



SCIENTIFIC TERRESTRIAL SERVICES

Desktop Ecological Investigation

OF THE PROPOSED REROUTING
ALTERNATIVES FOR THE MOKOLO CROCODILE
WATER AUGMENTATION PROJECT PIPELINE
(MCWAP2A).

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GLOSSARY OF TERMS

Most definitions are based on terms and concepts elaborated by Richardson et al. (2011), Hui and Richardson (2017), Wilson et al. (2017), Skowno et al. (2019), and SANBI (2016), with consideration to their applicability in the South African context, especially South African legislation [notably the National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004), and the associated Alien and Invasive Species Regulations, 2020].

Alien species (syn. exotic species; non-native species)	A species that is present in a region outside its natural range due to human actions (intentional or accidental) that have enabled it to overcome biogeographic barriers.
Biological diversity or Biodiversity (as per the definition in NEMBA)	The variability among living organisms from all sources including, terrestrial, marine, and other aquatic ecosystems and the ecological complexes of which they are part and includes diversity within species, between species, and of ecosystems.
Biome - as per Mucina and Rutherford (2006)	A broad ecological spatial unit representing major life zones of large natural areas – defined mainly by vegetation structure, climate, and major large-scale disturbance factors (such as fires).
Bioregion (as per the definition in NEMBA)	A geographic region which has in terms of section 40(1) been determined as a bioregion for the purposes of this Act.
Carrying Capacity	The maximum population size of a biological species that can be sustained by that specific environment, given the food, habitat, water, and other resources available.
Corridor	A dispersal route or a physical connection of suitable habitats linking previously unconnected regions.
Critical Biodiversity Area (CBA)	A CBA is an area considered important for the survival of threatened species and includes valuable ecosystems such as wetlands, untransformed vegetation, and ridges.
Degradation	The many human-caused processes that drive the decline or loss in biodiversity, ecosystem functions or ecosystem services in any terrestrial and associated aquatic ecosystems.
Disturbance	A temporal change, either regular or irregular (uncertain), in the environmental conditions that can trigger population fluctuations and secondary succession. Disturbance is an important driver of biological invasions.
Driver (ecological)	A driver is any natural or human-induced factor that directly or indirectly causes a change in ecosystem. A direct driver clearly influences ecosystem processes, where indirect driver influences ecosystem processes through altering one or more direct drivers.
Ecological processes	The functions and processes that operate to maintain and generate biodiversity. In order to include ecological processes in a biodiversity plan, their spatial components need to be identified and mapped.
Ecological Support Area (ESA)	An ESA provides connectivity and important ecological processes between CBAs and is therefore important in terms of habitat conservation.
Ecoregion	An ecoregion is a "recurring pattern of ecosystems associated with characteristic combinations of soil and landform that characterise that region."
Faunal Class	In biological classification, class (Latin: classis) is a taxonomic rank, as well as a taxonomic unit. Class specifically refers to major groups, namely: mammals, avifauna (birds), reptiles and invertebrates.
Ground-truth	Ground truth is a term used in various fields to refer to information provided by direct observation (i.e., empirical evidence) as opposed to information provided by inference.
Habitat (As per the definition in NEMBA)	A place where a species or ecological community naturally occurs.
Habitat loss	Conversion of natural habitat in an ecosystem to a land use or land cover class that results in irreversible change in the composition, structure and



	functional characteristics of the ecosystem concerned.
Indigenous vegetation (As per the definition in NEMA)	Vegetation occurring naturally within a defined area, regardless of the level of alien infestation and where the topsoil has not been lawfully disturbed during the preceding ten years.
Integrity (ecological)	The integrity of an ecosystem refers to its functional completeness, including its components (species) its patterns (distribution) and its processes.
Invasive species	Alien species that sustain self-replacing populations over several life cycles, produce reproductive offspring, often in very large numbers at considerable distances from the parent and/or site of introduction, and have the potential to spread over long distances.
Listed invasive species	All alien species that are regulated in South Africa under the NEMBA, Alien and Invasive Species Regulations, 2020.
Native species (syn. indigenous species)	Species that are found within their natural range where they have evolved without human intervention (intentional or accidental). Also includes species that have expanded their range as a result of human modification of the environment that does not directly impact dispersal (e.g., species are still native if they increase their range as a result of watered gardens but are alien if they increase their range as a result of spread along human-created corridors linking previously separate biogeographic regions).
Protected	Species of high conservation value or national importance that require protection, according to TOPS 2007 and NEMBA.
Red Data Listed (RDL) species	According to the Red List of South African plants (http://redlist.sanbi.org/) and the International Union for Conservation of Nature (IUCN), organisms that fall into the Extinct in the Wild (EW), Critically Endangered (CR), Endangered (EN), Vulnerable (VU) categories of ecological status.
Refugia (ecological)	Refugium (plural: refugia) is a location which supports an isolated or relict population of a once more widespread species. This isolation can be caused by climatic changes, geography, or human activities such as deforestation and overhunting.
Resource (ecological)	A resource is a substance or object in the environment required by an organism for normal growth, maintenance, and reproduction. Resources can be consumed by one organism and, as a result, become unavailable to another organism.
Species of Conservation Concern (SCC)	The term SCC in the context of this report refers to all RDL and IUCN listed threatened species as well as provincially and nationally protected species of relevance to the project.
Termitaria	Colonies of termites, typically within a tall mound of cemented earth.
Threatened ecosystem	An ecosystem that has been classified as CR, EN or VU, based on an analysis of ecosystem threat status. A threatened ecosystem has lost or is losing vital aspects of its structure, function, or composition. The NEMBA allows the Minister of Environmental Affairs or a provincial MEC for Environmental Affairs to publish a list of threatened ecosystems. To date, threatened ecosystems have been listed only in the terrestrial environment. In cases where no list has yet been published by the Minister, such as for all aquatic ecosystems, the ecosystem threat status assessment in the National Biodiversity Assessment (NBA) can be used as an interim list in planning and decision making.
Threatened species	A species that has been classified as CR, EN or VU, based on a conservation assessment (Red List), using a standard set of criteria developed by the IUCN for determining the likelihood of a species becoming extinct. A threatened species faces a high risk of extinction in the near future.
Trophic (ecological)	Refers to feeding and nutrition.



LIST OF ACRONYMS

AIP	Alien and Invasive Plant
BGIS	Biodiversity Geographic Information Systems
CARA	Conservation of Agricultural Resources Act, 1983 (Act No. 43 of 1983)
CBA	Critical Biodiversity Area
CR	Critically Endangered
DEA	Department of Environmental Affairs
DFFE	Department of Forestry, Fisheries, and the Environment
EA	Environmental Authorisation
EAP	Environmental Assessment Practitioner
E-GIS	Environmental Geographical Information Systems
EIA	Environmental Impact Assessment
EMPr	Environmental Management Programme
EN	Endangered
ESA	Ecological Support Area
EW	Extinct in the Wild
GBIF	Global Biodiversity Information Facility
GIS	Geographic Information System
GN	Government Notice
GPS	Global Positioning System
Ha	Hectare
IEM	Environmental Management
IUCN	International Union for Conservation of Nature
LC	Least Concern
LEDET	Limpopo Department of Economic Development, Environment & Tourism
LEMA	Limpopo Environmental Management Act, 2003 (Act No. 7 of 2003)
NBA	National Biodiversity Assessment
NEMA	National Environmental Management Act, 1998 (Act No. 107 of 1998)
NEMBA	National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004)
NPAES	National Protected Area Expansion Strategy
P	Protected
PES	Present Ecological State
POC	Probability of Occurrence
QDS	Quarter Degree Square
RDL	Red Data Listed
SACAD	South African Conservation Areas Database
SACNASP	South African Council for Natural Scientific Professionals
SANBI	South African National Biodiversity Institute
SanParks	South African National Parks
SAPAD	South African Protected Areas Database
SCC	Species of Conservation Concern
STS	Scientific Terrestrial Services (Pty) Ltd.
SWSA	Strategic Water Source Area
TOPS	Threatened or Protected Species
TSP	Threatened Species Programme
VEGMAP	National Vegetation Map Project
VU	Vulnerable
WSAs	Water Source Areas



1 INTRODUCTION

Scientific Terrestrial Services (Pty) Ltd. (STS) was appointed by GIBB Holdings (Pty) Ltd to undertake a Desktop Ecological Investigation (including desktop assessment and impact statement) of the alternative route options for the Mokolo Crocodile Water Augmentation Project Pipeline (MCWAP-2A), making use of previous studies and online databases. The project activities are located on the Limpopo province.

In 2021, STS undertook a vertebrate, invertebrate, and floral specialist detailed site sensitivity analyses¹ and design guidance into the MCWAP-2A project for which a 100-meter (m) corridor for the current High Lift Rising Main (i.e., the “pipeline”) alignment which has subsequently been approved (14/12/16/3/3/2/1100). However, the proponent is considering the re-routing of the pipeline on the farm Paarl 124 KQ and Mecklenburg 310 KQ.

The current pipeline alignment within the approved 100 m corridor will result in high induced current into the pipeline and high fault level currents, which will result in increased safety risks during construction and during future operation and maintenance of the pipeline. There is also an additional safety risk related to working with side booms, cranes, and heavy earth moving equipment within the existing Eskom servitude. The safety risks associated with the current pipeline alignment (including risk of damage if wires were earthed over the 6.4-kilometer (km) section of pipeline) must be avoided and a re-routing of the current pipeline outside of the Eskom servitude is proposed.

The desktop assessment during August 2023 focused on the following alternatives (Figure 1):

1. Western Alternatives;
2. Eastern Alternative; and
3. Sub Alternative for the Eastern Alternative (Dog leg).

Subsequent to the above, the proponent undertook additional discussions with Eskom and it became evident that Eskom has planned a future powerline next to the Eastern alternative. The Sub Alternative for the Eastern Alternative, as presented in Figure 1, was amended to the

¹ **Applicable Studies:**

STS 200032. 2021a. Biodiversity and invertebrate specialist detailed site sensitivity analyses and design guidance as part of the Mokolo and Crocodile River (West) Water Augmentation Project (Phase 2A) (MCWAP-2A), Limpopo Province. Prepared for: GBV Joint Venture. March 2021.

STS 200032. 2021b. Floral, vertebrate and invertebrate specialist assessments as part of the Environmental Assessment and Authorisation and Water Use License application processes for the proposed borrow pits for the Mokolo and Crocodile River (West) Water Augmentation Project (Phase 2A) (MCWAP-2A) between Thabazimbi and Lephalale, Limpopo Province. Prepared for: GBV Joint Venture. March 2021.



Dog Leg depicted in Figure 2 as this approach would eliminate Eskom's safety concerns. This final proposed location of the eastern alternative with refined dog leg location is only shown in Figure 2 of this report (all other maps still indicate the original, non-refined, dog leg).

