within the C12D quaternary of the Inkomati-Usuthu Water Management Area (WMA) (DWS, 2023) (Figure 4-2). All sampling sites are located within the C12D-01657 Sub-quaternary Reach (SQR). This SQR is approximately 14 km in length and classified as a first order stream (refer to Table 4-1).

Table 4-1 - Watercourses associated with the study area

WMA	Primary Drainage	River	SQR	Stream Order
Inkomati-Usuthu Water Management Area	C	Groot-Bossiespruit	C12D-01657	1
WMA = Water Management Area; SQR = Sub-Quaternary Reach				

4.4 RIVER PRESENT ECOLOGICAL STATE, IMPORTANCE AND SENSITIVITY

The DWS (2016) SQR summary, including the Present Ecological State (PES), for the associated watercourses is provided in Table 4-2 (DWS, 2016). The PES for the associated SQR is determined to be 'Seriously Modified with Low Ecological Importance and Moderate Ecological Sensitivity'. Impacts in this water course include the presence of roads, dams, mining and industrial facilities.

Table 4-2 - Desktop Present Ecological State, Importance and Sensitivity for the focus Sub Quaternary Reach

River name	Sub Quaternary Reach	Present Ecological Category	Category Description	Ecological Importance	Ecological Sensitivity
Groot-Bossiespruit	C12D-01657	E	Seriously Modified	Low	Moderate

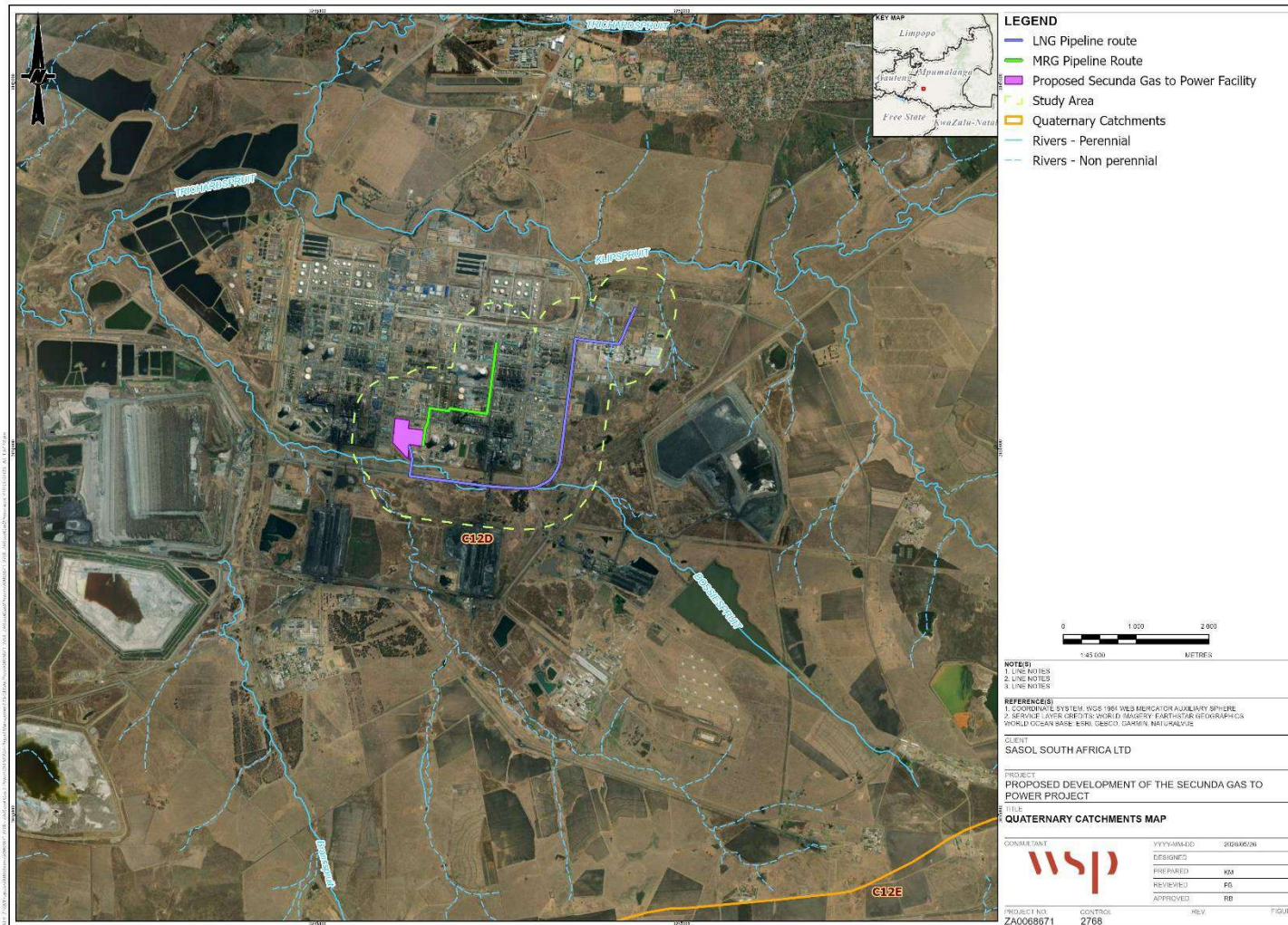


Figure 4-2 - Watercourses and quaternary catchments associated with the study area

4.5 REGIONAL BIODIVERSITY CONTEXT

4.5.1 STRATEGIC WATER RESOURCE AREAS (SWSAS)

The study area is not located in a Strategic Water Source Area (SWSA). Therefore, SWSAs were excluded as a receptor for the impact assessment or considered further in this report.

4.5.2 FRESHWATER ECOSYSTEM PRIORITY AREAS (FEPA)

The study area occurs in an Upstream Management Area, these are sub-quaternary catchments in which human activities need to be managed to prevent degradation of downstream river Freshwater Ecosystem Priority Areas (FEPAs) and Fish Support Areas (FSA) (Nel et al., 2011) (Figure 4-3).

These management areas are critical in ensuring that upstream activities do not adversely impact the ecological function of highly sensitive aquatic ecosystems downstream, often focusing on maintaining the required water quality and quantity (Nel et al., 2011).

4.5.3 NATIONAL FRESHWATER ECOSYSTEM PRIORITY AREAS (FEPA)

Based on the National Freshwater Ecosystem Priority Areas (NFEPA), no FEPA wetland systems are present within the study area.

4.5.4 NATIONAL WETLAND MAP 5 (NWM5)

The National Wetland Map 5 (NWM5) portrays the most up-to-date spatial data for the extent and types of estuarine and inland aquatic (freshwater) ecosystems of South Africa (Van Deventer et al., 2019). The project strives to conserve a sample of freshwater ecosystems and diversity of species as well as the ecosystem processes which generate and maintain diversity (Nel et al., 2011).

The study area in relation to wetlands mapped as part of the NWM5 project is illustrated in Figure 4-4. The study area falls within regulatory area of 500 m distance from wetlands (seep and channelled valley bottom wetlands). The presence of the wetlands was confirmed by Linström et al. (2024) and during the current field survey undertaken by WSP, though the infield verified wetland extent was confirmed to differ from that illustrated by the NWM5.

4.5.5 MPUMALANGA BIODIVERSITY SECTOR PLAN

The Mpumalanga Biodiversity Sector Plan (MBSP) map divides the landscape into Protected Areas, (PA), CBA, ESA, Other Natural Areas (ONA), and Moderately or Heavily Modified Areas.

Based on the MBSP freshwater assessment, the proposed area for the Sasol Secunda Gas to Power Facility fall within 100 m of a watercourse classified as ESA: Wetland clusters. These are priority freshwater areas identified to support CBAs, ensuring connectivity and ecological functionality (Figure 4-5).

