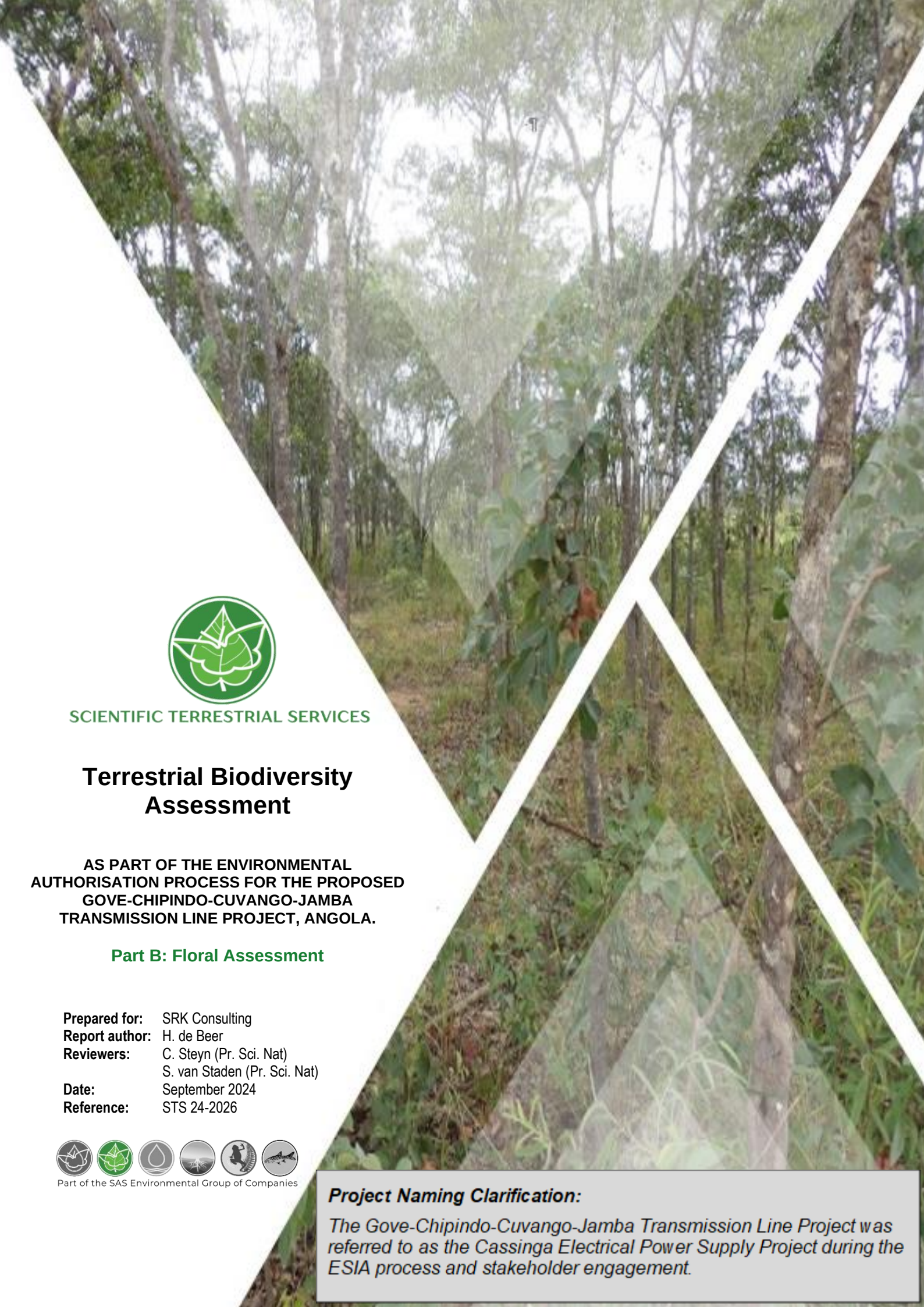

SCIENTIFIC TERRESTRIAL SERVICES

Terrestrial Biodiversity Assessment

AS PART OF THE ENVIRONMENTAL AUTHORISATION PROCESS FOR THE PROPOSED GOVE-CHIPINDO-CUVANGO-JAMBA TRANSMISSION LINE PROJECT, ANGOLA.

Part B: Floral Assessment

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Reference:	STS 24-2026

Part of the SAS Environmental Group of Companies

Project Naming Clarification:

The Gove-Chipindo-Cuvango-Jamba Transmission Line Project was referred to as the Cassinga Electrical Power Supply Project during the ESIA process and stakeholder engagement.

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ACRONYMS

AIP	Alien and Invasive Plant
AoL	Area of Influence
BI	Biodiversity Importance
CH	Critical Habitat
CI	Conservation Importance
CR	Critically Endangered
EAP	Environmental Assessment Practitioner
ECO	Environmental Control Officer
EIS	Ecological Importance and Sensitivity
EN	Endangered
EOO	Extent of Occurrence
ESIA	Environmental and Social Impact Assessment
ESMP	Environmental and Social Management Plan
FI	Functional Integrity
GPS	Global Positioning System
Ha	Hectares
IEM	Integrated Environmental Management
IFC	International Finance Corporation
IUCN	International Union for Conservation of Nature
KBA	Key Biodiversity Areas
km	kilometres
km^2	square kilometres
KPI	Key performance indicator
kV	Kilovolt
LC	Least Concern
m	metre
MINAMB	Ministry of Environment
MINEA	Ministry of Energy and Water
MEA	Millennium Ecosystem Assessment
MVA	Megavolt-amperes
OHL	Overhead Line
PES	Present Ecological State
PPE	Personal Protective Equipment
PS	Performance Standard
POC	Probability of Occurrence
RR	Receptor Resilience
SACNASP	South African Council for Natural Scientific Professions
SCC	Species of Conservation Concern
SEI	Site Ecological Importance
STS	Scientific Terrestrial Services [Pty] Ltd
VU	Vulnerable

GLOSSARY OF TERMS

Area of Influence (AoI)	AoL refers to all geographical regions and resources that could be impacted by a project's activities, extending beyond the immediate project site to include surrounding environments and communities. This concept encompasses direct and indirect effects on land, water, air, biodiversity, and local populations. By defining the AoI, organizations can ensure that potential environmental and social impacts are thoroughly assessed and managed, promoting responsible and sustainable development practices.
Biodiversity importance (BI)	BI of the receptor (e.g., species of conservation concern, the vegetation/fauna community or habitat type present on the site[1]) and its resilience to impacts (receptor resilience [RR])
Conservation Importance (CI)	CI is evaluated in accordance with recognised established internationally acceptable principles and criteria for the determination of biodiversity-related value, including the International Union for the Conservation of Nature (IUCN) Red List of Species, Red List of Ecosystems and Key Biodiversity Areas (KBA; IUCN [2016]).
Corridor (van Wilgen et al., 2020)	A dispersal route or a physical connection of suitable habitats linking previously unconnected regions.
Critically Endangered (CR) (IUCN Red List category) (Skowno et al., 2019)	**Applied to both species/taxa and ecosystems**: A species is CR when the best available evidence indicates that it meets at least one of the five IUCN criteria for CR, indicating that the species is facing an extremely high risk of extinction. CR ecosystem types are at an extremely high risk of collapse. Most of the ecosystem type has been severely or moderately modified from its natural state. The ecosystem type is likely to have lost much of its natural structure and functioning, and species associated with the ecosystem may have been lost. CR species are those considered to be at extremely high risk of extinction.
Degradation (Skowno et al., 2019)	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 (van Wilgen et al., 2020)	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) (Lead, 2005)	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.
Endangered (EN) (Red List category) (Skowno et al., 2019)	**Applied to both species/taxa and ecosystems**: A species is EN when the best available evidence indicates that it meets at least one of the five IUCN criteria for EN, indicating that the species is facing a very high risk of extinction. EN ecosystem types are at a very high risk of collapse. EN species are those considered to be at very high risk of extinction.
Functional Integrity (FI)	FI is: 'A measure of the ecological condition of the impact receptor as determined by its remaining intact and functional area, its connectivity to other natural areas and the degree of current persistent ecological impacts.'
Ground truth	To check the accuracy of (remotely sensed data) by means of in-situ observations.
Integrity (ecological)	The integrity of an ecosystem refers to its functional completeness, including its components (species) its patterns (distribution) and its processes.
Invasive species (ecological) (van Wilgen et al., 2020)	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.
Least Threatened	Least threatened ecosystems are still largely intact.

[1] Note that the habitat type may be independent of the vegetation community and that it may even be artificial, e.g., excavated rock quarries that provide crucial breeding habitat for cliff-nesting species such as Bald Ibis.

Native species (syn. Indigenous species)	See Indigenous Species
Receptor Resilience (RR)	RR is defined here as: 'The intrinsic capacity of the receptor to resist major damage from disturbance and/or to recover to its original state with limited or no human intervention
Species of Conservation Concern (SCC)	The term SCC in the context of this report refers to all IUCN listed threatened species as well as protected species of relevance to the project.
Site Ecological Importance (SEI)	SEI is considered to be a function of the biodiversity importance (BI) of the receptor (e.g., SCC, the vegetation/fauna community or habitat type present on the site) and its resilience to impacts (RR).
Threatened species	A species that has been classified as CR, EN or Vulnerable (VU), based on a conservation assessment, 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.
VU (Red List category) (Skowno et al., 2019)	Applied to both species/taxa and ecosystems: A species is VU when the best available evidence indicates that it meets at least one of the five IUCN criteria for VU, indicating that the species is facing a high risk of extinction. An ecosystem type is VU when the best available evidence indicates that it meets any of the criteria A to E for VU and is then considered to be at a high risk of collapse.

1 INTRODUCTION

Scientific Terrestrial Services (Pty) Ltd (STS) was appointed to conduct faunal and floral ecological assessments as part of the Environmental and Social Impact Assessment (ESIA) process for the proposed Gove-Chipindo-Cuvango-Jamba Transmission Line Project (*referred to as the Cassinga Electrical Power Supply Project during the ESIA process and stakeholder engagement*) (the Project) in Angola, henceforth referred to as the "study area".

The purpose of this report is to define the floral ecology of the study area, to identify areas of increased Ecological Importance and Sensitivity (EIS), as well as the mapping of such areas, and to describe the Present Ecological State (PES) of the study area as well as to collect sufficient data to define the site in terms of the International Finance Corporation (IFC) Performance Standards (2012).

This report (Part B) aims to map, consider, and describe the floristic assemblages associated with the study area according to data gathered during the summer survey conducted over five days in April 2024. In doing so, this report must guide the proponent, Environmental Assessment Practitioner (EAP), and regulating authorities, by means of the presentation of information on the baseline conditions[2], as to the management of the proposed project from an ecological risk management point of view as well as provide mitigation and management measures to manage potential and existing impacts.

1.1 Project Location

The study area is located south of the centre of Angola, namely, in the provinces of Huila and Huambo (Figures 1 and 2). The proposed powerline extends for about 170 kilometres (km), crossing six municipalities which include Jamba, Kuvango, Dongo, Galangue, Chipindo, and Kalima.

The main works will be carried out largely in Huila Province near the Gove Hydro Dam (Huambo) and extend for 135 km with an Overhead Line (OHL) of 220 kilovolt (kV) to Cuvango, where a new 220/30 kV substation will be built. A new 220/30 kV substation will also be built for distribution in Chipindo along with the construction of a 220 kV OHL from Cuvango to Jamba, with an approximate length of 35 km. A new 220/30 kV – 20 megavolt-amperes (MVA) substation will be constructed in Jamba. In addition, the infrastructure associated with the electrification of villages at Chipindo, Cuvango, and Jamba will be constructed.

[2] Conditions that currently exist. Also called "existing conditions".

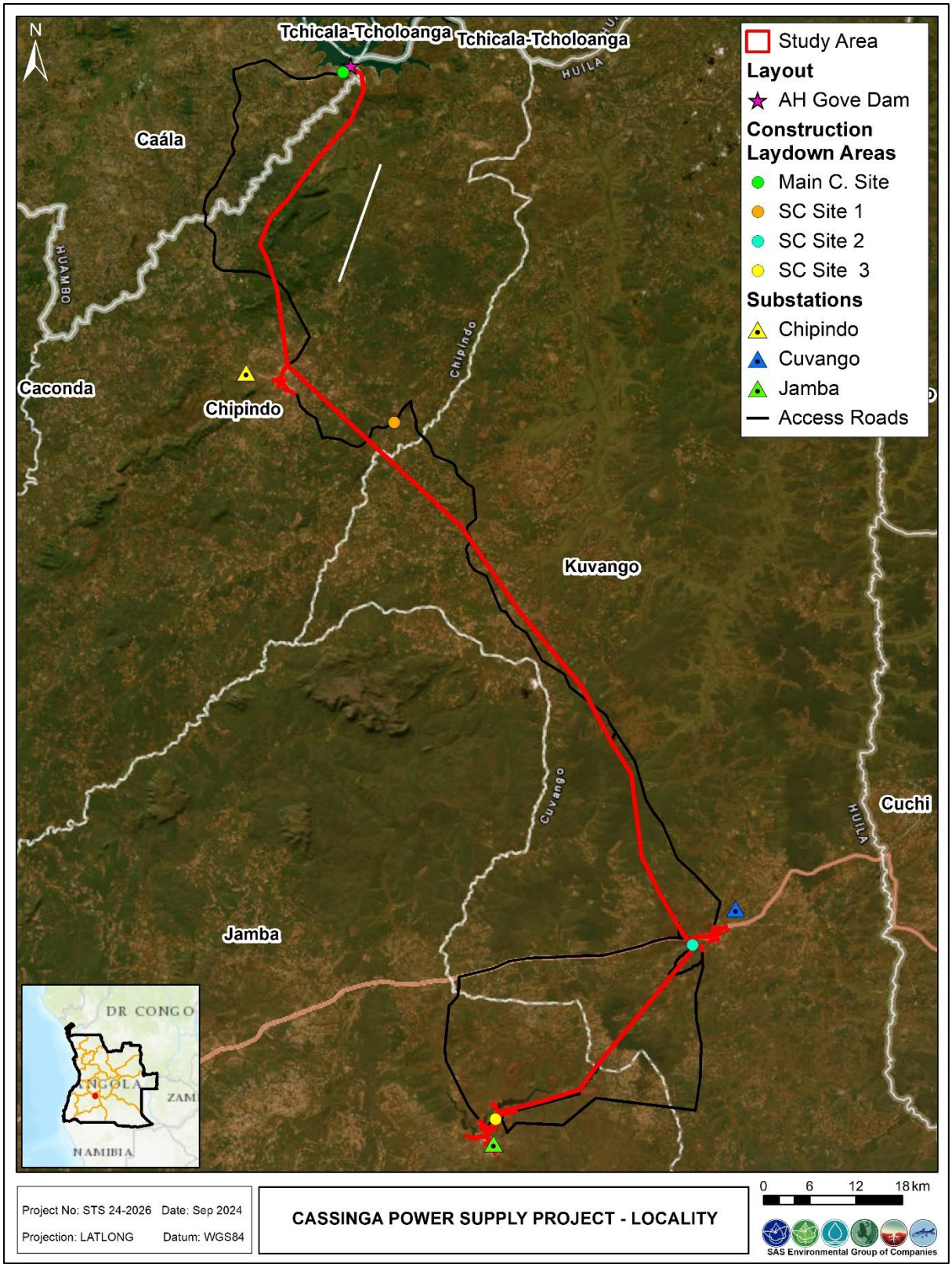


Figure 1: Digital satellite image depicting the location of the study area associated with the proposed powerline project in relation to the surrounding area.

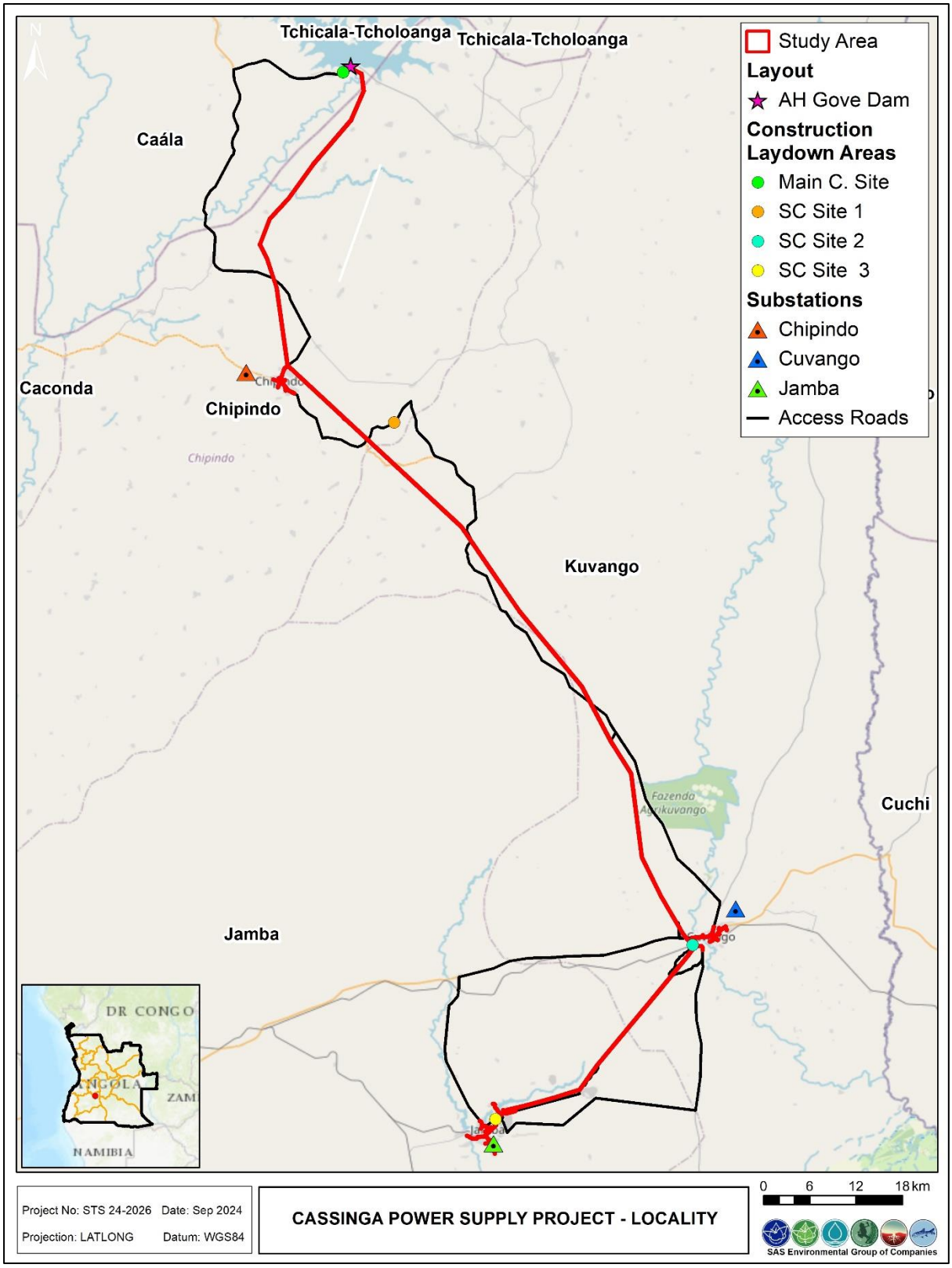


Figure 2: The study area associated with the proposed powerline project depicted on a topographical map in relation to the surrounding area.

1.2 Legislative Requirements, National and International Guidelines

The following legislation was taken into consideration during the assessment (Refer to Appendix E for further detail). The following section has been compiled from the online data resources and previous studies conducted in Angola:

- The Constitution of the Republic of Angola (2010);
- Law No. 5/98 - Environment Framework Law;
- Law No. 6/17 - General Framework Law on Forests and Wildlife;
- Law No. 6/02 – Water Law;
- Law No. 9/04 – Land Law;
- Presidential Decree No. 117/20 - General Regulation for Environmental Impact Assessment and Environmental Licensing Procedures;
- Presidential Decree No. 26/20 (National Biodiversity Strategy and Action Plan 2019-2025);
- Executive Decree No. 469/15 on the slaughter prohibition in the national territory of protected species of the fauna and wild flora;
- Presidential Decree No. 194/11 - Environmental Damage Regulations;
- Presidential Decree No. 261/11 on Water Quality;
- Executive Decree No. 252/18 approving the Red List of Animal and Plant Species of Angola;
- Presidential Decree No. 171/18 on Forestry Regulations;
- Equator Principles Version 4 (2020);
- IFC Environmental Health and Safety General Guidelines (2007); and
- IFC Performance Standards (2012).

1.3 Scope of Work

Specific outcomes in terms of the report are as follows:

- To determine and describe habitat types, communities and the ecological state of the sites associated with the study area and to rank each habitat type based on conservation importance and ecological sensitivity;
- To provide inventories of floral species as encountered within the study area;
- To identify and consider all sensitive landscapes such as indigenous forests, rocky ridges, wetlands;
- To conduct a floral species assessment with focus on species listed under the International Union for Conservation of Nature (IUCN) as well as an assessment of

other Species of Conservation Concern (SCC), including the potential for such species to occur within the study area;

- To provide detailed information to guide the activities associated with the proposed development within the study area;
- To ensure the ongoing functioning of the ecosystem in such a way as to support local and regional conservation requirements, to allow regional and national biodiversity targets to be met, and the provision of ecological services in the local area is sustained;
- To provide descriptions pertaining to habitat types from a floral perspective, communities and the ecological state of the study area and to define the sensitivity of each habitat based on the SANBI Site Ecological Importance (SEI) method;
- To provide detailed information on preserving and enhancing ecosystem services by protecting local plant species, maintaining biodiversity, and ensuring the integrity of important habitats for water filtration, carbon sequestration, and soil stabilization throughout the proposed project; and
- To define the various habitat units in accordance with the IFC guidelines.

1.4 Assumptions and Limitations

The following assumptions and limitations are applicable to this report:

- The floral assessment is confined to the proposed Project and associated infrastructure and does not include the neighbouring and adjacent properties. The immediate surroundings were, however, included in the desktop analysis of which the results are presented in **Part A: Section 3**;
- The floral assessment was primarily based within the study area, however, due to access/movement restrictions, where the OHL could not be accessed, representative sites in the adjacent areas were assessed as proxies. The study area surroundings were also considered in terms of floral habitat and species diversity;
- Due to the increased risk of land mines along the proposed study area, on-foot investigations were restricted and often confined to cleared areas deemed safe to access by the de-mining team present. Such restrictions limited extensive on-foot investigations of the study area;
- In terms of site surveys along the OHL, the corridor width was assessed as 200 meters (m) (i.e., 100 m either side of the OHL); and
- Sampling by its nature means that not all individuals are assessed and identified. With ecology being dynamic and complex, some aspects (some of which may be important) may have been overlooked. A field assessment was undertaken from the 6th to the 10th of April 2024 (summer / wet season) and from the 15th to the 18th of July 2024 (winter

/ dry season). Moreover, on-site data was augmented with all available desktop data to improve on the overall understanding of the assessment area's floral ecology. The inclusion of a wet and dry floral assessment is deemed suitable for the purposes of an informed decision-making processes.

1.5 Information sources

Various online databases were consulted to gather information supporting the floral assessment, recognising that species data and occurrences for Angola may not be comprehensive. The available data is deemed adequate for the proposed Project, supplemented by desktop analysis using Google Earth Pro satellite imagery and consultation of databases and websites for floral SCC:

- Executive Decree No. 252/18 that approves the Red List of Species of Angola;
- Global Biodiversity Information Facility - https://www.gbif.org/;
- IUCN Redlist - https://www.iucnredlist.org/;
- iNaturalist - https://www.inaturalist.org/;
- Earth's Endangered Creatures - http://www.earthsendangered.com/index.asp; ; and
- Previous studies undertaken by STS within Angola
- Angola red list for plants (2018).

2 ASSESSMENT APPROACH

Initially, a desktop study was undertaken to gather background information regarding the site and its surrounding areas. This involved consulting maps, aerial photographs, and digital satellite images in order to determine broad habitats and sensitive sites; a literature review concerning habitats, vegetation types, floral species distributions and identifying the status of the land as well as conservation requirements and nearby conservation and protected areas. Following this, both wet and dry season field assessments were undertaken, during which the data gathered during the desktop assessment phase was utilised to confirm the presence or absence of potentially sensitive habitats and to compile floral species inventories for each habitat unit. Photographs were captured depicting each vegetation community representative of its typical structure, alongside images documenting all detected SCC.

The species lists generated during the field assessments include potential floral SCC, alien and invasive plant (AIP) species, as well as medicinal species. Detailed explanations of the floral methods of assessment are provided in **Appendix A** of this report.

Ecosystem services – **the benefits that people and/or a project (the beneficiaries) obtain from ecosystems –** were also assessed as part of the flora study. In the strictest sense, without beneficiaries, there are no ecosystem services. The benefits gained can be either physical or psychological, and can be obtained actively or passively, directly or indirectly. For the purposes of this assessment, the definitions of ecosystem services were based on those developed by the *Millennium Ecosystem Assessment* (MEA, 2005):

- Cultural services: Aesthetic, spiritual, recreational, and other cultural values, e.g., sacred sites, recreation, sense of place;
- Provisioning services: Supporting human needs, e.g., medicinal plants and minerals utilisation, water sources, fire wood;
- Regulating services: Control of the natural environment, e.g., maintenance of key ecological processes, protected areas, habitat of special value, groundwater recharge, catchments; and
- Supporting services: Natural processes essential to the resilience and functioning of ecosystems. e.g., primary production, soil formation and nutrient cycling.

These definitions were chosen to keep consistency with the IFC's Performance Standards (PS), and because they are widely recognised.

3 PROJECT ACTIVITIES POSING POTENTIAL IMPACTS

Vegetation clearance of floral habitat as part of the construction activities will impact on floral diversity, ecosystem services and nutrient cycling and fragmentation of floral habitat, resulting in a decrease in habitat connectivity. The increased presence of humans during the construction and operation of the proposed project will likely result in harvesting of floral species, including floral SCC, and irregular fires resulting in loss of habitat and floral species diversity. Additionally, there is a risk of introducing and spreading AIP species, further altering the floral diversity.

4 RESULTS OF THE FLORAL ASSESSMENTS

The reference vegetation type associated with the study area is Woodland (White, 1983) and typically comprise of open stands of trees that are up to eight m high but never densely locking, whereas the field layer is often dominated by grasses (Kindt, *et al*.,2012). During the field assessments, a number of habitat units were identified and refined from the reference state to indicate variation in habitat integrity, species diversities, and vegetation structure. These habitat units are:

- **Miombo Woodland Habitat (± 1953 hectares (ha) within the study area)**, comprising several deciduous[3] tree species, where trees exceeded eight (8) m in height, with large predominantly interlinking canopies. This habitat unit was observed primarily in areas further away from communities within the study area. This habitat however is continually being impacted upon and decreasing in extent due to the harvesting of timber for informal charcoal production, leading to the ongoing transformation of miombo woodland species and fragmentation of this habitat;
- **Secondary Miombo Habitat (± 947 ha within the study area)**. The characteristics of this habitat unit were varied, with some of the more degraded areas being noted to have fewer characteristic/typical miombo floral species. This habitat unit is in a state of secondary succession, the floral species diversity is less species rich, and consequently supports a lower diversity and abundance of floral species;
- **Freshwater Habitat (± 307 ha within the study area)**, comprising of rivers, flood plain wetlands, channelled valley bottom wetlands, unchanneled valley bottom wetland, and dambos (seasonally or permanently wet grassy valleys). This habitat unit has been notably impacted upon as a result of vegetation clearance for agriculture (grazing and crop cultivation). The dambos and rivers convey large amounts of water through the study area, however the large-scale removal of vegetation has resulted in increased peak water flows leading to erosion within the dambos and that of the riverbanks; and
- **Transformed Habitat (± 973 ha within the study area).** Includes cultivated fields and areas where vegetation has been cleared within and around villages, serving to facilitate increased grazing for livestock. This occurs both in proximity to villages and at more distant locations where new fields are being cleared. In the northern section of the study area the proposed powerline goes through plantations of *Eucalyptus* sp.

These habitat units are described in the sections below and depicted in Figures 3 – 18 (maps are presented from the northern to southern extent of the OHL).

[3] (of a tree or shrub) shedding its leaves annually.

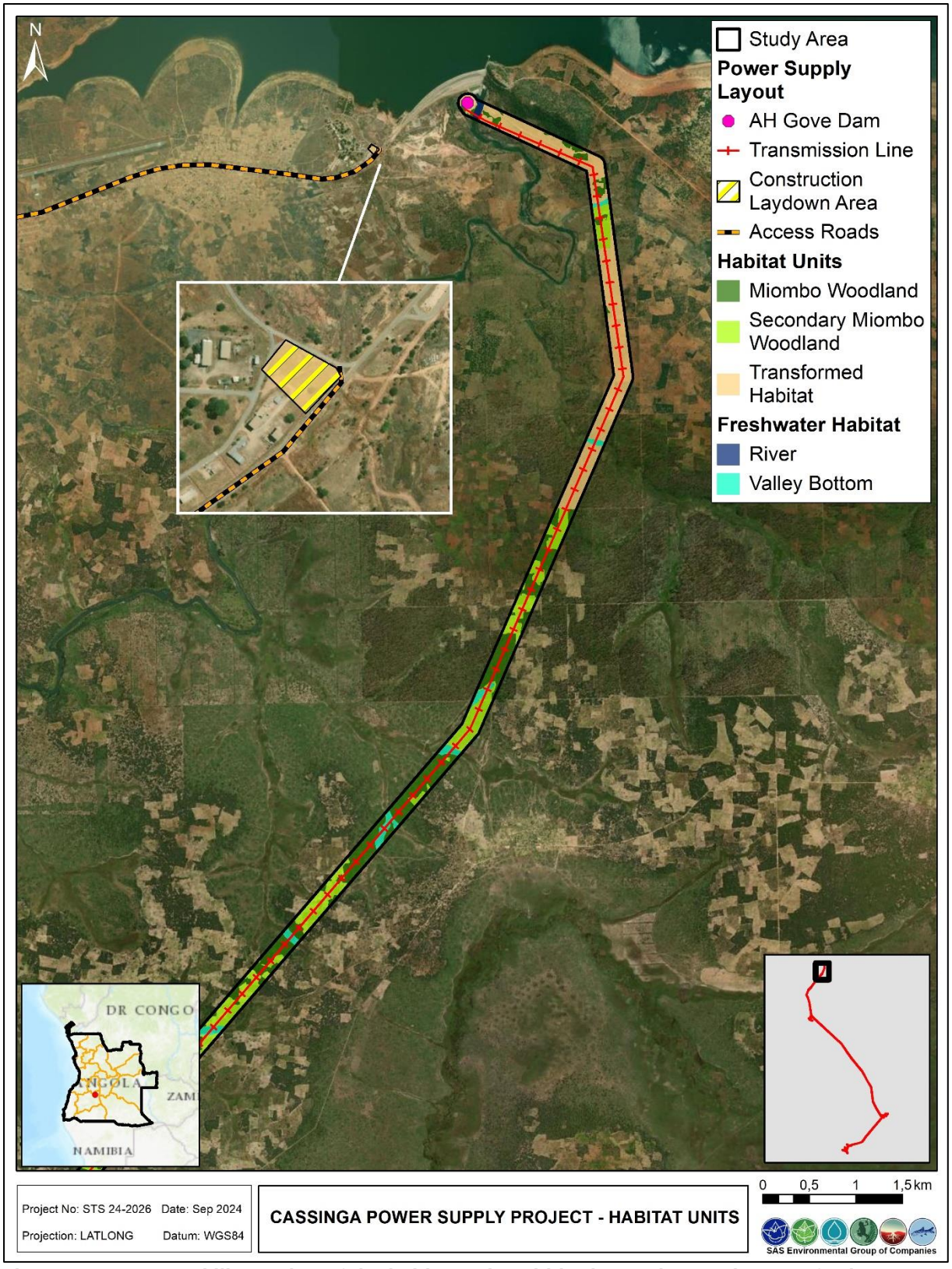


Figure 3: Conceptual illustration of the habitat units within the study area (Map 1 of 16).

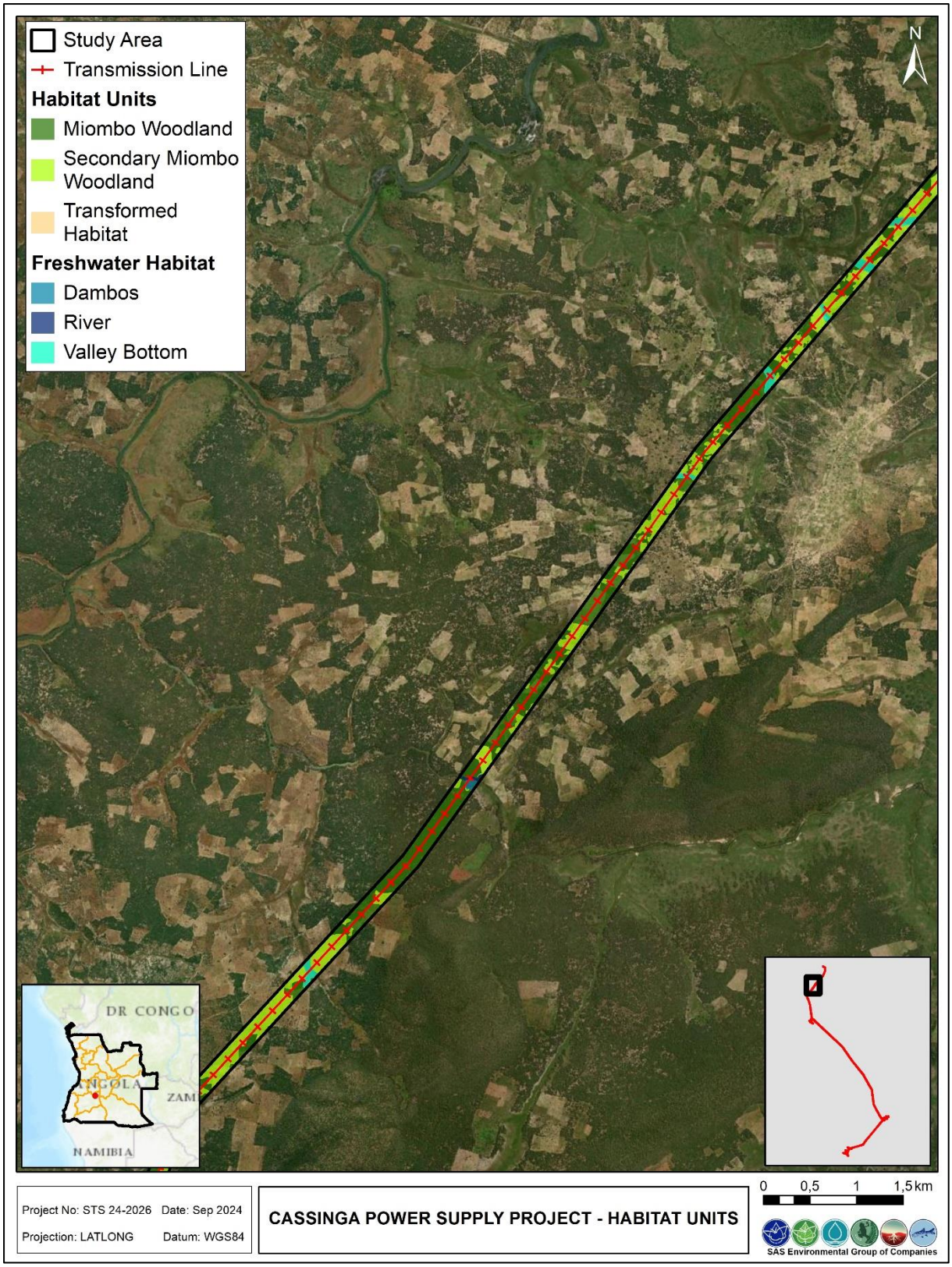


Figure 4: Conceptual illustration of the habitat units within the study area (Map 2 of 16).

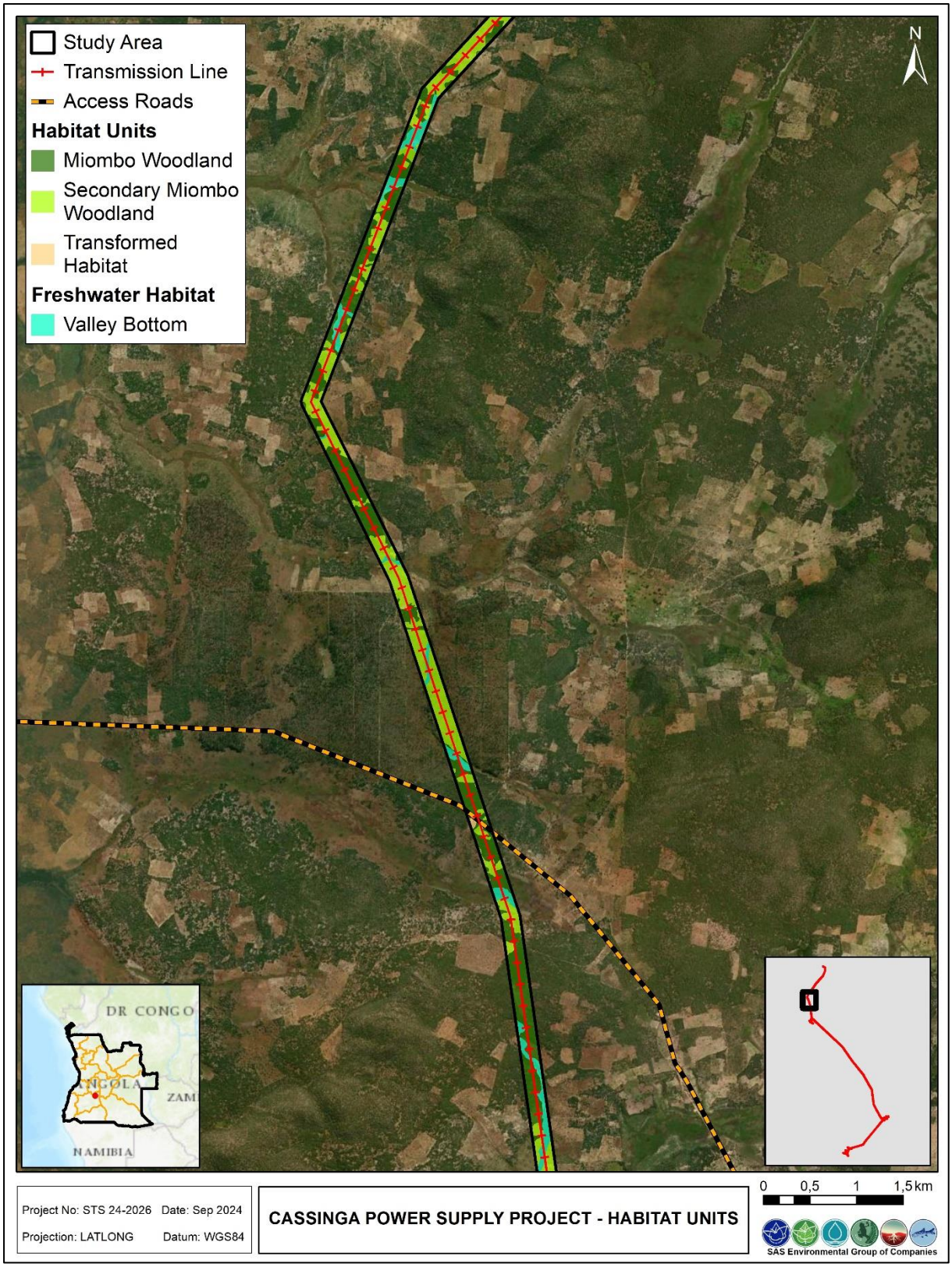


Figure 5: Conceptual illustration of the habitat units within the study area (Map 3 of 16).

