

Appendix G.2

AQUATIC SCOPING REPORT

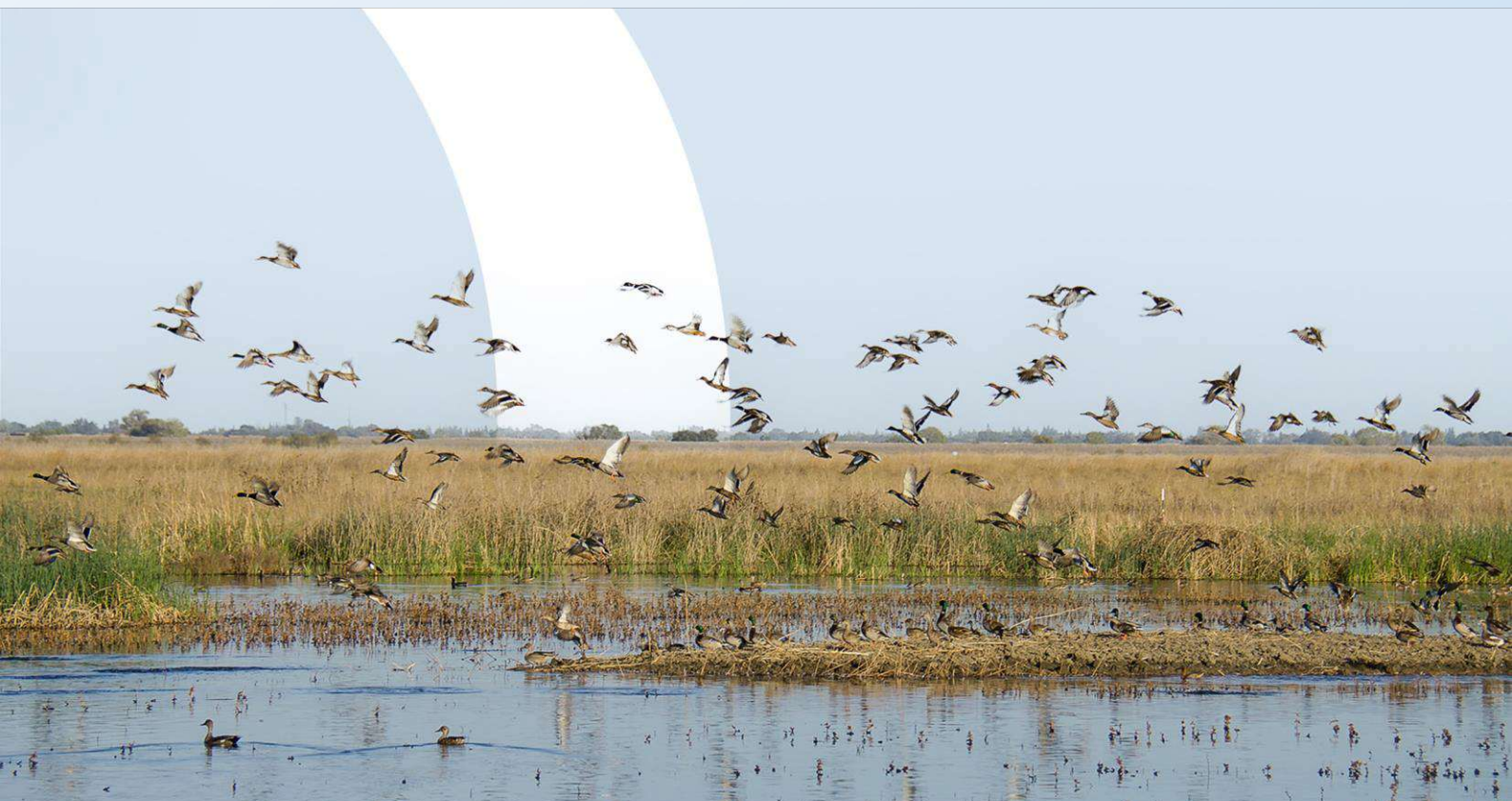




Sasol South Africa Ltd

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

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APPENDIX A



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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.