This report, after consideration of the description of the ecological integrity of the study area, must guide the developing proponent by means of the presentation of results and recommendations as to the viability of the proposed alternatives from a biodiversity resource management perspective.

1.1 Project Scope

Compilation of a desktop study and impact statement pertaining to the proposed alternative routes for the MCWAP-2A pipeline. All available online databases as well as the National Web based Environmental Screening Tool ("screening tool" hereafter) will be assessed and this information combined with data collected from the previous MCWAP-2A pipeline studies for the original route that was undertaken by STS (STS 200032. 2021a, 2021b).

1.2 Assumptions and Limitations

The following assumptions and limitations apply to this report:

The biodiversity desktop assessment is confined to a 200 m corridor surrounding the proposed pipeline alternatives (i.e., the "**study area**") and does not include detailed results of the surrounding areas or adjacent properties;

No field investigation was undertaken as part of this Desktop Ecological Investigation and the results of this report are based on data extrapolated from the original studies as well as all available online desktop databases. Together with project experience in the area, the findings of this assessment are considered suitable for the intended use of this document;

All assumptions and limitations as stipulated in the original assessments are applicable to this report; and

Some species of conservation concern (SCC) identities will not be made known in this report, i.e., as per the best practise guideline that accompanies the South African National Biodiversity Institute (SANBI) protocol and the screening tool, the name of the certain sensitive species may not appear in any reports released into the public domain. It will be referred to as sensitive plants, and its threat status included, e.g., critically endangered (CR) sensitive plant.



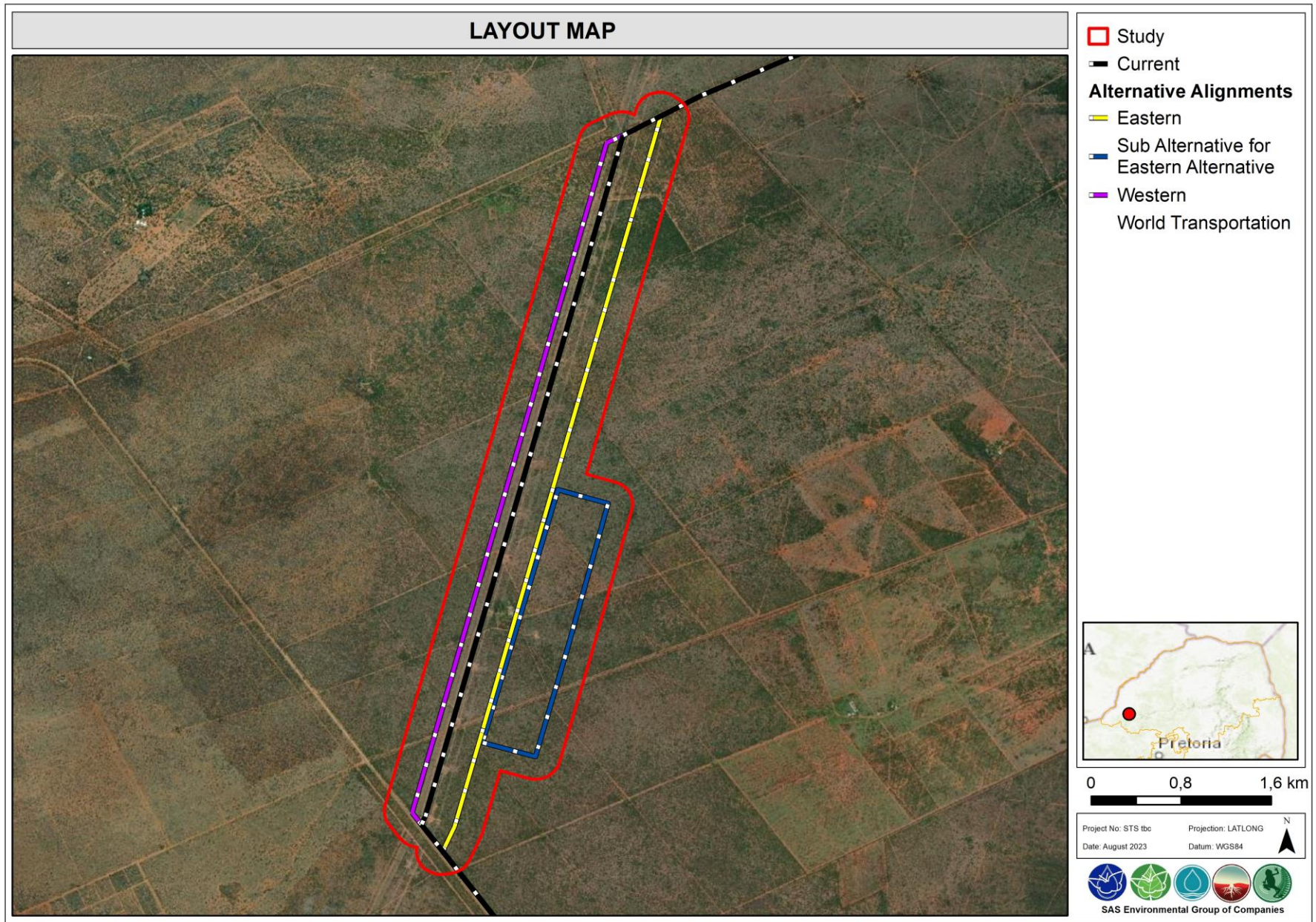


Figure 1: Digital Satellite image depicting the location of the proposed alternatives in relation to surrounding areas.



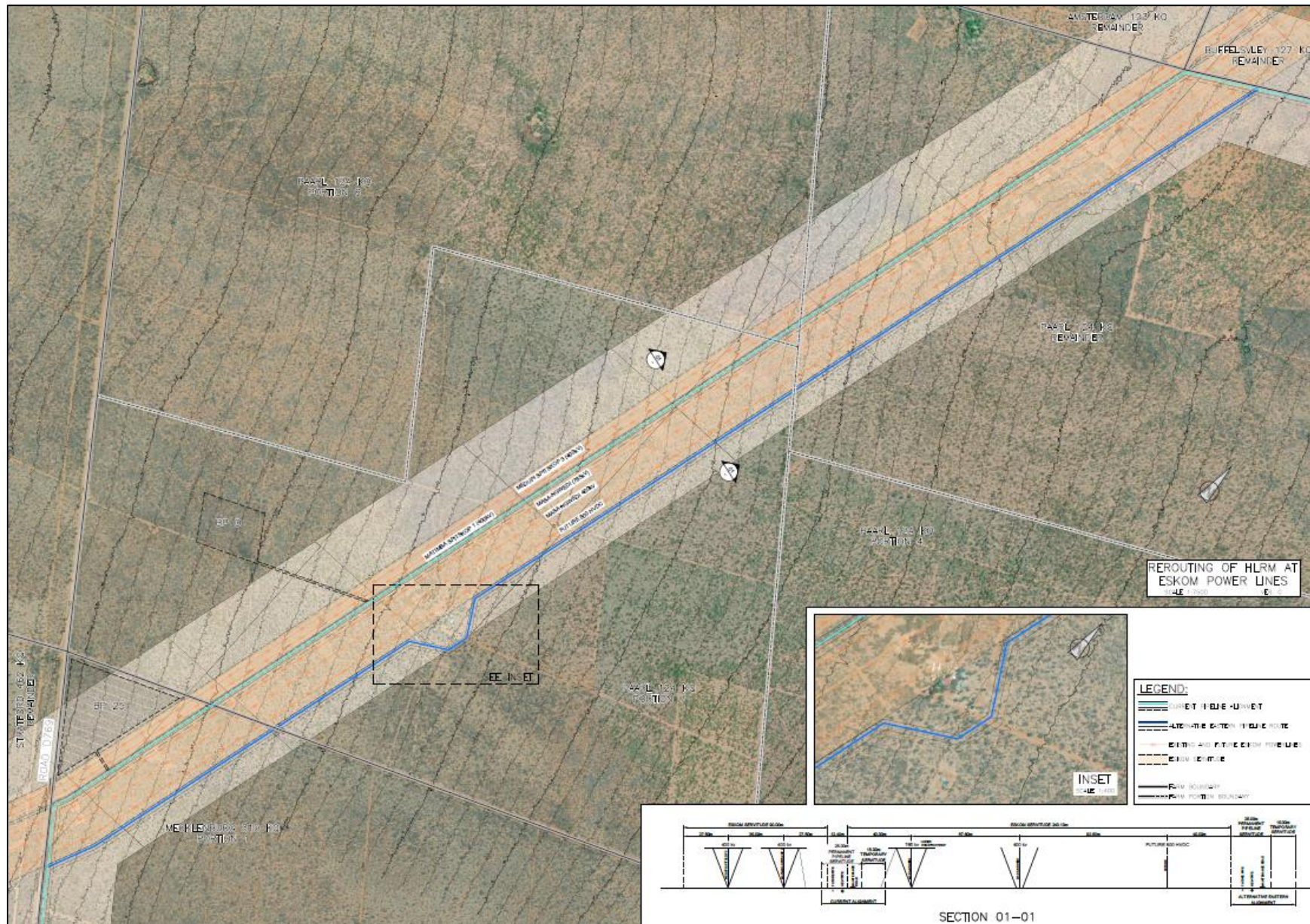


Figure 2: Digital Satellite image depicting the final proposed location of the eastern alternative with refined dog leg location.



2 ASSESSMENT APPROACH

The below sections outline the approach taken for the Desktop Ecological Investigation.

2.1 Desktop Research Approach

Maps and digital satellite images were generated to determine broad habitats, vegetation types and potentially sensitive sites. The biodiversity desktop assessment is confined to the study area and does not include the neighbouring and adjacent properties, although the sensitivity of surrounding areas is included on the respective maps. Relevant databases and documentation that were considered during the assessment of the study area included ²:

The 2018 Limpopo Province Map of Critical Biodiversity Areas (CBAs) and Ecological Support Areas (ESAs) (LEDET, 2018);

National Protected Areas Expansion Strategy (NPAES) – 2018 database;

The South African Conservation Areas Database, Quarter 4 (SACAD, 2022);

The South African Protected Areas Database, Quarter 4 (SAPAD, 2022);

The National Vegetation Map Project (VEGMAP), with the below vector dataset used for information on Biomes, Bioregions and Vegetation Type(s):

- 2018 Final Vegetation Map of South Africa, Lesotho and Swaziland (SANBI, 2018).

The 2022 Red List of Ecosystems (RLE) (SANBI 2022a; 2022b) for the terrestrial realm for South Africa. This database replaces the National Biodiversity Assessment (NBA, 2018) Terrestrial Assessment project, which forms one of the base databases that the RLE database is generated upon;

The Important Bird and Biodiversity Areas (IBA) Programme and vector dataset (BirdLife South Africa, 2015; Marnewick *et al.*, 2015a and 2015b), in conjunction with the South African Bird Atlas Project 2 (SABAP 2);

The International Union for Conservation of Nature (IUCN);

The screening tool (accessed 2023); and

From the 2017 Strategic Water Source Areas (SWSA) project:

- 2017 SWSA **Surface water** (Water Research Commission, 2017).