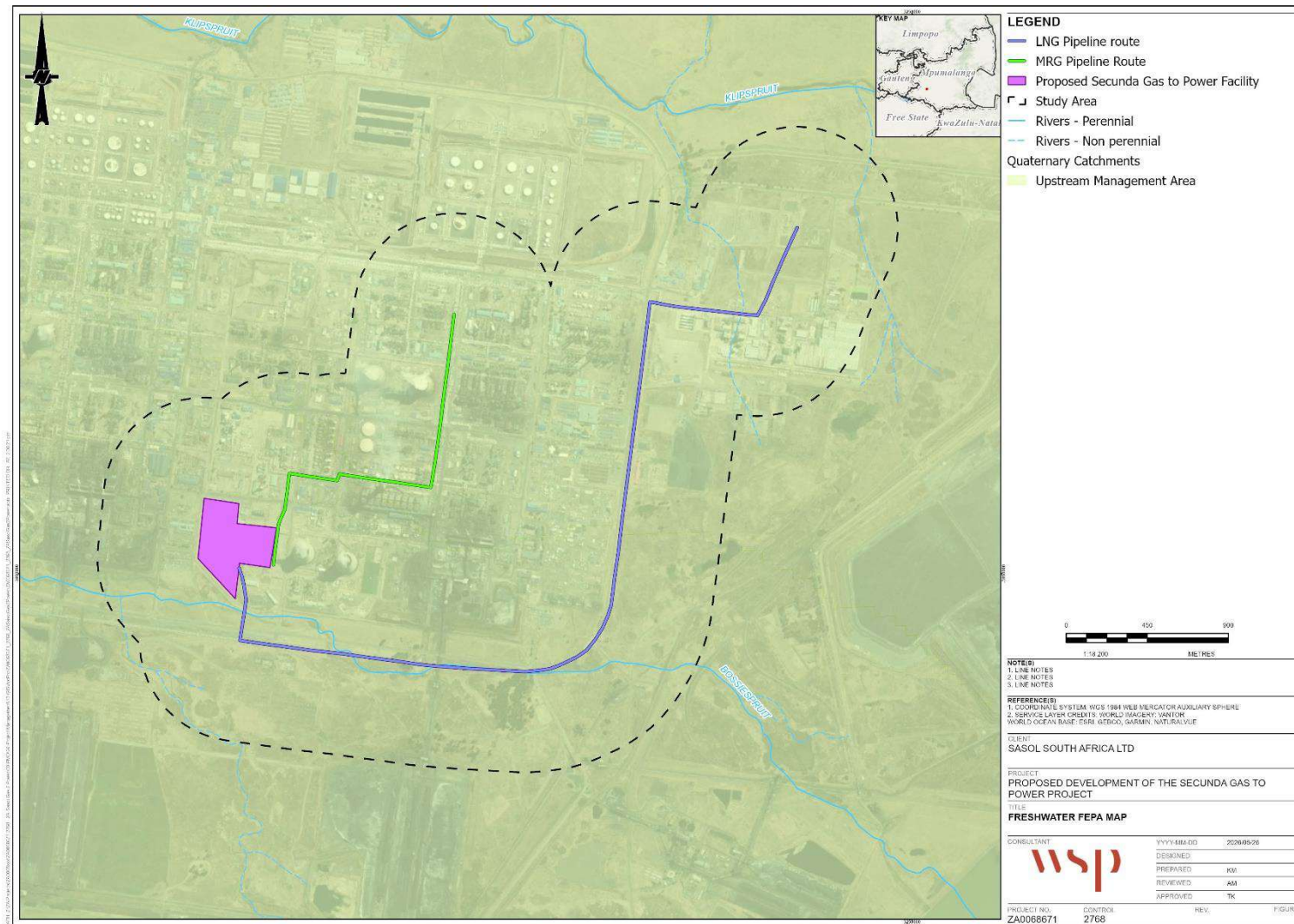


Figure 4-3 - FEPA in relation to the study area

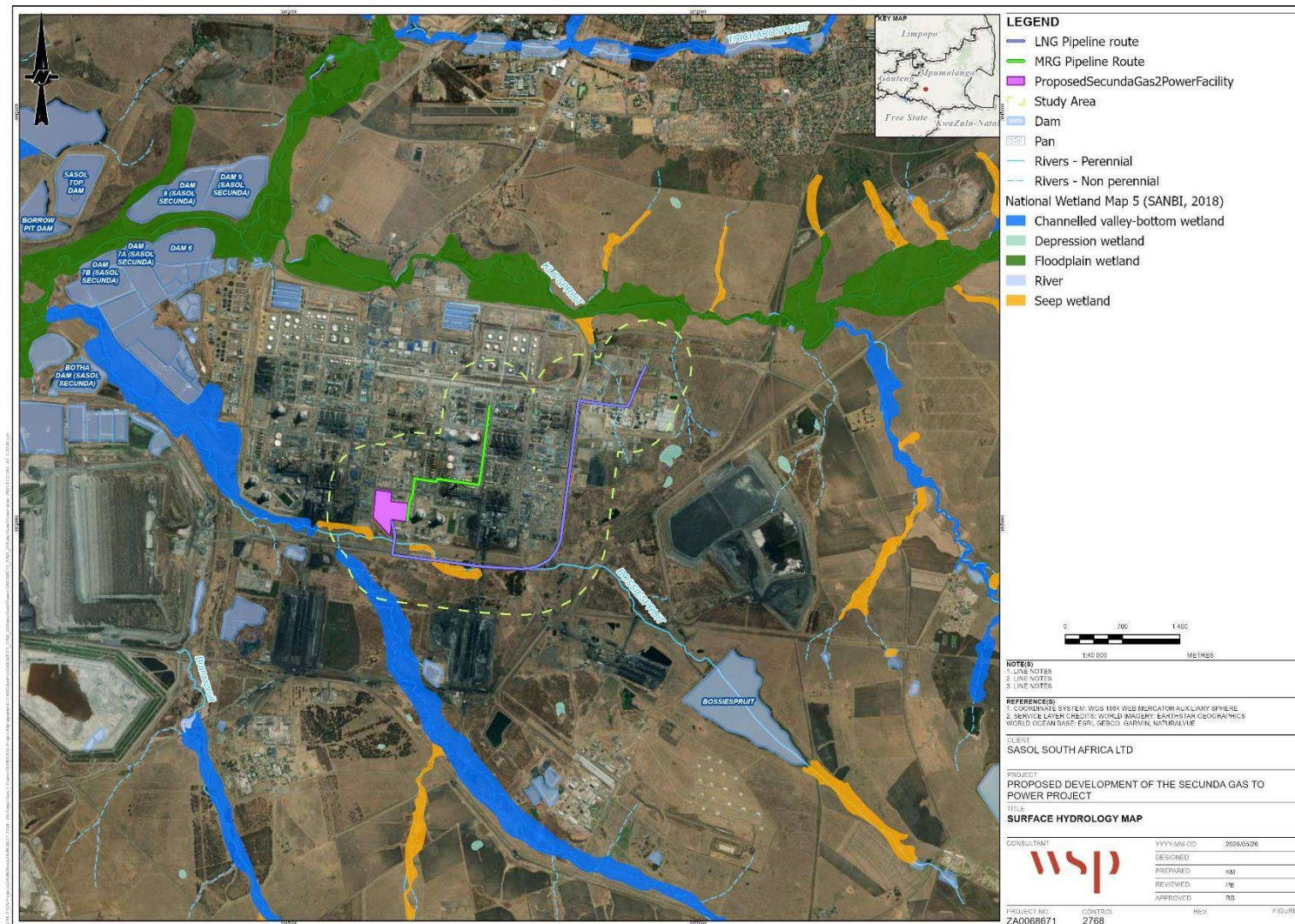


Figure 4-4 - National Wetland Map 5 for the study area

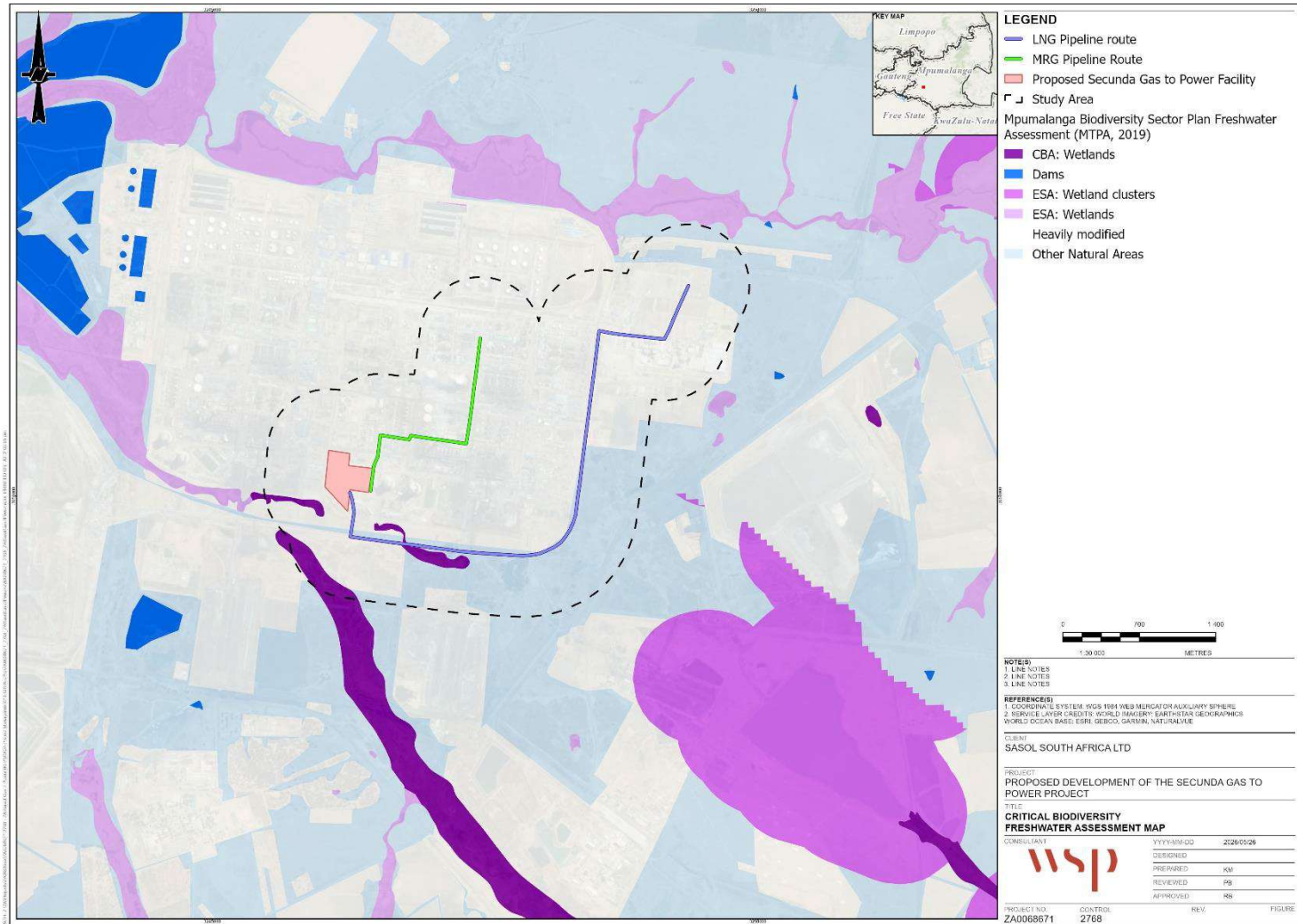


Figure 4-5 – MBSP Freshwater Assessment in relation to the study area

5 FIELD VERIFICATION RESULTS

This section summarises the findings of the assessments and observations made during the field surveys and which aided in confirmation of the desktop-based aquatic sensitivities as applicable.

5.1 WETLANDS

Channelled Valley Bottom (CVB) wetland systems were identified within the study area based on the previous wetland assessment (Linström et al., 2024) and confirmed through the site surveys

The CVB wetlands are distinct wetland ecosystems that occur on valley floors and are separate from, but may be associated with, adjacent river channels, which are classified as rivers. These wetlands are characterised by their position within valley bottoms, the absence of characteristic floodplain features, and the presence of a river channel flowing through the system. CVB systems tend to contribute less towards flood attenuation and sediment trapping as a consequence of the typical high flow velocities within the channel. Under low and medium flows, transport of sediment through, and out, of the system are more likely to be the dominant processes. Numerous valley bottom wetland systems exhibit signs of erosion, likely due to land-use changes (i.e., from natural to industrial hardened surfaces) and altered hydrology likely due to road crossings and dams.

CVB1 shown in Figure 5-1, is located within the west of proposed Gas to Power Facility and currently serves as an artificial landscaped canal which drains toward the Groot-Bossiespruit in the south. Historically the canal has experienced significant erosion and is currently incised to a depth of approximately 2 meters. The field survey confirmed that the system primarily receives its flow from surface runoff generated within the Sasol Operation, which is directed through multiple culverts that discharge into the system. The vegetation composition of CVB indicates that the wetland has been subject to ecological pressures resulting from the adjacent land-use, specifically the increase in hardened surfaces. The embankments of the CVB exhibits dense stands of Alien Invasive Plants (AIP) species including *Tagetes minuta* (African marigold), *Bidens Pilosa* (blackjack), *Ipomoea indica* (morning glory) and *Salix babylonica* (weeping willow). Despite the occurrence of invasive species, the channel was dominated by obligate wetland vegetation including *Phragmites australis* (common reed) and *Typha capensis* (bullrush).

CVB2 shown in Figure 5-2, is located just south of the proposed Gas to Power Facility and north of the Synfuels Road. The system forms part of the Groot-Bossiespruit which drains from east to west. The channel is confined along the northern edge due to shallow rocky soils and extends towards the south where deeper vertic soils were identified during the current field survey. The system has been modified as a consequence of industrial development (i.e. Sasol operation and road networks). The wetland supports both obligate and facultative species, with common obligate hydrophytes such as *T. capensis* and *P. australis* concentrated around the channel and in ponded, wetter areas. The temporary to seasonally zones were mainly dominated by facultative grasses, including *Cynodon dactylon* and *Paspalum dilatatum*. The northern edge of the system displayed an infestation of AIPs, which include *T. minuta*, *B. Pilosa* and *Conyza* sp. CVB2 serves as the main flow pathway, receiving water from CVB1 and a smaller southern tributary. Therefore, CVB2 may receive pollutants from the direct wetland catchment via releases, surface runoff, and seepage. Poor-quality water from industrial sources and activities in the wider catchment is therefore considered a significant impact on CVB2 and downstream watercourses.



