



Scientific Aquatic Services Pty Ltd

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Attention: Ms Umeshree Naicker

Dear Madam,

MEMORANDUM: DESKTOP VERIFICATION OF AQUATIC / FRESHWATER ECOLOGICAL SENSITIVITY FOR THE PROPOSED RE-ROUTING OF THE MOKOLO-CROCODILE RIVER (WEST) WATER AUGMENTATION PROJECT PHASE 2A (MCWAP-2A)

1. BACKGROUND AND INTRODUCTION

Scientific Aquatic Services (SAS) undertook a freshwater ecological assessment to establish pre-construction baseline ecological conditions of freshwater ecosystems traversed by the proposed Mokolo and Crocodile River (West) Water Augmentation Project Phase 2A (MCWAP-2A) between Thabazimbi and Lephalale in Limpopo Province, in March 2021 (SAS, 2021)¹. The proposed pipeline route starts at the Vlieëpoort Mountains, west of Thabazimbi, at the identified weir site in the Crocodile River, in the south-western portion of the project area. From there it runs in a predominantly northern direction along existing roads, farm boundaries and a railway line, until it reaches its destination at Medupi and Matimba Power Stations between Steenbokpan and Lephalale.

Subsequently, it has been determined that the current pipeline alignment in the approved 100m corridor (14/12/16/3/3/2/1100) will result in high induced current into the pipeline and high current fault levels, which will result in increased safety risks during construction of the pipeline and during future operation and maintenance of the pipeline, and that the safety risks of working with side booms, cranes and heavy

¹ Scientific Aquatic Services (SAS) (Pty) Ltd. 2021. *Freshwater Ecosystem Sensitivity Analysis and Management Plan For The Proposed Mokolo And Crocodile River (West) Water Augmentation Project (Phase 2a) (Mcpap-2a) Between Thabazimbi And Lephalale, Limpopo Province*. Undertaken for the GBV Joint Venture. Unpublished specialist report.

earth moving equipment within the Eskom servitude and the risk of damage to stay and earth wires over this 6.4 km section of pipeline should be avoided.

The proponent proposes re-routing the pipeline outside the Eskom servitude along the power lines. Two alternatives were identified for the desktop assessment, specifically the Western Alternative and the Eastern Alternative. Additionally, a Sub-Alternative for the Eastern Alternative was provided for assessment. These alternatives are depicted in relation to the approved alignment in Figures A1 to A3 in Appendix A of this memorandum.

To identify all possible freshwater ecosystems that may potentially be impacted, a 500 m “zone of investigation” around the footprint of the study area, in accordance with Government Notice 509 (GN 509) of 2016 as it relates to the National Water Act, 1998 (Act No. 36 of 1998) (NWA) (as amended), was used as a guide to assess possible sensitivities of the receiving environment. This area – i.e. the 500 m zone of investigation around the footprint of the study area- will henceforth be referred to as the “investigation area”.

2. APPLICABLE DEFINITIONS

For the purposes of this investigation, the definition of a freshwater ecosystems were taken as per that of a watercourse in the National Water Act, 1998 (Act No. 36 of 1998). The definitions are as follows:

A **watercourse** means:

- (a) a river or spring;
- (b) a natural channel in which water flows regularly or intermittently;
- (c) a wetland, lake or dam into which, or from which, water flows; and
- (d) any collection of water which the Minister may, by notice in the *Gazette*, declare to be a watercourse, and a reference to a watercourse includes where relevant, its bed and banks.

Wetland habitat is “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.”

Riparian habitat includes the physical structure and associated vegetation of the areas associated with a watercourse which are commonly characterized by alluvial soils, and which are inundated or flooded to an extent and with a frequency sufficient to support vegetation of species with a composition and physical structure distinct from those of adjacent areas.