² Datasets obtained from:

- SANBI BGIS (2019). The South African National Biodiversity Institute - Biodiversity GIS (BGIS) [online]. URL: <http://bgis.sanbi.org> as retrieved in 2019; and
- DEA Environmental Geographical Information Systems (E-GIS) website. URL: <https://egis.environment.gov.za/>



2.2 Sensitivity and Risk Results

This section of the report presents tables of habitat sensitivities and highlights constraints identified for the study area. More specifically, it breaks down the anticipated impacted floral, vertebrate, and invertebrate communities into **habitat sensitivity classes** based on the various biodiversity and conservation features that will be impacted. Habitat Sensitivity Classes are related to the integrity³ of the habitat, presence of significant conservation features (e.g., wetlands), presence (or potential presence) of SCC, as well as presence within nationally or provincially important areas (e.g., crossing through protected areas as identified in the National Environmental Management: Protected Areas Amendment Act, 2003 (Act No. 57 of 2003), as amended (NEMPAA)).

2.3 Mapping

All the ecological features associated with the study area were considered, and sensitive areas were delineated using a Global Positioning System (GPS). A Geographic Information System (GIS) was used to project these features onto satellite imagery.

3 RESULTS OF THE DESKTOP ANALYSIS

Table 1 contains data accessed as part of the desktop assessment. It is important to note, that although all data sources used provide useful and often verifiable high-quality data, the various databases do not always provide an entirely accurate indication of the area's actual biodiversity characteristics, and as such require ground truthing. The screening tool outcomes are presented in Figures 3 – 5.

³ **Integrity (ecological):** The integrity of an ecosystem refers to its functional completeness, including its components (species) its patterns (distribution) and its processes.



Table 1: Summary of the biodiversity and conservation significance of the three alternatives.

	VEGETATION TYPE	CBA CATEGORIES	PROTECTED AREAS (NPAES / SAPAD / SACAD)	Animal Species Theme	Plant Species Theme	Terrestrial Biodiversity Theme
Eastern Alignment	Dwaalboom Thornveld (Least Concern (LC))	CBA 2 and ESA 1	Paarl Private Nature Reserve & Patrysbos Private Nature Reserve.	<u>Medium Sensitivity:</u> Aves- <i>Aquila rapax</i> Sensitive species 5; and Mammalia- <i>Lycaon pictus</i>	Low sensitivity	<u>Very High:</u> CBA, ESA, Protected Area
Western Alignment	Dwaalboom Thornveld (LC)	CBA 2 and ESA 1	Helena Private Nature Reserve, Paarl Private Nature Reserve & Patrysbos Private Nature Reserve	<u>Medium Sensitivity:</u> Aves- <i>Aquila rapax</i> Sensitive species 5; and Mammalia- <i>Lycaon pictus</i> .	Low sensitivity	<u>Very High:</u> CBA, ESA, Protected Area
Sub Alternative	Dwaalboom Thornveld (LC)	CBA 2 and ESA 1	Patrysbos Private Nature Reserve	<u>Medium Sensitivity:</u> Aves- <i>Aquila rapax</i> Sensitive species 5; and Mammalia- <i>Lycaon pictus</i> .	Low sensitivity	<u>Very High:</u> CBA, ESA, Protected Area



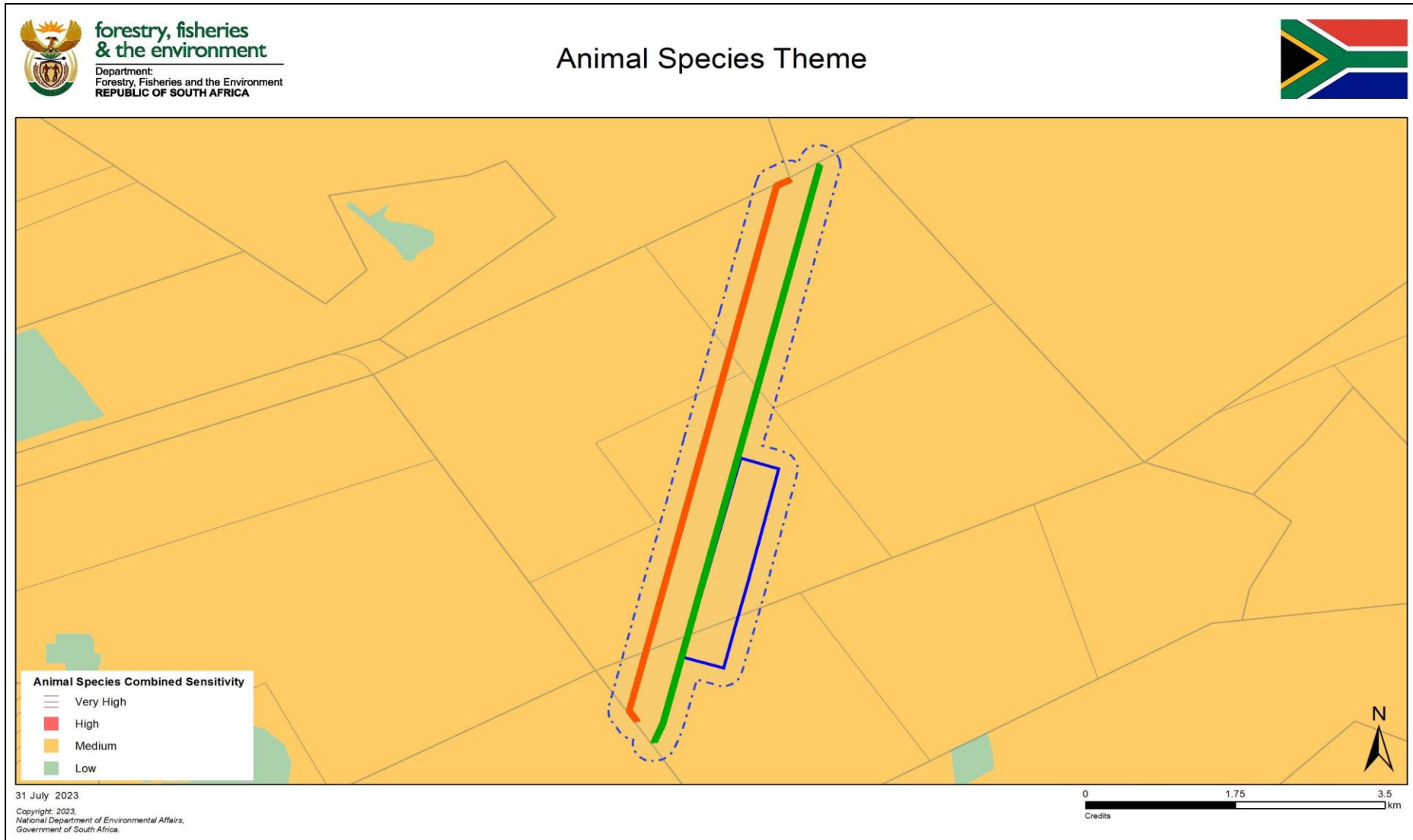


Figure 3: The study area in relation to the screening tool's Animal Species Theme sensitivity. The dotted line represents the study area, whereas the orange line = Western Alignment, the green line = Eastern Alignment, and the blue line = the Sub Alternative for the Eastern Alignment.



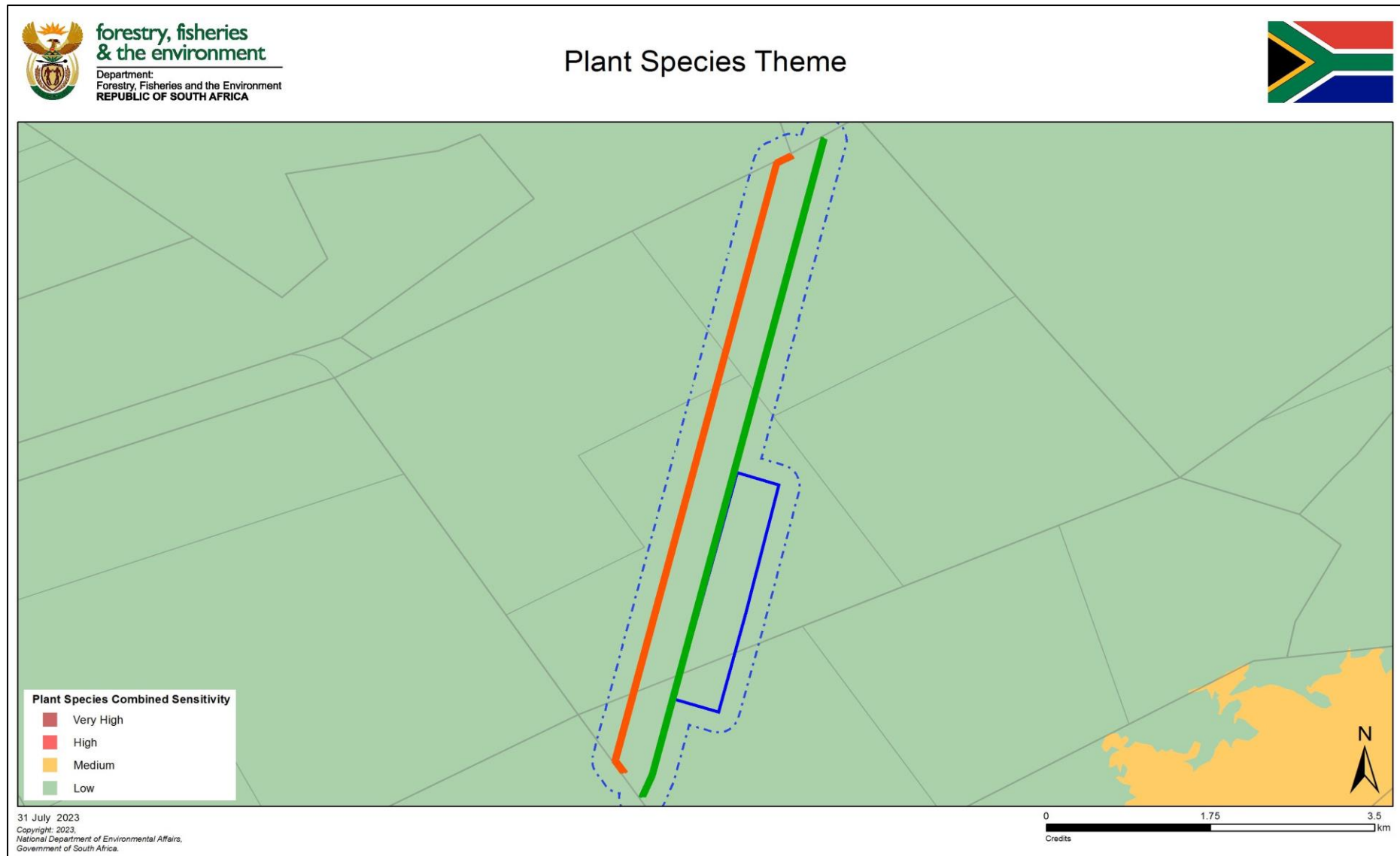


Figure 4: The study area in relation to the screening tool's Plant Species Theme sensitivity. The dotted line represents the study area, whereas the orange line = Western Alignment, the green line = Eastern Alignment, and the blue line = the Sub Alternative for the Eastern Alignment.