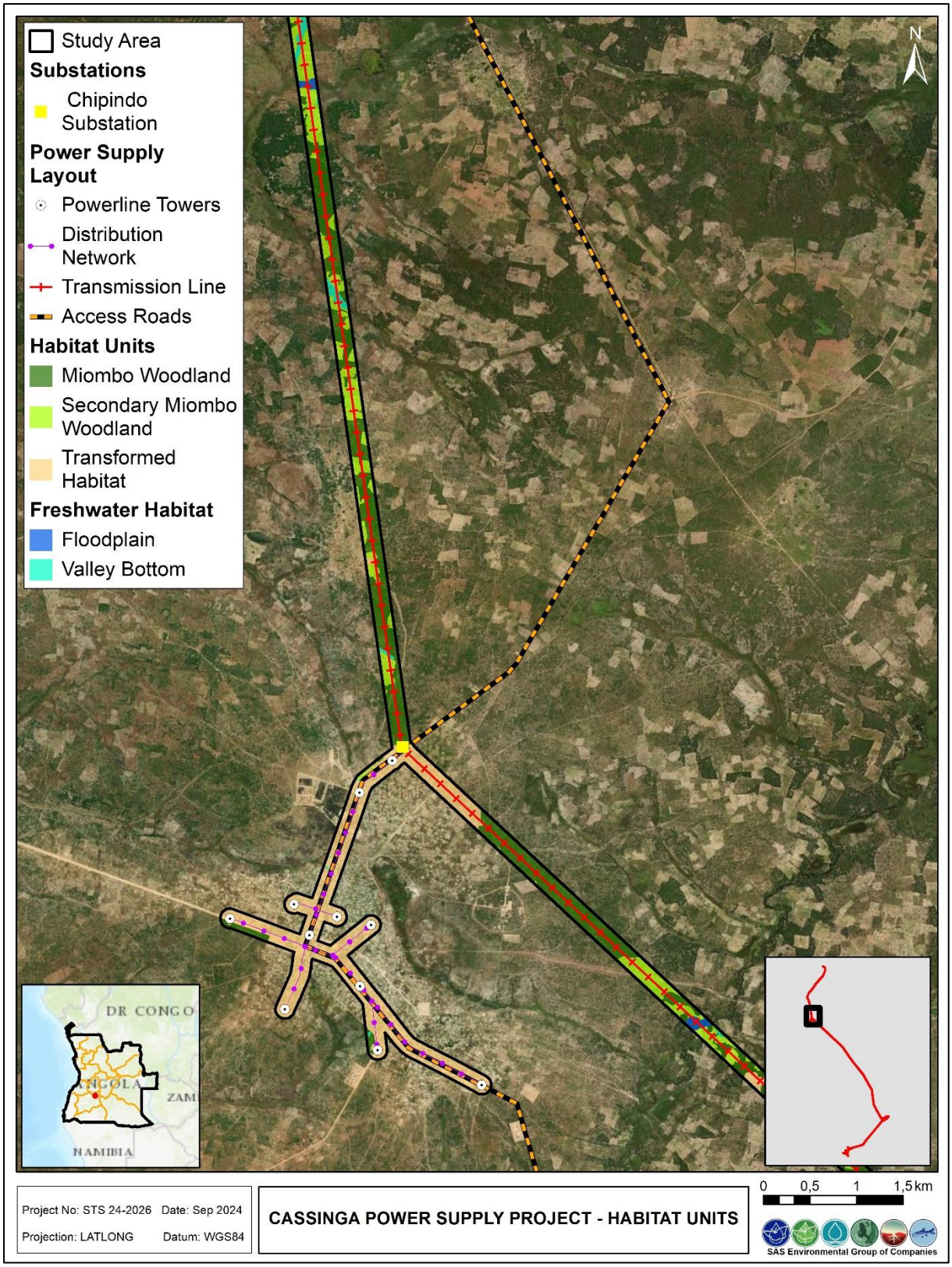


Figure 6: Conceptual illustration of the habitat units within the study area (Map 4 of 16).

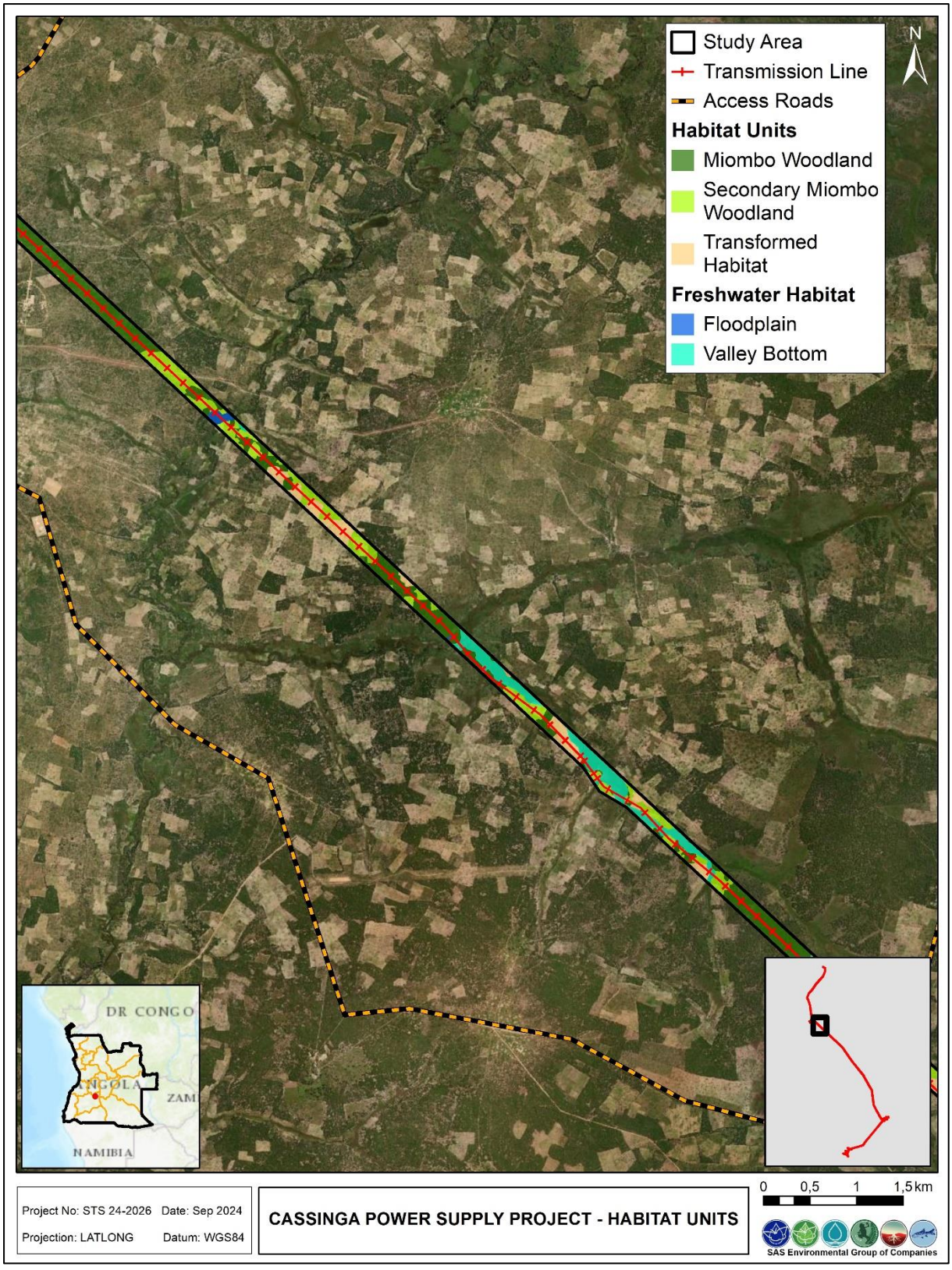


Figure 7: Conceptual illustration of the habitat units within the study area (Map 5 of 16).

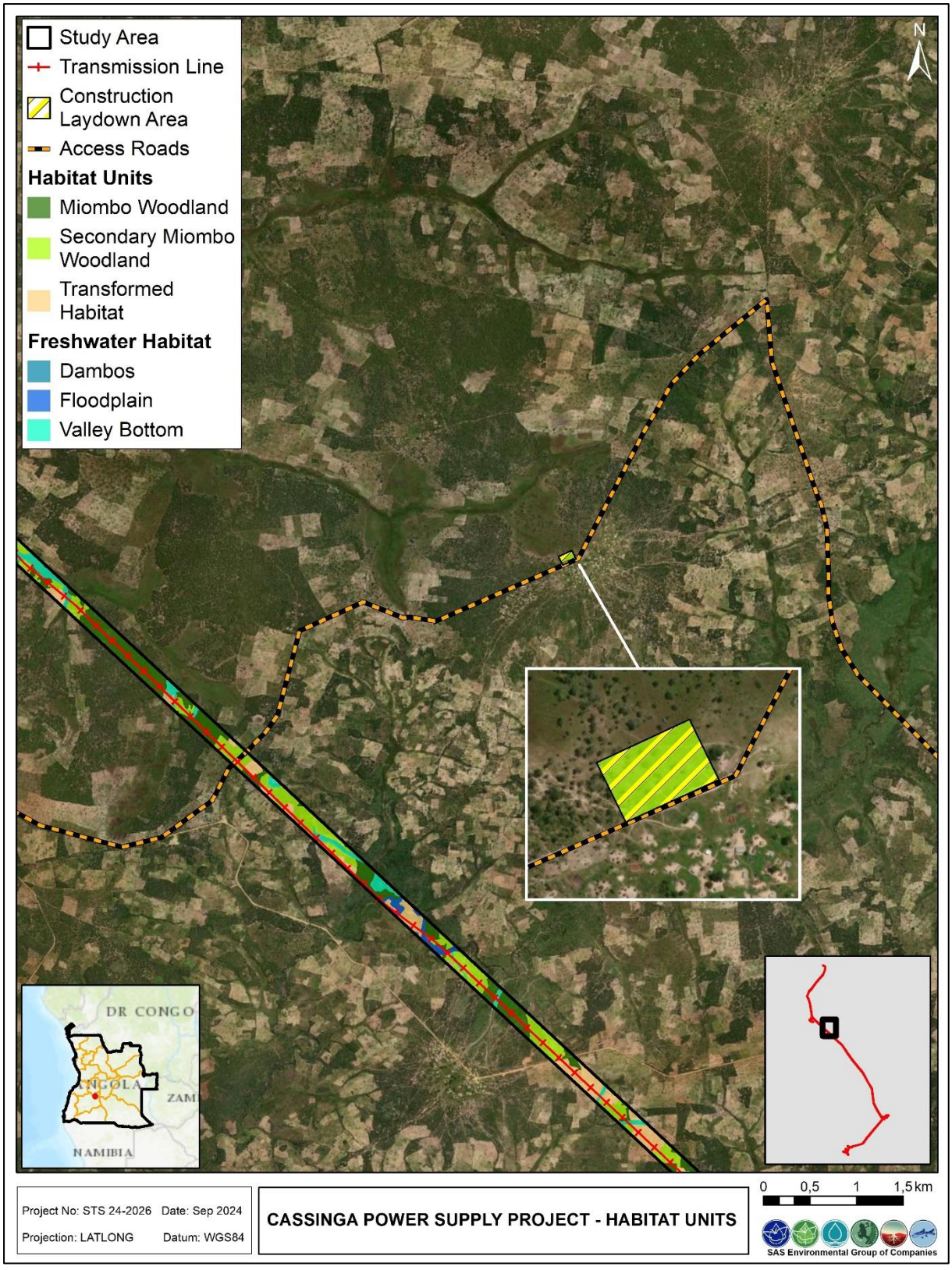


Figure 8: Conceptual illustration of the habitat units within the study area (Map 6 of 16).

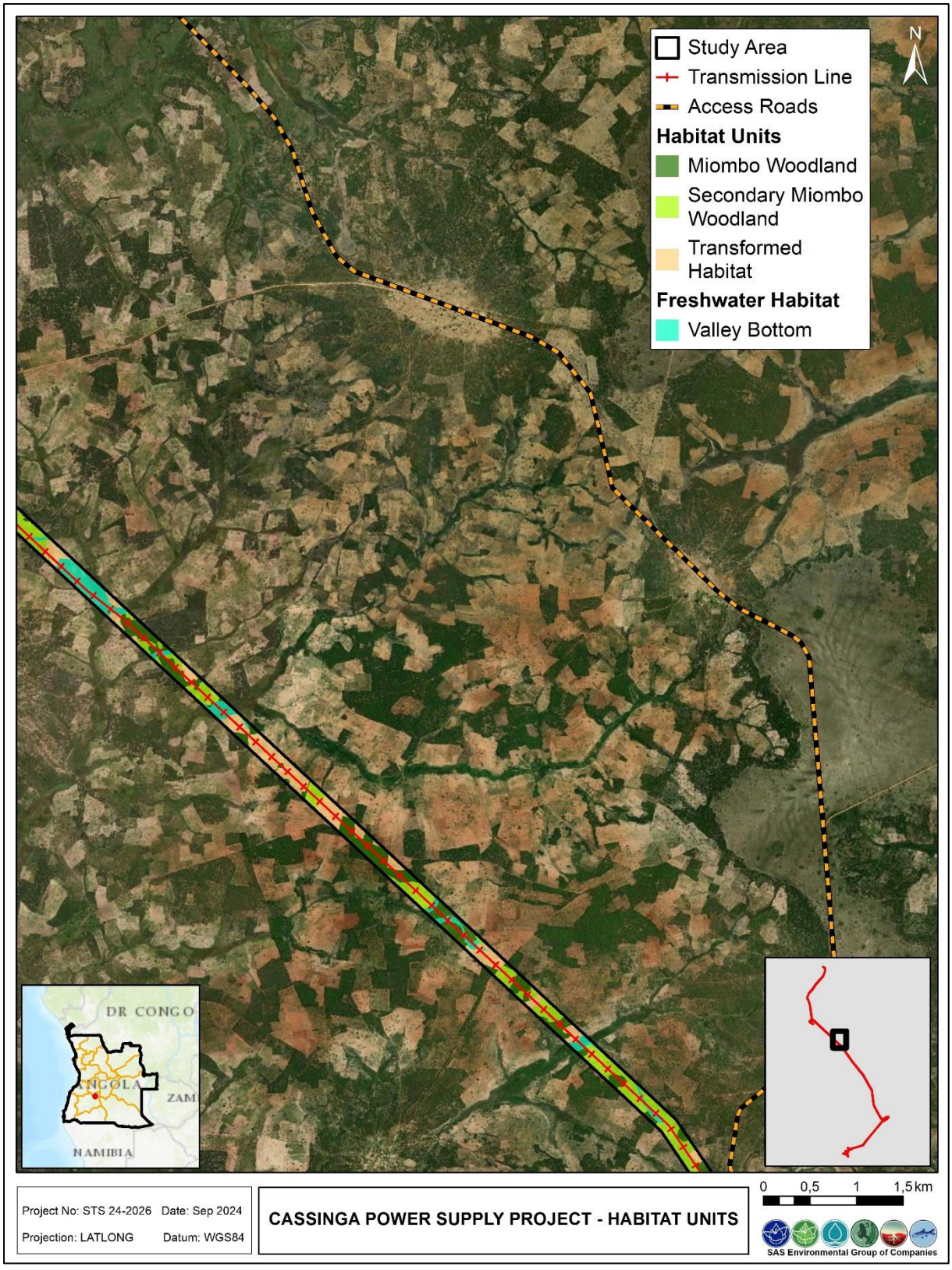


Figure 9: Conceptual illustration of the habitat units within the study area (Map 7 of 16).

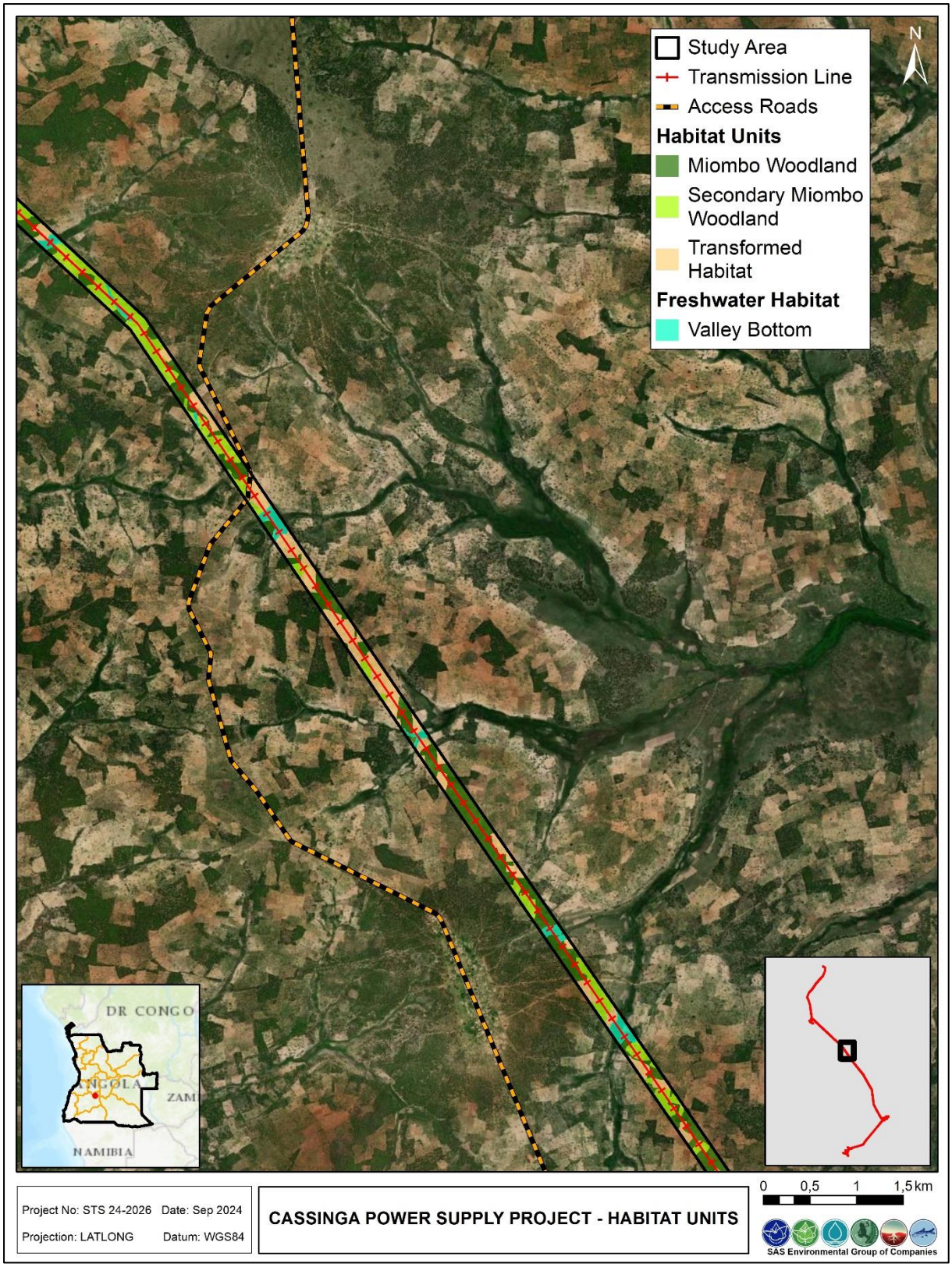


Figure 10: Conceptual illustration of the habitat units within the study area (Map 8 of 16).

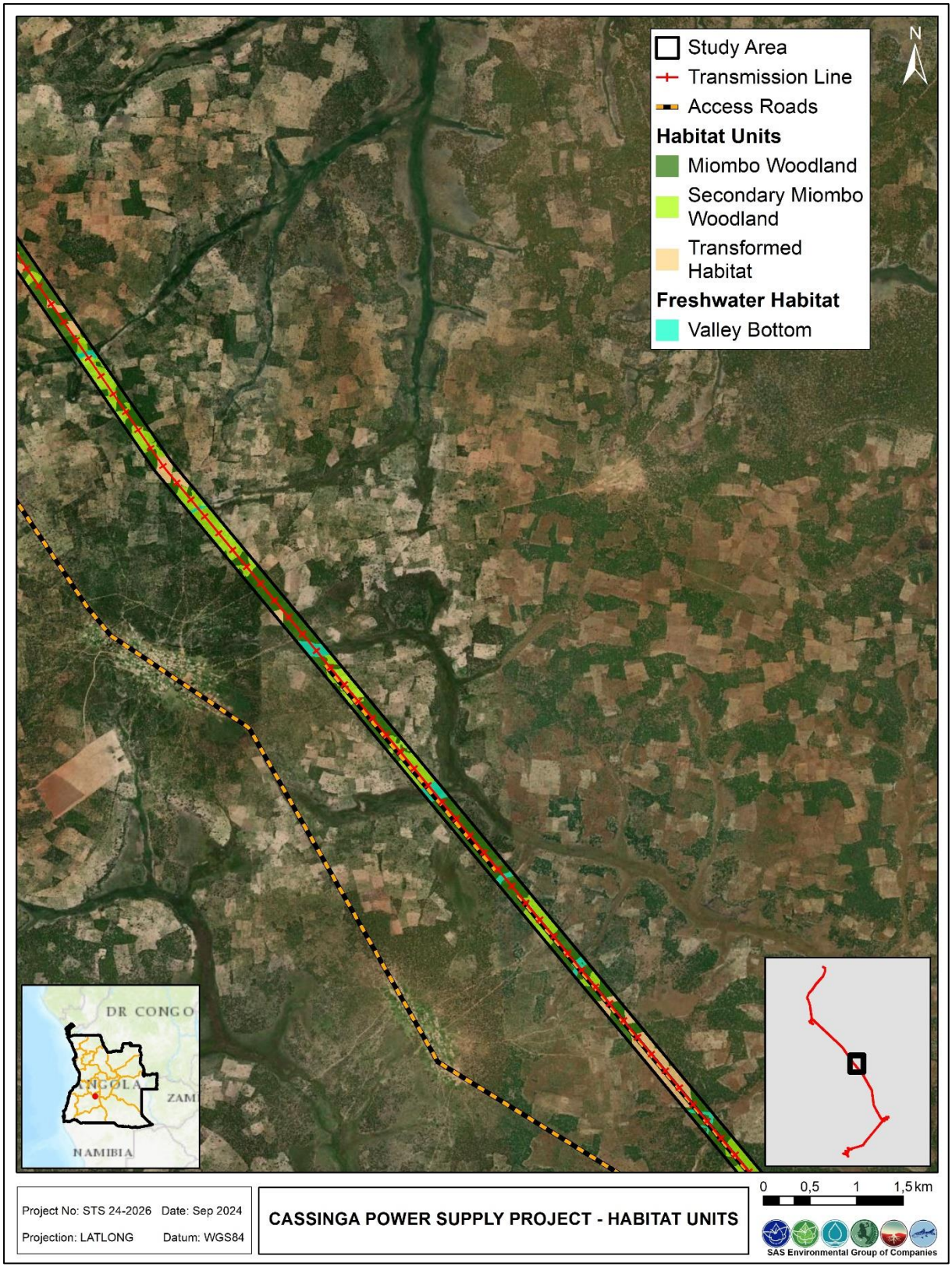


Figure 11: Conceptual illustration of the habitat units within the study area (Map 9 of 16).

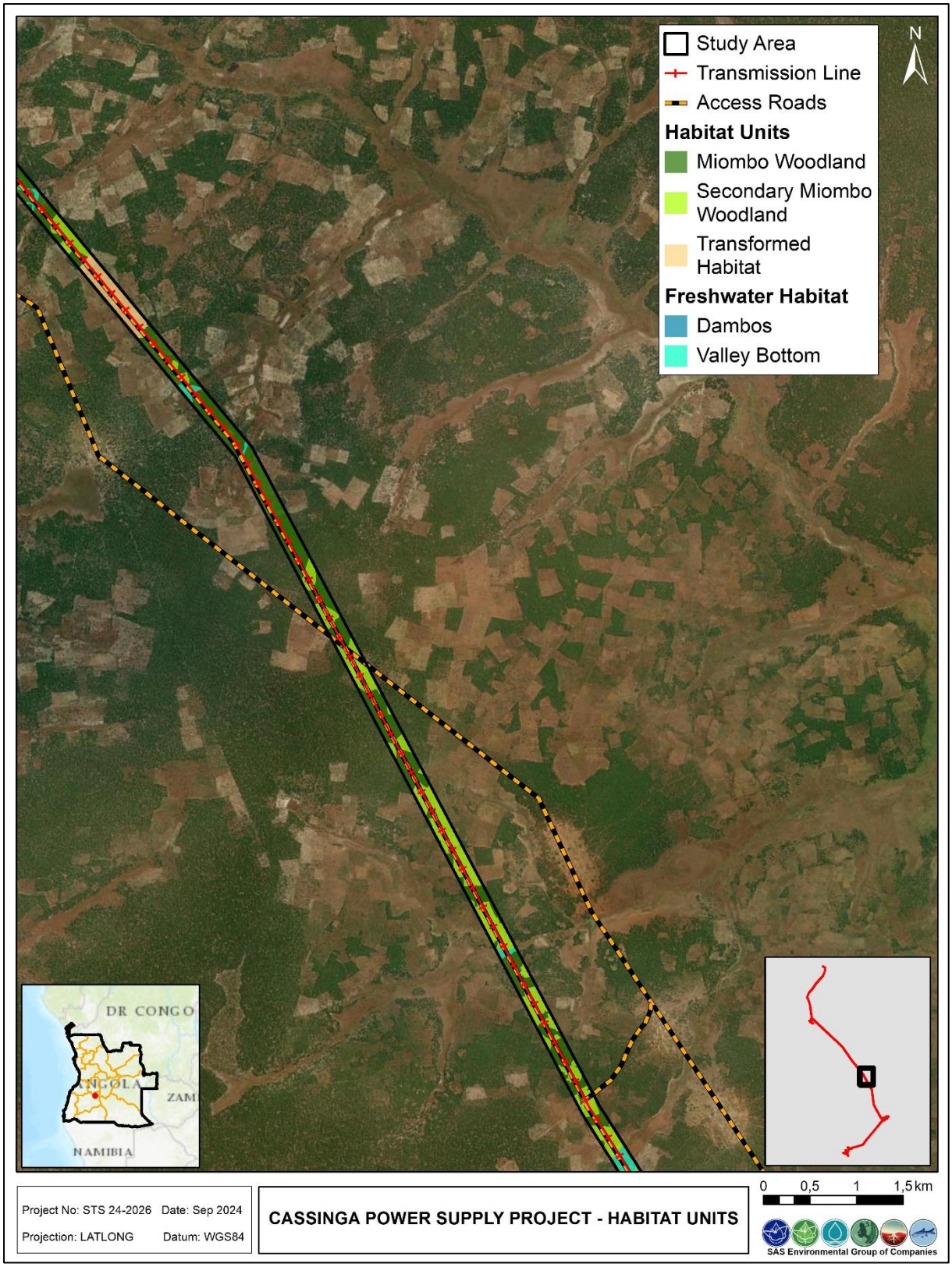


Figure 12: Conceptual illustration of the habitat units within the study area (Map 10 of 16).

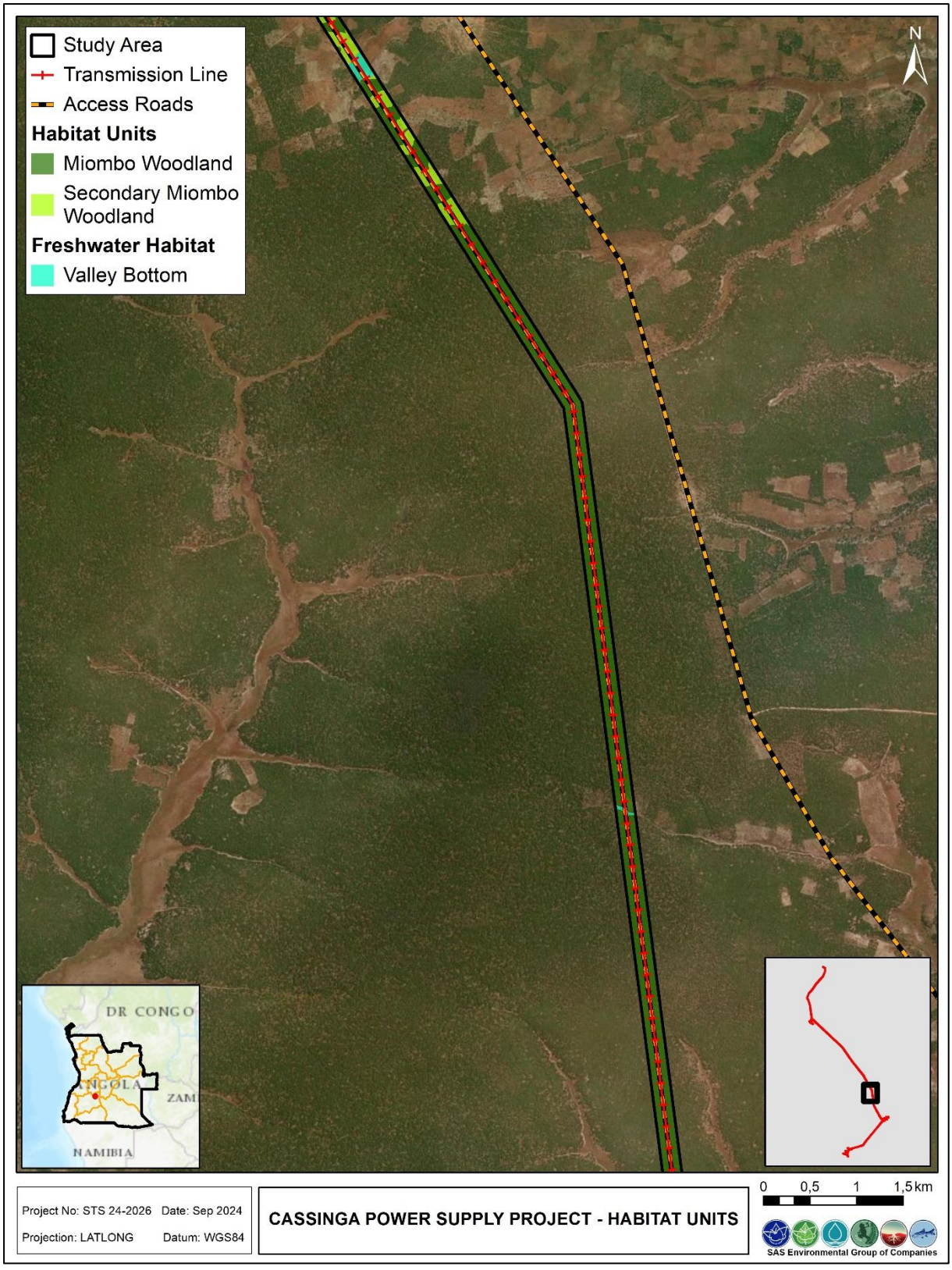


Figure 13: Conceptual illustration of the habitat units within the study area (Map 11 of 16).

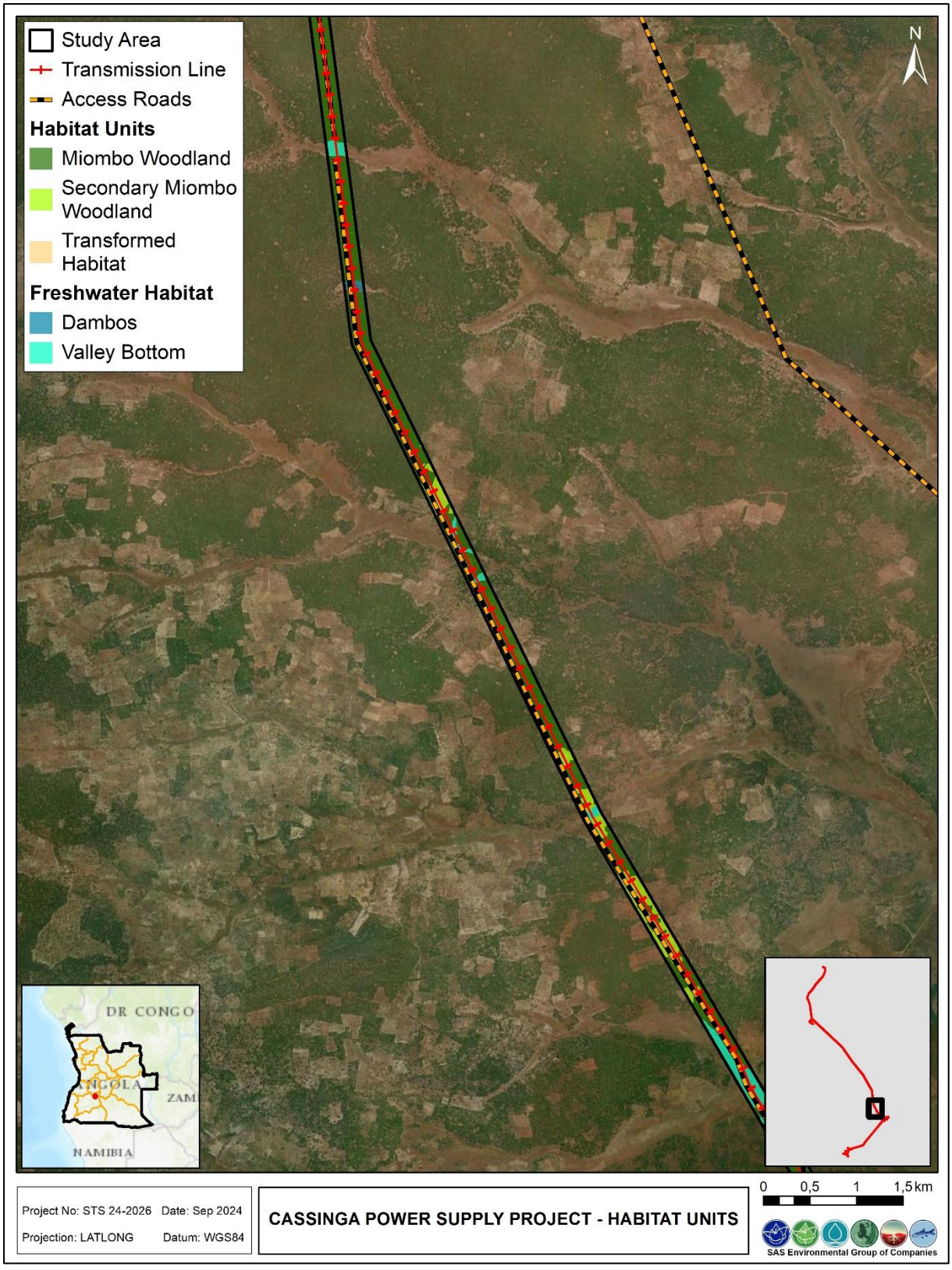


Figure 14: Conceptual illustration of the habitat units within the study area (Map 12 of 16).

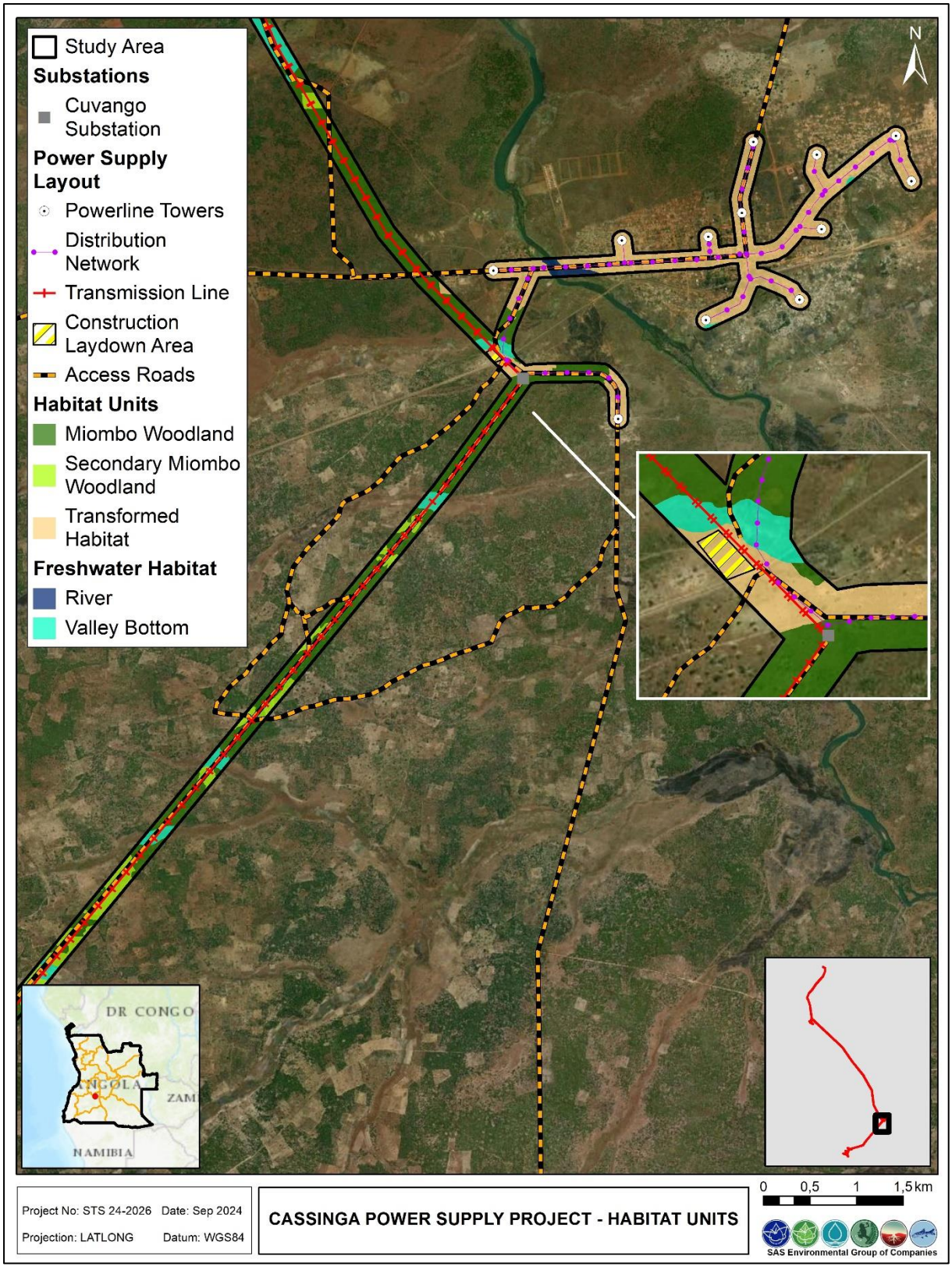


Figure 15: Conceptual illustration of the habitat units within the study area (Map 13 of 16).

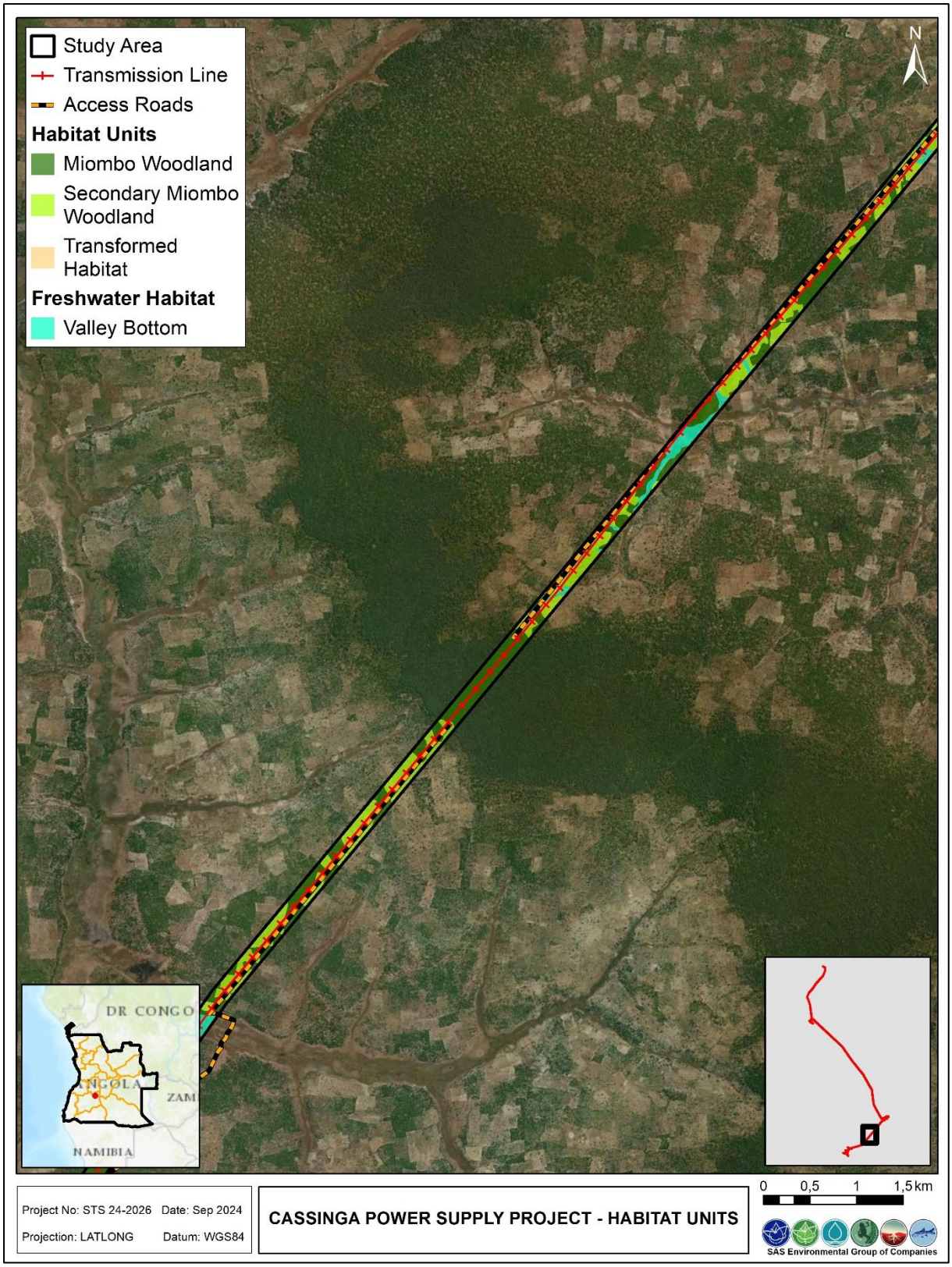


Figure 16: Conceptual illustration of the habitat units within the study area (Map 14 of 16).