3. IDENTIFICATION OF FRESHWATER ECOSYSTEMS IN RELATION TO THE PROPOSED ALIGNMENT ALTERNATIVES

The investigation area around the two proposed alternative routings was assessed using a suite of desktop methods, including the use of topographic data, 5 m contour data, historical aerial images and visual analysis of digital satellite imagery, to ascertain whether any freshwater ecosystems as defined in Section 2, are located therein. The following were taken into consideration when utilising these desktop methods:

- Linear features: since water flows/moves through the landscape, freshwater ecosystems often have a distinct linear element to their signature which makes them discernible on aerial photography or satellite imagery;
- Vegetation associated with freshwater ecosystems: a distinct increase in density as well as shrub size near flow paths;
- Hue: water flow paths often show as white/grey or black and outcrops or bare soils displaying varying chroma created by varying vegetation cover, geology and soil conditions. Changes in the hue of vegetation, with watercourse vegetation often indicated on black and white images

as areas of darker hue (dark grey and black); in colour imagery, these areas mostly show up as darker green and olive colours or brighter green colours in relation to adjacent areas, where there is less soil moisture or surface water present; and

- Texture: with areas displaying various textures which are distinct from the adjacent terrestrial areas, created by varying vegetation cover and soil conditions within the freshwater ecosystems.

No freshwater ecosystems meeting the definition of a watercourse as defined in Section 2 above were identified in relation to either alternative route by any of the applicable databases (including the National Freshwater Ecosystems Priority Areas [NFEPA] (2011) and the National Biodiversity Areas [NBA] (2018) datasets), nor were any drainage features or potential wetlands indicated on the topographic map (Figure A3). Furthermore, the Department of Forestry, Fisheries and Environment (DFFE), formerly the Department of Environmental Affairs (DEA) National web-based Environmental Screening Tool (2020) indicates that the entire investigation area around the two alternative alignments is of 'low' aquatic sensitivity.

The Eastern Alternative traverses a small feature which, based on digital satellite imagery, the topographic data and applicable databases, was characterised as being anthropogenic in origin and is likely a farm dam or wildlife watering hole. This feature was not field verified during the assessment undertaken in 2021 as it is located approximately 260 m from the originally assessed pipeline route and was therefore not considered to be at risk at the time of the assessment. If feasible, it is recommended that this feature be avoided, but should it not be practical from an engineering point of view, it is not deemed a 'fatal flaw' from a freshwater ecological management perspective.

4. CONSIDERATION OF APPLICABLE LEGISLATION

The following legislative requirements were considered during the assessment:

- The National Environmental Management Act, 1998 (Act No. 107) of 1998 (as amended) (NEMA);
- The National Water Act, 1998 (Act No. 36 of 1998) (NWA) (as amended); and
- Government Notice 509 as published in the Government Gazette 40229 of 2016 as it relates to the National Water Act, 1998 (Act No. 36 of 1998).

Certain articles of legislation related to the above legislation impose potential zones of regulation on freshwater ecosystems in both a national and provincial context. The Zones of Regulation (ZoR) are not necessarily development exclusion zones, rather areas in which EIA and Water Use Authorisation legislative tools have been introduced for the protection and sustainable use of freshwater resources by requiring that certain types of activities within a freshwater ecosystem, or within a certain distance of a freshwater ecosystem require authorisation. The definition and motivation for a regulated zone of activity for the protection of freshwater ecosystems can be summarised as follows:

Table 1: Articles of Legislation and the relevant zones of regulation applicable to each article.

Regulatory authorisation required	Zone of applicability
Listed activities in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA) Environmental Impact Assessment (EIA) Regulations, 2014 (as amended). The Department of Environmental Affairs	<ul style="list-style-type: none"> ➤ Activity 12 of Listing Notice 1 (GN 327) of the National Environmental Management Act, 1998 (Act No. 107 of 1998) Environmental Impact Assessment (EIA) regulations, 2014 (as amended) states that: The development of: (xii) infrastructure or structures with a physical footprint of 100 square metres or more; Where such development occurs— a) Within a watercourse; b) In front of a development setback; or If no development setback has been adopted, within 32 meters of a watercourse, measured from the edge of a watercourse.