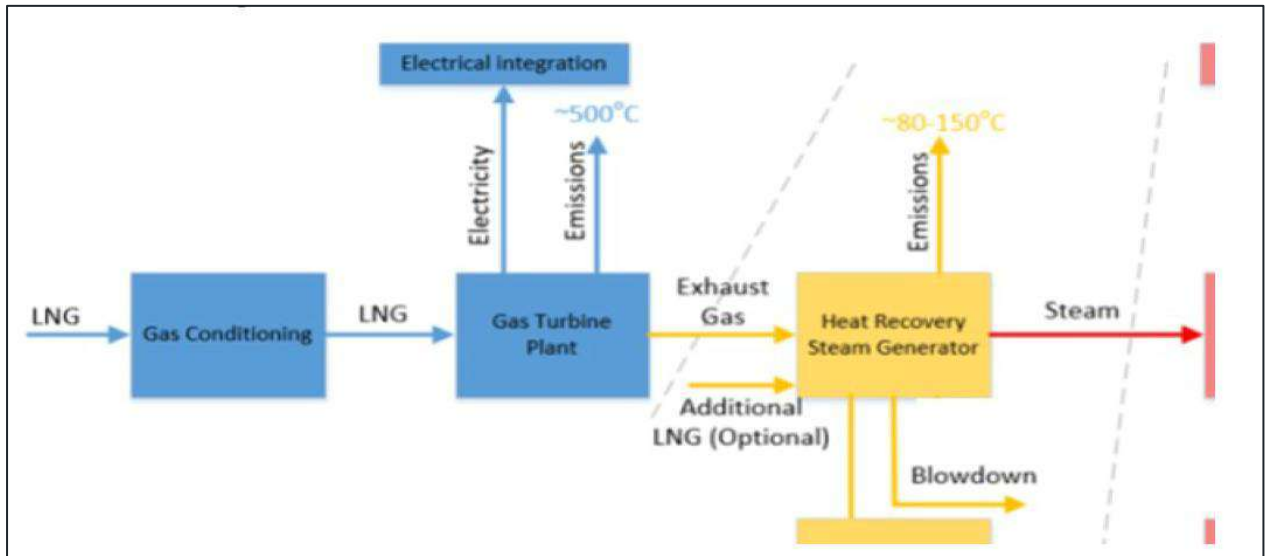


Figure 1-1 - Overview of the Gas to Power Facility

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.