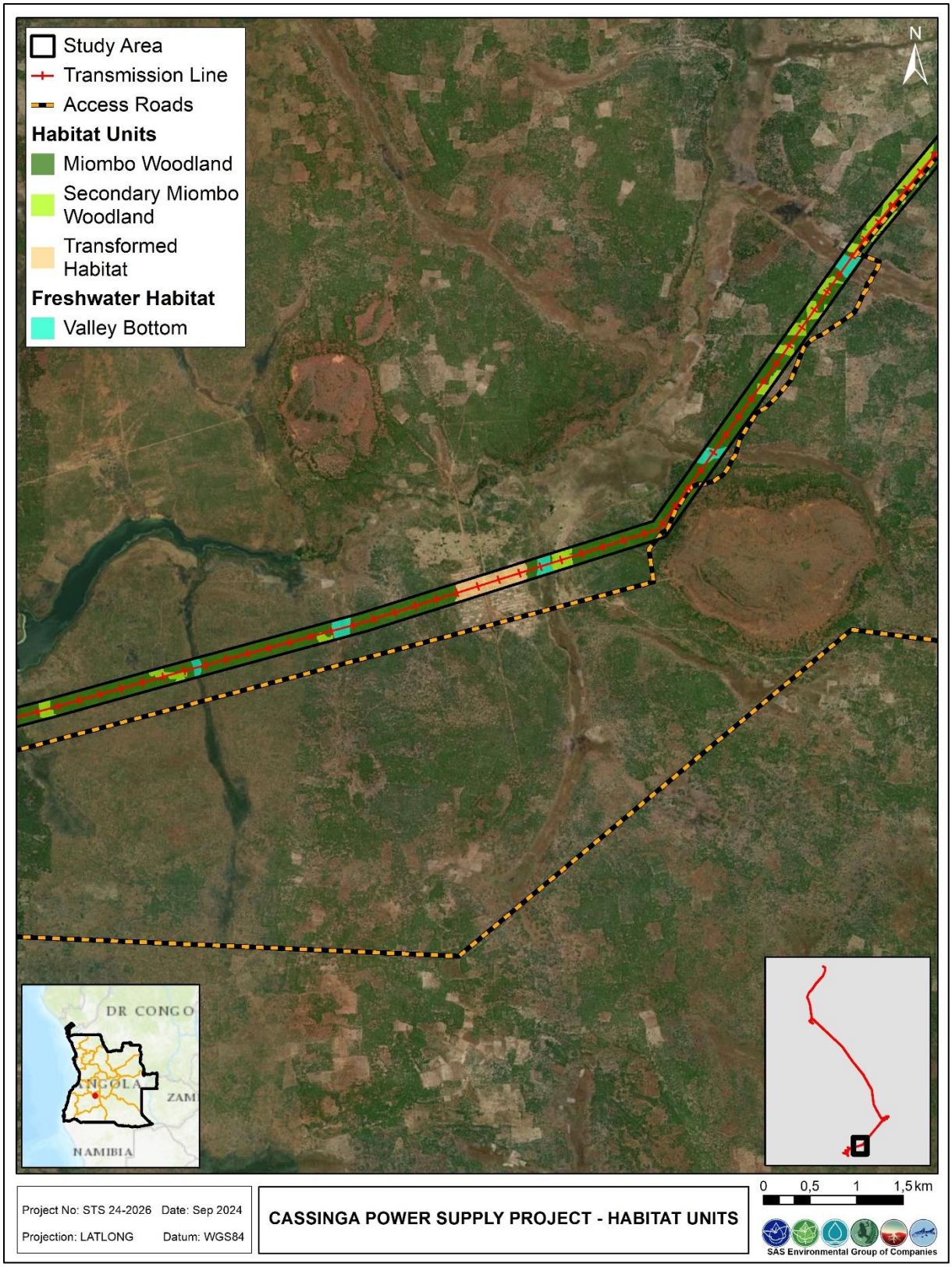


Figure 17: Conceptual illustration of the habitat units within the study area (Map 15 of 16).

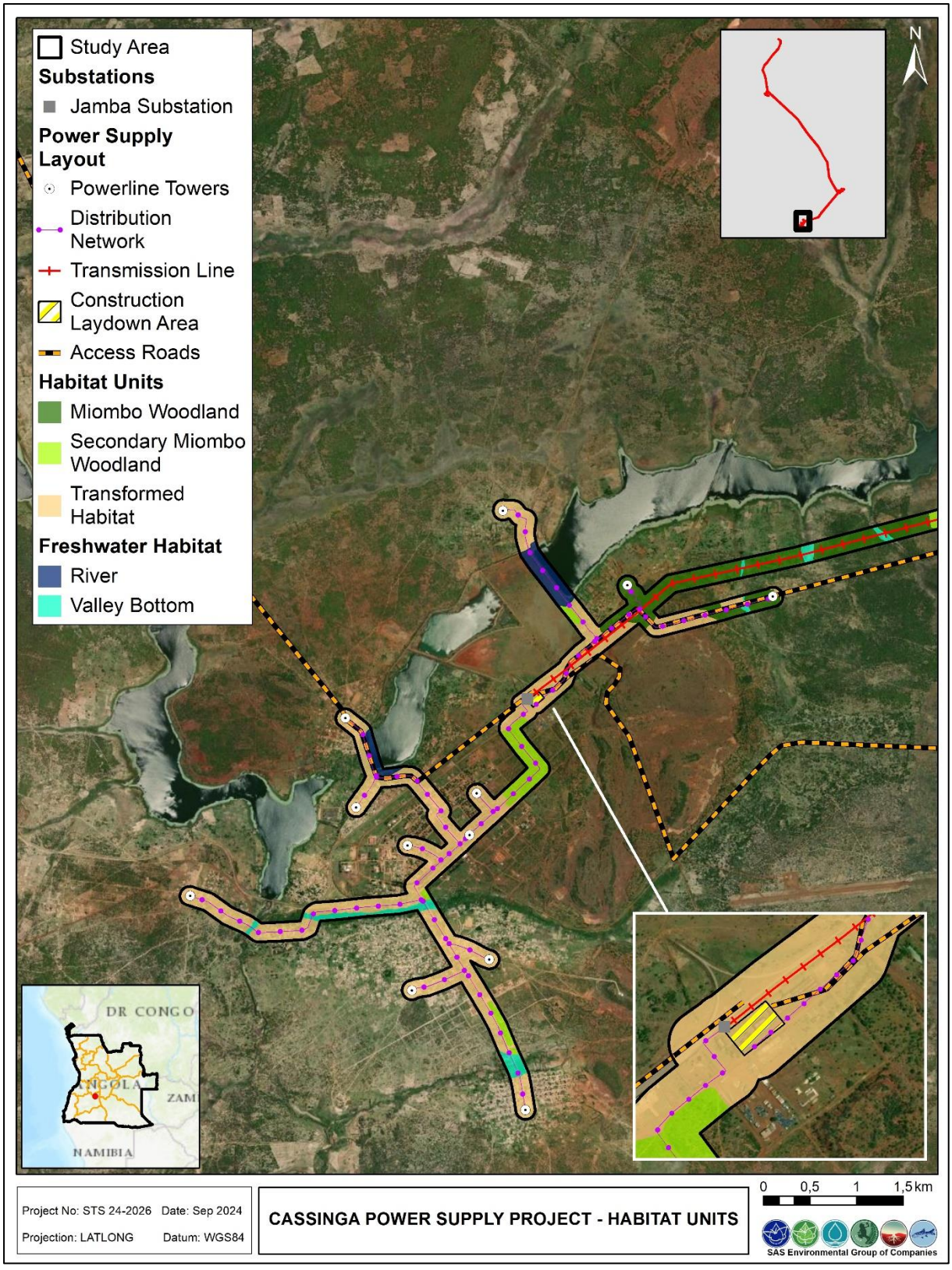


Figure 18: Conceptual illustration of the habitat units within the study area (Map 16 of 16).

4.1 Habitat Unit 1: Miombo Woodland

HABITAT OVERVIEW
Miombo woodlands are known for their expansive canopy of broadleaf, predominantly deciduous trees. From a floral perspective, this habitat unit showcases remarkable diversity, harbouring a plethora of plant species specifically adapted to the region's pronounced seasonal fluctuations. Characteristic of this habitat unit is the prominent hardwood taxa e.g., *Brachystegia boehmii* and *Julbernardia paniculata,* which dominate the landscape. The floral richness extends throughout the vertical strata, harbouring a diverse array of understory shrubs, herbaceous plants, and creeping plants. Miombo Woodland confronts escalating anthropogenic impacts (deforestation, agriculture, logging, and the production of charcoal) and these activities pose a significant risk to vegetation structure and communities within the habitat unit. These anthropogenic activities have resulted in the fragmentation and isolation of Miombo Woodland areas, where areas are unsuitable for agricultural activities.



Representative photographs illustrating the typical habitat associated with the Miombo Woodland.

Overall, the Miombo Habitat is representative of the reference vegetation type in terms of species composition and vegetation structure. Characteristic species recorded within the **Miombo Woodland Habitat** included:

- The woody layer was well developed with good structure, with a subset of shrubby species was recorded, e.g., *Julbernardia paniculata, Brachystegia boehmii, Pterocarpus angolensis, Dichrostachys cinerea* and *Terminalia brachystemma*;
- The graminoid layer was well-developed, comprising of the following species: *Digitaria eriantha, Heteropogon contortus* and *Panicum* sp.*;*
- The herbaceous layer consisted mostly of common, widespread species, such as *Commelina africana*; and
- AIP proliferation was low. Recorded species included *Tagetes minuta* and *Lantana camara*.

Refer to **Appendix C** for a more comprehensive list of species recorded within this habitat. Below are a few photographs of the species typically recorded across this habitat unit.

Species, from left to right: *Piliostigma thonningii, Julbernardia paniculata*, *Terminalia brachystemma,* and *Protea angolensis*.

4.2 Habitat Unit 2: Secondary Miombo Woodland

HABITAT OVERVIEW
The floral species within the Secondary Miombo Woodland habitat unit adds to the biodiversity of the area with medicinal floral species being present (although in lower numbers than what was observed in the Miombo Woodland) and areas with good vegetation cover will have a lower probability of erosion. The Secondary Miombo Woodland still provides essential ecosystem services as the livelihood of many rural people are supported by non-timber products such as fruit, honey, fodder, and fuelwood[4]. The ecological services within the Secondary Woodland still influence the floral diversity within the study area although at a lower level compared to the Miombo Woodland habitat unit. Across the study area, the vegetation community exhibits varying characteristics due to differing levels of anthropogenic impacts. In areas where trees were historically cleared, several miombo woodland species (*Terminalia brachystemma* and *Combretum zeyheri*) were dominant, with coppices and saplings evident, while larger trees have been harvested for charcoal production. In less disturbed areas, *Julbernardia paniculata* and *Brachystegia boehmii* were dominate the habitat unit.

Representative photographs illustrating the typical habitat associated with the Secondary Miombo Woodland.

Overall, the Secondary Miombo Woodland was representative of the reference vegetation type in terms of species composition but lacking in vegetation structure. Characteristic species recorded within the **Secondary Miombo Woodland Habitat** included:

- The woody layer was poorly developed, with certain areas (close to villages) lacking large trees, although a subset of shrubby species was recorded, e.g., *Terminalia brachystemma, Julbernardia paniculata, Brachystegia boehmii, Parinari curatellifolia, Dichrostachys cinerea,* and *Diospyros kirkii*;
- The graminoid layer was well-developed, comprising of the following species: *Sporobolus africanus* and *Digitaria eriantha;*
- The herbaceous layer consisted mostly of common, widespread species, such as *Commelina africana* and *Hibiscus nigricaulis*; and
- AIP proliferation was moderate. Recorded species included *Tagetes minuta* and *Lantana camara*.

Refer to **Appendix C** for a more comprehensive list of species recorded within this habitat. Below are a few of the species typically recorded across this habitat unit.

[4] https://forestry.co.za/miombo-network-calls-for-sustainable-and-integrated-management-of-miombo-forests/

Species, from left to right: *Pogonarthria squarrosa, Melinis repens*, *Brachystegia boehmiii,* and *Julbernardia paniculata*.

4.3 Habitat Unit 3: Transformed Habitat

HABITAT OVERVIEW
The Transformed Habitat does not provide important ecosystem services like the Miombo Woodland, lacking in medicinal floral species and having a higher probability of erosion due to reduced vegetation cover. The habitat unit does support rural livelihoods by offering non-timber products such as fruit, fodder, and some fuelwood. Within the Transformed Habitat, ecological processes like nutrient cycling, fire dynamics, and species interactions do not significantly influence floral diversity, as the habitat is less conducive to creating preferred habitats for various plant species. The Transformed Habitat is characterised by areas affected by anthropogenic activities which include agricultural activities (planting of *Zea mays* (Maize) and *Glycine max* (Soybean) and areas cleared of vegetation where homesteads were observed. Large areas have been cleared for agricultural activities, where trees have been cleared for local charcoal production. In the northern section of the study area, plantations were observed where native trees were removed and *Eucalyptus* sp. were planted.

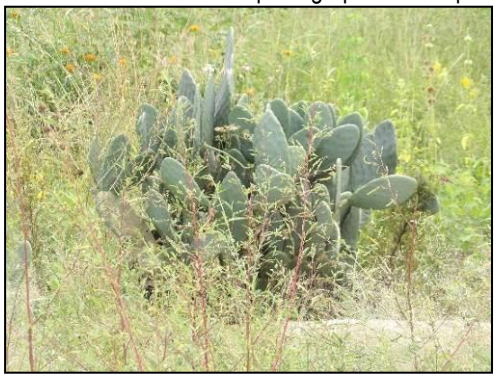
Representative photographs illustrating the typical habitat associated with the Transformed Habitat.

Overall, the Transformed Habitat starkly contrasts the reference vegetation type in terms of species composition and vegetation structure. Characteristic species recorded within the **Transformed Habitat** included:

- The woody layer was poorly developed and was largely lacking, although a subset of shrubby species was recorded, e.g., *Terminalia sericea*, *Dichrostachys cinerea*, *Piliostigma thonningii*, and *Erythrina zeyheri;*
- The graminoid layer was well-developed in areas where ground was covered by vegetation, comprising of the following species: *Hyparrhenia* spp, *Cynodon dactylon*, *Melinis repens* and *Eragrostis biflora*;
- The herbaceous layer *Cassytha filiformis* and *Hibiscus nigricaulis;* and
- AIP proliferation was fairly prolific. Recorded species included *Zea mays*, *Cucurbita* sp, *Tagetes minuta*, *Lantana camara* and *Bidens pilosa.*

Refer to **Appendix C** for a more comprehensive list of species recorded within this habitat. Below are a few photographs of the species typically recorded across this habitat unit.






Species, from left to right: *Musa* sp. (an alien species), *Eucalyptus* sp. (an alien species), *Opuntia ficus-indica* (and alien species), and *Melinis repens*.

4.4 Habitat Unit 4: Freshwater Habitat

HABITAT OVERVIEW
The Freshwater Habitat extensively spans the study area, featuring dambos (smallest of the Freshwater Habitat subunits within the study area, i.e., approximately 4 ha), and riparian zones characterised by elevated floral species diversity, a typical trait of such environments. Many floral species observed in these regions are exclusive to these habitats preferring areas with higher soil moisture content. Riparian areas, which are associated with rivers (of which approximately 29 ha occur in the study area), largely retain their integrity despite agricultural encroachment, with the remaining vegetation primarily consisting of woody species. Local communities utilise valley bottom wetlands (largest of the Freshwater Habitat subunits within the study area, i.e., approximately 262 ha), both channelled and unchanneled, for water collection, as water sources for livestock, and for washing clothes. Agricultural activities were noted on the edges of these wetlands. Cultivation activities and livestock grazing have impacted dambos and floodplains, leading to a reduction in natural vegetation cover and, in some instances, the encroachment of woody species. Despite enduring anthropogenic pressures, the overall integrity and diversity of the Freshwater Habitat (all subunits) remain moderately high.

Representative photographs illustrating the typical habitat associated with the Freshwater Habitat. Photographs a) and b): various valley bottom wetlands. Photographs c) and d): Cubango River (located in Cuvango)

Overall, the Freshwater Habitat is representative of the reference vegetation type in terms of species composition and vegetation structure. Characteristic species recorded within the **Freshwater Habitat** included:

- Some woody species were present within the riparian areas, and the woody layer was poorly developed and was largely lacking within the floodplains, valley bottom wetlands and dambos. Riparian woody species typically associated with the rivers included, e.g., *Ficus sycomorus*, *Mucuna coriacea* and *Vitex doniana*;
- The graminoid layer was well-developed, comprising of the following species: *Cynodon dactylon*, *Cyperus* sp., and *Cyperus tenuiflorus;*
- The herbaceous layer comprising of the following species: *Floscopa glomerata* and *Ethulia conyzoides*; and
- AIP proliferation was moderate. Recorded species included *Tagetes minuta* and *Bidens pilosa*.

Refer to **Appendix C** for a more comprehensive list of species recorded within this habitat. Below are a few photographs of the species typically recorded across this habitat unit.

Species, from left to right: *Phragmites australis, Vachellia sieberiana*, *Cyperus* sp., and *Cyperus tenuiflorus*.

4.5 Floral SCC Assessment

An assessment considering the presence of any floral SCC, as well as suitable habitat to support any such species was undertaken. Threatened species are species that are facing a high risk of extinction. Any species classified in the IUCN categories as Critically Endangered (CR), Endangered (EN) or Vulnerable (VU) is a threatened species. The IUCN on a global level did not identify any threatened species. Only the national legislation recognised threatened species.

4.5.1 Executive Decree No. 252/18 that approves the Red List of Species of Angola

The Executive Decree No. 252/18 that approves the Red List of Species of Angola, was consulted for species that may be present within the study area.

Only two floral SCC listed as VU were observed during the field assessments namely *Pterocarpus angolensis* and *Brachystegia spiciformis;* however, the IUCN lists these species as Least Concern (LC) species. These species were observed within the Miombo Woodland habitat unit. None of the other floral species that have been identified during the field assessment had a conservation status higher than that of LC on the IUCN database.

4.5.2 Floral species listed under IUCN

The floral species recorded within the assessed areas were cross-referenced with the IUCN Red List to determine if any species were classified as threatened. However, no threatened floral species were identified within the study area. A Probability of Occurrence (POC) assessment was conducted for a list of threatened SCCs derived from the IUCN for the region. Table 1 highlights the floral species with a medium to high POC in the study area, based on the presence of potentially suitable habitat within Miombo Woodland, Secondary Woodland and Freshwater habitat units. Given the fragmented nature of the landscape, large stretches of degraded habitat, and high levels of human activity within and around the study area, none of the species assessed were found to have a high POC.

Table 1: Floral SCC with the potential to occur within the study area (or within the surrounding natural areas).

Species name	IUCN Status	Habitat and Direct threats	POC
Ansellia africana	VU	This species is widespread, often in hot dry mixed deciduous woodlands at medium to low altitudes, in riverine vegetation and mopane or miombo woodlands near rivers, growing on trees and shrubs. The species faces threats from habitat loss due to deforestation, over-collection for the ornamental trade, and climate change affecting its environmental conditions. Conservation efforts	High

Species name	IUCN Status	Habitat and Direct threats	POC
		should focus on habitat protection, regulating collection, and promoting sustainable cultivation practices.	
Disa aequiloba	EN	This species is found growing in swamp areas, dambo, wet grassland, wet meadow; terrestrial. The main threats to this species include habitat loss due to agricultural expansion, overgrazing by livestock, and climate change, which can alter its habitat conditions.	Medium
Genlisea angolensis	EN	Carnivorous plant species native to the tropical regions of Africa, typically found in damp, acidic soils within savannas and wetlands. It thrives in moist, nutrient-poor environments where it captures insects to supplement its nutrient intake. The primary threats to this species include habitat loss due to drainage of wetlands, agricultural expansion, and land conversion.	Medium
Lysimachia elegantula	NT	Annual herb, rarely biannual, of swampy savannas and meadows. Threats to this species include development of housing and urban areas, including annual and perennial non-timber crops.	Medium
Mesanthemum glabrum	NT	This species grows in wet peaty soil of dambos, shallow pools, swamps or marshy ground near rivers; 1,100–1,500 m. The primary threats to this species include habitat destruction due to housing/ urban development, deforestation, logging, and agricultural expansion, which degrade and fragment its natural environment.	Medium
Monotes rubriglans	VU	Occurs in xerophilous Miombo woodland, savanna woodland and wooded savanna. Primary threats to this species include habitat loss from deforestation, illegal logging, and agricultural expansion, which result in the fragmentation and degradation of its natural habitat.	High
Utricularia bracteata	NT	Carnivorous plant species native to tropical Africa, commonly found in moist, swampy environments and wetlands with nutrient-poor, acidic soils. The main threats to this species include habitat loss due to drainage of wetlands, deforestation, and land conversion for agriculture, which lead to the degradation and fragmentation of its natural habitat.	Medium
Vigna procera	NT	A perennial herb with several annual erect stems arising from woody rootstock. It has pink to purple flowers and is found in moist areas near lakes, in grassland and by seasonal rivers and dambos. It is often associated with recent burning and is found in sandy or clay loam soil. Primary threats to this species include habitat loss due to deforestation, land conversion for agriculture, and overgrazing, which lead to degradation and fragmentation of its natural habitat.	Medium
Rotala smithii	VU	This species is endemic to Central Africa (the Democratic Republic of Congo (DRC) and Angola). It is often found growing into the mud, at the marshland borders. Water pollution is a major threat to this species.	Medium
Croton gossweileri	EN	This species is endemic to tropical Africa, often found in moist, lowland forests and along riverbanks. It thrives in shaded, well-drained soils with consistent moisture. The primary threats to *Croton gossweileri* include deforestation, habitat fragmentation, and land conversion for agriculture.	Medium

4.5.3 Non-threatened species of conservation concern

Species such as *Brachystegia boehmii* and *Julbernardia paniculata* are of concern as their known population numbers are declining due to overharvesting for wood. Apart from these woody species, there are also small bulbous species like *Boophone disticha*, which, although

classified as LC by the IUCN, face pressure from harvesting for medicinal purposes and species collections. As such, the placement of the proposed infrastructure should take into cognisance these species, and where possible limit placements within the Freshwater Habitat and Miombo Woodland Habitat as preferred habitat for floral SCC is present within these habitats. In the case of the smaller bulbous species, should they occur in a proposed footprint, they should be carefully excavated and replanted in an area of suitable habitat close to the disturbance footprint. This should be overseen by a suitably qualified specialist.

4.6 International Finance Corporation: Performance Standard 6

The section below introduces the IFC Sustainability framework and applicable sections of the IFC with relation to the proposed Project.

4.6.1 IFC Sustainability Framework:

The IFC articulates the Corporation's strategic commitment to sustainable development and is an integral part of IFC's approach to risk management. The sustainability framework comprises IFC's Policy and PSs on Environmental and Social Sustainability, and IFC's Access to Information Policy. The IFC PSs are designed to assist the proponent in designing and implementing a project in a manner where risks and impacts associated with the project are identified and mitigated to ensure the project is completed sustainably.

There are eight (8) PS which have to be implemented throughout the life of an investment by IFC. The PSs include:

- Assessment and Management of Environmental and Social Risk and Impacts;
- Labour and Working Conditions;
- Resource Efficiency and Pollution Prevention;
- Community Health, Safety, and Security;
- Land Acquisition and Involuntary Resettlement;
- Biodiversity Conservation and Sustainable Management of Living Natural Resources;
- Indigenous Peoples; and
- Cultural Heritage.

For the purposes of this assessment, the following PS is considered the most applicable:

- **PS 6:** Biodiversity Conservation and Sustainable Management of Living Natural Resources - Recognises that protecting and conserving biodiversity, maintaining ecosystem services, and sustainably managing living natural resources are fundamental to sustainable development.

The table below summarises the IFC habitat categories and project requirements to meet the IFC Standards (according to PS 6).

Table 2: Descriptions of the IFC habitat categories and project requirements to meet IFC Standards.

Modified Habitat
Modified habitats are areas that may contain a large proportion of plant and/or animal species of non-native origin, and/or where human activity has substantially modified an area's primary ecological functions and species composition. Modified habitats may include areas managed for agriculture, forest plantations, reclaimed coastal zones, and reclaimed wetlands. This PS applies to those areas of modified habitat that include significant biodiversity value, as determined by the risks and impacts identification process required in PS 1. The client should minimise impacts on such biodiversity and implement mitigation measures as appropriate.
Natural Habitat
Natural habitats are areas composed of viable assemblages of plant and/or animal species of largely native origin, and/or where human activity has not essentially modified an area's primary ecological functions and species composition. The client will not significantly convert or degrade natural habitats, unless all of the following are demonstrated: • No other viable alternatives within the region exist for development of the project on modified habitat; • Consultation has established the views of stakeholders, including Affected Communities, with respect to the extent of conversion and degradation; and • Any conversion or degradation is mitigated according to the mitigation hierarchy. In areas of natural habitat, mitigation measures will be designed to achieve no net loss of biodiversity where feasible. Appropriate actions include: • Avoiding impacts on biodiversity through the identification and protection of set-asides; • Implementing measures to minimise habitat fragmentation, such as biological corridors; • Restoring habitats during operations and/or after operations; and • Implementing biodiversity offsets.
Critical Habitat
Critical habitats was based on species level, ecosystem level and landscape level criteria with high biodiversity value and includes **(i)** habitat of significant importance to CR and/or EN species; **(ii)** habitat of significant importance to endemic and/or restricted-range species; **(iii)** habitat supporting globally significant concentrations of migratory species and/or congregatory species; **(iv)** highly threatened and/or unique ecosystems; and/or **(v)** areas associated with key evolutionary processes. In areas of critical habitat, the client will not implement any project activities unless all of the following are demonstrated: • No other viable alternatives within the region exist for development of the project on modified or natural habitats that are not critical; • The project does not lead to measurable adverse impacts on those biodiversity values for which the critical habitat was designated, and on the ecological processes supporting those biodiversity values; • The project does not lead to a net reduction in the global and/or national/regional population of any CR or EN species over a reasonable period of time; and • A robust, appropriately designed, and long-term biodiversity monitoring and evaluation program is integrated into the client's management program. In such cases where a client is able to meet the requirements defined in paragraph 17, the project's mitigation strategy will be described in a Biodiversity Action Plan and will be designed to achieve net gains of those biodiversity values for which the critical habitat was designated. In instances where biodiversity offsets are proposed as part of the mitigation strategy, the client must demonstrate through an assessment that the project's significant residual impacts on biodiversity will be adequately mitigated to meet the requirements of paragraph 17.

As Critical Habitat (CH) is defined by five (5) criteria, the following assessment evaluates the habitat units based on these criteria to confirm or refute the presence of Critical habitat.

Species level:

- Criterion 1: None of the plant species recorded during the wet and dry season are listed by the IUCN as CR or EN on an international level. However, *Disa aequiloba*, *Genlisea angolensis* and *Croton gossweileri* which are listed as EN species may occur within the study area. Although no individuals were observed, a precautionary approach is suggested in terms of CH classification. Therefore, Criterion 1a is triggered in terms of these species for the Miombo, Secondary Miombo and Freshwater Habitats;
- Criterion 2: Only two floral SCC listed as VU (Executive Decree No. 252/18) were observed during the field assessments namely *Pterocarpus angolensis* and *Brachystegia spiciformis*. However, the IUCN assessed these species as having a LC LC threat status. These species have been recorded throughout topical regions in Africa and are not reliant on habitats that are unique. Both species also have an Extent of Occurrence (EOO) that exceeds 50 000 square kilometres (km^2) and are thus also not considered “restricted-range” species. Therefore, none of the habitats within the study area trigger Criterion 2;

Ecosystem level:

- Criterion 3: Does not apply to plant species or vegetation types. Refer to Part C for a discussion on Criterion 3;
- Criterion 4: None of the habitat units identified within the study area is considered to be highly threatened and/or unique ecosystems. While the Miombo Woodland is under threat from mining activities and local over utilisation, the broader landscape contains similar and ecologically more intact habitats than what was observed within the study area. Therefore, from a botanical perspective, none of the habitats that are present and that will be impacted by the proposed project can be considered as critical habitat under Criterion 4;

Landscape level:

- Criterion 5: The study area does not include ecological gradients that support diverse plant species across varying environmental conditions, unique or isolated habitats that foster endemism, critical connectivity corridors for gene flow, or areas of high habitat diversity essential for evolutionary dynamics.

The table below indicate the habitat categories for the vegetation units identified in the study area.

Table 3. IFC PS 6 Habitat categories for the vegetation units identified in the study area.

Vegetation Unit	Description of the IFC habitat categories
Miombo Woodland, Secondary Miombo Woodland, and Freshwater Habitat	**Critical Habitat** The Miombo Woodland, Secondary Miombo Woodland and Freshwater Habitat are areas of natural habitat that are composed of viable assemblages of plant and/or animal species of largely native origin and where the surrounding anthropogenic activities (i.e., wood harvesting, agricultural) activities have not yet modified the area's primary ecological functions and species composition. However, ecological function and species composition may be lower with regards to the Secondary Miombo Woodland.
Transformed Habitat	**Modified Habitat** The Transformed Habitat is an area that contains a moderate to high proportion of plant and/or animal species of non-native origin and include areas that have substantially been modified by human activity (i.e., agricultural activities). Areas where the primary ecological functions and species composition have been modified.

It is however important to note that further assessments for potential critical habitat species must be undertaken during the pre-construction monitoring. Should such assessments indicate that these species are not present in sufficient densities to qualify for CH, the CH must be noted only as natural habitat.

4.7 Exotic and Invasive Species

Alien floral species in the study area were mostly associated with villages and in particular agricultural areas. The table below lists the exotic and invader species identified during the assessments along with their basic methods of control. It is recommended that all AIPs that are located within the proposed Project and associated infrastructure footprint are removed and destroyed, ensuring that the seed is not dispersed into the surrounding areas. The only two exceptions on the list below are that of *Mangifera indica* (Mango) and *Psidium guajava* (Guava) which have an important social and economic use in the communities as a seasonal supply of food. Removal or destruction of these trees should be avoided where possible.

Table 4: Exotic or invasive species listed and identified during the assessments.

Scientific name	Common name	Listed under Category D of Executive Decree No. 252/18	Control Options
Terrestrial Species			
Acacia saligna	Orange wattle	Invasive species	Chemical and mechanical control
Acacia mearnsii	Black wattle	Not listed	Chemical and mechanical control
Argemone mexicana	Mexican prickly poppy	Invasive species	Chemical and mechanical control
Bidens pilosa	Spanish Blackjack	Not listed	Pre-emergence herbicide, mechanical control
Cosmos sulphureus	Sulfur cosmos	Not listed	Chemical and mechanical control

Scientific name	Common name	Listed under Category D of Executive Decree No. 252/18	Control Options
Chromolaena odorata	Triffid weed	Invasive species	Chemical and mechanical control
Eucalyptus sp.	Gum tree	Not listed	Chemical and mechanical control
Lantana camara	Lantana	Not listed	Mechanical control, herbicide
Leucaena leucocephala	River tamarind	Not listed	Chemical and mechanical control
Mangifera indica	Mango	Not listed	None, agricultural use
Opuntia ficus-indica	Prickly Pear	Not listed	Mechanical control, herbicide
Opuntia stricta	Prickly pear	Invasive species	Chemical and mechanical control
Prosopis glandulosa	Honey mesquite	Not listed	Chemical and mechanical control
Prosopis juliflora	Mesquite	Not listed	Chemical and mechanical control
Psidium guajava	Guava	Not listed	None, agricultural use
Ricinus communis	Castor oil plant	Invasive species	Chemical control
Solanum mauritianum	Bugweed	Invasive species	Chemical and mechanical control
Tagetes minuta	Tall Khaki Weed	Not listed	Pre-emergence herbicide, mechanical control
Tithonia diversifolia	Mexican sunflower	Invasive species	Mechanical control
Aquatic Species			
Arundo donax	Giant reed	Invasive species	Chemical and mechanical control
Azolla filiculoides	Red water fern	Not listed	Biological and mechanical control
Eichhornia crassipes	Common water hyacinth	Invasive species	Chemical, Biological and mechanical control
Myriophyllum aquaticum	Parrot feather	Not listed	Mechanical control
Pistia stratiotes	Water lettuce	Not listed	Biological and mechanical control
Salvinia molesta	Giant salvinia	Not listed	Chemical and mechanical control

4.8 Medicinal Plant Species

The table below presents a list of plant species with traditional medicinal value, plant parts traditionally used, and their main applications.

The majority of the plants identified in the study area all have medicinal properties and are considered to be common to the region, especially within the Miombo Woodland Habitat and Secondary Miombo Woodland Habitat. When planning the proposed Project and associated infrastructure locations, it is important that the local traditional healers be consulted to ensure that the proposed infrastructure locations will not lead to the unnecessary removal of important medicinal plants.

Table 5: Traditional medicinal plants identified during the field assessments. Medicinal applications and application methods are also presented. Exotic and invasive species are marked with an asterisk (*).

Scientific name	Medicinal use
Adenia senensis	An infusion of the bark is used as a remedy for mental disorders and snakebite. The leaves and bark are boiled, and the decoction inhaled to treat fever and influenza.
Aframomum alboviolaceum	The plant is used as a febrifuge.
Annona senegalensis	The bark is used medicinally to treat gastrointestinal ailments and the gum from the bark is used for sealing cuts and wounds
*Bidens pilosa**	Its roots, leaves, and seeds are reported to have antibacterial, antidysenteric, anti-inflammatory, antimicrobial, antimalarial, diuretic, hepatoprotective, and hypotensive properties. In Africa, B. pilosa is used to treat headaches, ear infections, hangovers, diarrhoea, kidney problems, malaria, jaundice, dysentery, burns, arthritis, ulcers, and abdominal problems. It is also used as an anaesthetic, coagulant, and treatment to ease childbirth. In sub-Saharan Africa, its fresh or dried shoots and young leaves are eaten as a leaf vegetable, especially in times of food scarcity.
Boophone disticha	The outer covering of the bulb is applied to boils and abscesses; fresh leaves are used to stop bleeding of wounds.
Brachystegia spiciformis	An infusion provides treatment for dysentery and diarrhoea. A decoction is applied as an eyewash for conjunctivitis.
Cassytha filiformis	An infusion of the stems is used in the treatment of digestive problems such as indigestion, biliousness, and diarrhoea; feverish conditions including malaria; urinary system problems, including nephritis and oedema; headache, hepatitis, piles, sinusitis and spermatorrhoea. It is also often used by women to stimulate menstruation, hasten parturition and to suppress lactation after a stillbirth. The pounded stems are given as a vermifuge and for other intestinal troubles. A decoction of the stems is drunk to relieve itch and eczema. Externally, the stems are widely used to treat a range of skin complaints, including itchy conditions, eczema, ulcers, and parasitic conditions of both skin and scalp. It is also used, in an infusion, as an eyewash. The whole plant is often used for treating venereal discharges, urethritis, gonorrhoea, and syphilis. The stems are normally used fresh but can also be dried for later use.
Combretum zeyheri	The gum of *Combretum zeyheri* has antibiotic properties. The roots of the tree are used to make baskets, necklaces for young girls, and fishing traps. Pounded roots mixed with fats are used for an ointment to relieve haemorrhoids. Powdered roots are taken orally in porridge to stop a bleeding nose and to ease kidney pains. Leaves mixed with oil are used as an embrocation (liquid for rubbing on the body to relieve pain), to ease a stiff neck and backache. Crushed leaves are mixed with water and the resultant fluid.
Ficus sycomorus	The bark is used for the treatment of scrofula, coughs, and throat and chest diseases. The milky latex is used for treatment of dysentery and chest diseases or is applied to inflamed areas.
Flacourtia indica	The leaf is carminative, astringent and used as a tonic, an expectorant and for asthma, pain relief, gynaecological complaints and as an anthelmintic, and treatment for hydrocele, pneumonia and intestinal worms.
*Mangifera indica**	Charred and pulverized leaves make a plaster to remove warts and also act as a styptic. Seeds are used to treat stubborn colds and coughs, obstinate diarrhoea and bleeding piles. The bark is astringent, homeostatic and antirheumatic.
Opuntia ficus indica	Prickly pear cactus might lower blood sugar and cholesterol levels by reducing how much the stomach absorbs. People most commonly use prickly pear cactus for diabetes.
Ozoroa insignis	The roots and bark are considered to be cholagogue, purgative and vermifuge. A decoction is used to treat kidney and liver complaints; ulcers and hernias; throat infections; chest pain; diarrhoea; schistosomiasis.
Parinari curatellifolia	An infusion of the roots is used to treat toothache, and a leaf decoction is either drunk or used in a bath as a remedy for fevers. The crushed or pulped leaves are used in a dressing for fractures or dislocations, and for wounds, sores and cuts
Pericopsis angolensis	Included in treatment for ringworm, stabbing pains, eye problems, malaria, blackwater fever, stomach problems and to increase the supply of breast milk
Piliostigma thonningii	Tender leaves are chewed, and the juice swallowed to treat stomach-ache, coughs and snakebite. The roots are used to treat prolonged menstruation, haemorrhage and miscarriage in women and also for the treatment of coughs, colds, body pain and STDs.
Senna singueana (Cassia singueana)	Extracts of the root bark have shown significant analgesic, antipyretic, anthelmintic and antiplasmodial activity. An infusion of the leaves is used as a remedy for venereal disease,

Scientific name	Medicinal use
	malaria, convulsions, epilepsy, coughs, intestinal worms, constipation, heartburn and stomach-ache
Steganotaenia araliacea	The stem bark contains a number of dibenzocyclo-octadiene lignans. These have displayed cytotoxic (antimitotic) activity in a manner similar to colchicine on 11 human tumour cell lines. The lignans steganangin (the most abundant analogue), steganacin and steganolide A were most abundant. Saponins isolated from the leaves have shown antileukemic activity. An infusion of the plant is strongly emetic. The roots are used in treating snake bites and painful chest conditions.
Strychnos cocculoides	The fruit is mixed with honey or sugar and used to treat coughing. The fruit is used in making eardrops for treating ear complaints. The root can be chewed to alleviate stomach disorders, eczema and sores on the skin. It is also an alleged cure for gonorrhoea.
Terminalia sericea	The leaves and roots are boiled in water and the infusion is taken orally for the treatment of coughs, diarrhoea and stomachache. The leaves can be used as an antibiotic for wounds. In the case of bleeding, a paste can be made by cooking the leaves in water and placing them on the wounds.
Vachellia sieberiana	In Central Africa, a bark/root decoction is used for inflammation of the urinary passages. Leaf, bark and resin are used as an astringent for colds/chest problems, diarrhoea, haemorrhage and eye inflammation. In Tanzania, bark is used to treat gonorrhoea.
Vangueria infausta	The root is anthelmintic, antidote and purgative. A popular snake-bite remedy, it is also used to treat a variety of complaints such as malaria, pneumonia, coughs and other chest troubles. A warm decoction of the roots is considered to be an effective remedy for heart ailments in Namibia. The leaves are applied externally as a treatment for swellings on the legs; inflammation of the navel in children; abdominal pain; and for the relief of dental pain.
Ziziphus mucronata	A concoction of the bark and the leaves is used for respiratory ailments and other septic swellings of the skin. Pastes of the root and leaves can be applied to treat boils, swollen glands, wounds and sores. Steam baths from the bark are used to purify and improve the complexion.

5 ECOSYSTEM SERVICES AND THE INTERNATIONAL FINANCE CORPORATION

The term 'ecosystem services' refers to the products or goods and services that ecosystems provide to society. The term encompasses both the ecosystems which deliver the services and the people who benefit from them (Le Maitre *et al*, 2007). These services range widely from products like food through to stabilising and regulatory services such as disease control, and life quality-enhancing functions such as environments for recreation and spiritual inspiration (Le Maitre *et al*, 2007). It is very important to acknowledge that ecosystem services are interlinked and often inter-dependent (Le Maitre *et al*, 2007), and that an impact on one service may have a significant knock-on impact on other services.

This section focuses on the suite of ecosystem services provided by the relevant ecosystems within the study area. Habitat transformation and modification is extensive throughout the study area and surrounds, however, many of the habitats have recovered well and are contributing to ecosystem services. Several of the habitats with and surrounding the study area have historically been excluded from significant direct impacts and transformation, thus these habitats are increasingly important for ecosystem services.

PS 6 defines ecosystem services as “the benefits that people, including businesses, obtain from ecosystems” (paragraph 2), which is in line with the definition provided by the Millennium Ecosystem Assessment (GN106). As described in paragraph 2 and footnote 1 of PS 6, ecosystem services are organised into four major categories:

1. Provisioning ecosystem services:
2. Regulating ecosystem services:
3. Supporting services

The following is a summary of the ecosystem services provided by various habitat units (as identified in sections 4.1 to 4.4).

Table 6: Important ecosystem services provided by the habitats within the study area.

Ecosystem Services	Habitats in the study area that support these services.
Provisioning Services	
These are the products obtained from ecosystems, including: ➢ Food; ➢ Fuel - biological materials serve as sources of energy (wood); ➢ Ethnobotanical plants; and ➢ Freshwater.	Food, fuel, and ethnobotanical plants are obtained from the habitats within the study area, especially from the Miombo Woodland and Secondary Woodland. Sources and uses of water are relied on from the Freshwater Habitats within and surrounding the study area.
Regulating Services	
These are the benefits obtained from the regulation of ecosystem processes, including: ➢ Air quality regulation; ➢ Climate regulation. Ecosystems influence climate both locally and globally. For example, at a local scale, changes in land cover can affect both temperature and precipitation. At the global scale, ecosystems play an important role in climate by either sequestering or emitting greenhouse gases; ➢ Water regulation. The timing and magnitude of runoff, flooding, and aquifer recharge can be strongly influenced by changes in land cover, including, in particular, alterations that change the water storage potential of the system, such as the conversion of wetlands or the replacement of forests with croplands or croplands with urban areas; ➢ Erosion regulation. Vegetative cover plays an important role in soil retention and the prevention of landslides. ➢ Disease regulation. Changes in ecosystems can directly change the abundance of human pathogens, such as cholera, and can alter the abundance of disease vectors, such as mosquitoes.	Miombo Woodland, Secondary Woodland, and Freshwater Habitat are most important for these ecosystem services.