Regulatory authorisation required	Zone of applicability
<p>Water Use Authorisation Application for water uses as stipulated in Section 21(c) and (i) of the National Water Act, 1998 (Act No. 36 of 1998) (as amended).</p>	<p>Government Notice 509 as published in the Government Gazette 40229 of 2016 as it relates to the National Water Act, 1998 (Act No. 36 of 1998)</p> <p>In accordance with GN509 of 2016 as it relates to the National Water Act, 1998 (Act 36 of 1998), a regulated area of a watercourse in terms of water uses as listed in Section 21 (c) and 21 (i) is defined as:</p> <ul style="list-style-type: none"> • the outer edge of the 1 in 100 year flood line and/or delineated riparian habitat, whichever is the greatest distance, measured from the middle of the watercourse of a river, spring, natural channel, lake or dam; • in the absence of a determined 1 in 100 year flood line or riparian area the area within 100 m from the edge of a watercourse where the edge of the watercourse is the first identifiable annual bank fill flood bench; or • a 500 m radius from the delineated boundary (extent) of any wetland or pan in terms of this regulation.

As no freshwater ecosystems were identified within the investigation area associated with both the Western and Eastern Alternatives, the above Zones of Regulation as they pertain to watercourses are not applicable.

5. IMPACT STATEMENT

Although no freshwater ecosystems were identified within the investigation area, it is still considered ‘best practice’ to ensure that any potential impacts to the surrounding natural environment are minimised in line with the mitigation hierarchy (DEA *et al.* 2013). Therefore, the mitigation measures stipulated by SAS (2021) remain applicable, and must be implemented particularly during the construction phase of the proposed pipeline, to ensure that no indirect impacts on downgradient freshwater ecosystems occur.

6. CONCLUSION

Following a visual analysis and extensive desktop assessment of the two alternative pipeline routes, it was concluded that neither alternative is associated with any freshwater ecosystems. Thus, no significant quantum of risk is posed to any freshwater ecosystems by re—routing the assessed portion of the pipeline.

Therefore, on that basis, it is the specialist’s opinion that provided the appropriate authorisations are obtained from the relevant competent authorities, development of either the Western or Eastern Alternatives are considered acceptable. Should the Eastern ‘Sub-Alternative’ be the most viable option in terms of eliminating safety concerns relating to existing and planned future Eskom infrastructure, from a freshwater management point of view, this sub-alternative is considered acceptable and should be utilised.

We trust this information will be useful in the decision-making process regarding the proposed development. Should you have any queries please feel free to contact me.

Yours Faithfully,

Digital Documentation Not Signed For Security Purposes

Stephen van Staden
Pr. Sci. Nat.