Figure 5-1 – Photographs illustrating CVB1 characteristics and condition in 2026: (Right) view towards the north showing the start of CVB1 which contains *P. australis* and AIP infestation (Left) view looking south, highlighting AIPs along the embankments and *T. capensis* within the channel



Figure 5-2 - Photographs illustrating CVB2 characteristics and conditions in 2026: (Right) the main channel of the Groot-Bossiespruit with *T. capensis* and *P. australis* along the channel, (Left) the AIP infestation along the northern edge of the system

5.2 RIPARIAN/RIVERINE HABITATS

5.2.1 IN SITU WATER QUALITY

The In situ water quality parameters such as temperature, pH, electrical conductivity and dissolved oxygen were measured onsite by means of portable XS Revio Multiparameter.

These data are important to assist in the interpretation of biological results due to the direct influence water quality has on aquatic life forms and provide an indication of the physico-chemical status of the water at a sampling site at the time of the survey.

Results are indicated in Table 5-2, and were referenced against various water quality guidelines shown in Table 5-1. The following terms have been used to denote the state of the water quality based on deviations from the water quality guidelines:

- **'Good'** – denotes no exceedances from the recommended guidelines.
- **'Moderate'** – denotes minor exceedances, from the recommended guidelines, in one or more of the water quality variables.
- **'Poor'** – denotes notable exceedances, from the recommended guidelines, in one or more of the water quality variables.

Table 5-1 - Sources for the recommended water quality guidelines for aquatic ecosystems

Variable	Source	Guideline limit
Temperature	South African Water Quality Guidelines: <i>Aquatic Ecosystems (Volume 7)</i> (Department Of Water Affairs And Forestry, 1996)	5 – 30 °C
pH		6 – 8
Dissolved Oxygen % Saturation		80 – 120 %
Dissolved Oxygen concentration	Minimum Dissolved Oxygen concentration for aquatic macroinvertebrates (Nebeker et al., 1996)	> 5 mg/l
Electrical Conductivity	Conductivity guideline value of 500 µS/cm stipulated in U.S. U.S. Environmental Protection Agency (2010)	< 500 µS/cm

Table 5-2 - In situ water quality results recorded during the field assessment

Sites	Time	Temp. (°C)	pH	EC (µS/cm)	DO (mg/l)	DO (%)
TWQR	-	5 - 30°	6 – 8	<500	>5.0	80 - 120
GB1	15:56	17.2	8.0	334	6.5	80.9
GB2	14:51	17.6	8.1	343	6.7	83.9
GB3	13:00	17.8	8.2	358	6.9	86.3
GB4	11:20	17.6	8.2	359	7.0	87.2
GBT	14:11	24.5	7.9	775	5.7	81.6
EC = Electrical Conductivity; DO = Dissolved Oxygen; DO = Percentage saturation TWQR = Target Water Quality Range Red text indicates exceedance to the TWQR						

In situ water quality results indicate that temperatures ranged from 17.2 – 17.8 °C at all sites within Groot-Bossiespruit. Site GBT located within the artificial canal recorded a higher temperature value of 24.5 °C. All temperature values were therefore within acceptable ranges for aquatic ecosystems. The pH levels at all sites except at site GB1 within the Groot-Bossiespruit marginally exceeded the

recommended range for aquatic ecosystems with slightly alkaline pH levels ranging from 8.0 pH units at site GB2 and 8.2 pH units at sites GB3 and GB4 respectively. The pH level at GBT was within the recommended range with a pH level of 7.9 pH units. Electrical conductivity (EC) levels increased downstream (334 – 359 $\mu\text{S}/\text{cm}$) within Groot-Bossiespruit sites but remained within recommended guidelines, whilst site GBT exceeded the guideline limit with high EC levels of 775 $\mu\text{S}/\text{cm}$. This exceedance was likely influenced by contaminated water runoff observed discharging through the canal at the time of the field survey. Dissolved oxygen levels (5.7 – 7.0 mg/l ; 80 – 87%) met ecological requirements across all sites (Table 5-2). Overall, water quality was classified as Moderate at Groot-Bossiespruit sites and Poor at GBT.

5.2.2 FLOW AND GENERAL HABITAT OBSERVATIONS

Habitat quality and availability, as well as flow conditions play a critical role in the occurrence of aquatic biota. The quality of the instream and riparian habitat influences the structure and function of biota in aquatic systems. Flow conditions influence the processes that determine the size, shape, structure and dynamics of the aquatic ecosystems, and subsequently linked to habitats and biotic communities (Thorp & Thoms, 2006). Thus, habitat, flow conditions and water levels aid in the interpretation of biological results

Notable impacts on the instream and riparian habitat of the assessed Groot-Bossiespruit include culverts, bank erosion and encroachment of aquatic macrophytes. The assessed river reach was characterised by moderate to high flows in medium to shallow depths respectively. High flows were more evident at the downstream reaches, particularly at site GB2 and GB3, leading to some level of erosion noted along the riverbanks at site GB2 and substrate rearrangement at site GB3. Gravel, cobbles, and small boulders at site GB3 had been pushed by the strong kinetic energy of the river flows and accumulated within a confined segment of the river, while sand was displaced and deposited along the banks (Figure 5-3).

No clearly defined channel was observed at site GBT; instead, the watercourse consisted of wetland habitat dominated by *Typha capensis*. This habitat appeared to be artificial, likely resulting from a canal that was discharging at the time of the survey. *Typha capensis* was also the predominant species along the banks at all sites within the Groot-Bossiespruit, with *Phragmites* species also present at several locations, particularly at site GB4 (Figure 5-3).

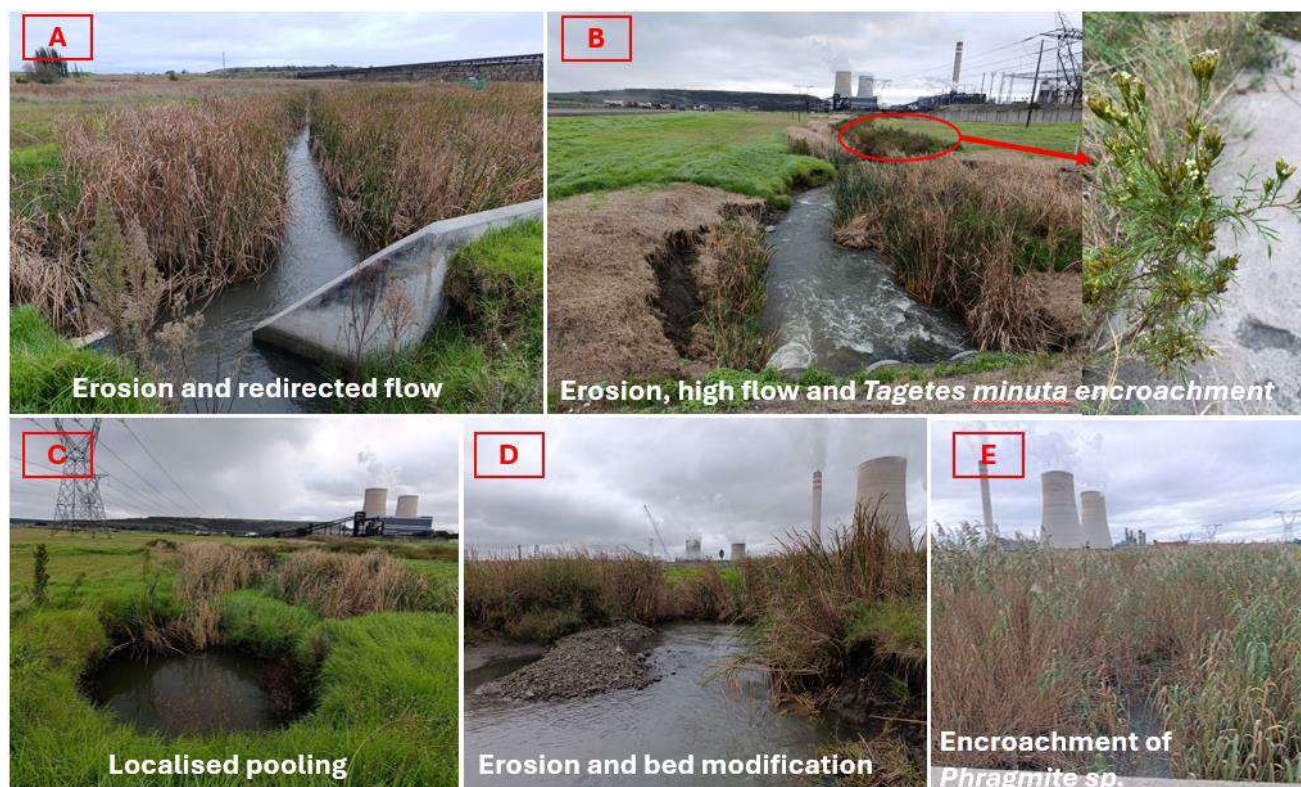


Figure 5-3 - Flow and habitat modifications along the assessed Groot-Bossiespruit reach: A= Site GB1; B = GB2; C and D = GB3 and E = GB4

5.2.3 BIOLOGICAL CONDITIONS

5.2.3.1 Aquatic Macroinvertebrates

The South African Scoring System Version 5 (SASS5) protocol was conducted to sample macroinvertebrates at sites with suitable habitat, to assess the macroinvertebrate diversity within the focus watercourses. This protocol provides a general indication of the current state of the macroinvertebrate community and subsequently the 'health' of the river (Dickens & Graham, 2002). The macroinvertebrates were not sampled at site GBT due to lack of suitable habitat. This site is located in an artificial watercourse and exhibited wetland habitat at the time of the survey. Therefore, this site was not suitable for the application of SASS5.

A total of 29 invertebrate taxa were collected within the study area. The macroinvertebrate community assemblage was similar in composition within the different sampling sites along the Groot-Bossiespruit. Most collected taxa were predominantly pollution-tolerant. However, the highest scoring from the collected taxa was *Atyidae* (Freshwater Shrimps, with a sensitivity score of 8) (Figure 5-4). The highest scoring taxon was collected at GB1 and GB4 sapling sites. The SASS5 results are presented in Table 5-3.

Table 5-3 – SASS5 data of the collected macroinvertebrates in the study area

River	Site	SASS5	# of Taxa	ASPT
Groot-Bossiespruit	GB1	41	7	5.9
	GB2	26	6	4.3
	GB3	39	8	4.9
	GB4	45	8	5.6
ASPT = Average Score Per Taxon				



Figure 5-4 - The highest scoring macroinvertebrate taxon– *Atyidae* (Figure from Basin (2017))

5.2.3.2 Ichthyofauna

The composition of fish communities is often altered by anthropogenic activities in the catchment. Changes in water quality, flows and habitat can result in the absence or addition of species, ultimately altering the biotic integrity of the system. Thus, fish can effectively give an indication of the degree of modification in aquatic systems.

Fish sampling was undertaken by means of the electroshocking technique at each site. The collected fish specimens were identified in the field and released back into the river. Collected fish species, abundance and respective International Union for Conservation of Nature (IUCN) status of fish species collected at each sampling site are indicated in Table 5-4.

None of the collected fish species are classified as species of conservation concern. All collected species prefer habitat which was present at the time of the survey i.e., over hanging vegetation, bank undercut and water column within flowing water and are moderately tolerant to modified water quality (DWS, 2014).