➢ Pollination. Ecosystem changes affect the distribution, abundance, and effectiveness of pollinators.	
Supporting Services	
Supporting services are essential for the creation of all other ecosystem services. They contrast with provisioning, regulating, and cultural services in that their effects on humans are usually not immediate or happen gradually, whereas changes in the other groups have more immediate and direct effects on people. ➢ Soil Formation; ➢ Photosynthesis; ➢ Primary Production; ➢ Nutrient cycling; and ➢ Water cycling.	The supporting services provided by vegetation are dependent on intact vegetation cover and on reasonable levels of plant diversity. As such, most of the habitats within the study area contribute towards supporting services (except where lands are bare and poorly vegetated). In this regard, Miombo Woodland, Secondary Woodland, and the Freshwater Habitat are most important.

6 SITE ECOLOGICAL IMPORTANCE MAPPING

This section aims to 1) present the Site Ecological Importance (**SEI**) of the receptors identified within the study area (e.g., SCC, the floral community or habitat type present on the site), and 2) clearly define and map areas where avoidance mitigation is strongly recommended if significant, negative residual impacts are to be avoided (and to prevent potential fatal flaws).

Based on the criteria provided in Appendix A of this report, all habitats within the study area were allocated an importance category, i.e., SEI category. SEI is a function of the biodiversity importance (**BI**) of the receptor and its resilience to impacts (receptor resilience [**RR**]). BI in turn is a function of conservation importance (**CI**) and the functional integrity (**FI**) of the receptor.

Table 6 indicates the individual SEI scoring for each habitat unit respectively. Figures 19 to 34 indicate the SEI for the study area.

Table 7: SEI importance for the different habitat units associated with the study area. SEI = Site Ecological Importance, CI = Conservation Importance, FI = Functional Integrity, BI = Biodiversity Importance, and RR = Receptor Resilience.

Habitat Unit	CI	FI	BI	RR	SEI	Development Constraints
Transformed Habitat	**Low** No confirmed or highly likely populations of SCC.	**Low** Several major current negative ecological impacts.	**Low**	**Very High** Habitat that can recover rapidly (~ less than 5 years) to restore > 75% of the original species composition and functionality of the receptor functionality, or species that have a very high likelihood of remaining at a site even when a disturbance or impact is occurring, or species that have a very high likelihood of returning to a site once the disturbance or impact has been removed.	**Very Low**	Minimisation mitigation – development activities of medium to high impact acceptable and restoration activities may not be required.
Freshwater Habitat	**Low** No confirmed or highly likely populations of SCC.	**High** Good habitat connectivity with potentially functional ecological corridors. Only minor current negative ecological impacts with no signs of major past disturbance and good rehabilitation potential.	**Medium**	**Low** Habitat that is unlikely to be able to recover fully after a relatively long period: > 15 years required to restore ~ less than 50% of the original species composition and functionality of the receptor functionality, or species that have a low likelihood of remaining at a site even when a disturbance or impact is occurring, or species that have a low likelihood of returning to a site once the disturbance or impact has been removed.	**High**	Avoidance mitigation wherever possible. Minimisation mitigation – changes to project infrastructure design to limit the amount of habitat impacted, limited development activities of low impact acceptable. Offset mitigation may be required for high impact activities."
Secondary Miombo Woodland	**Medium** > 50% of receptor contains natural habitat with potential to support SCC.	**Medium** Only narrow corridors of good habitat connectivity or larger areas of poor habitat connectivity. Mostly minor current negative ecological impacts with some major impacts and a few signs of minor past disturbance. Moderate rehabilitation potential.	**Medium**	**High** Habitat that can recover relatively quickly (~ 5–10 years) to restore > 75% of the original species composition and functionality of the receptor functionality, or species that have a high likelihood of remaining at a site even when a disturbance or impact is occurring, or species that have a high likelihood of returning to a site once the disturbance or impact has been removed.	**Low**	Minimisation and restoration mitigation – development activities of medium impact acceptable followed by appropriate restoration activities.

Habitat Unit	CI	FI	BI	RR	SEI	Development Constraints
Miombo Woodland	**Medium** > 50% of receptor contains natural habitat with potential to support SCC.	**High** Good habitat connectivity with potentially functional ecological corridors. Only minor current negative ecological impacts with no signs of major past disturbance and good rehabilitation potential.	**Medium**	**Medium** Will recover slowly (~ more than 10 years) to restore > 75% of the original species composition and functionality of the receptor. The species that are currently in this habitat are common and largely homogenous and may have a moderate likelihood of returning to a site once the disturbance or impact has been removed.	**Medium**	Minimisation and restoration mitigation – development activities of medium impact acceptable followed by appropriate restoration activities.

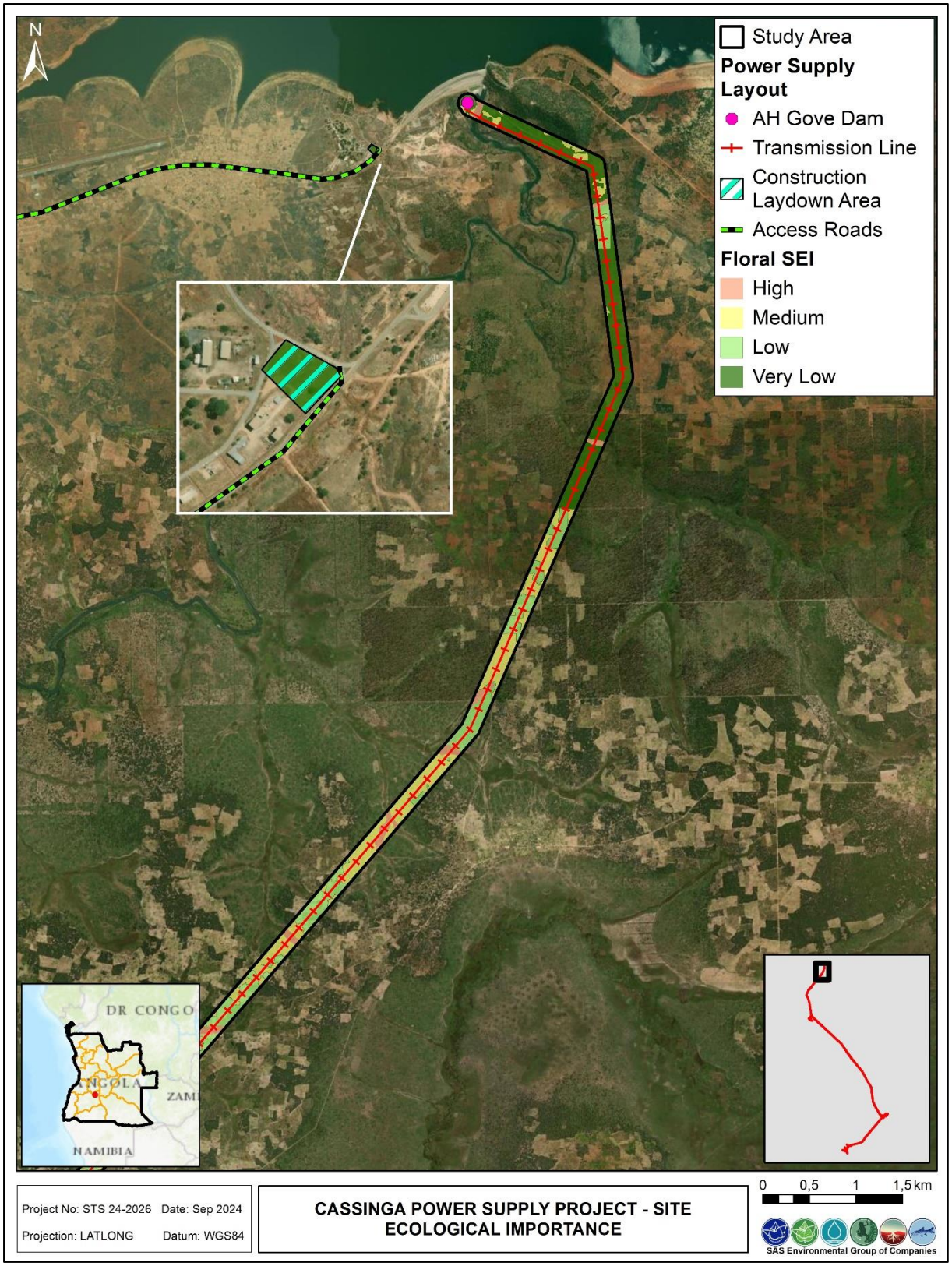


Figure 19: Sensitivity map pertaining to the floral assessment of the study area (Map 1 of 16).

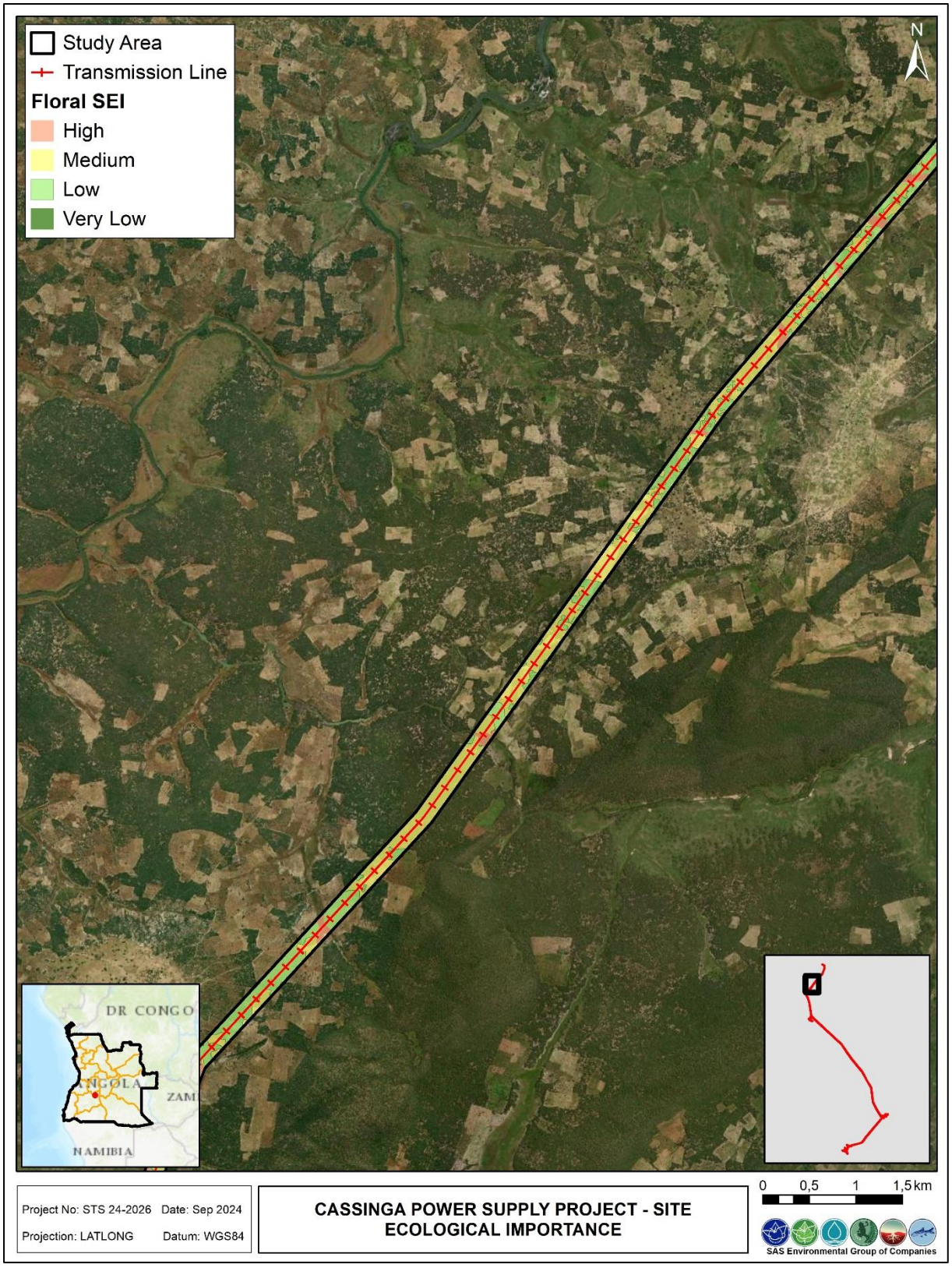


Figure 20: Sensitivity map pertaining to the floral assessment of the study area (Map 2 of 16).

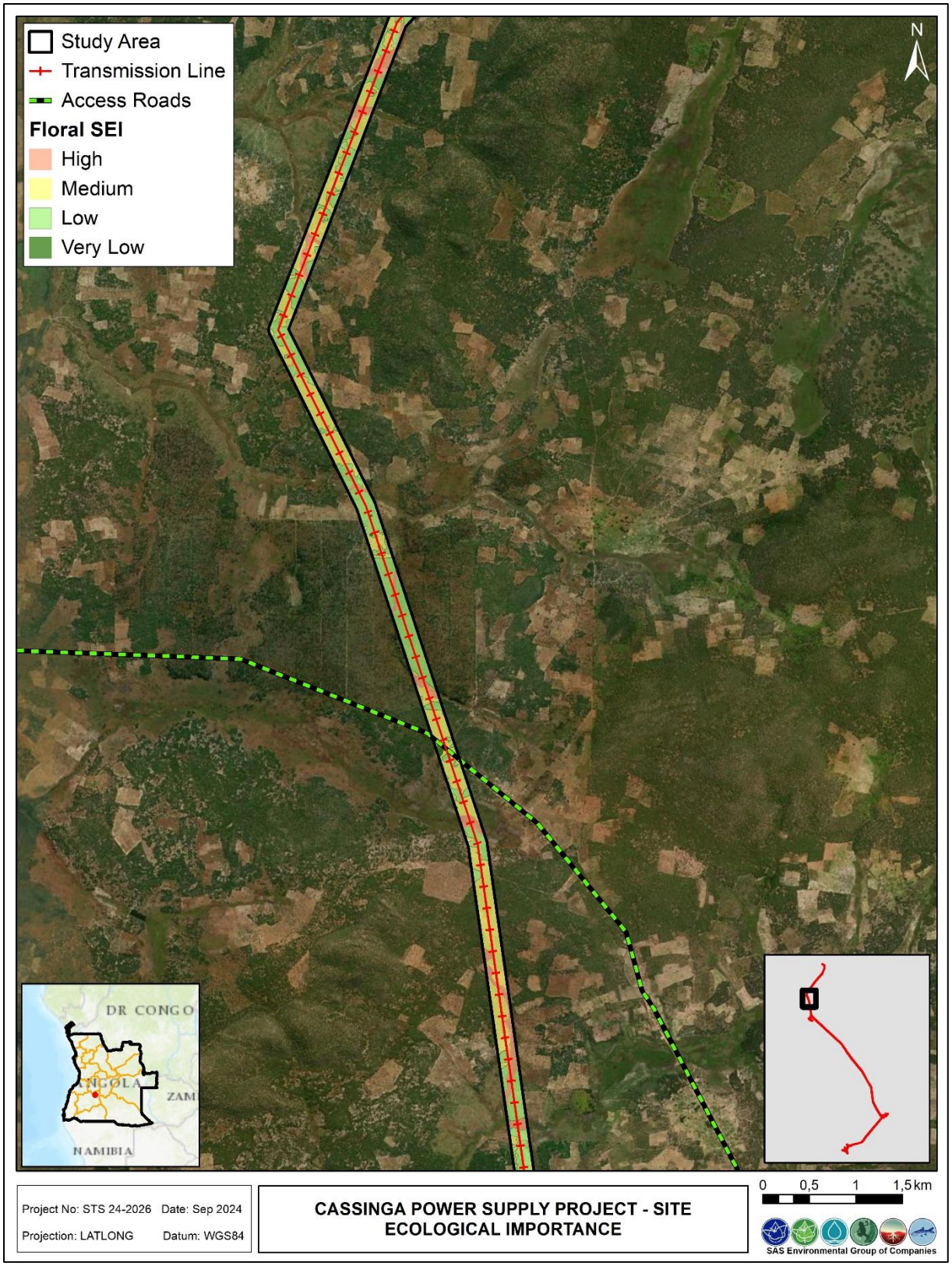


Figure 21: Sensitivity map pertaining to the floral assessment of the study area (Map 3 of 16).

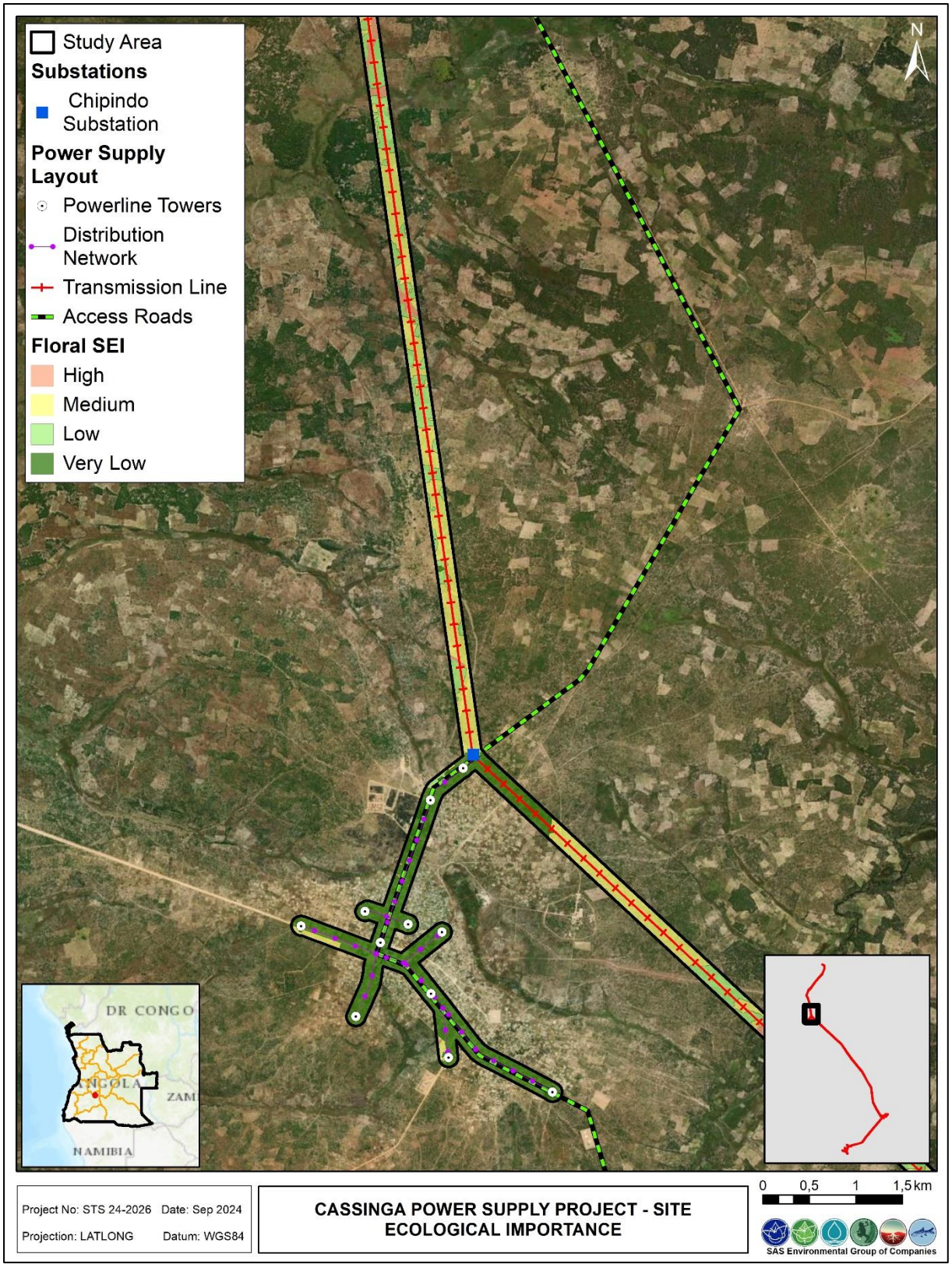


Figure 22: Sensitivity map pertaining to the floral assessment of the study area (Map 4 of 16).

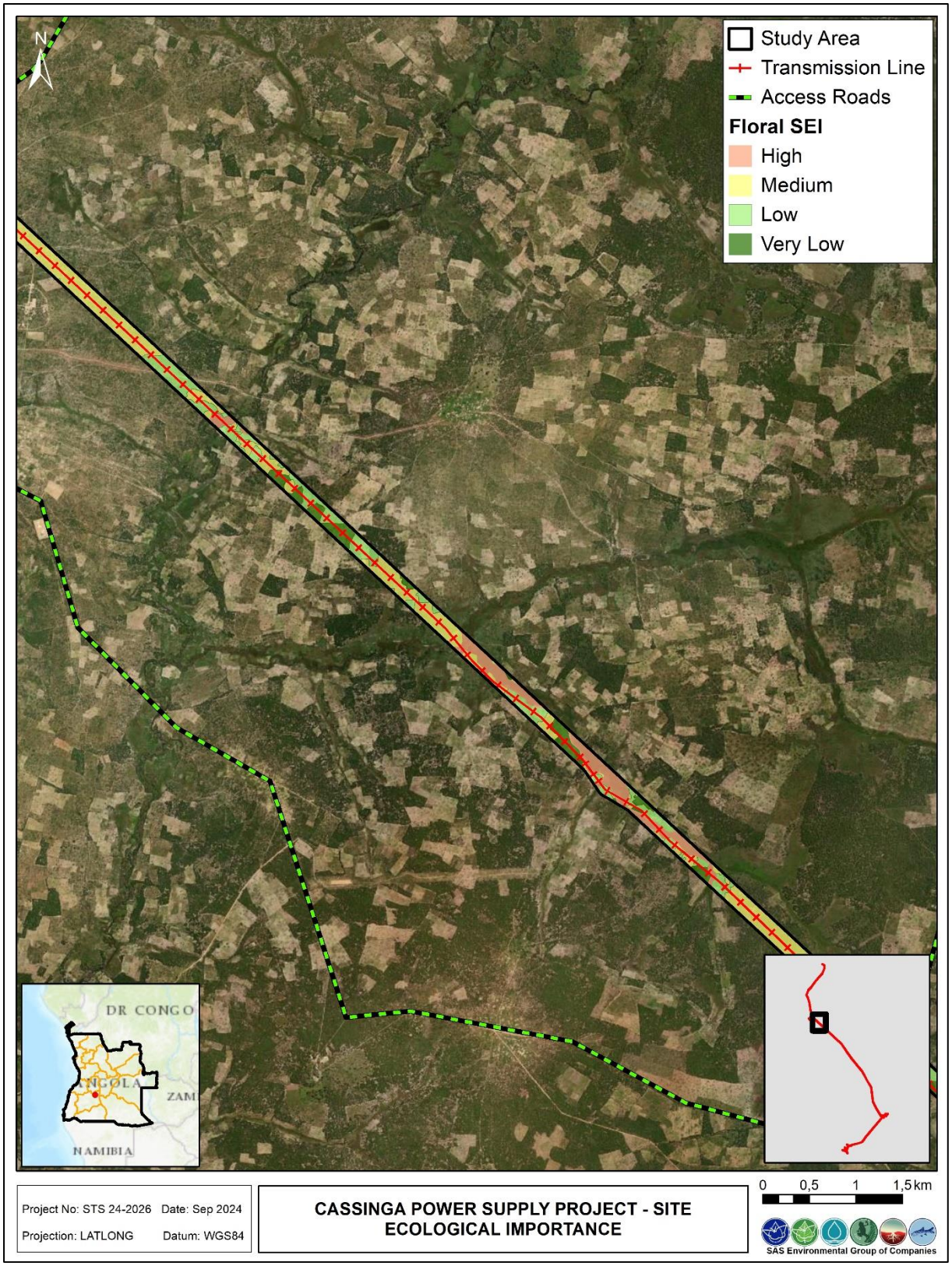


Figure 23: Sensitivity map pertaining to the floral assessment of the study area (Map 5 of 16).

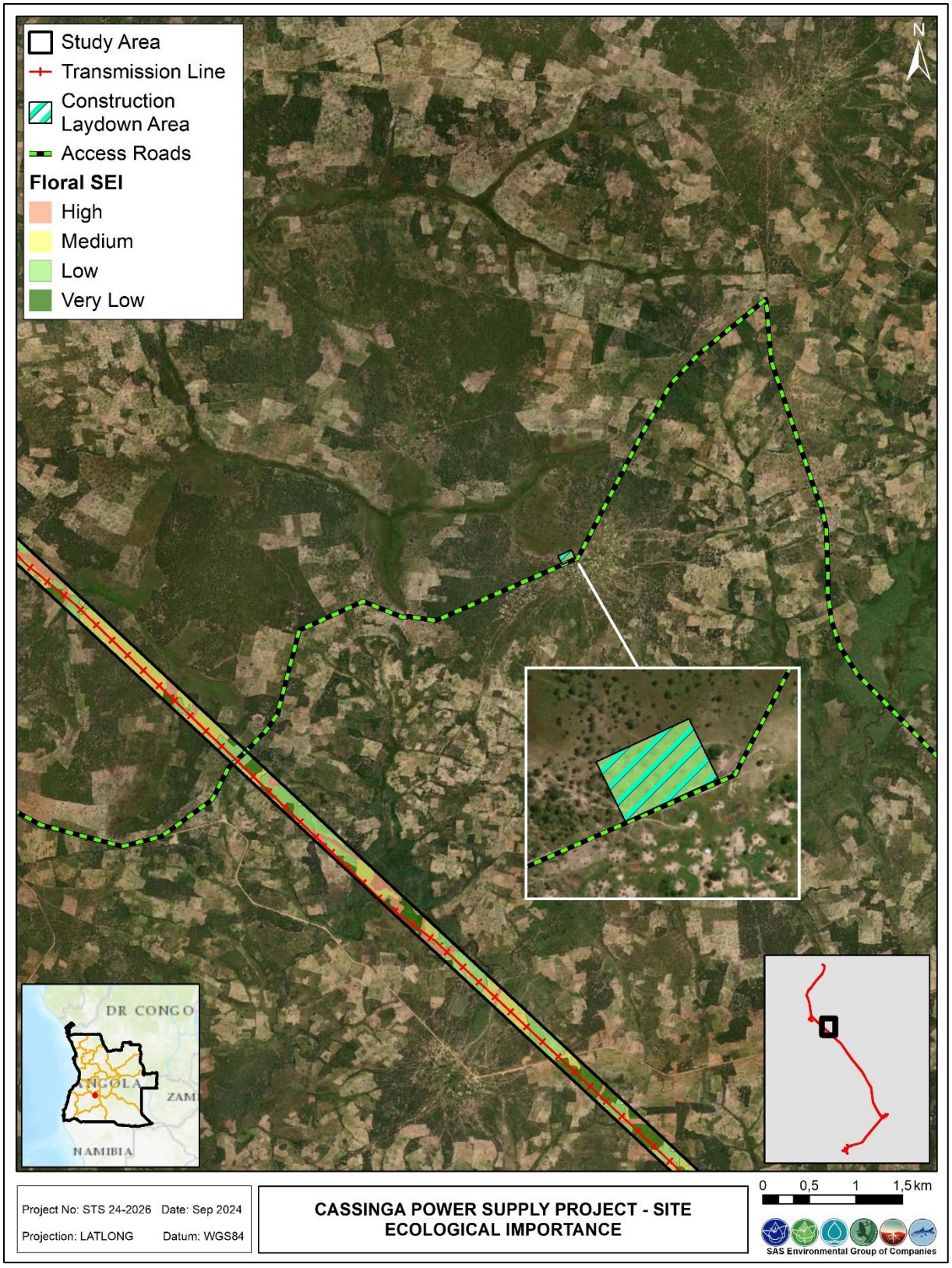


Figure 24: Sensitivity map pertaining to the floral assessment of the study area (Map 6 of 16).

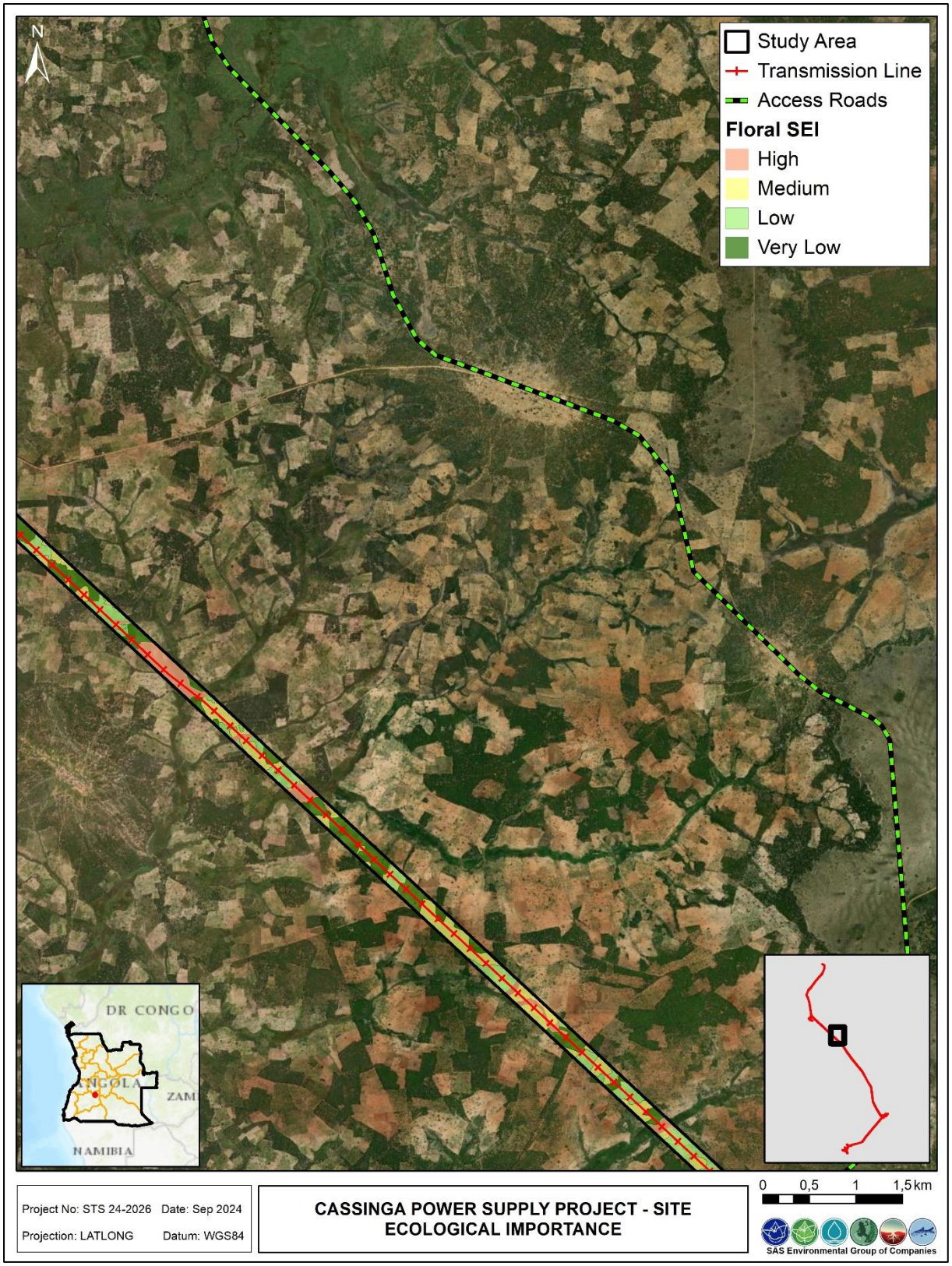


Figure 25: Sensitivity map pertaining to the floral assessment of the study area (Map 7 of 16).

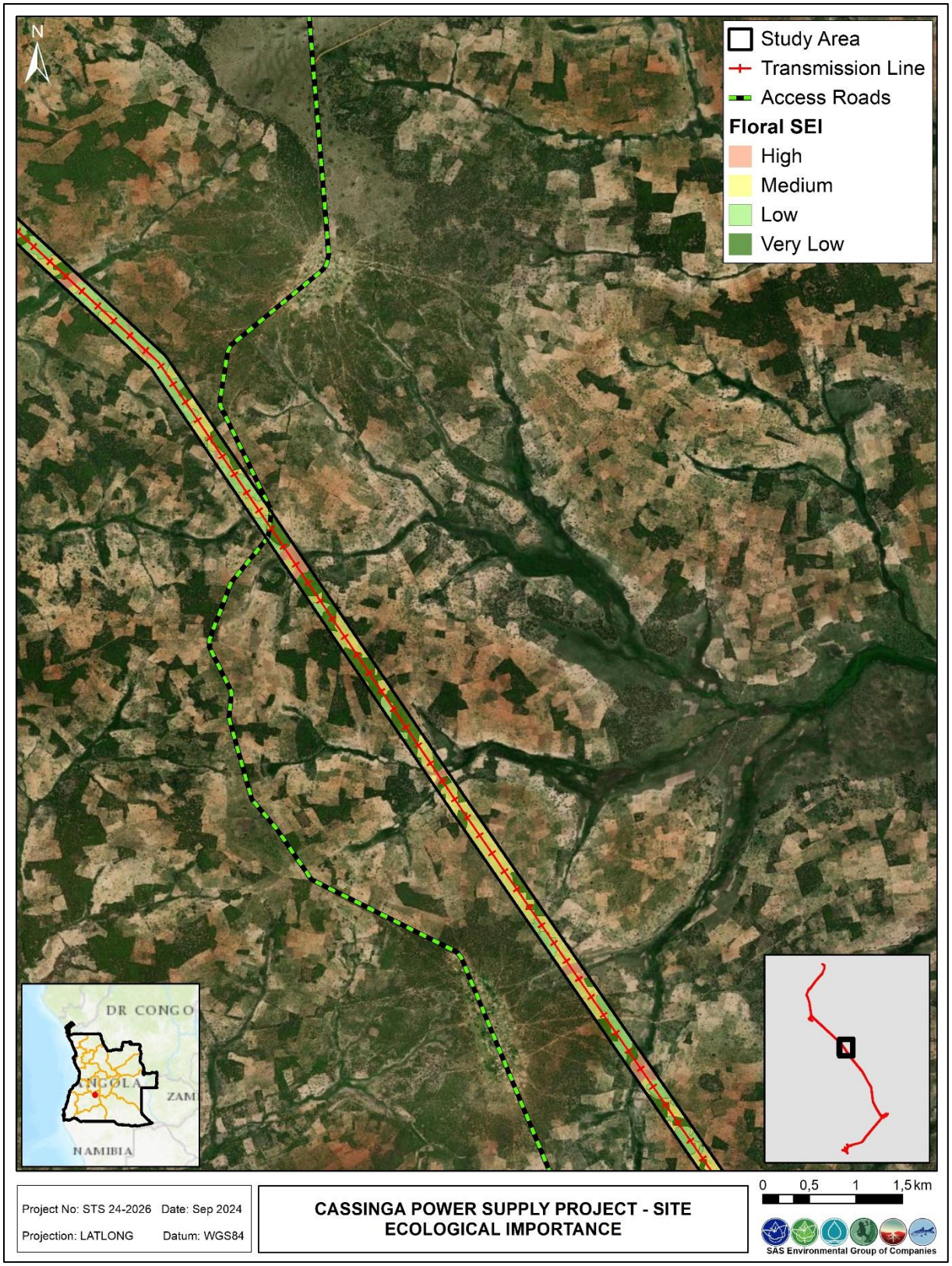


Figure 26: Sensitivity map pertaining to the floral assessment of the study area (Map 8 of 16).

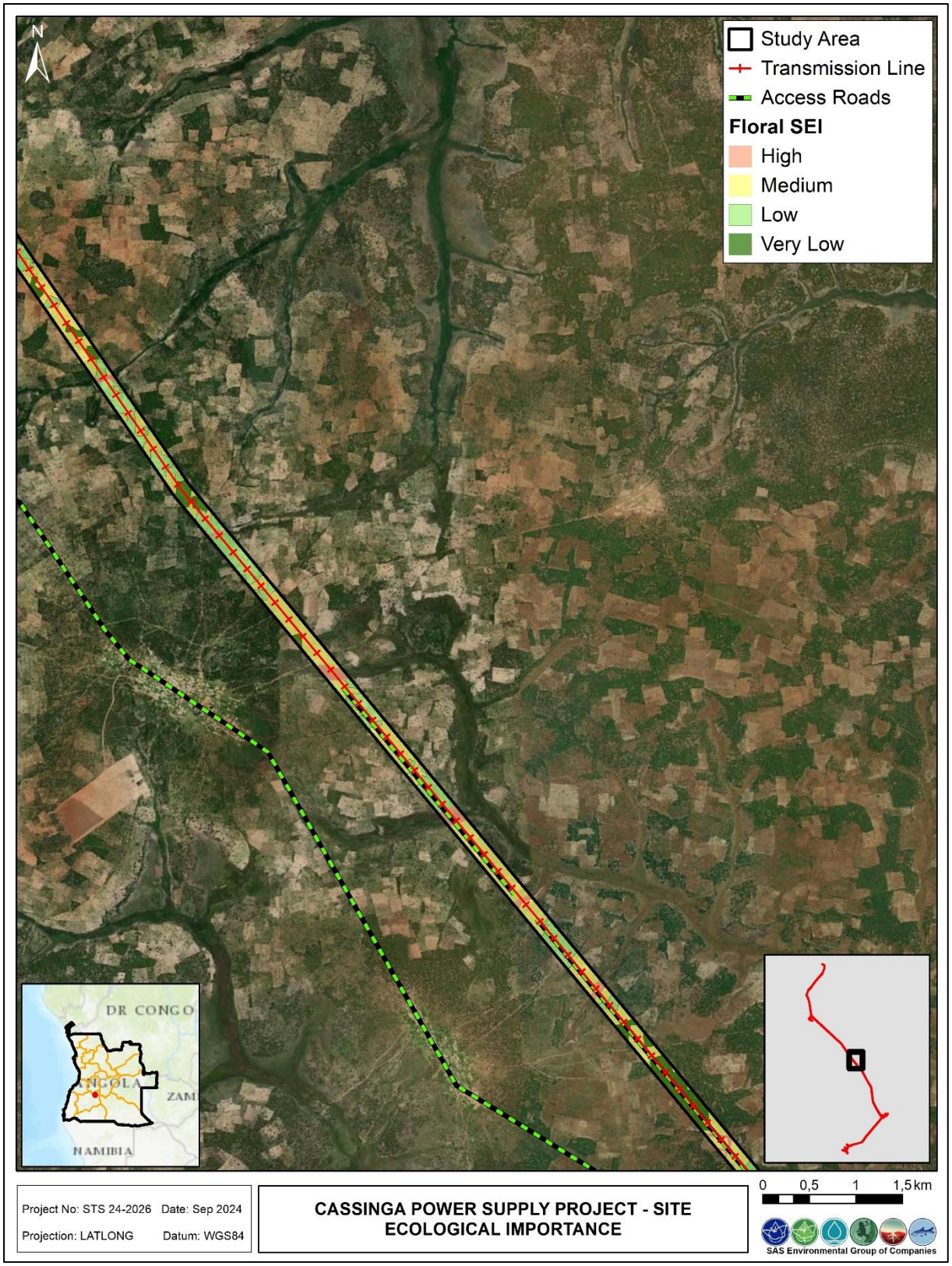


Figure 27: Sensitivity map pertaining to the floral assessment of the study area (Map 9 of 16).

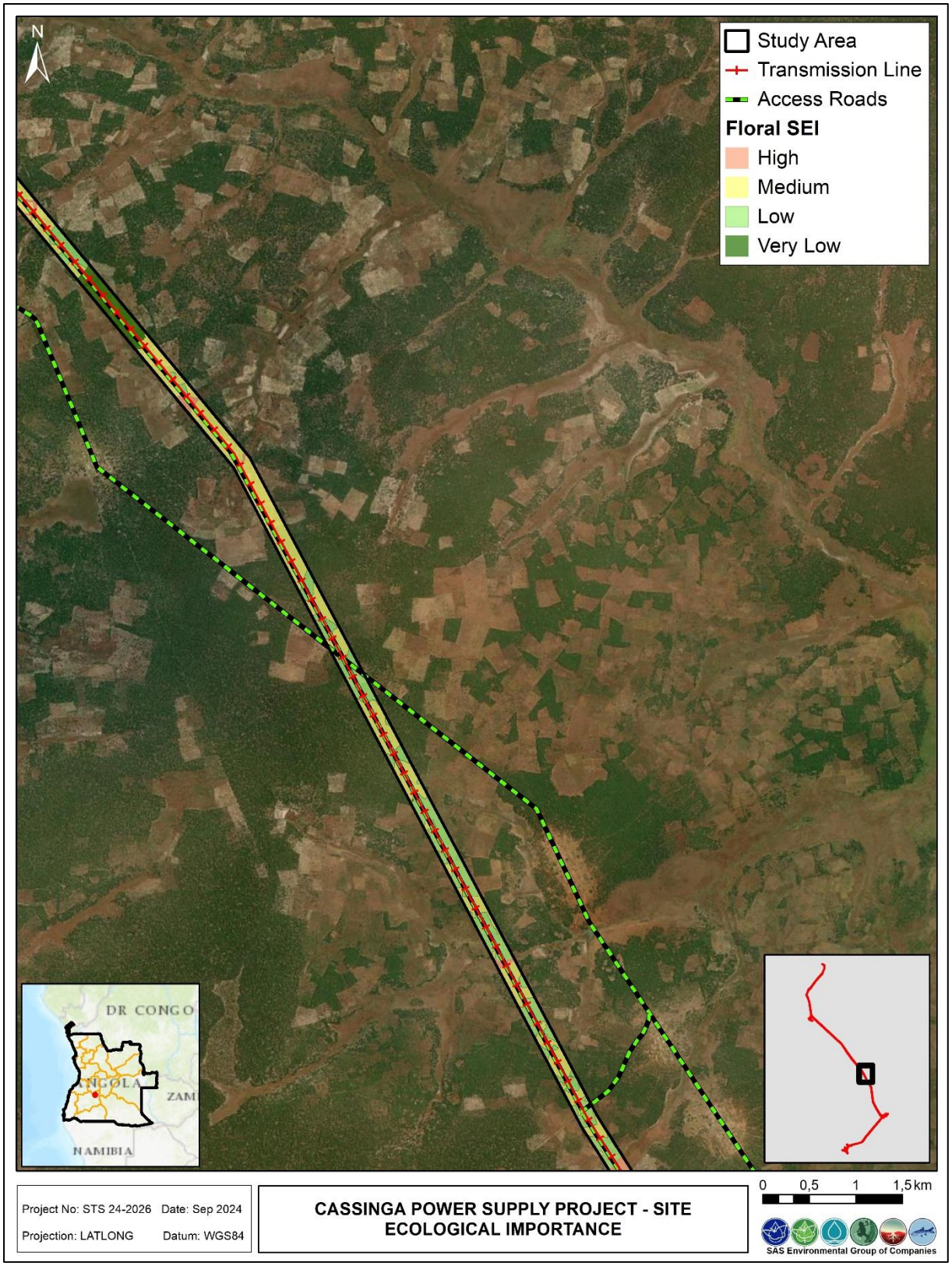


Figure 28: Sensitivity map pertaining to the floral assessment of the study area (Map 10 of 16).

