AQUATIC AND WETLAND WALKDOWN ASSESSMENT REPORT FOR THE PROPOSED MAHIKENG–PLUTO 400KV TRANSMISSION POWERLINE AND ASSOCIATED INFRASTRUCTURE.

Supporting Water Use Licence Application







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DECLARATION

I, Khuliso Collen Maphaha, declare that:

- I am an independent specialist and the author of this Freshwater Walkdown Assessment Report;
- I have acted as the independent specialist in this application;
- I have no vested financial, personal, or other interest in the proposed development other than fair remuneration for work performed;
- The work presented in this report is based on my professional knowledge, experience, and available information at the time of compilation;
- The findings, results, and recommendations contained in this report are, to the best of my knowledge, true, correct, and unbiased;
- This report complies with the requirements of the National Environmental Management Act (Act 107 of 1998) and relevant guidelines, including the Aquatic Biodiversity Assessment Protocol (GN 320 of 2020);
- All reasonable care has been taken to ensure that the information provided is accurate and representative of site conditions observed during the assessment;
- I acknowledge that the submission of false or misleading information may result in legal consequences.

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LIST OF ABBREVIATIONS

Abbreviation	Description
DFFE	Department of Forestry, Fisheries and the Environment
DWS	Department of Water and Sanitation
EA	Environmental Authorisation
EAP	Environmental Assessment Practitioner
EIA	Environmental Impact Assessment
EMPr	Environmental Management Programme
GN	Government Notice
HIA	Hydrological Impact Assessment
NEMA	National Environmental Management Act (Act 107 of 1998)
NFEPA	National Freshwater Ecosystem Priority Areas
PES	Present Ecological State
REC	Recommended Ecological Category
SANBI	South African National Biodiversity Institute
SACNASP	South African Council for Natural Scientific Professions
SANS	South African National Standards
SoER	State of Environment Report
WMA	Water Management Area
WULA	Water Use Licence Application
WUL	Water Use Licence
NWA	National Water Act (Act 36 of 1998)
DEA	Department of Environmental Affairs (now DFFE)
GIS	Geographic Information System

LIST OF DEFINITIONS

Term	Definition
Aquatic Ecosystem	A water-based environment including rivers, wetlands, dams, and streams, supporting aquatic and semi-aquatic life.
Buffer Zone	A protected area surrounding a watercourse or wetland where development activities are restricted to prevent impacts.
Catchment	The area from which rainfall flows into a river, wetland, or water body.
Delineation	The process of identifying and mapping the boundaries of wetlands and watercourses using field indicators such as vegetation, soils, and hydrology.
Depression Wetland	A wetland occurring in a topographic low where water accumulates, often seasonally.
Drainage Line	A natural pathway where surface water flows, usually non-perennial and only active after rainfall events.
EIA (Environmental Impact Assessment)	A process used to evaluate the potential environmental impacts of a proposed development.
EMPr (Environmental Management Programme)	A document outlining mitigation measures and management actions to minimise environmental impacts during a project.
Freshwater Walkdown Assessment	A field-based survey conducted to verify aquatic features and sensitivities along a proposed development alignment.
Hydrology	The study of the movement, distribution, and quality of water within the environment.
Hydropedology	The study of soil-water interactions, particularly in wetlands.
Indigenous Vegetation	Native plant species naturally occurring in a specific area.
Non-perennial River/Stream	A watercourse that flows only during certain times of the year, typically after rainfall.
Perennial River	A river that flows continuously throughout the year under normal conditions.
PES (Present Ecological State)	A measure of the current ecological condition of a watercourse or wetland relative to its natural state.
Riparian Zone	The interface between land and a river or stream, often characterised by distinct vegetation.
Section 21(c) & (i)	Water uses under the National Water Act relating to impeding/diverting flow (c) and altering the bed, banks, or characteristics of a watercourse (i).
Servitude	A designated corridor (e.g., 100 m for powerlines) within which infrastructure is constructed and maintained.
Seep Wetland	A wetland formed where groundwater slowly discharges to the surface, typically on slopes.

Term	Definition
Valley Bottom Wetland	A wetland located in valley bottoms, often associated with drainage lines and periodic flow.
Watercourse	As defined by the National Water Act, includes rivers, streams, wetlands, and any natural channel where water flows or accumulates.
Wetland	Land that is transitional between terrestrial and aquatic systems where the water table is usually at or near the surface, supporting hydrophytic vegetation.
WULA (Water Use Licence Application)	A regulatory process required when activities impact water resources as defined under the National Water Act.

EXECUTIVE SUMMARY

Tshilimo Consulting Services (Pty) Ltd was appointed to undertake a Freshwater Walkdown Assessment for the proposed Pluto-Mahikeng 400kV Transmission Powerline and associated infrastructure. The assessment was undertaken to verify aquatic features along the proposed alignment, assess potential freshwater constraints and support compliance with the Environmental Authorisation, the National Environmental Management Act (Act 107 of 1998), the National Water Act (Act 36 of 1998), and the Aquatic Biodiversity Assessment Protocol (GN 320 of 2020).

The assessment included a detailed tower-to-tower field walkdown supported by drone verification and desktop information. Wetlands, rivers, streams, drainage features and other hydrologically sensitive areas were assessed along the alignment. In addition to the transmission line servitude, aquatic features occurring within a 500 m radius of tower positions were considered as part of the broader assessment area to identify potential indirect impacts and inform Water Use Licence Application (WULA) requirements.

Field verification confirmed that aquatic features are generally localised along the alignment and include seasonal wetlands, depression systems, non-perennial streams, perennial rivers and modified aquatic features. Significant systems identified along the route include the Molopo River, Mooi River, Ramatlabana River and several high-sensitivity wetland systems, including the wetland system associated with Towers 320-321. Artificial features, including borrow pits at Towers 215-216, 280 and 450, were also identified. These borrow pits are anthropogenic features and are not considered natural wetlands or watercourses.

The assessment confirmed that no tower positions are located within the applicable 50 m wetland buffers or 100 m river/stream buffers. Aquatic features occurring within the broader 500 m assessment area remain relevant for consideration of potential indirect impacts such as altered runoff, erosion, sediment mobilisation and accidental contamination. The 500 m distance therefore represents an assessment area and does not constitute a blanket no-go buffer.

The borrow pit associated with Tower 450 is treated separately from natural aquatic features. As the feature is artificial, the standard 50 m wetland and 100 m river/stream buffers are not applicable. A 15 m site-specific management buffer has been adopted around the borrow pit as a

precautionary measure to minimise disturbance, erosion, sediment mobilisation and contamination.

The DWS Risk Assessment Matrix indicates that the overall risk to aquatic features ranges from low to high, with higher risks generally associated with sensitive wetland systems and major river features. With the implementation of appropriate mitigation measures, including maintenance of aquatic buffers, stormwater management, erosion and sediment control, pollution prevention and rehabilitation, the residual risks can be reduced to acceptable levels.

Detailed tower-specific findings, sensitivities and mitigation measures are provided in Appendix 11-E, while the updated DWS Risk Assessment Matrix is provided in Appendix 11-F. These requirements must be incorporated into the Environmental Management Programme (EMPr) and implemented during construction.

Overall, the proposed transmission line is considered environmentally manageable from a freshwater perspective, provided that the recommended buffers, site-specific mitigation measures and environmental monitoring requirements contained in this report are implemented.

1. INTRODUCTION

1.1. Background

Tshilimo Consulting Services (Pty) Ltd was appointed by Vhubvo Consultancy cc to undertake a specialist freshwater walkdown assessment for the proposed Pluto-Mahikeng 400kV Powerline and associated infrastructure.

The proposed development forms part of the expansion of the national electricity transmission network and includes the construction of a 400kV transmission line linking the proposed Mahikeng Main Transmission Substation to the existing Pluto Substation.

Environmental Authorisation (EA) has been granted for the project in terms of the National Environmental Management Act (Act No. 107 of 1998), subject to specific conditions. One of the key requirements of the EA is that a detailed specialist walkdown assessment must be undertaken prior to construction to verify environmental sensitivities and inform the micro-siting of infrastructure, particularly to avoid impacts on wetlands, rivers, and other watercourses.

In this context, the freshwater walkdown assessment was undertaken to ground-truth aquatic features identified during previous Environmental Impact Assessment (EIA) phases and to provide site-specific information required to support impact assessment, mitigation planning, and the refinement of the project layout.

The outcomes of this study are intended to inform the final alignment of the powerline, contribute to the Environmental Management Programme (EMPr), and ensure compliance with applicable environmental legislation and best practice guidelines, including the Aquatic Biodiversity Assessment Protocol (GN 320 of 2020).

1.2. Project Description

The proposed Pluto-Mahikeng 400kV Transmission Powerline comprises approximately 583 tower positions, extending between the proposed Mahikeng Main Transmission Substation and the existing Pluto Substation.

The project forms part of Eskom’s transmission infrastructure expansion and is intended to strengthen electricity supply and network reliability within the North West and Gauteng Provinces.

The proposed development includes:

- Construction of a 400kV transmission powerline
- Development of the proposed Mahikeng Main Transmission Substation
- Integration with the existing Pluto Substation
- A deviation section of approximately 14 km between Tower 491 and Tower 522

The deviation section represents a revised alignment, which does not follow the originally authorised route and is subject to a separate Basic Assessment process. This deviation has been introduced to address environmental sensitivities, engineering constraints, and land use considerations identified during the planning and walkdown phases.

The powerline alignment traverses multiple local municipalities within the North West and Gauteng Provinces and crosses a range of land uses, including agricultural areas, natural vegetation, and developed landscapes. Along its extent, the alignment intersects various aquatic features, including rivers, wetlands, and non-perennial drainage lines, which require careful consideration during infrastructure placement.

The walkdown assessment was therefore undertaken across the full alignment, with particular emphasis on environmentally sensitive areas and the deviation section, to inform the final positioning of towers and associated infrastructure in line with Environmental Authorisation requirements.

1.3. Objectives of the Study

The primary objective of the freshwater walkdown assessment was to verify and assess aquatic features along the proposed Pluto-Mahikeng 400kV Transmission Powerline alignment, in order to inform environmentally responsible infrastructure placement and ensure compliance with applicable legislative requirements.

The specific objectives of the study were to:

- Verify the presence, extent, and condition of watercourses and wetlands along the alignment;
- Delineate aquatic features and associated buffer zones in accordance with applicable guidelines

- Identify environmentally sensitive areas, including no-go areas and areas requiring special management;
- Assess potential impacts at a tower-level scale, with particular focus on interactions with aquatic systems;
- Provide site-specific mitigation measures to avoid, minimise, or manage identified impacts
- Inform the micro-siting of towers and associated infrastructure to reduce environmental risk;
- Support the Site Sensitivity Verification process in terms of the Aquatic Biodiversity Protocol (GN 320 of 2020); and
- Ensure compliance with Environmental Authorisation conditions and relevant environmental legislation, including the National Water Act (Act 36 of 1998).

1.4. Scope of Work

The scope of the freshwater walkdown assessment was defined in accordance with the project requirements provided by Vhubvo Consultancy cc and relevant environmental legislation and guidelines.

The scope included the following key components:

- Conducting a detailed tower-to-tower walkdown assessment along the full extent of the proposed transmission line alignment, covering approximately 583 tower positions;
- Undertaking a focused assessment of the deviation section between Tower 491 and Tower 522, where a revised alignment is proposed;
- Verifying and ground-truthing aquatic features identified during previous Environmental Impact Assessment (EIA) phases;
- Identifying and delineating watercourses, wetlands, and drainage lines within and adjacent to the powerline servitude;
- Recording GPS coordinates of identified features and capturing photographic evidence to support field observations;
- Assessing the ecological condition and environmental sensitivity of identified aquatic systems;
- Identifying environmental constraints, including no-go areas and areas requiring mitigation or micro-siting adjustments;

- Providing site-specific mitigation measures and management recommendations for inclusion in the Environmental Management Programme (EMPr);
- Supporting the Site Sensitivity Verification process in accordance with the requirements of the Aquatic Biodiversity Protocol (GN 320 of 2020); and
- Preparing a comprehensive freshwater walkdown report, including maps, figures, and spatial data (shapefiles/KML) illustrating aquatic features, buffer zones, and sensitive areas.

2. LEGISLATIVE FRAMEWORK

2.1. National Environmental Management Act (Act No. 107 of 1998)

The proposed Pluto-Mahikeng 400kV Transmission Powerline is subject to the requirements of the National Environmental Management Act (NEMA) (Act No. 107 of 1998) and the Environmental Impact Assessment (EIA) Regulations.

In terms of NEMA, activities associated with the development of transmission lines and substations require environmental authorisation prior to commencement. Environmental Authorisation (EA) has been granted for the project, subject to specific conditions aimed at avoiding and minimising environmental impacts.

A key condition of the EA is the requirement for a detailed specialist walkdown assessment to be conducted prior to construction. The purpose of the walkdown is to verify environmental sensitivities on site and to inform the micro-siting of infrastructure, particularly to avoid impacts on wetlands, rivers, and other sensitive ecological features.

The findings of this assessment are required to be incorporated into the Environmental Management Programme (EMPr) to ensure that site-specific mitigation measures are implemented during construction and operation.

2.2. National Water Act (Act No. 36 of 1998)

The National Water Act (NWA) (Act No. 36 of 1998) provides the legal framework for the protection and management of water resources in South Africa.

In terms of Section 21 of the Act, the following water uses are relevant to the proposed development:

- Section 21(c): Impeding or diverting the flow of water in a watercourse
- Section 21(i): Altering the bed, banks, course, or characteristics of a watercourse

These water uses may be triggered where infrastructure such as towers, access roads, or construction activities occur within or in close proximity to watercourses and wetlands.

Where such impacts cannot be avoided, a Water Use Licence Application (WULA) or General Authorisation may be required from the Department of Water and Sanitation (DWS).

This walkdown assessment supports the identification of potential water use triggers and informs the risk assessment process in terms of Section 21(c) and (i).

2.3. Aquatic Biodiversity Assessment Protocol (GN 320 of 2020)

This assessment has been undertaken in accordance with the Procedures for the Assessment and Minimum Criteria for Reporting on Identified Environmental Themes in terms of Sections 24(5)(a) and (h) and 44 of NEMA (Government Notice 320 of 2020).

The protocol sets out requirements for:

- Site Sensitivity Verification
- Aquatic biodiversity specialist assessments
- Impact assessment and reporting standards

In compliance with GN 320, this study includes:

- Verification of aquatic features identified through desktop screening tools
- Classification of environmental sensitivity based on field observations
- Assessment of potential impacts on aquatic ecosystems
- Provision of mitigation measures to avoid or minimise impacts

2.4. Environmental Authorisation Requirements

The Environmental Authorisation issued for the project includes specific conditions relevant to aquatic ecosystems and environmental management.

A key requirement of the EA is that a specialist walkdown assessment must be conducted prior to construction, and that the findings must be used to inform the final alignment and micro-siting of towers to avoid sensitive environmental features such as wetlands, rivers, and drainage lines.

Furthermore, the EA requires that:

- The findings and recommendations of the walkdown assessment must be incorporated into the Environmental Management Programme (EMPr);
- Infrastructure placement must avoid environmentally sensitive areas where feasible;
- Appropriate mitigation measures must be implemented during construction and operation; and

- Activities impacting watercourses must comply with the National Water Act (Act 36 of 1998).

This freshwater walkdown assessment therefore directly fulfils the requirements of the Environmental Authorisation and provides the necessary information to support environmentally responsible project implementation.

2.5. Other Relevant Guidelines and Tools

The following additional guidelines and tools were considered in the assessment:

- Department of Water Affairs and Forestry (DWAF, 2005): A Practical Field Procedure for the Identification and Delineation of Wetlands and Riparian Areas;
- National Wetland Map (NWM v5);
- National Freshwater Ecosystem Priority Areas (NFEPA) database; and
- DFFE Screening Tool (2020) for environmental sensitivity.

3. PHYSICAL ENVIRONMENT

3.1. Regional Setting

The proposed Pluto-Mahikeng 400kV Transmission Powerline is located within the North West and Gauteng Provinces of South Africa, extending between the proposed Mahikeng Main Transmission Substation in the west and the existing Pluto Substation in the east.

The alignment traverses multiple local and district municipalities, including:

- Mahikeng Local Municipality
- Ditsobotla Local Municipality
- JB Marks Local Municipality
- Merafong City Local Municipality

At a district level, the project falls within:

- Ngaka Modiri Molema District Municipality
- Dr Kenneth Kaunda District Municipality
- West Rand District Municipality

As illustrated in Figure 3-1 (Locality Map), the transmission line extends in a generally west-to-east direction, covering a predominantly rural landscape characterised by agricultural land, natural vegetation, and scattered settlements.

The deviation section between Tower 491 and Tower 522, as shown in Figure 3-2 (Deviation Map) is located within the central portion of the alignment and represents a locally adjusted route to accommodate environmental and land-use constraints identified during planning and field investigations.

Overall, the regional setting reflects a landscape that is moderately transformed, with ecological features of varying condition and sensitivity distributed along the alignment.

3.2. Hydrology

3.2.1. Catchment Context

The proposed Pluto-Mahikeng 400kV Transmission Powerline is located within the broader Vaal River catchment system, one of the most significant hydrological regions in South Africa. As

illustrated in Figure 3-3, the alignment traverses multiple quaternary catchments, including C23E, C23F, C24C, C24F, C31A, C31B, and D41A. These catchments form part of an interconnected drainage network that contributes to the Vaal River system, which plays a critical role in regional water supply and ecological functioning.

The distribution of these quaternary catchments along the alignment reflects the variability in hydrological processes across the study area, with each catchment exhibiting distinct drainage characteristics influenced by local topography, geology, and land use.

3.2.2. Water Management Areas

The study area spans portions of multiple Water Management Areas (WMAs), including the Crocodile (West) and Marico WMA in the western section, as well as the Upper, Middle, and Lower Vaal WMAs towards the central and eastern portions of the alignment. The presence of multiple WMAs highlights the regional importance of the project area from a water resource management perspective.

Each WMA is governed by specific management objectives and regulatory frameworks, and the intersection of the alignment with these WMAs underscores the need for careful consideration of water resource protection and compliance with the National Water Act (Act 36 of 1998).

3.2.3. Surface Water Systems

The study area is characterised by a network of surface water systems that include rivers, non-perennial drainage lines, and wetlands. River systems, such as the Mooi River and its associated tributaries, represent the primary drainage features within the region and are typically located within well-defined channels.

In addition to these systems, numerous non-perennial drainage lines occur along the alignment. These features are generally ephemeral in nature and convey water primarily during rainfall events. Wetlands, including seep, valley-bottom, and depression wetlands, are also present and are typically associated with low-lying areas and zones of groundwater discharge.

3.2.4. Hydrological Characteristics

The hydrology of the study area is predominantly driven by seasonal rainfall, with the region experiencing a summer rainfall regime. Surface runoff generated during rainfall events contributes to the activation of drainage lines and replenishment of wetland systems.

The dominance of non-perennial systems indicates that flow within the study area is largely episodic and rainfall-dependent, with limited baseflow contribution in most areas. Wetlands play an important role in regulating hydrological processes by storing water, attenuating floods, and maintaining ecological functioning within the landscape.

3.2.5. Hydrological Sensitivity

Hydrological sensitivity along the alignment varies depending on the presence and condition of aquatic features. Areas associated with wetlands and river systems exhibit higher sensitivity due to their role in maintaining hydrological and ecological processes.

These systems are particularly vulnerable to disturbance, including alterations to flow regimes, sedimentation, and physical modification of channels and wetland areas. In contrast, highly modified or transformed areas exhibit lower hydrological sensitivity due to reduced ecological functioning.

3.2.6. Implications for the Study

The hydrological setting of the study area has important implications for the assessment and design of the proposed development. The presence of multiple quaternary catchments and water management areas necessitates a careful approach to maintaining natural drainage patterns and avoiding impacts on sensitive aquatic systems.

This context informed the freshwater walkdown assessment, particularly in identifying areas of higher sensitivity, guiding the micro-siting of infrastructure, and developing appropriate mitigation measures to ensure compliance with relevant environmental legislation.

3.3. Topography

The topography of the study area, as illustrated in Figure 3-4 (Topographical Map), is characterised by moderately undulating terrain with distinct variations in elevation along the alignment.

Elevation across the study area ranges approximately between 1,163 m and 1,757 m above mean sea level, with higher elevations generally occurring in the central and eastern portions of the alignment, and lower-lying areas located towards the western sections near Mahikeng.

3.3.1. Terrain Characteristics

The alignment traverses a landscape consisting of:

- Elevated ridges and plateau areas
- Moderate slopes transitioning into valley systems
- Low-lying drainage zones associated with wetlands and rivers

The central portion of the alignment is characterised by more pronounced relief, with visible ridges and incised drainage features, while the western and eastern portions exhibit relatively gentler slopes.

3.3.2. Influence on Drainage Patterns

Topography plays a critical role in controlling surface water flow and drainage patterns within the study area.

- Higher elevation areas act as watershed zones, directing runoff into lower-lying areas
- Sloping terrain facilitates surface runoff and channel formation
- Valley-bottom areas support the development of wetlands and drainage lines

The topographical gradient observed along the alignment contributes to the formation of non-perennial drainage lines and wetland systems, particularly in areas where water accumulates.

3.3.3. Topographic Control of Wetlands

Wetland systems identified along the alignment are strongly influenced by topographic position.

- Seep wetlands are typically associated with gentle slopes and groundwater discharge zones
- Valley-bottom wetlands occur in low-lying areas along drainage lines
- Depression wetlands form in localised topographic lows

These features are directly linked to the movement and accumulation of water within the landscape.

3.3.4. Implications for Infrastructure Development

The variation in topography has important implications for the placement of transmission infrastructure:

- Steeper areas may present engineering and access challenges
- Low-lying areas are often associated with higher environmental sensitivity due to the presence of wetlands and drainage features
- Topography influences the micro-siting of towers to avoid sensitive areas and maintain structural stability

Understanding the topographic context was therefore critical in guiding the walkdown assessment, identifying environmentally sensitive zones, and informing appropriate alignment adjustments.

3.4. Land Use

The proposed Pluto-Mahikeng 400kV Transmission Powerline traverses a predominantly rural landscape characterised by a mix of agricultural activities, natural vegetation, and scattered settlements.

Land use along the alignment varies spatially, reflecting differences in terrain, accessibility, and proximity to towns and infrastructure.

3.4.1. Agricultural Land Use

The dominant land use within the study area is agriculture, which includes both:

- Crop cultivation (dryland farming)
- Livestock grazing

Large portions of the alignment pass through cultivated fields and grazing land, particularly within the central and eastern sections. These areas are typically associated with transformed landscapes, where natural vegetation has been altered to support farming activities.

Agricultural practices influence the condition of aquatic systems through:

- Soil disturbance
- Increased runoff and sedimentation
- Modification of natural drainage patterns

3.4.2. Natural Vegetation

Patches of natural and semi-natural vegetation occur along the alignment, particularly in areas that are less suitable for agriculture, such as:

- Steeper slopes
- Rocky terrain
- Undisturbed or marginal lands

These areas often support intact ecological processes and may be associated with higher environmental sensitivity, especially where they coincide with wetlands or drainage features.

3.4.3. Rural Settlements and Infrastructure

The alignment intersects areas of low-density rural settlements, including homesteads and small communities. Associated infrastructure includes:

- Local access roads
- Farm infrastructure
- Utility services

These areas represent localised zones of disturbance and may influence land use patterns and environmental conditions within the surrounding landscape.

3.4.4. Disturbed and Transformed Areas

Several portions of the alignment show evidence of anthropogenic disturbance, including:

- Cultivated land
- Overgrazed areas
- Infrastructure corridors

These transformed areas generally exhibit reduced ecological integrity, although they may still contain functional aquatic features such as drainage lines and modified wetlands.

3.4.5. Land Use and Environmental Sensitivity

Land use plays a significant role in determining the ecological condition and sensitivity of the study area.

- Natural areas tend to exhibit higher ecological integrity and sensitivity
- Agricultural areas are generally moderately modified but still support important ecological functions
- Highly transformed areas typically exhibit lower sensitivity

The interaction between land use and aquatic systems is particularly important, as wetlands and drainage features within agricultural areas may still retain ecological value despite surrounding disturbance.

3.4.6. Implications for the Study

The existing land use patterns informed the freshwater walkdown assessment and the identification of environmentally sensitive areas.

Understanding land use distribution was important for:

- Identifying areas of disturbance versus intact systems
- Informing micro-siting of towers to minimise environmental impact
- Supporting the development of mitigation measures
- Assessing potential impacts on aquatic systems

3.5. Geology and Soils

The geology and soils of the study area play a fundamental role in influencing hydrological processes, wetland formation, and drainage characteristics along the proposed Pluto-Mahikeng 400kV Transmission Powerline alignment.

As illustrated in Figure 3-5 and Figure 3-6, the alignment traverses a geologically diverse landscape comprising multiple lithological units and soil forms.

3.5.1. Geology

The study area is underlain by a combination of sedimentary and igneous formations, including:

- Quartzite
- Dolomite
- Tillite
- Sedimentary rocks

- Andesite
- Sand formations

Quartzite and andesite formations are generally associated with resistant rock units, often forming elevated ridges and influencing surface runoff patterns. These formations tend to have low primary permeability, resulting in increased surface runoff and limited infiltration.

Dolomitic formations are of particular significance, as they are typically associated with karstic conditions, including solution cavities and enhanced secondary permeability. These areas may support groundwater movement and localised discharge zones, which can contribute to the formation of seep wetlands.

Tillite and other sedimentary formations generally weather to form soils with varying permeability, influencing both infiltration rates and runoff generation. Sandy formations, where present, promote higher infiltration and may reduce surface runoff, while finer-grained sediments tend to retain water and support wetland development.

3.5.2. Soils

The soils within the study area, as indicated on the soil map, are dominated by the following soil forms:

- Aro
- CLp
- LVf
- LPe
- LXf
- LXh

These soil types exhibit varying physical and hydrological properties that influence water movement and storage within the landscape.

Soils such as LVf and LPe are typically associated with clayey or structured horizons, which can promote water retention and are often linked to wetland development in low-lying areas.

In contrast, soils such as LXf and LXh may exhibit better drainage characteristics depending on their texture and structure, contributing to increased infiltration and reduced surface ponding.

The presence of CLp and ARo soils reflects areas of variable permeability and soil depth, which influence both surface runoff and subsurface flow processes.

3.5.3. Influence on Hydrology and Wetlands

The interaction between geology and soils plays a critical role in controlling hydrological processes within the study area.

- Impermeable or low-permeability geological units promote surface runoff and drainage line formation
- Permeable formations facilitate infiltration and groundwater recharge
- Clay-rich soils support water retention and wetland formation
- Dolomitic areas may contribute to groundwater-driven wetlands (seep systems)

These factors influence the distribution and characteristics of wetlands and drainage features observed during the walkdown assessment.

3.5.4. Implications for the Study

The geological and soil conditions along the alignment have important implications for both environmental sensitivity and infrastructure development.

- Areas underlain by dolomite may present geotechnical and hydrological risks, including subsidence and groundwater movement
- Clay-rich soils and low-lying areas are associated with higher wetland occurrence and environmental sensitivity
- Soil erodibility influences the risk of sedimentation and erosion during construction

Understanding these conditions was essential in supporting the delineation of wetlands, assessing hydrological behaviour, and informing the micro-siting of towers and mitigation measures.

3.6. Vegetation

The vegetation of the study area, as illustrated in Figures Figure 3-7, Figure 3-8, and Figure 3-9, is characterised by a transition between savanna and grassland ecosystems, with localised occurrences of azonal vegetation associated with wetlands and drainage systems.

Vegetation distribution along the proposed Pluto-Mahikeng 400kV Transmission Powerline is influenced by climate, geology, soils, and topography, resulting in a mosaic of vegetation types with varying ecological characteristics.