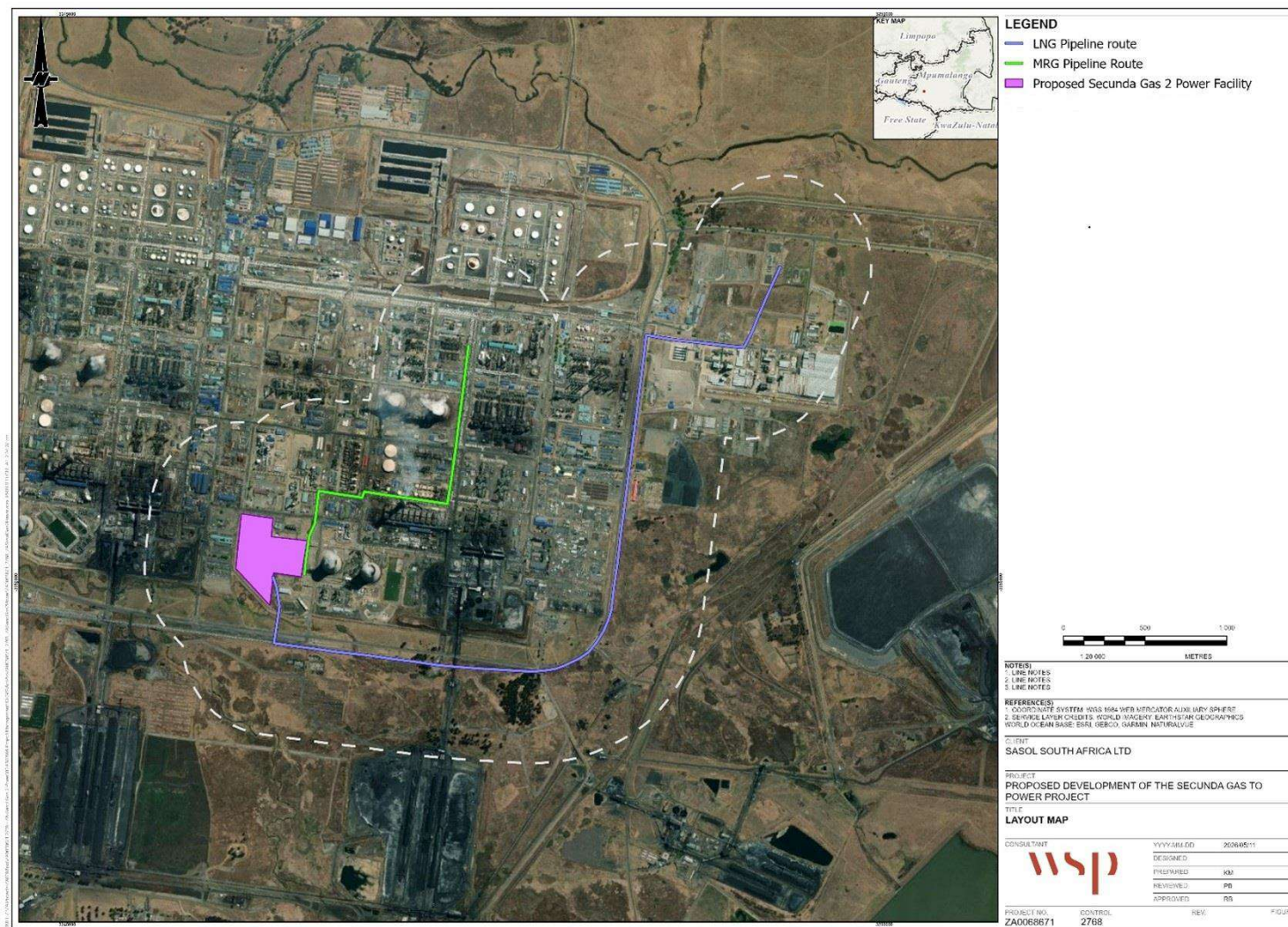


Figure 3-1 – Extent of the proposed Gas to Power footprint in relation to the study area