APPENDIX A: BACKGROUND MAPS AND INFORMATION

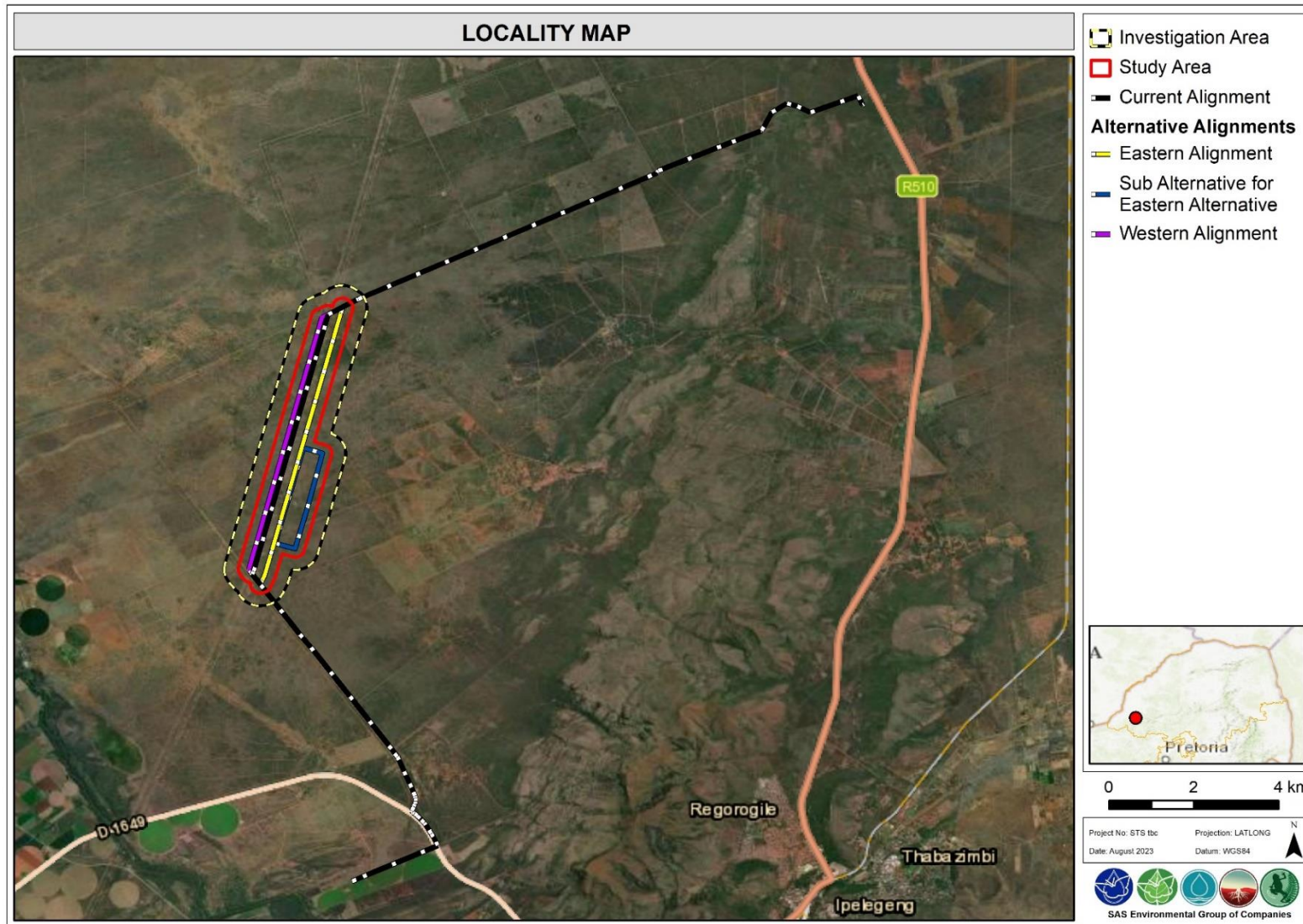


Figure A1: Locality of the current routing in relation to the proposed Western and Eastern Alternatives depicted on digital satellite imagery.