3.6.1. Vegetation Types

The alignment traverses several recognised vegetation units, including:

- Mafikeng Bushveld
- Klerksdorp Thornveld
- Highveld Salt Pans
- Western Highveld Sandy Grassland
- Carletonville Dolomite Grassland
- Soweto Highveld Grassland

Mafikeng Bushveld and Klerksdorp Thornveld are typically associated with savanna systems, characterised by a combination of grasses and woody species. These systems often occur on well-drained soils and support moderate biodiversity.

Grassland units, including Western Highveld Sandy Grassland and Soweto Highveld Grassland, are dominated by grass species with limited woody vegetation, and are typically associated with higher rainfall areas and finer-textured soils.

Carletonville Dolomite Grassland is associated with dolomitic geology, often supporting unique vegetation communities linked to underlying karst conditions.

Highveld Salt Pans represent azonal systems, occurring in localised depressions where saline conditions influence vegetation composition.

3.6.2. Biome Classification

The study area falls within the following biomes:

- Savanna Biome (western portions)
- Grassland Biome (central and eastern portions)
- Azonal Vegetation associated with wetlands and pans

The Savanna Biome is characterised by a mixture of grasses and woody plants, while the Grassland Biome is dominated by herbaceous vegetation, primarily grasses.

Azonal vegetation occurs in areas where environmental conditions such as soil moisture and salinity override climatic controls, resulting in specialised vegetation communities.

3.6.3. Bioregional Context

At a bioregional scale, the alignment traverses the following vegetation bioregions:

- Eastern Kalahari Bushveld Bioregion
- Dry Highveld Grassland Bioregion
- Inland Saline Vegetation Bioregion

The Eastern Kalahari Bushveld Bioregion is characterised by semi-arid savanna vegetation, while the Dry Highveld Grassland Bioregion supports open grassland systems adapted to seasonal rainfall and frost conditions.

The Inland Saline Vegetation Bioregion is associated with salt pans and seasonally inundated depressions, which support specialised plant communities adapted to saline conditions.

3.6.4. Vegetation Condition and Disturbance

Vegetation along the alignment has been influenced by land use activities, particularly agriculture and grazing.

- Agricultural areas are typically transformed, with reduced natural vegetation cover
- Grazing has resulted in varying levels of disturbance, including changes in species composition
- Natural vegetation persists in less disturbed areas, particularly where topography or soil conditions limit agricultural use

Despite these disturbances, many areas still retain functional ecological characteristics, particularly in association with wetlands and drainage features.

3.6.5. Ecological Importance

Vegetation plays a critical role in supporting:

- Biodiversity
- Soil stability and erosion control
- Hydrological processes, particularly in wetlands
- Habitat connectivity

Azonal vegetation associated with wetlands and drainage systems is of particular importance, as it supports aquatic and semi-aquatic ecosystems and contributes to overall ecological functioning.

3.6.6. Implications for the Study

The vegetation characteristics of the study area informed the freshwater walkdown assessment and sensitivity classification.

- Grassland and savanna systems exhibit moderate ecological sensitivity
- Wetland-associated vegetation exhibits high ecological sensitivity
- Transformed areas generally exhibit lower sensitivity, but may still contain important ecological features

Understanding vegetation distribution was essential in identifying sensitive areas, guiding tower micro-siting, and developing appropriate mitigation measures.

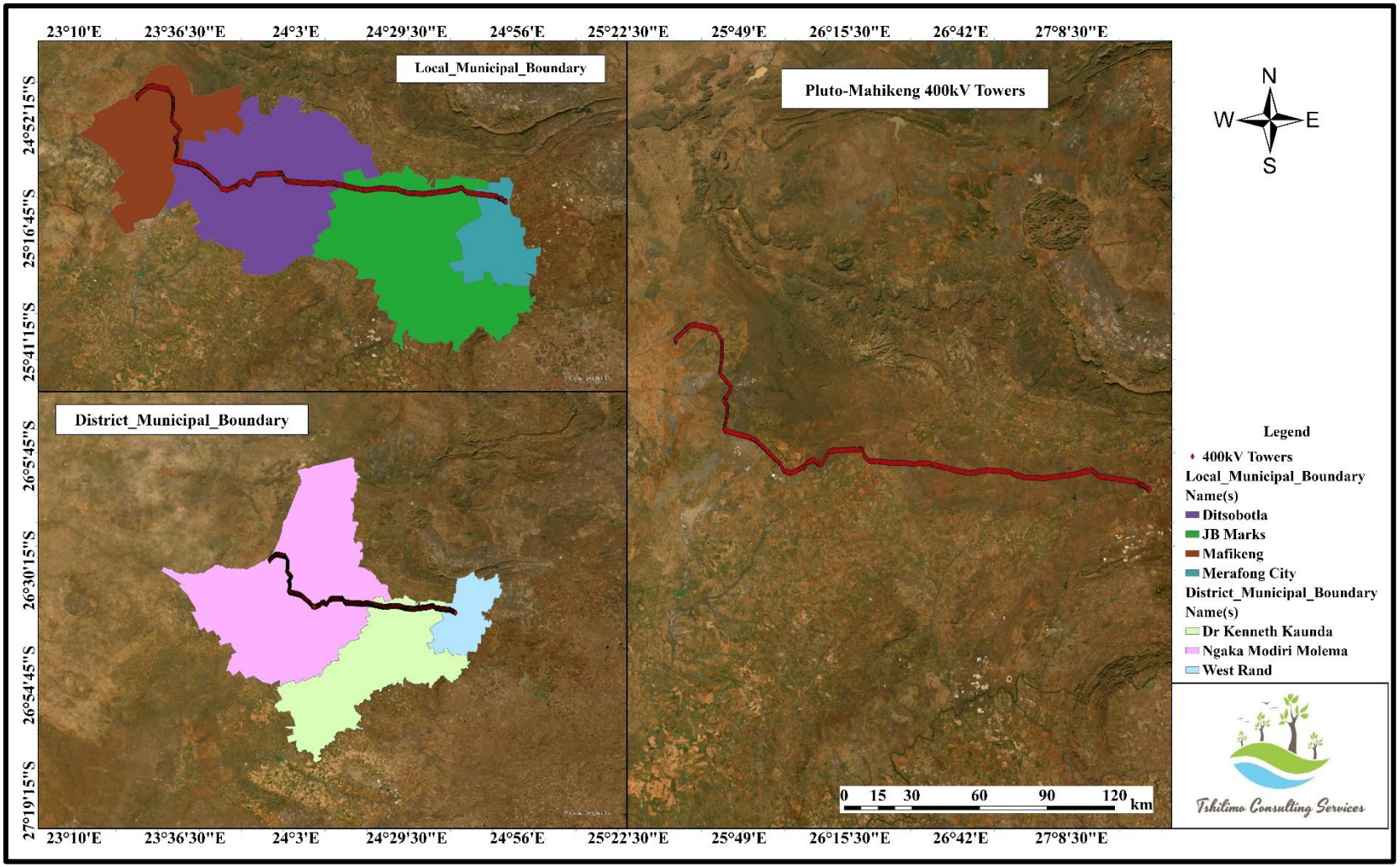


Figure 3-1: Locality map (municipalities).

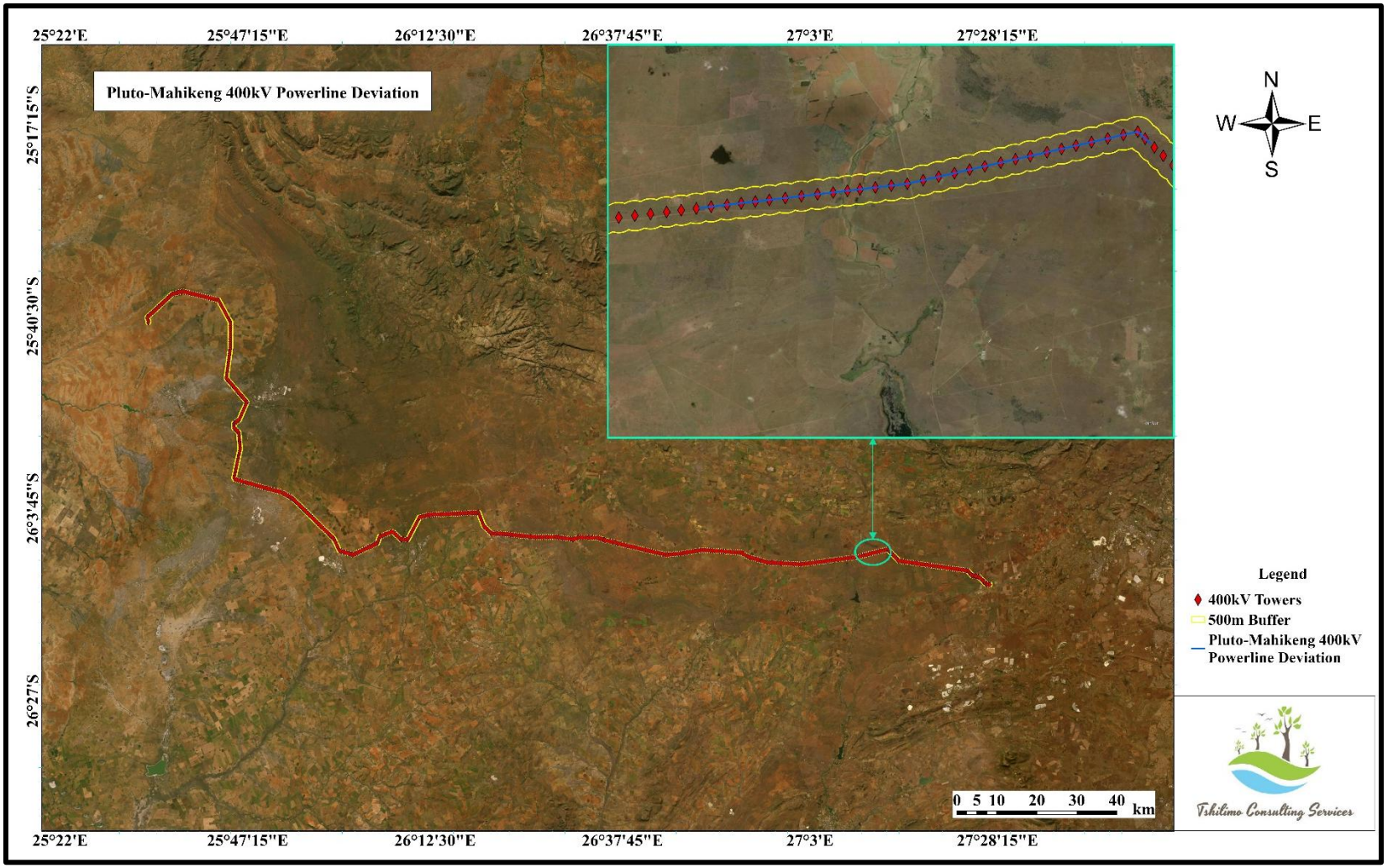


Figure 3-2: Powerline Deviation map.

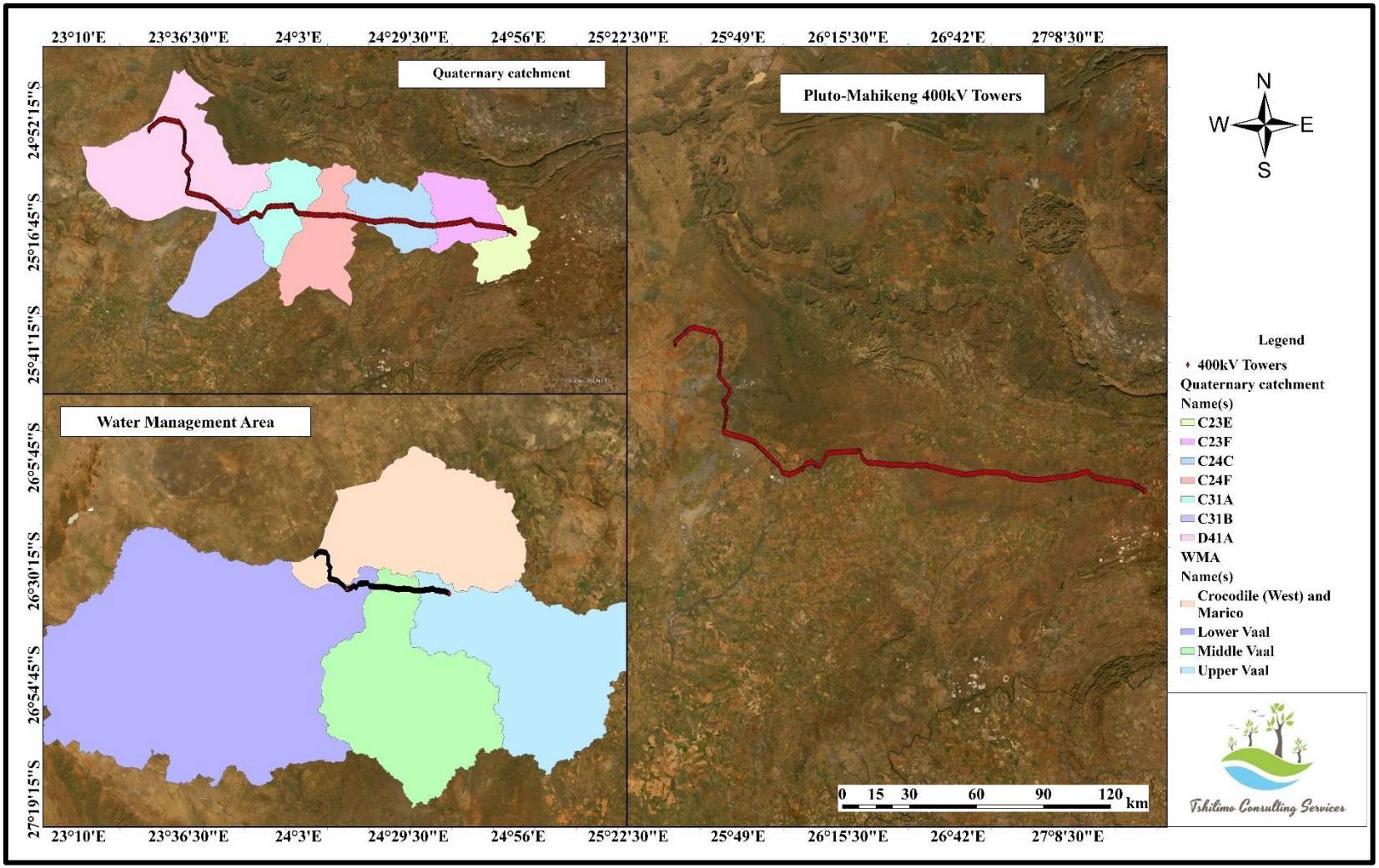


Figure 3-3: Catchment information map.

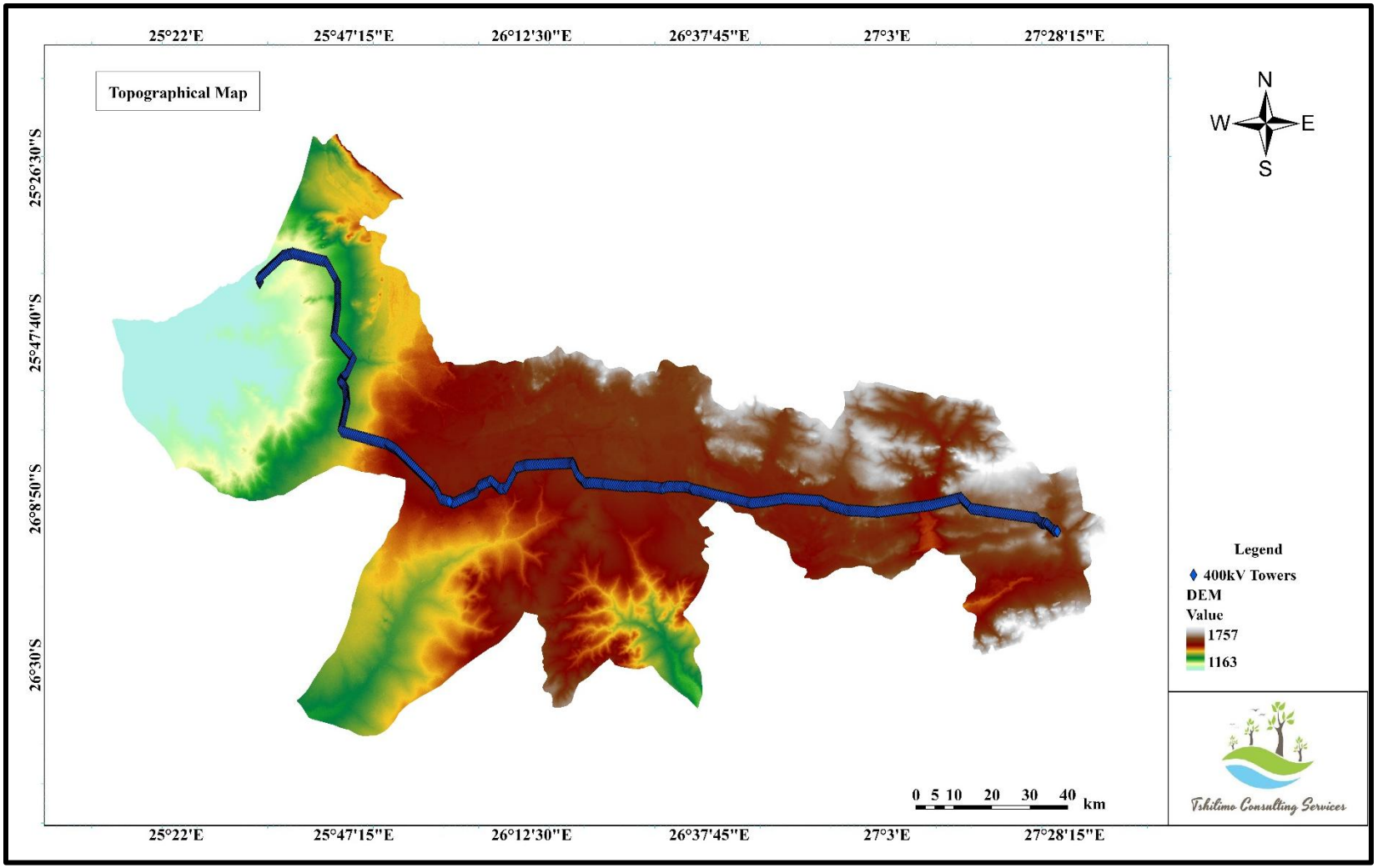


Figure 3-4: Topographical map (DEM).

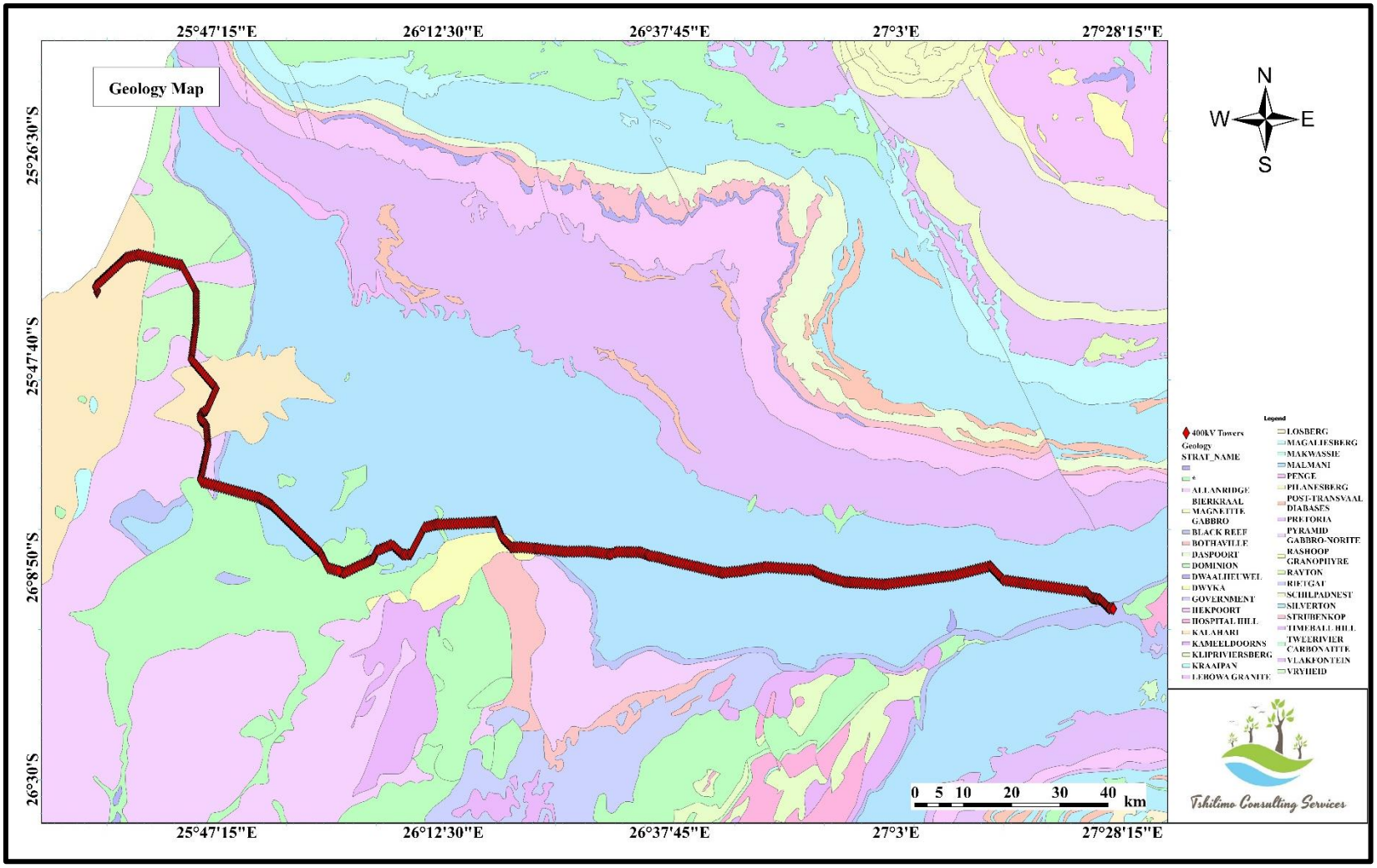


Figure 3-5: Geology map.

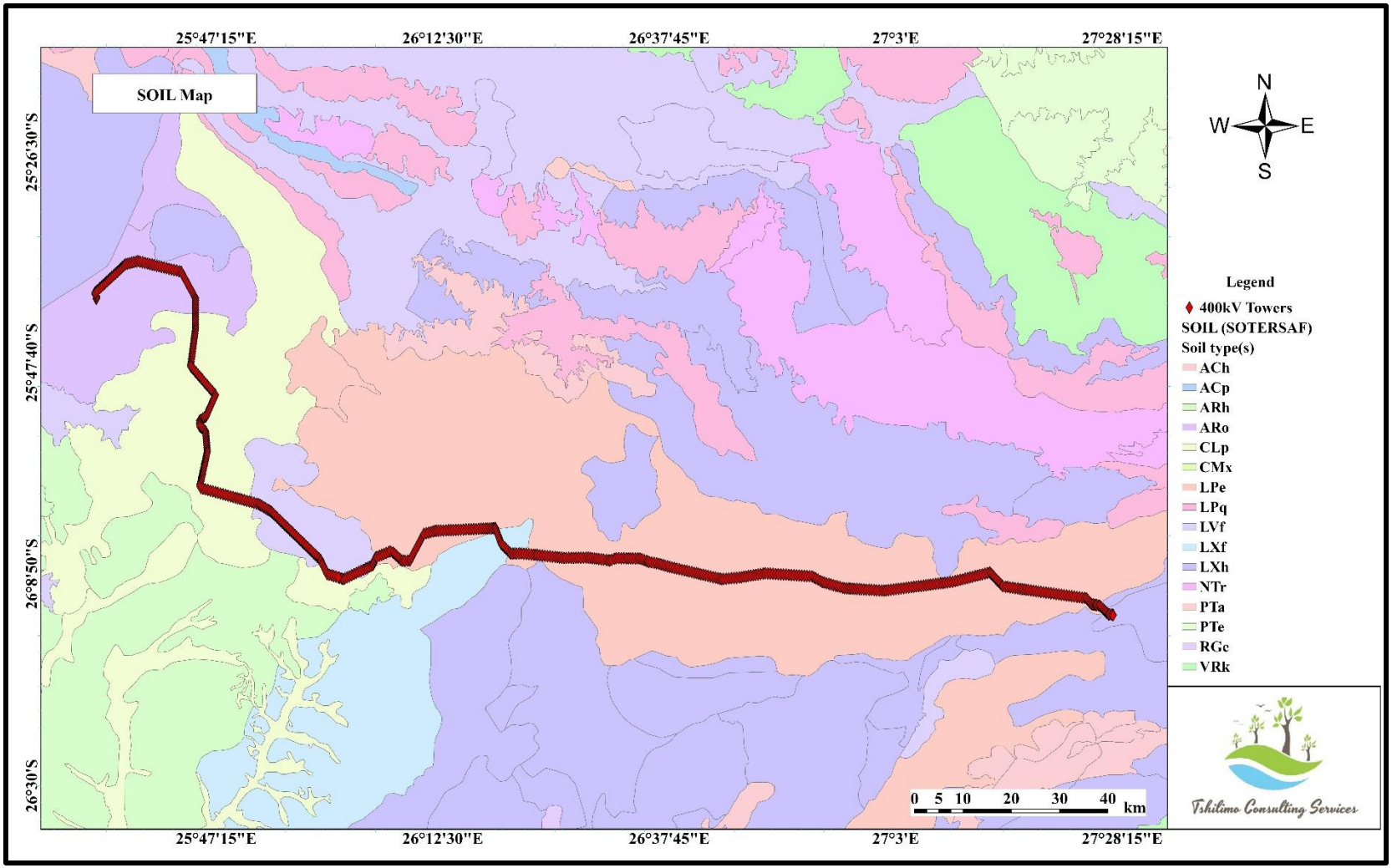


Figure 3-6: Soil types map.

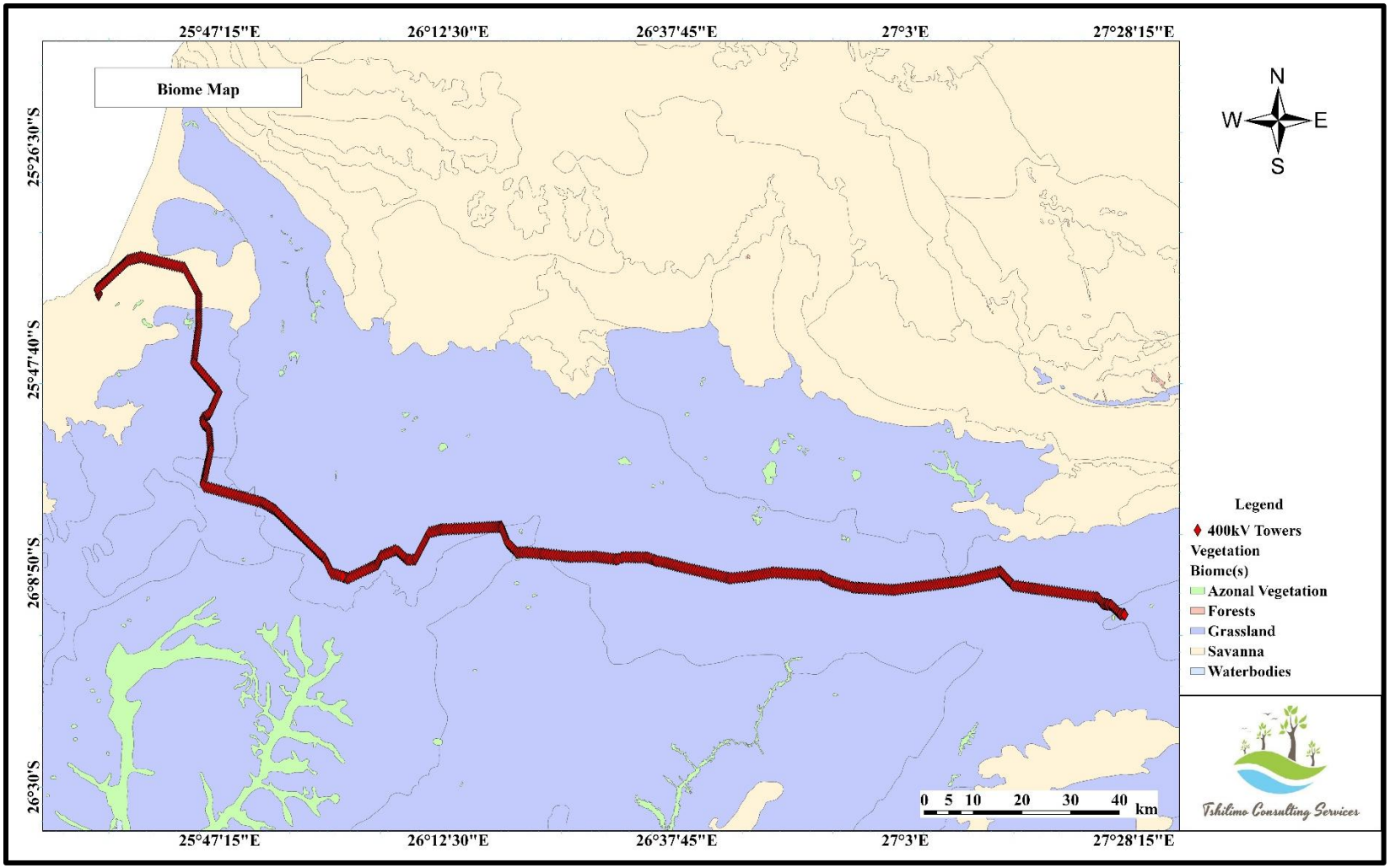


Figure 3-7: Biome map.