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

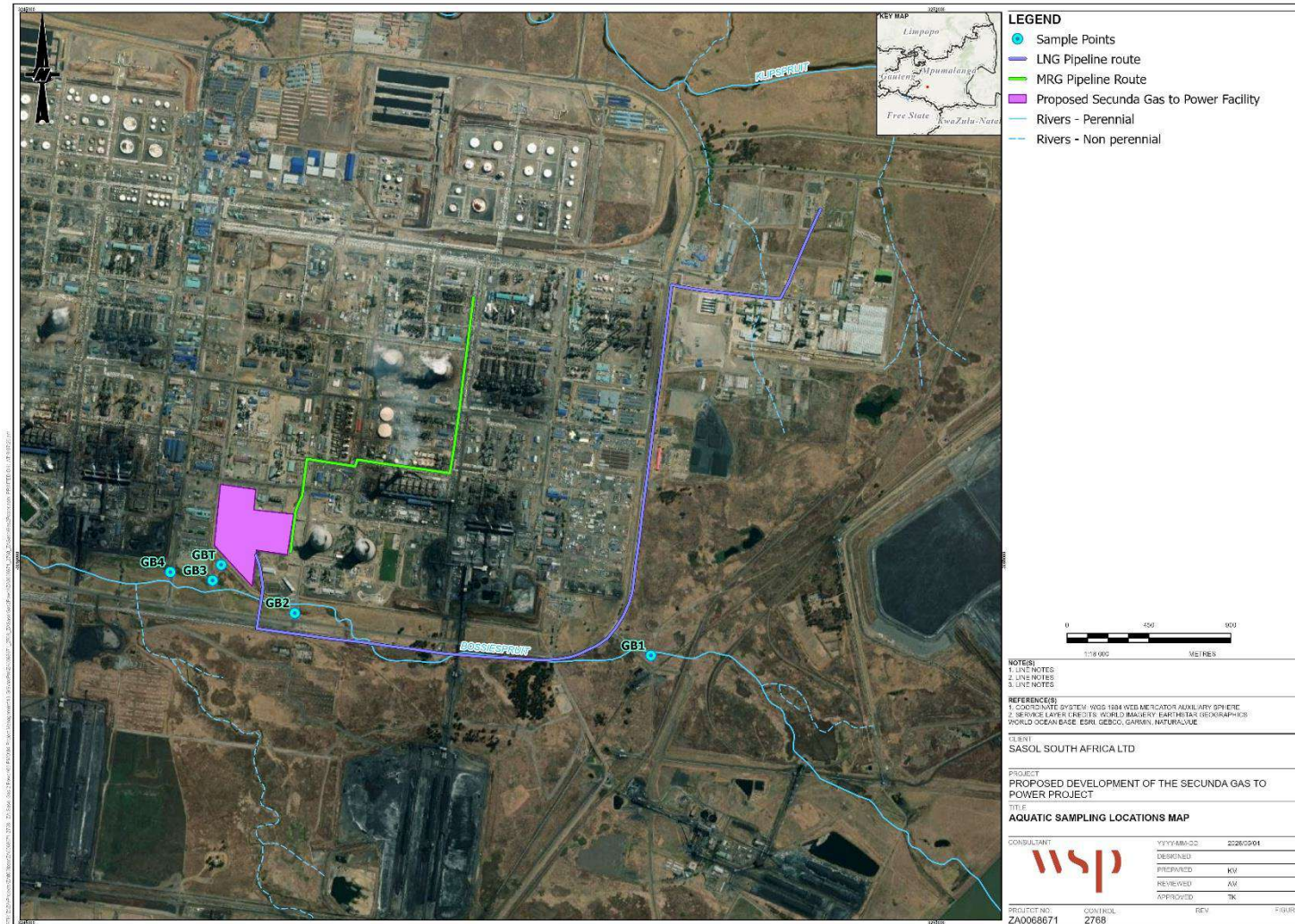


Figure 3-2 - Location of sampling points

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