Table 5-4 - Collected fish species in the study area

Fish species	IUCN Status	GB1	GB2	GB3	GB4
<i>Enteromius anoplus</i>	Least concern	6	14	9	7
<i>Labeo umbratus</i>	Least concern	0	3	0	0
<i>Pseudocrenilabrus philander</i>	Least concern	9	7	12	10

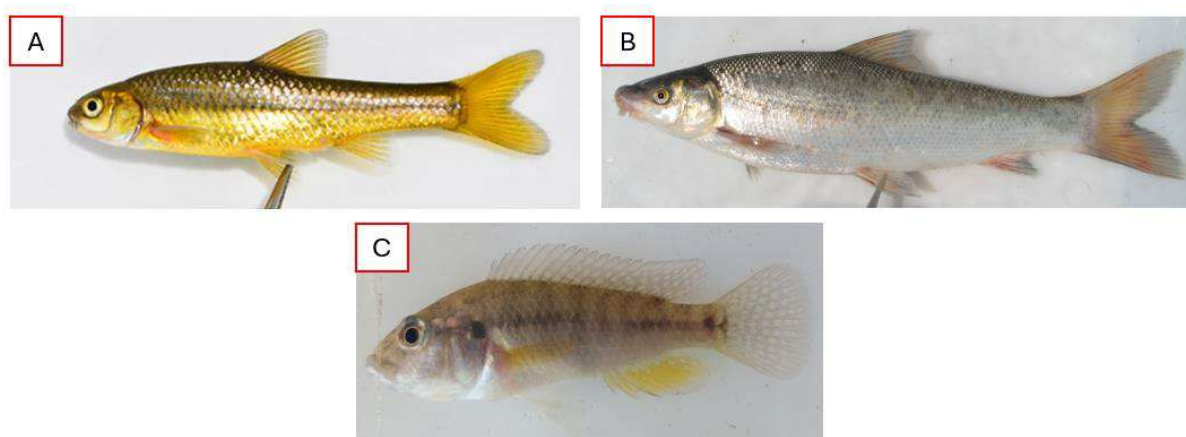


Figure 5-5 - Collected fish specimens. A - *Enteromius anoplus*, B - *Labeo umbratus* and C - *Pseudocrenilabrus philander* (Figures from: A- Kambikambi et al., 2021; B- Ramoejane et al., 2026 and C- Katongo et al., 2017)

6 QUALITATIVE SCREENING OF POTENTIAL IMPACTS

The proposed project may interact with aquatic biodiversity features within the study area, including wetlands and riparian habitats. A high-level qualitative screening was therefore undertaken to identify key impact pathways, mainly associated with construction and operational activities such as vegetation clearance, soil disturbance, stormwater runoff, altered drainage patterns and pollutant mobilisation. These potential impacts have been detailed below:

Pre-Construction Phase:

- Movement of personnel and vehicles during pre-construction surveys, walkdowns or specialist investigations may potentially result in localised disturbance to wetland margins, riparian vegetation and drainage features.
- Minor ground disturbance associated with pre-construction activities may potentially expose soils and increase the risk of sediment mobilisation during rainfall events.

Construction Phase

- Initial vegetation removal and surface disturbance may expose soils before stormwater controls are implemented. This can result in soil loss and sediment mobilisation into nearby wetlands or drainage systems.
- Sedimentation and erosion from vegetation clearance, soil disturbance, excavation, stockpiling and stormwater runoff.
- Water quality deterioration due to accidental spills, leaks, contaminated runoff, cementitious materials, or other construction-related pollutants entering nearby watercourses or wetlands.
- Loss or disturbance of aquatic and riparian habitat through construction activities near wetlands, riparian zones or watercourse margins.
- Impacts on aquatic biota, including macroinvertebrates and fish, through reduced habitat quality, altered water quality, sedimentation or flow changes.

Operational Phase

- Ineffective stormwater management from operational areas may transport chemicals and sediments into adjacent drainage systems, resulting in water quality degradation in the Groot-Bossiespruit.
- Increased impermeable surfaces associated with the facility may reduce infiltration and alter natural hydrological regimes by increasing runoff volumes.
- Routine maintenance activities may result in periodic disturbance to soils and vegetation and potentially lead to the establishment and spread of invasive plant species
- Accidental spills of chemicals may occur during operations, potentially contaminating soils, groundwater, and surface water systems.

These potential impacts should be considered during project planning, design refinement and subsequent impact assessment.

7 SITE SENSITIVITY VERIFICATION OUTCOME

The findings of the site sensitivity verification exercise, based on the data gathering activities conducted to date (review and consolidation of available desktop data, site sensitivity verification site visits), together with the anticipated reporting requirement as stipulated by the various protocols, are summarised in Table 7-1. Based on the findings of the desktop assessment, site sensitivity verification and wet-season field survey, the project footprint is confirmed to be of “Very High” sensitivity for aquatic biodiversity. This is due to the presence of wetlands, riparian zones and riverine ecosystems associated with the Groot-Bossiespruit within the study area.

Table 7-1 - Site sensitivity verification

Theme	Screening tool sensitivity	Site-based sensitivity	Motivation	Reporting requirements
Aquatic biodiversity	Very High	Very High	<ul style="list-style-type: none"> ■ Project footprint overlaps with areas mapped as: <ul style="list-style-type: none"> ● NFEPA features: <ul style="list-style-type: none"> – Upstream Management areas. ■ Presence of moderately sensitive aquatic macroinvertebrates ■ Presence of wetland habitats 	Full aquatic biodiversity specialist baseline and impact assessment report inclusive of wetlands and rivers.

8 CONCLUSION AND RECOMMENDATIONS

Based on the findings of the desktop assessment, site sensitivity verification and wet-season field survey, the project area is confirmed to be of Very High sensitivity for aquatic biodiversity. This includes wetlands, riparian zones and riverine ecosystems associated with the Groot-Bossiespruit. In accordance with the National Web-based Environmental Screening Tool and GN 320 protocols, it is therefore recommended that a full Aquatic Biodiversity Specialist Assessment, inclusive of wetland and riverine components, be undertaken to support the environmental authorisation process.

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Appendix A

METHODOLOGY

Table A-1 – Instream aquatic biodiversity sampling methodology.

Methodology	Measurement description	Guidelines/Description		
In Situ Water Quality	Determined using portable field instruments: <ul style="list-style-type: none"> pH: Eutech pHTester2; Electrical Conductivity: Eutech ECTester11 Dual Range; Dissolved oxygen: Eutech CyberScan DO300; and Temperature: Eutech CyberScan DO300. 	In situ water variable	Guideline	Guideline referenced
		Temperature (°C)	5 - 30	South African Water Quality Guidelines: <i>Aquatic Ecosystems (Volume 7)</i> (Department Of Water Affairs And Forestry, 1996)
		pH	6 - 8	
		Dissolved Oxygen Saturation (%)	80 – 120	
		Dissolved Oxygen concentration (mg/l)	>5	Minimum Dissolved Oxygen concentration for aquatic macroinvertebrates (Nebeker et al., 1996)
		Electrical Conductivity (µS/m)	< 500	Conductivity guideline value of 500 µS/cm stipulated in U.S. U.S. Environmental Protection Agency (2010)
Habitat Assessment	Habitat assessment can be defined as the evaluation of the structure, of the surrounding physical habitat, that influences the quality of the water resource, and the condition of the resident aquatic community (Barbour et al., 1999). Habitat quality and availability plays a critical role in the occurrence of aquatic biota. For this reason, habitat evaluation is conducted simultaneously with biological evaluations to facilitate the interpretation of results.			
Aquatic Macroinvertebrates	Aquatic macroinvertebrates were sampled using the qualitative kick sampling method called South African Scoring System (SASS, <i>version 5</i>) (Dickens & Graham, 2002) and identified using the hand guide from Gerber & Gabriel (2002).			

Appendix B

AQUATIC MACROINVERTEBRATES

Table B-1 - Aquatic Macroinvertebrates recorded during SASS5

Taxon	Sensitivity	Wet Season Survey - April 2026			
		GB1	GB2	GB3	GB4
ANNELIDA					
Oligochaeta (Earthworms)	1			A	
CRUSTACEA					
Amphipoda	13				
Potamonautidae* (Crabs)	3	1	A		1
Atyidae (Freshwater Shrimps)	8	B			B
EPHEMEROPTERA (Mayflies)					
Baetidae 1sp	4				
Baetidae 2sp	6		B		
Baetidae >2sp	12	B		B	B
ODONATA (Dragonflies & Damselflies)					
Coenagrionidae (Sprites and blues)	4	A	A		A
Gomphidae (Clubtails)	6			1	
Libellulidae (Darters/Skimmers)	4		A		
HEMIPTERA (Bugs)					
Gerridae* (Pond skaters/Water striders)	5			A	1
Veliidae/M...veliidae* (Ripple bugs)	5				A
TRICHOPTERA (Caddisflies)					
Hydropsychidae 1 sp	4	1	A	B	
COLEOPTERA (Beetles)					
Gyrinidae* (Whirligig beetles)	5				1
DIPTERA (Flies)					
Simuliidae (Blackflies)	5	1			
GASTROPODA (Snails)					
Physidae* (Pouch snails)	3			B	
Planorbinae* (Orb snails)	3			1	1
PELECYPODA (Bivalves)					
Corbiculidae (Clams)	5	1	1	A	
SASS Score		41	26	39	45
Number of Taxa		7	6	8	8
ASPT		5.9	4.3	4.9	5.6

Appendix C

SITE PHOTOS

Table C-1 – Site photos captured at different sampling sites

GB1 Upstream	GB1 Downstream
	
GB2 Upstream	GB2 Downstream
	
GB3 Upstream	GB3 Downstream
	

GB4 Upstream	GB4 Downstream
	



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Midrand, 1685
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Appendix C.4

PALAEONTOLOGY SSVR



**Palaeontological Impact Assessment for the
Secunda Gas to Power project, Secunda
Operations, Sasol, Secunda,
Mpumalanga Province**

Desktop Study (Phase 1)

Subcontracted by

Artefactual Heritage Consulting (Pty) Ltd

17 April 2026

Prof Marion Bamford

Palaeobotanist

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1. Executive Summary

A Palaeontological Impact Assessment was requested for the proposed Secunda Gas to Power project at Secunda Operations, Sasol, Secunda, Mpumalanga Province. The site is already developed for other purposes.

To comply with the regulations of the South African Heritage Resources Agency (SAHRA) in terms of Section 38(8) of the National Heritage Resources Act, 1999 (Act No. 25 of 1999) (NHRA), a desktop Palaeontological Impact Assessment (PIA) was completed for the proposed development.

The proposed site lies on the potentially very highly sensitive Vryheid Formation (Ecca Group, Karoo Supergroup) that could preserve fossil plants of the Glossopteris flora, however the site has already been developed for other purposes and has foundations and buildings present. Nonetheless, a Fossil Chance Find Protocol should be added to the EMPr. Based on this information it is recommended that no further palaeontological impact assessment is required unless fossils are found by the contractor, environmental officer or other designated responsible person once NEW excavations or drilling activities have commenced. Since the impact will be low, as far as the palaeontology is concerned, the project should be authorised.

ASPECT	SCREENING TOOL SENSITIVITY	VERIFIED SENSITIVITY	OUTCOME STATEMENT/ PLAN OF STUDY	RELEVANT SECTION MOTIVATING VERIFICATION
Palaeontology	Very High	Low	Palaeontological Impact Assessment	Section 7.2. SAHRA Requirements

2. Declaration of independence and summary of expertise.

a. Declaration

This report has been compiled by Professor Marion Bamford, of the University of the Witwatersrand, sub-contracted by Artefactual Heritage Consulting (Pty) Ltd, Cape Town, South Africa. The views expressed in this report are entirely those of the author and no other interest was displayed during the decision-making process for the Project.