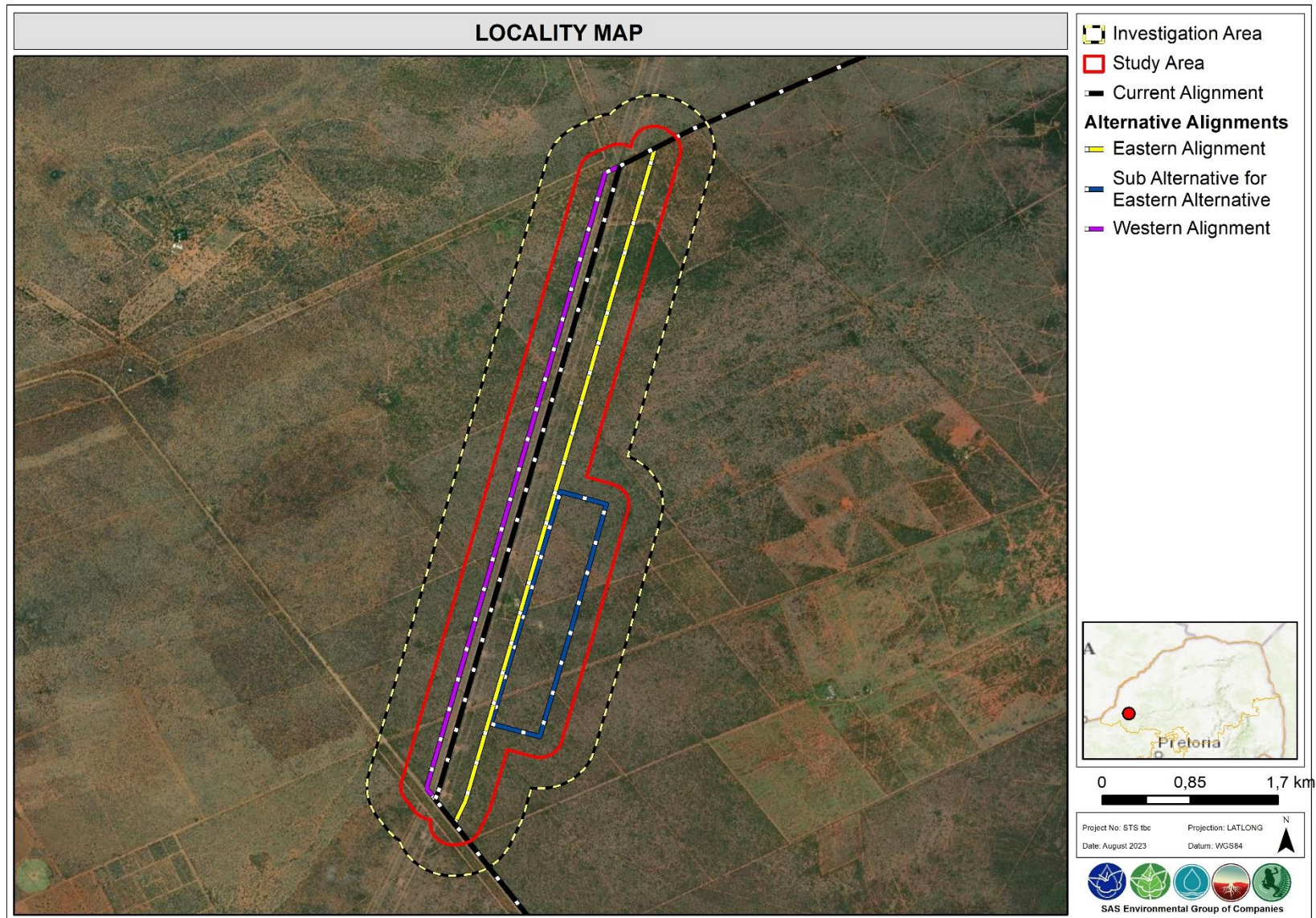


Figure A2: Locality of the current routing in relation to the proposed Western and Eastern Alternatives depicted on digital satellite imagery.

Table 2: Desktop data indicating the characteristics of the freshwater ecosystems associated within the pipeline alignment alternatives and investigation area.