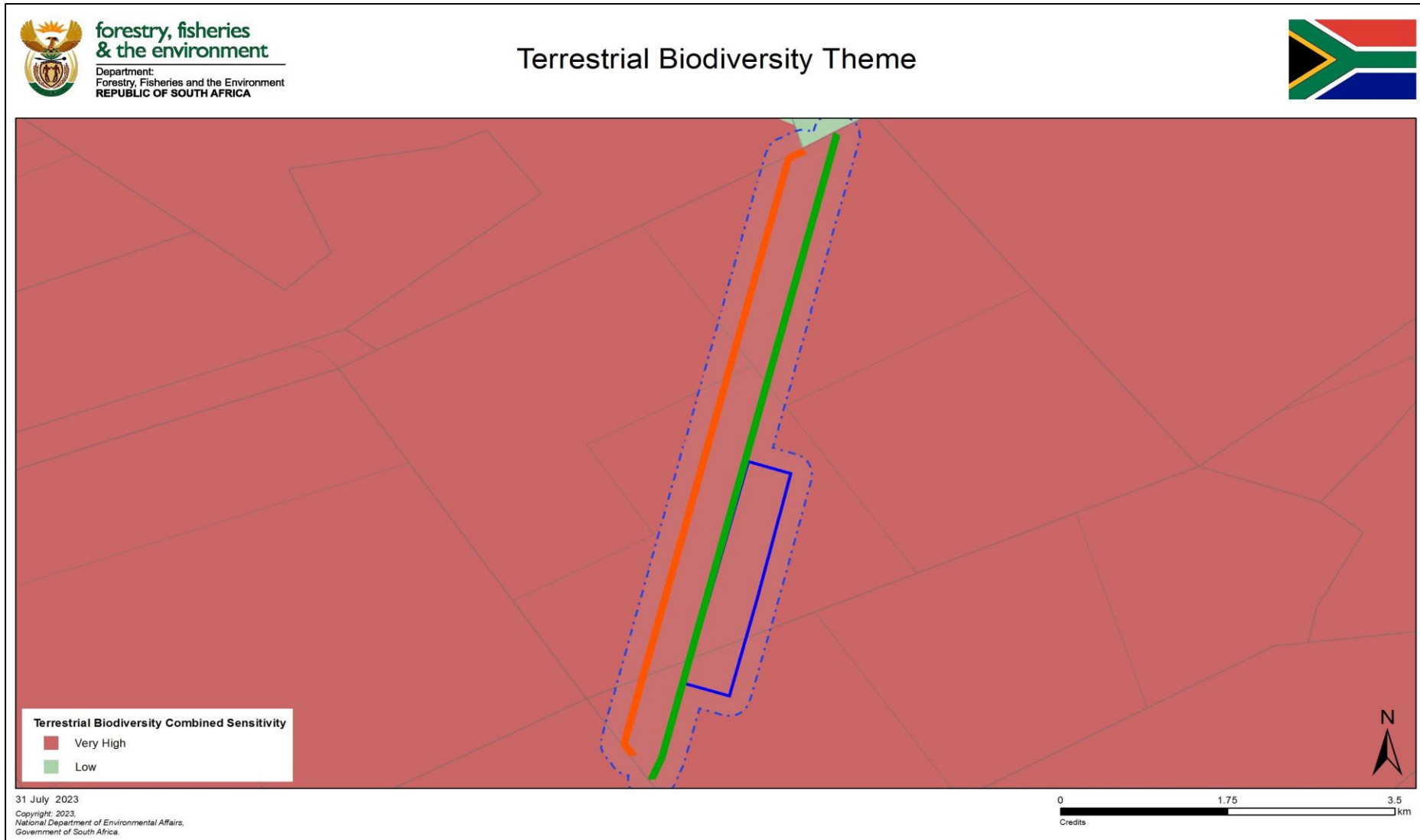


Figure 5: The study area in relation to the screening tool's Terrestrial Biodiversity Theme sensitivity. The dotted line represents the study area, whereas the orange line = Western Alignment, the green line = Eastern Alignment, and the blue line = the Sub Alternative for the Eastern Alignment.



4 BIODIVERSITY SENSITIVITIES AND RISKS

The habitat associated with the study area includes intact Dwaalboom Thornveld, impacted Degraded Thornveld, as well as one artificial Dam (only crossed by the Eastern Alternative). Refer to Figure 6 for a depiction of the desktop-classified habitats.

4.1 Floral aspects

As mentioned above, three habitats can be distinguished for the study area based on a desktop assessment, namely Dwaalboom Thornveld, Degraded Thornveld, and a Dam (artificial). Most of the study area (and alternatives) are located in the **Dwaalboom Thornveld** habitat which is considered a LC vegetation type (SANBI, 2018). This habitat comprises of native floral communities with some bush encroachment by indigenous woody species present (e.g., *Grewia flava* and *Senegalia mellifera* subsp. *detinens*). The habitat remains representative of the reference state, and disturbances are not extensive. The habitat can broadly be described as having a **short-to-tall, open-to-closed thicket** structure – owing to variation in the landscape. Given that the study area was not assessed on foot, refined habitat units (where fine-scale floral communities are defined) could not be delineated for the proposed alternatives. Floral communities that are typically associated with the Dwaalboom Thornveld habitat (based on previous site assessments for the surrounding areas) are moderately diverse. The habitat is best represented by mycophyllous woody species such as *Senegalia erubescens*, *Senegalia nigrescens*, *Vachellia erioloba* and *Vachellia tortillis* subsp. *heteracantha*. The broad-leaf woody species included those generally occurring in the larger area such as *Combretum imberbe*, *Grewia flavescens*, *Sclerocarya birrea* subsp. *caffra*, and *Ziziphus mucronata*, but also included indigenous encroaching shrubs such as *Grewia flava*.

The **Degraded Thornveld** includes a subset of the species associated with Dwaalboom Thornveld. The habitat integrity of the Degraded Thornveld has been altered as it is either located within the existing Eskom servitude (and thus subjected to maintenance activities) or has been transformed (homesteads) or heavily encroached (northern sections).

The **Dam** is artificial and thus not anticipated to be associated with any unique wetland-associated plants.



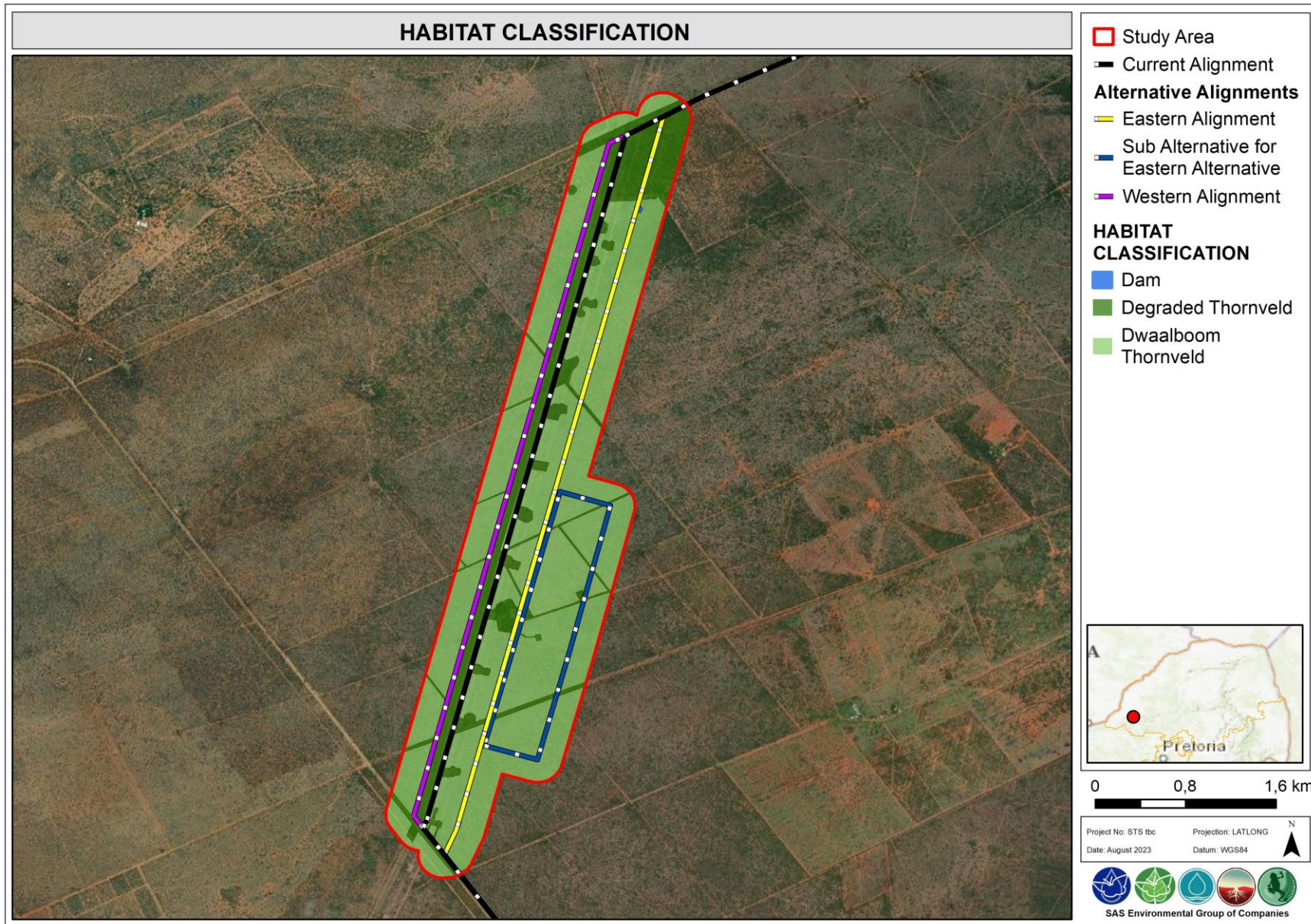


Figure 6: The current alignment and proposed rerouted alignments in relation to the classified habitats within the study area.