Specialist: Prof Marion Bamford

Signature: 

b. Expertise

The Palaeontologist Consultant: Prof Marion Bamford

Qualifications: PhD (Wits Univ, 1990); FRSSAf, mASSAf, PSSA

Experience: 36 years research and lecturing in Palaeontology; over 28 years PIA studies and over 450 projects completed.

c. Specialist declaration of independence and statement of objectivity for the assessment.

Declaration of Independence

I, Marion Bamford, declare that –

General declaration:

- I act as the independent palaeontology practitioner in this application,
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant,
- I declare that there are no circumstances that may compromise my objectivity in performing such work,
- I have expertise in conducting palaeontological impact assessments, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, Regulations and all other applicable legislation,
- I will take into account, to the extent possible, the matters listed in section 38 of the NHRA when preparing the application and any report relating to the application,
- I have no, and will not engage in, conflicting interests in the undertaking of the activity,
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority,
- I will ensure that information containing all relevant facts in respect of the application is distributed or made available to interested and affected parties

and the public and that participation by interested and affected parties is facilitated in such a manner that all interested and affected parties will be provided with a reasonable opportunity to participate and to provide comments on documents that are produced to support the application,

- I will provide the competent authority with access to all information at my disposal regarding the application, whether such information is favourable to the applicant or not
- All the particulars furnished by me in this form are true and correct,
- I will perform all other obligations as expected from a heritage practitioner in terms of the Act and the constitutions of my affiliated professional bodies; and
- I realise that a false declaration is an offence in terms of regulation 71 of the Regulations and is punishable in terms of section 24F of the NEMA.

Disclosure of Vested Interest

- I do not have and will not have any vested interest (either business, financial, personal or other) in the proposed activity proceeding other than remuneration for work performed in terms of the Regulations.

d. Summary of the specialist's expertise

I, Marion Bamford, am a professional Palaeontologist with a PhD in Palaeontology (Wits University, 1990). I have more than 36 years of experience in palaeontological research and have published over 200 papers in peer-reviewed journals and published more than 14 scholarly book chapters. I review manuscripts for international and local journals and also review funding proposals for international funding bodies. Currently I am the Director of the Evolutionary Studies Institute, the only palaeontological institute in Southern Africa.

I have completed more than 500 palaeontological impact assessments (desktop and site visit studies) in the last 29 years for a variety of projects (solar energy projects, wind energy projects, powerlines, roads, infrastructure, housing and retail projects and from all over South Africa. I have been subcontracted by over 30 different companies. From my own projects and training provided by me and other staff in the ESI for Palaeontological Impact Assessments, I am familiar with the legislation.

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3.

Project Background

The Secunda Gas to Power (GtP) project aims to generate electricity through LNG (methane rich gas being considered as back-up feed), with the objective to provide power to the national grid, supporting South Africa's growing energy needs. The Inside Battery Limit (IBL) scope includes the main equipment for generating electricity, which will be proposed by the vendor. The Outside Battery Limit (OBL) scope will focus on the external infrastructure and utilities required to support the Secunda Gas to Power project (integration into the Secunda facility).

The electrical scope will cover the reconfiguration of the electrical network. The installation of transmission lines, along with the routing of high-voltage cables through existing servitudes, will also be considered. In addition to the electrical work, the OBL scope will involve the installation and routing of various pipelines. These will include pipelines for LNG, Methane Rich Gas (MRG) and any required utilities such as cooling water, raw water, firewater, instrument air, and any effluent. Depending on the IBL requirements, raw water treatment will also be included to achieve the necessary water quality specifications.

This proposed site for the Secunda Gas to Power facility is located at the Sasol Secunda Factory in Mpumalanga, South Africa. The plot under consideration covers approximately 50 000m² within the primary area of the factory (Figures 1-2).

A Palaeontological Impact Assessment was requested for the Secunda Gas to Power project. To comply with the regulations of the South African Heritage Resources Agency (SAHRA) in terms of Section 38(8) of the National Heritage Resources Act, 1999 (Act No. 25 of 1999) (NHRA), a desktop Palaeontological Impact Assessment (PIA) was completed for the proposed development and is reported herein. The minimum requirements for reporting are listed in Table 1.

Table 1: National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA) and Environmental Impact Assessment (EIA) Regulations, 2014 (as amended) - Requirements for Specialist Reports (Appendix 6). Includes the requirements from GNR Appendix 6 of GN 326 EIA Regulation 2017.

	A specialist report prepared in terms of the Environmental Impact Regulations of 2017 must contain:	Relevant section in report
ai	Details of the specialist who prepared the report,	Section 2
aii	The expertise of that person to compile a specialist report including a curriculum vitae	Section 2
b	A declaration that the person is independent in a form as may be specified by the competent authority	Section 2

c	An indication of the scope of, and the purpose for which, the report was prepared	Section 3
ci	An indication of the quality and age of the base data used for the specialist report: SAHRIS palaeosensitivity map accessed – date of this report	Yes
cii	A description of existing impacts on the site, cumulative impacts of the proposed development and levels of acceptable change	Section 6
d	The date and season of the site investigation and the relevance of the season to the outcome of the assessment	N/A
e	A description of the methodology adopted in preparing the report or carrying out the specialised process	Section 4
f	The specific identified sensitivity of the site related to the activity and its associated structures and infrastructure	Section 6
g	An identification of any areas to be avoided, including buffers	N/A
h	A map superimposing the activity including the associated structures and infrastructure on the environmental sensitivities of the site including areas to be avoided, including buffers;	N/A
i	A description of any assumptions made and any uncertainties or gaps in knowledge;	Section 7
j	A description of the findings and potential implications of such findings on the impact of the proposed activity, including identified alternatives, on the environment	Section 8
k	Any mitigation measures for inclusion in the EMPr	Section 10, Appendix A
l	Any conditions for inclusion in the environmental authorisation	N/A
m	Any monitoring requirements for inclusion in the EMPr or environmental authorisation	Section 10, Appendix A
ni	A reasoned opinion as to whether the proposed activity or portions thereof should be authorised	Section 8
nii	If the opinion is that the proposed activity or portions thereof should be authorised, any avoidance, management and mitigation measures that should be included in the EMPr, and where applicable, the closure plan	Sections 8, 10
o	A description of any consultation process that was undertaken during the course of carrying out the study	EAP
p	A summary and copies of any comments that were received during any consultation process	N/A
q	Any other information requested by the competent authority.	N/A
2	Where a government notice gazetted by the Minister provides for any protocol or minimum information requirement to be applied to a specialist report, the requirements as indicated in such notice will apply.	N/A



Figure 1: Google Earth map of the general area to show the relative land marks. The Secunda Gas to Power project site is shown by the red polygon.



Figure 2: Google Earth Map of the proposed Secunda Gas to Power project at Secunda Operations, Sasol, with the section shown by the red outline.

4. Methods and Terms of Reference

The Terms of Reference (ToR) for this study were to undertake a PIA and provide feasible management measures to comply with the requirements of SAHRA.

The methods employed to address the ToR included:

1. Consultation of geological maps, literature, palaeontological databases, published and unpublished records to determine the likelihood of fossils occurring in the affected areas. Sources include records housed at the Evolutionary Studies Institute at the University of the Witwatersrand and SAHRA databases; eg <https://sahris.sahra.org.za/map/palaeo>
2. Where necessary, site visits by a qualified palaeontologist to locate any fossils and assess their importance (*not applicable to this assessment*);
3. Where appropriate, collection of unique or rare fossils with the necessary permits for storage and curation at an appropriate facility (*not applicable to this assessment*); and
4. Determination of fossils' representativity or scientific importance to decide if the fossils can be destroyed or a representative sample collected (*not applicable to this assessment*).

5. Geology and Palaeontology

- i. Project location and geological context



Figure 3: Geological map of the area around Secunda with the GtP site indicated within the black circle polygon. Abbreviations of the rock types are explained in Table 2. Map enlarged from the Geological Survey 1: 250 000 map 2628 East Rand.

Table 2: Explanation of symbols for the geological map and approximate ages (Johnson et al., 2006;). SG = Supergroup; Fm = Formation; Ma = million years; grey shading = formations impacted by the project.

Symbol	Group/Formation	Lithology	Approximate Age
Q	Quaternary	Alluvium, sand, calcrete	Quaternary ca 1.0 Ma to Present
Jd	Jurassic dykes	Dolerite dykes, intrusive	Jurassic, Ca 183 Ma
Pv	Vryheid Fm, Eccca Group, Karoo SG	Shale, mudstone, coal, sandstone	Middle Permian ca 266 – 260 Ma

The project lies in the central part of the main Karoo Basin where only the Vryheid Formation is exposed, with abundant intrusive dolerite (Figure 3).

The Karoo Supergroup rocks cover a very large proportion of South Africa and extend from the northeast (east of Pretoria) to the southwest and across to almost the KwaZulu Natal south coast. It is bounded along the southern margin by the Cape Fold Belt and along the northern margin by the much older Transvaal Supergroup rocks. Representing some 120 million years (300 – 183Ma), the Karoo Supergroup rocks have preserved a diversity of fossil plants, insects, vertebrates and invertebrates.

Overlying the basal Dwyka Group glaciogene rocks are rocks of the Eccca Group that are Early Permian in age. There are eleven formations recognised in this group but they do

not all extend throughout the Karoo Basin. In the central and eastern part are the following formations, from base upwards: Pietermaritzburg, **Vryheid** and Volksrust Formations. All of these sediments have varying proportions of sandstones, mudstones, shales and siltstones and represent shallow to deep water settings, deltas, rivers, streams and overbank depositional environments.

Large exposures of Jurassic dolerite dykes occur throughout the area. These intruded through the Karoo sediments around 183 million years ago at about the same time as the Drakensberg basaltic eruption.