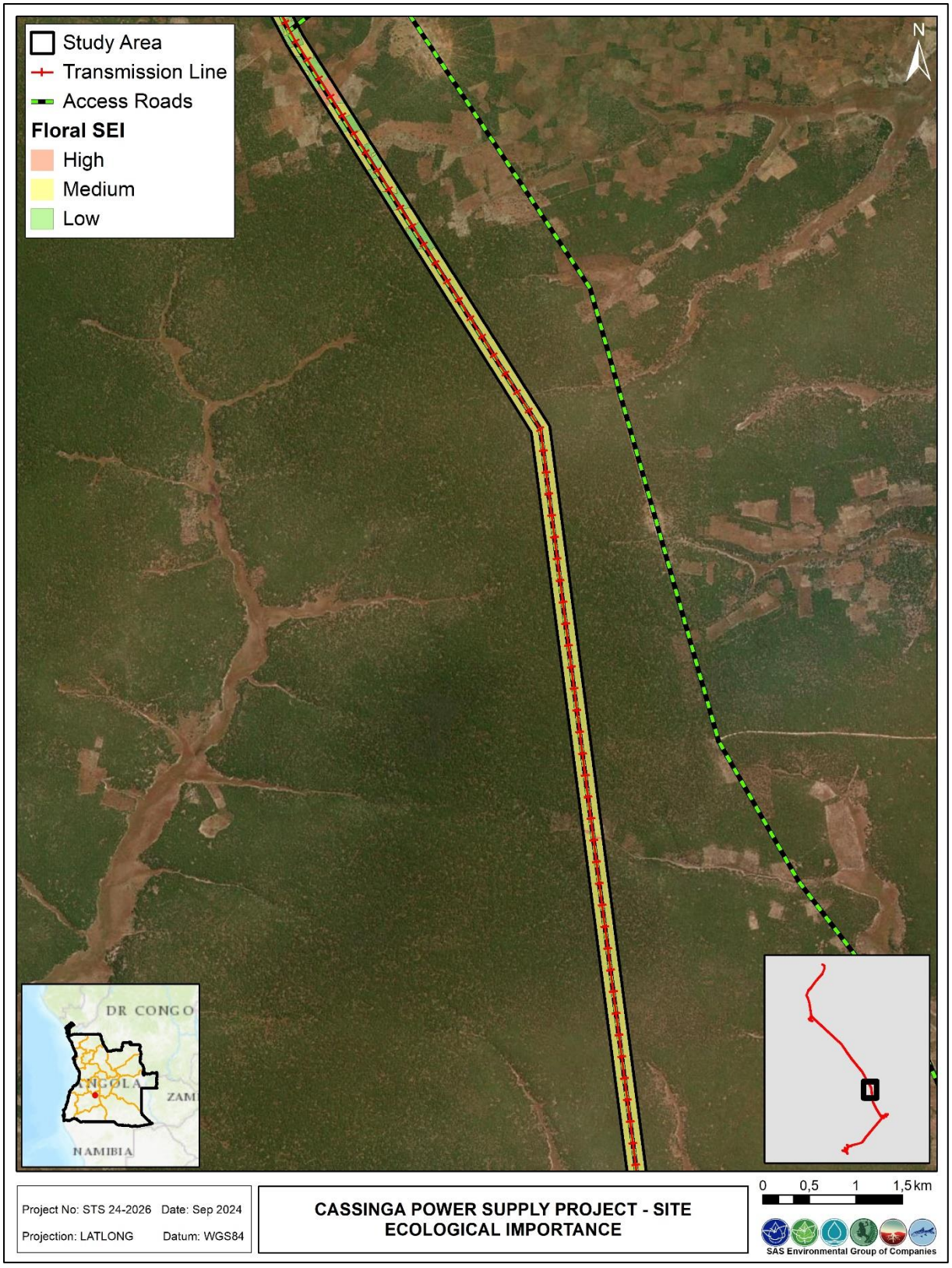


Figure 29: Sensitivity map pertaining to the floral assessment of the study area (Map 11 of 16).

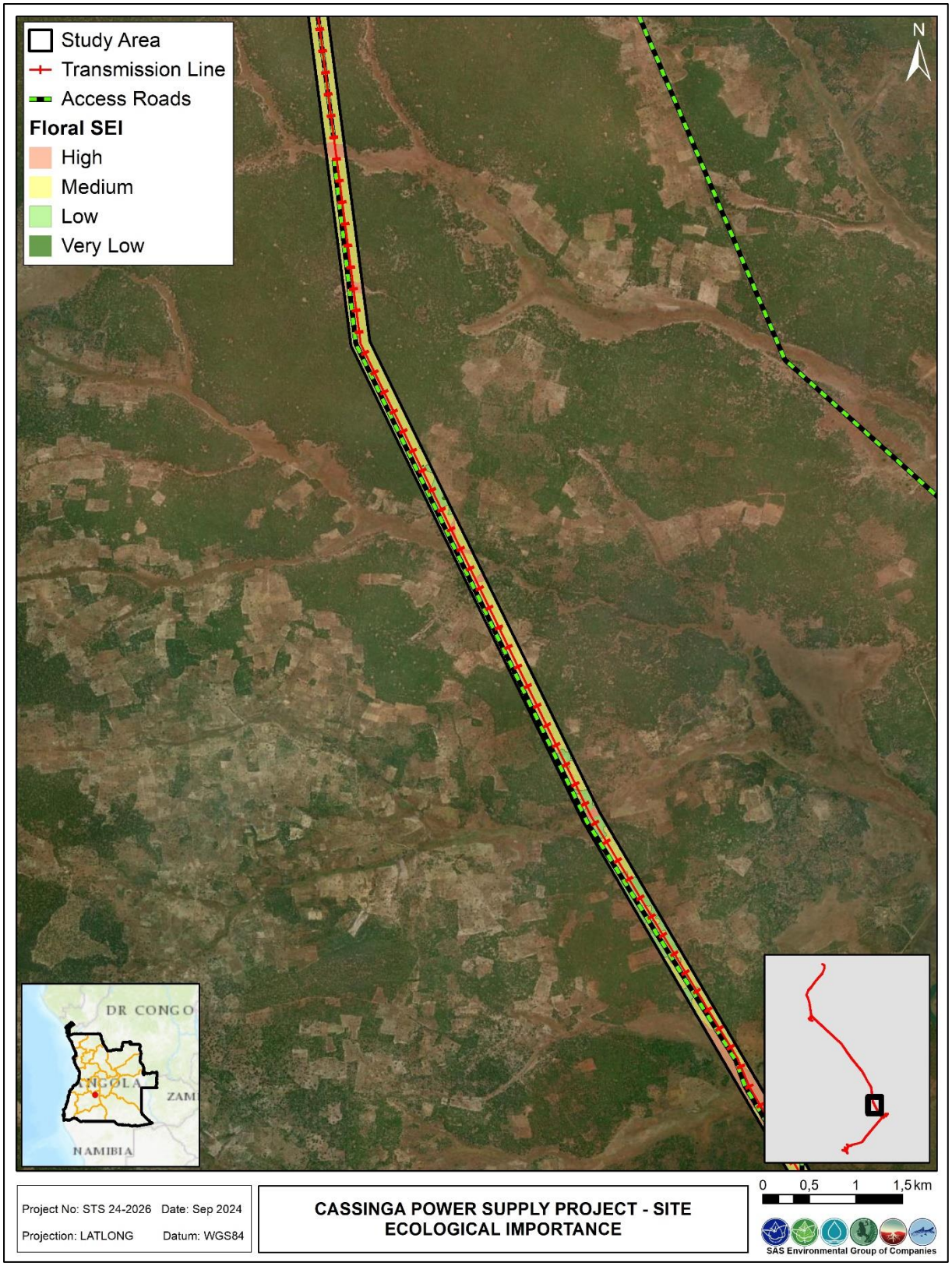


Figure 30: Sensitivity map pertaining to the floral assessment of the study area (Map 12 of 16).

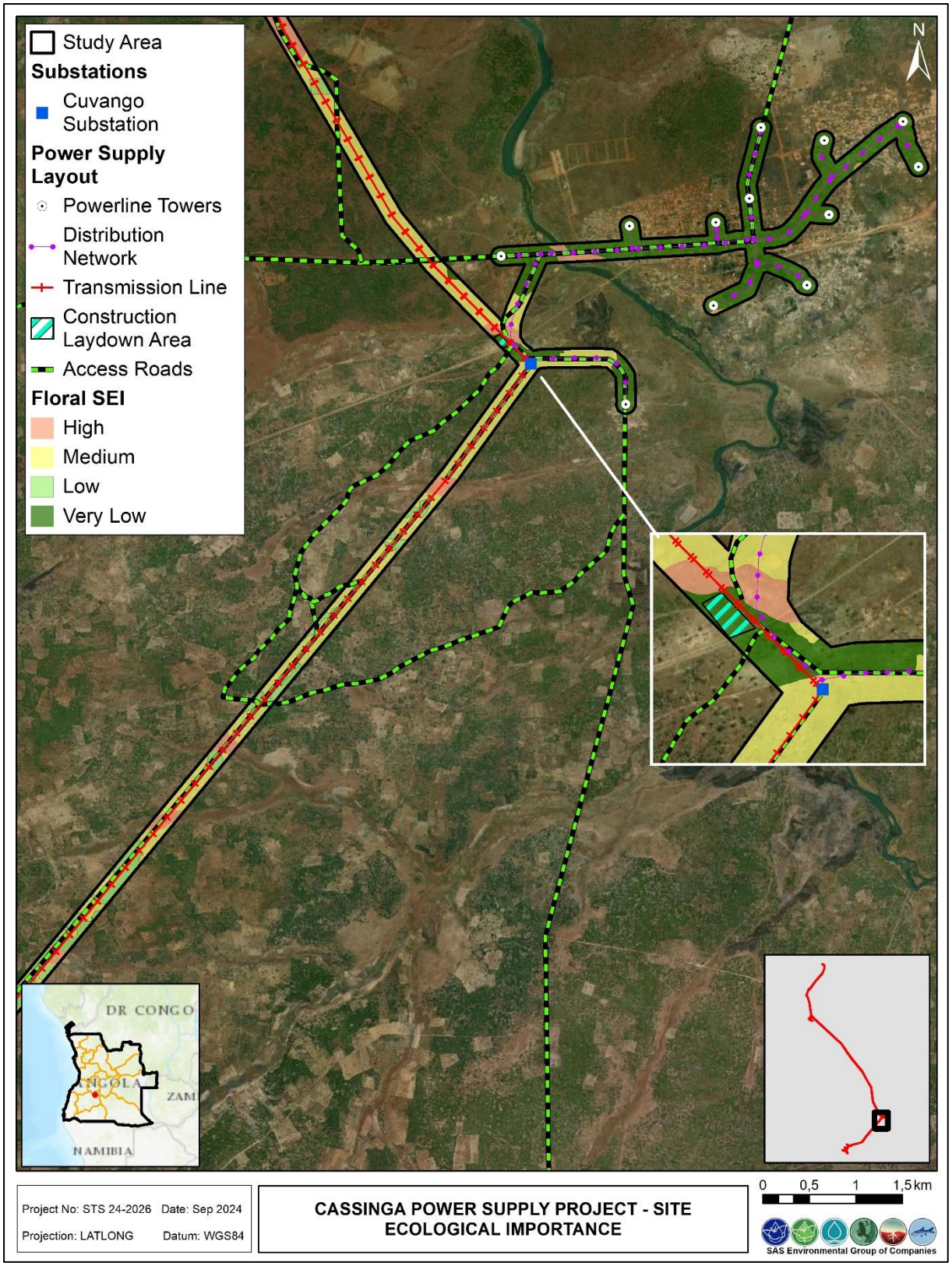


Figure 31: Sensitivity map pertaining to the floral assessment of the study area (Map 13 of 16).

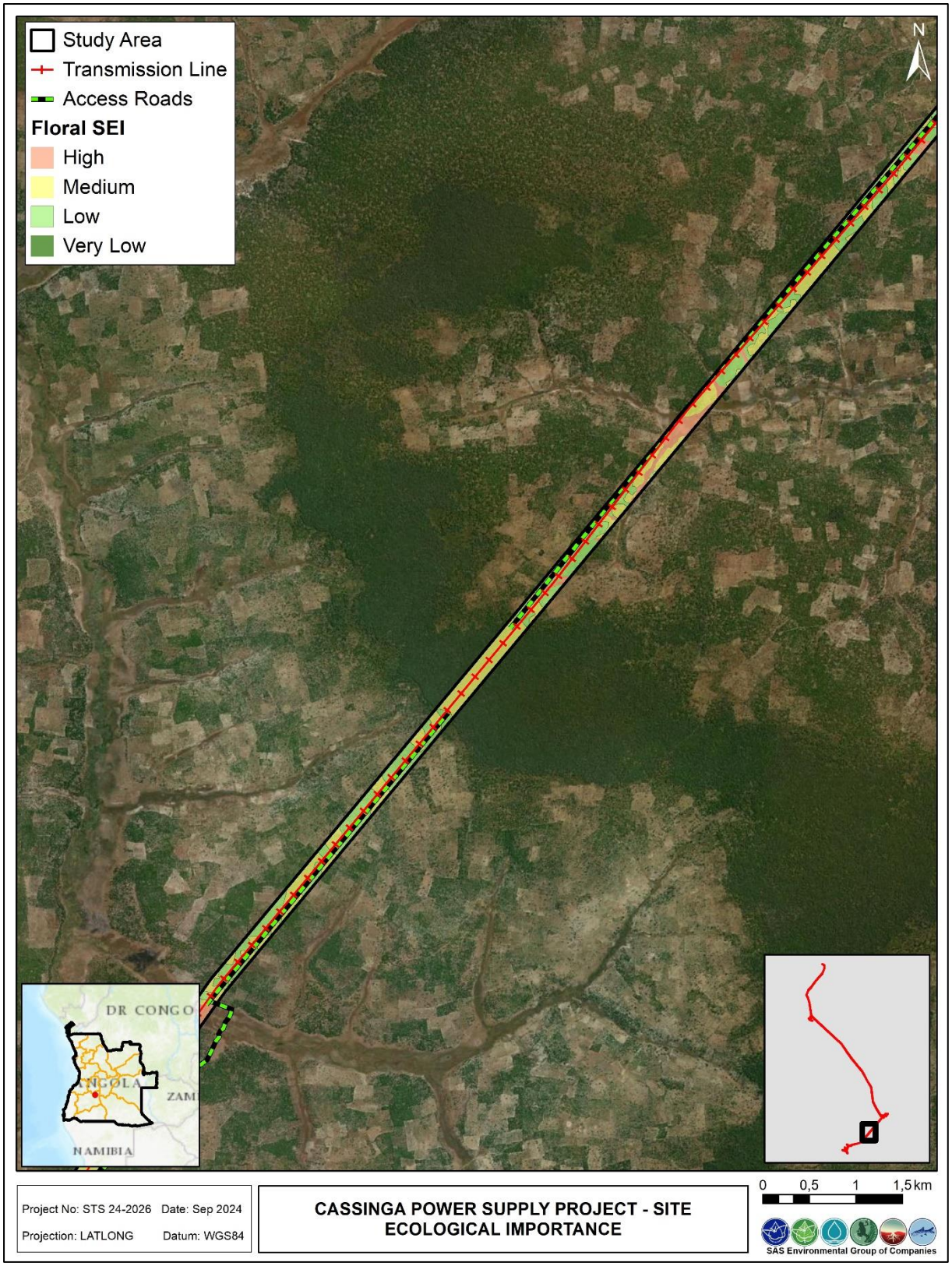


Figure 32: Sensitivity map pertaining to the floral assessment of the study area (Map 14 of 16).

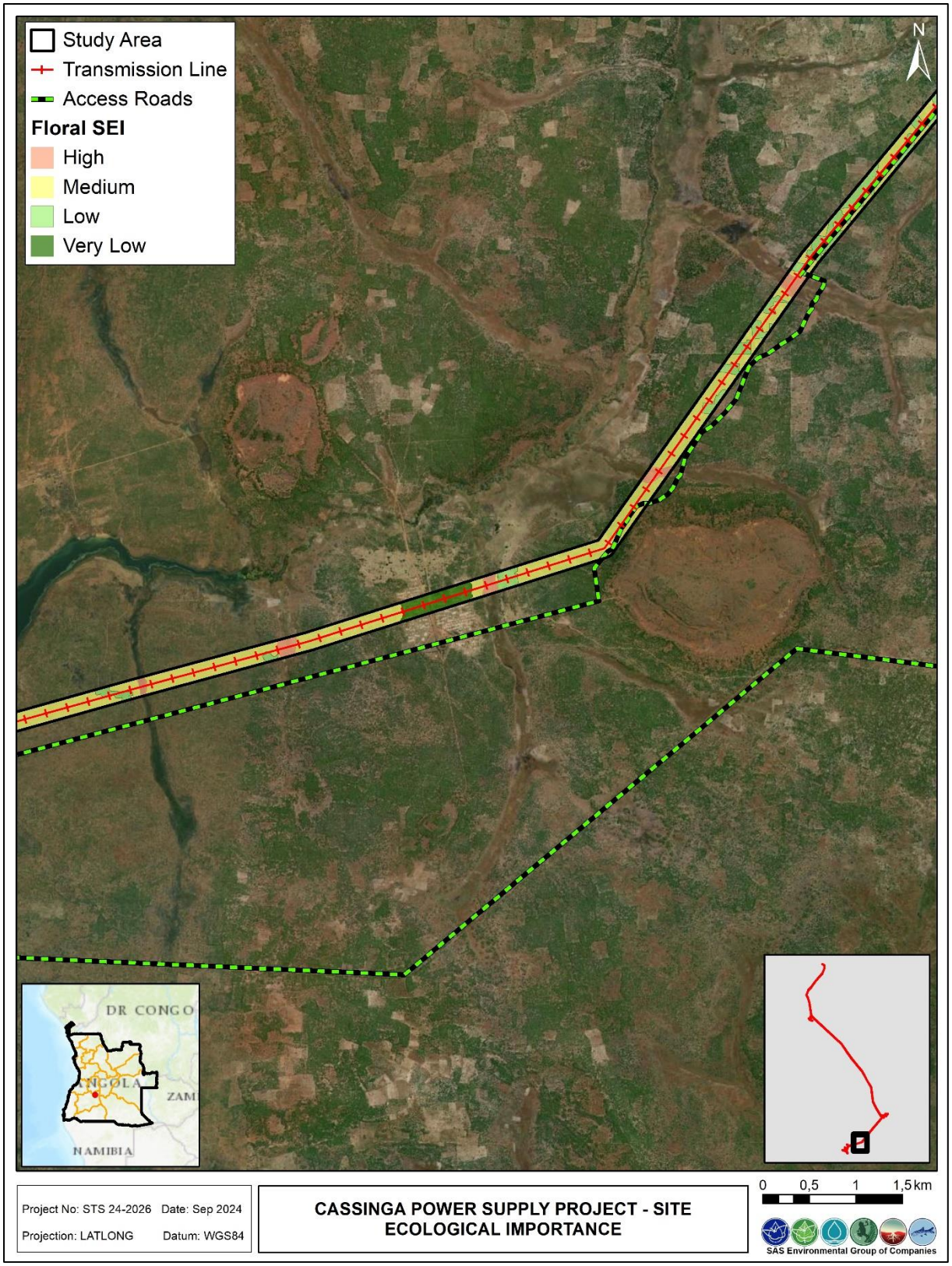


Figure 33: Sensitivity map pertaining to the floral assessment of the study area (Map 15 of 16).

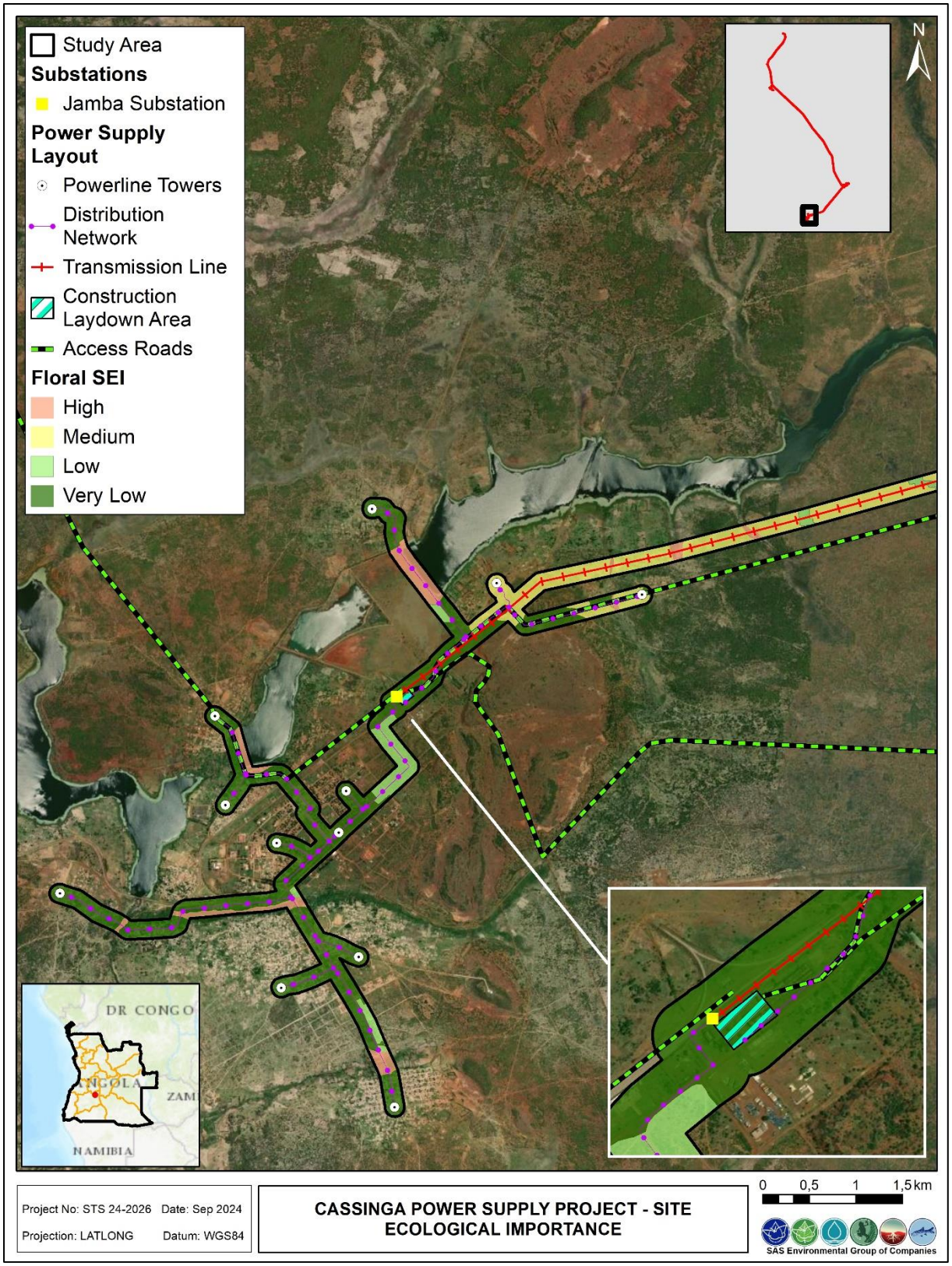


Figure 34: Sensitivity map pertaining to the floral assessment of the study area (Map 16 of 16).

7 IMPACT ASSESSMENT AND PROPOSED MANAGEMENT MEASURES

The significance of perceived impacts on the floral ecology of the proposed Project, according to the method described in Appendix B, as provided by the proponent is presented in Section 7.2 (Table 8 to 24) on top of each table.

An impact discussion and assessment of all potential (1) Pre-construction & Planning, (2) Construction, (3) Operational and Maintenance, and (4) Decommissioning Phase impacts are provided in Section 7.2 (Table 8 to 24). All mitigatory measures required to minimise the perceived impacts are presented in Section 7.2 (Table 8 to 24) at the bottom of each table.

Impacts to each of the habitat units were assessed independently for each phase of the project. Where activities are perceived to have similar impacts to the receiving environment (or will be impacting in the same area), these were grouped and assessed together.

7.1 Identification of Potential Impacts

The below table presents the perceived potential impacts that will impact on floral habitat, species diversity and SCC as a result of the pre-construction, construction, and operation and maintenance phases of the proposed Project.

Table 8: Summary of the potential impacts to floral habitat and species associated with the project.

Potential Impacts	Description of Impacts
Pre-Construction Phase	
Loss of floral habitat and species diversity	➢ Planning of infrastructure placement and design, leading to the loss of floral habitat of varying SEI categories (i.e., very low to high scoring habitats), as well as unnecessary edge effect impacts on areas outside of the proposed development footprint due to overriding economic and socio-cultural reasons; ➢ Potential failure to develop appropriate rehabilitation and erosion control plans before the commencement of construction activities; and ➢ Potential increase in fragmentation of habitats due to pore planning.
Loss of potential floral SCC	➢ Potential loss of floral SCC habitat due to inconsiderate planning; and ➢ Potential failure to implement stormwater management activities before the commencement of construction activities
Construction Phase	
Loss of floral habitat and species diversity	➢ Site clearing and the removal of indigenous vegetation leading to a loss of floral diversity and species composition; ➢ Proliferation of AIP species that colonise in areas of increased disturbances and that outcompete native species, including the further transformation of adjacent natural habitat; ➢ Dumping of construction material within areas where no construction is planned, thereby leading to further habitat disturbance - allowing the establishment and spread of AIPs;

Potential Impacts	Description of Impacts
	➢ Risk of contamination from construction vehicle spills which may pollute receiving environment; ➢ Potentially poorly managed edge effects: o Potential ineffective rehabilitation of compacted areas, bare soils, or eroded areas outside of the development of the approved footprint leading to ongoing proliferation of AIP species in disturbed areas and subsequent spread to surrounding natural areas altering the floral habitat; and o Compaction of soils outside of the study area due to indiscriminate driving of construction vehicles through natural vegetation; and ➢ Possible increased fire frequency during construction.
Loss of potential floral SCC	➢ Site clearing and the removal of floral SCC; ➢ Potential failure to conduct a walkdown of the approved footprint area before construction activities for floral SCC to be mark for rescue and relocation to suitable habitat outside the development footprint within the study area; ➢ Potential failure to relocate marked SCC to suitable habitat either within the study area or to suitable habitat outside of the study area; ➢ Proliferation of AIP species that colonise in areas of increased disturbances and that outcompete potential floral SCC; and ➢ Dumping of construction material within areas where no construction is planned, thereby leading to further habitat disturbance - allowing the establishment and spread of AIPs and subsequent loss of SCC habitat.
Habitat fragmentation	➢ Clearing vegetation for the proposed Project and its associated infrastructure will lead to habitat fragmentation in the landscape, particularly in larger intact areas of the Miombo Woodland; and ➢ With the increased accessibility to the area may, it may lead to increased wood harvesting and expansion of agricultural land, hereby exacerbating fragmentation across the landscape.
Operational and Maintenance Phase	
Loss of floral habitat and species diversity	➢ Increased introduction and proliferation of AIPs due to a lack of maintenance activities, or poorly implemented AIP Management programme, leading to ongoing displacement of natural vegetation outside of the proposed footprint area; ➢ Potentially poorly managed edge effects: o Potential ineffective rehabilitation of compacted areas, bare soils, or eroded areas outside of the development footprint areas leading to ongoing proliferation of AIP species in disturbed areas and subsequent spread to surrounding natural areas altering the vegetation communities surrounding footprint areas; ➢ Increased human presence in the area once operational, potentially leading to Illegal harvesting/ collection of medicinal plants or an increased risk of fire frequency impacting on floral communities outside of the development footprint; and ➢ On-going disturbance during operational phase may lead to erosion and sedimentation of surrounding floral habitat.
Loss of potential floral SCC	➢ Increased introduction and proliferation of AIPs due to a lack of maintenance activities, or poorly implemented AIP Management programme, leading to habitat loss for floral SCC; ➢ Potentially poorly managed edge effects: o Potential ineffective rehabilitation of compacted areas, bare soils, or eroded areas outside of the development footprint areas leading to ongoing proliferation of AIP species in disturbed areas and subsequent spread to surrounding natural areas altering the preferred habitat for floral SCC; and ➢ Increased human presence in the area once operational, potentially leading to unlawful harvesting/ collection of floral SCC or an increased

Potential Impacts	Description of Impacts
	risk of fire frequency impacting on floral SCC outside of the development footprint.
Decommissioning Phase	
Loss of floral habitat and species diversity	➢ Possible increased fire frequency during the decommissioning phase; ➢ Potentially poorly managed edge effects: o Potential ineffective rehabilitation of compacted areas, bare soils, or eroded areas outside of the rehabilitation footprint areas leading to ongoing proliferation of AIP species in disturbed areas and subsequent spread to surrounding natural areas altering the vegetation communities surrounding footprint areas; o Compaction of soils outside of the study area due to indiscriminate driving of decommissioning and rehabilitation vehicles through natural vegetation; ➢ Risk of contamination from decommissioning and rehabilitation vehicle spills which may contaminate the receiving environment; ➢ Increased human presence in the area during the decommissioning phase, potentially leading to Illegal harvesting/ collection of medicinal plants or an increased risk of fire frequency impacting floral communities outside of the development footprint; ➢ On-going disturbance during the decommissioning phase (demolition activities) may lead to erosion and sedimentation of surrounding floral habitat; and ➢ Potential failure to monitor rehabilitation efforts and apply appropriate adaptive management.
Loss of potential floral SCC	➢ Increased introduction and proliferation of AIPs due to a lack of rehabilitation activities, or poorly implemented AIP Management programme, leading to habitat loss for floral SCC; ➢ Potentially poorly managed edge effects: o Potential ineffective rehabilitation of compacted areas, bare soils, or eroded areas outside of the development footprint areas leading to ongoing proliferation of AIP species in disturbed areas and subsequent spread to surrounding natural areas altering the preferred habitat for floral SCC; and ➢ Increased human presence in the area during the decommissioning phase, potentially leading to unlawful harvesting/ collection of floral SCC or an increased risk of fire frequency impacting on floral SCC outside of the development footprint.
Consideration of Cumulative Impacts	
Altered species diversity and occurrences	The vegetation clearance proposed for the Project will compound ongoing clearance efforts for subsistence agriculture in the area. The construction of new access roads could accelerate the conversion of indigenous vegetation to agricultural fields due to improved accessibility. This fragmentation can disrupt habitat connectivity crucial for floral species, resulting in reduced genetic diversity and isolated populations.
Habitat fragmentation	The fragmentation of habitats caused by activities such as vegetation clearance and the construction of new access roads can disrupt the connectivity of habitats important for the survival of floral species. As a consequence, this disruption can lead to a reduction in the genetic diversity of floral populations and the isolation of these populations from one another. Consequently, isolated populations may face challenges such as reduced gene flow, and increased vulnerability to environmental disturbances, which can ultimately threaten their long-term viability and survival.

7.2 Floral Impact Assessment Tables

The below section provides the findings of the impact assessment undertaken with reference to the perceived impacts prior to the implementation of mitigation measures and following the implementation of mitigation measures. The mitigated results of the impact assessment have been calculated on the premise that all mitigation measures as stipulated in this report are adhered to and implemented. Should such actions not be adhered to, it is highly likely that post-mitigation impact scores will increase.

Table 9: Impact Assessment considering the impacts and mitigation surrounding the floral habitat and diversity during the Pre-construction and Planning phase of the proposed Project development and proposed infrastructure of new substations.

ACTIVITY 1: Site preparation prior to commencement of construction with focus on floral habitat and diversity.									
Impact Summary: ➢ Loss of favourable floral habitat beyond the authorised footprint, leading to a decline in floral diversity; ➢ Loss of sensitive habitat and /or fragmentation of vegetation communities; ➢ Increased risk of erosion and loss of topsoil; ➢ Potential increase in fragmentation of vegetation communities and disruption of natural dispersal processes; and ➢ Potential increase in fragmentation of ecological corridors and diminished ecological functionality.									
Habitat unit	**Management**	***Magnitude***	***Duration***	***Scale***	***Consequence***	***Probability***	***Significance***	***Status***	***Confidence***
Transformed	Before	Minor (-)	Medium term	Local	Medium	Definite	**Low**	–	Medium
	After	Minor (-)	Short term	Site	Low	Possible	**Low**	–	Medium
Freshwater	Before	Major (-)	Medium term	Local	Medium	Definite	**Medium**	–	Medium
	After	Minor (-)	Short term	Site	Low	Possible	**Low**	–	Medium
Secondary Miombo	Before	Moderate (-)	Medium term	Local	Medium	Definite	**Medium**	–	Medium
	After	Minor (-)	Short term	Site	Low	Possible	**Low**	–	Medium
Miombo Woodland	Before	Major (-)	Medium term	Local	Medium	Definite	**Medium**	–	Medium
	After	Minor (-)	Short term	Site	Low	Possible	**Low**	–	Medium
Essential management measures: ➢ At all times, ensure that sound environmental management is in place during the planning phase; ➢ The design plans should take cognisance of sensitive habitats described during the ESIA phase; ➢ Development should be prioritised in habitats of decreased sensitivity; ➢ Access roads should be kept to existing roads were possible so to reduce further fragmentation of existing natural habitat; ➢ A rehabilitation plan should be developed that will promote habitat reinstatement in disturbed sites and allow for increased habitat connectivity during the operation and maintenance phase of the project; and ➢ A stormwater management plan should be developed to ensure sound stormwater design and management planning.									

Table 10: Impact Assessment considering the impacts and mitigation surrounding the floral SCC during the Pre-construction and Planning phase of the proposed Project development and proposed infrastructure of new substations.

ACTIVITY 2: Site preparation prior to commencement of construction with focus on floral SCC.									
Impact Summary: ➢ Potential loss of habitat for SCC through inconsiderate planning of layout placement; and ➢ Potential unmitigated loss of floral SCC (rescue and relocation should take place during the planning phase prior to vegetation clearing).									
Habitat unit	**Management**	***Magnitude***	***Duration***	***Scale***	***Consequence***	***Probability***	***Significance***	***Status***	***Confidence***
Transformed	Before	Minor (-)	Medium term	Local	Medium	Definite	**Low**	–	Medium
	After	Minor (-)	Short term	Site	Low	Unlikely	**Low**	–	Medium
Freshwater	Before	Minor (-)	Medium term	Local	Low	Possible	**Low**	–	Medium
	After	Minor (-)	Short term	Site	Low	Unlikely	**Low**	–	Medium
Secondary Miombo	Before	Moderate (-)	Medium term	Local	Medium	Possible	**Medium**	–	Medium
	After	Minor (-)	Short term	Site	Low	Unlikely	**Low**	–	Medium
Miombo Woodland	Before	Major (-)	Medium term	Local	Medium	Definite	**Medium**	–	Medium
	After	Minor (-)	Short term	Site	Low	Unlikely	**Low**	–	Medium
Essential management measures: ➢ Impact must be limited to the footprint area and kept to what is essential only; ➢ A walkdown of the footprint area must take place before construction activities commence, where all anticipated floral SCC species are searched for and marked to determine the number of individuals that will be impacted; ➢ Should any threatened floral species be encountered during the walkdown, rescue and relocation of the species are recommended. For this, an expert (botanist familiar with the species and traditional healers) must be consulted and should assess the feasibility of the plant rescue and relocation activities. This process must include collecting data regarding the condition of any relocated species (along with photographic evidence), and monitoring of relocated species must continue through all phase of the proposed Project development; ➢ No unauthorised collection of floral SCC must be allowed; ➢ Edge effect control needs to be implemented to prevent further degradation and potential loss of floral SCC outside of the proposed disturbance footprint area; and ➢ In the planning phase, the placement of the pylons should be adjusted as needed to minimise any potential impact on floral SCCs.									

Table 11: Impact Assessment considering the impacts and mitigation surrounding the floral habitat and diversity during the Construction phase of the proposed Project development and proposed infrastructure of new substations.

ACTIVITY 3: Vegetation clearing activities for the construction of the proposed Project development and proposed infrastructure of new substations and OHPL with focus on impacts to floral habitat and diversity.

Impact Summary:

- Loss of indigenous vegetation through vegetation clearing (specifically within the Miombo Woodland Habitat and Freshwater Habitat;
- Loss of floral habitat and diversity with associated decline of species diversity within the impacted areas);
- Loss of topsoil and seedbanks;
- Soil-compaction, erosion, and AIP proliferation within disturbed areas; and
- Loss of floral habitat beyond the project footprint due to potential footprint creep as a result of increased erosion or potential dumping of construction material within areas where no construction is planned.

Habitat unit	Management	*Magnitude*	*Duration*	*Scale*	*Consequence*	*Probability*	*Significance*	*Status*	*Confidence*
Transformed	Before	Minor (-)	Medium term	Local	Low	Possible	**Low**	–	High
	After	Minor (-)	Short term	Site	Low	Definite	**Low**	–	Medium
Freshwater	Before	Moderate (-)	Long term	Local	High	Possible	**Medium**	–	High
	After	Moderate (-)	Long term	Site	Medium	Possible	**Low**	–	Medium
Secondary Miombo	Before	Minor (-)	Long term	Local	Medium	Definite	**Medium**	–	High
	After	Minor (-)	Long term	Site	Medium	Definite	**Low**	–	Medium
Miombo Woodland	Before	Moderate (-)	Long term	Local	High	Possible	**High**	–	High
	After	Minor (-)	Long term	Site	Medium	Possible	**Low**	–	Medium

Essential management measures:

- Provide training and raise staff awareness of biodiversity requirements (such as protecting native floral species, preserving habitats, and preventing the spread of AIP), ensuring that all activities are aligned with the protection of local ecosystems and the conservation of floral species;
- The construction footprint must be kept as small as possible to minimise the impact on the surrounding environment (edge effect management);
- During the construction phase, it is advised that traditional healers be consulted on the removal of important/medicinal plants to ensure the preservation of important/medicinal plants, as they hold valuable knowledge on the sustainable use and cultural significance of these species;
- Construction footprint areas should be clearly demarcated to monitor footprint extent and avoid footprint creep;
- Removal of vegetation must be restricted to what is necessary and should remain within the approved development footprint;
- Clearing of vegetation should take place in a phased manner if feasible as to keep bare soil areas as small as possible to limit the erosion potential;
- Access roads should be kept to existing roads as far as is feasible so to reduce fragmentation of existing natural habitat (and to reduce the risk of AIP being introduced into natural habitats);
- Vehicles should be restricted to travelling only on designated roadways to limit the ecological footprint of the construction activities. Additional road construction should be limited to what is absolutely necessary, and the footprint thereof kept to a minimal;
- No indiscriminate movement of construction vehicles or personnel are allowed in the Freshwater Habitat particularly during intense rainfall events as water may flow with greater intensity within these areas;
- Care should be taken during the construction of the proposed development to limit edge effects to surrounding natural habitat. At minimum, this can be achieved by: (i) Demarcating all footprint areas during construction activities, (ii) No construction rubble or cleared AIPs are to be disposed of outside of demarcated areas and should be taken to a registered waste disposal facility and (iii) manage the spread of AIP species, which may affect remaining natural habitat within surrounding areas. Any areas that have been left bare or disturbed

because of the construction activities should be rehabilitated using indigenous species. Ensure AIP vegetation cuttings/propagules are disposed of adequately, i.e., it must be ensured that the spread of these species is prevented. Designated spots for cuttings are highly recommended, or potentially make use of registered waste sites;

- No chemical control of AIP is permitted within the 32 m buffer of any Freshwater Habitat unless it has been approved as safe for use in wetlands, and the application of herbicide should only be carried out by suitably trained personnel. Adequate Personal Protective Equipment (PPE) must be supplied to the personnel involved with AIP control;
- Bi-annual monitoring of the Affected Area of Influence (AoL) should be done to determine the presence of AIP and the success of control in affected area;
- Equipment used for AIP control must be cleaned in designated areas to prevent possible contamination of herbicide used in area not to be treated for AIP proliferation;
- Minimise the impact of floral habitat fragmentation and interference with habitat connectivity in freshwater habitats (including temporary crossings/roads). In this regard it is crucial to implement mitigation measures such as preserving and restoring riparian vegetation, and ensuring that construction practices avoid disturbing important plant habitats and thus hindering the movement and dispersal of species;
- Any on-site fires by construction personnel must be restricted to designated areas only, and no uncontrolled fires whatsoever must be allowed;
- No temporary dump sites must be allowed in areas with natural vegetation. It is advised that waste disposal containers and bins be provided during the construction phase for all construction rubble and general waste;
- No dumping of general or hazardous waste must take place. If any spills occur, they should be immediately cleaned up, and be disposed of at a registered waste facility; and
- Avoid soil sealing (i.e., the destruction or covering of the ground by an impermeable material). Ensure that a vegetation layer is maintained (where possible). In this regard, use of indigenous plants from the reference vegetation type is recommended for best biodiversity outcomes;
- Maintain vegetation corridors along the OHL servitudes and substations. Contributing towards conserving the regional genetic diversity of plants in these areas must be ensured through revegetating with indigenous species from the area. AIP control in revegetated sections must take place. By using native seeds/propagules and plants that are suitable for the site and that have been collected from within a defined source region, it is possible to reduce loss of regional plant genetic diversity; and
- Any additional mitigation measures provided in the freshwater report; SAS 24-2026 (2024) must also be implemented.