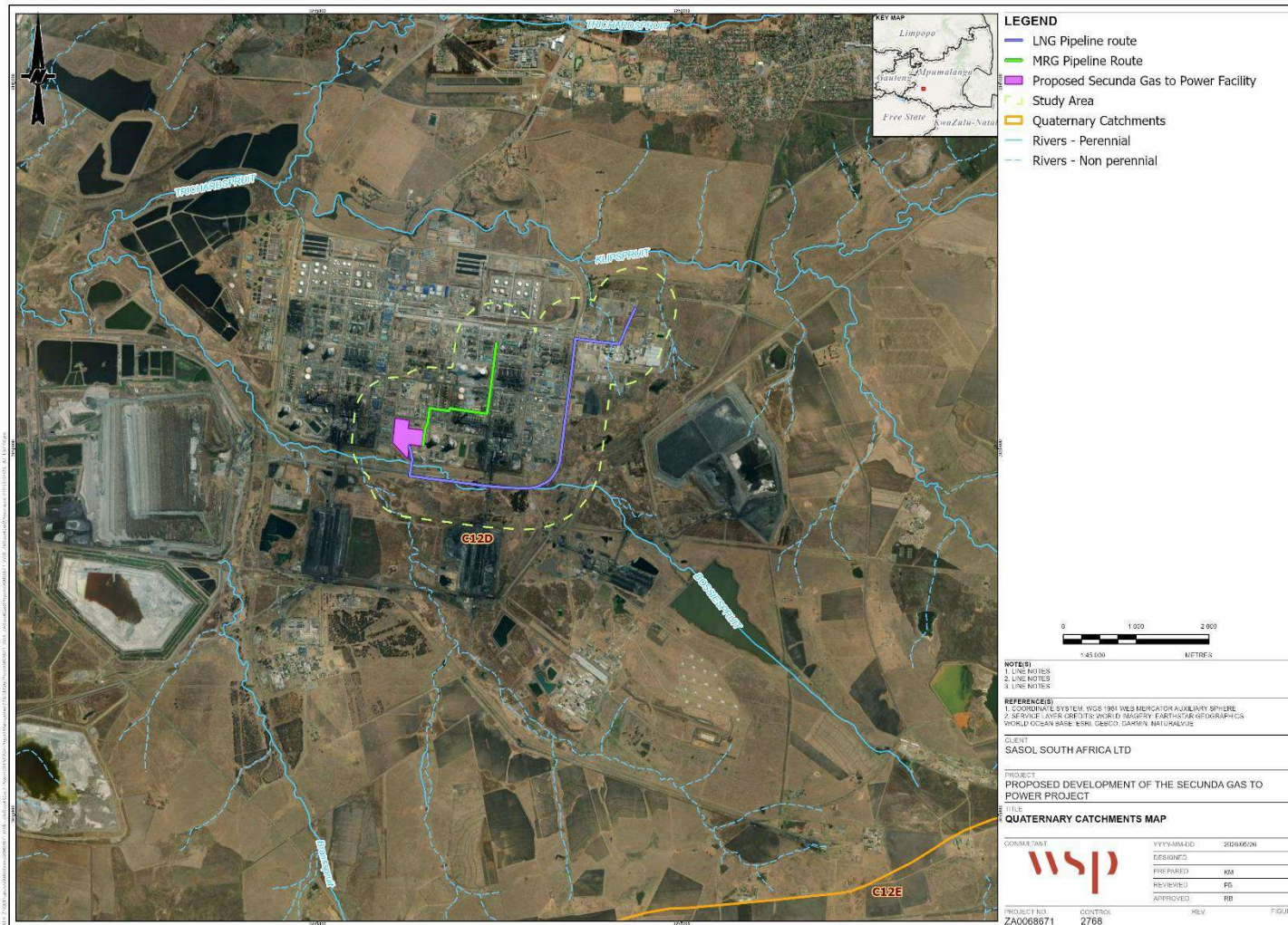


Figure 4-2 - Watercourses and quaternary catchments associated with the study area

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).