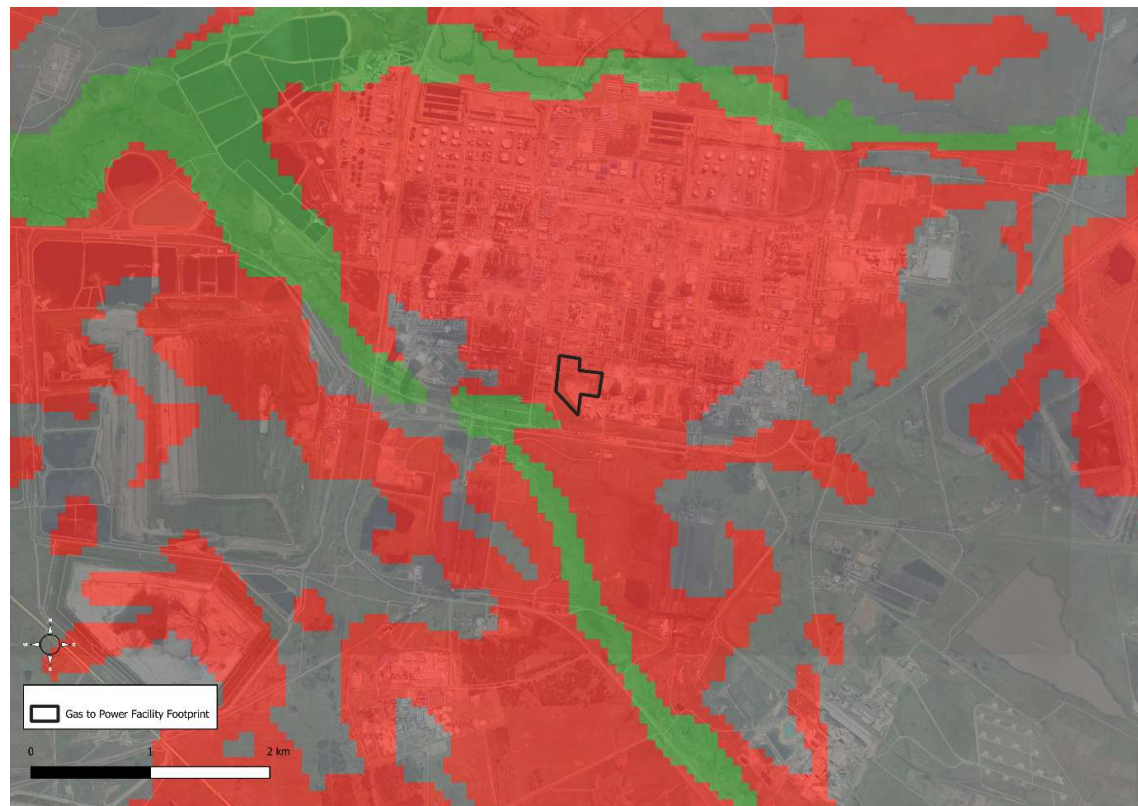
From uplift of the continent at various times in the past, weathering and erosion, sands alluvium and colluvium have washed down and been deposited on lower pediments, hillslopes and depressions. Some of these have become consolidated and in this area are known as the Masotcheni Formation (Partridge et al., 2006). These Late Pleistocene deposits are well represented in some parts of KwaZulu Natal but tend to erode easily and leave dongas (Botha, 2021). Along the rivers and valleys such sands are reworked and deposited and also are difficult to date.

ii. Palaeontological context

The palaeontological sensitivity of the area under consideration is presented in Figure 4. The site for development is in the potentially very highly sensitive Vryheid Formation (red). Dolerite does not preserve fossils so is indicated as grey. Quaternary sands are moderately sensitive (green).

The **Vryheid Formation** lies on the uneven topography of pre-Karoo or Dwyka Group rocks in the northern and northwestern margins, but lies directly on the Pietermaritzburg Formation in the central and eastern part. The lithofacies show a number of upward-coarsening cycles, some very thick, and they are essentially deltaic in origin. There are also delta-front deposits, evidence of delta switching, and fluvial deposits with associated meandering rivers, braided streams, back swamps or interfluvies and abandoned channels (Cadle et al., 1993; Cairncross, 1990; 2001; Johnson et al., 2006). Coal seams originated where peat swamps developed on broad abandoned alluvial plains, and less commonly in the backswamps or interfluvies. Most of the economically important coal seams occur in the fluvial successions (ibid). In the east (Mpumalanga and northern KwaZulu Natal), the Vryheid formation can be subdivided into a lower fluvial-dominated deltaic interval, a middle fluvial interval, and an upper fluvial-dominated deltaic interval again (Taverner-Smith et al., 1988).

Fossil plants of the *Glossopteris* flora occur in the Vryheid Formation. This flora includes *Glossopteris* leaves, seeds, fructifications, roots and wood, as well other groups such as the lycopods, sphenophytes, ferns, cordaitaleans and early gymnosperms (Plumstead, 1969; Anderson and Anderson, 1985; Bamford, 2004).



Colour	Sensitivity	Required Action
RED	VERY HIGH	field assessment and protocol for finds is required
ORANGE/ YELLOW	HIGH	desktop study is required and based on the outcome of the desktop study, a field assessment is likely
GREEN	MODERATE	desktop study is required
BLUE	LOW	no palaeontological studies are required however a protocol for finds is required
GREY	INSIGNIFICANT/ZERO	no palaeontological studies are required
WHITE/CLEAR	UNKNOWN	these areas will require a minimum of a desktop study. As more information comes to light, SAHRA will continue to populate the map.

Figure 4: SAHRIS palaeosensitivity map for the site for the proposed Secunda Gas to Power project shown within the black outline.

From the SAHRIS map above the area is indicated as very highly sensitive (red) so a site visit could be required. From Figure 2, however, the site is already occupied by buildings and their foundations will have destroyed and fossils (if any were present). Since this new project is on highly disturbed ground, there will be no fossils present on the surface. If new or deeper excavations are made, then a fossil chance find protocol must be followed (Section 10).

6. Impact assessment

An assessment of the potential impacts to possible palaeontological resources considers the criteria encapsulated in Table 3:

Table 3a: Criteria for assessing impacts

PART A: DEFINITION AND CRITERIA		
Criteria for ranking of the SEVERITY/NATURE of environmental impacts	H	Substantial deterioration (death, illness or injury). Recommended level will often be violated. Vigorous community action.
	M	Moderate/ measurable deterioration (discomfort). Recommended level will occasionally be violated. Widespread complaints.
	L	Minor deterioration (nuisance or minor deterioration). Change not measurable/ will remain in the current range. Recommended level will never be violated. Sporadic complaints.
	L+	Minor improvement. Change not measurable/ will remain in the current range. Recommended level will never be violated. Sporadic complaints.
	M+	Moderate improvement. Will be within or better than the recommended level. No observed reaction.
	H+	Substantial improvement. Will be within or better than the recommended level. Favourable publicity.
Criteria for ranking the DURATION of impacts	L	Quickly reversible. Less than the project life. Short term
	M	Reversible over time. Life of the project. Medium term
	H	Permanent. Beyond closure. Long term.
Criteria for ranking the SPATIAL SCALE of impacts	L	Localised - Within the site boundary.
	M	Fairly widespread – Beyond the site boundary. Local
	H	Widespread – Far beyond site boundary. Regional/ national
PROBABILITY (of exposure to impacts)	H	Definite/ Continuous
	M	Possible/ frequent
	L	Unlikely/ seldom

Table 3b: Impact Assessment

PART B: Assessment		
SEVERITY/NATURE	H	-
	M	-
	L	Soils do not preserve fossils; so far there are no records from the Vryheid Fm of plant or animal fossils in this region so it is very unlikely that fossils occur on the site. The impact would be negligible
	L+	-
	M+	-
	H+	-
DURATION	L	-
	M	-

	H	Where manifest, the impact will be permanent.
SPATIAL SCALE	L	Since the only possible fossils within the area would be fossil plants in the unweathered shales below the ground surface, the spatial scale will be localised within the site boundary.
	M	-
	H	-
PROBABILITY	H	-
	M	-
	L	It is extremely unlikely that any fossils would be found in the loose soils and sands that cover the area or in the soils that might be excavated. Nonetheless, a Fossil Chance Find Protocol should be added to the eventual EMPr.

Based on the nature of the project, surface activities may impact upon the fossil heritage if preserved in the development footprint. The geological structures suggest that the rocks are the correct age and type to contain fossils BUT are highly disturbed. Furthermore, the material to be excavated is soil and this does not preserve fossils. Since there is a small chance that fossils from the Vryheid Formation may be disturbed a Fossil Chance Find Protocol has been added to this report. Taking account of the defined criteria, the potential impact to fossil heritage resources is low.

7. Assumptions and uncertainties

Based on the geology of the area and the palaeontological record as we know it, it can be assumed that the formation and layout of the dolomites, sandstones, shales and sands are typical for the country and only some might contain fossil plant, insect, invertebrate and vertebrate material. The sands of the Quaternary period would not preserve fossils.

8. Recommendation

Based on experience and the lack of any previously recorded fossils from the area, it is extremely unlikely that any fossils would be preserved in the overlying soils of the Quaternary. The site is already highly disturbed from previous construction and operations. There is a very small chance that fossils may occur in the unweathered shales below the ground surface of the Vryheid Formation so a Fossil Chance Find Protocol should be added to the EMPr. If fossils are found by the environmental officer, or other responsible person once NEW excavations have commenced then they should be rescued and a palaeontologist called to assess and collect a representative sample. The impact on the palaeontological heritage would be low, as far as the palaeontology is concerned, so the project should be authorised.

ASPECT	SCREENING TOOL SENSITIVITY	VERIFIED SENSITIVITY	OUTCOME STATEMENT/ PLAN OF STUDY	RELEVANT SECTION MOTIVATING VERIFICATION
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Palaeontology	Very High	Low	Palaeontological Impact Assessment	Section 7.2. SAHRA Requirements
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10. Fossil Chance Find Protocol

Monitoring Programme for Palaeontology – to commence once the excavations / drilling activities begin.

1. The following procedure is only required if fossils are seen on the surface and when drilling/excavations commence.
2. When excavations begin the rocks and discard must be given a cursory inspection by the environmental officer or designated person. Any fossiliferous material (plants, insects, bone or coal) should be put aside in a suitably protected place. This way the project activities will not be interrupted.
3. Photographs of similar fossils must be provided to the developer to assist in recognizing the fossil plants, vertebrates, invertebrates or trace fossils in the shales and mudstones (for example see Figure 5). This information will be built into the EMP's training and awareness plan and procedures.
4. Photographs of the putative fossils can be sent to the palaeontologist for a preliminary assessment.
5. If there is any possible fossil material found by the developer/environmental officer then the qualified palaeontologist sub-contracted for this project, should visit the site to inspect the selected material and check the dumps where feasible.
6. Fossil plants or vertebrates that are considered to be of good quality or scientific interest by the palaeontologist must be removed, catalogued and housed in a suitable institution where they can be made available for further study. Before the fossils are removed from the site a SAHRA permit must be obtained. Annual reports must be submitted to SAHRA as required by the relevant permits.
7. If no good fossil material is recovered then no site inspections by the palaeontologist will be necessary. A final report by the palaeontologist must be sent to SAHRA once the project has been completed and only if there are fossils.
8. If no fossils are found and the excavations have finished then no further monitoring is required.

11. Appendix A – Examples of fossils from the Vryheid Formation



Figure 5: Photographs of fossil plants that could be found in the Vryheid Formation shales, to assist the on-site responsible person.

Appendix C.5

ARCHAEOLOGICAL AND CULTURAL HERITAGE SSVR





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Contextual Analysis

THE SECUNDA GAS TO POWER PROJECT, SECUNDA OPERATIONS, SASOL, SECUNDA

For: WSP

Date: April 2026

Proposed Development

The Secunda Gas to Power (GtP) project aims to generate electricity through LNG (methane rich gas being considered as back-up feed), with the objective to provide power to the national grid, supporting South Africa's growing energy needs. The Inside Battery Limit (IBL) scope includes the main equipment for generating electricity, which will be proposed by the vendor. The Outside Battery Limit (OBL) scope will focus on the external infrastructure and utilities required to support the Secunda Gas to Power project (integration into the Secunda facility). The electrical scope will cover the reconfiguration of the electrical network. The installation of transmission lines, along with the routing of high-voltage cables through existing servitudes, will also be considered.

In addition to the electrical work, the OBL scope will involve the installation and routing of various pipelines. These will include pipelines for LNG, Methane Rich Gas (MRG) and any required utilities such as cooling water, raw water, firewater, instrument air, and any effluent. Depending on the IBL requirements, raw water treatment will also be included to achieve the necessary water quality specifications.

This proposed site for the Secunda Gas to Power facility is located at the Sasol Secunda Factory in Mpumalanga, South Africa. The plot under consideration covers approximately 50 000m² within the primary area of the factory.