Table 12: Impact Assessment considering the impacts and mitigation surrounding the floral habitat and diversity during the Construction phase of the proposed construction of camp sites / laydown areas for the proposed Project development.

ACTIVITY 4: Vegetation clearing activities for the construction of camp sites / laydown areas for the proposed Project development with focus on impacts to floral habitat and diversity.

Impact Summary:

- Loss of indigenous vegetation through vegetation clearing (specifically within the Secondary Miombo Woodland Habitat and Transformed Habitat).
- Loss of localised floral habitat and diversity with associated decline of species diversity within the impacted areas;
- Loss of topsoil and seedbanks;
- Soil-compaction, erosion, and AIP proliferation within disturbed areas; and
- Loss of floral habitat beyond the project footprint due to potential footprint creep as a result of increased erosion or potential dumping of construction material within areas where no construction is planned.

Habitat unit	Management	*Magnitude*	*Duration*	*Scale*	*Consequence*	*Probability*	*Significance*	*Status*	*Confidence*
Transformed	Before	Minor (-)	Medium term	Local	Low	Possible	**Low**	–	High
	After	Minor (-)	Medium term	Site	Low	Possible	**Low**	–	High
Secondary Miombo	Before	Moderate (-)	Medium term	Local	Medium	Definite	**Medium**	–	High
	After	Moderate (-)	Medium term	Site	Low	Definite	**Medium**	–	Medium

Essential management measures:

- Provide training and raise staff awareness of biodiversity requirements (such as protecting native floral species, preserving habitats, and preventing the spread of AIP), ensuring that all activities are aligned with the protection of local ecosystems and the conservation of floral species;
- The construction footprint must be kept as small as possible to minimise the impact on the surrounding environment (edge effect management);
- During the construction phase, it is advised that traditional healers be consulted on the removal of important/medicinal plants to ensure the preservation of important/medicinal plants, as they hold valuable knowledge on the sustainable use and cultural significance of these species;
- Construction footprint areas should be clearly demarcated to monitor footprint extent and avoid footprint creep;
- Removal of vegetation must be restricted to what is necessary and should remain within the approved development footprint;
- Clearing of vegetation should take place in a phased manner if feasible to keep bare soil areas as small as possible to limit the erosion potential;
- Access roads should be kept to existing roads as far as is feasible so to reduce fragmentation of existing natural habitat (and to reduce the risk of AIP being introduced into natural habitats);
- Vehicles should be restricted to travelling only on designated roadways to limit the ecological footprint of the construction activities. Additional road construction should be limited to what is absolutely necessary, and the footprint thereof kept to a minimal;
- No indiscriminate movement of construction vehicles or personnel are allowed in the Freshwater Habitat particularly during intense rainfall events as water may flow with greater intensity within these areas. Additionally, construction vehicles should not drive indiscriminately through any of the surrounding natural habitats;
- Care should be taken during the construction of the proposed development to limit edge effects to surrounding natural habitat. At minimum, this can be achieved by: (i) Demarcating all footprint areas during construction activities, (ii) No construction rubble or cleared AIPs are to be disposed of outside of demarcated areas and should be taken to a registered waste disposal facility and (iii) manage the spread of AIP species, which may affect remaining natural habitat within surrounding areas. Any areas that have been left bare or disturbed because of the construction activities should be rehabilitated using indigenous species. Ensure AIP vegetation cuttings/propagules are disposed of adequately, i.e., it must be ensured that the spread of these species is prevented. Designated spots for cuttings are highly recommended, or potentially make use of registered waste sites;
- No chemical control of AIP is permitted within the 32 m buffer of any Freshwater Habitat unless it has been approved as safe for use in wetlands, and the application of herbicide should only be carried out by suitably trained personnel. Adequate PPE must be supplied to the personnel involved with AIP control;

- Bi-annual monitoring of the study area should be done to determine the presence of AIP and the success of control in affected area;
- Equipment used for AIP control must be cleaned in designated areas to prevent possible contamination of herbicide used in area not to be treated for AIP proliferation;
- Minimise the impact of floral habitat fragmentation and interference with habitat connectivity in freshwater habitats (including temporary crossings/roads), it is crucial to implement mitigation measures such as preserving and restoring riparian vegetation, and ensuring that construction practices avoid disturbing important plant habitats;
- Any on-site fires by construction personnel must be restricted to designated areas only, and no uncontrolled fires whatsoever must be allowed;
- No temporary dump sites must be allowed in areas with natural vegetation. It is advised that waste disposal containers and bins be provided during the construction phase for all construction rubble and general waste;
- No dumping of general or hazardous waste must take place. If any spills occur, they should be immediately cleaned up, and be disposed of at a registered waste facility; and
- Avoid soil sealing (i.e., the destruction or covering of the ground by an impermeable material). Ensure that a vegetation layer is maintained (where possible). In this regard, use of indigenous plants from the reference vegetation type is recommended for best biodiversity outcomes;
- AIP control in revegetated sections must take place. By using native seeds/propagules and plants that are suitable for the site and that have been collected from within a defined source region, it is possible to reduce loss of regional plant genetic diversity; and
- Any additional mitigation measures provided in the freshwater report; SAS 24-2026 (2024) must also be implemented.

Table 13: Impact Assessment considering the impacts and mitigation surrounding the floral habitat and diversity during the Construction phase of the construction of the proposed access roads for the proposed Project development.

ACTIVITY 5: Vegetation clearing activities for the construction of the proposed access roads for the proposed Project development with focus on impacts to floral habitat and diversity.

Impact Summary:

- Altered runoff patterns within the local catchment of the freshwater systems, potentially leading to increased erosion and sedimentation of the freshwater systems;
- Potential temporary in-channel diversion of the freshwater crossing may be required to allow excavations for the road crossing to take place.
- Soil-compaction, erosion, and AIP proliferation within disturbed areas; and
- Loss of floral habitat beyond the project footprint due to potential footprint creep as a result of increased erosion or potential dumping of construction material within areas where no construction is planned.

Habitat unit	Management	*Magnitude*	*Duration*	*Scale*	*Consequence*	*Probability*	*Significance*	*Status*	*Confidence*
Transformed	Before	Minor (-)	Medium term	Local	Low	Possible	**Low**	–	High
	After	Minor (-)	Short term	Site	Low	Definite	**Low**	–	Medium
Freshwater	Before	Moderate (-)	Long term	Local	High	Possible	**Medium**	–	High
	After	Moderate (-)	Long term	Site	Medium	Possible	**Low**	–	Medium

Essential management measures:

- Provide training and raise staff awareness of biodiversity requirements (such as protecting native floral species, preserving habitats, and preventing the spread of AIP), ensuring that all activities are aligned with the protection of local ecosystems and the conservation of floral species;
- The construction footprint must be kept as small as possible to minimise the impact on the surrounding environment (edge effect management);
- During the construction phase, it is advised that traditional healers be consulted to ensure the preservation of important/medicinal plants, as they hold valuable knowledge on the sustainable use and cultural significance of these species;
- Construction footprint areas should be clearly demarcated to monitor footprint extent and avoid footprint creep;
- Removal of vegetation must be restricted to what is necessary and should remain within the approved development footprint;
- Clearing of vegetation for the proposed road in the southern section of the study area should take place in a phased manner if feasible as to keep bare soil areas as small as possible to limit the erosion potential;
- Vehicles should be restricted to travelling only on designated roadways to limit the ecological footprint of the construction activities. Additional road construction should be limited to what is absolutely necessary, and the footprint thereof kept to a minimal;
- No indiscriminate movement of construction vehicles or personnel are allowed in the Freshwater Habitat, particularly during intense rainfall events, as water may flow with greater intensity within these areas. Additionally, construction vehicles should not drive indiscriminately through any of the surrounding natural habitats;
- Care should be taken during the construction of the proposed development to limit edge effects to surrounding natural habitat. At minimum, this can be achieved by: (i) Demarcating all footprint areas during construction activities, (ii) No construction rubble or cleared AIPs are to be disposed of outside of demarcated areas and should be taken to a registered waste disposal facility and (iii) manage the spread of AIP species, which may affect remaining natural habitat within surrounding areas. Any areas that have been left bare or disturbed because of the construction activities should be rehabilitated using indigenous species. Ensure AIP vegetation cuttings/propagules are disposed of adequately, i.e., it must be ensured that the spread of these species is prevented. Designated spots for cuttings are highly recommended, or potentially make use of registered waste sites;
- No chemical control of AIP is permitted within the 32 m buffer of any Freshwater Habitat unless it has been approved as safe for use in wetlands, and the application of herbicide should only be carried out by suitably trained personnel. Adequate PPE must be supplied to the personnel involved with AIP control;
- Bi-annual monitoring of the study area should be done to determine the presence of AIP and the success of control in affected area;
- Equipment used for AIP control must be cleaned in designated areas to prevent possible contamination of herbicide used in area not to be treated for AIP proliferation;

- Minimise the impact of floral habitat fragmentation and interference with habitat connectivity in freshwater habitats (including temporary crossings/roads), it is crucial to implement mitigation measures such as preserving and restoring riparian vegetation, and ensuring that construction practices avoid disturbing important plant habitats;
- Any on-site fires by construction personnel must be restricted to designated areas only, and no uncontrolled fires whatsoever must be allowed;
- No temporary dump sites must be allowed in areas with natural vegetation. It is advised that waste disposal containers and bins be provided during the construction phase for all construction rubble and general waste;
- No dumping of general or hazardous waste must take place. If any spills occur, they should be immediately cleaned up, and be disposed of at a registered waste facility; and
- Avoid soil sealing (i.e., the destruction or covering of the ground by an impermeable material). Ensure that a vegetation layer is maintained (where possible). In this regard, use of indigenous plants from the reference vegetation type is recommended for best biodiversity outcomes; and
- Any additional mitigation measures provided in the freshwater report; SAS 24-2026 (2024) must also be implemented.

Table 14: Impact Assessment considering the impacts and mitigation surrounding the floral SCC during the Construction phase of the proposed Project development and proposed infrastructure of new substations.

ACTIVITY 6: Vegetation clearing activities for the construction of the proposed Project development and proposed infrastructure of new OHPL and substations with focus on floral SCC.									
Impact Summary: ➢ Loss of habitat for SCC through site clearing; ➢ Potential loss of floral SCC missed during site walkdowns; and ➢ Potential loss of floral SCC due to unsuccessful relocation attempts.									
Habitat unit	**Management**	***Magnitude***	***Duration***	***Scale***	***Consequence***	***Probability***	***Significance***	***Status***	***Confidence***
Transformed	Before	Minor (-)	Short term	Local	Low	Unlikely	**Low**	–	High
	After	Minor (-)	Short term	Site	Low	Unlikely	**Low**	–	Medium
Freshwater	Before	Moderate (-)	Short term	Local	Low	Unlikely	**Low**	–	High
	After	Minor (-)	Short term	Site	Low	Unlikely	**Low**	–	Medium
Secondary Miombo	Before	Moderate (-)	Short term	Local	Low	Unlikely	**Low**	–	High
	After	Minor (-)	Short term	Site	Low	Unlikely	**Low**	–	Medium
Miombo Woodland	Before	Major (-)	Medium term	Local	Medium	Definite	**Medium**	–	High
	After	Moderate (-)	Short term	Site	Low	Possible	**Low**	–	Medium
Essential management measures: ➢ During the construction phase, it is advised that traditional healers be consulted on the removal of important/ plants to ensure the preservation of important/medicinal plants, as they hold valuable knowledge on the sustainable use and cultural significance of these species; ➢ Monitor, where applicable, the success or failures of relocated floral SCC; ➢ Edge effect control needs to be implemented to prevent further degradation and potential loss of floral SCC resulting from construction activities outside that of the proposed development footprint area, notably where disturbance footprints are near areas of increased suitability for SCC to be present; ➢ Impact must be limited to the footprint area and kept to what is essential only; ➢ Demarcate and monitor the floral SCC populations outside of the footprint areas to ensure construction activities do not infringe onto these species; and ➢ No collection or harvesting of floral SCC or floral species as listed within Section 4.5 of this report should be allowed by construction personnel.									

Table 15: Impact Assessment considering the impacts and mitigation surrounding the floral SCC during the Construction phase for the construction of the proposed camp sites / laydown areas of the proposed Project development.

ACTIVITY 7: Vegetation clearing activities for the construction of camp sites / laydown areas for the proposed Project development with focus on floral SCC.									
Impact Summary: ➢ Potential loss of floral SCC missed during site walkdowns; and ➢ Potential loss of floral SCC due to unsuccessful relocation attempts.									
Habitat unit	**Management**	***Magnitude***	***Duration***	***Scale***	***Consequence***	***Probability***	***Significance***	***Status***	***Confidence***
Transformed	Before	Minor (-)	Short term	Local	Low	Unlikely	**Low**	–	High
	After	Minor (-)	Short term	Site	Low	Unlikely	**Low**	–	Medium
Secondary Miombo	Before	Major (-)	Medium term	Local	Medium	Definite	**Medium**	–	High
	After	Moderate (-)	Short term	Site	Low	Possible	**Low**	–	Medium
Essential management measures:									
➢ During the construction phase, it is advised that traditional healers be consulted on the removal of important/medicinal plants to ensure the preservation of important/medicinal plants, as they hold valuable knowledge on the sustainable use and cultural significance of these species; ➢ Monitor, where applicable, the success or failures of relocated floral SCC; ➢ Edge effect control needs to be implemented to prevent further degradation and potential loss of floral SCC resulting from construction activities outside that of the proposed development footprint area, notably where disturbance footprints are near areas of increased suitability for SCC to be present; ➢ Impact must be limited to the footprint area and kept to what is essential only; ➢ Demarcate and monitor the floral SCC populations outside of the footprint areas to ensure construction activities do not infringe onto these species; and ➢ No collection or harvesting of floral SCC or floral species as listed within Section 4.5 of this report should be allowed by construction personnel.								

Table 16: Impact Assessment considering the impacts and mitigation surrounding the floral SCC during the Construction phase for the construction of the proposed access roads of the proposed Project development.

ACTIVITY 8: Vegetation clearing activities for the construction of access roads for the proposed Project development with focus on floral SCC.									
Impact Summary: ➢ Potential loss of floral SCC missed during site walkdowns; and ➢ Potential loss of floral SCC due to unsuccessful relocation attempts.									
Habitat unit	**Management**	***Magnitude***	***Duration***	***Scale***	***Consequence***	***Probability***	***Significance***	***Status***	***Confidence***
Transformed	Before	Minor (-)	Short term	Local	Low	Unlikely	**Low**	–	High
	After	Minor (-)	Short term	Site	Low	Unlikely	**Low**	–	Medium
Freshwater	Before	Moderate (-)	Short term	Local	Low	Unlikely	**Low**	–	High
	After	Minor (-)	Short term	Site	Low	Unlikely	**Low**	–	Medium
Essential management measures:									
➢ During the construction phase, it is advised that traditional healers be consulted on the removal of important/medicinal plants to ensure the preservation of important/medicinal plants, as they hold valuable knowledge on the sustainable use and cultural significance of these species; ➢ Monitor, where applicable, the success or failures of relocated floral SCC; ➢ Edge effect control needs to be implemented to prevent further degradation and potential loss of floral SCC resulting from construction activities outside that of the proposed development footprint area, notably where disturbance footprints are near areas of increased suitability for SCC to be present; ➢ Impact must be limited to the footprint area and kept to what is essential only; ➢ Demarcate and monitor the floral SCC populations outside of the footprint areas to ensure construction activities do not infringe onto these species; and ➢ No collection or harvesting of floral SCC or floral species as listed within Section 4.5 of this report should be allowed by construction personnel.									

Table 17: Impact Assessment considering the impacts and mitigation surrounding the floral habitat and diversity during the Operational and Maintenance Phase of the proposed Project development and proposed infrastructure of new substations.

ACTIVITY 9: Operation and maintenance activities of the proposed Project development and proposed infrastructure of new OHPL and substations with focus on floral habitat and diversity.

Impact Summary:

- Altered drainage patterns due to reduced vegetation cover and increased impermeable surfaces;
- Potential loss of floral habitat beyond the project footprint;
- Potential loss of floral habitat and species diversity;
- Loss of dispersal trajectories, reduction to ecological integrity of the area, compromised ecological functions on a local scale due to dispersal corridors altered / impaired due to long-term fragmentation of the remaining natural habitat in the study area and surrounds;
- Potential loss of productive topsoil; and
- Potential increased erosion risk and/or further exacerbating the proliferation of AIPs.

Habitat unit	Management	*Magnitude*	*Duration*	*Scale*	*Consequence*	*Probability*	*Significance*	*Status*	*Confidence*
Transformed	Before	Minor (-)	Medium term	Local	Low	Possible	**Low**	–	High
	After	Minor (-)	Short term	Site	Low	Unlikely	**Low**	–	Medium
Freshwater	Before	Major (-)	Medium term	Local	Medium	Definite	**Medium**	–	Medium
	After	Minor (-)	Short term	Site	Low	Possible	**Low**	–	Medium
Secondary Miombo	Before	Moderate (-)	Medium term	Local	Medium	Definite	**Medium**	–	Medium
	After	Minor (-)	Short term	Site	Low	Possible	**Low**	–	Medium
Miombo Woodland	Before	Major (-)	Medium term	Local	Medium	Definite	**Medium**	–	Medium
	After	Minor (-)	Short term	Local	Low	Possible	**Low**	–	Medium

Essential management measures:

- Disturbed areas are to be rehabilitated to a similar state as that of pre-disturbance conditions. Where this is not possible due to operational and maintenance requirements, it is recommended that at a minimum a suitable herbaceous layer is maintained within the footprint of the proposed Project development and proposed infrastructure so as to ensure that no erosion occurs;
- All areas of increased ecological sensitivity beyond the approved footprint must be designated as No-Go areas and be off-limits to all operational and maintenance vehicles and personnel;
- No additional habitat is to be disturbed during the operational and maintenance phase of the project outside of the demarcated approved footprints;
- Monitor the Miombo Woodland and Freshwater Habitat within the study area to ensure that floral communities are not degraded;
- Ongoing erosion and stormwater monitoring and control to be implemented throughout the operational and maintenance phase;
- Vehicles should be restricted to travelling only on designated roadways to limit the ecological footprint of the operational activities;
- Manage the spread of AIP species, which may affect remaining natural habitat within surrounding areas;
- Ongoing AIP monitoring and clearing/control should take place throughout all phases of the project activities. The project perimeters should regularly be checked for AIP proliferation to prevent spread into surrounding natural areas;
- Monitor the success of rehabilitation efforts of disturbed areas seasonally;
- Monitor and maintain the vegetation corridors that were created along the OHL servitudes to contribute to reduced habitat fragmentation, and improved regional plant genetics; and
- No illicit fires must be allowed during the operational phases.

Table 18: Impact Assessment considering the impacts and mitigation surrounding the floral habitat and diversity during the Operational and Maintenance Phase of the proposed access roads for the of the proposed Project.

ACTIVITY 10: Operation and maintenance activities of the proposed access roads for the Project development and proposed infrastructure of construction site/ laydown areas with focus on floral habitat and diversity.

Impact Summary:

- Altered drainage patterns due to reduced vegetation cover and increased impermeable surfaces;
- Potential loss of floral habitat beyond the project footprint;
- Potential loss of floral habitat and species diversity;
- Loss of dispersal trajectories, reduction to ecological integrity of the area, compromised ecological functions on a local scale due to dispersal corridors altered / impaired due to long-term fragmentation of the remaining natural habitat in the study area and surrounds;
- Potential loss of productive topsoil; and
- Potential increased erosion risk and/or further exacerbating the proliferation of AIPs.

Habitat unit	Management	*Magnitude*	*Duration*	*Scale*	*Consequence*	*Probability*	*Significance*	*Status*	*Confidence*
Transformed (access roads)	Before	Minor (-)	Medium term	Local	Low	Possible	**Low**	–	High
	After	Minor (-)	Short term	Site	Low	Unlikely	**Low**	–	Medium
Freshwater	Before	Major (-)	Medium term	Local	Medium	Definite	**Medium**	–	Medium
	After	Minor (-)	Short term	Site	Low	Possible	**Low**	–	Medium

Essential management measures:

- Disturbed areas are to be rehabilitated to a similar state as that of pre-disturbance conditions. Where this is not possible due to operational and maintenance requirements, it is recommended that at a minimum a suitable herbaceous layer is maintained within the footprint of the proposed Project development and proposed infrastructure so as to ensure that no erosion occurs;
- All areas of increased ecological sensitivity beyond the approved footprint must be designated as No-Go areas and be off-limits to all operational and maintenance vehicles and personnel;
- No additional habitat is to be disturbed during the operational and maintenance phase of the project outside of the demarcated approved footprints;
- Monitor the Freshwater Habitat within the study area to ensure that floral communities are not degraded;
- Ongoing erosion and stormwater monitoring and control to be implemented throughout the operational and maintenance phase;
- Vehicles should be restricted to travelling only on designated roadways to limit the ecological footprint of the operational activities;
- Manage the spread of AIP species, which may affect remaining natural habitat within surrounding areas;
- Ongoing AIP monitoring and clearing/control should take place throughout all phases of the project activities. The project perimeters should regularly be checked for AIP proliferation to prevent spread into surrounding natural areas;
- Monitor the success of rehabilitation efforts of disturbed areas seasonally;
- Monitor and maintain the vegetation corridors that were created along the OHL servitudes to contribute to reduced habitat fragmentation, and improved regional plant genetics; and
- No illicit fires must be allowed during the operational phases.

Table 19: Impact Assessment considering the impacts and mitigation surrounding the floral SCC during the Operational and Maintenance Phase of the proposed Project development and proposed infrastructure of new substations.

ACTIVITY 11: Operation and maintenance activities of the proposed Project development and proposed infrastructure of new substations with focus on floral SCC.									
Impact Summary: ➢ Potential loss of habitat for SCC through habitat change. ➢ Potential loss of floral SCC through unsuccessful relocation activities.									
Habitat unit	**Management**	**Magnitude**	**Duration**	**Scale**	**Consequence**	**Probability**	**Significance**	**Status**	**Confidence**
Transformed	Before	Minor (-)	Short term	Site	Low	Possible	**Low**	–	Medium
	After	Minor (-)	Short term	Site	Low	Unlikely	**Low**	–	Medium
Freshwater	Before	Minor (-)	Short term	Site	Low	Possible	**Low**	–	Medium
	After	Minor (-)	Short term	Site	Low	Unlikely	**Low**	–	Medium
Secondary Miombo	Before	Moderate (-)	Medium term	Local	Medium	Possible	**Medium**	–	Medium
	After	Minor (-)	Short term	Site	Low	Possible	**Low**	–	Medium
Miombo Woodland	Before	Moderate (-)	Medium term	Local	Medium	Possible	**Medium**	–	Medium
	After	Minor (-)	Short term	Site	Low	Possible	**Low**	–	Medium
Essential management measures:									
➢ Harvesting of protected and threatened floral species by operational and maintenance personnel must be strictly prohibited, including collection of floral material by such personnel; ➢ Monitoring of any rescued and relocated floral SCC (if applicable) must commence during the construction phase and continue until it is evident that relocated species have successfully established and the population are stable; ➢ Maintenance activities must ensure that floral SCC and protected flora (where present outside of the footprint areas) will not be adversely impacted; and ➢ Edge effect control needs to be implemented to prevent further degradation and potential loss of floral SCC outside of the proposed development footprint area.								

Table 20: Impact Assessment considering the impacts and mitigation surrounding the floral SCC during the Operational and Maintenance Phase of proposed access roads for the proposed Project development.

ACTIVITY 12: Operation and maintenance activities of the proposed access roads for the proposed Project development with focus on floral SCC.									
Impact Summary: ➢ Potential loss of habitat for SCC through habitat change. ➢ Potential loss of floral SCC through unsuccessful relocation activities.									
Habitat unit	**Management**	**Magnitude**	**Duration**	**Scale**	**Consequence**	**Probability**	**Significance**	**Status**	**Confidence**
Transformed	Before	Minor (-)	Short term	Site	Low	Possible	**Low**	–	Medium
	After	Minor (-)	Short term	Site	Low	Unlikely	**Low**	–	Medium
Freshwater	Before	Minor (-)	Short term	Site	Low	Possible	**Low**	–	Medium
	After	Minor (-)	Short term	Site	Low	Unlikely	**Low**	–	Medium
Essential management measures:									
➢ Harvesting of protected and threatened floral species by operational and maintenance personnel must be strictly prohibited, including collection of floral material by such personnel; ➢ Monitoring of any rescued and relocated floral SCC (if applicable) must commence during the construction phase and continue until it is evident that relocated species have successfully established and population are stable; ➢ Maintenance activities must ensure that floral SCC and protected flora (where present outside of the footprint areas) will not be adversely impacted; and ➢ Edge effect control needs to be implemented to prevent further degradation and potential loss of floral SCC outside of the proposed development footprint area.									

Table 21: Impact Assessment considering the impacts and mitigation surrounding the floral habitat and diversity during the Decommissioning Phase of the proposed Project development and proposed OHPL and infrastructure of new substations.

ACTIVITY 13: Decommissioning Phase activities of the proposed Project development and proposed OHPL infrastructure of new substations with focus on floral habitat and diversity.

Impact Summary:

- Potential loss of floral habitat beyond the project footprint and a reduction in species diversity;
- Landscapes left fragmented, resulting in reduced dispersal capabilities of floral species and an overall decrease in floral diversity;
- Potential loss of productive topsoil;
- Compacted soils limiting the re-establishment of natural vegetation; and
- Potential increased erosion risk and/or further exacerbating the proliferation of AIPs.

Habitat unit	Management	*Magnitude*	*Duration*	*Scale*	*Consequence*	*Probability*	*Significance*	*Status*	*Confidence*
Transformed	Before	Minor (-)	Medium term	Local	Low	Possible	**Low**	–	High
	After	Minor (-)	Short term	Site	Low	Unlikely	**Low**	–	Medium
Freshwater	Before	Moderate (-)	Medium term	Local	Medium	Definite	**Medium**	–	Medium
	After	Minor (-)	Short term	Site	Low	Possible	**Low**	–	Medium
Secondary Miombo	Before	Moderate (-)	Medium term	Local	Medium	Definite	**Medium**	–	Medium
	After	Minor (-)	Short term	Site	Low	Possible	**Low**	–	Medium
Miombo Woodland	Before	Major (-)	Medium term	Local	Medium	Definite	**Medium**	–	Medium
	After	Minor (-)	Short term	Site	Low	Possible	**Low**	–	Medium

Essential management measures:

- Decommissioning and rehabilitation footprint areas should be clearly demarcated to monitor footprint extent and avoid footprint creep;
- The decommissioning and rehabilitation footprint must be kept as small as possible to minimise the impact on the surrounding environment (edge effect management);
- No additional habitat is to be disturbed during the decommissioning phase of the project outside of the demarcated approved footprints;
- Disturbed areas are to be rehabilitated to a similar state as that of pre-disturbance conditions. Where this is not possible, it is recommended that at a minimum a suitable herbaceous layer is maintained within the footprint of the proposed Project development and proposed infrastructure so as to ensure that no erosion occurs;
- Access roads should be kept to existing roads as far as is feasible so as to reduce fragmentation of existing natural habitat (and to reduce the risk of AIP being introduced into natural habitats);
- Vehicles should be restricted to travelling only on designated roadways to limit the ecological footprint of the decommissioning activities;
- All areas of increased ecological sensitivity beyond the approved footprint must be designated as No-Go areas and be off-limits to all decommissioning phase vehicles and personnel;
- Monitor the Miombo Woodland and Freshwater Habitat within the study area to ensure that floral communities are not degraded;
- Management of AIPs during the decommissioning phase activities must be focused on limiting their spread. For example, roadsides should be monitored, as they serve as common corridors along which AIP species are introduced and dispersed, and disturbed areas should regularly be monitored for AIP recruitment until successfully rehabilitated;
- Monitor and maintain the vegetation corridors that were created along the OHL servitudes to contribute to reduced habitat fragmentation and improved regional plant genetics; and
- No illicit fires must be allowed during the decommissioning phase.

Table 22: Impact Assessment considering the impacts and mitigation surrounding the floral habitat and diversity during the Decommissioning Phase of the proposed Project development and proposed construction sites/ laydown areas.

ACTIVITY 14: Decommissioning Phase activities of the proposed Project development and proposed construction site/ laydown area with focus on floral habitat and diversity.									
Impact Summary: ➢ Potential loss of floral habitat beyond the project footprint and a reduction in species diversity; ➢ Landscapes left fragmented, resulting in reduced dispersal capabilities of floral species and an overall decrease in floral diversity; ➢ Potential loss of productive topsoil; ➢ Compacted soils limiting the re-establishment of natural vegetation; and ➢ Potential increased erosion risk and/or further exacerbating the proliferation of AIPs.									
Habitat unit	**Management**	***Magnitude***	***Duration***	***Scale***	***Consequence***	***Probability***	***Significance***	***Status***	***Confidence***
Transformed	Before	Minor (-)	Medium term	Local	Low	Possible	**Low**	–	High
	After	Minor (-)	Short term	Site	Low	Unlikely	**Low**	–	Medium
Secondary Miombo	Before	Moderate (-)	Medium term	Local	Medium	Definite	**Medium**	–	Medium
	After	Minor (-)	Short term	Site	Low	Possible	**Low**	–	Medium
Essential management measures:									
➢ Decommissioning and rehabilitation footprint areas should be clearly demarcated to monitor footprint extent and avoid footprint creep; ➢ The decommissioning and rehabilitation footprint must be kept as small as possible to minimise the impact on the surrounding environment (edge effect management); ➢ No additional habitat is to be disturbed during the decommissioning phase of the project outside of the demarcated approved footprints; ➢ Disturbed areas are to be rehabilitated to a similar state as that of pre-disturbance conditions. Where this is not possible, it is recommended that at a minimum a suitable herbaceous layer is maintained within the footprint of the proposed construction sites\laydown areas so as to ensure that no erosion occurs; ➢ Access roads should be kept to existing roads as far as is feasible so as to reduce fragmentation of existing natural habitat (and to reduce the risk of AIP being introduced into natural habitats); ➢ Vehicles should be restricted to travelling only on designated roadways to limit the ecological footprint of the decommissioning activities; ➢ All areas of increased ecological sensitivity beyond the approved footprint must be designated as No-Go areas and be off-limits to all decommissioning phase vehicles and personnel; ➢ Management of AIPs during the decommissioning phase activities must be focused on limiting their spread. For example, roadsides should be monitored, as they serve as common corridors along which AIP species are introduced and dispersed, and disturbed areas should regularly be monitored for AIP recruitment until successfully rehabilitated; and ➢ No illicit fires must be allowed during the decommissioning phase.									

Table 23: Impact Assessment considering the impacts and mitigation surrounding the floral SCC during the Decommissioning Phase of the proposed Project development and proposed OHL infrastructure of new substations.

ACTIVITY 15: Decommissioning Phase activities of the proposed Project development and proposed OHPL infrastructure of new substations with focus on floral SCC.									
Impact Summary: ➢ Potential loss of habitat for SCC through habitat change; ➢ Failure to rehabilitate bare areas or disturbed sites; and ➢ Inadequate stormwater management resulting in loss of viable soils and potentially increasing erosion risk.									
Habitat unit	**Management**	**Magnitude**	**Duration**	**Scale**	**Consequence**	**Probability**	**Significance**	**Status**	**Confidence**
Transformed	Before	Minor (-)	Short term	Site	Low	Possible	**Low**	–	Medium
	After	Minor (-)	Short term	Site	Low	Unlikely	**Low**	–	Medium
Freshwater	Before	Minor (-)	Short term	Site	Low	Possible	**Low**	–	Medium
	After	Minor (-)	Short term	Site	Low	Unlikely	**Low**	–	Medium
Secondary Miombo	Before	Moderate (-)	Medium term	Local	Medium	Possible	**Medium**	–	Medium
	After	Minor (-)	Short term	Site	Low	Possible	**Low**	–	Medium
Miombo Woodland	Before	Moderate (-)	Medium term	Local	Medium	Possible	**Medium**	–	Medium
	After	Minor (-)	Short term	Site	Low	Possible	**Low**	–	Medium
Essential management measures: ➢ Harvesting of protected and threatened floral species by decommissioning phase personnel must be strictly prohibited, including collection of floral material by such personnel; ➢ Monitoring of any rescued and relocated floral SCC (if applicable) must continue during the decommissioning phase (three years after commencement of the decommissioning phase) until it is evident that relocated species have successfully established and population are stable; ➢ Rehabilitation activities must ensure that floral SCC and protected flora (where present outside of the footprint areas) will not be adversely impacted; ➢ Impact must be limited to the footprint area and kept to what is essential only; and ➢ Edge effect control needs to be implemented to prevent further degradation and potential loss of floral SCC outside of the proposed development footprint area.									

Table 24: Impact Assessment considering the impacts and mitigation surrounding the floral SCC during the Decommissioning Phase of the proposed Project development and proposed construction sites/ laydown areas.

ACTIVITY 16: Decommissioning Phase activities of the proposed Project development and proposed construction sites/ laydown areas with focus on floral SCC.									
Impact Summary: ➢ Potential loss of habitat for SCC through habitat change; ➢ Failure to rehabilitate bare areas or disturbed sites; and ➢ Inadequate stormwater management resulting in loss of viable soils and potentially increasing erosion risk.									
Habitat unit	**Management**	**Magnitude**	**Duration**	**Scale**	**Consequence**	**Probability**	**Significance**	**Status**	**Confidence**
Transformed	Before	Minor (-)	Short term	Site	Low	Possible	**Low**	–	Medium
	After	Minor (-)	Short term	Site	Low	Unlikely	**Low**	–	Medium
Secondary Miombo	Before	Moderate (-)	Medium term	Local	Medium	Possible	**Medium**	–	Medium
	After	Minor (-)	Short term	Site	Low	Possible	**Low**	–	Medium
Essential management measures: ➢ Harvesting of protected and threatened floral species by decommissioning phase personnel must be strictly prohibited, including collection of floral material by such personnel; ➢ Monitoring of any rescued and relocated floral SCC (if applicable) must continue during the decommissioning phase (three years after commencement of the decommissioning phase) until it is evident that relocated species have successfully established and population are stable; ➢ Rehabilitation activities must ensure that floral SCC and protected flora (where present outside of the footprint areas) will not be adversely impacted; ➢ Impact must be limited to the footprint area and kept to what is essential only; and ➢ Edge effect control needs to be implemented to prevent further degradation and potential loss of floral SCC outside of the proposed development footprint area.									

Table 25: Impact Assessment considering the impacts and mitigation surrounding the floral habitat fragmentation during all phases of the proposed Project development and proposed infrastructure of new substations.

ACTIVITY 17: Vegetation clearing activities for the construction of the proposed Project development and proposed infrastructure of new substations with focus on impacts to floral habitat fragmentation.									
Impact Summary: ➢ Fragmentation of vegetation communities; ➢ Potential increase in fragmentation of vegetation communities and disruption of natural dispersal processes; and ➢ Potential increase in fragmentation of ecological corridors and diminished ecological functionality.									
Habitat unit	**Management**	***Magnitude***	***Duration***	***Scale***	***Consequence***	***Probability***	***Significance***	***Status***	***Confidence***
Transformed	Before	Minor (-)	Long term	Local	Medium	Possible	**Low**	–	High
	After	Minor (-)	Long term	Site	Medium	Unlikely	**Low**	–	Medium
Freshwater	Before	Moderate (-)	Long term	Local	High	Possible	**High**	–	High
	After	Minor (-)	Long term	Site	Medium	Unlikely	**Low**	–	Medium
Secondary Miombo	Before	Moderate (-)	Long term	Local	High	Possible	**High**	–	High
	After	Minor (-)	Long term	Site	Medium	Unlikely	**Low**	–	Medium
Miombo Woodland	Before	Major (-)	Long term	Local	High	Possible	**High**	–	High
	After	Moderate (-)	Long term	Site	Medium	Unlikely	**Low**	–	Medium
Essential management measures: ➢ The construction footprint must be kept as small as possible to minimise the impact on the surrounding environment (edge effect management); ➢ Construction footprint areas should be clearly demarcated to monitor footprint extent and avoid footprint creep; ➢ Removal of vegetation must be restricted to what is necessary and should remain within the approved development footprint; ➢ Development should be prioritised in habitats of decreased sensitivity wherever possible given the linear nature of the project; ➢ Access roads should be kept to existing roads were possible so to reduce further fragmentation of existing natural habitat; ➢ A rehabilitation plan should be developed that will promote habitat reinstatement in disturbed sites and allow for increased habitat connectivity during the operation and maintenance phase of the project; ➢ Vehicles should be restricted to travelling only on designated roadways to limit the ecological footprint of the construction activities. Additional road construction should be limited to what is absolutely necessary, and the footprint thereof kept to a minimal; ➢ No indiscriminate movement of construction vehicles or personnel are allowed in the Freshwater Habitat particularly during intense rainfall events as water may flow with greater intensity within these areas; and ➢ Maintain vegetation corridors along the OHL servitudes. Contributing towards conserving the regional genetic diversity of plants in these areas must be ensured through revegetating with indigenous species from the area. AIP control in revegetated sections must take place. By using native seeds/propagules and plants that are suitable for the site and that have been collected from within a defined source region, it is possible to reduce loss of regional plant genetic diversity.									

7.3 Impact Discussion

The impact assessment was undertaken on all aspects of floral ecology deemed likely to be affected by the proposed Project development. After rating impacts on floral ecology resulting from the proposed development, the impacts associated with the floral habitat, diversity, and SCC are anticipated to be medium to high prior to the implementation of mitigation measures. These associated impacts are anticipated to be reduced provided that strict mitigation measures are implemented.

For floral habitat and diversity, the construction will have the greatest immediate impacts, with the operational and maintenance phase likely to have ongoing, long-term impacts on habitat and diversity outside of the proposed project footprints if edge effect management is not appropriately implemented.

7.3.1 Impact on Floral Habitat and Diversity

The data gathered during the site visit indicates that the Freshwater Habitat has a high SEI, Miombo Woodland has a medium SEI, Secondary Miombo Woodland has a low SEI, whereas the Transformed Habitat has a very low SEI. The total area per habitat loss for the Miobo Woodland (+- 45 ha), Secondary Woodland (+- 23 ha), Freshwater Habitat (+- 4 ha) and Transformed Habitat (+- 11 ha).

The loss of floral habitat and subsequent floral diversity will be greater and more significant where footprints are within the intact and more sensitive Miombo Woodland habitat and Freshwater Habitat. Impacts on these habitat units must be minimised (Miombo Woodland) and avoided (Freshwater Habitat) as far as possible to ensure the impacts from the proposed activities will not be highly significant. Secondary Miombo Woodland is classified as natural habitat. In areas of natural habitat, mitigation measures will be designed to achieve no net loss of biodiversity where feasible. Appropriate actions include avoiding impacts on biodiversity through the identification and protection of set-asides, implementing measures to minimize habitat fragmentation, such as biological corridors, and restoring habitats during operations and/or after operations.

Moreover, the habitat associated with the Transformed Habitat is more degraded, homogenous, and fragmented; as such, impacts in these habitat units will not result in significant declines in floral diversity or habitat.

<u>Prior to mitigation measures implemented</u>

Impact significance on floral habitat and diversity will be **medium**. The *Pre-construction Phase* will have limited direct impacts on floral habitat and diversity with the only direct impact

stemming from the rescue and relocation of floral SCC (potential threatened species) that must take place prior to the vegetation clearing.

The *Construction Phase* will have the greatest impact on floral habitat and diversity due to vegetation clearing activities, with impact significance on habitat and diversity within the habitat units anticipated to be high to low, resulting in a marginal loss of a diversity of floral species. If the impacts are not managed the negative impacts will extend into the surrounding areas and the loss of floral habitat and diversity will increase.

For the *Operational and Maintenance Phase*, impacts on floral habitat and diversity will largely be indirect in nature and will stem from edge effects such as a lack of AIP control, poor rehabilitation of areas outside of the approved footprint that has been impacted by construction activities, poor stormwater management, as well as increased human movement through natural areas outside of the approved footprint. Impact significance on habitat and diversity within the affected habitat units is anticipated to be medium to low and will result in a marginal loss of floral species. If the impacts are not managed, the negative impacts will extend into the surrounding areas and the loss of flora habitat and diversity will increase.

For the *Decommissioning Phase*, will have a negative impact on floral habitat and diversity due to vegetation clearing activities associated with rehabilitation activities, with impact significance on habitat and diversity within the habitat units anticipated to be medium to low, resulting in a marginal loss of a diversity of floral species. If the impacts are not managed the negative will extent into the surrounding areas and the loss of flora habitat and diversity will increase.