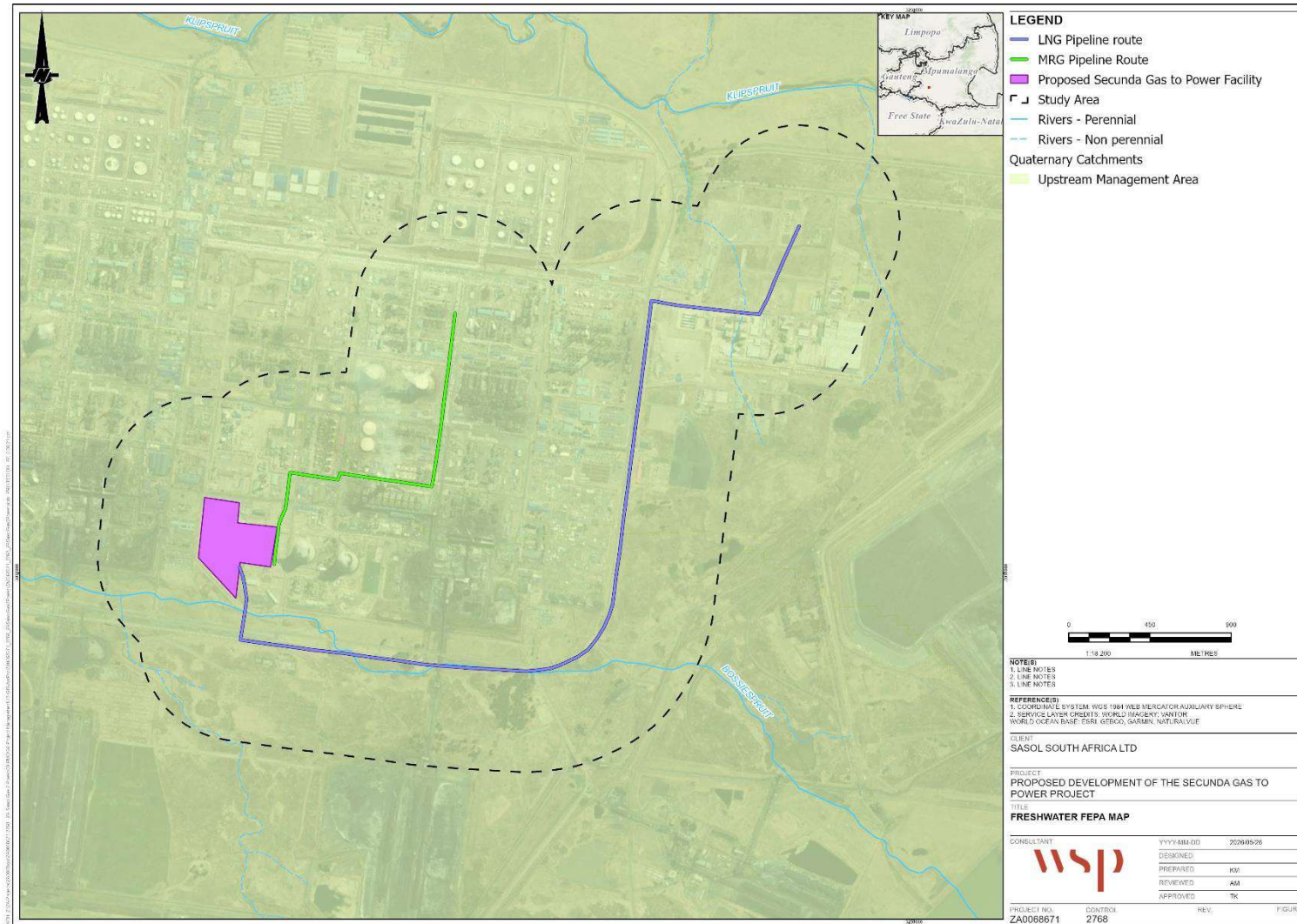


Figure 4-3 - FEPA in relation to the study area

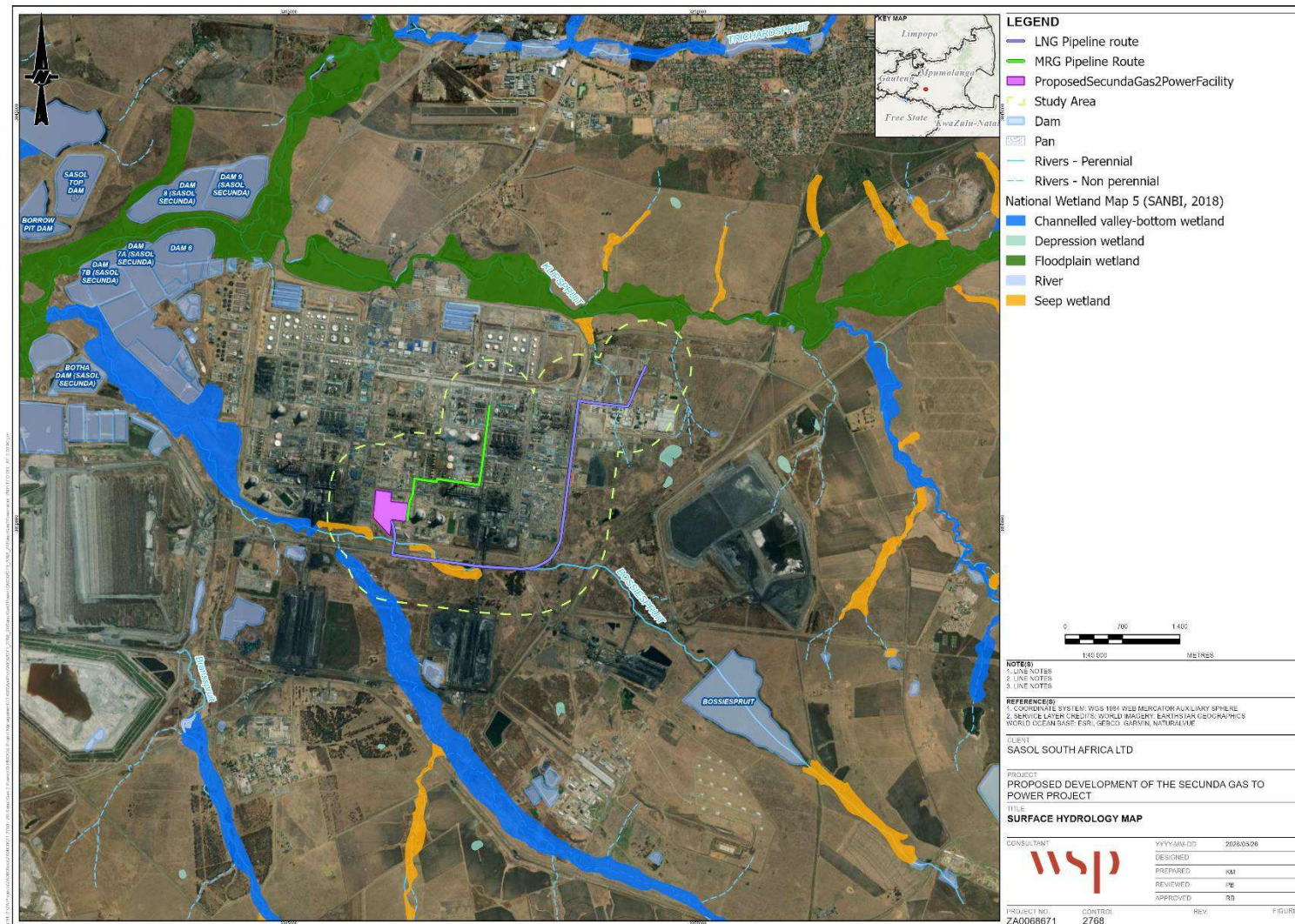


Figure 4-4 - National Wetland Map 5 for the study area