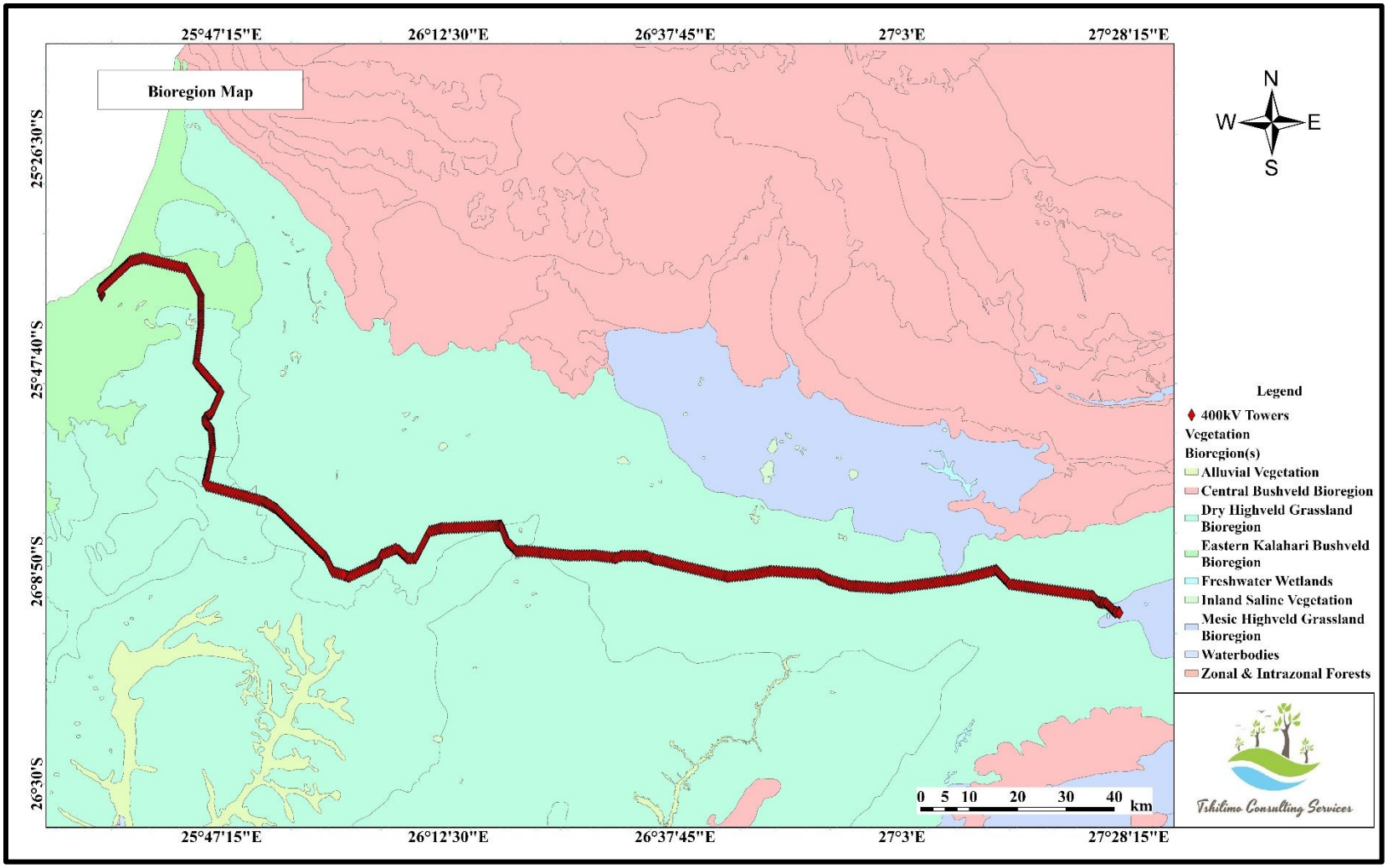


Figure 3-8: Bioregion map.

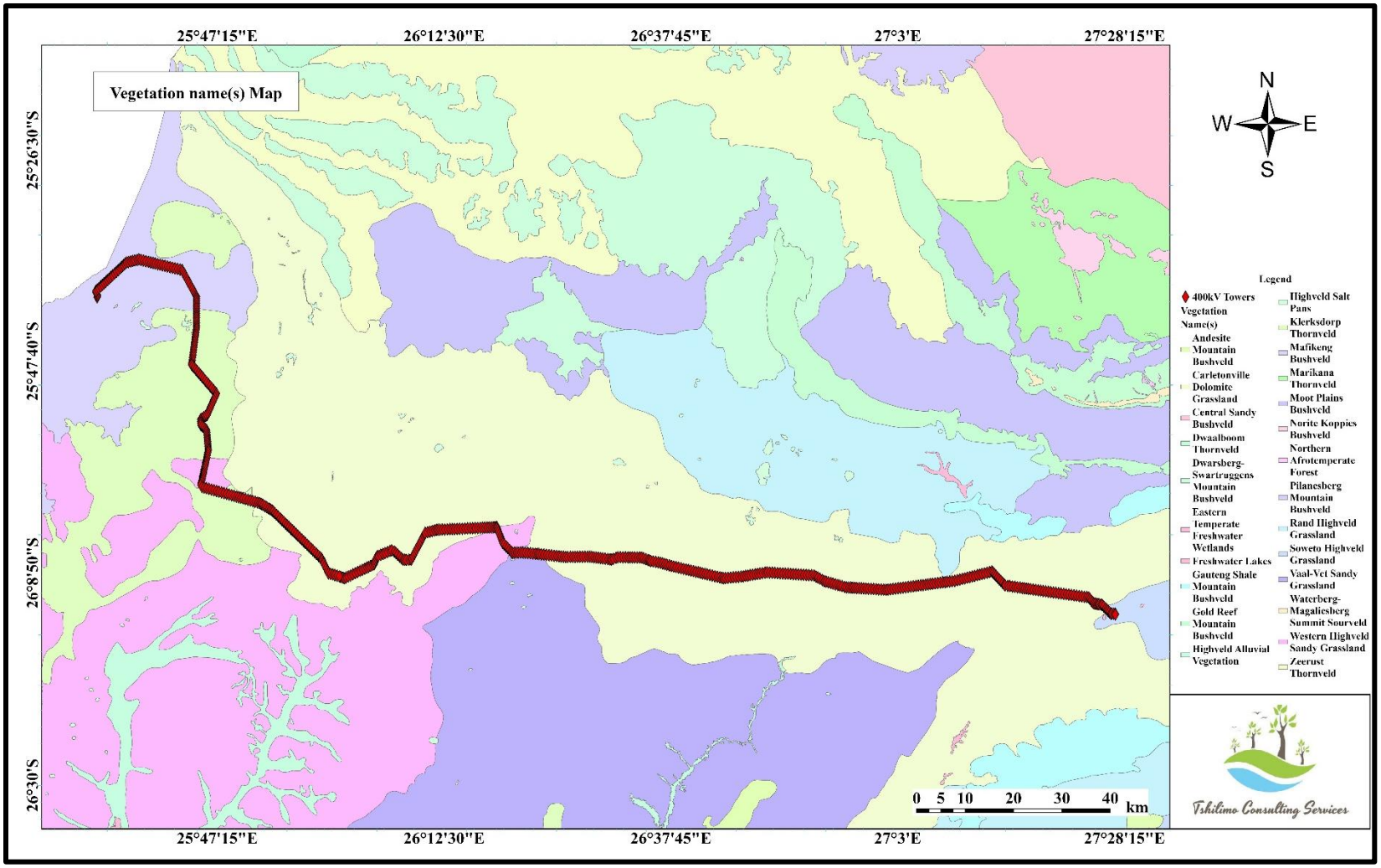


Figure 3-9: Vegetation types map.

4. METHODOLOGY

4.1. Desktop Assessment

A comprehensive desktop assessment was undertaken prior to the field investigation to identify potential aquatic features and environmental sensitivities along the proposed powerline alignment.

The desktop review included:

- DFFE Screening Tool (2020) - to determine environmental sensitivity, particularly for aquatic biodiversity;
- National Wetland Map (NWM v5) - to identify mapped wetlands;
- National Freshwater Ecosystem Priority Areas (NFEPA) database; and
- Topographical maps and aerial imagery - to assess drainage patterns and terrain.

The desktop assessment informed the planning of the field survey and guided the identification of areas requiring detailed investigation.

4.2. Field Assessment (Walkdown Survey)

A detailed tower-to-tower freshwater walkdown assessment was conducted along the full extent of the alignment, covering approximately 583 tower positions, including the deviation section between Tower 491 and Tower 522.

The field assessment included:

- Ground-truthing aquatic features
- Wetland and watercourse delineation
- GPS recording of features
- Photographic documentation
- Assessment of ecological condition and environmental sensitivity
- Identification of environmental constraints at tower level

Each tower position and surrounding servitude were assessed to inform micro-siting of infrastructure.

4.3. Wetland and Watercourse Delineation

Wetlands and watercourses were delineated in accordance with:

- DWAF (2005): A Practical Field Procedure for the Identification and Delineation of Wetlands and Riparian Areas

Delineation was based on:

- Terrain indicators
- Soil indicators (hydromorphic soils)
- Vegetation indicators (hydrophilic species)

4.4. Wetland Function Assessment

Wetland function was assessed using the WET-EcoServices methodology, which evaluates the capacity of wetlands to provide ecosystem services.

The assessment considered the following functions:

- Flood attenuation
- Sediment trapping
- Nutrient removal
- Water storage
- Biodiversity support

Each wetland was assigned a functional importance rating based on field observations and ecological characteristics.

4.5. WET-Health Assessment

The ecological condition of wetlands was assessed using the WET-Health Version 2.0 methodology developed by Macfarlane et al. (2020), i.e.

- WET-Health Version 2.0 is the latest and currently accepted methodology used in South Africa for assessing wetland condition and determining the Present Ecological State (PES).
- The method evaluates the degree to which wetlands have been modified from their natural condition based on key drivers of change, including hydrology, geomorphology, and vegetation.

4.5.1. Present Ecological State (PES) Classification

The ecological condition of wetlands is classified using the Present Ecological State (PES) categories, which describe the level of modification from natural conditions. These categories range from natural, unmodified systems to critically modified systems with significant loss of ecological function, as presented in Table 4-1 below.

Table 4-1: Present Ecological State (PES) Categories for Wetlands.

Category	Ecological Condition	Description
A	Natural	Unmodified, natural condition
B	Largely Natural	Slightly modified
C	Moderately Modified	Noticeable disturbance
D	Largely Modified	Significant alteration
E	Seriously Modified	Extensive degradation
F	Critically Modified	Almost complete loss of ecological function

4.5.2. Brief Description of Application

The WET-Health assessment is typically undertaken at a Level 2 (field-based) scale for environmental impact assessments. It provides a rapid but reliable indication of wetland health, which is used to inform:

- Environmental sensitivity classification
- Impact assessment
- Mitigation and management measures
- Determination of ecological importance

4.6. Index of Habitat Integrity (IHI)

The ecological condition of riverine systems and drainage lines was assessed using the Index of Habitat Integrity (IHI), which forms part of the River EcoStatus Assessment framework developed for the Department of Water and Sanitation (DWS).

- The IHI methodology was originally developed by Kleynhans, C.J. (1996) and was also updated in 2008.
- The method has since been incorporated into the River EcoStatus Monitoring Programme, which represents the current approach used by DWS for assessing river health.

4.6.1. Description of the Method

The IHI is a qualitative assessment tool used to determine the Present Ecological State (PES) of river systems by evaluating the degree of modification caused by anthropogenic disturbances.

The assessment considers two primary components:

- Instream Habitat Integrity
  (e.g. flow modification, channel alteration, water abstraction, sedimentation)
- Riparian Habitat Integrity
  (e.g. vegetation removal, bank erosion, land use impacts, invasion by alien species)

Each component is evaluated based on observed impacts, and an overall integrity score is assigned to reflect the ecological condition of the river system.

4.6.2. IHI Classification System

The ecological condition of rivers is classified using the Instream Habitat Integrity (IHI) categories, which describe the level of modification from natural conditions based on habitat integrity and flow alterations. These categories range from natural, unmodified systems to critically modified systems with severe degradation of ecological function, as presented in Table 4-2 below.

Table 4-2: Instream Habitat Integrity (IHI) Classification System for Rivers

Category	Ecological Condition	Description
A	Natural	Unmodified, natural condition
B	Largely Natural	Slightly modified
C	Moderately Modified	Noticeable disturbance
D	Largely Modified	Significant alteration
E	Seriously Modified	Extensive degradation
F	Critically Modified	System severely degraded

4.6.3. Application in This Study

The IHI assessment was applied to rivers and drainage lines identified along the proposed alignment to determine their ecological condition and sensitivity to disturbance.

The results of the IHI assessment were used to support:

- Environmental sensitivity classification
- Impact assessment in terms of GN 320
- Identification of high-risk areas requiring avoidance or mitigation
- Integration with Ecological Importance and Sensitivity (EIS) and Recommended Ecological Category (REC)

4.7. Ecological Importance and Sensitivity (EIS)

The Ecological Importance and Sensitivity (EIS) of aquatic features identified along the proposed Pluto-Mahikeng 400kV Transmission Powerline alignment was assessed to determine their ecological value and vulnerability to disturbance.

The EIS assessment is based on methodologies developed for water resource classification and Reserve determination in South Africa, as outlined by the Department of Water and Sanitation (DWS).

4.7.1. Description of the Method

The EIS assessment evaluates the importance of an aquatic system in terms of its ecological functioning and biodiversity value, as well as its sensitivity to changes in flow, water quality, and habitat disturbance.

The assessment considers the following key factors:

- Biodiversity importance (e.g. species diversity, presence of sensitive or protected species)
- Rarity and uniqueness of the system
- Ecological functioning (e.g. role in maintaining hydrological and ecological processes)
- Connectivity within the broader landscape or catchment
- Sensitivity to disturbance, including vulnerability to changes in flow, water quality, and physical habitat

4.7.2. EIS Classification System

The ecological importance and sensitivity of aquatic systems are classified using the Ecological Importance and Sensitivity (EIS) categories, which reflect the ecological value of a system and its tolerance to disturbance. These categories range from systems of low ecological importance with

high resilience, to systems of very high importance that are highly sensitive and vulnerable to impacts, as presented in Table 4-3 below.

Table 4-3: Ecological Importance and Sensitivity (EIS) Categories for Aquatic Systems

EIS Category	Ecological Importance and Sensitivity	Description
Low	Low importance and low sensitivity	Systems with limited ecological value and high tolerance to disturbance
Moderate	Moderate importance and sensitivity	Systems with some ecological function but moderate resilience
High	High importance and sensitivity	Systems with significant ecological value and sensitivity to disturbance
Very High	Very high importance and sensitivity	Critical systems with high biodiversity value and very low tolerance to disturbance

4.7.3. Application in This Study

The EIS assessment was applied to all identified aquatic features, including wetlands, rivers, and drainage lines, to determine their relative ecological importance and sensitivity.

The outcomes of the EIS assessment were used to:

- Inform environmental sensitivity classification
- Support impact assessment in terms of GN 320 (2020)
- Identify areas requiring avoidance or strict mitigation
- Contribute to the determination of the Recommended Ecological Category (REC)

The EIS ratings were considered together with the Present Ecological State (PES) derived from WET-Health and IHI assessments to provide an integrated understanding of the ecological condition and management requirements of the aquatic systems.

4.8. Recommended Ecological Category (REC)

The Recommended Ecological Category (REC) represents the desired ecological condition of a water resource and serves as a management target to guide the protection, use, and rehabilitation of aquatic ecosystems.

The determination of the REC is based on methodologies developed by the Department of Water and Sanitation (DWS) as part of the Water Resource Classification System (WRCS) and Reserve determination processes.

4.8.1. Description of the Method

The REC is derived through the integration of:

- Present Ecological State (PES) (from WET-Health for wetlands and IHI for rivers)
- Ecological Importance and Sensitivity (EIS)

The REC reflects a management objective, indicating the ecological condition that should be maintained or achieved in order to ensure the sustainable use and protection of the water resource.

In general:

- Systems with high EIS require a higher REC (closer to natural condition)
- Systems with lower EIS may be managed at a lower REC, depending on land use and development pressures

4.8.2. REC Classification System

The ecological condition of aquatic systems is further described using the Recommended Ecological Category (REC), which follows the same classification framework as the Present Ecological State (PES). These categories indicate the desired or targeted ecological condition of a system, ranging from natural, minimally impacted systems to critically modified systems with little remaining ecological function, as presented in Table 4-4 below.

Table 4-4: Recommended Ecological Category (REC) Classification System

Category	Ecological Condition	Description
A	Natural	No or minimal change from natural condition
B	Largely Natural	Slight modification, ecosystem largely intact
C	Moderately Modified	Some ecological degradation, but functioning maintained
D	Largely Modified	Significant change, reduced ecological functioning
E	Seriously Modified	Major loss of natural habitat and function
F	Critically Modified	System largely transformed, minimal ecological function

4.8.3. Application in This Study

The REC was determined for all identified aquatic features, including wetlands, rivers, and drainage lines, based on the integration of PES and EIS results.

The REC was used to:

- Define management targets for aquatic systems along the alignment
- Inform impact assessment and mitigation requirements
- Identify areas where avoidance is required versus areas where controlled development may be acceptable
- Support compliance with GN 320 (2020) and the National Water Act (Act 36 of 1998)

Aquatic systems with a high or very high EIS were generally assigned a higher REC (Category A or B), indicating a need for protection and minimal disturbance.

4.9. Sensitivity Assessment

The environmental sensitivity of aquatic features identified along the proposed Pluto–Mahikeng 400kV Transmission Powerline alignment was assessed to determine their vulnerability to disturbance and to inform appropriate management and mitigation measures.

The sensitivity assessment was undertaken in accordance with the requirements of the Aquatic Biodiversity Assessment Protocol (GN 320 of 2020) and integrates the outcomes of:

- Present Ecological State (PES) derived from WET-Health (wetlands) and IHI (rivers)
- Ecological Importance and Sensitivity (EIS)
- Recommended Ecological Category (REC)

4.9.1. Approach to Sensitivity Classification

Sensitivity was determined based on a combination of:

- Ecological condition (PES)
- Ecological importance (EIS)
- Degree of modification
- Hydrological and ecological functioning
- Vulnerability to disturbance

Aquatic features with higher ecological importance and better ecological condition were considered more sensitive and require stricter protection measures.

4.9.2. Sensitivity Classification System

Based on the above factors, aquatic features were classified into the following sensitivity categories as described in Table 4-5 below:

Table 4-5: Sensitivity Classification System

Sensitivity Class	Description
Low Sensitivity	Highly modified systems with low ecological importance and high tolerance to disturbance
Medium Sensitivity	Moderately modified systems with some ecological function and moderate sensitivity
High Sensitivity	Largely natural systems with high ecological importance and sensitivity to disturbance
Very High Sensitivity	Critical aquatic systems (e.g. wetlands, rivers) with very high ecological importance and low tolerance to disturbance

4.9.3. Application in This Study

The sensitivity classification was applied to all identified aquatic features along the alignment to:

- Inform tower micro-siting and alignment optimisation
- Identify no-go areas and buffer requirements
- Support impact assessment in terms of GN 320 (2020)
- Guide the development of site-specific mitigation measures

In general:

- Features with PES Category A-B and High/Very High EIS were classified as High to Very High Sensitivity
- Features with PES Category C-D and Moderate EIS were classified as Medium Sensitivity
- Features with PES Category E-F and Low EIS were classified as Low Sensitivity

4.9.4. Use of Sensitivity in the Assessment

The sensitivity ratings were used to guide:

- Avoidance of high-risk areas
- Identification of suitable tower locations

- Development of mitigation and management measures
- Integration into the Environmental Management Programme (EMPr)

5. RESULTS

5.1. Desktop Results

The desktop assessment identified a range of aquatic features along the proposed Pluto-Mahikeng 400kV Transmission Powerline alignment based on available spatial datasets and environmental screening tools.

5.1.1. DFFE Screening Tool (2020): Aquatic Biodiversity Theme Sensitivity

The DFFE Screening Tool (2020) was used to assess the Aquatic Biodiversity Theme Sensitivity of the proposed Pluto-Mahikeng 400kV Transmission Powerline alignment. The screening results (refer to Figure 5-1 above and Screening Report) indicate that the study area traverses regions of low, medium, high, and very high aquatic biodiversity sensitivity.

Areas classified as high to very high sensitivity are primarily associated with:

- Mapped wetlands (including seep and valley-bottom systems)
- River corridors and drainage lines
- Ecologically important freshwater ecosystems identified in national datasets

These areas are considered environmentally sensitive due to their role in supporting hydrological processes, biodiversity, and ecosystem services, and therefore require avoidance or strict management measures during project development.

The majority of the alignment, however, falls within areas of low to medium sensitivity, which are generally associated with:

- Modified landscapes
- Agricultural and grazing areas
- Disturbed or transformed ecosystems

While these areas present fewer environmental constraints, they still require the implementation of standard mitigation measures to minimise potential impacts.

The screening tool results further identified the need for a detailed Aquatic and Wetland Assessment, which was subsequently undertaken in accordance with GN 320 (Aquatic Biodiversity Protocol). The outcomes of the screening process were used to:

- Guide the field-based walkdown assessment
- Prioritise sensitive areas for verification
- Inform the micro-siting of infrastructure

Overall, the DFFE Screening Tool provides a high-level sensitivity overview, which must be refined through site-specific assessments to accurately determine the extent and significance of aquatic features along the alignment.

5.1.2. National Wetland Map (NWM 5) and NFEPA Features

A desktop assessment of aquatic features associated with the proposed Pluto-Mahikeng 400 kV transmission line was undertaken using the National Wetland Map Version 5 (NWM5) and the National Freshwater Ecosystem Priority Areas (NFEPA) database. These datasets provide a national-scale representation of wetland types, river systems, and freshwater ecosystem priorities and are considered essential baseline tools in aquatic biodiversity assessments.

The objective of this assessment was to:

- Identify mapped wetlands and watercourses along the proposed alignment;
- Classify wetland types according to hydrogeomorphic (HGM) units;
- Determine proximity of infrastructure (towers) to aquatic features; and
- Support the identification of potential Section 21(c) and 21(i) water uses in terms of the National Water Act (Act 36 of 1998).

Spatial analysis was conducted using ArcGIS, where the following steps were undertaken:

- The NWM5 dataset and NFEPA layers were imported and overlaid with the proposed transmission line alignment;
- A 500 m buffer was generated around all mapped watercourses and wetland features;
- All transmission line towers located within this 500 m buffer zone were identified and extracted;
- Wetland types were classified based on NWM5 hydrogeomorphic categories; and
- Spatial outputs were produced to support interpretation and reporting.

The application of a 500 m buffer is consistent with Department of Water and Sanitation (DWS) practice, which recognises that activities within this zone may:

- Alter the bed, banks, or characteristics of a watercourse (Section 21(c)); and/or
- Impede or divert flow within a watercourse (Section 21(i)).

All maps generated from this analysis, illustrating wetland distribution, tower locations, and buffer zones, are presented as Figures in Appendix 11-B and Appendix 11-C of this report and are referenced throughout this section.

5.1.2.1. National Wetland Map (NWM5) Features

The NWM5 dataset indicates that the study area is dominated by the following wetland types:

- Depression Wetlands (DEPR)
  - Depression wetlands are the most prevalent wetland type along the alignment. These features:
    - Occur as isolated or clustered depressions;
    - Are primarily driven by surface water accumulation;
    - May exhibit seasonal or episodic hydrological connectivity; and
    - Are often associated with agricultural landscapes.
  - Although generally considered moderate in sensitivity, larger or clustered depression wetlands may play an important role in local water storage, sediment retention, and biodiversity support.
- Seep Wetlands (SEEP)
  - Seep wetlands are present in several sections of the alignment and are characterised by:
    - Diffuse groundwater discharge;
    - Persistent soil saturation;
    - Linear or slope-associated distribution; and
    - High ecological importance due to sustained moisture availability.
  - These systems are typically regarded as high to very high sensitivity, as they contribute to baseflow maintenance and ecological functioning of downstream systems.
- Channelled Valley-Bottom Wetlands (CVB)
  - Channelled valley-bottom wetlands were identified in selected areas and are defined by:

        - A well-defined channel within a valley-bottom setting;
        - Clear flow paths and connectivity to downstream river systems; and
        - Strong hydrological and geomorphological processes.
    - These wetlands are generally classified as high sensitivity.
- Unchannelled Valley-Bottom Wetlands (UVB)
    - Unchannelled valley-bottom wetlands occur where:
        - No distinct channel is present;
        - Flow is diffuse across a valley-bottom; and
        - Wetland processes are governed by broad saturation zones.
    - These systems are typically high sensitivity.

5.1.2.2. NFEPA Features

The NFEPA database was used to supplement the NWM5 data by identifying priority freshwater ecosystems, including:

- River Freshwater Ecosystem Priority Areas (FEPAs)
- Wetland FEPAs
- Fish Support Areas (FSAs)
- Sub-quaternary catchment priorities

The analysis indicates that portions of the alignment intersect or occur in proximity to freshwater ecosystems of ecological importance, particularly where valley-bottom and seep systems are present.

5.1.2.3. Identification of Towers within 500 m of Watercourses

Using the 500 m buffer analysis, multiple towers were identified within proximity of mapped wetlands and watercourses.

This approach was specifically applied to:

- Ensure compliance with DWS regulatory requirements; and
- Identify all infrastructure potentially triggering:
    - Section 21(c) - Impeding or diverting flow
    - Section 21(i) - Altering bed, banks, or characteristics

Table 5-1: Summary of Wetlands Identified (NWM5 & NFEPA).