With mitigation measures implemented

With mitigation measures implemented, the direct and indirect impacts on the floral habitat and diversity can be reduced to **low** significance levels. Generally, impacts across the study area are anticipated to be localised (given the nature of the project) with edge effects of limited extent if well managed. To ensure impacts remain localised, it must be ensured that planned and authorised footprints do not increase during the Construction Phase and/or Operational & Maintenance Phase.

7.3.2 Impacts on Floral SCC

The region has seen extensive transformation through clearance of vegetation from Miombo Woodland to agricultural areas as well as for charcoal production. Two floral SCC were observed within the Miombo Woodland and Secondary Miombo Woodland habitats at the time of assessment, namely *Pterocarpus angolensis* (locally listed as VU but LC on the IUCN) and *Brachystegia spiciformis* (locally listed as VU but LC on the IUCN); however, species such as

Brachystegia boehmii, Julbernardia paniculata and *Boophone disticha*, although of LC, are also considered to be of concern due to increased harvesting in the region. No SCC were recorded within the Transformed Habitat, nor are any anticipated to be located within this habitat.

The loss of floral habitat and subsequent floral SCC will be more pronounced and significant in areas within the intact and sensitive Miombo Woodland habitat. It is imperative to minimise impacts on these habitats (Miombo Woodland) and avoid them altogether. No floral SCC was observed during the field assessments and preferred habitat was present within the Secondary Miombo Woodland and Freshwater Habitat. No suitable habitat for floral SCC was found within the Transformed Habitat, being more degraded, homogenous, and fragmented, are less likely to experience significant declines in floral SCC due to impacts from the proposed activities.

Prior to mitigation measures implemented

Without mitigation measures implemented, the impact significance on floral SCC communities is anticipated to be medium to low. The greatest impacts on SCC will be within the *Pre-construction Phase* where SCC are rescued and relocated. During the construction phase there is likely to be further loss of SCC individuals that were either missed during relocation activities or that were not eligible for relocation. Indirect impacts on SCC are anticipated during the *Operational and Maintenance* and *Decommissioning Phase* potentially resulting from the harvesting of SCC or due to pressure on the remaining habitat of SCC resulting from an increased presence of humans in the area.

With mitigation measures implemented

With mitigation measures implemented, the impact significance on floral SCC communities is anticipated to be low. If the proposed development is authorised, it is recommended that a walkthrough of the site be undertaken prior to the commencement of any construction activities and all SCC identified be marked and considered for possible relocation to suitable habitat outside of the disturbance footprint. If no suitable habitat is located within the footprint area, these species need to be relocated to (suitable) habitat outside of the footprint area. With the implementation of the mitigations within this report, the impact significance will be lower from a medium to low significance to a low significance.

7.3.3 Probable Residual Impacts

Even with extensive mitigation, residual impacts on the receiving floral ecological environment are deemed likely. The following points highlight the key residual impacts that have been identified:

- Permanent loss of niche floral habitat within the Freshwater Habitat on a local scale;
- Permanent loss of and altered floral species diversity on a local scale;
- Edge effects such as habitat fragmentation and AIP proliferation;
- The ongoing loss of SCC and suitable habitat for such species; and
- Disturbed areas not rehabilitated to an ecologically functioning state.

7.3.4 Cumulative Impacts

A major threat to the biodiversity of the study area (including floral diversity), and particularly the surrounding areas, is continued fragmentation of natural habitat and anthropogenic activities (agricultural and charcoal production). Continued development will negatively impact the remaining biodiversity of the area (i.e., through removal and/or transformation of suitable habitat by expanding construction).

Apart from the proposed development, another threat to the floral ecology within the study area is the continued proliferation of AIP species, resulting in the overall loss of indigenous floral communities within the local area. The proposed development will increase the movement of humans within the area and could lead to increased harvesting of floral SCC and / or the degradation of suitable floral habitat for SCC due to continued exposure to anthropogenic disturbances.

8 PERMIT REQUIREMENTS

Currently, no known permitting requirements specifically address floral species. This absence of specific regulations may pose challenges for the protection and conservation of floral diversity, as it may result in inadequate oversight and management of activities impacting floral species and their habitats.

9 BIODIVERSITY MANAGEMENT AND MONITORING ACTIONS

Biodiversity management and monitoring during the construction and operational phase of the proposed Project development is important to ensure that all aspects of the receiving environment in terms of floral species are taken into account and that aspects are not overlooked. Whilst management aspects are used to define or highlight biodiversity goals / objectives, monitoring is required to assess the suitability and effectiveness of the management actions and if needed, highlight shortcomings or areas of change which are needed in order to better meet the overall management objectives.

The overall biodiversity management goal is to ensure that the construction and operation of the proposed Project development has as low an impact as possible on the receiving environment, and in the case of this report, with specific reference to floral species.

The table below details tasks / objectives for the project as well as monitoring activities and potential outcomes that should be implemented along with the mitigation measures already mentioned in Section 6 which are to be included in the Environmental and Social Management Plan (ESMP).

It should be noted that this report does not include monitoring assessments of the Freshwater Habitat itself (although the associated Freshwater Habitats are assessed in this report from a botanical perspective).

Table 25 below summarises the objectives and monitoring activities that needs to be incorporated in the ESMP.

Table 26: Objectives and monitoring activities to be incorporated into the ESMP.

OBJECTIVE / TASK	SITE MANAGEMENT AND MONITORING ACTIVITIES	KEY PERFORMANCE INDICATOR (KPI)
Ensure that project footprints earmarked for clearance of vegetation are clearly demarcated.	➢ Using bunting/reflective tape, clearly demarcate all proposed laydown areas, pylons footprint areas, and any new access roads where vegetation clearance will take place. ➢ Ensure that the teams responsible for vegetation clearance activities are well briefed on their tasks and understand that they are only to clear vegetation within the demarcated areas.	1. Footprints have been clearly demarcated. 2. Vegetation clearance teams have only cleared within the demarcated footprint areas.
Ensure that footprint creep does not occur and that floral habitat beyond the demarcated areas is not impacted upon.	➢ Inspections of the project footprints are to take place to ensure that no footprint creep is taking place. ➢ Where clearance is taking place beyond the demarcated footprints, ensure that those activities cease and that where necessary, rehabilitation measures are implemented.	1. Report is compiled detailing any issues encountered on site and areas where footprint extensions have occurred. 2. Rehabilitation / rectification actions have been implemented (if and where needed).
Monitor for any erosion activities or significant sedimentation of the adjacent floral habitat taking place due to ground clearing activities.	➢ Erosion monitoring of footprints is to take place. ➢ Erosion control measures implemented to reduce erosion and surface water runoff.	1. Reporting on erosion. 2. Erosion management interventions have been implemented.
Monitoring for any AIP within the proposed footprint areas.	➢ AIP monitoring of footprints is to take place on a bi-annual basis during the construction phase detailing any AIP species observed within the footprint area and noting localities.	3. Bi-annual reporting on AIP. 4. AIP management interventions have been implemented.
Rehabilitation of old laydown areas and construction footprints once activities therein are completed.	➢ Ensure all waste material and construction equipment has been removed from the site/footprint area. ➢ Implement suitable rehabilitation / revegetation plan to ensure that no bare soil area remain post construction.	1. All waste and construction equipment has been removed. 2. Revegetation activities are taking place and plant cover is starting to re-establish in the disturbed areas.
Pylon footprint inspections are to be undertaken.	➢ Footprint inspections undertaken to assess revegetation progress. ➢ Assess footprints for erosion/alien plant proliferation so timeous preventative measures can be taken.	1. Report submitted detailing vegetation regrowth in the disturbed areas including photographic evidence and locality data. 2. Erosion / alien plant control measures implemented based on site inspection outcomes.

9.1 Monitoring philosophy and requirements

Prudent floral monitoring of the study area is of utmost importance, as this will ensure a continual flow of data, enabling all parties involved to accurately assess and manage floral diversity-related progress and issues. To ensure the accurate gathering of data, the following techniques and guidelines should be followed:

- Monitoring of floral species structure and composition should be undertaken at the various footprint areas during the construction and operational phase;
- All data gathered should be measurable (qualitative and quantitative);
- Monitoring reports should be repeatable and ideally temporally and spatially comparable;
- Data should be auditable;
- Data gathered should be an accurate representation of the PES of the study area, as well as the various floral communities represented by each monitoring site;
- Data gathered should represent all aspects of all communities, i.e., grasses, forbs, shrubs and trees; and
- General habitat overviews (ad hoc observations) should also be undertaken.

Several protocol(s) are applicable for the collection of floral data (refer to Table 26).

Table 27: Floral Data Capturing Protocols.

Aspect	Monitoring Location	Frequency of sampling	Frequency of Reporting	Report Content	Equipment
Floral Monitoring	Footprint areas	Construction Phase: ➢ Annual	Construction Phase: ➢ Annual	1. Floral species composition and vegetation structure changes; and 2. Increase in alien plant species.	1. Camera 2. Global Positioning System (GPS) (if available)
		Operational Phase: ➢ Every three years	Operational Phase: ➢ Every three years		
		Decommissioning Phase: ➢ Monitoring should be done in a phaseout manner, ensuring that floral species composition and vegetation structure are monitored until the areas are revegetated in order to relinquish the site.	Decommissioning Phase: ➢ Annual (Should be done in a phased-out manner until the site is relinquished).		
Erosion	Erosion-prone areas and where vegetation clearing activities took place.	Construction Phase: ➢ Monthly basis	➢ After every major rainstorm and/or flood. ➢ Monthly monitoring report compiled by the appointed Environmental Control Officer (ECO).	1. Brief indication of the method of assessment; 2. Assumptions and Limitations must be listed; 3. Photos and GPS point locations taken erosion sites within the footprint areas. 4. Management recommendations made; and 5. Map indicating where erosion is present.	1. GPS (if available) 2. Camera 3. Field Form
		Operational Phase: ➢ Annual basis	➢ Annual monitoring report compiled by the appointed ECO ➢ After every major flood event if more than once a year		
		Decommissioning Phase: ➢ After every major rainstorm and/or flood; and ➢ Should be done in a phaseout manner, ensuring that rehabilitated areas are monitored until the areas are revegetated in order to relinquish the site.	➢ After every major rainstorm and/or flood. ➢ Monthly monitoring report compiled by the appointed ECO		
Alien vegetation control	Areas where vegetation clearing took place	Construction Phase: ➢ Bi-annual basis	At the end of the first growing season following the completion of construction.	1. Provide a list of species occurring within the study area; 2. Ad hoc discussion of density/abundance of species; 3. Recommend control measures to be undertaken; and 4. Assess the necessity of further alien and invasive vegetation control.	1. GPS (if available) 2. Camera 3. Field Form
		Operational Phase: ➢ Annual basis	During the growing season		
		Decommissioning Phase: ➢ Annual basis for two years after the decommissioning phase.	During the growing season		

10 CONCLUSION AND IMPACT STATEMENT

The study area is associated with habitat of varying degrees of ecological importance, and each will be impacted to different extents. Floral communities identified for the Gove-Chipindo-Cuvango-Jamba Transmission Line Project (*referred to as the Cassinga Electrical Power Supply Project during the ESIA process and stakeholder engagement*) (the Project) that will be impacted by the proposed activities include the following:

- Transformed Habitat of **very low SEI** (within the proposed project footprint);
- Secondary Miombo Woodland of **low SEI** (within the proposed project footprint);
- Freshwater Habitat of **high SEI** (within the proposed project footprint); and
- Miombo Woodland of **medium SEI** (within the proposed project footprint).

During the field assessments, it became apparent that the ongoing expansion of residential communities, coupled with prevailing economic conditions, has spurred increased small-scale crop cultivation and charcoal production from harvested trees. These activities have resulted in significant and ongoing loss of floral habitat and species diversity due to widespread vegetation clearance. While providing communities with areas for food crop cultivation, the clearing of vegetation within the study area has led to notable changes in floral species composition, particularly affecting woody species due to wood harvesting and clearing activities.

Table 27 below provides a summary of the impacts associated with the proposed Project. Provided that the mitigation measures as discussed within this report are implemented, the impacts can be suitably managed and mitigated to low significance levels.

Table 28: A summary of the impact assessment associated with the proposed Project during all phases.

Habitat unit	Management	Loss of Floral Habitat and Species Diversity	Loss of Sensitive Floral Species
Pre-construction and Planning phase			
Transformed	Before	Low	Low
	After	Low	Low
Freshwater	Before	Medium	Low
	After	Low	Low
Secondary Miombo	Before	Medium	Medium
	After	Low	Low
Miombo Woodland	Before	Medium	Medium
	After	Low	Low
Construction phase			
Transformed (OHPL and associated infrastructure)	Before	Low	Low
	After	Low	Low
Freshwater (OHPL and associated infrastructure)	Before	Medium	Low
	After	Low	Low
	Before	Medium	Low

Habitat unit	Management	Loss of Floral Habitat and Species Diversity	Loss of Sensitive Floral Species
Secondary Miombo (OHPL and associated infrastructure)	After	Low	Low
Miombo Woodland (OHPL and associated infrastructure)	Before	High	Medium
	After	Low	Low
Transformed (Construction site/ laydown area)	Before	Medium	Low
	After	Low	Low
Secondary Miombo (Construction site/ laydown area)	Before	Medium	Medium
	After	Medium	Low
Access roads (Transformed Habitat)	Before	Low	Low
	After	Low	Low
Access road (Freshwater Habitat)	Before	Medium	Low
	After	Low	Low
Operational and Maintenance Phase			
Transformed (OHPL and associated infrastructure)	Before	Low	Low
	After	Low	Low
Freshwater (OHPL and associated infrastructure)	Before	Medium	Low
	After	Low	Low
Secondary Miombo (OHPL and associated infrastructure)	Before	Medium	Medium
	After	Low	Low
Miombo Woodland (OHPL and associated infrastructure)	Before	Medium	Medium
	After	Low	Low
Access roads (Transformed Habitat)	Before	Low	Low
	After	Low	Low
Access road (Freshwater Habitat)	Before	Medium	Low
	After	Low	Low
Decommissioning Phase			
Transformed (OHPL and associated infrastructure)	Before	Low	Low
	After	Low	Low
Freshwater (OHPL and associated infrastructure)	Before	Medium	Low
	After	Low	Low
Secondary Miombo (OHPL and associated infrastructure)	Before	Medium	Medium
	After	Low	Low
Miombo Woodland (OHPL and associated infrastructure)	Before	Medium	Medium
	After	Low	Low
Transformed (Construction site/ laydown area)	Before	Low	Low
	After	Low	Low
Secondary Miombo (Construction site/ laydown area)	Before	Medium	Medium
	After	Low	Low
Habitat fragmentation			
Transformed	Before	Low	
	After	Low	
Freshwater	Before	High	
	After	Low	
Secondary Miombo	Before	High	
	After	Low	
Miombo Woodland	Before	High	
	After	Low	

The construction of the proposed Project is likely to result in further vegetation clearance and habitat fragmentation for the proposed infrastructure footprint areas, access roads, construction / laydown areas and the proposed new powerlines. These activities will result in further loss of habitat and floral species within the footprint areas, with potential secondary impacts stemming from the increased levels of area access created by the new access roads which may lead to increased wood harvesting and additional habitat degradation.

From a floral perspective, it is recommended that the sensitivity map is taken into consideration when refining the layouts for the proposed Project, and that as far as possible all infrastructure, but especially pylons, are located outside of the sensitive Freshwater Habitats.

From a precautionary approach, the Miombo, Secondary Woodland and Freshwater Habitats have been listed as critical habitat for the purpose of this report, due to the limited availability of data on these species and access restrictions on site, which hindered thorough data collection. It is however important to note that further assessments for potential critical habitat species must be undertaken during the pre-construction monitoring. Should such assessments indicate that these species are not present in sufficient densities to qualify for CH, the CH must be noted only as natural habitat.

The objective of this study was to provide sufficient information on the floral ecology of the area in order for the EAP and the relevant authorities to apply the principles of Integrated Environmental Management (IEM) and the concept of sustainable development. It is the opinion of the specialist that whilst the proposed Project will lead to loss of habitat within the study area, the overall impact within the study area is expected to be limited, provided that mitigation measures as stipulated within this report are implemented.

11 REFERENCES

NOTE: Reliable reference material at the required level of detail and accuracy is scant, and thus verified and accurate reference material was utilised. These references are internationally accepted and although many of them do not specifically cover the study area, the species ranges and distributions overlap. Notes on ecological and biological requirements allowed the specialists to reliably extrapolate data.

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APPENDIX A: FLORAL METHOD OF ASSESSMENT

Vegetation Surveys

Various field sampling methods are available for the purpose of collecting floristic data. Generally, the selection of chosen field methods is dependent on serval factors, including the size of the area to be assessed, the heterogeneity of the vegetation/habitat present, time and budget allocated for field assessments, the scale and magnitude of potential project impacts, and the scope of work to be assessed.

When planning the timing of a floristic survey, it is important to remember that the primary objective is not an exhaustive species list but rather to ensure that sufficient data are collected to describe all the vegetation communities present in the area of interest, to optimise the detection of SCC and to assess habitat suitability for other potentially occurring SCC (SANBI, 2020). An understanding of the location and extent of vegetation types of increased sensitivity, and the location of areas of increased importance for various species of SCC, will focus efforts for the identification and marking of SCC during detailed pre-construction walkdown efforts.

Given the restricted time frames in which the proposed field surveys need to be conducted and the combined objective of accurately demarcating sensitive habitats within the area of interest, the method chosen needs to allow for:

I. Rapid, accurate data collection; and
II. The optimisation of time spent in habitats that are likely to sustain SCC.

Several survey methods, known as rapid biological assessments (Larsen, 2016)[5], can be employed. Example of rapid biological assessments include plot-based assessments or transect-based assessments. SANBI (2020) recommends the use of a transect-based approach, namely timed-meander searches (TMS; Goff et al., 1982[6]). The vegetation surveys presented below are a modified version of the TMS methods (hereafter referred to as modified-meander searches (MMS)). The TMS and MMS are subjective sampling methods which employs techniques where the specialist chooses specific sample sites within the area of interest, based on their professional experience in the area and background research done prior to the site visit. This allows representative recordings of floral communities and optimal detection of SCC.

The difference in the TMS and MMS is that the MMS is not timed. The below list presents the reasons for selection of a modified approach:

- Time, access, and safety constraints are often unpredictable and cannot be planned for prior to a site assessment, especially within remote areas and areas where local communities may not provide consent to specialist to survey their lands. As such, a timed approach may result in disproportionate efforts in some pre-defined habitats.
- Vegetation surveys are conducted at the same time as the SCC assessments which limits the potential for timed assessments as SCC often occur either sporadically, or are difficult to detect and hence, longer surveys in certain areas are necessary (skewing the timed approach). This is especially true for the pre-defined broad habitats within more sensitive areas such as the Sekhukhune Centre of Plant Endemism where desktop databases may not be a true reflection of on-site habitat extent and heterogeneity. Micro habitats where SCC are often found, are often difficult to detect on digital satellite imagery. As such, timing the surveys according to unverified field data will increase the risk of overlooking importance SCC data or habitat integrity features.
- Subjective decisions need to be made on-site that would otherwise interfere with a times-meander approach.

The employment of the presented field methods is beneficial because they allow for rapid data collection and subjective placement (based on professional experience and previous fieldwork knowledge) of the

[5] Larsen, T.H. ed., 2016. Core standardized methods for rapid biological field assessment. Conservation International.
[6] Goff, F.G., Dawson, G.A. and Rochow, J.J., 1982. Site examination for threatened and endangered plant species. Environmental Management, 6(4), pp.307-316.

MMSs in habitats that have a higher likelihood of sustaining SCC. Furthermore, this method allows for extensive coverage of the subject property, thus increasing the probability of SCC and micro habitat detection. Extensive coverage of the area of interest will also be advantageous where properties are of large extents that need to be assessed.

Based on the broad habitat units delineated before going to site and the pre-identified points of interest, which is updated based on on-site observations and access constraints, the selected sample areas are surveyed on foot, following the subjective MMT, to identify the occurrence of the dominant plant species and habitat diversities, but also to detect SCC which tend to be sparsely distributed. Photographs are taken of each vegetation community that is representative of typical vegetation structure of that community, as well as photos of all detected SCC (sensitive species will not be presented in the report).

Vegetation structure has been described following the guideline in Edwards (1983). Refer to Figure A1 below:

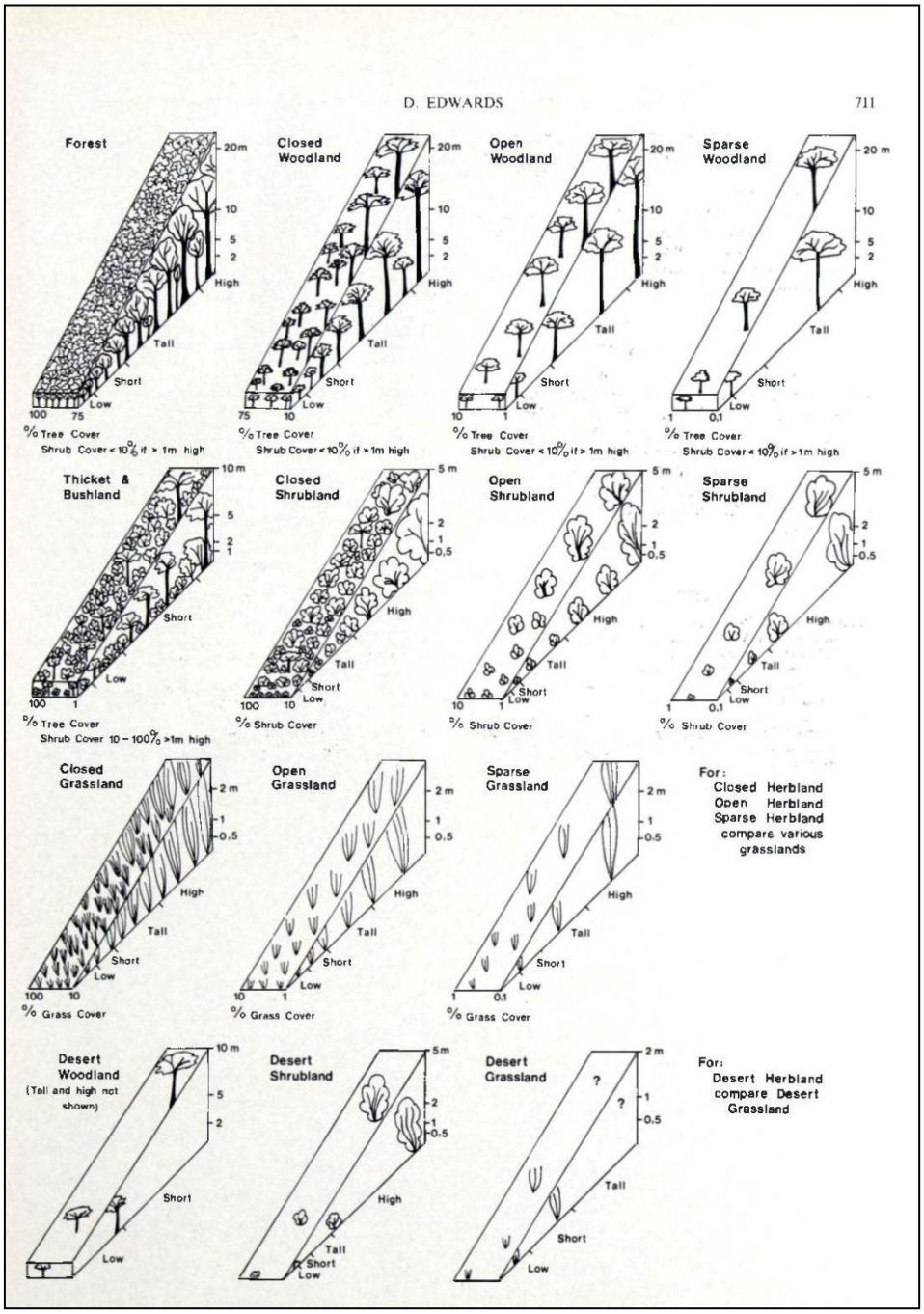

Figure A1: Diagrammatic representation of structural groups and formation classes. Only dominant growth forms are shown.

Floral Species of Conservational Concern Assessment

Prior to the site visit, a record of floral SCC and their habitat requirements was developed for the study area. Throughout the floral assessment, special attention was paid to the identification of any of these SCC as well as the identification of suitable habitat that could potentially support these species.

The Probability of Occurrence (POC) for each floral SCC is described:

- "**Confirmed'**: if observed during the survey;
- "**High**": if within the species' known distribution range and suitable habitat is available;
- "**Medium**": if either within the known distribution range of the species or if suitable habitat is present; or
- "**Low**": if the habitat is not suitable and falls outside the distribution range of the species.

Low POC	Medium POC	High POC	Confirmed

The accuracy of the POC is based on the available knowledge about the species in question, with many of the species lacking in-depth habitat research.

Consideration and application of the precautionary approach

The precautionary principle is defined by Tickner & Raffensperger (1999) as follows:

"*When an activity raises threats of harm to human health or the environment, precautionary measures should be taken even if some cause-and-effect relationships are not fully established scientifically*".

Given time and resource constraints within the field, it is not always feasible to definitively state the presence or absence of particular Species of Conservation Concern (SCC) or sensitive habitats. In such instances, the precautionary principle should be applied (SANBI, 2020). By applying such principles, a preventative action is taken in the face of uncertainty. Furthermore, for cryptic species that are often difficult to detect, it is not always easy to provide undeniable proof that a species occurs within a particular area within a subject property. As such, if suitable habitat is identified within the subject property and there is potential evidence to suggest the species did or can occur within the subject property (i.e., confirmed sightings in adjacent properties), then the precautionary principle will be to assume that the species does indeed occur within the area of interest. Appropriate mitigation and management efforts would then need to follow accordingly.

Floral Site Ecological Importance (SEI)

SEI is considered to be a function of the biodiversity importance (BI) of the receptor (e.g., species of conservation concern, the vegetation/fauna community or habitat type present on the site[7]) and its resilience to impacts (receptor resilience [RR]) as follows:

SEI = BI + RR

SEI can be derived from a simple matrix of BI and RR as follows:

Table A1: Matrix of CI and FI to determine BI.

Site Ecological Importance (SEI)		Biodiversity Importance				
		Very high	High	Medium	Low	Very low
Receptor Resilience	Very low	Very high	Very high	High	Medium	Low
	Low	Very high	Very high	High	Medium	Very low
	Medium	Very high	High	Medium	Low	Very low
	High	High	Medium	Low	Very low	Very low
	Very high	Medium	Low	Very low	Very low	Very low

[7] Note that the habitat type may be independent of the vegetation community and that it may even be artificial, e.g., excavated rock quarries that provide crucial breeding habitat for cliff-nesting species such as Bald Ibis.

Interpretation of the SEI in the context of the proposed development is provided below.

Table A2: Guidelines for interpreting SEI in the context of the proposed development activities.

Site ecological importance	Interpretation in relation to proposed development activities
Very high	Avoidance mitigation – no destructive development activities should be considered. Offset mitigation not acceptable/not possible (i.e., last remaining populations of species, last remaining good condition patches of ecosystems/ unique species assemblages). Destructive impacts for species/ecosystems where persistence target remains.
High	Avoidance mitigation wherever possible. Minimisation mitigation – changes to project infrastructure design to limit the amount of habitat impacted, limited development activities of low impact acceptable. Offset mitigation may be required for high impact activities.
Medium	Minimisation and restoration mitigation – development activities of medium impact acceptable followed by appropriate restoration activities.
Low	Minimisation and restoration mitigation – development activities of medium to high impact acceptable followed by appropriate restoration activities.
Very low	Minimisation mitigation – development activities of medium to high impact acceptable and restoration activities may not be required.

BI in turn is a function of conservation importance (CI) and the functional integrity (FI) of the receptor as follows:

BI = CI + FI

BI can be derived from a simple matrix of CI and FI as follows:

Table A3: Matrix of CI and FI to determine BI.

Biodiversity importance		Conservation importance				
		Very high	High	Medium	Low	Very low
Functional Integrity	Very high	Very high	Very high	High	Medium	Low
	High	Very high	High	Medium	Medium	Low
	Medium	High	Medium	Medium	Low	Very low
	Low	Medium	Medium	Low	Low	Very low
	Very low	Medium	Low	Very low	Very low	Very low

Conservation importance (CI) is evaluated in accordance with recognised established internationally acceptable principles and criteria for the determination of biodiversity-related value, including the IUCN Red List of Species, Red List of Ecosystems and Key Biodiversity Areas (KBA; IUCN [2016]).

Conservation importance is defined here as:

'The importance of a site for supporting biodiversity features of conservation concern present, e.g., populations of IUCN threatened and Near Threatened species (CR, EN, VU and NT), Rare species, range-restricted species, globally significant populations of congregatory species, and areas of threatened ecosystem types, through predominantly natural processes.'

These criteria are defined as follows:

- IUCN threatened and Near Threatened species (CR, EN, VU and NT) are defined as either the global or national assessments of the risk of extinction as evaluated by a dedicated panel of species specialists according to the criteria of the International Union for The Conservation of Nature (www.iucnredlist.org). Where the global and national assessments differ for the same taxon, the national evaluation of status[8] should be used in calculating SEI unless the global assessment is both more recent and of a more threatened category. It is important to note that

[8] http://speciesstatus.sanbi.org/. For mammals: https://www.ewt.org.za/wp-content/uploads/2020/04/2020-updated-2016-Red-List-of-Mammals-of-South- Africa-Lesotho-Swaziland-Summary-Listings.xlsx; for plants: http://redlist.sanbi.org.

the specialist is required to have a firm understanding of the IUCN Red List Categories and Criteria (IUCN 2012) in order to appropriately apply these for the evaluation of SEI. This criterion can be assessed using confirmed occurrences of species or the suitability of the habitat to support these species. Rare species are those included on South Africa's National Red List as Rare or Critically Rare or Extremely Rare. These are highly restricted species that are currently not declining. However, should any development impact on a population of these species they will immediately qualify under one of the IUCN categories of threat. y Range-restricted species – the presence of terrestrial flora, vertebrate, and invertebrate fauna with a global population extent of occurrence (EOO) of 10 000 km^2 or less.

- Globally significant populations of congregatory species – a roughly estimated proportion (%) of the global population of a fauna species that congregate for breeding/feeding/hibernation/other reasons. y Significant areas of threatened vegetation types – this is a function of both the area (size) being considered in relation to the total extent of that vegetation type (i.e., proportion) and how threatened (CR, EN, VU) the vegetation types are.
- Natural processes – natural unmanaged areas with low levels of ecological disturbance have largely intact natural processes such as pollination, seed dispersal and migration, and thus have greater intrinsic conservation importance than those that are modified through ecological disturbance.

While most of the features that will be included in the CI will be provided by the screening tool, it is important to note that CI is evaluated at a much finer spatial scale and based on fieldwork data collection and comprehensive desktop analyses performed by the specialist during the EA process. As a minimum requirement, CI needs to be determined for each identified habitat within the project footprint, but best practice recommendation is that it should be determined for all habitats within the entire PAOI[9].

Fulfilling criteria to evaluate CI do not rely on a single specific threshold for each of the above defining characteristics but can act in combination or in isolation, providing a more robust evaluation of CI (Table A4). Furthermore, while CI is most likely to be assessed based on data collected during the fieldwork survey, it can also be an assessment of the suitability of the receptor to support populations conforming to the fulfilling criteria. As can be seen from the worked example below, each of these evaluations of the fulfilling criteria demand necessary justification.

Table A4: Conservation importance (CI) criteria.

Conservation importance	Fulfilling criteria
Very high	- Confirmed or highly likely occurrence of CR, EN, VU or Extremely Rare[10] or Critically Rare[11] species that have a global EOO of < 10 km^2. - Any area of natural habitat[12] of a CR ecosystem type or large area (> 0.1% of the total ecosystem type extent[13]) of natural habitat of EN ecosystem type. - Globally significant populations of congregatory species (> 10% of global population).
High	- Confirmed or highly likely occurrence of CR, EN, VU species that have a global EOO of > 10 km^2. IUCN threatened species (CR, EN, VU) must be listed under any criterion other than A. If listed as threatened only under Criterion A, include if there are less than 10 locations or < 10 000 mature individuals remaining. - Small area (> 0.01% but < 0.1% of the total ecosystem type extent) of natural habitat of EN ecosystem type or large area (> 0.1%) of natural habitat of VU ecosystem type.

[9] Because CI needs to be assigned to a receptor (e.g., the vegetation/fauna community or habitat type), it is customary to use the flora community delineation developed for a PAOI by a botanical specialist. However, such delineation is often too fine scaled to define fauna-specific habitats, which are generally more structural than phytosociological in nature. Where this is the case, the fauna specialist should merge two or more relevant floral communities to correlate with the specific fauna habitat type that is characteristic of a particular taxon assemblage. In certain cases, the faunal specialist will have to demarcate habitats that have not been classified by the botanical specialist; a pertinent example is the presence of cliffs, which are frequently important breeding habitat for some bird SCC.

[10] For butterflies, as per Armstrong *et al*. (2013).

[11] For plants, as per Raimondo *et al*. (2009).

[12] This excludes areas of Transformed Habitat within a defined ecosystem even if these are partially restored, e.g., Highveld grasslands that have been converted to maize fields and then abandoned so that some form of functional grassland is restored; this is not natural habitat as it does not and will not in the future have species composition representative of the original natural habitat.

[13] This can be calculated from the threatened ecosystem of South Africa shapefile available from the SANBI (current available version 2011: http://bgis.sanbi. org/Projects/Detail/49).

Conservation importance	Fulfilling criteria
	- Presence of Rare species. - Globally significant populations of congregatory species (> 1% but < 10% of global population).
Medium	- Confirmed or highly likely occurrence of populations of NT species, threatened species (CR, EN, VU) listed under Criterion A only and which have more than 10 locations or more than 10 000 mature individuals. - Any area of natural habitat of threatened ecosystem type with status of VU. - Presence of range-restricted species. - > 50% of receptor contains natural habitat with potential to support SCC.
Low	- No confirmed or highly likely populations of SCC. - No confirmed or highly likely populations of range-restricted species. - < 50% of receptor contains natural habitat with limited potential to support SCC.
Very low	- No confirmed and highly unlikely populations of SCC. - No confirmed and highly unlikely populations of range-restricted species. - No natural habitat remaining.

Functional integrity (FI) of the receptor (e.g., the vegetation/fauna community or habitat type) is defined here as the receptors' current ability to maintain the structure and functions that define it, compared to its known or predicted state under ideal conditions. Simply stated, FI is:

'A measure of the ecological condition of the impact receptor as determined by its remaining intact and functional area, its connectivity to other natural areas and the degree of current persistent ecological impacts.'

These criteria can be defined as:

- Connectivity to other natural areas – connectivity, which can also be measured conversely as the degree of habitat fragmentation, refers to how connected habitat patches are to each other, which has a significant influence on numerous ecological processes, such as migration and dispersal opportunities of biota and therefore genetic exchange between populations. Connectivity to other similar habitats becomes more important as the remaining intact and functional area of a habitat decreases, mainly because population sizes decrease and are therefore at greater risk from ecological perturbations and inbreeding effects. The degree of connectivity between habitat patches varies greatly with the dispersal ability of the taxon or taxon group (e.g., fossorial reptiles) in question.
- Degree of current persistent negative ecological impacts – persistent negative impacts such as uncontrolled spread of alien and invasive flora effectively decreases both the remaining intact area and ecosystem functioning of a particular habitat. Persistent ecological disruptors must not include components that landowners are legally obliged to address or that should be addressed as norm for best practice. Wilful neglect of these legal obligations or the presence of invasive alien species that can practically be controlled through management actions should not negatively influence the FI score to a major extent.
- Remaining intact and functional area – the proportion of the receptor that supports natural habitat with intact ecological processes – small areas are less likely to withstand ecological degradation compared to large areas, and the latter are therefore better able to maintain structure and function allowing for intact ecological processes.

Ecological processes can be considered to be mostly intact and functional if the receptor area has low levels of current ecological disruptors, has good connectivity to other areas and is a relatively large area. As for CI, the fulfilling criteria to evaluate FI do not rely on a single specific threshold for each of the above defining characteristics but can act in combination or in isolation (Table A5) and will require justification by the specialist.

Table A5: Functional integrity (FI) criteria.

Functional integrity	Fulfilling criteria
Very high	- Very large (> 100 ha) intact area for any conservation status of ecosystem type or > 5 ha for CR ecosystem types. - High habitat connectivity serving as functional ecological corridors, limited road network between intact habitat patches. - No or minimal current negative ecological impacts with no signs of major past disturbance (e.g., ploughing).
High	- Large (> 20 ha but < 100 ha) intact area for any conservation status of ecosystem type or > 10 ha for EN ecosystem types. - Good habitat connectivity with potentially functional ecological corridors and a regularly used road network between intact habitat patches. - Only minor current negative ecological impacts (e.g., few livestock utilising area) with no signs of major past disturbance (e.g., ploughing) and good rehabilitation potential.
Medium	- Medium (> 5 ha but < 20 ha) semi-intact area for any conservation status of ecosystem type or > 20 ha for VU ecosystem types. - Only narrow corridors of good habitat connectivity or larger areas of poor habitat connectivity and a busy used road network between intact habitat patches. - Mostly minor current negative ecological impacts with some major impacts (e.g., established population of alien and invasive flora) and a few signs of minor past disturbance. Moderate rehabilitation potential.
Low	- Small (> 1 ha but < 5 ha) area. - Almost no habitat connectivity but migrations still possible across some modified or degraded natural habitat and a very busy used road network surrounds the area. Low rehabilitation potential. - Several minor and major current negative ecological impacts.
Very low	- Very small (< 1 ha) area. - No habitat connectivity except for flying species or flora with wind-dispersed seeds. - Several major current negative ecological impacts.

Ecological processes can be considered to be mostly intact and functional if the receptor area has low levels of current ecological disruptors, has good connectivity to other areas and is a relatively large area. As for CI, the fulfilling criteria to evaluate FI do not rely on a single specific threshold for each of the above defining characteristics but can act in combination or in isolation (Table 8.2) and will require justification by the specialist (see worked example below).

Receptor resilience (RR) is defined here as:

'The intrinsic capacity of the receptor to resist major damage from disturbance and/or to recover to its original state with limited or no human intervention.'

The fulfilling criteria to evaluate RR are based on the estimated recovery time required to restore an appreciable portion of functionality to the receptor (Table A4) and will require justification by the specialist. The specialist needs to bear in mind that resilience will often be linked to a particular disturbance or impact, or even time of year, and needs to be described in relation to these factors. For example, large birds of prey have different levels of resilience to noise disturbance depending on whether they are breeding or not; these species would have low resilience to noise disturbance such as construction of a road adjacent to a nest site during the breeding season but a higher resilience to lodge construction in an area with limited breeding habitat outside of the breeding season.

Receptor resilience needs to be evaluated by the specialist and justification for each evaluation must be provided in the report (see worked example below). Finally, after the successful evaluation of both BI and RR as described above, it is possible to evaluate SEI from the final matrix as follows:

SEI should be described in the above manner for each impact receptor within the area of influence and clearly mapped in relation to the proposed development activities and infrastructure. Interpretation of SEI in the context of the proposed development activities (Table A1) must be provided by the specialist.

It is very important to note that SEI is specific to the proposed development activities and cannot be meaningfully compared between different proposed projects with different associated

activities on the same spatial location. However, SEI for the same proposed development with multiple alternative layouts and/or locations may be compared within the same study.

Table A6: Resilience criteria.

Resilience	Fulfilling criteria
Very high	Habitat that can recover rapidly (~ less than 5 years) to restore > 75%[28] of the original species composition and functionality of the receptor functionality, or species that have a very high likelihood of remaining at a site even when a disturbance or impact is occurring, or species that have a very high likelihood of returning to a site once the disturbance or impact has been removed.
High	Habitat that can recover relatively quickly (~ 5–10 years) to restore > 75% of the original species composition and functionality of the receptor functionality, or species that have a high likelihood of remaining at a site even when a disturbance or impact is occurring, or species that have a high likelihood of returning to a site once the disturbance or impact has been removed.
Medium	Will recover slowly (~ more than 10 years) to restore > 75% of the original species composition and functionality of the receptor functionality, or species that have a moderate likelihood of remaining at a site even when a disturbance or impact is occurring, or species that have a moderate likelihood of returning to a site once the disturbance or impact has been removed.
Low	Habitat that is unlikely to be able to recover fully after a relatively long period: > 15 years required to restore ~ less than 50% of the original species composition and functionality of the receptor functionality, or species that have a low likelihood of remaining at a site even when a disturbance or impact is occurring, or species that have a low likelihood of returning to a site once the disturbance or impact has been removed.
Very low	Habitat that is unable to recover from major impacts, or species that are unlikely to remain at a site even when a disturbance or impact is occurring, or species that are unlikely to return to a site once the disturbance or impact has been removed.

APPENDIX B: IMPACT ASSESSMENT METHODOLOGY

The project impact assessment method was supplied by SRK Consulting.

Impact assessment methodology

Potential impacts (direct, indirect, cumulative) will be assessed using information gathered during the baseline assessment in combination with previously collected desktop data and compared with the detailed project description.

Impact significance rating

Practicable management measures will be recommended that avoid, and if avoidance is not possible, then reduce, restore, compensate/offset negative impacts, enhance positive impacts and assist project design. The impact significance rating system is presented in Table 4-1 and involves the following parts:

- Part A: Defines impact consequence using the three primary impact characteristics of magnitude, spatial scale and duration.
- Part B: Uses the matrix to determine a rating for impact consequence based on the definitions identified in Part A.
- Part C: Uses the matrix to determine the impact significance rating, which is a function of the impact consequence rating (from Part B) and the probability of occurrence.