4.1.1 Floral SCC

The following floral SCC have previously been recorded within the properties in which the alternatives are proposed (Figure 6): *Combretum imberbe* (LC; NFA-protected), *Sclerocarya birrea* subsp. *caffra* (LC; NFA-protected), *Spirostachys africana* (LC; LEMA-protected), and *Vachellia erioloba* (LC; NFA-protected). No Red Data Listed (RDL) species are anticipated in the study area. Walkdowns of the chosen alternative will be required where potentially occurring NFA- and LEMA-protected species are marked within the disturbance footprint areas for permit application (either a destruction permit or a relocation permit). The following should be considered:

In terms of the GN 1935: List of Protected Tree Species as published in the Government Gazette 46094 dated 25 March 2022, as it relates to the National Forest Act, 1998 (Act No. 84 of 1998, amended) (NFA), protected tree species may not be cut, disturbed, damaged, or destroyed and their products may not be possessed, collected, removed, transported, exported, donated, purchased or sold - except under licence granted by the Department of Forestry, Fisheries, and the Environment (DFFE) by a delegated authority. Applications for such activities should be made to the responsible official in each province. Each application is evaluated on merit (including field assessments) before a decision is taken whether or not to issue a licence (with or without conditions). Such decisions must be in line with national policy and guidelines; and

In terms of the Limpopo Environmental Management Act, 2003 (Act No.7 of 2003) (LEMA), where individuals or communities of Schedule 12 Protected Plants will be disturbed by construction/operational activities, they must be relocated to suitable, similar habitat in close proximity to where they were removed from, but outside the disturbance footprint after obtaining the relevant permits from the LEDET.

No RDL species are anticipated to occur in the study area and the low sensitivity outcome of the screening tool for the plant species theme is verified for the study area.



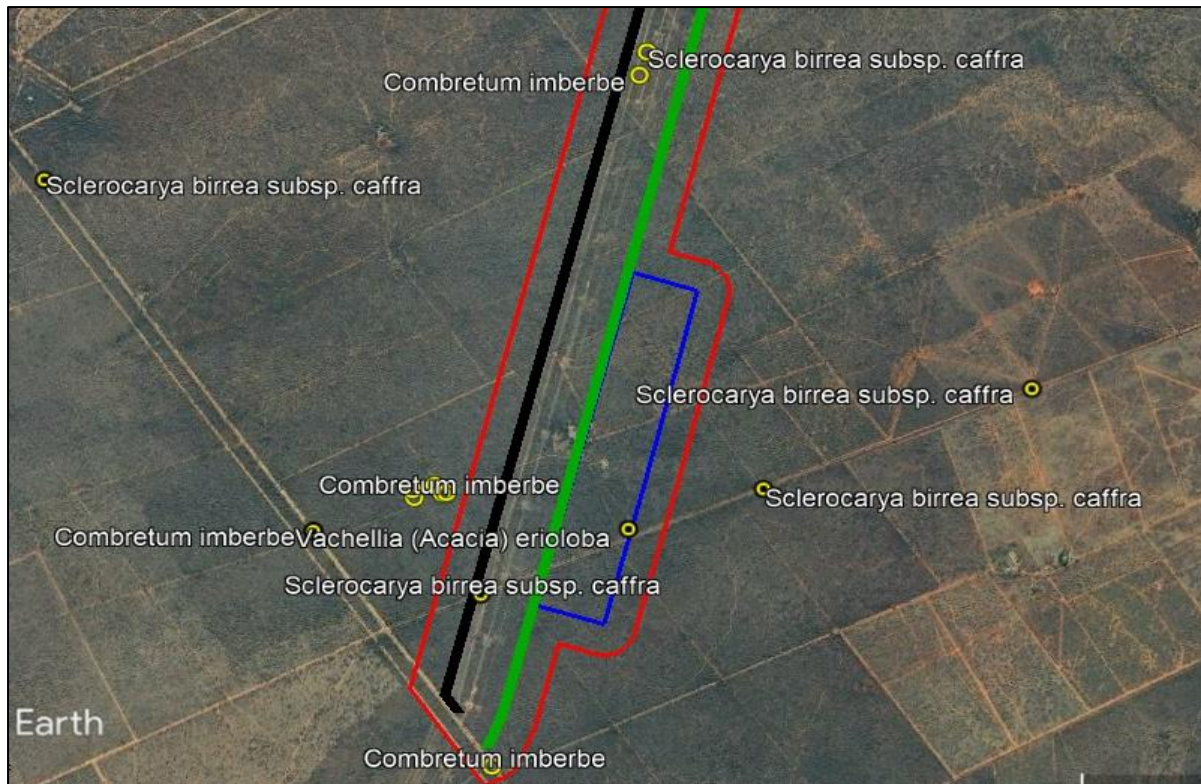


Figure 7: The proposed Western Alignment (black lines), Eastern Alignment (green lines), and Sub Alternative (blue line) in relation to previously recorded NFA-protected flora.

4.1.2 Biodiversity priority areas

The very high screening tool sensitivity outcome for the terrestrial biodiversity theme is verified for the study area – refer to the below sections for a breakdown of these features.

Biodiversity priority areas⁴ associated with the habitats include:

CBA 2 sites (Figure 8) associated with the northern and southern portions of the Dwaalboom Thornveld habitat (as well as the Dam). Incompatible Land-Uses for CBA 2 sites include urban land-uses including Residential (golf estates, rural residential, resorts), Business, mining & Industrial, Infrastructure (roads, power lines, pipelines).

Note: Certain elements of these activities could be allowed subject to detailed impact assessment to ensure that developments were designed to CBA 2. Alternative areas may need to be identified to ensure the CBA network still meets the required targets.

⁴ **Biodiversity priority areas:** Features in the landscape or seascape that are important for conserving a representative sample of ecosystems and species, for maintaining ecological processes, or for the provision of ecosystem services. They include the following categories, most of which are identified based on systematic biodiversity planning principles and methods: Protected Areas, Critically Endangered and Endangered ecosystems, Critical Biodiversity Areas and Ecological Support Areas, Freshwater Ecosystem Priority Areas, high water yield areas, flagship free-flowing rivers, priority estuaries, Priority Areas for land-based protected area expansion, and Focus areas for offshore protection.



ESA 1 sites associated with the central sections of the Dwaalboom Thornveld habitat (Figure 8). Incompatible Land-Uses for ESA 1 sites include Urban land-uses including Residential (including golf estates, rural residential, resorts), Business, Mining & Industrial; Infrastructure (roads, power lines, pipelines). Note: Certain elements of these activities could be allowed subject to detailed impact assessment to ensure that developments were designed to maintain the overall ecological functioning of ESAs.



Figure 8: The proposed Western Alignment (black lines), Eastern Alignment (green lines), and Sub Alternative (blue line) in relation to a CBA 2 and ESA 1 (as per the Limpopo 2018 CBA dataset).

Protected areas (Figure 9) associated with most of the study area, i.e., the Eastern Alignment is within the Paarl Private Nature Reserve & Patrysbos Private Nature Reserve, the Western Alignment is within the Helena Private Nature Reserve, Paarl Private Nature Reserve & the Patrysbos Private Nature Reserve, and the Sub Alternative is within the Patrysbos Private Nature Reserve. As per the National Environmental Management: Protected Areas Act, 2003 (Act No. 57 of 2003, as amended) (NEMPAA) Section 50(5): No development, construction or farming may be permitted in a national park, nature reserve or world heritage site without the prior written approval of the management authority. Early engagement with the relevant landowners and environmental authorities are required for the proposed alignments within the Nature Reserves.



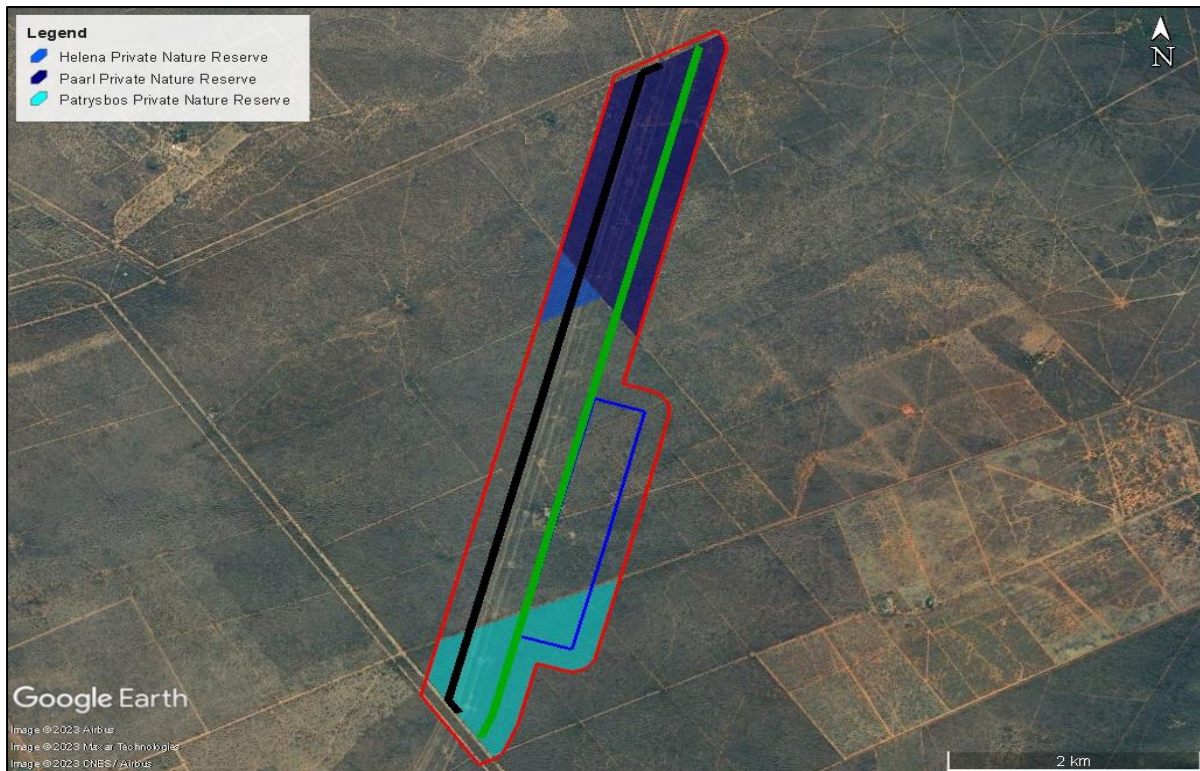


Figure 9: The proposed Western Alignment (black lines), Eastern Alignment (green lines), and Sub Alternative (blue line) in relation to Nature Reserves as per the SAPAD 2023 Q1.