Tower Range	Wetland Type (NWM5)	NFEPA Relevance
5-6	DEPR	Not FEPA
11-12	DEPR	Not FEPA
25-29	CVB	FEPA-associated
36	DEPR	Not FEPA
57	DEPR	Not FEPA
67-76	DEPR	Not FEPA
97-105	CVB + DEPR	FEPA-associated
113	DEPR	Not FEPA
175-183	DEPR	Not FEPA
190-200	DEPR + SEEP	FEPA-related
210-212	DEPR	Not FEPA
218-220	DEPR	Not FEPA
226-233	DEPR	Not FEPA
256-258	SEEP	FEPA-related
280-281	SEEP	FEPA-related
291-292	UVB	FEPA-associated
299-312	DEPR	Not FEPA
317-327	DEPR	FEPA-associated
386	DEPR	Not FEPA
430	DEPR	Not FEPA
500-501	SEEP	FEPA-related
535-538	DEPR	Not FEPA
558-560	DEPR	Not FEPA
575-578	DEPR	FEPA-associated

5.1.3. NWBSP2015 Terrestrial CBA and ESA Features

A terrestrial biodiversity assessment was undertaken using the North West Biodiversity Sector Plan 2015 (NWBSP2015) dataset, specifically the Terrestrial Critical Biodiversity Areas (CBA) and Ecological Support Areas (ESA) layer (NWBSP2015_Terrestrial_CBA_v1_u35s).

The dataset was used to:

- Identify biodiversity-sensitive areas intersecting the transmission line alignment;
- Determine which towers fall within CBAs and ESAs; and

- Support environmental sensitivity classification in accordance with NEMA requirements and biodiversity planning guidelines.

The assessment was conducted using ArcGIS, where:

- The transmission line alignment and tower positions were overlaid on the NWBSP dataset;
- Spatial intersection analysis was performed to identify towers located within biodiversity categories; and
- Each tower was assigned to a specific biodiversity class (CBA1, CBA2, ESA1, or ESA2).

The spatial distribution of CBA and ESA features along the alignment is illustrated in Table 5-2 and Figure 5-2 below.

Table 5-2: Towers Located within Biodiversity Categories (NWBSP2015).

Biodiversity Category	Towers
CBA1	Tower 105; Towers 106-110; Tower 180; Tower 210; Towers 216-217; Towers 285-291; Towers 293-295; Towers 298-303; Towers 320-327; Tower 331
CBA2	Towers 2-5, 7; Towers 12-14; Tower 28; Tower 33; Tower 40; Towers 45-47; Towers 72-77; Towers 86-88; Towers 92-93; Towers 97-99; Towers 111-114; Towers 122-140; Towers 160-169; Towers 245-273; Towers 279-280; Towers 282-284; Towers 496-501; Towers 503-507; Towers 537-539; Tower 541; Towers 544-545; Towers 548-550
ESA1	Towers 576-581
ESA2	Towers 8-11; Towers 15-27; Towers 29-32; Towers 34-35; Towers 36-39; Towers 41-44; Towers 89-91; Towers 94-96; Towers 158-159; Towers 340-359; Towers 376-386; Towers 401-402; Towers 408-424; Tower 430; Towers 477-495; Tower 502; Towers 508-519; Towers 523-526; Towers 542-543; Towers 546-547

5.1.4. Desktop Overall Findings

The desktop assessment incorporated multiple national and provincial spatial datasets, including the National Wetland Map (NWM 5), NFEPA wetlands and river systems, and the NWBSP2015 Terrestrial CBA and ESA dataset, to evaluate environmental sensitivities along the proposed transmission line alignment.

Wetland and Watercourse Sensitivity

The NWM 5 and NFEPA datasets confirmed the presence of various wetland systems along the alignment, including:

- Depression wetlands (DEPR);
- Seep wetlands (SEEP); and
- Unchannelled valley-bottom wetlands (UVB).

Several of these features occur within close proximity to the transmission line, with multiple towers falling within or near mapped wetlands and drainage features.

To comply with Department of Water and Sanitation (DWS) requirements, a 500 m buffer was applied to all identified watercourses and wetlands using ArcGIS. This approach was adopted to:

- Identify all infrastructure potentially triggering Section 21(c) and (i) water uses under the National Water Act (Act 36 of 1998); and
- Ensure that all sensitive aquatic features are considered during the planning phase.

The analysis confirmed that numerous towers fall within the 500 m buffer, indicating a high likelihood of water use authorisation requirements and the need for detailed field verification.

Biodiversity Sensitivity (CBA and ESA)

The NWBSP2015 dataset indicates that the alignment traverses areas of varying biodiversity importance, including:

- CBA1 (Irreplaceable areas) - very high sensitivity;
- CBA2 (Optimal areas) - high sensitivity;
- ESA1 (Ecological support areas - high importance); and
- ESA2 (Ecological support areas - moderate importance).

A significant portion of the alignment falls within CBA2 and ESA2 areas, while selected sections intersect CBA1 areas, which are considered highly sensitive and should ideally be avoided.

Integrated Environmental Sensitivity

The combined analysis of aquatic and terrestrial datasets indicates that:

- The alignment intersects multiple environmentally sensitive zones, including wetlands, drainage lines, and biodiversity priority areas;
- There is overlap between wetland features and biodiversity-sensitive areas, increasing the ecological significance of certain sections; and
- Several towers are located within high-risk zones, particularly where wetlands coincide with CBA1 or CBA2 areas.

Implications for the Project

Based on the desktop findings:

- There is a high probability of triggering Section 21(c) and (i) water uses;
- Certain sections of the alignment may require avoidance or micro-siting adjustments, particularly within CBA1 areas;
- Detailed field verification is required to confirm the presence and extent of wetlands and watercourses; and
- Mitigation measures and environmental management controls will be necessary to minimise impacts.

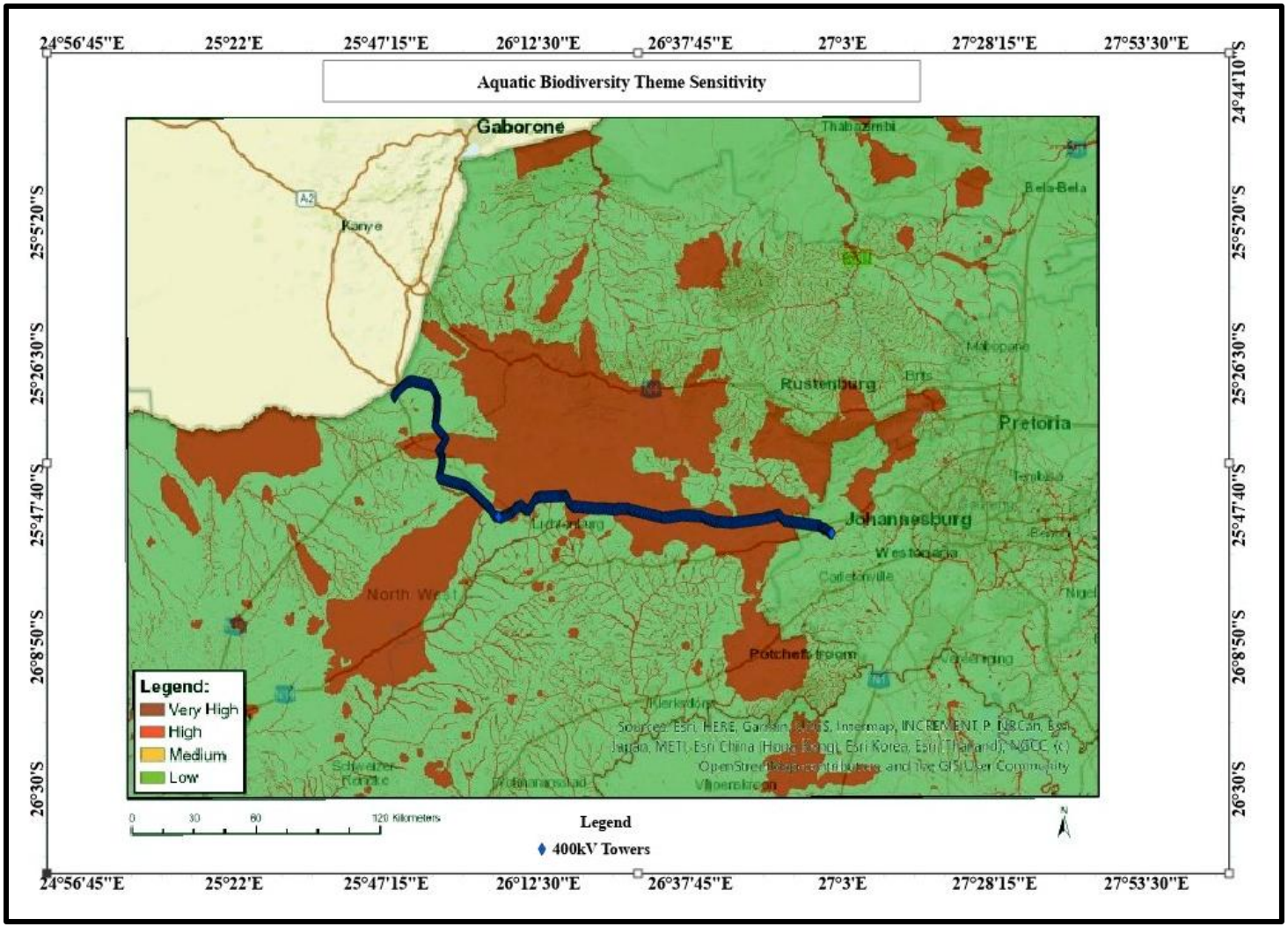


Figure 5-1: Aquatic Biodiversity Theme Sensitivity map.

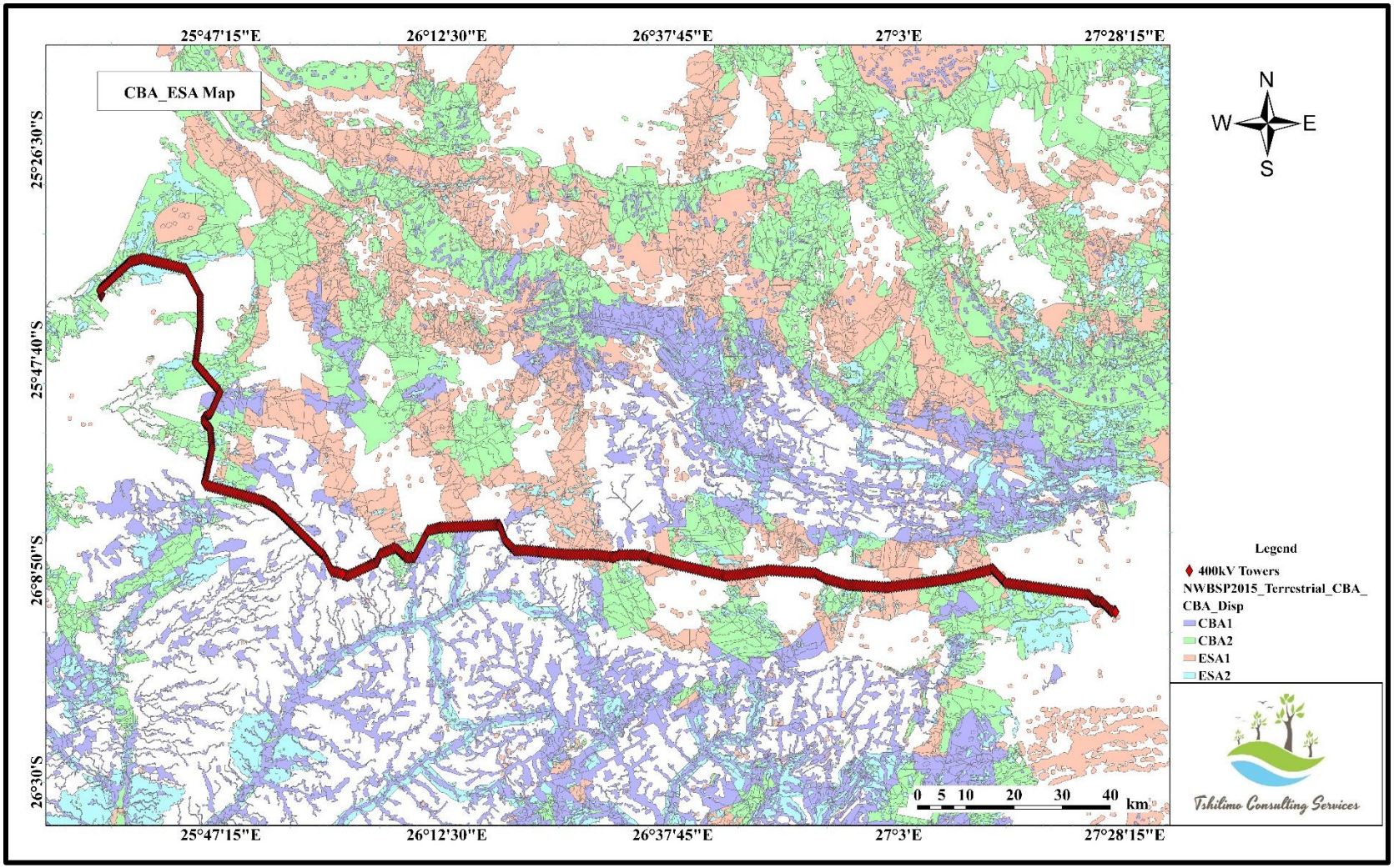


Figure 5-2: CBA and ESA map.

5.2. Field Assessment (Walkdown Survey)

A comprehensive field-based walkdown survey, supported by drone-assisted aerial surveys and photographic documentation, was conducted along the proposed transmission line alignment from Tower 1 to the Pluto Substation. The purpose of the assessment was to verify aquatic features identified during the desktop phase and to characterise wetlands, watercourses and hydrologically sensitive areas occurring within the study corridor.

The assessment was undertaken in accordance with the DFFE Aquatic Biodiversity Assessment Protocol (GN 320, GG 43110) and included the evaluation of hydrological indicators such as surface water presence, flow pathways and soil saturation; vegetation characteristics, including hydrophilic species and zonation; soil conditions, with emphasis on hydromorphic indicators; and geomorphological features such as drainage patterns and landscape position. Drone-assisted surveys supplemented the field assessment in areas with restricted access or where additional verification of aquatic features was required.

The field assessment primarily focused on the transmission line servitude and individual tower positions. In addition, wetlands and watercourses occurring within a 500 m radius of the tower positions were assessed as part of the broader zone of influence and to support the Water Use Licence Application (WULA). Features occurring within the 500 m assessment area were considered in relation to potential indirect impacts associated with construction activities, including changes in surface runoff, erosion, sediment mobilisation and accidental contamination.

Field verification confirmed that aquatic features along the alignment are generally localised and discontinuous, comprising seasonal wetlands, depression systems, drainage features and major river systems. The Molopo River between Towers 104-105 and the Mooi River between Towers 500-501 represent significant perennial river systems. A non-perennial stream occurs between Towers 136-137, while an impounded stream was identified in the vicinity of Tower 258. A high-sensitivity wetland system was also identified in the vicinity of Towers 320-321, together with several other seasonal and modified wetland systems occurring within the broader 500 m assessment area.

Based on the verified tower positions and delineated aquatic features, no towers are located within the applicable 50 m wetland buffers or 100 m river/stream buffers. Towers associated with aquatic

features occurring within the broader 500 m assessment buffer remain included in the assessment for consideration of potential indirect impacts and appropriate environmental management measures.

Several artificial features, including borrow pits at Towers 215-216, 280 and 450, were also identified during the field assessment. Although these excavated features may temporarily retain stormwater following rainfall events, they are anthropogenic features and are not considered natural wetlands or natural watercourses. The borrow pit associated with Tower 450 is therefore not subject to the standard 50 m wetland or 100 m river/stream buffer. A 15 m site-specific management buffer is applied around the borrow pit as a precautionary measure to minimise disturbance, erosion, sediment mobilisation and construction-related contamination.

Overall, the assessment confirmed that the majority of the transmission line alignment is not directly associated with aquatic features. Where wetlands and watercourses occur within the broader 500 m assessment area, appropriate avoidance, stormwater management, erosion control, pollution prevention and rehabilitation measures are recommended to minimise potential indirect impacts.

All supporting photographic and drone survey evidence is provided in Appendix 11-A.

Table 5-3: Verified Watercourses and Wetlands Identified Along the Alignment.

Tower No.	Watercourse / Wetland Identified	Within 100 m (Servitude)	Within 500 m (Assessment Buffer)
6	Depression / valley-bottom wetland	No	Yes
11	Seasonal wetland	No	Yes
12	Diffuse wetland	No	Yes
26-30	Ramatlabana River (non-perennial)	No	Yes
49	Seasonal dam / depression wetland	No	Yes
56	Seasonal dam / wetland	No	Yes
104-105	Molopo River (major crossing)	No	No
118-119	Seasonal wetland (ponding)	No	Yes
136-137	Non-perennial stream	No	Yes
163-164	Farm dam / depression wetland	No	Yes
176-177	Modified wetland (agricultural)	No	Yes
180	Seasonal wetland	No	Yes

Tower No.	Watercourse / Wetland Identified	Within 100 m (Servitude)	Within 500 m (Assessment Buffer)
183	Wetland	No	Yes
193	Seasonal wetland	No	Yes
198	Seasonal wetland	No	Yes
199	Seasonal wetland	No	Yes
210	Wetland	No	Yes
212	Seasonal wetland	No	Yes
215-216	Borrow pit (artificial feature)	No	Yes
218	Depression wetland	No	Yes
219-220	Depression wetlands	No	Yes
220-221	Depression wetlands	No	Yes
221	Depression wetland	No	Yes
229-230	Seasonal wetland	No	Yes
232	Seasonal wetland	No	Yes
258	Impounded stream	No	Yes
280	Borrow pit (artificial feature)	No	Yes
308	Wetland	No	Yes
309	Wetland	No	Yes
311	Wetland	No	Yes
320-321	High sensitivity wetland	No	Yes
412	Seasonal dam / depression wetland	No	Yes
430	Seasonal wetland	No	Yes
436	Wetland	No	Yes
437-450	Seasonal wetland system	No	Yes
450	Borrow pit (artificial feature)	No	Yes
493	Seasonal wetland	No	Yes
500-501	Mooi River (major crossing)	No	Yes
535-536	Depression wetland	No	Yes
537-538	Large depression wetland / dam	No	Yes
558	Depression wetland / dam	No	Yes
560	Seasonal wetland	No	Yes
575	Wetland (intersecting tower; disturbed)	No	Yes

5.3. Watercourses and Wetlands Classification

The watercourses and wetlands identified during the field assessment were classified in accordance with the Department of Forestry, Fisheries and the Environment (DFFE) Aquatic Biodiversity Assessment Protocol (GN 320, GG 43110), as well as standard wetland classification approaches based on hydrogeomorphic (HGM) units, hydrological regime, and ecological characteristics (refer to Table 5-4 to Table Table 5-6 below).

The classification process was informed by integrated field and remote assessment techniques, including walkdown survey observations, drone-assisted imagery, vegetation assessments (with emphasis on hydrophilic species and zonation), soil indicators such as hydromorphic conditions and mottling, geomorphological setting, and hydrological indicators including surface water presence, saturation, and flow pathways.

All identified features were evaluated against the definition of a watercourse in terms of the National Water Act (Act 36 of 1998), which includes rivers, streams, wetlands, and any natural or artificial systems where water flows or accumulates.

Table 5-4: Hydrogeomorphic Classification of Identified Watercourses and Wetlands.

HGM Unit	Description	Key Characteristics	Identified Tower Locations
Depression Wetlands	Wetlands occurring in topographic depressions where water accumulates	➢ Seasonal ponding ➢ Diffuse hydrology ➢ Hydrophilic vegetation ➢ Clay-rich soils	6, 11, 12 49, 56, 412 218-221, 232 308, 309 535-536, 537-538 558, 560
Valley-Bottom Wetlands (Diffuse/Unchannelled)	Wetlands in low-lying valley positions with diffuse flow	➢ Diffuse flow ➢ Seasonal saturation ➢ No defined channel	120-135 180, 183, 193 198, 199, 210, 212
Channelled Watercourses (Rivers & Streams)	Systems with defined bed and banks	➢ Defined channel ➢ Flow (seasonal/perennial) ➢ Riparian vegetation	104-105 (Molopo River) 500-501 (Mooi River) 136-137 (stream) 258 (impounded stream) 26-30 (Ramatlabana River)
Artificial Water Features	Man-made water features with hydrological function	➢ Standing water ➢ Altered hydrology ➢ Limited ecological function	163-164 (farm dam) 49, 56, 412 (seasonal dams) 215-216, 280, 450 (borrow pits)

Table 5-5: Hydrological Classification of Identified Systems.

Hydrological Regime	Description	Tower Locations
Perennial Systems	Systems with continuous flow throughout the year	Mooi River (500-501) Molopo River (104-105)
Seasonal / Non-Perennial Systems	Systems flowing in response to rainfall events	Ramatlabana River (26-30) Stream (136-137) Impounded stream (258)
Seasonal to Semi-Permanent Wetlands	Wetlands with periodic inundation	Depression wetlands across alignment (e.g. 6, 11, 218-221, 308, 535-538, 558, 560)
Permanent Wetlands (Localised)	Wetlands with persistent standing water	Towers 537-538 (large depression wetland/dam system)

Table 5-6: Sensitivity Classification of Watercourses and Wetlands.

Sensitivity Class	Description	Associated Features / Locations
Very High Sensitivity	Critical aquatic systems of high ecological and regulatory importance	Mooi River (500-501)
High Sensitivity	Significant wetlands and major river systems	Molopo River (104-105) Wetlands at 320-321 Wetlands at 537-538 Tower 575 (wetland intersecting footprint)
Moderate to High Sensitivity	Functionally important wetlands and diffuse systems	Valley-bottom wetlands (120-135) Wetlands within servitude (e.g. 215-216, 232, 308, 430, 493)
Moderate Sensitivity	Seasonal wetlands and partially functional systems	Depression wetlands (6, 11, 218-221, 535-536, 558, 560) Seasonal dams (49, 56, 412) Farm dam (163-164)

Sensitivity Class	Description	Associated Features / Locations
Low Sensitivity	Highly disturbed or artificial systems	Borrow pits (215-216, 280, 450)

5.4. Wetland and Watercourse Delineation

Wetland and watercourse delineation was undertaken as part of the field assessment to determine the spatial extent of aquatic features in relation to the proposed development footprint. The delineation process focused specifically on watercourses and wetlands located within the 100 m servitude, as this represents the direct impact zone where construction and operational activities associated with the proposed powerline will occur (see Table 5-7 below).

Delineation was conducted in accordance with accepted methodologies, including the identification of hydromorphic soils, hydrophilic vegetation, and hydrological indicators, as prescribed in the DFFE Aquatic Biodiversity Assessment Protocol (GN 320, GG 43110) and best practice wetland delineation guidelines. Indicators such as soil colour, mottling, texture, vegetation composition, and evidence of saturation or periodic inundation were used to define the outer boundaries of wetlands and watercourses within the servitude.

The walkdown survey was supported by drone-assisted imagery to improve accuracy in areas of limited access, subtle wetland signatures, or modified landscapes (e.g. cultivated fields and impounded systems). This approach ensured that wetland boundaries were identified with a high level of confidence, particularly in diffuse and depression systems where field indicators may be spatially variable.

For the purposes of this assessment, only wetlands and watercourses occurring within the 100 m servitude were physically delineated in the field, as these are the features that may be directly impacted by construction activities, including tower placement, access roads, and associated infrastructure.

Watercourses and wetlands identified within the broader 500 m assessment buffer were not delineated, but were instead identified and recorded to ensure compliance with the National Water Act (Act 36 of 1998), specifically in relation to potential triggers for Section 21(c) (impeding or diverting flow) and Section 21(i) (altering the bed, banks, course, or characteristics of a watercourse). The rationale for this approach is that no construction or operational activities are proposed outside the 100 m servitude, and therefore these features fall outside the direct disturbance footprint.

However, the inclusion of watercourses within the 500 m buffer is critical for identifying indirect impacts such as changes in surface runoff patterns, ensuring that all regulated watercourses within the zone of influence are considered during the WULA process, and supporting a precautionary approach to environmental management and regulatory compliance.

Table 5-7: Wetland and Watercourse Delineation Results and Indicators.

Feature ID	Feature Description	System Type	Landscape Unit	Hydrological Indicators	Soil Indicators	Vegetation Indicators	Delineation Confidence	Condition	Sensitivity
49	Seasonal dam / depression wetland	Wetland (Modified)	Depression	Seasonal ponding	Hydromorphic soils	Wetland grasses/sedges	High	Modified	Moderate
104-105	Molopo River	Watercourse (River)	Channelled valley bottom	Defined channel, continuous flow	Alluvial soils	Riparian vegetation	High	Moderately modified	High
118-119	Seasonal wetland	Wetland	Depression / valley bottom	Ponding, saturation	Mottled/gleyed soils	Hydrophilic vegetation	High	Moderately disturbed	Moderate–High
136-137	Non-perennial stream	Watercourse	Channelled valley bottom	Episodic flow	Alluvial soils	Riparian vegetation	High	Moderately disturbed	Moderate
180	Seasonal wetland	Wetland	Depression	Seasonal saturation	Hydromorphic soils	Wetland grasses	High	Moderately disturbed	Moderate
198	Seasonal wetland	Wetland	Depression	Surface saturation	Mottled soils	Hydrophilic vegetation	High	Moderately disturbed	Moderate
210	Wetland	Wetland	Valley bottom	Diffuse saturation	Hydromorphic soils	Wetland vegetation	High	Moderately disturbed	Moderate–High
215-216	Borrow pit (impounded water)	Artificial feature	Excavated depression	Standing water	Disturbed soils	Sparse wetland vegetation	Moderate	Highly modified	Low
219-221	Depression wetlands	Wetland	Depression complex	Ponding, saturation	Gleyed soils	Hydrophilic vegetation	High	Largely intact	Moderate–High
232	Transformed wetland	Wetland (Transformed)	Valley bottom	Altered hydrology	Hydromorphic soils	Crops dominant	Moderate	Highly disturbed	Moderate
258	Impounded stream	Watercourse (Modified)	Channelled valley bottom	Channel with impeded flow	Alluvial soils	Disturbed riparian vegetation	Moderate–High	Moderately disturbed	Moderate

Feature ID	Feature Description	System Type	Landscape Unit	Hydrological Indicators	Soil Indicators	Vegetation Indicators	Delineation Confidence	Condition	Sensitivity
280	Borrow pit	Artificial feature	Excavated depression	Standing water (localised)	Disturbed soils	Limited vegetation	Moderate	Modified	Low
308	Seasonal depression wetland	Wetland	Depression	Ponding	Clay-rich soils	Marginal wetland vegetation	High	Moderately disturbed	Moderate–High
320-321	High sensitivity wetland	Wetland	Depression / valley bottom complex	Persistent saturation	Strong gleying	Well-developed hydrophilic zones	High	Largely intact	High
412	Seasonal dam / depression wetland	Wetland (Modified)	Depression	Ponding	Hydromorphic soils	Wetland vegetation	High	Modified	Moderate
430	Seasonal wetland	Wetland	Depression	Seasonal saturation	Mottled soils	Hydrophilic vegetation	High	Moderately disturbed	Moderate
450	Borrow pit	Artificial feature	Excavated depression	Standing water	Disturbed soils	Sparse vegetation	Moderate	Highly modified	Low
493	Seasonal wetland	Wetland	Depression	Ponding	Hydromorphic soils	Wetland vegetation	High	Moderately disturbed	Moderate
500-501	Mooi River	Watercourse (River)	Channelled valley bottom	Continuous flow	Alluvial soils	Riparian vegetation	High	Moderately modified	Very High
575	Wetland (intersecting tower; disturbed)	Wetland (Disturbed)	Valley bottom	Diffuse saturation	Compacted hydromorphic soils	Disturbed vegetation	Moderate	Disturbed	Moderate

5.5. Watercourses and Wetlands Assessment

The ecological status and impact significance of the identified watercourses and wetlands were assessed using standard indicators aligned with the DFFE Aquatic Biodiversity Assessment Protocol (GN 320, GG 43110) and supporting water resource assessment frameworks.

The assessment incorporated four key metrics, namely the Present Ecological State (PES), Ecological Importance and Sensitivity (EIS), Hydrological Integrity Assessment (HIA), and Recommended Ecological Category (REC) (See Table 5-8 below). These indicators collectively provide a structured understanding of the ecological condition, functional importance, hydrological integrity, and desired management state of each aquatic feature.