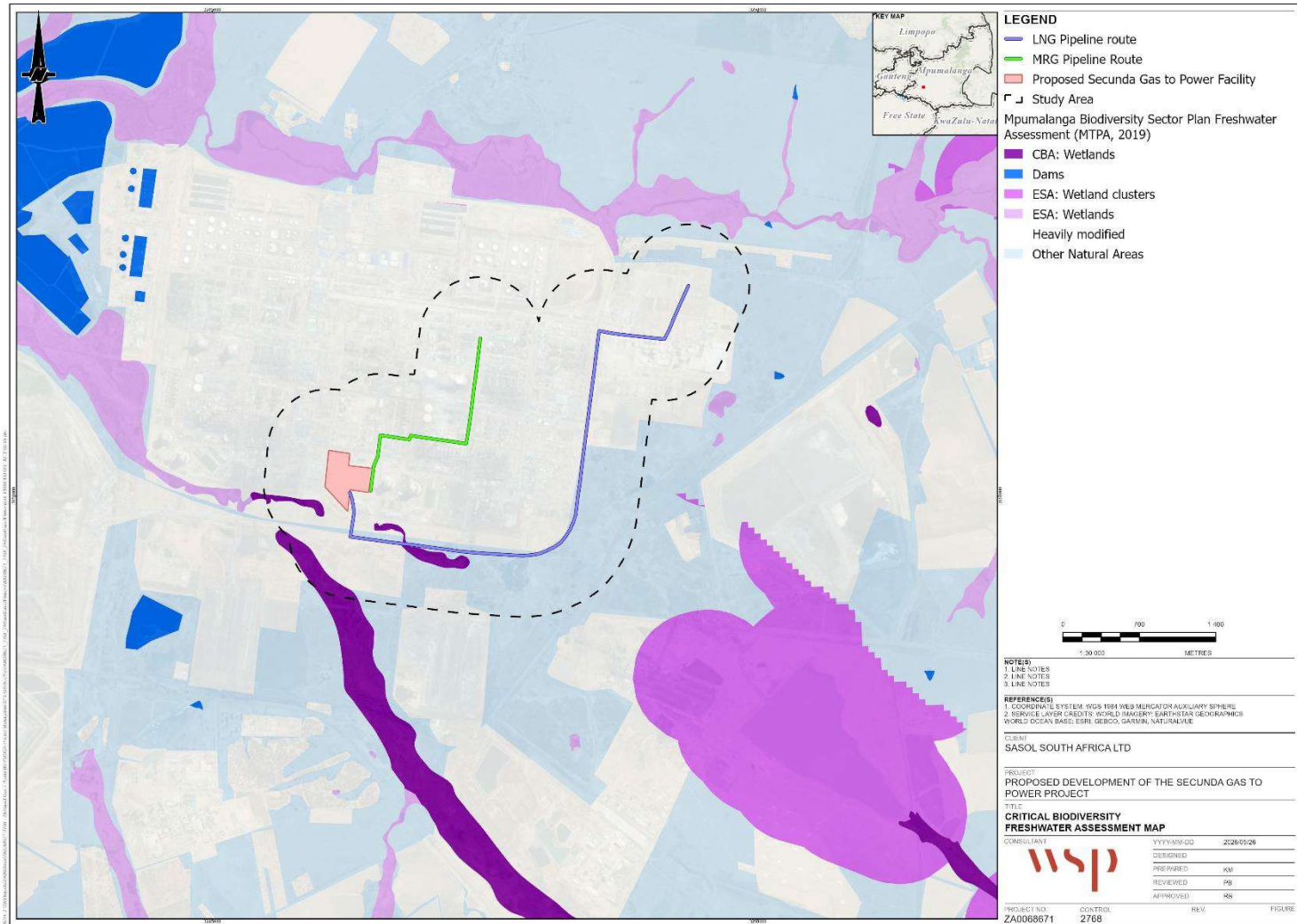


Figure 4-5 – MBSP Freshwater Assessment in relation to the study area

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).