4.2 Vertebrate and Invertebrate Aspects

The proposed Eastern and Western Alternatives traverse three habitats, namely the Dwaalboom Thornveld, Degraded Thornveld, and a Dam (artificial), with the dominant habitat unit being traversed being the Dwaalboom Thornveld. The Dwaalboom Thornveld is still largely intact, albeit marginally encroached, providing suitable habitat to a diversity of vertebrate and invertebrate species. The Degraded Thornveld shares similar faunal species diversity to that of the Dwaalboom Thornveld, however this is predominantly due to the close association of these two habitats in the study area. It is noted however that the species abundances will likely be lower within the Degraded Thornveld, with common species being more prevalent. Habitat connectivity within the study area has been compromised due to perimeter and internal fencing which in many instances, is designed to contain species within the various farm portions. Some of the internal fencing was however noted to be standard cattle fencing and as such, less restrictive to species movement. Smaller vertebrate species as well as invertebrate species will readily traverse these fence lines, however larger vertebrate species (notably mammals), will be largely restricted to the respective farm portions. Amphibian diversity for the western alignment will be low and restricted to water independent amphibians. The eastern alignment will likely exhibit similar low abundances of amphibian species, except where the alternative traverses a dam (northern portion of the



alignment route). Here, it is likely that an increased abundance and diversity of amphibian species may occur. Reptile species, notably smaller skinks, lizards and snakes will likely be abundant throughout the study area and will be similarly represented throughout all alternatives.

4.2.1 Vertebrate and Invertebrate SCC

The Animal Species Theme obtained from the Screening Tool indicated a medium sensitivity for the study area. Three vertebrate species were triggered for the area, namely *Aquila rapax* (Tawny Eagle), Sensitive species 5 and *Lycaon pictus* (Wild Dog). Whilst the habitat within the study area is potentially suitable for *Lycaon pictus*, there are no known free-roaming packs / individuals in the vicinity of the study area, whilst the lack of suitable prey items, game fences and persecution from farmers will further exclude this species from the occurring herein. Similarly, although free roaming Sensitive species 5 individuals are known from the Waterberg region, the dense vegetation and lack of suitable prey items will preclude this species from the study area. Persecution from farmers will also be a significant threat to this species in the area. *Aquila rapax* may forage over the study area, and potentially roost and / or nest in some of the larger trees in the study area. The dense vegetation may however hinder hunting activities, whilst the existing powerlines will pose a threat to this species due to collision risks. The Threatened or Protected Species (TOPS) listed species *Python natalensis* (Southern African Python) may occur in the study area, however the occurrence of this species, much like other SCC, will not be limited to only the study area, with this species readily utilising the surrounding habitat as well. The dam associated with the eastern alignment may also provide breeding habitat for the TOPS listed species, *Pyxicephalus adspersus* (Giant Bullfrog).

No Invertebrate species were listed by the Screening Tool; however, it is possible that three TOPS listed species, namely *Ceratogyrus darlingi* (Rear-horned Baboon Spider), *Opisththalmus glabrifrons* (Rough Burrower) and *Opisthacanthus asper* (Tree Creeper) may occur within the study area.

5 TERRESTRIAL SENSITIVITY

Considering the previous assessments (STS 200032. 2021a; 2021b), outcomes of the screening tool (run in July 2023), as well as updates to the Limpopo Conservation Plan (C-Plan), the three alternatives are located in areas of high, medium, and low sensitivity. Table 2 describes the sensitivities associated with the various habitats, whereas Figures 10 – 12 depict the proposed alternatives in relation to these habitat sensitivities.



Table 2: Sensitivity descriptions.

Sensitivity Class	Sensitivity Criteria
High Sensitivity / Integrity	<p>Associated with the northern and southern sections of the Dwaalboom Thornveld habitat. The below is applicable to this area:</p> <ul style="list-style-type: none"> • Little to no disturbance or alien vegetation within these areas; • Presence of significant or unique biodiversity and conservation features such as CBAs; • Presence of SCC: <ul style="list-style-type: none"> - IUCN threat status of species; - NEMBA Section 56 (TOPS); - LEMA Schedules 2, 3, 4, 11 and/or 12; and - GN 1935: List of Protected Tree Species as published in the Government Gazette 46094 dated 25 March 2022, as it relates to the NFA. • Presence of invertebrate and/or vertebrate SCC known or likely.
Medium Sensitivity / Integrity	<p>Associated with the central sections of the Dwaalboom Thornveld habitat. The below is applicable to this area:</p> <ul style="list-style-type: none"> • The habitat is still associated with indigenous floral communities but excludes significant or unique biodiversity and conservation features such as watercourses, threatened ecosystems, or CBAs. The presence of ESAs are, however, confirmed; • Levels of disturbance and alien vegetation are often higher within these areas; • The presence of LEMA Schedules 2, 3, 4, 11 and 12 species, as well as species from GN 1935: List of Protected Tree Species (as it relates to the NFA), are still present in these habitats; • Habitat supports a diversity of common and wide-ranging invertebrate and vertebrate species; and • Presence of SCC known or likely.
Low Sensitivity / Integrity	<p>Associated with the Degraded Thornveld habitat. These areas have high levels of disturbance and/or a high abundance of alien vegetation. Significant biodiversity and conservation features are largely absent from these areas.</p>



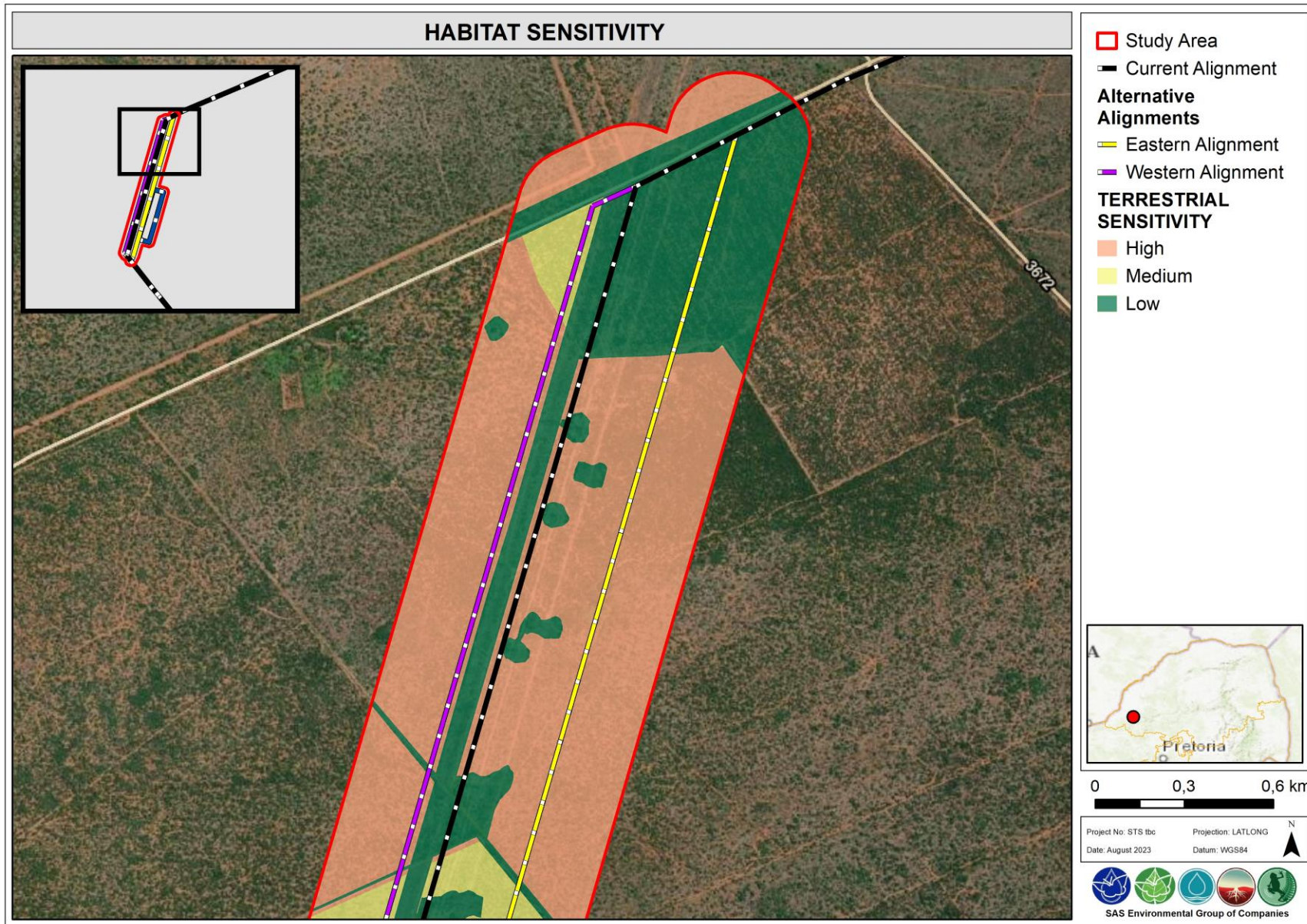


Figure 10: The current alignment and proposed rerouted alignments in relation to the habitat sensitivities - northern section of the study area.