5.5.1. Present Ecological State (PES)

PES describes the current ecological condition of a watercourse or wetland relative to its natural (reference) state.

Category	Description
A	Natural / unmodified
B	Largely natural
C	Moderately modified
D	Largely modified
E	Seriously modified
F	Critically modified

5.5.2. Ecological Importance and Sensitivity (EIS)

EIS reflects the ecological value and sensitivity of the system, considering biodiversity support, habitat provision, and hydrological connectivity.

Category	Description
Low	Limited ecological importance
Moderate	Some ecological function
Moderate-High	Important ecological role
High	Critical ecological system

5.5.3. Hydrological Integrity Assessment (HIA)

HIA evaluates the degree to which natural hydrological processes are maintained, including flow regime, connectivity, and water storage.

Rating	Description
High	Natural hydrological regime intact
Moderate	Some alteration present
Low	Significant alteration of flow

5.5.4. Recommended Ecological Category (REC)

REC defines the desired ecological condition of the system, taking into account its importance and required level of protection.

Category	Management Objective
A/B	Protection (minimal impact allowed)
B/C	Sustainable use
C/D	Managed use with mitigation
D/E	Rehabilitation required

5.5.5. Assessment Results

Table 5-8: PES, EIS, HIA, and REC Assessment.

Feature ID	Feature Type	PES	EIS	HIA	REC	Justification
49	Seasonal dam / depression wetland	D	Moderate	Moderate	C/D	Modified depression system with altered hydrology
104-105	Molopo River	C	High	Moderate	B/C	Major river system with moderate modification but high ecological importance
118-119	Seasonal wetland	C	Moderate-High	Moderate	C	Seasonal wetland with moderate ecological function
136-137	Non-perennial stream	C	Moderate	Moderate	C/D	Channel present but hydrology seasonal and somewhat altered
180	Seasonal wetland	C	Moderate	Moderate	C	Typical seasonal depression wetland
198	Seasonal wetland	C	Moderate	Moderate	C	Moderately functional seasonal wetland
210	Wetland	C	Moderate-High	Moderate	B/C	Functionally important wetland within servitude
215-216	Borrow pit (impounded water)	E	Low	Low	D/E	Artificial feature with highly altered hydrology
219-221	Depression wetlands	B/C	Moderate-High	High	B/C	Relatively intact wetland cluster with good connectivity
232	Transformed wetland	D	Moderate	Low–Moderate	C/D	Agricultural disturbance affecting structure and function
258	Impounded stream	C/D	Moderate	Moderate	C/D	Flow modified but system retains partial function
280	Borrow pit	E	Low	Low	D/E	Artificial excavation with minimal ecological function
308	Depression wetland	C	Moderate-High	Moderate	B/C	Good hydrological expression despite disturbance
320-321	High sensitivity wetland	B	High	High	B	Intact wetland with strong ecological integrity
412	Seasonal dam / depression wetland	D	Moderate	Moderate	C/D	Modified system with altered water storage
430	Seasonal wetland	C	Moderate	Moderate	C	Seasonal system with moderate ecological function

Feature ID	Feature Type	PES	EIS	HIA	REC	Justification
450	Borrow pit	E	Low	Low	D/E	Artificial feature with minimal ecological value
493	Seasonal wetland	C	Moderate	Moderate	C	Typical seasonal wetland system
500-501	Mooi River	C	High	High	B/C	Perennial river with strong ecological and hydrological function
575	Disturbed wetland	D	Moderate	Moderate	C/D	Wetland impacted by infrastructure but still functional

6. DWS RISK MATRIX (SECTION 21(C) & (I))

A risk assessment was undertaken to evaluate the potential risks associated with the proposed development in terms of Section 21(c) (impeding or diverting the flow of water in a watercourse) and Section 21(i) (altering the bed, banks, course, or characteristics of a watercourse) of the National Water Act (Act 36 of 1998).

The risk assessment follows the DWS Risk Assessment Matrix Guidelines, which evaluate:

- Consequence of impact
- Likelihood of occurrence
- Overall risk rating (before and after mitigation)

The purpose of this assessment is to:

- Identify risk levels associated with each watercourse/wetland
- Inform WULA decision-making
- Define required mitigation measures

6.1. Risk Assessment Methodology

The DWS risk rating is determined as:

- Risk = Consequence × Likelihood

Consequence Rating

Based on:

- Severity of impact
- Extent
- Duration
- Reversibility
- Sensitivity of the receiving environment

Score	Description
1-2	Low consequence
3	Moderate consequence
4	High consequence

Score	Description
5	Very high consequence

Likelihood Rating

Score	Description
1	Rare
2	Unlikely
3	Possible
4	Likely
5	Almost certain

Risk Categories

Risk Score	Risk Class
1-4	Low
5-9	Moderate
10-16	High
17-25	Very High

The detailed DWS Risk Matrix Results are provided in Appendix 11-F for reference and further review.

7. BUFFER ZONE AND NO-GO AREAS

Buffer zones and no-go areas were established to minimise potential impacts on identified wetlands and watercourses associated with the proposed transmission line development. The buffers provide appropriate separation between tower infrastructure and aquatic features, while the broader 500 m assessment area allows for the consideration of potential indirect impacts and Water Use Licence Application (WULA) requirements.

7.1. Buffer Zone Determination

The following buffer distances were adopted for the protection of natural aquatic features:

Feature Type	Buffer Distance
Wetlands	50 m
Rivers and streams	100 m

The buffers are intended to protect ecological integrity and hydrological functioning; minimise disturbance to wetlands and watercourses; reduce erosion, sedimentation and contamination risks; and guide the management of construction activities in proximity to aquatic features.

Based on the verified tower positions and identified aquatic features, no towers are located within the applicable 50 m wetland buffers or 100 m river/stream buffers.

The 500 m assessment buffer remains applicable to identified wetlands and watercourses occurring within 500 m of tower positions. This represents the broader assessment area used to identify potential indirect impacts and inform the WULA process.

Artificial features such as borrow pits are considered separately from natural aquatic features. In particular, the borrow pit associated with Tower 450 is not considered a natural wetland or watercourse and is therefore not subject to the standard 50 m or 100 m aquatic buffers. A 15 m site-specific management buffer is applied around this borrow pit as a precautionary environmental management measure.

7.2. Application of Buffers within the Study Area

The 50 m wetland and 100 m river/stream buffers are applied to natural aquatic features identified during the field assessment. These buffers provide separation between tower infrastructure and sensitive aquatic environments.

No tower foundations are located within these applicable aquatic buffers. However, where wetlands and watercourses occur within the broader 500 m assessment area, appropriate environmental management measures must still be implemented to minimise potential indirect impacts associated with construction activities.

7.2.1. Tower Positions and Aquatic Buffers

All tower positions assessed during the freshwater walkdown occur outside the applicable:

- 50 m buffer associated with wetlands; and
- 100 m buffer associated with rivers and streams.

Accordingly, direct interaction between tower foundations and these aquatic buffer areas is not anticipated.

Construction activities must nevertheless remain within the approved development footprint and must not unnecessarily encroach into identified wetlands, watercourses or their associated buffers.

7.2.2. Features within the 500 m Assessment Buffer

Wetlands and watercourses occurring within 500 m of tower positions remain included in the freshwater assessment and WULA considerations.

Although tower foundations are located outside the applicable 50 m and 100 m buffers, construction activities have the potential to indirectly affect aquatic features through altered runoff, erosion, sediment transport, accidental pollution and unnecessary disturbance.

The following measures therefore apply:

- Construction camps, laydown areas and stockpiles must be appropriately located away from aquatic features;
- Refuelling and servicing of equipment must be undertaken in designated controlled areas;
- Existing drainage patterns must be maintained;

- Erosion and sediment control measures must be implemented where required; and
- Disturbance outside the approved construction footprint must be avoided.

7.3. Tower Compliance with Aquatic Buffers

The freshwater walkdown assessment confirmed that no towers are located within the applicable 50 m wetland or 100 m river/stream buffers.

Towers associated with wetlands or watercourses within the 500 m assessment area remain subject to the relevant tower-specific mitigation measures provided in this report. Their inclusion within the 500 m assessment area does not necessarily indicate a direct impact but ensures that potential indirect impacts are appropriately considered.

Tower 450 is associated with an artificial borrow pit. As the borrow pit is not a natural wetland or watercourse, the standard aquatic buffers are not applicable. A 15 m management buffer must instead be maintained around the borrow pit to minimise disturbance, erosion, sediment mobilisation and contamination.

7.4. Management of Watercourse and Wetland Crossings

Where the transmission line crosses or passes in proximity to wetlands and watercourses, construction activities must be undertaken in a manner that maintains the ecological and hydrological functioning of these systems.

The following requirements apply:

- No tower foundations may be placed within identified wetlands or active river/stream channels;
- The applicable 50 m wetland and 100 m river/stream buffers must be maintained;
- Natural drainage and surface-water flow paths must not be obstructed;
- Unnecessary disturbance of wetland soils and riparian vegetation must be avoided;
- Construction activities near aquatic features should, where practicable, be undertaken during drier conditions;
- Erosion and sediment control measures must be implemented where runoff could affect aquatic features;

- Fuels, oils, chemicals and construction waste must be prevented from entering wetlands and watercourses; and
- Temporarily disturbed areas must be stabilised and rehabilitated following construction.

Where the transmission line spans a watercourse or wetland, the crossing must be managed to avoid direct physical disturbance of the aquatic feature as far as practicable.

7.5. No-Go Areas

Identified natural wetlands, rivers and streams, together with their applicable environmental buffers, must be treated as environmentally sensitive areas during construction.

The following are regarded as no-go areas for unnecessary construction-related disturbance:

- Delineated wetlands and natural watercourses;
- The 50 m buffers associated with wetlands;
- The 100 m buffers associated with rivers and streams; and
- Other high-sensitivity aquatic areas identified during the freshwater assessment.

No tower foundations are located within the applicable 50 m or 100 m aquatic buffers. These areas must nevertheless be protected from construction camps, stockpiling, waste disposal, refuelling, unnecessary vehicle movement and other activities that could adversely affect aquatic ecosystems.

Aquatic features occurring within the broader 500 m assessment area are not automatically regarded as 500 m no-go zones. Rather, their inclusion within the 500 m assessment area is intended to identify potential indirect impacts and inform appropriate environmental management and WULA requirements.

For Tower 450, the artificial borrow pit must be managed using the adopted 15 m site-specific management buffer. This setback is a precautionary management measure and does not constitute a wetland or watercourse buffer.

8. MITIGATION AND MANAGEMENT MEASURES

The freshwater walkdown confirmed that no towers are located within the applicable 50 m wetland or 100 m river/stream buffers. However, aquatic features occurring within the broader 500 m assessment area remain relevant due to potential indirect impacts from construction activities.

Detailed tower-specific findings and mitigation measures are provided in Appendix 11-E: Specialist Findings and Mitigation Measures and should be read together with this section.

8.1. General Mitigation Measures

The following measures must be implemented during construction:

- Maintain the applicable 50 m wetland and 100 m river/stream buffers.
- Restrict construction activities to approved working areas.
- Maintain natural drainage and surface-water flow paths.
- Prevent erosion, sedimentation and contamination of aquatic features.
- Locate camps, stockpiles, refuelling and equipment storage away from wetlands and watercourses.
- Avoid unnecessary disturbance of wetlands, rivers and streams.
- Implement the tower-specific mitigation measures provided in Appendix 11-E.

8.2. Features within the 500 m Assessment Area

Wetlands and watercourses occurring within 500 m of tower positions must remain subject to appropriate environmental management to minimise potential indirect impacts. The 500 m distance represents an assessment area and not a blanket no-go buffer.

8.3. Artificial Features

Borrow pits identified along the alignment are artificial features and are not considered natural wetlands or watercourses. For Tower 450, a 15 m site-specific management buffer must be maintained around the borrow pit to minimise disturbance, erosion, sediment mobilisation and contamination.

8.4. Rehabilitation and Monitoring

All temporarily disturbed areas must be stabilised and rehabilitated following construction. The Environmental Control Officer (ECO) must monitor compliance with the applicable buffers and mitigation measures.

The detailed requirements applicable to individual towers and associated aquatic features are presented in Appendix 11-E and must be incorporated into the project EMPr.

9. CONCLUSION AND RECOMMENDATIONS

9.1. Conclusion

The Freshwater Walkdown Assessment confirmed the presence of wetlands, rivers, streams and other aquatic features along the proposed transmission line alignment. The most significant aquatic systems include the Molopo River, Mooi River and high-sensitivity wetland systems identified along the route.

The assessment confirmed that no towers are located within the applicable 50 m wetland or 100 m river/stream buffers. Aquatic features occurring within the broader 500 m assessment area remain relevant for the consideration and management of potential indirect impacts.

Artificial borrow pits identified along the alignment are not considered natural wetlands or watercourses. A 15 m site-specific management buffer is applicable to the borrow pit associated with Tower 450.

Subject to the implementation of the recommended mitigation measures, potential impacts on aquatic systems can be appropriately managed.

9.2. Recommendations

The following recommendations are made:

- Maintain the 50 m wetland and 100 m river/stream buffers during construction.
- Implement appropriate erosion, stormwater and pollution-control measures.
- Maintain natural drainage and avoid unnecessary disturbance of aquatic features.
- Apply the 15 m site-specific management buffer at Tower 450.
- Implement the tower-specific mitigation measures contained in Appendix 11-E.
- Incorporate the applicable mitigation measures into the project EMPr.
- Ensure environmental monitoring by the Environmental Control Officer (ECO) during construction activities near sensitive aquatic features.

9.3. Final Statement

Based on the findings of the freshwater walkdown assessment, the proposed transmission line is considered environmentally manageable from a freshwater perspective, provided that the

recommended buffers and mitigation measures contained in this report and Appendix 11-E are implemented.

10. REFERENCES

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11. APPENDICES

The appendices provide supporting information and detailed evidence used in the compilation of this report, including field data, photographic records, and spatial outputs.

Appendix 11-A: Photographic Record (Field and Drone Survey).

Field Survey	
	
Wetland on Tower 6 (+/-376m NW of Tower 6)	*Wetland on Tower 12 (+/-429m S of Tower 12)*



Tower 11 (+/-178m S of Tower 11)



Ramatlabama River



Season Dam on Tower 49 (+/-120m NW of Tower 49)



Season Dam on Tower 56 (+/-145m of W of Tower 56)



Molopo River



Season Wetland on Tower 119 (+/-140m N of Tower 119)



Stream between 136 and 137



Dam on Tower 163 (+/-299m NE of Tower 163)



Wetland on Tower 176 (+/-245m S of Tower 176)



Wetland on Tower 180 (+/-22m E of Tower 180)



Wetland on Tower 183 (+/-143m E of Tower 183)



Wetland on Tower 193 (+/-332m SW of Tower 193)



Wetland on Tower 210 (+/-88m S of Tower 210)



Borrow_pit (+/-181m N of Tower 216)



Wetland on Tower 218 (+/-420m S of Tower218)



Wetlands on Tower 219-220



Wetlands on Tower 220-221



Wetland on Tower 232 (+/-59m E of Tower 232)



Borrow pit on Tower 280 (+/-99m W of Tower 280)



Season Dam on Tower 412 (+/-106m NW of Tower 412)



Wetland on Tower 436 (+/-210m N of Tower 436)



Borrow pit on Tower 450 (+/-59m E of Tower 450)



Wetland on Tower 535 (+/-342m S of Tower 535)



Wetland on Tower 558 (+/-374m of Tower 558)



Wetland on Tower 560 (+/-148m N of Tower 560)



Wetland on Tower 575 (+/- 9m N of Tower 575)

Drone Survey



Arial view of Tower 73-78



Arial view of Tower 98-99



Arial view of Tower 101-103



Arial view of Impeded stream on Tower 258



Arial view of Wetland on Tower 308 (+/-100 W of Tower 308)



Arial view of Wetland on Tower 309 (+/-222 W of Tower 309)



Arial view of wetlands on Tower 318 (+/-487 S of Tower 318)



Arial view of wetland on Tower 320 and 321



Arial view on Tower 338



Arieal view of Mooi River

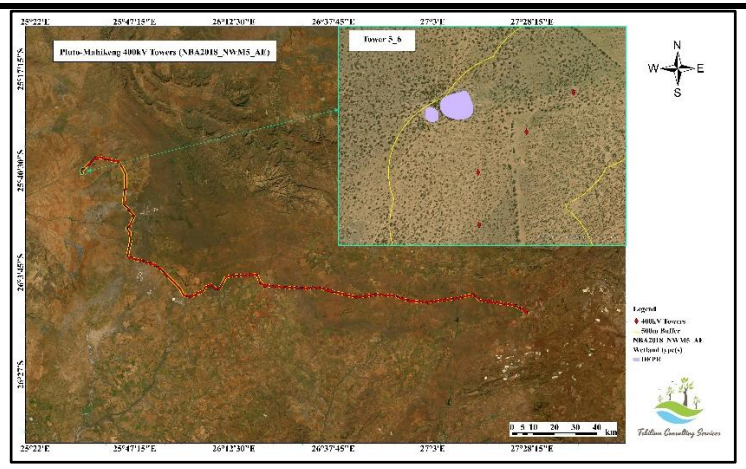


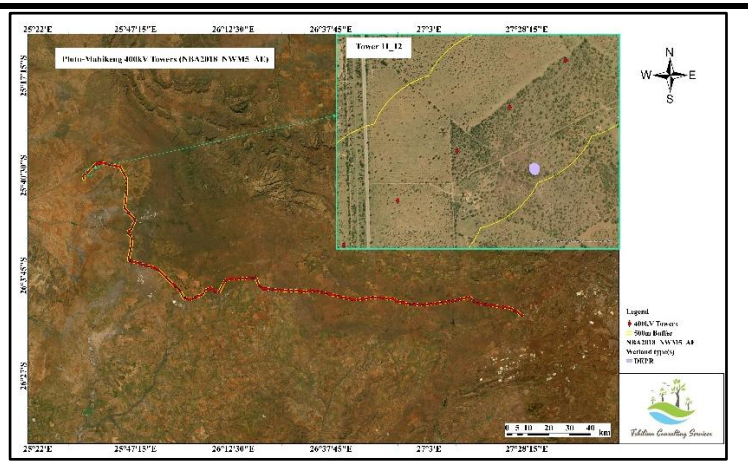
Arial view of wetland on tower 535 (+/-350m S)

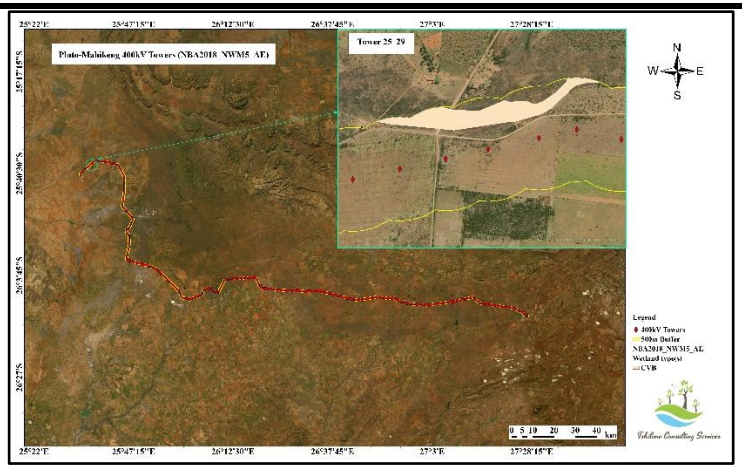


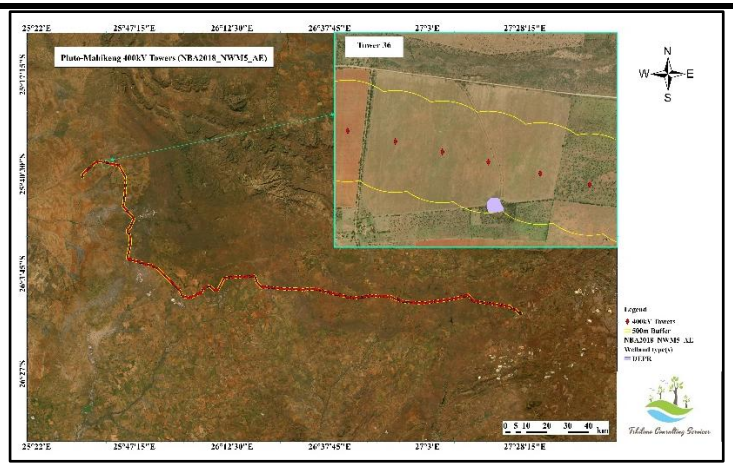
Arial view of wetland on tower 537 (+/-117m S)

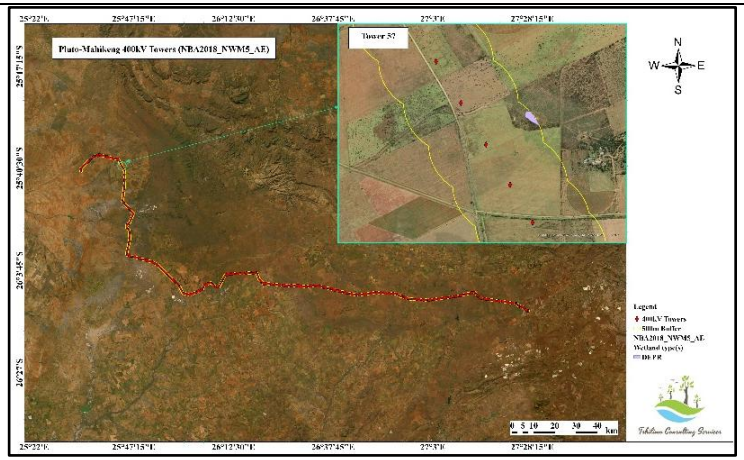
Appendix 11-B: National Wetland Map (NWM 5).

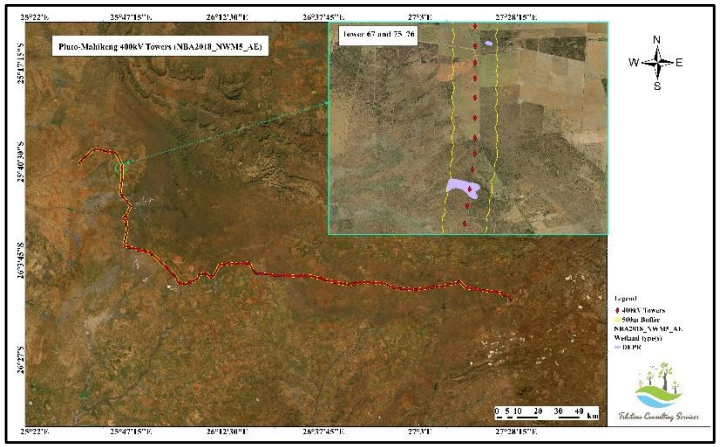


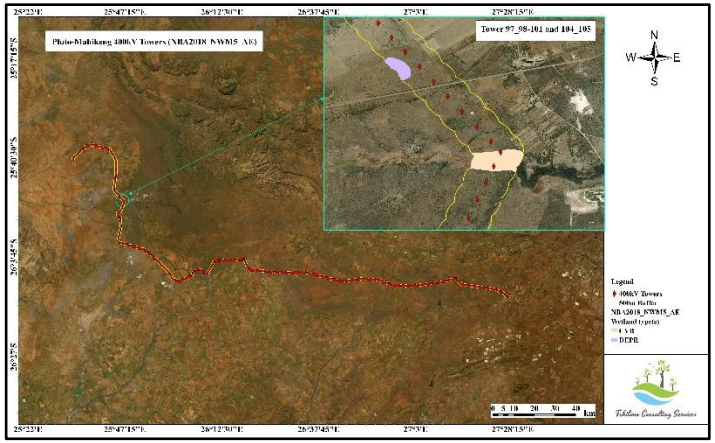


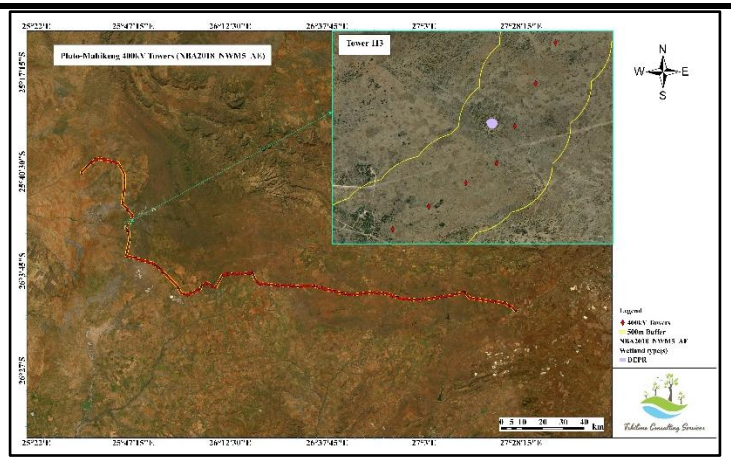

Pluto-Mahikeng 400kV Towers (NBA2018_NWM5_AE)
Tower 25 29
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400kV Towers
500m Buffer
NBA2018_NWM5_AE
Wetland type(s)
CVB
0 5 10 20 30 40 km
Tshikhona Consulting Services

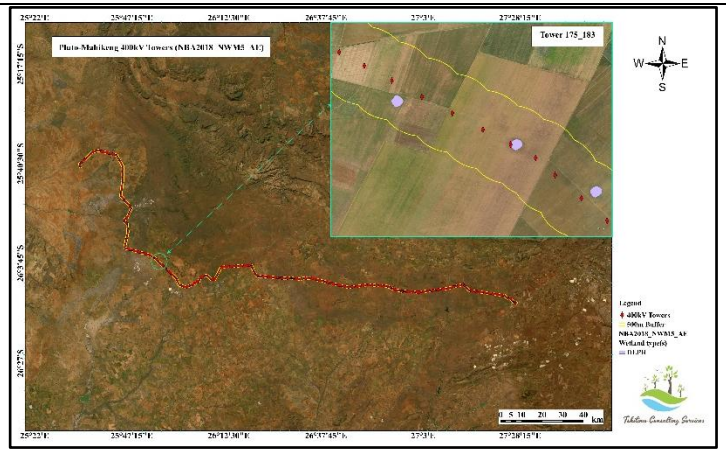

Pluto-Mahikeng 400kV Towers (NBA2018_NWM5_AE)
Tower 36
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500m Buffer
NBA2018_NWM5_AE
Wetland type(s)
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0 5 10 20 30 40 km
Tshikhona Consulting Services

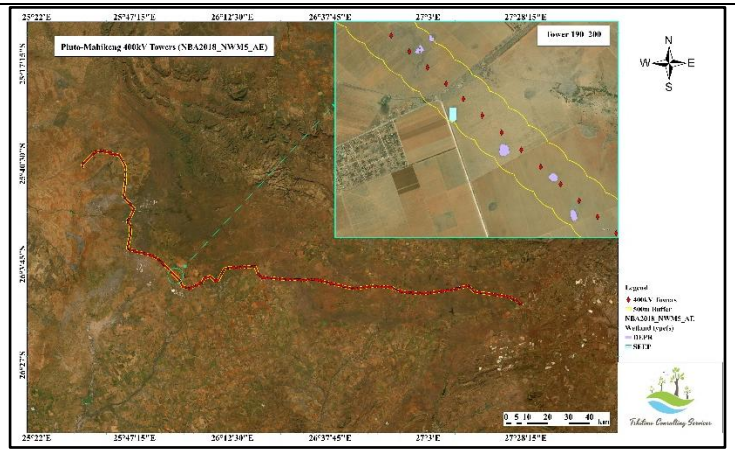

Pluto-Mahikeng 400kV Towers (NBA2018_NWM5_AE)
Tower 57
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400kV Towers
500m Buffer
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Wetland type(s)
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Tshikhona Consulting Services