Aquatic ecoregion and sub-regions in which the study and investigation area located.		Detail of the study and investigation area in terms of the National Freshwater Ecosystem Priority Area (NFEPA) (2011) database	
Ecoregion	Limpopo Plain	FEPA CODE	The study and investigation area do not fall within a FEPA code.
Catchment	Limpopo		
Quaternary Catchment	A24J		
WMA	Crocodile (West) and Marico		
subWMA	Lower Crocodile		
Dominant characteristics of the Ecoregion Level II (Kleynhans <i>et al.</i>, 2007a)		NFEPA Wetlands	According to the NFEPA Database, there are no wetlands traversed by either of the proposed alternative pipeline alternatives and associated investigation area nor within the close surrounding area.
Ecoregion Level II	Limpopo Plain (1.03)		
Dominant terrain morphology	Plains, low relief		
Dominant primary vegetation	Mixed Bushveld		
Altitude (m a.m.s.l)	700 to 1300	Wetland Vegetation Type	The proposed alternative pipeline alternatives and investigation area are situated within the Central Bushveld Group 2 Wetland Vegetation Type which is considered Vulnerable (VU) according to Mbona <i>et al.</i> , (2015).
MAP (mm)	300 to 600		
Coefficient of Variation	25 to 34 (% of MAP)		
Rainfall concentration index	60 to >65		
Rainfall seasonality	Early to mid-summer	NFEPA Rivers	According to the NFEPA Database, no rivers are traversed by either proposed alternative pipeline alternatives and investigation area nor within the close surrounding area.
Mean annual temp. (°C)	18 to 22		
Winter temperature (July)	2 to 24		
Summer temperature (Feb)	16 to 32		
Median annual runoff (mm)	<5 to 60	National Biodiversity Assessment (2018): South African Inventory of Inland Aquatic Ecosystems (SAIAE) (National Wetland Map 5 is included in the NBA)	
Strategic Water Source Areas (SWSA) (2017)		Detail of the study and investigation area in terms of the Limpopo Conservation Plan Version 2 (2013)	
According to the Strategic Water Source Area Database (2017) the study and investigation area falls within the Crocodile River Valley strategic water source area for groundwater. The Strategic Water Source Areas for groundwater (SWSA-gw) reflect areas that have high groundwater recharge and where the groundwater forms a nationally important resource. The areas are delineated for the purposes of research, and the outcomes are useful to national level planners and decision makers as an indication of the location of strategic groundwater sources and resources. Sub-national WSAs for groundwater were also identified.		Critical Biodiversity Areas (CBA) 2	The majority of the investigation area is indicated as the CBA 2. CBA 2 areas are selected to meet biodiversity pattern and/or ecological process targets. Alternative sites may be available to meet targets. The land management objective is to maintain in a natural state with limited or no biodiversity loss, maintain current agricultural activities, ensure that land use is not intensified and that activities are managed to minimise impact on threatened species.
		Ecological Support Areas (ESA) 1	A portion of the study and investigation area is indicated to be ESA 1. ESA 1 areas are selected to be natural, near natural and degraded areas supporting CBAs by maintaining ecological processes. The land management objective is to maintain ecosystem functionality and connectivity allowing for limited loss of biodiversity pattern.
Department of Forestry, Fisheries, and the Environment (DFFE) National Web-based Screening Tool (Accessed 2023)		Ecological Support Areas (ESA) 2	A small portion in the north of the study and investigation area is indicated to be ESA 2. ESA 2 areas are areas with no natural habitat that is important for supporting ecological processes. The land management objective is to avoid additional / new impacts on ecological processes.
The screening tool is intended to allow for pre-screening of sensitivities in the landscape to be assessed within the EA process. this assists with implementing the mitigation hierarchy by allowing developers to adjust their proposed development footprint to avoid sensitive areas.			

For the aquatic biodiversity theme, study and investigation area is considered to have a **low aquatic sensitivity**. This sensitivity is attributed to the absence of freshwater ecosystem in the vicinity of the study and investigation area. This is confirmed by the NFEPA (2011) and NBA (2018) Databases.

Detail of the Assessment area in terms of the Land Type Data (Job *et al.*, 2019)

The study and investigation area are dominated by Ae Land Type. Soils in this group are yellow, freely drained apedal soils of the Hutton, Griffin and Clovelly soils occupying more than 40% of the landscape. Deeper (> 300 mm, but generally 500 to 1 000 mm) red soils of the Hutton form are dominant. Mishap and Glenrosa soils usually occupy significant proportions of the landscape. Soils with neocutanic, plinthic, duplex horizons and shallow black clay soils may occupy small proportions of the landscape. Katspruit, duplex soils and black clay soils usually occupy bottomland terrain positions with streambeds and erosion.

CBA = Critical Biodiversity Area; DWS = Department of Water and Sanitation; EI = Ecological Importance; ES = Ecological Sensitivity; ESA = Ecological Support Area; m.a.m.s.l = Metres Above Mean Sea Level; MAP = Mean Annual Precipitation; NBA = National Biodiversity Assessment; NFEPA = National Freshwater Ecosystem Priority Areas; PES = Present Ecological State; SAIIE = South African Inventory of Inland Aquatic Ecosystems; WMA = Water Management Area