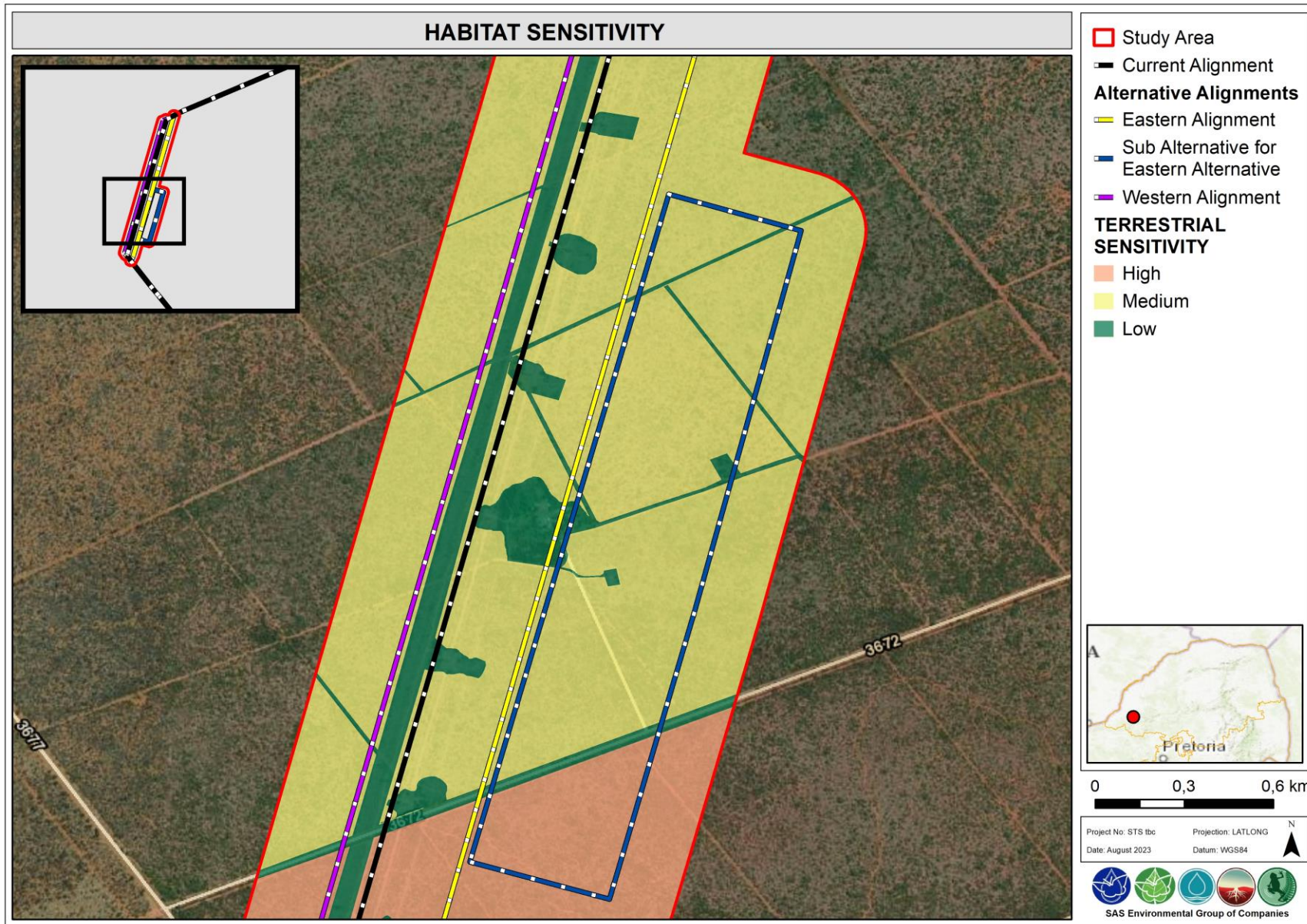


Figure 11: The current alignment and proposed rerouted alignments in relation to the habitat sensitivities - central section of the study area.



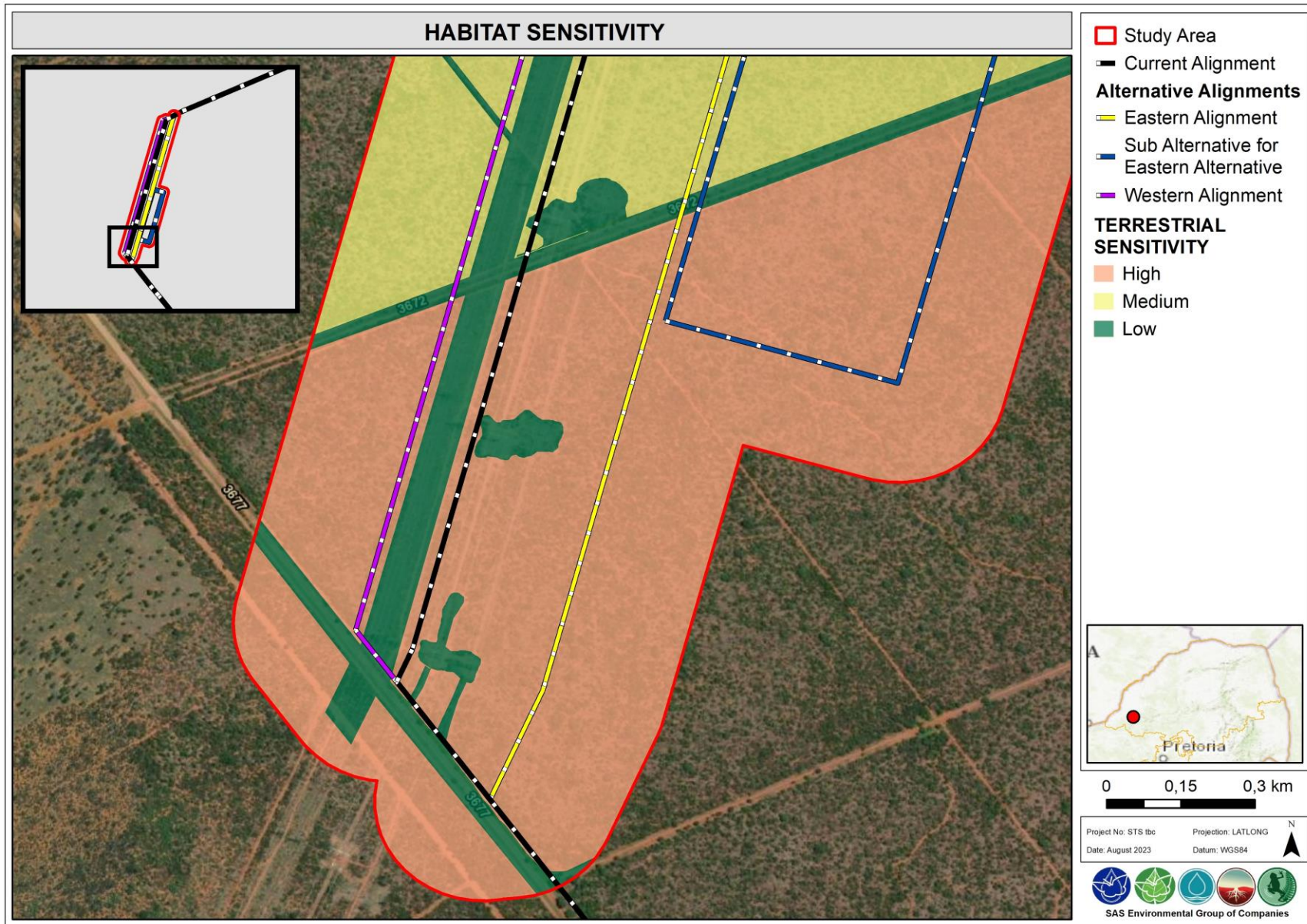


Figure 12: The current alignment and proposed rerouted alignments in relation to the habitat sensitivities - southern section of the study area.



6 IMPACT STATEMENT AND CONCLUDING REMARKS

The proposed alternatives will all impact on habitat that is of low, medium and/or high sensitivity. The impact is not anticipated to result in significant loss of floral habitat and species (no threatened ecosystems or threatened plant species present) given that the general mitigation measures and considerations from the previous report (STS 200032, 2021a) are adhered to. Several protected floral species (NFA and LEMA) are however likely to be impacted (regardless of the chosen alternative) and the necessary permits for the relocation or destruction of such species must be obtained for the chosen alternative. Refer to STS 200032 (2021a) for guidelines on rescue, relocation, and rehabilitation associated with protected flora.

The proposed alternatives will lead to habitat loss for faunal species, however the extent thereof is not expected to be significant, though it is acknowledged that post construction habitat conditions will unlikely be similar to that of pre-construction conditions. Habitat connectivity will be impacted upon during the construction phase, though this will be reinstated during the operational phase. It is important that all management and mitigation measure as stipulated in the previous specialist reports are adhered to and implemented. Further, management measures as per the Herpetofauna and invertebrate remediation action plan (STS, 210016) are to be implemented should any invertebrate or herpetofauna SCC be encountered.

The Limpopo CBA database has been updated since the previous assessments were undertaken and the Current Alignment as well as the proposed alternative alignments will impact on CBA 2 sites as well as ESA 1 sites. The Western Alignment will have the smallest impact on CBA and ESA sites (as it is more closely aligned to already disturbed areas), whereas the Eastern Alignment and Sub Alternative will have a slightly greater impact on these features. Both alternatives will, however, result in further fragmentation of the landscape whilst also impacting on dispersal corridors. Consultation with regional authorities regarding the suitability of the proposed alignments within affected CBAs and ESAs is needed.

The Eastern Alignment will impact upon a small artificial impoundment that collects stormwater runoff and functions as a game watering hole which may be an important feature for amphibian SCC whilst also serving as a seasonal source of water for faunal species, though it is noted this feature is artificial.



The results herein serve to provide the proponent with a brief overview of the biodiversity associated with the study area from a desktop perspective. At a high-level, this document also provides information that will serve to inform and guide the proponent as to the suitability of the proposed alternative alignments from a biodiversity resource management perspective.



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APPENDIX A: Indemnity and Terms of Use of this Report

The findings, results, observations, conclusions and recommendations given in this report are based on the author's best scientific and professional knowledge as well as available information. The report is based on survey and assessment techniques which are limited by seasonality, time and budgetary constraints relevant to the type and level of investigation undertaken as well as the project program and STS (Pty) Ltd. and its staff, at their sole discretion, reserve the right to modify aspects of the report including the recommendations if and when new information may become available from ongoing research or further work in this field or pertaining to this investigation.

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This report must not be altered or added to without the prior written consent of the author. This also refers to electronic copies of this report which are supplied for the purposes of inclusion as part of other reports, including main reports. Similarly, any recommendations, statements or conclusions drawn from or based on this report must make reference to this report. If these form part of a main report relating to this investigation or report, this report must be included in its entirety as an appendix or separate section to the main report.