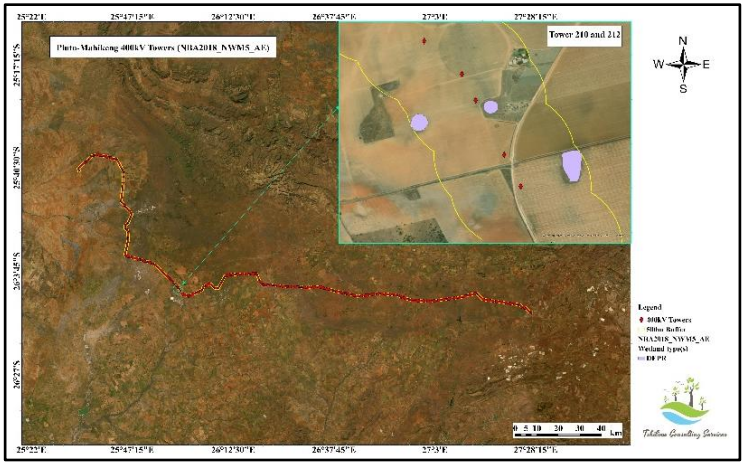

Pluto-Mahikeng 400kV Towers (NBA2018_NWM5_AE)
Tower 67 and 75 76
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400kV Towers
500m Buffer
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Wetland type(s)
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Tshikhona Consulting Services

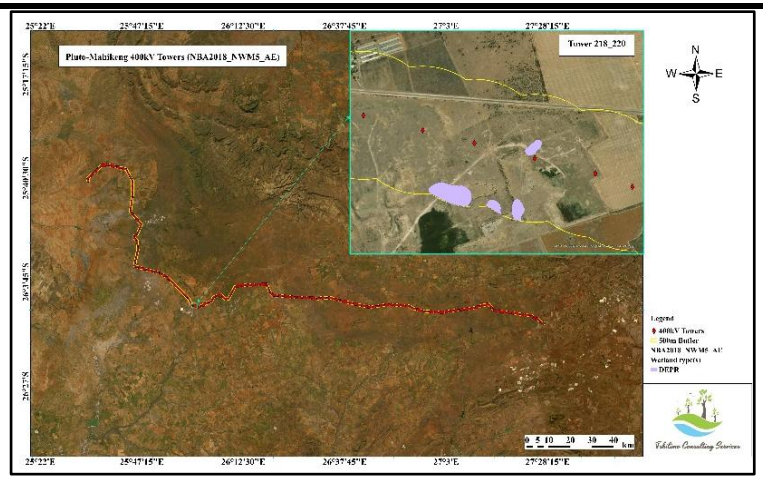

Plato-Mahikeng 400kV Towers (NBA2018_NWM35_AE)
Tower 97_98-101 and 104_105
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400kV Towers
500m Buffer
NBA2018_NWM35_AE
Wetland type(s)
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Tekhana Consulting Services

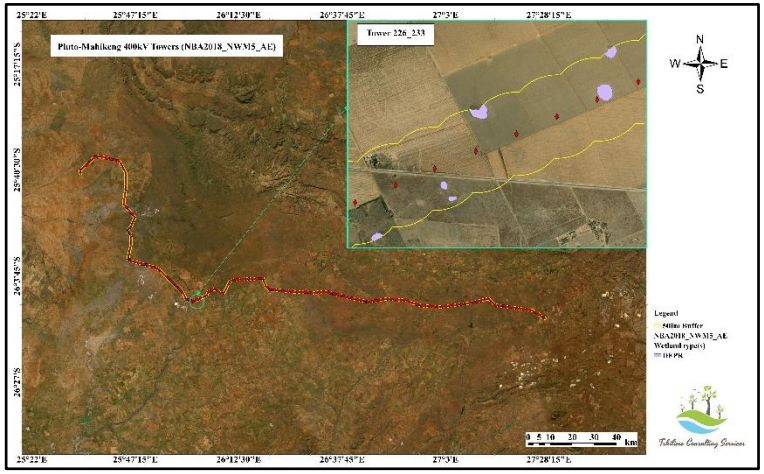

Plato-Mahikeng 400kV Towers (NBA2018_NWM35_AE)
Tower 113
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400kV Towers
500m Buffer
NBA2018_NWM35_AE
Wetland type(s)
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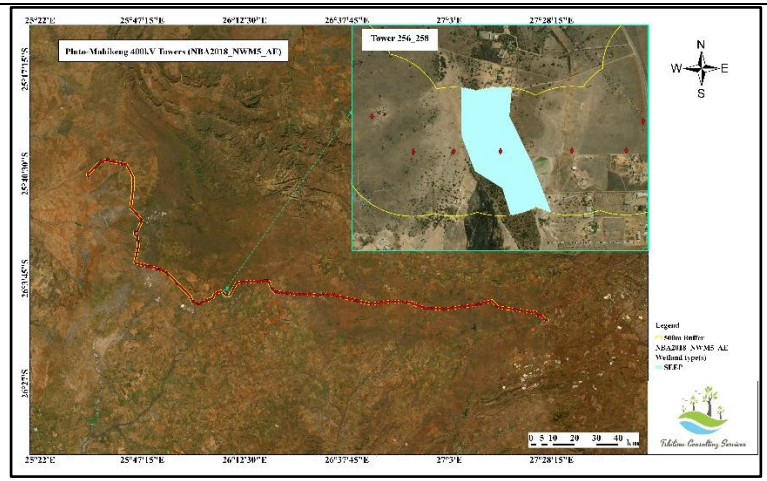

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Tower 175_183
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400kV Towers
500m Buffer
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Wetland type(s)
DEPR
0 5 10 20 30 40 km
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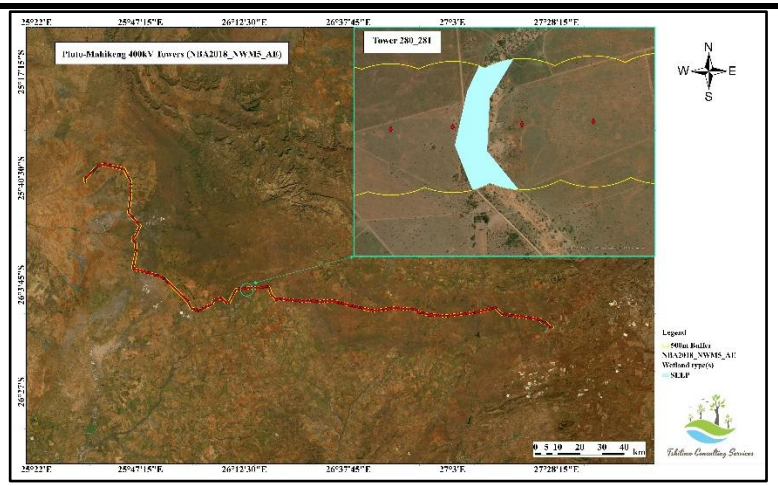

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Tower 190_200
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400kV Towers
500m Buffer
NBA2018_NWM35_AE
Wetland type(s)
DEPR
0 5 10 20 30 40 km
Tekhana Consulting Services

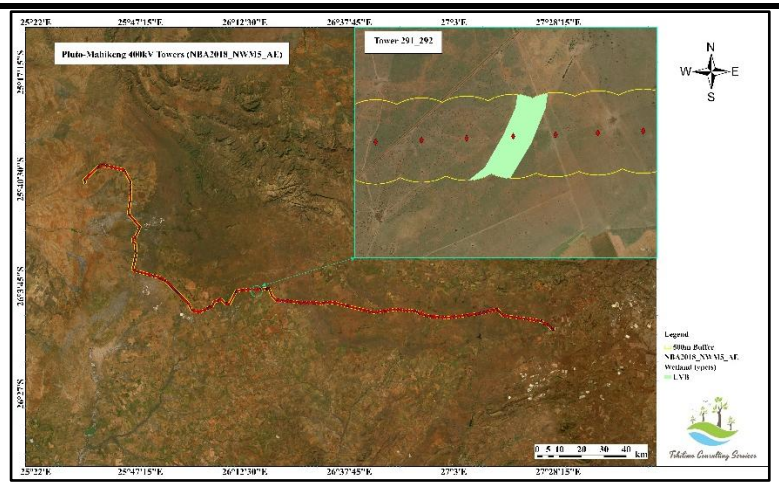

Pluto-Mahikeng 400kV Towers (NBA2018_NWM5_AE)
Tower 210 and 212
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400kV Towers
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NBA2018_NWM5_AE
Wetland type(s)
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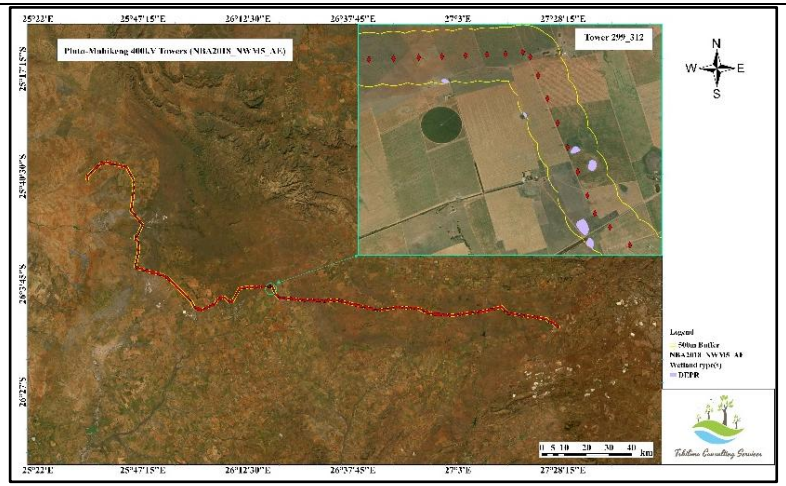

Pluto-Mahikeng 400kV Towers (NBA2018_NWM5_AE)
Tower 218_220
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400kV Towers
500m Buffer
NBA2018_NWM5_AE
Wetland type(s)
0 5 10 20 30 40 km
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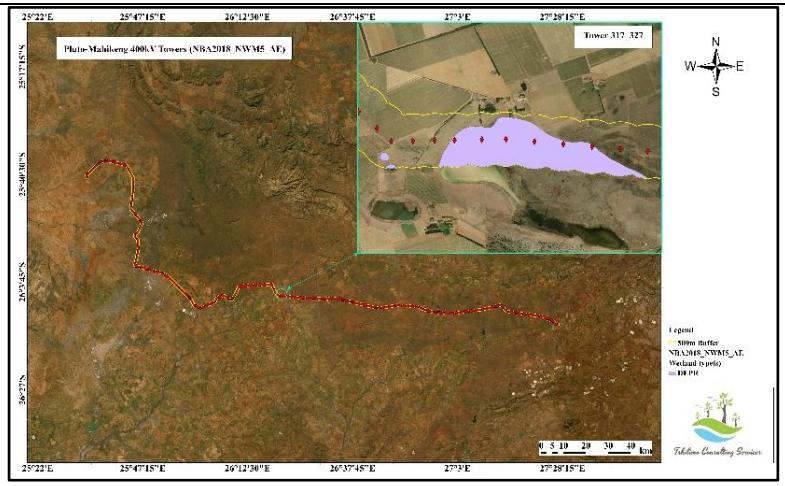

Pluto-Mahikeng 400kV Towers (NBA2018_NWM5_AE)
Tower 226_233
N
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Legend
500m Buffer
NBA2018_NWM5_AE
Wetland type(s)
0 5 10 20 30 40 km
Tshikhos Consulting Services

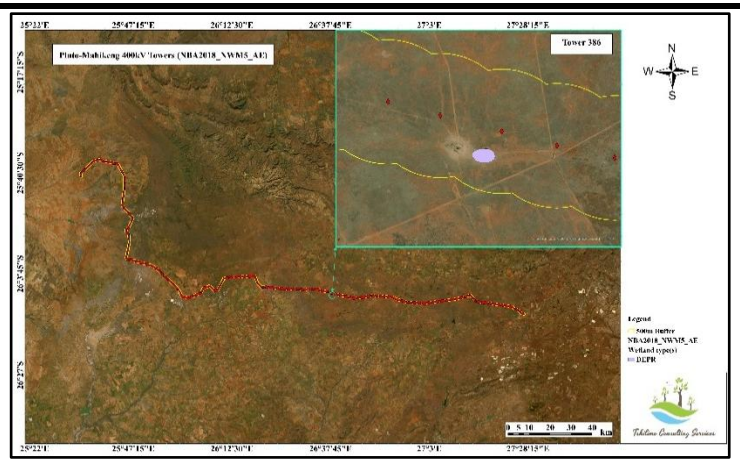

Pluto-Mahikeng 400kV Towers (NBA2018_NWM5_AE)
Tower 256_258
N
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Legend
500m Buffer
NBA2018_NWM5_AE
Wetland type(s)
0 5 10 20 30 40 km
Tshikhos Consulting Services

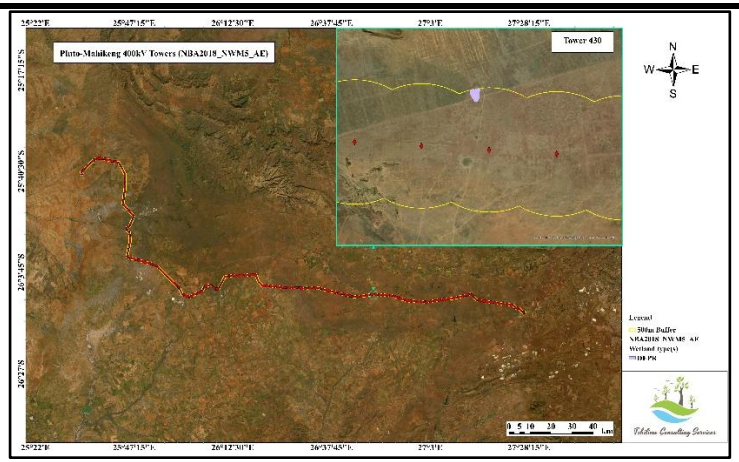

Pluto-Mahikeng 400kV Towers (NBA2018_NWM5_AE)
Tower 280_281
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Legend
500m Buffer
NBA2018_NWM5_AE
Wetland type(s)
SELF
0 5 10 20 30 40 km
Tshilimo Consulting Services

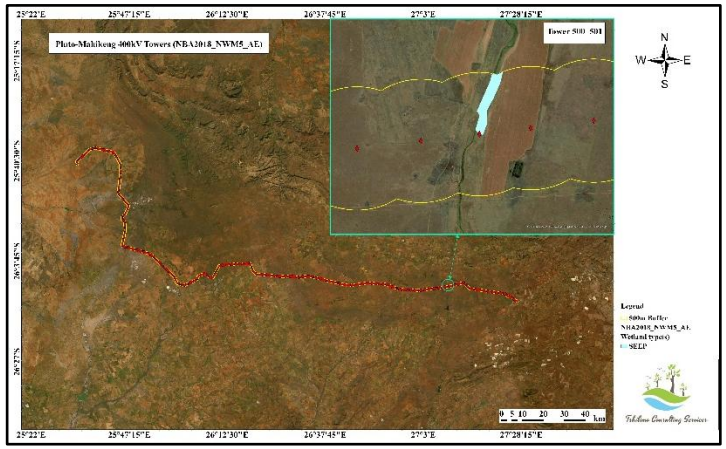

Pluto-Mahikeng 400kV Towers (NBA2018_NWM5_AE)
Tower 291_292
N
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Legend
500m Buffer
NBA2018_NWM5_AE
Wetland type(s)
LVB
0 5 10 20 30 40 km
Tshilimo Consulting Services

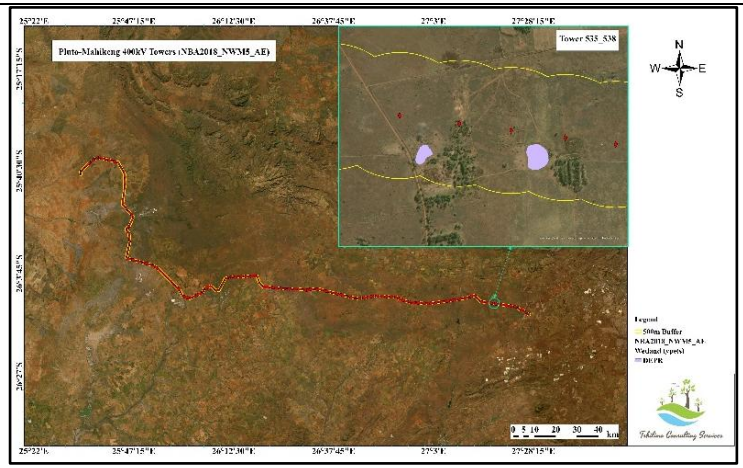

Pluto-Mahikeng 400kV Towers (NBA2018_NWM5_AE)
Tower 299_312
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Legend
500m Buffer
NBA2018_NWM5_AE
Wetland type(s)
DTFR
0 5 10 20 30 40 km
Tshilimo Consulting Services

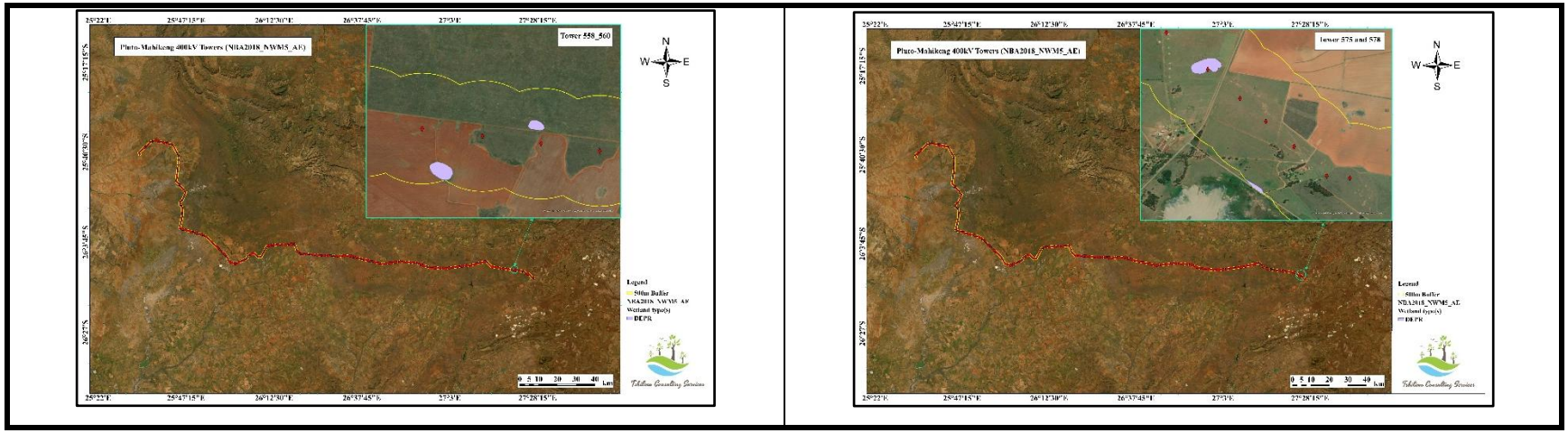

Pluto-Mahikeng 400kV Towers (NBA2018_NWM5_AE)
Tower 317_327
N
W
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Legend
500m Buffer
NBA2018_NWM5_AE
Wetland type(s)
DFPH
0 5 10 20 30 40 km
Tshilimo Consulting Services


Pluto-Mahikeng 400kV Towers (NBA2018_NWM5_AE)
Tower 386
N
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Legend
500m Buffer
NBA2018_NWM5_AE
Wetland type(s)
DEPR
0 5 10 20 30 40 km
Tshilinn Consulting Services

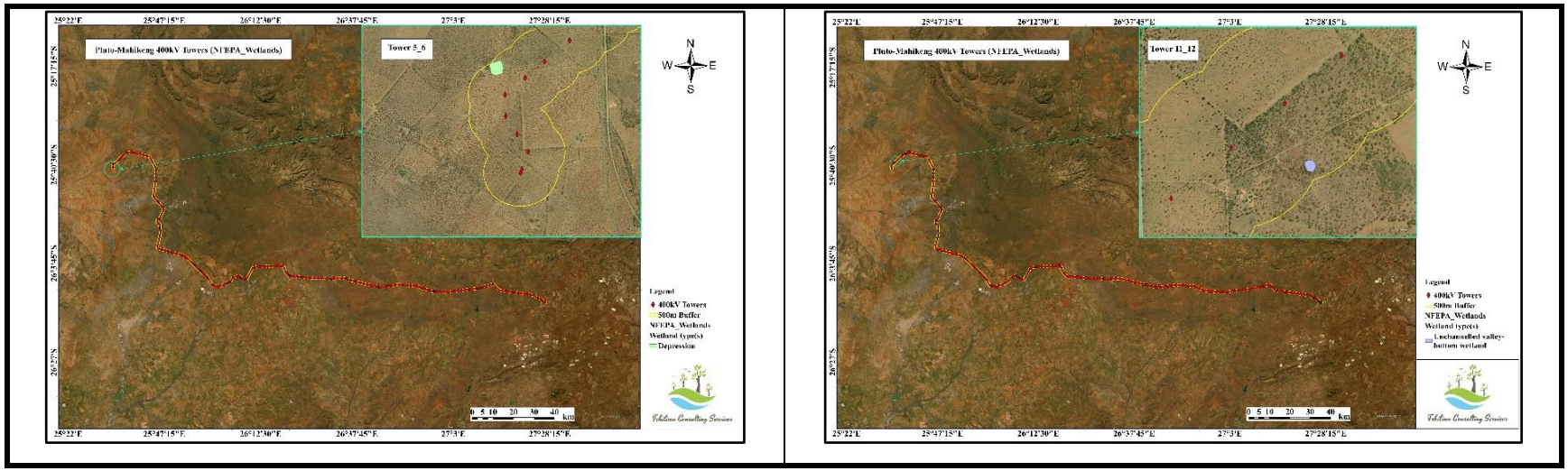

Pluto-Mahikeng 400kV Towers (NBA2018_NWM5_AE)
Tower 430
N
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Legend
500m Buffer
NBA2018_NWM5_AE
Wetland type(s)
DEPR
0 5 10 20 30 40 km
Tshilinn Consulting Services

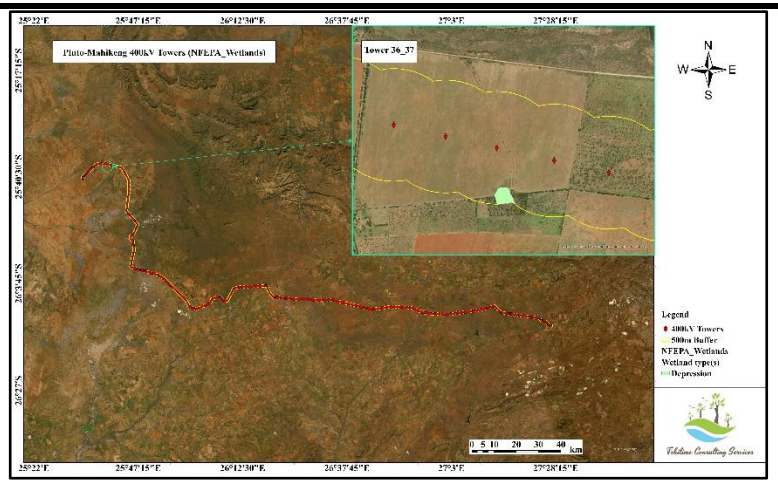

Pluto-Mahikeng 400kV Towers (NBA2018_NWM5_AE)
Tower 500_501
N
W
E
S
Legend
500m Buffer
NBA2018_NWM5_AE
Wetland type(s)
SELF
0 5 10 20 30 40 km
Tshilinn Consulting Services

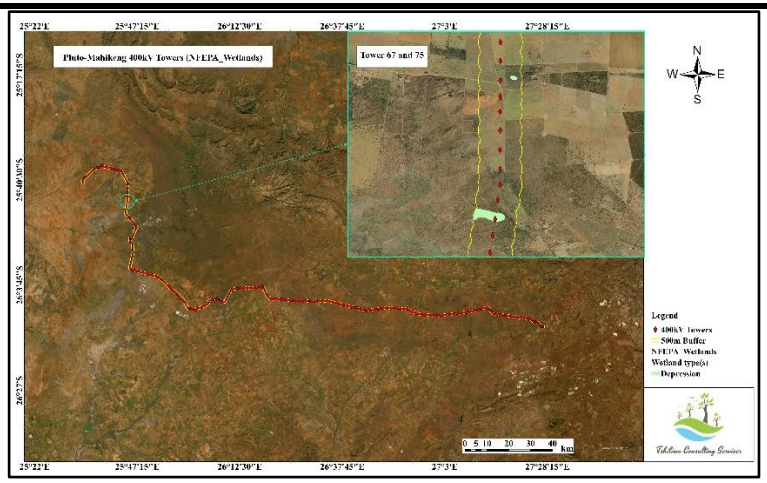

Pluto-Mahikeng 400kV Towers (NBA2018_NWM5_AE)
Tower 535_538
N
W
E
S
Legend
500m Buffer
NBA2018_NWM5_AE
Wetland type(s)
DEPR
0 5 10 20 30 40 km
Tshilinn Consulting Services

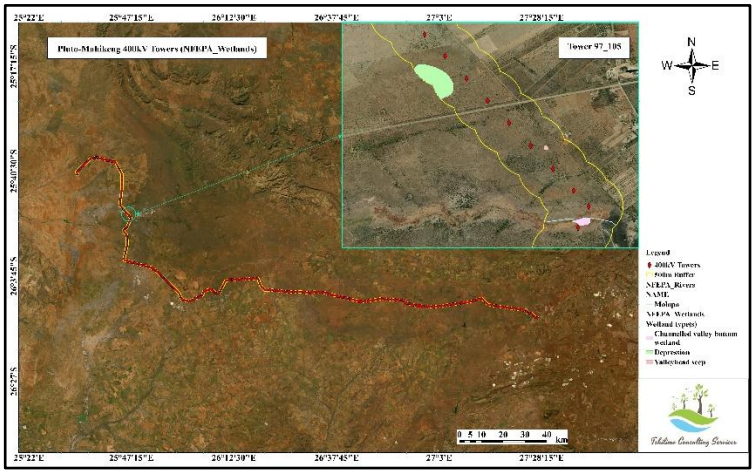


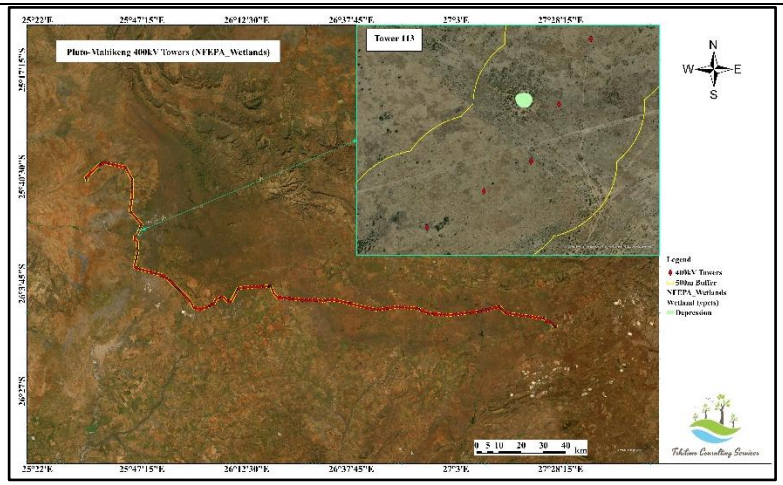
Appendix 11-C: National Freshwater Ecosystem Priority Areas (NFEPA) features.