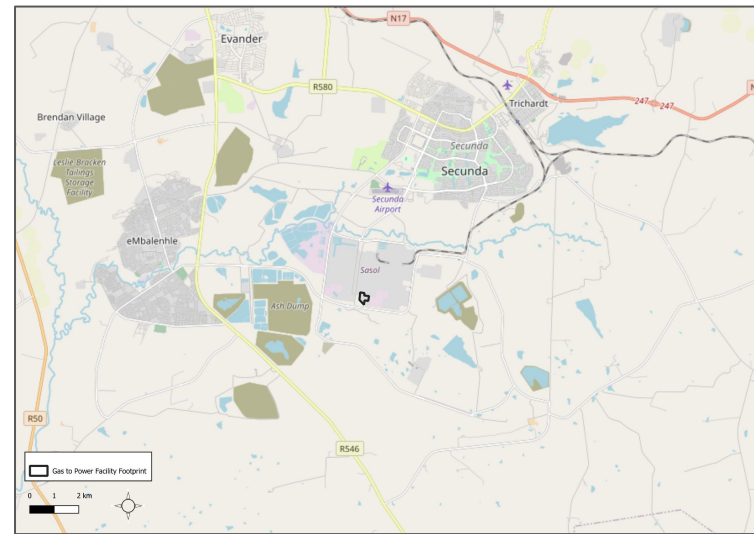


Figure 1.1 and 1.2: Map of the proposed development area



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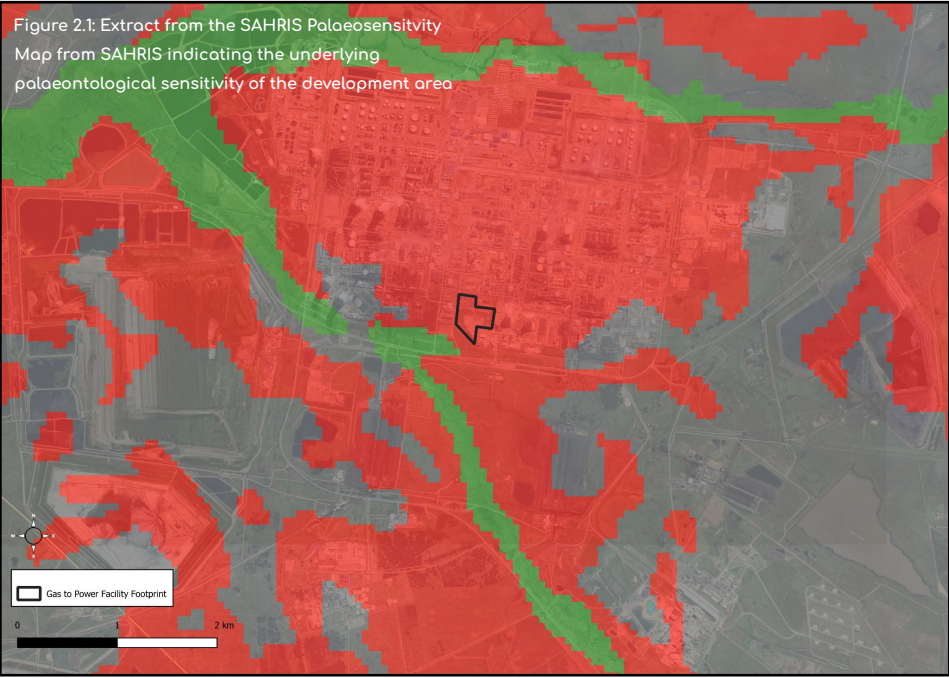
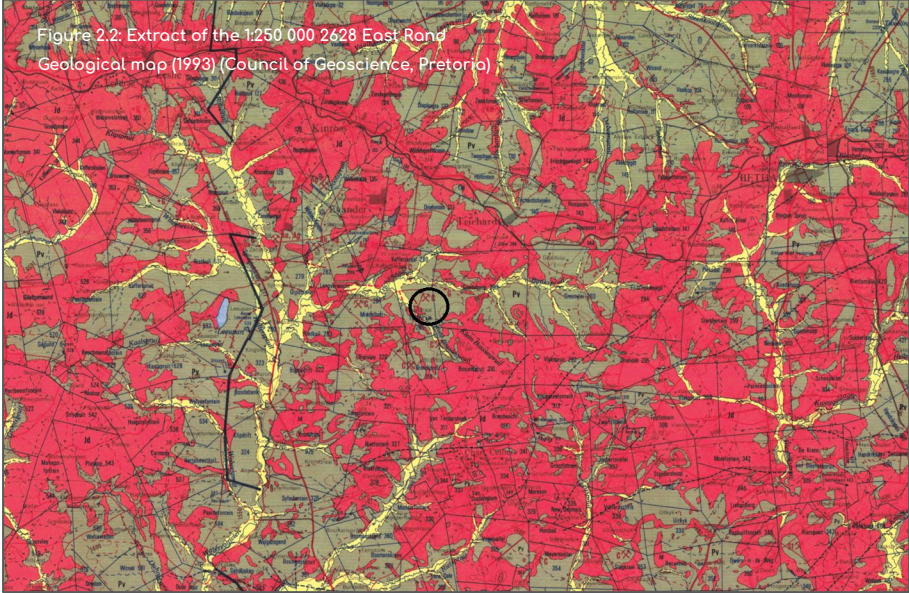
Geology and Palaeontology

The geology underlying the assessment area consists of:

- Jd – Dolerite, Jurassic (ZERO)
- Pv – Sandstone, shale and grit with coal and oil-shale beds (brown). Vryheid Formation, Eccca Group, Karoo Supergroup. Permian (VERY HIGH)
- Quaternary Alluvium (MODERATE)

Jurassic Dolerite has zero palaeontological sensitivity. The Vryheid Formation is known to preserve abundant plant fossils of Glossopteris and other plants as well as trace fossils. Rich fossil plant assemblages of the Permian Glossopteris Flora (lycopods, rare ferns and horsetails, abundant glossopterids, cordaitaleans, conifers, ginkgoaleans), rare fossil wood, diverse palynomorphs are known from this formation. Additionally, abundant, low diversity trace fossils, rare insects, possible conchostracans, non-marine bivalves, fish scales have identified in similar sediments. The subject area has VERY HIGH palaeontological sensitivity.

Figure 2.1: Extract from the SAHRIS Palaeosensitivity Map from SAHRIS indicating the underlying palaeontological sensitivity of the development area



Anderson (2025) notes that “The Vryheid Formation contains trace fossils, which are common and of little palaeontological significance. It also contains abundant plant fossils. These occur rarely within sandstones but make up almost 100% of coal seams. Coal seams are fossil fuels which are burned routinely in power stations. These plant fossils are valuable palaeontological tools but are very common, and consequently not palaeontologically significant. The red coding is linked to the correlation with the Vryheid Formation and the Whitehill Formation. The Whitehill Formation contains the palaeontologically significant marine reptile Mesosaurus, but this has never been seen in the Vryheid Formation.”

In a PIA completed for CTS Heritage by Bamford (2023) for a proposed development located immediately south of the R546 in this area, it is noted that “The proposed site lies partly on the potentially very highly sensitive Vryheid Formation (Eccca Group, Karoo Supergroup) that could preserve fossil plants of the Glossopteris flora. Some areas are underlain by the non-fossiliferous Jurassic dolerite. The site visit and walk through on 20 November by palaeontologists confirmed that the area is disturbed from past and present agriculture and game farming. There were NO FOSSILS present on the land surface in the project footprint.”

Nonetheless a Fossil Chance Find Protocol should be added to the EMP. Based on this information it is recommended that no further palaeontological impact assessment is required unless fossils are found by the contractor, developer, environmental officer or other designated responsible person once excavations for foundations, infrastructure and amenities have commenced." Bamford concludes that the impact will be low as far as the palaeontology is concerned.

While the area proposed for development is underlain by sediments of very high palaeontological sensitivity belonging to the Vryheid Formation, the area proposed for development has already been extensively disturbed from activities associated with the Sasol plant. As noted by Bamford (2023), due to the existing disturbances associated with the Sasol Plant, **the likelihood of impact to significant palaeontological heritage is low.** Nevertheless, it is recommended that the attached Chance Fossil Finds Procedure is implemented for the duration of trenching activities.

Archaeology

As noted by Anderson (2025), "Very few Early Stone Age sites are on record for Mpumalanga and no sites dating to this period are expected for the study area. An example in Mpumalanga is Maleoskop on the farm Rietkloof where ESA tools have been found. This is one of only a handful of such sites in Mpumalanga.

The MSA has not been extensively studied in Mpumalanga, but evidence of this period has been excavated at Bushman Rock Shelter, a well-known site on the farm Klipfonteinhoek in the Ohrigstad district. This cave was excavated twice in the 1960's by Louw and later by Eloff. The MSA layers show that the cave was repeatedly visited over a long period. Lower layers have been dated to over 40 000 BP (Before Present) while the top layers date to approximately 27 000 BP (Esterhuizen & Smith in Delius, 2007; Bergh, 1998). Some isolated finds were recorded close to Witbank as well by Huffman (1999) on the farm Rietfontein.

The Later phases of the Stone Age began at around 20 000 years BP. This period was marked by numerous technological innovations and social transformations within these early hunter-gatherer societies. Evidence of their existence is to be found in numerous rock shelters throughout the Eastern Mpumalanga where some of their rock paintings are still visible. A number of these shelters have been documented throughout the province (Bornman, 1995; Schoonraad in Barnard, 1975; Delius, 2007). These include areas such as Witbank, Ermelo, Barberton, Nelspruit, White River, Lydenburg and Ohrigstad. Three late Stone Age sites are on record in the greater area. The sites are Welgelegen Skuiling close to Ermelo, Chrissiesmeer (also known for rock art) and lastly Groenvlei close to Carolina, this area is also known for rock art (Bergh 1999).

Pelser (2024) notes that "heritage surveys have recorded few outstanding Stone Age sites, rock paintings and engravings in the Eastern Highveld - mainly as a result of limited extensive archaeological surveys. Stone tools have however been recorded around some of the pans which occur on the Eastern Highveld (Pistorius 2010:16). According to Bergh there are no known Stone Age sites in the area, with the closest near Ermelo, Carolina and Chrissiesmeer to the north-east of Standerton (Bergh 1999: 4 – 5)."

In the heritage assessment of a powerline upgrade at the nearby Syferfontein Mine, approximately 15km north of the proposed development, Nel & Karodia (2014), note that "a heritage assessment was conducted in 2000 by the National Cultural History Museum and included in the Syferfontein Mine EMP in 2010. During the survey, a few Stone Age artefacts were identified. These artefacts were not considered to have any primary context and therefore were interpreted to have low significance value. No Early Iron Age sites were identified. The Late Iron Age sites found here conform to those identified in the literature for the Southern Highveld area (former southern Transvaal, northern Orange Free State) as Type V sites. As the soil is mostly turf, Iron Age settlement usually took place on the various dolerite outcrops. The added benefit of choosing these locations was that it was located at the source of building material used in constructing the settlements. One such site shows interesting features as the living units were actually excavated to obtain enough building material for the surrounding walls. A few of the farmsteads dating to the early part of this century were identified as possibly having historical-architectural significance. A number of abandoned homesteads are located in the areas that were investigated. These seem to belong to farm labourers and were all abandoned within the last few years. They are therefore not viewed to be of cultural or historical significance. However, some graves are located in the vicinity of the homesteads and it is possible that more graves will be located nearby".