APPENDIX B: Declaration and Specialists CV's

Christien Steyn
Chris Hooton
Stephen van Staden

MSc Plant Science (University of Pretoria)
BTech Nature Conservation (Tshwane University of Technology)
MSc Environmental Management (University of Johannesburg)

1. (A). (ii) The expertise of that specialist to compile a specialist report including a curriculum vitae

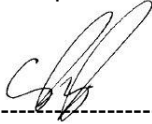
Company of Specialist:	Scientific Terrestrial Services (PTY) Ltd.		
Postal address:	PO. Box 751779, Gardenview		
Postal code:	2047	Fax:	086 724 3132
Telephone:	011 616 7893		
Name / Contact person:	Chris Hooton		
E-mail:	chris@sasenvgroup.co.za		
Qualifications	BTech Nature Conservation (Tshwane University of Technology) National Diploma Nature Conservation (Tshwane University of Technology)		
Name / Contact person:	Christien Steyn		
E-mail:	christien@sasenvgroup.co.za		
Qualifications	MSc (Plant Science) (University of Pretoria) BSc (Hons) Plant Science (University of Pretoria) BSc (Environmental Sciences) (University of Pretoria)		
Registration / Associations	Professional member of the South African Council for Natural Scientific Professions (SACNASP – Reg No. 127823/21) Member of the Botanical Society of South Africa (BotSoc) Member of the Grassland Society of South Africa (GSSA) Member of the Land Rehabilitation Society of Southern Africa (LARSSA) Member of the South African Association of Botanists (SAAB) Member of the South African Wildlife Management Association (SAWMA)		
Name / Contact person:	Stephen van Staden		
E-mail:	stephen@sasenvgroup.co.za		
Qualifications	MSc (Environmental Management) (University of Johannesburg) BSc (Hons) Zoology (Aquatic Ecology) (University of Johannesburg) BSc (Zoology, Geography and Environmental Management) (University of Johannesburg)		
Registration / Associations	Registered Professional Scientist at South African Council for Natural Scientific Professions (SACNASP) Accredited River Health Practitioner by the South African River Health Program (RHP) Member of the South African Soil Surveyors Association (SASSO) Member of the Gauteng Wetland Forum Member of the Gauteng Wetland Forum Member of International Association of Impact Assessors (IAIA) South Africa Member of the Land Rehabilitation Society of South Africa (LaRSSA)		



1. (b) a declaration that the specialist is independent in a form as may be specified by the competent authority

I, Chris Hooton, declare that -

- I act as the **independent specialist** 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 the specialist report relevant to this application, including knowledge of the relevant legislation and any guidelines that have relevance to the proposed activity;
- I will comply with the applicable legislation;
- I have not, 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;
- All the particulars furnished by me in this form are true and correct



Signature of the Specialist

I, Christien Steyn, declare that -

- I act as the **independent specialist** 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 the specialist report relevant to this application, including knowledge of the relevant legislation and any guidelines that have relevance to the proposed activity;
- I will comply with the applicable legislation;
- I have not, 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;
- All the particulars furnished by me in this form are true and correct



Signature of the Specialist



I, Stephen van Staden, declare that -

I act as the **independent specialist (reviewer)** 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;

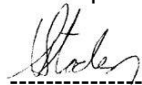
I have expertise in conducting the specialist report relevant to this application, including knowledge of the relevant legislation and any guidelines that have relevance to the proposed activity;

I will comply with the applicable legislation;

I have not, 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;

All the particulars furnished by me in this form are true and correct



Signature of the Specialist





SAS ENVIRONMENTAL GROUP OF COMPANIES – SPECIALIST CONSULTANT INFORMATION

CURRICULUM VITAE OF CHRISTOPHER HOOTON

PERSONAL DETAILS

Position in Company	Senior Scientist, Member Biodiversity Specialist
Joined SAS Environmental Group of Companies	2013

EDUCATION

Qualifications

BTech Nature Conservation (Tshwane University of Technology)	2013
National Diploma Nature Conservation (Tshwane University of Technology)	2008

AREAS OF WORK EXPERIENCE

South Africa – Gauteng, Mpumalanga, North West, Limpopo, KwaZulu-Natal, Eastern Cape, Western Cape, Northern Cape, Free State

Africa - Zimbabwe, Sierra Leone, Zambia

KEY SPECIALIST DISCIPLINES

Biodiversity Assessments

- Floral Assessments
- Faunal Assessments
- Biodiversity Actions Plan (BAP)
- Biodiversity Management Plan (BMP)
- Alien and Invasive Control Plan (AICP)
- Ecological Scan
- Protected Tree and Floral Marking and Reporting
- Biodiversity Offset Plan

Freshwater Assessments

- Freshwater Verification Assessment
- Freshwater (wetland / riparian) Delineation and Assessment
- Freshwater Eco Service and Status Determination
- Rehabilitation Assessment / Planning





SAS ENVIRONMENTAL GROUP OF COMPANIES – SPECIALIST CONSULTANT INFORMATION

CURRICULUM VITAE OF CHRISTOPHER HOOTON

PERSONAL DETAILS

Position in Company	Senior Scientist, Member Biodiversity Specialist
Joined SAS Environmental Group of Companies	2013

EDUCATION

Qualifications

BTech Nature Conservation (Tshwane University of Technology)	2013
National Diploma Nature Conservation (Tshwane University of Technology)	2008

AREAS OF WORK EXPERIENCE

South Africa – Gauteng, Mpumalanga, North West, Limpopo, KwaZulu-Natal, Eastern Cape, Western Cape, Northern Cape, Free State

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- Alien and Invasive Control Plan (AICP)
- Ecological Scan
- Protected Tree and Floral Marking and Reporting
- Biodiversity Offset Plan

Freshwater Assessments

- Freshwater Verification Assessment
- Freshwater (wetland / riparian) Delineation and Assessment
- Freshwater Eco Service and Status Determination
- Rehabilitation Assessment / Planning





SAS ENVIRONMENTAL GROUP OF COMPANIES – SPECIALIST CONSULTANT INFORMATION

CURRICULUM VITAE OF CHRISTIEN STEYN

PERSONAL DETAILS

Position in Company	Floral Ecologist
Joined SAS Environmental Group of Companies	2018

MEMBERSHIP IN PROFESSIONAL SOCIETIES

Professional member of the South African Council for Natural Scientific Professions (SACNASP – Reg No. 127823/21)

Member of the Botanical Society of South Africa (BotSoc)

Member of the Grassland Society of South Africa (GSSA)

Member of the Land Rehabilitation Society of Southern Africa (LARSSA)

Member of the South African Association of Botanists (SAAB)

Member of the South African Wildlife Management Association (SAWMA)

EDUCATION

Qualifications

MSc Plant Science (University of Pretoria)	2017
BSc (Hons) Plant Science (Invasion Biology) (University of Pretoria)	2014
BSc Environmental Science (University of Pretoria)	2013

Short courses and Training

- BotSoc Branch: Species Environmental Assessment Guidelines Course (2022).
- Advanced Grass Identification Course (2021).
- Practical Plant Identification, including Herbarium Usage and Protocols.
- Vegetation Classification and Mapping: Use of Geographic Information System for understanding vegetation pattern and biodiversity conservation.
- Introduction to Statistics for Biologists: Applications of plant ecology principles in plant conservation, i.e., species distribution modelling, alien plant invasions, conservation planning.
- International Plant Functional Trait Course: Hands-on, field-based exploration of plant functional traits, along with experience in the usage of plant traits data in climate-change research and ecosystem ecology. <https://www.uib.no/en/rg/EECRG/97477/plant-functional-traits-course-2>

AREAS OF WORK EXPERIENCE

South Africa – Gauteng, Mpumalanga, North West, Limpopo, KwaZulu-Natal, Northern Cape, Free State

KEY SPECIALIST DISCIPLINES

Biodiversity Assessments

- Terrestrial Ecological and Biodiversity Scoping Assessments
- Terrestrial Ecological and Biodiversity Screening Assessments
- Floral Assessments
- Input into Terrestrial Rehabilitation Plan design with the focus on the re-establishment of vegetation
- Floral Rescue and Relocation Plans
- Alien and Invasive Plant Control and Management Plans (AIPCPs)
- Alien and Invasive Plant Identification and awareness training
- Terrestrial Monitoring
- Protected Tree and Floral Marking and Reporting
- Desktop Studies, Mapping and Background Information Research





SAS ENVIRONMENTAL GROUP OF COMPANIES – SPECIALIST CONSULTANT INFORMATION

CURRICULUM VITAE OF **STEPHEN VAN STADEN**

PERSONAL DETAILS

Position in Company	Group CEO, Water Resource Discipline Lead, Managing Member, Ecologist, Aquatic Ecologist
Joined SAS Environmental Group of Companies	2003 (year of establishment)

MEMBERSHIP IN PROFESSIONAL SOCIETIES

Registered Professional Scientist at South African Council for Natural Scientific Professions (SACNASP)
Accredited River Health Practitioner by the South African River Health Program (RHP)
Member of the South African Soil Surveyors Association (SASSO) Member of the Gauteng Wetland Forum
Member of the Gauteng Wetland Forum
Member of International Association of Impact Assessors (IAIA) South Africa;
Member of the Land Rehabilitation Society of South Africa (LaRSSA)

EDUCATION

Qualifications

MSc Environmental Management (University of Johannesburg)	2003
BSc (Hons) Zoology (Aquatic Ecology) (University of Johannesburg)	2001
BSc (Zoology, Geography and Environmental Management) (University of Johannesburg)	2000

Short Courses

Integrated Water Resource Management, the National Water Act, and Water Use Authorisations, focusing on WULAs and IWWMPs	2017
Tools for Wetland Assessment (Rhodes University)	2017
Legal liability training course (Legricon Pty Ltd)	2018
Hazard identification and risk assessment training course (Legricon Pty Ltd)	2018
Wetland Management: Introduction and Delineation (WLID1502S) (University of the Free State)	2018
Hydropedology and Wetland Functioning (TerraSoil Science and Water Business Academy)	2018

AREAS OF WORK EXPERIENCE

South Africa – All Provinces

Southern Africa – Lesotho, Botswana, Mozambique, Zimbabwe Zambia

Eastern Africa – Tanzania Mauritius

West Africa – Ghana, Liberia, Angola, Guinea Bissau, Nigeria, Sierra Leona

Central Africa – Democratic Republic of the Congo

DEVELOPMENT SECTORS OF EXPERIENCE

1. Mining: Coal, chrome, Platinum Group Metals (PGMs), mineral sands, gold, phosphate, river sand, clay, fluorspar
2. Linear developments (energy transmission, telecommunication, pipelines, roads)
3. Minerals beneficiation
4. Renewable energy (Hydro, wind and solar)
5. Commercial development
6. Residential development
7. Agriculture
8. Industrial/chemical

KEY SPECIALIST DISCIPLINES

Legislative Requirements, Processes and Assessments

- Water Use Applications (Water Use Licence Applications / General Authorisations)
- Environmental and Water Use Audits
- Freshwater Resource Management and Monitoring as part of EMPr and WUL conditions

Freshwater Assessments

- Freshwater (wetland / riparian) Delineation and Assessment
- Freshwater Eco Service and Status Determination
- Rehabilitation Assessment / Planning



- Maintenance and Management Plans
- Plant Species and Landscape Plans
- Freshwater Offset Plans
- Hydropedological Assessment
- Pit Closure Analysis
- Aquatic Ecological Assessment and Water Quality Studies**
- Habitat Assessment Indices (IHAS, HRC, IHIA & RHAM)
- Aquatic Macro-Invertebrates (SASS5 & MIRAI)
- Fish Assemblage Integrity Index (FRAI)
- Fish Health Assessments
- Riparian Vegetation Integrity (VEGRAI)
- Toxicological Analysis
- Water quality Monitoring
- Screening Test
- Riverine Rehabilitation Plans
- Biodiversity Assessments**
- Floral Assessments
- Biodiversity Actions Plan (BAP)
- Biodiversity Management Plan (BMP)
- Alien and Invasive Control Plan (AICP)
- Ecological Scan
- Terrestrial Monitoring
- Biodiversity Offset Plan
- Soil and Land Capability Assessment**
- Soil and Land Capability Assessment
- Hydropedological Assessment
- Visual Impact Assessment**
- Visual Baseline and Impact Assessments
- Visual Impact Peer Review Assessments