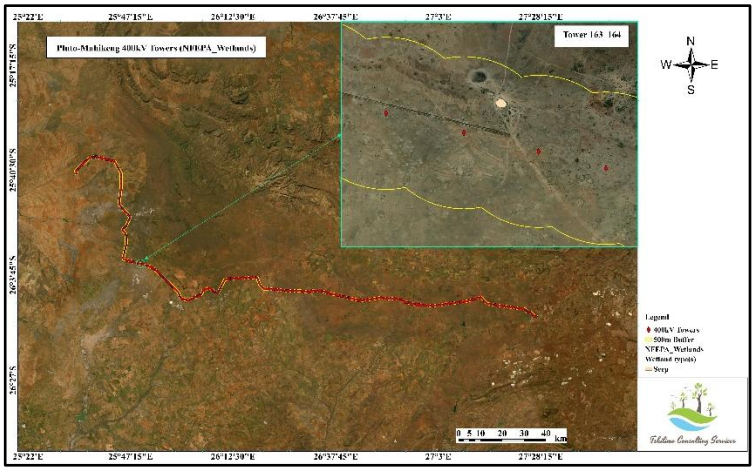


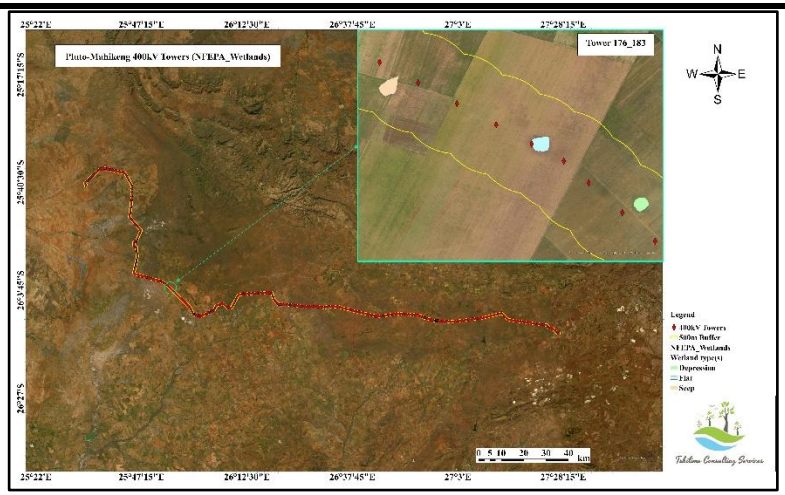

Pluto-Mahikeng 400kV Towers (NFEPA_Wetlands)
Tower 36_37
Legend
400kV Towers
500m Buffer
NFEPA_Wetlands
Wetland type(s)
Depression

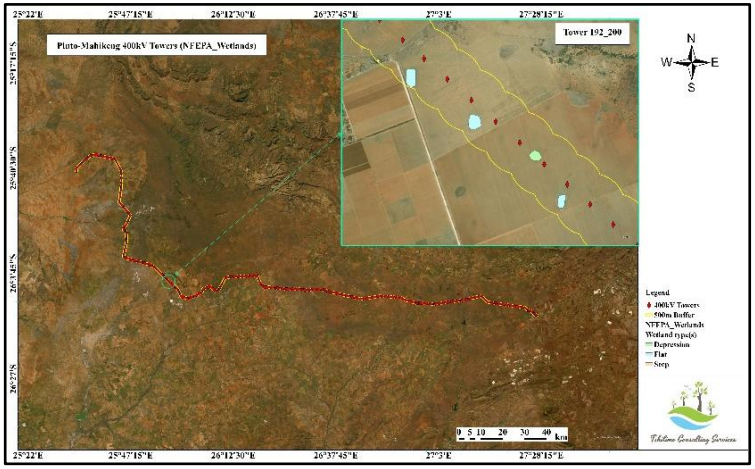

Pluto-Mahikeng 400kV Towers (NFEPA_Wetlands)
Tower 67 and 75
Legend
400kV Towers
500m Buffer
NFEPA_Wetlands
Wetland type(s)
Depression

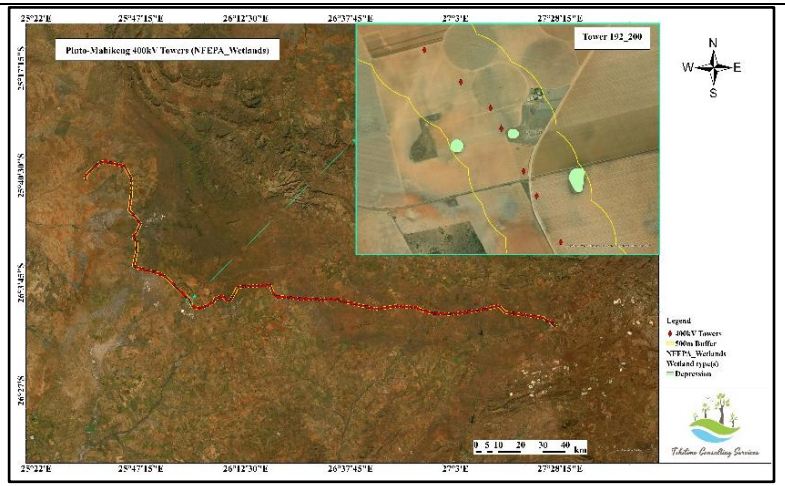

Pluto-Mahikeng 400kV Towers (NFEPA_Wetlands)
Tower 97_105
Legend
400kV Towers
500m Buffer
NFEPA_Rivers
NAME
Molopo
NFEPA_Wetlands
Wetland type(s)
Channelled valley bottom wetland
Depression
Valley-head seep

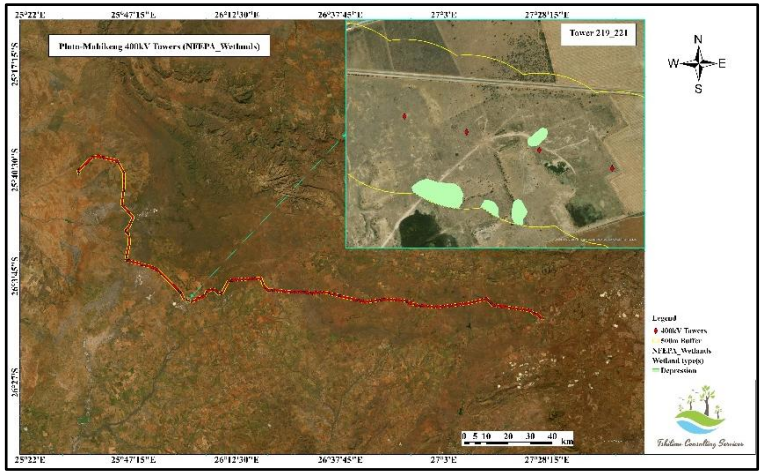

Pluto-Mahikeng 400kV Towers (NFEPA_Wetlands)
Tower 113
Legend
400kV Towers
500m Buffer
NFEPA_Wetlands
Wetland type(s)
Depression

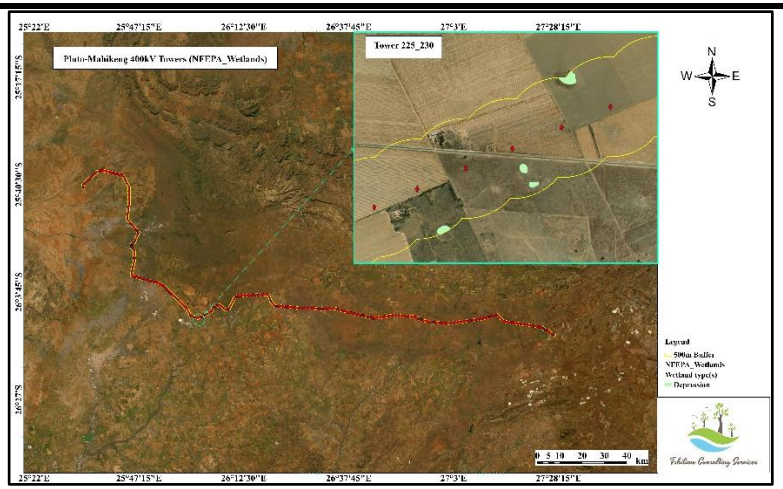

Pluto-Mahikeng 400kV Towers (NFEPA_Wetlands)
Tower 163_164
25°22'E
25°47'15"E
26°12'30"E
26°37'45"E
27°3'E
27°28'15"E
N
W
E
S
Legend
400kV Towers
500m Buffer
NFEPA_Wetlands
Wetland type(s)
Seep
0 5 10 20 30 40 km
Tshikhona Consulting Services

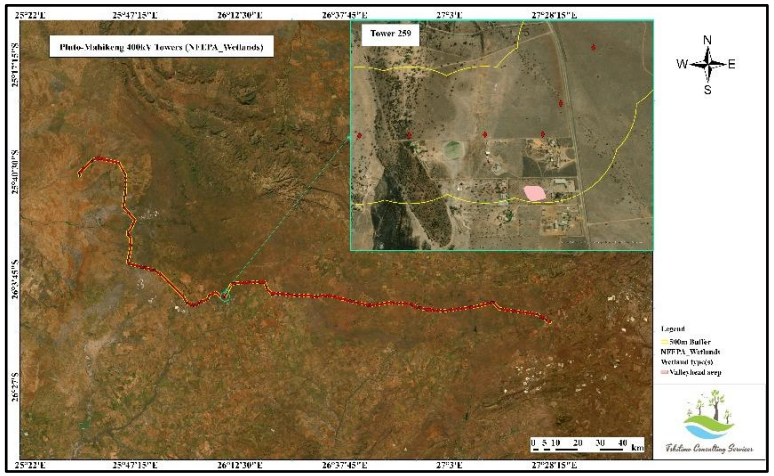

Pluto-Mahikeng 400kV Towers (NFEPA_Wetlands)
Tower 176_183
25°22'E
25°47'15"E
26°12'30"E
26°37'45"E
27°3'E
27°28'15"E
N
W
E
S
Legend
400kV Towers
500m Buffer
NFEPA_Wetlands
Wetland type(s)
Depression
Flat
Seep
0 5 10 20 30 40 km
Tshikhona Consulting Services

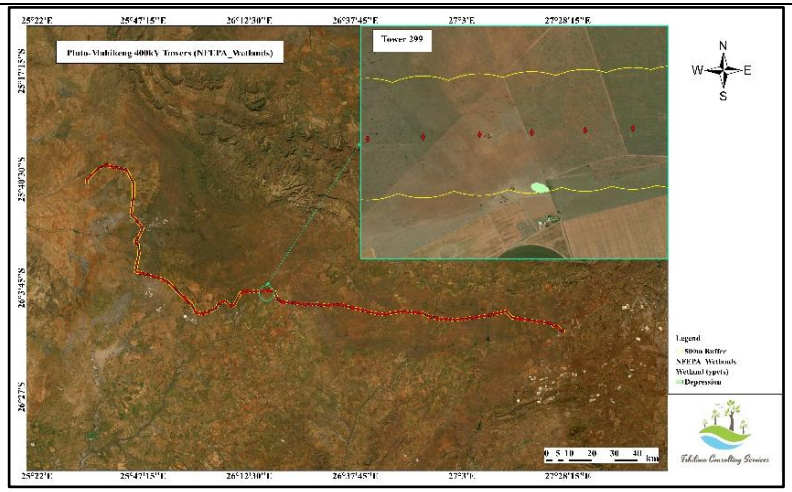

Pluto-Mahikeng 400kV Towers (NFEPA_Wetlands)
Tower 192_200
25°22'E
25°47'15"E
26°12'30"E
26°37'45"E
27°3'E
27°28'15"E
N
W
E
S
Legend
400kV Towers
500m Buffer
NFEPA_Wetlands
Wetland type(s)
Depression
Flat
Seep
0 5 10 20 30 40 km
Tshikhona Consulting Services

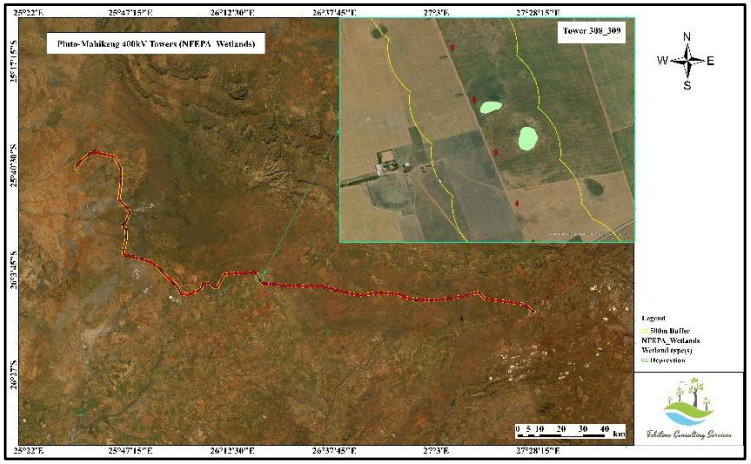

Pluto-Mahikeng 400kV Towers (NFEPA_Wetlands)
Tower 192_200
25°22'E
25°47'15"E
26°12'30"E
26°37'45"E
27°3'E
27°28'15"E
N
W
E
S
Legend
400kV Towers
500m Buffer
NFEPA_Wetlands
Wetland type(s)
Depression
0 5 10 20 30 40 km
Tshikhona Consulting Services

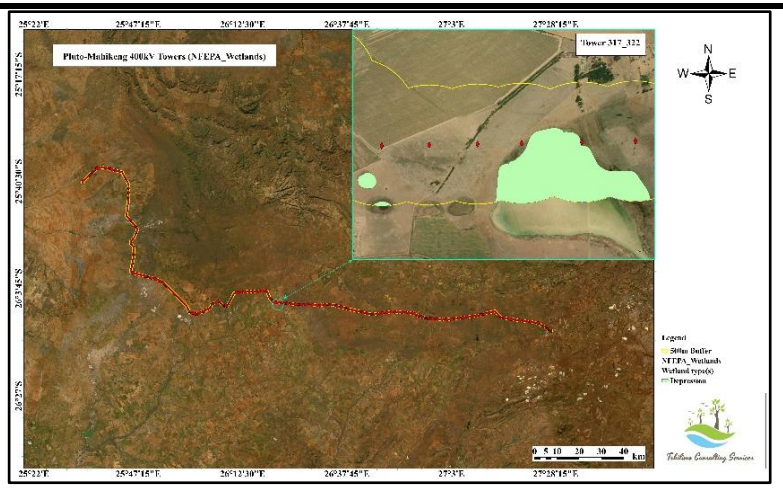

Pluto-Mahikeng 400kV Towers (NFEPA_Wetlands)
Tower 219_221
N
W
E
S
Legend
400kV Towers
500m Buffer
NFEPA_Wetlands
Wetland type(s)
Depression
0 5 10 20 30 40 km
Tshikhona Consulting Services

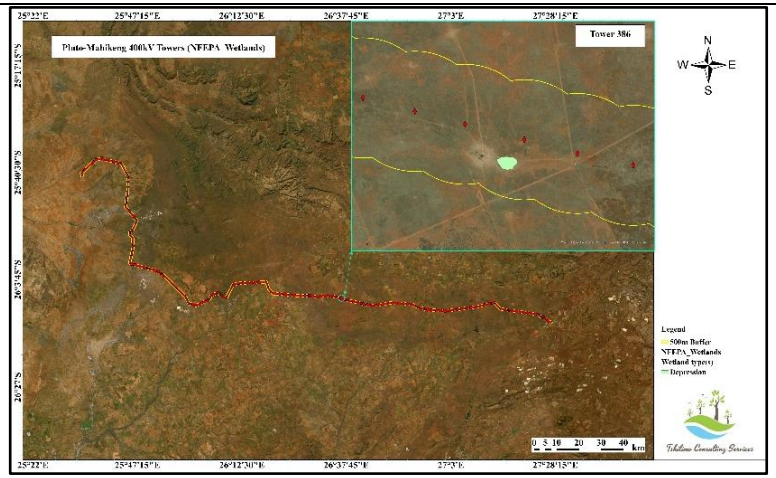

Pluto-Mahikeng 400kV Towers (NFEPA_Wetlands)
Tower 225_230
N
W
E
S
Legend
500m Buffer
NFEPA_Wetlands
Wetland type(s)
Depression
0 5 10 20 30 40 km
Tshikhona Consulting Services

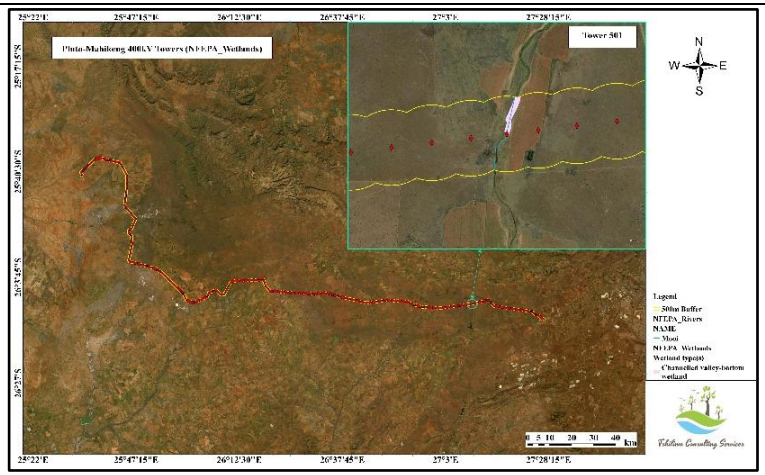

Pluto-Mahikeng 400kV Towers (NFEPA_Wetlands)
Tower 259
N
W
E
S
Legend
500m Buffer
NFEPA_Wetlands
Wetland type(s)
Valley head seep
0 5 10 20 30 40 km
Tshikhona Consulting Services

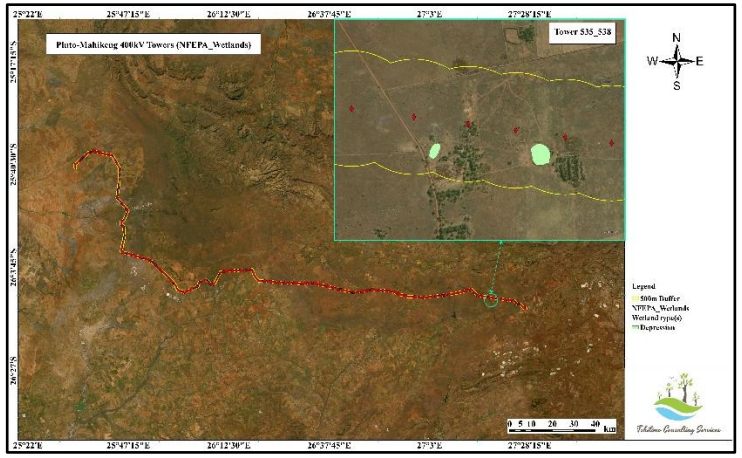

Pluto-Mahikeng 400kV Towers (NFEPA_Wetlands)
Tower 399
N
W
E
S
Legend
500m Buffer
NFEPA_Wetlands
Wetland type(s)
Depression
0 5 10 20 30 40 km
Tshikhona Consulting Services

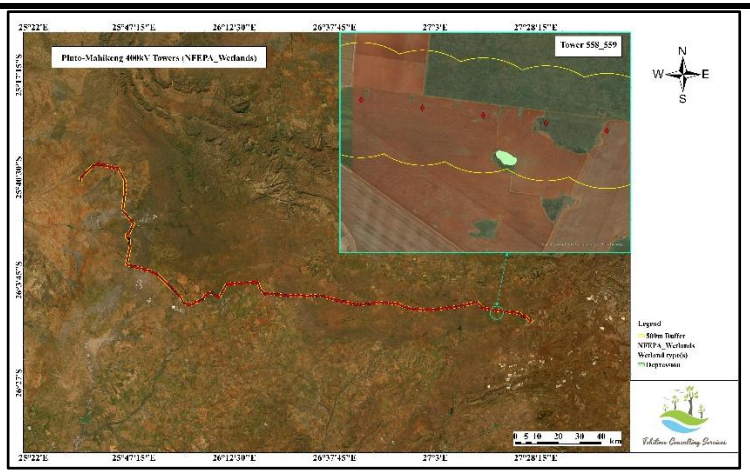

Pluto-Mahikeng 400kV Towers (NFEPA_Wetlands)
Tower 308_309
N
W
E
S
Legend
500m Buffer
NFEPA_Wetlands
Wetland type(s)
Depression
0 5 10 20 30 40 km
Tshilidzini Consulting Services

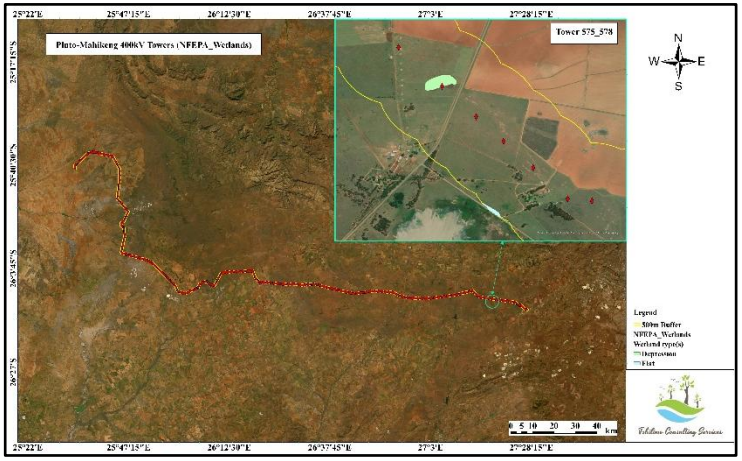

Pluto-Mahikeng 400kV Towers (NFEPA_Wetlands)
Tower 317_322
N
W
E
S
Legend
500m Buffer
NFEPA_Wetlands
Wetland type(s)
Depression
0 5 10 20 30 40 km
Tshilidzini Consulting Services

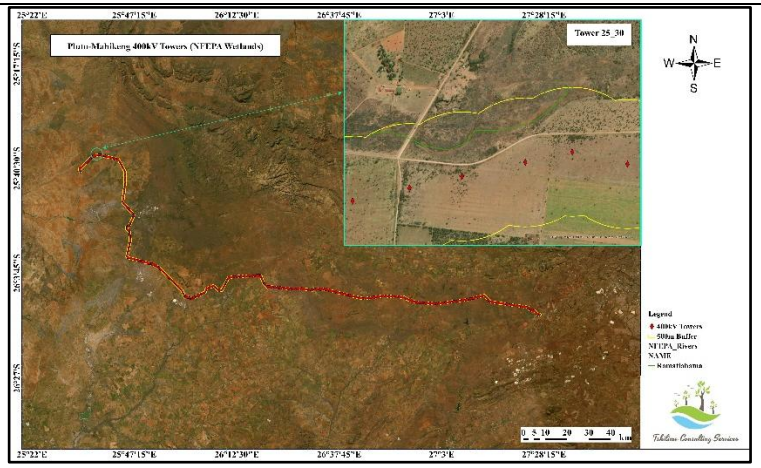

Pluto-Mahikeng 400kV Towers (NFEPA_Wetlands)
Tower 386
N
W
E
S
Legend
500m Buffer
NFEPA_Wetlands
Wetland type(s)
Depression
0 5 10 20 30 40 km
Tshilidzini Consulting Services


Pluto-Mahikeng 400kV Towers (NFEPA_Wetlands)
Tower 501
N
W
E
S
Legend
500m Buffer
NFEPA_Rivers
NAME
Main
NFEPA_Wetlands
Wetland type(s)
Channelled valley-bottom wetland
0 5 10 20 30 40 km
Tshilidzini Consulting Services

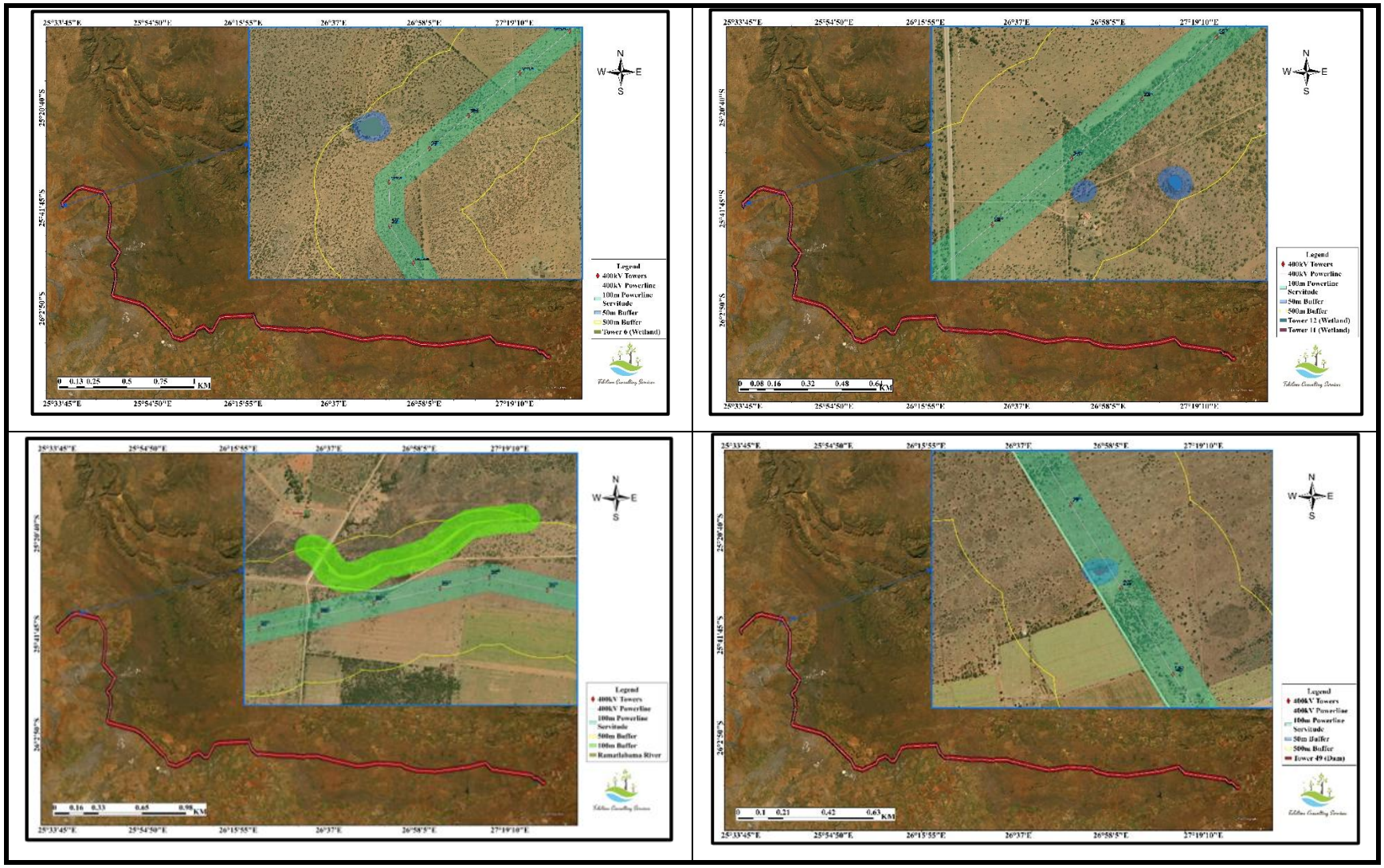

Pluto-Mahikeng 400kV Towers (NFEPA_Wetlands)
Tower 535_538
N
W
E
S
Legend
500m Buffer
NFEPA_Wetlands
Wetland type(s)
Depression
0 5 10 20 30 40 km
Tshilidzini Consulting Services