In 2013, Pretorius, conducted an HIA for 9 borrow pits located immediately north of the proposed development area. During the assessment of Borrow Pit 08, two historical ruins and one graveyard were identified. Both ruins were graded as having medium significance, and the graves as having high significance. Pretorius recommended a Phase II investigation of the structures prior to demolition. In 2011, Coetzee conducted an HIA south of the proposed development area. Coetzee identified 11 sites, of which 2 are the same structures as the ones identified by Pretorius in 2013.

The nearest heritage resource recorded on SAHRIS to the area proposed for development is INV Number 2629CA2. This site is described as "Rietvley 320 IS Historical farmstead with associated midden, stock enclosures & other structures". **This site is located more than 6km from the area proposed for development.**

In 2023, CTS Heritage completed an archaeological assessment of an area located south of the R546 in this area. They identified a cluster of Late Iron Age enclosures on the edge of an old field in the southernmost PV area while historical werfs and ruins north and northwest of this PV area. The ruins were easily visible and the walls were made from locally sourced sandstone.

They identified a number of historical graves associated with the historical werfs that were noted. Their assessment confirmed that the maize fields have been ploughed right up to the graves and ruins. The WBHO Ash Dams are located north of Rietvlei and several graves previously recorded in the 2000s and 2010s have since been relocated to make way for the industrial facilities.

While the broader area had known heritage value based on the findings of previous assessments, the area proposed for development has already been extensively disturbed from activities associated with the Sasol plant. **It is therefore unlikely that significant archaeological heritage resources are located here** and the likelihood of the proposed development impacting on significant archaeological heritage is low.



Figure 3.1: Map of finds from SAHRIS (2026)

History of the Area

The broader development area evolved from rural farmland into a massive petrochemical and mining hub over the 20th century. Van Vollenhoven (2015) notes, "At the beginning of the 19th century the Phuthing, a South Sotho group, stayed in the vicinity of modern day Bethal. During the Difaquane they fled to the south (Bergh 1999: 10-11; 109). In 1829 the traveller Robert Scoon passed through an area to the north of Bethal (Bergh 1999: 13). The first white farmers only settled here during the late 1850's. By the 1890's this area was inhabited by many white farmers (Bergh 1999: 18-20). The town of Standerton was established in 1879 although it already was a district in 1878. Bethal was established in 1880 and it became an independent district in 1898 (Bergh 1999: 20-21).

During the Anglo-Transvaal War (1880-1881) the British garrison in Standerton was beleaguered by the Boer forces (Bergh 1999: 46). The Highveld areas also saw much action consisting of various skirmishes between Boer and Brit during the Anglo-Boer War (1899-1902). It includes skirmishes on the farms Oshoek (4 December 1901), Trigaardsfontein (10 December 1901), Witbank (11 January 1902) and Nelspan (26 January 1902) (Bergh 1999: 51, 54)... At Standerton there was both a concentration camp for white and for black people (Bergh 1999: 54):"

The earliest towns in the area are Bethal (1880) and Trichardt (1906) established as rural towns to service the local farming community. Trichardt, located approximately 10km north of the area proposed for development, originated as a settlement of the Dutch Reformed Church and was proclaimed in 1906. The town was named after Carolus Johannes Tregardt (1811-1901), son of the Voortrekker Louis Tregardt. Charl Cilliers is located approximately 10km south of the development area and was originally known as Van Tondershoek. It was renamed in 1917 after the Voortrekker leader Sarel Cilliers following the establishment of a Dutch Reformed Church congregation.

In the 1950's, a profitable gold reef was identified at what is now known as Evander located approximately 10km northwest of the development area. This gold mine remains active and is now managed by Harmony Gold. In the 1970's, the area became a massive industrial complex due to coal mining and the establishment of Secunda (which brought significant development between Trichardt, Evander, and Charl Cilliers) for petrochemical production.

According to SA History Online; "Secunda was built in the 1970s/80's for Sasol's second and third CTL plants, its name means: "second" in Latin, referring to its status as the second refinery after Sasolburg. This industry dominates the area with Sasol's facilities, producing synthetic fuels, diesel, and chemicals from coal, making South Africa less reliant on imported oil. Built around vast coalfields and home to the massive Sasol coal-to-liquids (CTL) plants, making it a major producer of synthetic fuels and petrochemicals, known for its industrial landscape but also offering recreational spots like Lake Umuzi and outdoor activities, while also facing environmental scrutiny as a large emitter. A significant population lives in the town and the nearby township of: 'eMbalenhle', growing with Sasol's expansions. This township was established in the 1970's near Secunda to house Black workers for industries like Sasol, meaning "beautiful flower."

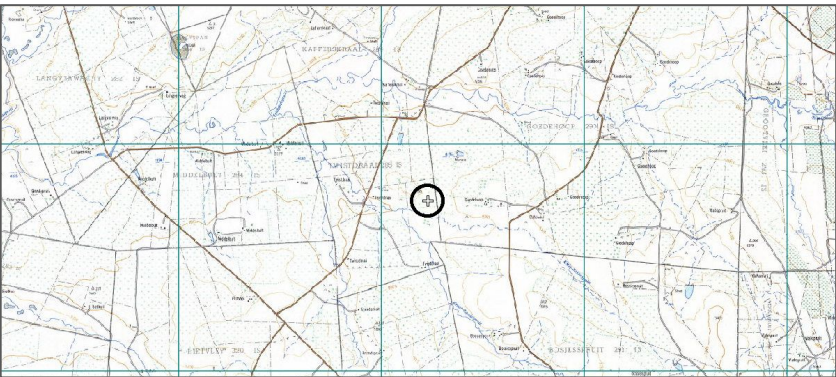
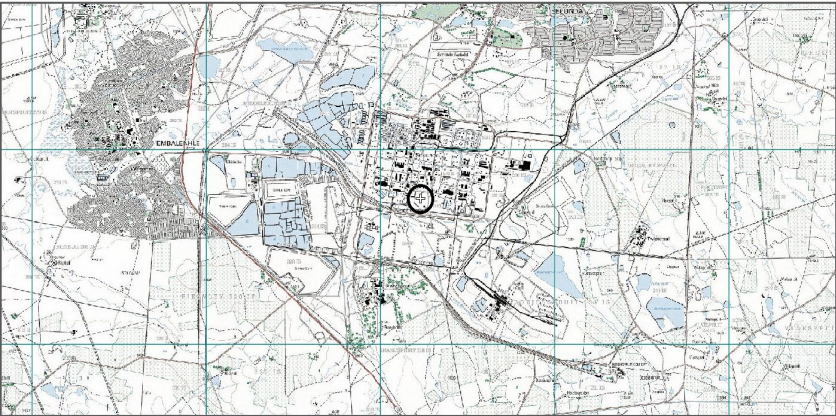


Figure 4.1: First Edition Topo Map - NGI (Top)
Figure 4.2: Current Topo Map - NGI (Bottom)
With the approximate location of the development area indicated

Cultural Landscape

Van Vollenhoven (2015) describes the broader area as “*disturbed by recent human activities, mainly agriculture. This consists of maize fields. Other disturbance visible is mining infrastructure..., a railway track... and power lines... Signs of old fields were also present which could be seen in the pioneer plant species consisting of weeds and grass. Almost half of the surveyed area consists of natural grassland. The vegetation cover varies between short and long grass... The topography of the area forms part of the rolling hills of the surrounding landscape.*”

In his assessment for a project located approximately 10km east of the proposed development, Van Schalkwyk (1998) describes the context as “*situated southwards from the town of Trichardt, in the Highveld Ridge district of Mpumalanga. The topography of the area is mainly gently rolling highveld, with the most important geographical features the various streams crossing the area, such as Klipspruit and Leeuspruit. The soil is mostly turf, which was not deemed suitable for settlement by Iron Age people. The current land use is mainly livestock and maize farming and very little of the original vegetation remains.*” Van Schalkwyk (1998) goes on to note that “*A number of abandoned homesteads are located in the area... These are either old farmsteads, or seem to have belonged to farm labourers. The latter all seems to have been abandoned within the last few years and are therefore not viewed to be of cultural or historical significance.*” Often, marked and unmarked burial grounds are associated with farm werfs and homesteads. Burial grounds are considered to be of high local social value and as such, should not be negatively impacted by any proposed development.

Both the R50 and the R546 are historical routes, however, the proposed development area lies more than 2km from the nearest roads and as such, it is unlikely to impact on the experience of the area from the road. This brief history points to the layered cultural landscape that is present in this area.

Due to the scale of the proposed development, it is likely to change the sense of place associated with this landscape and may impact the way that this historic landscape reads by obscuring layers of the past. Cognisance must be taken of this unique cultural landscape, consisting of farm werfs etc in the proposed layout. The way that the local farmsteads and roads interact with each other and elements of the landscape such as topography and river courses etc. all act as contributing elements to the cultural landscape.

The proposed development is located within the existing Sasol Mine and Industrial Area and as such is unlikely to negatively impact on any significant aspects of this cultural landscape.



Figure 5.1: Historic Aerial from 1955 - NGI (Top Right)
Figure 5.2: Historic Aerial from 1975 - NGI (Bottom Right)

Site Sensitivity Verification

Theme	Screening Tool Sensitivity	Confirmed Sensitivity	Summary
Archaeology and Cultural Heritage LOW		Confirmed LOW	While the broader area had known heritage value based on the findings of previous assessments, the area proposed for development has already been extensively disturbed from activities associated with the Sasol plant. It is therefore unlikely that significant archaeological heritage resources are located here and the likelihood of the proposed development impacting on significant archaeological heritage is low .
Palaeontology VERY HIGH		Confirmed LOW	<p>The proposed site lies on the potentially very highly sensitive Vryheid Formation (Ecca Group, Karoo Supergroup) that could preserve fossil plants of the Glossopteris flora, however the site has already been developed for other purposes and has foundations and buildings present.</p> <p>As the development area has been extensively altered, a Chance Fossil Finds Protocol is recommended for the duration of the construction phase.</p>

Likely Impacts to Heritage Resources

The subject property forms part of the rural farm landscape located between the historic towns of Trichardt, Charl Cilliers and Evander in Mpumalanga. This area retains much of its rural nature, however this sense of place is negatively impacted by the existing coal mines and Sasol infrastructure in the area.

While the broader area had known heritage value based on the findings of previous assessments, the area proposed for development has already been extensively disturbed from activities associated with the Sasol plant. **It is therefore unlikely that significant archaeological heritage resources are located here** and the likelihood of the proposed development impacting on significant archaeological heritage is low.

Bamford (2023) completed a PIA that identified no fossils nearby, although she highlighted the overall sensitivity of the Vryheid Formation for impacts to significant fossil heritage. Bamford (2026) completed a desktop assessment for this project and recommended that no further palaeontological impact assessment is required unless fossils are found by the contractor, environmental officer or other designated responsible person once NEW excavations or drilling activities have commenced. Since the impact will be low, as far as the palaeontology is concerned, the project should be authorised.

Recommendations for further assessment

Based on the information available, it is unlikely that any significant heritage resources will be impacted by the proposed development and as such, no further heritage studies are recommended on condition that the attached Chance Fossil Finds Procedure is implemented for the duration of construction activities.

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[CDNGI Geospatial Portal](#)
[Fossil Heritage Layer Browser | SAHRIS](#)
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