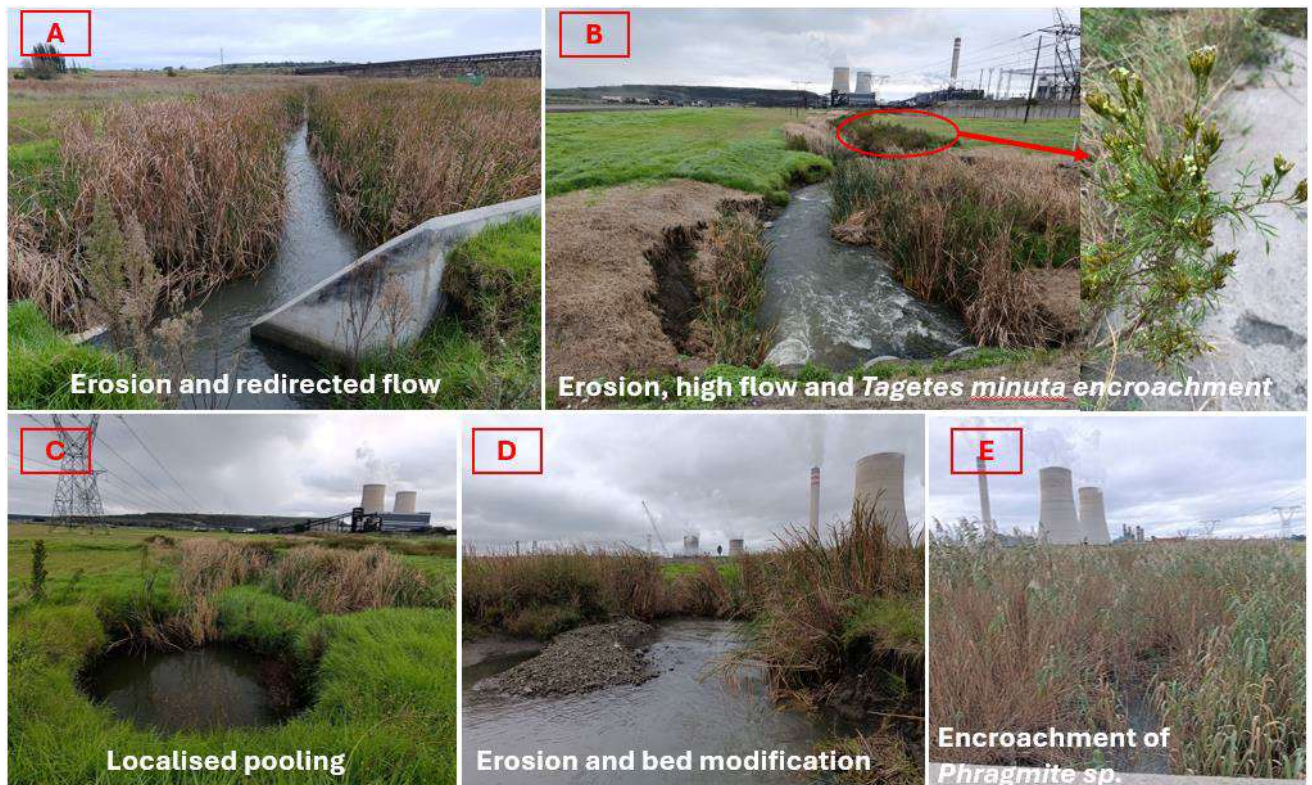


Figure 5-3 - Flow and habitat modifications along the assessed Groot-Bossiespruit reach: A= Site GB1; B = GB2; C and D = GB3 and E = GB4

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

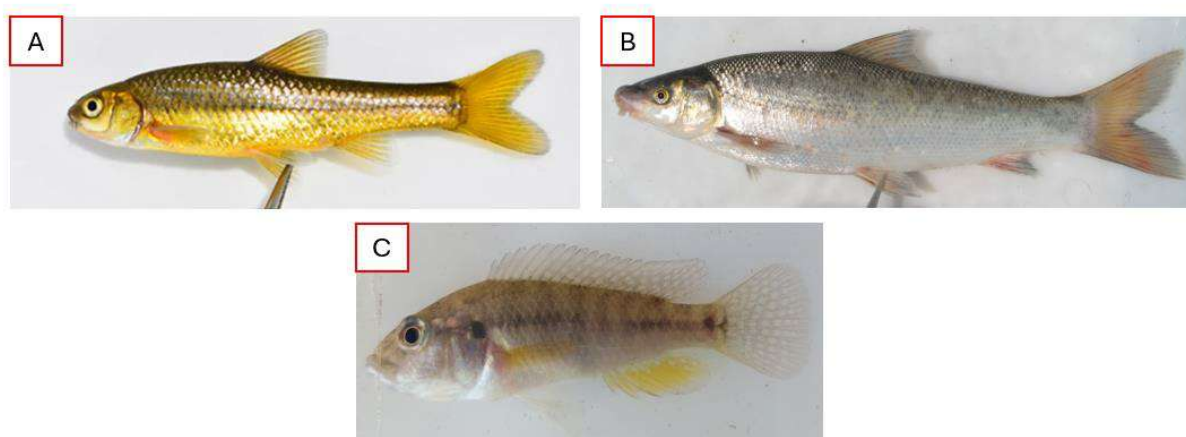


Figure 5-5 - Collected fish specimens. A - *Enteromius anoplus*, B - *Labeo umbratus* and C - *Pseudocrenilabrus philander* (Figures from: A- Kambikambi et al., 2021; B- Ramoejane et al., 2026 and C- Katongo et al., 2017)

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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