Table B1: Method for rating significance of importance

PART A: DEFINING CONSEQUENCE IN TERMS OF MAGNITUDE, DURATION AND SPATIAL SCALE *Use these definitions to define the consequence in Part B*		
Impact characteristics	**Definition**	**Criteria**
MAGNITUDE	Major -	Substantial deterioration or harm to receptors; receiving environment has an inherent value to stakeholders; receptors of impact are of conservation importance; or identified threshold often exceeded
	Moderate -	Moderate/measurable deterioration or harm to receptors; receiving environment moderately sensitive; or identified threshold occasionally exceeded
	Minor -	Minor deterioration (nuisance or minor deterioration) or harm to receptors; change to receiving environment not measurable; or identified threshold never exceeded
	Minor +	Minor improvement; change not measurable; or threshold never exceeded
	Moderate +	Moderate improvement within or better than the threshold; or no observed reaction
	Major +	Substantial improvement; within or better than the threshold; or favourable publicity
SPATIAL SCALE OR POPULATION	Site	The area that is directly exposed to project facilities (i.e. project footprint)
	Local	The area affected by the project's direct impacts, i.e. impacts that result from the direct interaction between project's infrastructures, routine project activities and the receiving environment
	Regional	the wider geographic area affected by the indirect impacts of the project's infrastructures and activities and/or impacts resulting from unforeseen (accidental) project activities, specifically the potential impacts in the unlikely event to occur
DURATION	Short term	Up to 18 months.
	Medium term	18 months to 5 years
	Long term	Longer than 5 years

PART B: DETERMINING CONSEQUENCE RATING *Rate consequence based on definition of magnitude, spatial extent and duration*					
			SPATIAL SCALE/ POPULATION		
			Site	Local	Regional
MAGNITUDE					
Minor	DURATION	Long term	Medium	Medium	High
		Medium term	Low	Low	Medium
		Short term	Low	Low	Medium
Moderate	DURATION	Long term	Medium	High	High
			Medium	Medium	High
		Short term	Low	Medium	Medium

PART A: DEFINING CONSEQUENCE IN TERMS OF MAGNITUDE, DURATION AND SPATIAL SCALE *Use these definitions to define the consequence in Part B*					
Impact characteristics	Definition		Criteria		
Major	DURATION	Long term	High	High	High
		Medium term	Medium	Medium	High
		Short term	Medium	Medium	High

PART C: DETERMINING SIGNIFICANCE RATING *Rate significance based on consequence and probability*				
		CONSEQUENCE		
		Low	Medium	High
PROBABILITY (of exposure to impacts)	Definite	Medium	Medium	High
	Possible	Low	Medium	High
	Unlikely	Low	Low	Medium

Notes: + denotes a positive impact. Using the matrix, the significance of each described impact is initially rated. This rating assumes the management measures inherent in the project design are in place.

Management recommendations and post management significance

After determining the significance rating, practicable management measures are suggested for each specific impact. The impact description should indicate the significance rating prior to and following mitigation/optimisation. As explained above:

"Recommendations for management should focus on avoidance, and if avoidance is not possible, then to reduce, restore, compensate/offset negative impacts, enhance positive impacts and assist project design."

The significance of impacts is then re-assessed with assumed management measures in place ("after management"). Specialists also recommend and describe appropriate monitoring and review programs to track the efficacy of management measures.

An example of the table used to report the significance rating for each impact before and after the implementation of mitigation / management measures, and listing these measures, is provided as Table 4-2.

APPENDIX C: FLORAL SPECIES LIST

Table C1: Floral species encountered during the wet- and dry field assessments. Exotic and invasive species are marked with an asterisk (*).

Species	Miombo woodland	Secondary Miombo Woodland	Freshwater Habitat	Transformed
WOODY SPECIES				
*Acacia mearnsii**				x
*Acacia saligna**				x
Adenia senensis	x			
Albizia adianthifolia	x	x		x
Annona senegalensis		x	x	x
Antidesma venosum			x	
Azanza garckeana				x
*Azolla filiculoides**			x	
Bobgunnia madagascariensis		x		
Brachystegia boehmiii	x	x		
Brachystegia spiciformis		x		
Brachystegia utilis	x	x		
Cassia singueana	x			
Combretum adenogonium			x	
Combretum molle	x	x		
Combretum zeyheri	x	x		
Commiphora africana	x			
Crossopteryx febrifuga				x
Dalbegiella nyasae		x		
Dichrostachys cinerea	x	x		x
Diospyros kirkii	x			
Diplorhynchus condylocarpon	x	x		
Eichhornia crassipes			x	
Erythrina zeyheri	x			
Ethulia conyzoides			X	
Eucalyptus sp.*				x
Ficus sycomorus			x	
Flacourtia indica				x
Grewia flavescens	x	x		x
Hexalobus monopetalus		x		x
Hymenocardia acida		x		
Julbernardia paniculata		x		
Kigelia africana	x	x		
*Lantana camara**		x		x
*Leucaena leucocephala**			x	
*Mangifera indica**				x
Myriophyllum aquaticum			x	
*Ozoroa insignis**		x		x
Parinari curatellifolia	x	x		
Pericopsis angolensis	x			x
Piliostigma thonningii		x		x
*Pistia stratiotes**			x	
*Prosopis glandulosa**		x		x
*Prosopis juliflora**				x

Species	Miombo woodland	Secondary Miombo Woodland	Freshwater Habitat	Transformed
Protea angolensis	x	x		
Pseudolachnostylis maprouneifolia	x	x		
*Psidium guajava**			x	x
Pterocarpus angolensis	x			
Salvinia molesta			x	
*Senna spectabilis**				x
*Solanum mauritianum**		x		x
Steganotaenia araliacea		x		x
Strychnos cocculoides		x		
*Tagetes minuta**			x	x
Terminalia sericea	x	x		x
*Tithonia diversifolia**		x		x
Uapaca sansibarica		x		
Uapaca siberiana				x
Vachellia sieberiana			x	
Vangueria infausta		x	x	
Vangueriopsis lanciflora		x		
Xylomphis obovata				x
Ziziphus mucronata	x	x		x
SUCCULENTS				
Opuntia ficus-indica		x		x
*Opuntia stricta**		x		x
FORBS AND GRAMINOIDS				
Albuca abyssinica		x		
*Argemone Mexicana**		x		x
Aristida adscensionis		x		x
Aristida congesta		x		x
*Arundo donax**			x	
Ascolepis protea			x	
*Azolla filiculoides**			x	
*Bidens pilosa**	x		x	x
Bidens schimperi				x
Boophone disticha		x		
Brachiaria serrata		x		
*Cassytha filiformis**		x		x
Cenchrus ciliaris		x		x
Chloris gayana	x	x		x
*Cosmos sulphureus**				x
Commelina africana	x	x		
*Chromolaena odorata**		x		
Cynodon dactylon		x	x	x
Cyperus sp.			x	
Cyperus tenuiflorus			X	
Digitaria eriantha	x	x	x	
Diheteropogon amplectens	x	x		
Eragrostis biflora				x
*Eichhornia crassipes**			x	
Floscopa glomerata			X	
Heteropogon contortus	x	x		x
Hibiscus nigricaulis		x		x
Hyparrhenia sp.	x	x		

Species	Miombo woodland	Secondary Miombo Woodland	Freshwater Habitat	Transformed
Hypoxis nyasica			x	
Kyllinga pumila			x	
*Myriophyllum aquaticum**			x	
Panicum sp.	x	x	x	
Phragmites australis			x	
*Pistia stratiotes**			x	
Salvinia molesta			x	
Setaria pumila				x
*Ricinus communis**		x		x
Sporobolus africanus		x		x
Sporobolus fimbriatus		x		x
*Tagetes minuta**		x		x
*Tithonia diversifolia**		x		x

APPENDIX D: FLORAL SCC

Table D1: Executive Decree No. 252/18 Red List of Plant Species of Angola (2018). Listed under Category C – Vulnerable (VU).

Class		Common Name	Scientific Name	Direct threat	POC
Plants	1	Moreira	*Chiorophora excelsa*	Unsustainable exploitation	Low
	2	Munguba	*Entandrophragma utile*	Unsustainable exploitation	Low
	3	Muanza	*Albizia glaberrima*	Unsustainable exploitation	Low
	4	Undianuno/Kibaba	*Khaya anthotheca*	Unsustainable exploitation	Low
	5	Tacula	*Pterocarpus angolensis*	Unsustainable exploitation	Confirmed
	6	Ako	*Antiaris welwitschii*	Unsustainable exploitation	Low
	7	Longui	*Gambeya africana*	Unsustainable exploitation	Low
	8	Mafumeira	*Ceiba pentandra*	Unsustainable exploitation	Low
	9	Tola-Chifuta	*Oxystigma oxyphylium*	Unsustainable exploitation	Low
	10	Xinga-Xinca/Muazmza	*Piptadeniastrum africanum*	Unsustainable exploitation	Low
	11	Munguela	*Ricinodendron heudeloti*	Unsustainable exploitation	Low
	12	Imbondeiro	*Adansonia digitata*	Urbanisation and industrialisation	Low
	13	Kitiba	*Entandrophragma angolense*	Unsustainable exploitation	Low
	14	Ebano	*Diospyros mespiliformis*	Unsustainable exploitation	Low
	15	Pau-faro	*Caesalpinia leostachya*	Unsustainable exploitation	Low
	16	Pau-preto	*Dalbergia latifolia*	Unsustainable exploitation	Low
	17	Sândalo africano	*Santalum album*	Unsustainable exploitation	Low
	18	Mogna	*Khaya sp.*	Unsustainable exploitation	Low
	19	Kungulo-Mukungulo	*Autrenella congolensis*	Unsustainable exploitation	Low
	20	Mupanda	*Brachystegia spiciformis*	Unsustainable exploitation	Confirmed
	21	Welwitschia	*Welwitschia mirabilis*	Overgrazing	Low
	22	Mucumbi-Kumbi	*Lannea Welwitschii*	Unsustainable exploitation	Low
	23	N'Dulu-Ako	*Autriaris Welwitschia*	Unsustainable exploitation	Low
	24	Kababa-Ohia	*Celtis mildbraedii*	Unsustainable exploitation	Low
	25	Os mangais (todas as espécies)	*R macronata B. gymnorrhiza*	Indiscriminate harvesting and chemical pollution	Low
	26	Nfumbua	*Gnetum africanum*	Unsustainable exploitation	Low
	27	Makakata	*Harpagopphytum procumbens*	Unsustainable exploitation	Low
	28	Palmeiras Nativas		urbanization	Low
	29	Pau de Cabinda	*Pausinystalia macroceras*	Unsustainable exploitation	Low
	30	Pau-Rosa	*Swartzia fistuloide*	Unsustainable exploitation	Low

Table D2: Threatened and Protected flora listed on the IUCN list.

Species name	IUCN Status	Habitat and Direct threats	POC
Albizia ferruginea	NT	It occurs mainly in lowland semi-deciduous and its density is lower in evergreen forests. Main threats to this species include deforestation due to logging, agricultural expansion, and	Low

		infrastructure development. These activities contribute to habitat loss and fragmentation, putting pressure on the species and reducing its natural populations.	
Ansellia africana	VU	This species is widespread, often in hot dry mixed deciduous woodlands at medium to low altitudes, in riverine vegetation and mopane or miombo woodlands near rivers, growing on trees and shrubs. The species faces threats from habitat loss due to deforestation, over-collection for the ornamental trade, and climate change affecting its environmental conditions. Conservation efforts should focus on habitat protection, regulating collection, and promoting sustainable cultivation practices.	High
Baphia dewevrei subsp. marquesii	VU	*Baphia dewevrei* subsp. *marquesii* is found in the lowland forests of Central Africa, including parts of Cameroon and the Congo Basin. It typically inhabits humid, tropical forests with well-drained soils and high levels of rainfall. This subspecies faces threats from deforestation, illegal logging, and habitat fragmentation due to agricultural expansion. Conservation efforts should focus on protecting its forest habitat and regulating logging activities to prevent further population decline.	Low
Barleria cyanea	NT	This species occurs in a variety of habitats including among open sandy flats with *Colophospermum mopane* and *Catophractes alexandri* woodland and thickets, at the bases of and among rocky areas such as koppies, and in dry bushland along river margins. The species faces threats from habitat loss due to deforestation, land conversion for agriculture, and overgrazing.	Low
Barleria namba	VU	This species is recorded from open rocky hillslopes. The primary threats to this species include habitat loss due to deforestation, agricultural expansion, and land conversion, which lead to habitat fragmentation and reduced population sizes.	Low
Combretum aureonitens	NT	Is a shrub or small tree native to tropical Africa, commonly found in dry, deciduous forests and savannas. It thrives in well-drained soils and areas with seasonal rainfall, adapting to both open and semi-wooded environments. The primary threats to *Combretum aureonitens* include habitat loss due to deforestation, land conversion for agriculture, and overgrazing by livestock.	Low
Croton gossweileri	EN	This species is endemic to tropical Africa, often found in moist, lowland forests and along riverbanks. It thrives in shaded, well-drained soils with consistent moisture. The primary threats to *Croton gossweileri* include deforestation, habitat fragmentation, and land conversion for agriculture.	Medium
Ctenolophon englerianus	NT	Is a tree species native to tropical Africa, particularly found in lowland and montane forests with well-drained, fertile soils. It thrives in humid, shaded environments typical of dense rainforests. The main threats to this species include habitat loss due to deforestation, logging, and agricultural expansion.	Low
Dactyladenia floribunda	NT	Native to tropical Africa, typically found in lowland and montane forests with well-drained soils. It thrives in humid, shaded environments, often in forest undergrowth. The primary threats to *Dactyladenia floribunda* include habitat destruction due to deforestation, agricultural expansion, and logging.	Low
Dalbergia macrosperma	EN	Tree species native to tropical Africa, found in lowland and upland forests with well-drained soils. It thrives in humid, tropical climates and is known for its high-quality wood. The main threats to this species include habitat loss due to deforestation, illegal logging, and agricultural expansion.	Low

Daniellia alsteeniana	NT	It occurs in lowland woods, dry forests and savannah at low elevations. It thrives in humid, tropical environments and is often a component of dense rainforests. The primary threats to *Daniellia alsteeniana* include deforestation, habitat fragmentation due to logging, and agricultural expansion.	Low
Disa aequiloba	EN	This species is found growing in swamp areas, dambo, wet grassland, wet meadow; terrestrial. The main threats to this species include habitat loss due to agricultural expansion, overgrazing by livestock, and climate change, which can alter its habitat conditions.	Medium
Drypetes euryodes	CR	*Drypetes euryodes* is known from a woody rocky cliff and was collected at around 1,000 m in elevation. The primary threats to *Drypetes euryodes* include habitat loss due to deforestation, logging, and agricultural expansion.	Low
Entandrophragma angolense	NT	It is most commonly found in moist semi-deciduous forest, though it can also be found in evergreen forest. It is a non-pioneer light-demanding tree species that occurs in lowland and mid-altitude rainforest, but sometimes also in gallery forest and thickets, at elevations up to 1,800 m. The main threats to this species include deforestation, illegal logging, and habitat fragmentation due to agricultural expansion.	Low
Eugenia dewevrei	VU	Native to the rainforests of Central Africa, typically found in lowland and upland forest areas with well-drained, fertile soils. It thrives in humid, tropical environments and plays a role in the biodiversity of its forest habitat. The primary threats to *Eugenia dewevrei* include habitat loss due to deforestation, illegal logging, and agricultural expansion, which fragment and degrade its natural environment.	Low
Fernandoa ferdinandi	VU	Native to tropical Africa, particularly found in semi-deciduous and riverine-evergreen forest mosaic with well-drained, fertile soils. It thrives in humid, tropical environments and is an integral part of its forest ecosystem. The main threats to *Fernandoa ferdinandi* include deforestation, habitat fragmentation due to logging, and agricultural expansion.	Low
Genlisea angolensis	EN	Carnivorous plant species native to the tropical regions of Africa, typically found in damp, acidic soils within savannas and wetlands. It thrives in moist, nutrient-poor environments where it captures insects to supplement its nutrient intake. The primary threats to this species include habitat loss due to drainage of wetlands, agricultural expansion, and land conversion.	Medium
Gnetum africanum	NT	Is a vine species native to tropical Africa, found in primary and secondary semi-deciduous, humid forests, in some cases where the forest had been degraded substantially. The species tolerates both dense forests and the transition of anthropogenous grass savanna to forest at exposed, sunny locations. The primary threats to *Gnetum africanum* include deforestation, habitat fragmentation due to logging, and agricultural expansion, which impact its natural habitat and reduce its availability.	Low
Guibourtia carrissoana	VU	Typically found in dry forest and dry coastal lowlands. The main threats to this species include deforestation, illegal logging, and habitat fragmentation due to agricultural expansion.	Low
Inversodicraea cristata	VU	This species is endemic to Central African countries (Cameroon, Gabon, Equatorial Guinea, Central Africa Republic, Angola). Although very gregarious plant where it grows, its specialization into very narrow habitat (waterfall) tends to make of it a low abundant plant. Known from four to five sites in Cameroon (three in Flora of	Low

		Cameroon; plus Tello and possibly Vina: J.-P. Gogue pers. comm. 2008).	
Inversodicraea warmingiana	VU	Aquatic herb, annual, submerged or not, growing fixed on rocks in waterfalls and rapids. It grows fixed by a thallus on rocks or any other hard object. Threats to this species include dams, misuse of water management that will negatively impact on preferred habitat.	Low
Isolona pilosa	VU	Tree species native to the tropical rainforests of Central Africa. It typically grows in humid, lowland forest environments with well-drained, fertile soils. The primary threats to this species include deforestation, habitat fragmentation due to logging, and land conversion for agriculture, which adversely impact its natural habitat.	Low
Khaya anthotheca	VU	Tree species native to tropical Africa, found in lowland and swamp forests with well-drained, fertile soils. It thrives in humid, tropical environments and is valued for its high-quality, durable timber. The main threats to this species include deforestation, illegal logging, and habitat loss due to agricultural expansion.	Low
Khaya senegalensis	VU	Tree species native to tropical Africa, found in a range of habitats including savannas, woodlands, and riverine forests with well-drained soils. It thrives in humid to semi-arid environments and is highly valued for its high-quality, durable timber. The primary threats to this species include deforestation, illegal logging, and habitat loss due to agricultural expansion.	Low
Lysimachia elegantula	NT	Annual herb, rarely biannual of swampy savannas and meadows. Threats to this species include development of housing and urban areas, including annual and perennial non-timber crops.	Medium
Mesanthemum glabrum	NT	This species grows in wet peaty soil of dambos, shallow pools, swamps or marshy ground near rivers; 1,100–1,500 m. The primary threats to this species include habitat destruction due to housing/ urban development, deforestation, logging, and agricultural expansion, which degrade and fragment its natural environment.	Medium
Mesanthemum reductum	NT	The species grows submerged in fast flowing rivers, forming patches and rooting in the sandy substrate; 1,230–1,290 m. Further study is needed to assess the threats faced by this species.	Low
Millettia gracilis	VU	It is found in thickets on forest margins, in secondary thickets, where it is sometimes sporadic, and in riverine forest. It thrives in humid, tropical environments and contributes to the biodiversity of its forest habitat. Primary threats to this species include habitat loss due to deforestation, illegal logging, and agricultural expansion. These activities lead to fragmentation and degradation of its natural habitat, impacting the species survival.	Low
Millettia nudiflora	EN	It is found in evergreen moist forest and also in riverine forest and thrives in humid, tropical environments and plays a role in maintaining forest biodiversity. Main threats to this species include habitat loss from deforestation, illegal logging, and agricultural expansion, which lead to the fragmentation and degradation of its natural habitat.	Low
Mitragyna stipulosa	NT	It occurs in swamps and marshy localities and on the edge of wetlands. It is a light-demanding species dispersed by wind. This species occurs mainly in gallery forest in the dry forest and savanna zone. Main threats to this species include habitat loss due to deforestation, illegal logging, and agricultural expansion, which result in fragmentation and degradation of its natural habitat.	Low
Monotes pearsonii	VU	It occurs on wooded slopes on shallow rocky soils (Meerts et al. 2017). It occurs in woodland associated with Brachystegia and	Low

		other Monotes species. Main threats to this species include habitat loss due to deforestation, illegal logging, and agricultural expansion, which cause fragmentation and degradation of its natural habitat.	
Monotes rubriglans	VU	Occurs in xerophilous Miombo woodland, savanna woodland and wooded savanna. Primary threats to this species include habitat loss from deforestation, illegal logging, and agricultural expansion, which result in the fragmentation and degradation of its natural habitat.	High
Pavetta gossweileri	EN	It is found in moist Guinea-Congolian coffee forests, including in Kumbira Forest which is the most southerly of the small isolated patches of this habitat type. Primary threats to this species include habitat loss due to deforestation, illegal logging, and agricultural expansion, which result in fragmentation and degradation of its natural environment.	Low
Piptostigma exellii	CR	It is known to be sporadically found in humid gallery forests. Due to alluvial diamond extraction, we infer the species is threatened by habitat loss. Moreover, the area where the species is known to occur, has been affected by civil war from 1975 to 2002.	Low
Pogostemon micangensis	VU	This is recorded in river marshes, drying sandy riverbeds, flooded meadows and swamps at 600–1,300 meters elevation. Given this species preference for semi-aquatic habitats such as river marshes, drying sandy riverbeds and flooded meadows the most plausible future threats to this species are unsustainable extraction of sand from rivers, drought due to climate change and increased pressure from grazing and watering of livestock.	Low
Polyscias letestui	EN	This species is known from secondary vegetation in areas of rainforest, between 730 and 1,300 m in elevation. The natural habitat is probably the open vegetation along streams in mountainous areas. Main threats to Polyscias letestui include habitat loss due to deforestation, illegal logging, and agricultural expansion, which cause fragmentation and degradation of its natural habitat.	Low
Prunus africana	VU	This species occurs in evergreen forests near the coast (South Africa), inland mistbelt forests and Afromontane forests up to 2,700(–3,000) m. In most of its range it occurs primarily in moist montane forest above 1,800 m, occurring at lower altitudes in southern Africa. Primary threats to this species include overharvesting for medicinal use, deforestation, and habitat loss due to agricultural expansion and logging.	Low
Rotala smithii	VU	This species is endemic to Central Africa (the Democratic Republic of Congo (DRC) and Angola). It is often found growing into the mud, at the marshland borders. Water pollution is a major threat to this species.	Medium
Schumanniophyton hirsutum	NT	Native to tropical Africa, typically found in moist, shaded forest environments with well-drained soils. It thrives in humid, tropical habitats and is often associated with specific microhabitats within forests. Primary threats to this species include habitat loss due to deforestation, illegal logging, and agricultural expansion, which lead to fragmentation and degradation of its natural habitat.	Low
Scleria pulchella	CR	This species grows in wet grasslands together with short grasses. Little is known about this species except that it was found growing near the river close to Humpata and Palanca in the Huíla Province. It was last collected in 1952. This whole area is now largely covered with small and large agricultural fields.	Low

Turraeanthus africanus	VU	The species is commonly found in moist semi-deciduous forest, often in poorly drained places. Its growth is considered gregarious in moist environments. The species is also found in coastal forests and alongside streams or lakes. The primary threats to this species include habitat loss due to deforestation, illegal logging, and agricultural expansion, which cause fragmentation and degradation of its natural habitat.	Low
Utricularia bracteata	NT	Carnivorous plant species native to tropical Africa, commonly found in moist, swampy environments and wetlands with nutrient-poor, acidic soils. The main threats to this species include habitat loss due to drainage of wetlands, deforestation, and land conversion for agriculture, which lead to the degradation and fragmentation of its natural habitat.	Medium
Vepris welwitschii	NT	It is found in dry bushy rocky hills and mountainous rocky places. From satellite imagery on Google Earth there appears to be land use change in recent years from agriculture and settlement, in areas where this species occurs, particularly closer to Luanda. However, it is uncertain whether the rocky habitat of this species is significantly impacted. More research is needed into the threats of this species.	Low
Vigna procera	NT	A perennial herb with several annual erect stems arising from woody rootstock. It has pink to purple flowers and is found in moist areas near lakes, in grassland and by seasonal rivers and dambos. It is often associated with recent burning and is found in sandy or clay loam soil. Primary threats to this species include habitat loss due to deforestation, land conversion for agriculture, and overgrazing, which lead to degradation and fragmentation of its natural habitat.	Medium
Vitex cuspidata	VU	This species is a tree growing in lowland forests. Primary threats to this species include habitat loss due to deforestation, illegal logging, and agricultural expansion, which result in fragmentation and degradation of its natural habitat.	Low
Albizia ferruginea	NT	It occurs mainly in lowland semi-deciduous and its density is lower in evergreen forests. Main threats to this species include deforestation due to logging, agricultural expansion, and infrastructure development. These activities contribute to habitat loss and fragmentation, putting pressure on the species and reducing its natural populations.	Low

APPENDIX E: LEGISLATION

Ministry of Environment (MINAMB)

The Ministry of Environment (MINAMB) is the Ministerial Department responsible to formulate, conduct, supervise, evaluate, and execute the Executive's policy in the field of protection, preservation and conservation of environmental quality, pollution control, areas of conservation and enhancement of natural heritage, as well as the preservation and rational use of mineral resources.

MINAMB comprises a set of agencies and services, in particular, the National Directorate for the Prevention and Assessment of Environmental Impacts (Direcção Nacional de Prevenção e Avaliação de Impactes Ambientais (DNPAIA)), which is the service responsible for the conception and implementation of policies and strategies to prevent the incidences of environmental impacts.

Depending on the type of project being developed, the Environmental Impact Assessment (EIA) report must also be approved by the line ministry. This ensures that the EIA not only addresses the requirements of the Environmental Baseline Law and the Presidential Decree on EIA and Environmental Licensing, but also the relevant sectoral legislation.

MINAMB is responsible for the implementation of the Environment Framework Law 5/98, the approval of EIAs under the Presidential Decree 117/20 on EIA and Environmental Licensing Procedure, and all associated Regulations.

Environmental Legislation

The General Environmental Law No. 5/98

The General Environmental Law (Lei de Bases do Ambiente, LBA) was promulgated in accordance with the Constitutional Law of the Republic of Angola. The purpose of the law is to provide the framework for environmental legislation and regulations; more specifically to define the basic concepts and principles for the protection, preservation and conservation of the Environment, promotion of quality of life and the rational use of natural resources (Article 1). The LBA incorporates international declarations which Angola has ratified and defines citizens' rights and responsibilities. Further, the LBA introduces the concept of legal penalties for illegal activities that have caused damage to the environment.

Article 4 includes a number of principles guiding LBA, including a principle in respect of liability: all persons or organisations which through their actions cause harm to the environment, or the degradation, destruction or depletion of national resources, shall be held liable for the same, and shall be required to repair such damage and/or pay compensation for the damage caused.

Article 16(1) of LBA stipulates that an EIA, including public consultation (Articles 10 and 32), is mandatory for all undertakings which have an impact on the balance and wellbeing of the environment and society. Article 16(2) states that more specific legislation on EIAs will be developed by the government.

An Environmental License is issued on the basis of an EIA/EIS and a license is required before any other license required by law will be granted (Article 17(2)). According to the LBA, MINAMB is responsible for issuing environmental licenses.

Decree No.117/20 on General Regulation for Environmental Impact Assessment and Environmental Licensing Procedure

This decree establishes the standards and procedures that regulate the environmental impact assessment of public and private projects and the environmental licensing procedure for activities that, due to their nature, location or dimension, may cause significant environmental and social impact (Article 1). Applies to all public or private activities that may directly or indirectly influence environmental components (Article 2).

This decree revokes the regulations previously in force on these matters (Decree No. 51/04, of 23 July 2004, on EIA, and Decree No. 59/07, of 13 July, on Environmental Licensing), as well as all legislation that contradicts its wording. Chapter II of the decree focuses on EIA, and Chapter III establishes the provisions applicable to Environmental Licensing. Chapter IV sets out the requirements for monitoring the provisions of the decree, the fees to be paid and the fines and accessory penalties applicable to infractions.

Article 7 refers to the categorization of the activities and therefore Annexes I to V list the activities that are classified under Category A, B, C, D and E, respectively, and specifies the requirements for each one of those categories. For activities under category A, an EIA is required as well as Terms of Reference (TOR) and an Environmental Pre-Feasibility Study and Scoping (EPDA) (Article 7 and 12); Category B requires an EIA and the preparation of TOR for its elaboration; and Category C will require a Simplified Environmental Study and TOR.

At the beginning of an EIA procedure, the project owner (in this instance, Soul Rock) must register the proposed activity, under the terms of the applicable legislation in force, in the Integrated Environmental System (SIA). The Ministerial Department that oversees the proposed activity must, within 5 (five) days, after receiving the Environmental Impact Study, issue an opinion on the project to be licensed (Article 6 (3)).

Within a maximum period of 30 (thirty) days from the date of receipt of the documentation, the Ministerial Department responsible for the Environment Sector sends the respective opinion to the competent authority to license or authorize the project (Article 17). Therefore, the project that has received a negative opinion from the Minister responsible for the Environment cannot be given authorization or license (Article 18 (1)). Furthermore, the decision taken by MINAMB can be appealed under the general terms of administrative procedures and litigation (Article 18 (2)).

This decree adopts provisions concerning requirements, criteria and administrative procedures related to Environmental Licenses. In terms of Article 26, any activity requiring an EIA must apply for an Environmental License, which the MINAMB issues.

Water Law No. 6/02

Article 10 states that the objective of the State is “to ensure the use of available water for all purposes through its rational and planned use for the sustained development of the national economy” and also to “promote, frame and regulate the use of water for agricultural, livestock, industrial and hydroelectric purposes”.

The law states that private use of water cannot come before public use: “Common uses, as described in articles 21 and 22, have priority over any private use, so that private use cannot be granted or maintained to the detriment of those”.

Pursuant to Articles 22 and 24, water uses are classified as (1) common (public) use, which refers to water taken from natural sources without any administrative approval, and (2) private water use, which requires a license. Common (public) water uses have priority over private water uses. Articles 24 and 26 of the Act further clarify private uses that require and do not require a license or concession.

The supply of water to the population for human consumption and health needs has priority over other private uses (Article 33(2)).

Article 41 (1) establish that private use of water depends on licensing, in which its use does not significantly change the quality and quantity of the water and the environmental balance, in accordance with the Regulation. n.º2 of the same Article states that the following also depends on licensing: a) prospecting, pumping water and use of groundwater, except the activities described line c) of n.º1 of article 26 of this law[1]; b) deposits installation, the crops implantation or plantations and the cut down of trees on the beds and banks of the continuous or discontinuous natural currents and lakes, lagoons and marshes; and c) the extraction of inert materials, such as sand and gravel, from the beds and margins of continuous or discontinuous natural currents and from lakes, lagoons and marshes.

In terms of Article 68, Section 1 of the law, "the discharge of wastewater, wastes or other substances, and any activities that cause pollution or degradation of public water, is dependent on authorisation granted by the institution responsible for managing water resources".

Law No. 9/04, Land Law

The present law establishes the general bases of the legal regime of the lands integrated in the original property of the State, the land rights and the general regime of transmission, constitution, exercise and extinction of these rights (Article 2).

This law shall apply to rural and urban land over which the State constitutes any of the land rights provided for the benefit of natural persons or legal persons governed by public or private law, in particular with a view to pursuing agricultural purposes, livestock, forestry, mining, industrial, commercial, housing, urban or rural building, land use planning, environmental protection and anti-erosion (Article 3(1)).

The State respects and protects the land rights held by rural communities, including those based on custom or custom (Article 9(1)). Number 2 of the same Article establishes that land in rural communities may be expropriated for the purpose of public utility and to be an object of requisition, with fair compensation.

According to Article 16(1), "The occupation, the use, and usufruct of the land is subject to the rules on environmental protection, in particular those related to the protection of the landscape, and the species of flora and fauna, preservation of the ecological balance, and the citizens' rights to a healthy, and unpolluted environment".

Article 19(3) states that grantable land[2] is classified into urban and rural land. Rural land is considered to be the rustic building situated outside the area bounded by a charter or the area of an urban agglomeration and intended to be used for agricultural, livestock, forestry and mining purposes (Article 19(5)).

According to Article 22(1), rural land is classified according to the purpose for which it is intended and the legal regime to which it is subject, in rural community land, to agricultural land, forest land, installation land and road land. Rural community land is land occupied by families of local rural communities for their dwelling, practice of their activity or for other purposes recognised by custom or this law and its regulations (Article 22(2)). Number 5 of the same article defines that the installation land is the land provided for the implementation of mining, industrial or agro-industrial installations, under the terms of the present law and the respective legislation applicable to mining and oil activities and industrial parks.

Community rural land are considered, according to the Article 23(1), as land used by a rural community in accordance with customary land use, including, as appropriate, complementary areas for shifting agriculture, transhumance corridors for access by livestock to water sources and pastures and crossings, whether or not subject to the easement regime, used to access water or roads or access roads to urban areas.
It is competent, for the classification of a land as land of mining and oil installation, the body that oversees the planning of the territory and the environment, upon proposal or prior opinion of the entities that oversee the respective area (Article 25(2)).

Presidential Decree No. 26/20 (National Biodiversity Strategy and Action Plan 2019-2025)

To implement the recommendations from the United Nations Convention on Biological Diversity (UNCBD, ratified by Resolution No. 23/97), the Government approved through Resolution No. 42/06 of 26 July 2006, the National Biodiversity Strategy and Action Plan (NBSAP). However, this Resolution was revoked by Presidential Decree No. 26/20 that approves the National Biodiversity Strategy and Action Plan 2019-2025, an annex of this Presidential Decree.

This strategy aims to incorporate measures for the conservation and sustainable use of biological diversity and the fair and equitable distribution of biological resources favouring all Angolans into policies and development programmes.

The NBSA) of the Republic of Angola was developed to serve as an integrated strategic framework. the conservation and sustainable use of biodiversity can be organized and coordinated to fulfil an Action Plan over seven years (2019-2025).

Presidential Decree No. 194/11 on Liability on Environmental Damage

This decree establishes strict liability for degradation of the environment. Aimed at preventing and repairing environmental damage, the decree establishes that all activities capable of causing damage to the environment (Article 3(1)) are considered liabilities and are subject to regulation under the “polluter pays” principle.

According to the decree, any entity responsible for pollution (by act of wilful misconduct or negligence) will be held responsible for cleaning up and restoring the environmental damage. Responsibility will be held for losses and damages caused to the environment by way of compensation for damages and environmental recovery measures.

Article 18º informs the right of the public to request intervention when there is concern that environmental damage has taken place. In Article 21º, the Decree also states that any individuals or legal entities which carry out activities that impose environmental risks shall have civil liability insurance.

Presidential Decree No. 261/11 on Water Quality

This decree serves as an addition to the national Water Law No. 6/02, dealing specifically with water quality. It establishes the roles within the Angolan governmental administration for overseeing water quality issues and addressing the water quality standards relating to human consumption and waste water. The decree also lists the role of water quality monitoring and the standard parameters for drinking water, surface water and emissions limits for wastewater discharge (in Annex VI).

According to item 3 of Article 1, this law also regulates the control standards of wastewater discharge in water bodies and soil to preserve the quality of the aquatic environment and protect public health.
Article 13 of Chapter III (Protection of Waters Against Pollution of Discharged Wastewater) defines that the discharge of wastewater from a treatment facility into water and soil requires a license issued by the Ministry of Environment, in which discharge standards for mitigation or prevention of damage are set.

Presidential Decree No. 82/14, approves the Regulation on the General Use of Water Resources

This decree applies to surface water and groundwater, namely watercourses, lakes, lagoons, swamps, springs, reservoirs, estuarine areas and other water bodies, without prejudice to the respective watercourse bed, river banks and surroundings.

Article 17 states that the use of water resources for private use need a specific title of use (concession or license).

Article 109(2) establishes that holders of rights to use water resources shall in general be prohibited from:
"b) Accumulate solid wastes, liquids or any substances in places and conditions that may contaminate or create danger of water resources contamination;
c) Carry out any activities that imply or may imply the degradation or pollution of the water resources;
d) Make any changes to the regime, flow, quality and use of water resources that may affect the public health, natural resources, the general environment, security and national sovereignty;
e) Carry out any activities in the water protection zones."

Article 110 establishes that proponents shall consider a 200m buffer zone as follows: "*areas of protection of water resources, the water course beds, river banks and water courses adjacent zones of up to a distance of 200 metres*".

Article 111 defines, as it is forbidden, in the protection zones of the water resources, in terms of the present Diploma and other applicable laws:
"d) Install dumps or heaps resulting from mining activity;
f) Install pipelines and reservoirs of hydrocarbons or wastewater."

Article 119 states that: "*without prejudice the provisions of this legal document, the assignment of any permits for the use of water resources, independently of its end, is subject to prior approval by the corresponding environmental impact studies, provided that that the legislation in force to require, by virtue of its nature, size or location, which may have significant environmental and social impacts*."

Sections I and II from Chapter VIII (Fees) presents the calculations related with the fees to be paid for water abstraction and wastewater discharge.

Executive Decree No. 469/15 on the slaughter prohibition in the national territory of protected species of the fauna and wild flora

This executive decree establishes a ban on the slaughtering of wild fauna and flora (protected species) on national territory, in order to avoid the illegal hunting and trafficking of valuable objects, activities which, in recent years have assumed high levels, endangering the biodiversity, under the Convention on the International Trade in Endangered Species of Wild Fauna and Flora (CITES), assigning to the Ministry of Environment inspectors the responsibility for overseeing and define the regime of sanctions.

Joint Executive Decree No. 201/16 on Animals that may not be Hunted

The joint executive decree establishes a list of animals for which hunting is prohibited in Angola (Table 2) and a list of animals for which hunting is permitted in each season (Table 3) and respective amounts of compensation rates due to the State.

Law No. 6/17, General Framework Law on Forests and Wildlife

This law regulates the protection of forests and wildlife, with the objectives of conservation and sustainable use. Article 30(1) forbids tree felling and deforestation; article 30(2) states the need for authorization from the Department responsible for Forest and Fauna sectors for any purpose, especially agricultural, mining and public works.
According to Article 35 (EIA), projects that are likely to significantly impact forests, wildlife, and ecosystems require environmental impact assessments. This shall be emphasised by the Department responsible for Forests and Fauna sectors, collaborating with other departments.

Executive Decree No. 252/18 that approves the Red List of Species of Angola

This decree approves the Angolan Red List of Species. According to Article 2, this list consists of four categories:

a. Category A - Extinct Species (Ex), when the species has a natural occurrence in Angola and is considered extinct or has never been seen in its habitat;
b. Category B - Threatened Species of Extinction (AEx), when several factors seriously threaten its existence, hindering its reproduction or natural regeneration, bringing its populations below sustainable levels;
c. Category C - Vulnerable Species (Vul), when human activity threatens its natural occurrence in the National Territory; and
d. Category D - Invasive Species, when the species does not occur naturally or is introduced into the National Territory.

The categories of each species are updated using available scientific information every five years.

Presidential Decree No. 171/18 on Forestry Regulations

This decree regulates the sustainable management of forest resources and related ecosystems. It aims to establish standards for its conservation and rational use, taking into account these resources' environmental, social, economic and cultural dimensions.

According to Article 14(1), "*Protected trees has the status of natural monuments and are identified on the ground by a sign indicating the common and scientific names of the species and classification*". Article 14(2) states that "*It is prohibited to cut or damage protected trees*".

APPENDIX F: DETAILS, EXPERTISE AND CURRICULUM VITAE OF SPECIALISTS

1. (a) (i) Details of the specialist who prepared the report

Hennie de Beer	BTech Nature Conservation (Tshwane University of Technology)
Christien Steyn	MSc Plant Science (University of Pretoria)
Stephen van Staden	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		
Postal address:	PO. Box 751779, Gardenview		
Postal code:	2047	Fax:	086 724 3132
Telephone:	011 616 7893		
Name / Contact person:	**Hennie de Beer**		
E-mail:	hennie@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)		
	Registered Professional Scientist at South African Council for Natural Scientific Professions (SACNASP) Member of the South African Association of Botanists (SAAB) Member of the Botanical Society of South Africa (BotSoc) Southern African Wildlife Management Association (SAWMA) Grassland Society of South Africa (GSSA) Land Rehabilitation Society of Southern Africa (LaRSSA)		
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)		
	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, Hennie de Beer, 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 (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 June 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 June 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.

Specialist Signature

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 HENNIE DE BEER

PERSONAL DETAILS

Position in Company	Faunal Ecologist
Joined SAS Environmental Group of Companies	2014, 2023

EDUCATION

Qualifications

BTech Nature Conservation (Tshwane University of Technology)	2021
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 - Mozambique

KEY SPECIALIST DISCIPLINES

Biodiversity Assessments

- Floral Assessments
- Faunal Assessments
- Avifaunal 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
- Rehabilitation Assessment / Planning

SAS ENVIRONMENTAL GROUP OF COMPANIES – SPECIALIST CONSULTANT INFORMATION

CURRICULUM VITAE OF CHRISTIEN STEYN

PERSONAL DETAILS

Position in Company	Senior Floral Ecologist and Discipline Lead
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)

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 – Eastern Cape, Free State, Gauteng, KwaZulu-Natal, Limpopo, Mpumalanga, Northern Cape, North West.
Africa – Lesotho, Sierra Leone.

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

Freshwater Assessments

- Desktop Freshwater Ecosystem Delineation

- Freshwater Ecosystem Rehabilitation Assessment / Planning
- Freshwater Ecosystem Maintenance and Management Plans
- Freshwater Ecosystem Plant Species Plans

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