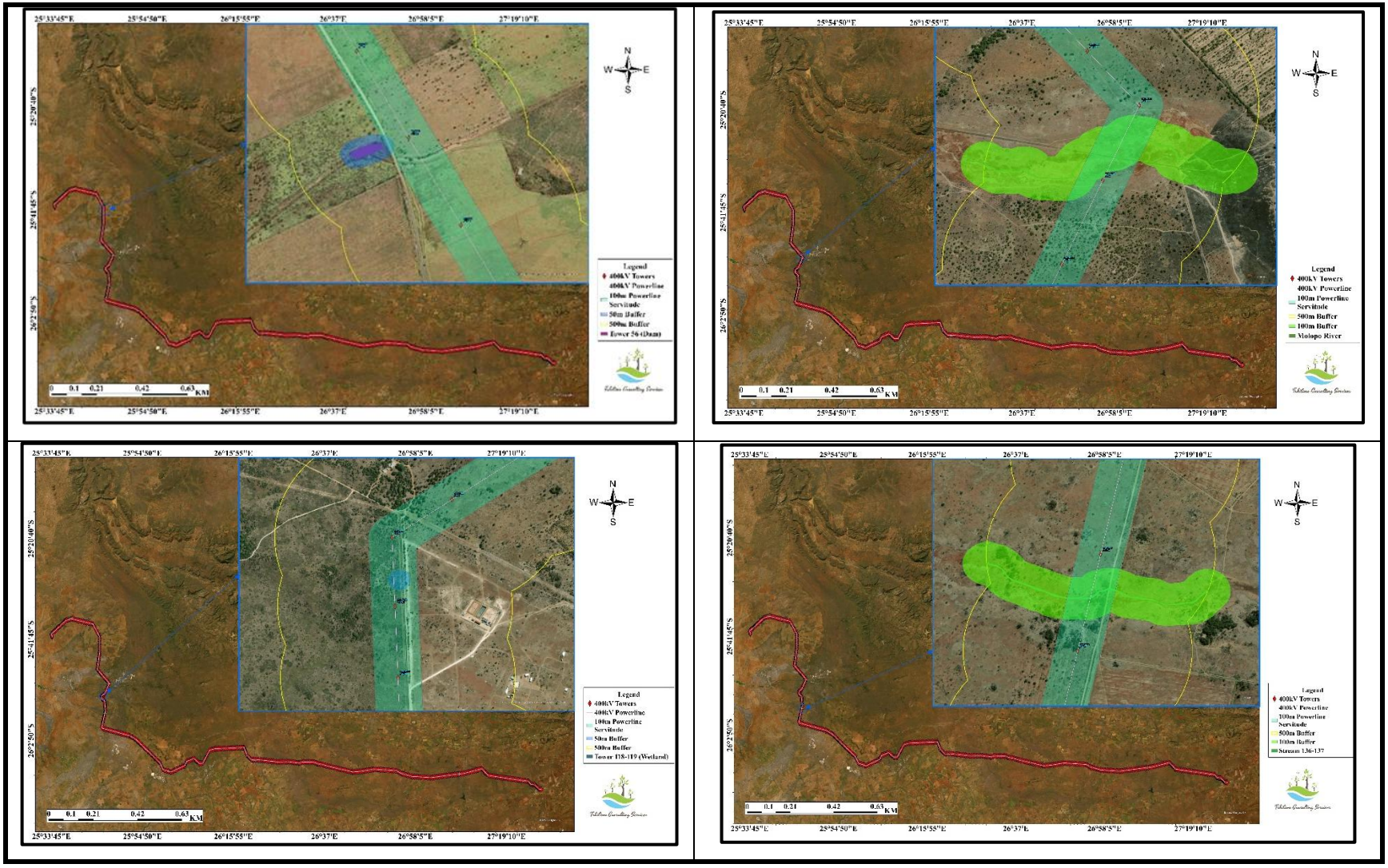

Pluto-Mahikeng 400kV Towers (NFEPA_Wetlands)
Tower 558_559
N
W
E
S
Legend
500m Buffer
NFEPA_Wetlands
Wetland type(s)
Depression
0 5 10 20 30 40 km
Tshilidzini Consulting Services

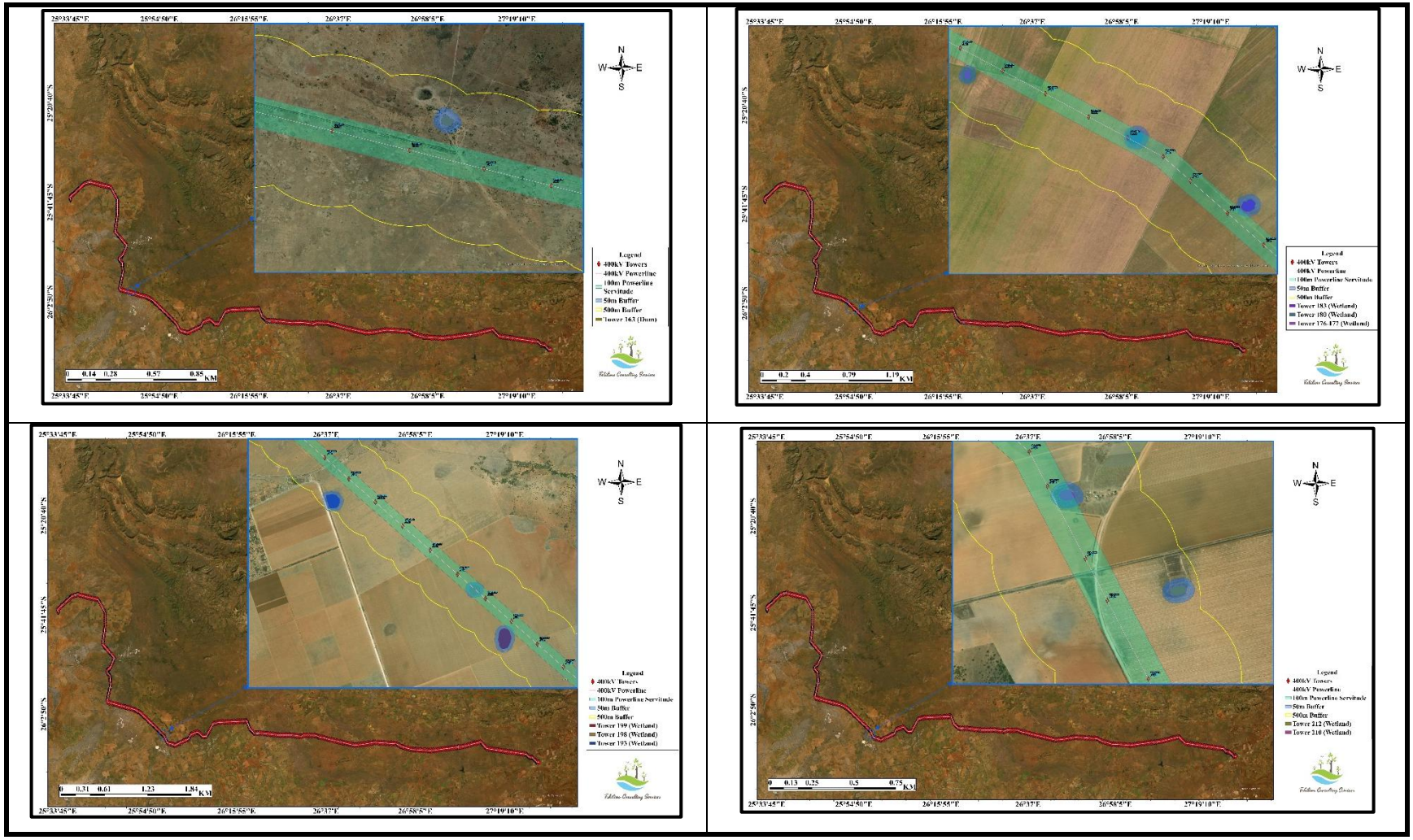

Pluto-Mahikeng 400kV Towers (NFEPA_Wetlands)
Tower 575_578
N
W
E
S
Legend
500m Buffer
NFEPA_Wetlands
Wetland type(s)
Depression
Rivers
0 5 10 20 30 40 km
Tshilidzini Consulting Services

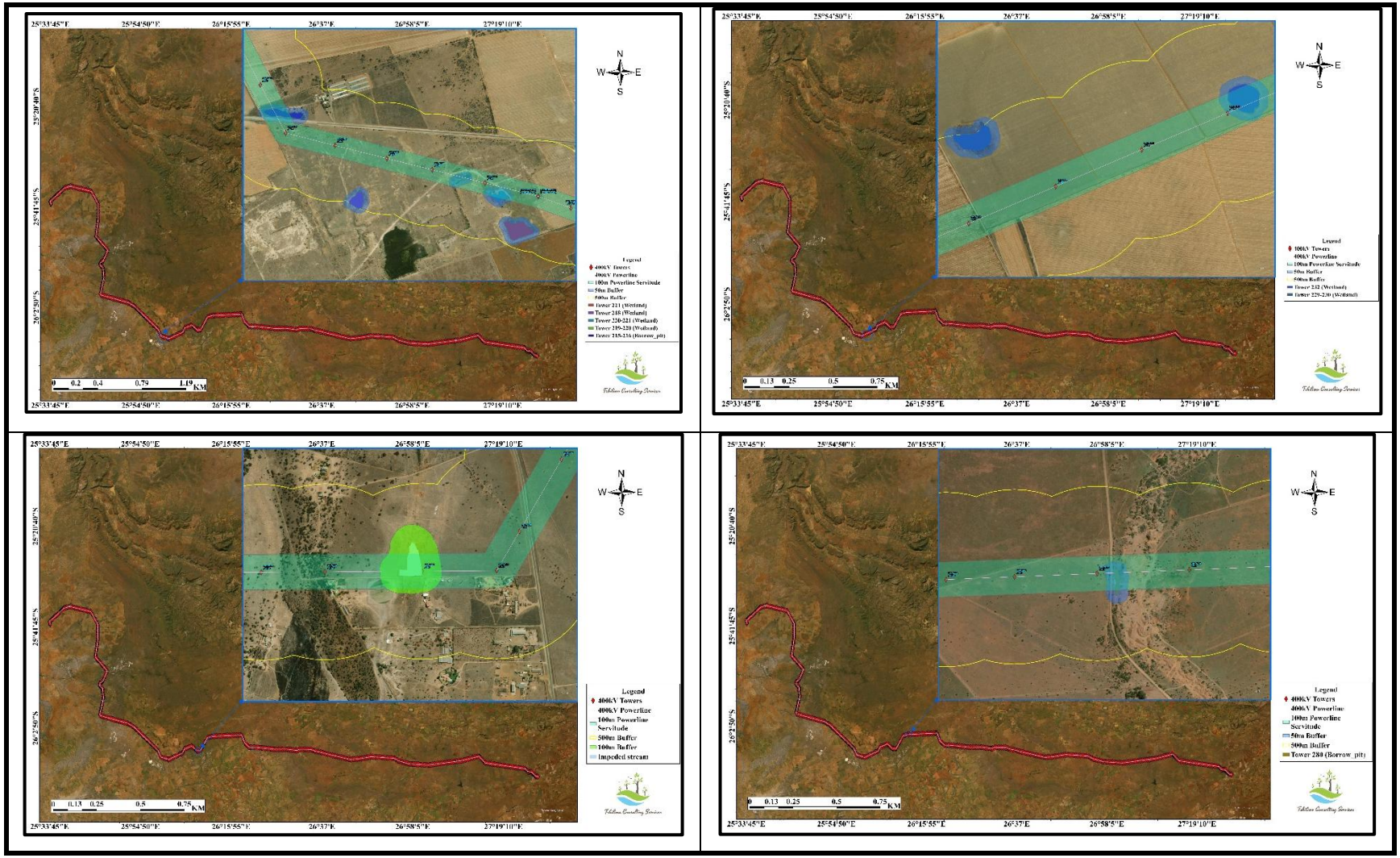

Pluto-Mahikeng 400kV Towers (NFEPA Wetlands)
Tower 25_30
N
W
E
S
Legend
400kV Towers
500m Buffer
NFEPA_Rivers
NAMR
Nonattainment
0 5 10 20 30 40 km
Tshilidzini Consulting Services

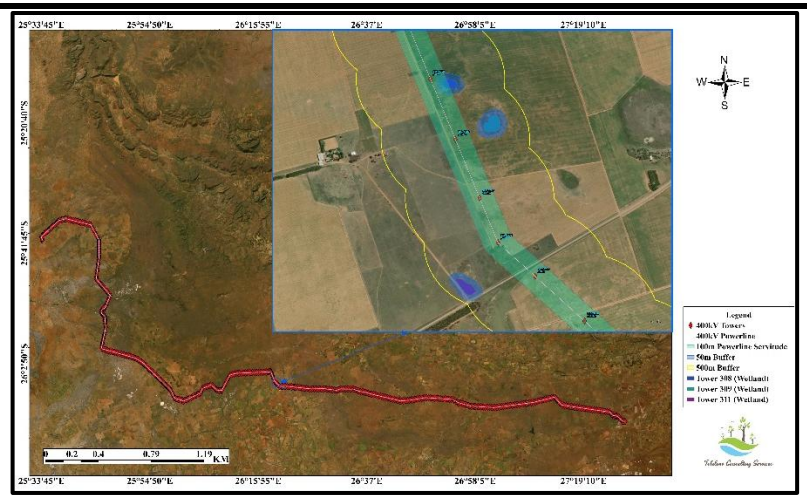
Appendix 11-D: Buffer zone and 100m Servitudes.

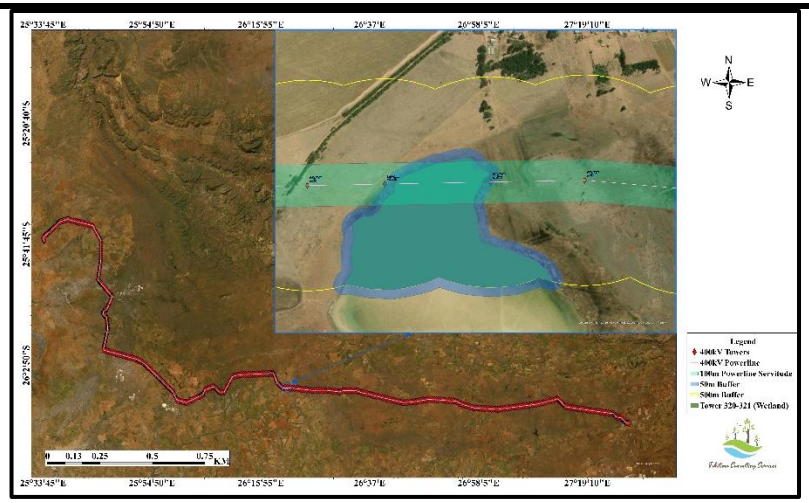


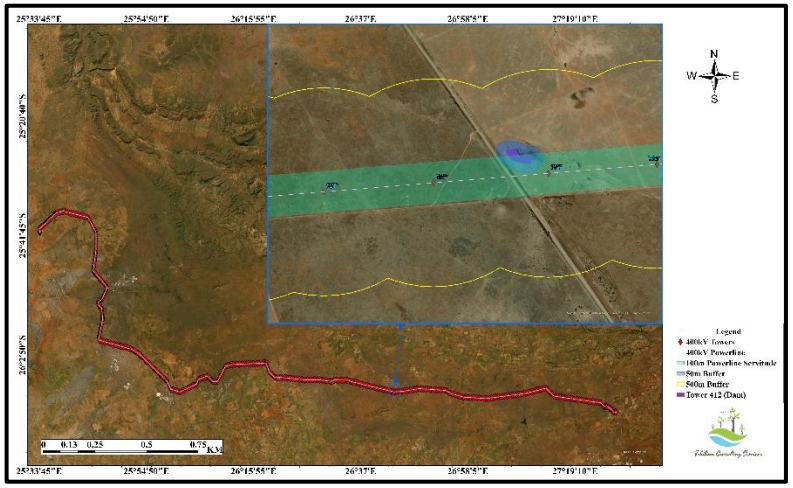

25°33'45"E
25°54'50"E
26°15'55"E
26°37'E
26°58'5"E
27°19'10"E
N
W
E
S
0 0.1 0.21 0.42 0.63 KM
Legend
400kV Towers
400kV Powerline
100m Powerline Servitude
50m Buffer
500m Buffer
Tower 56 (Dam)
25°33'45"E
25°54'50"E
26°15'55"E
26°37'E
26°58'5"E
27°19'10"E
25°30'40"S
25°41'45"S
26°2'50"S
N
W
E
S
0 0.1 0.21 0.42 0.63 KM
Legend
400kV Towers
400kV Powerline
100m Powerline Servitude
500m Buffer
100m Buffer
Molopo River
25°33'45"E
25°54'50"E
26°15'55"E
26°37'E
26°58'5"E
27°19'10"E
25°30'40"S
25°41'45"S
26°2'50"S
N
W
E
S
0 0.1 0.21 0.42 0.63 KM
Legend
400kV Towers
400kV Powerline
100m Powerline Servitude
50m Buffer
500m Buffer
Tower 118-119 (Wetland)
25°33'45"E
25°54'50"E
26°15'55"E
26°37'E
26°58'5"E
27°19'10"E
25°30'40"S
25°41'45"S
26°2'50"S
N
W
E
S
0 0.1 0.21 0.42 0.63 KM
Legend
400kV Towers
400kV Powerline
100m Powerline Servitude
500m Buffer
100m Buffer
Stream 136-137

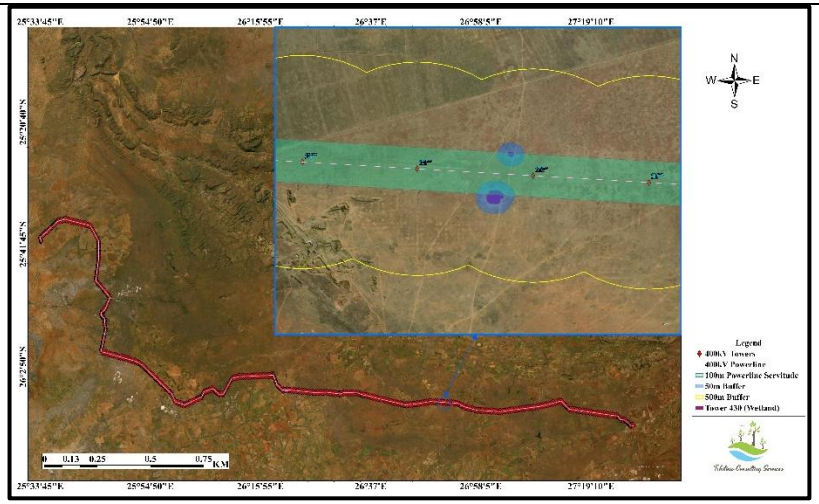

25°33'45"E
25°54'50"E
26°15'55"E
26°37'E
26°58'5"E
27°19'10"E
N
W
E
S
Legend
400kV Towers
400kV Powerline
100m Powerline Servitude
50m Buffer
500m Buffer
Tower 183 (Wetland)
Tower 180 (Wetland)
Tower 176 177 (Wetland)
Tower 199 (Wetland)
Tower 198 (Wetland)
Tower 193 (Wetland)
Tower 212 (Wetland)
Tower 210 (Wetland)
Tower 163 (Dam)
KM

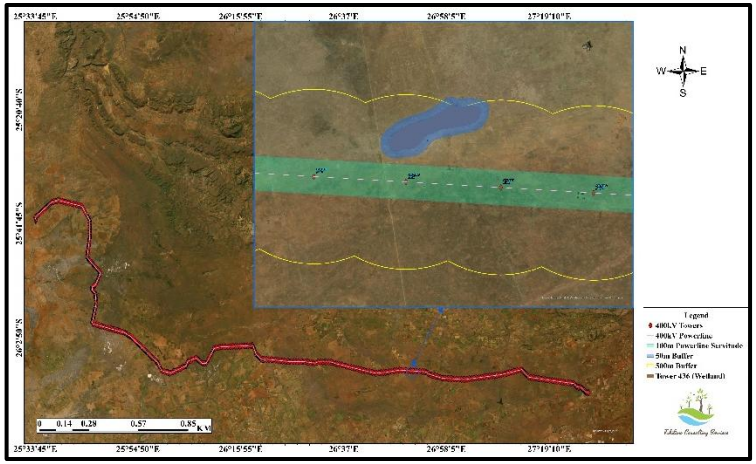

25°33'45"E
25°54'50"E
26°15'55"E
26°37'E
26°58'5"E
27°19'10"E
25°20'40"S
25°41'45"S
26°2'50"S
N
W
E
S
Legend
400kV Towers
400kV Powerline
100m Powerline Servitude
50m Buffer
500m Buffer
Tower 221 (Wetland)
Tower 248 (Wetland)
Tower 220-221 (Wetland)
Tower 289-320 (Wetland)
Tower 285-336 (Borrow_pit)
0 0.2 0.4 0.79 1.19 KM
Tower 232 (Wetland)
Tower 229-230 (Wetland)
0 0.13 0.25 0.5 0.75 KM
100m Buffer
Impeded stream
Tower 280 (Borrow_pit)

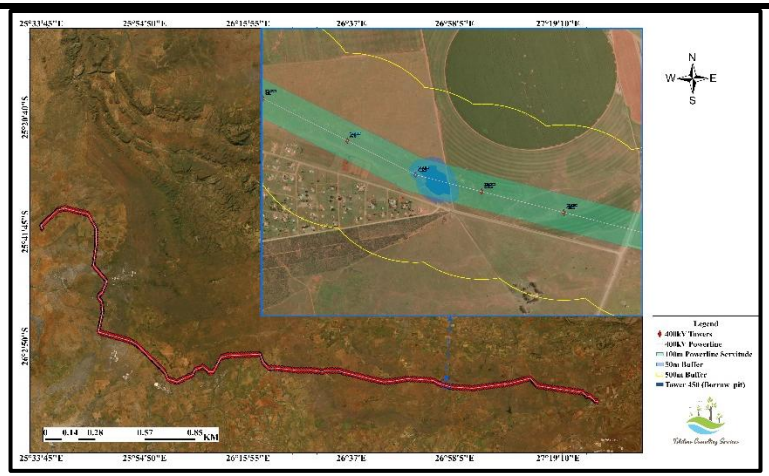

25°33'45"E
25°54'50"E
26°15'55"E
26°37'E
26°58'5"E
27°19'10"E
25°20'10"S
25°41'45"S
26°2'50"S
N
W
E
S
Legend
400kV Towers
400kV Powerline
140m Powerline Servitude
50m Buffer
500m Buffer
Tower 308 (Wetland)
Tower 309 (Wetland)
Tower 311 (Wetland)
0 0.2 0.4 0.79 1.19 KM

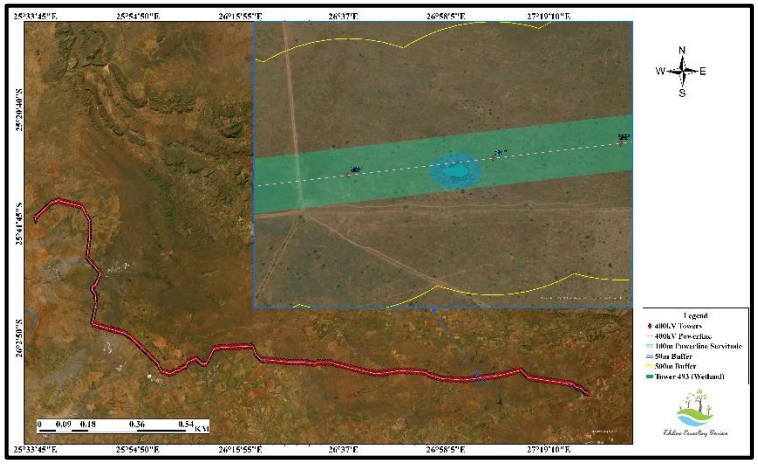

25°33'45"E
25°54'50"E
26°15'55"E
26°37'E
26°58'5"E
27°19'10"E
25°24'20"S
25°41'45"S
26°2'50"S
N
W
E
S
Legend
400kV Towers
400kV Powerline
140m Powerline Servitude
50m Buffer
500m Buffer
Tower 320-321 (Wetland)
0 0.13 0.25 0.5 0.75 KM

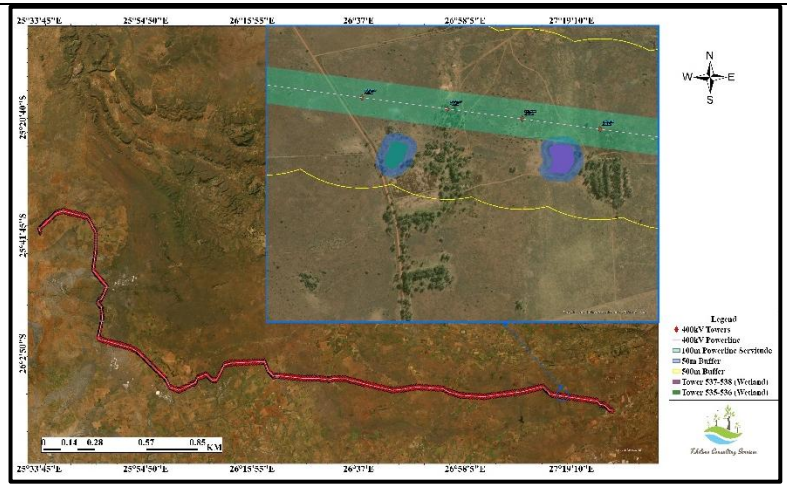

25°33'45"E
25°54'50"E
26°15'55"E
26°37'E
26°58'5"E
27°19'10"E
25°24'20"S
25°41'45"S
26°2'50"S
N
W
E
S
Legend
400kV Towers
400kV Powerline
140m Powerline Servitude
50m Buffer
500m Buffer
Tower 412 (Dam)
0 0.13 0.25 0.5 0.75 KM

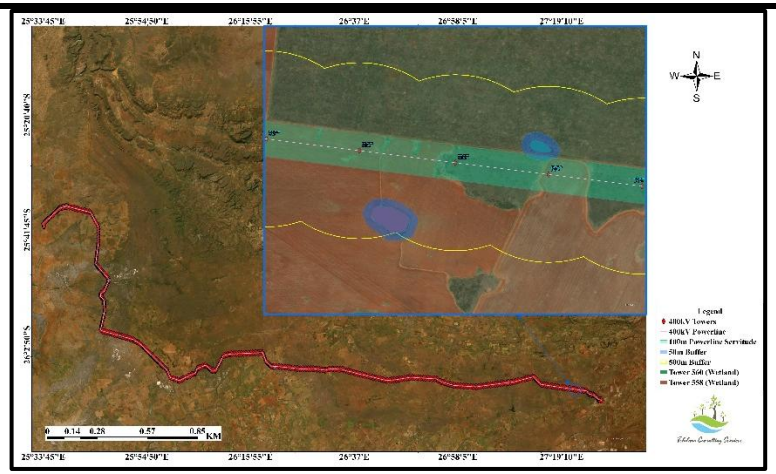
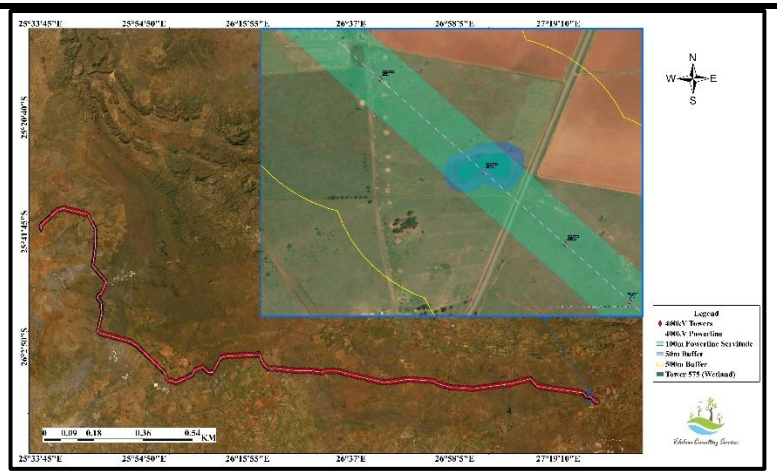

25°33'45"E
25°54'50"E
26°15'55"E
26°37'E
26°58'5"E
27°19'10"E
25°24'20"S
25°41'45"S
26°2'50"S
N
W
E
S
Legend
400kV Towers
400kV Powerline
140m Powerline Servitude
50m Buffer
500m Buffer
Tower 430 (Wetland)
0 0.13 0.25 0.5 0.75 KM


25°33'45"E
25°54'50"E
26°15'55"E
26°37'E
26°58'5"E
27°19'10"E
25°29'48"S
25°41'48"S
26°53'50"S
N
W
E
S
Legend
400kV Towers
400kV Powerline
100m Powerline Servitude
50m Buffer
500m Buffer
Tower 436 (Wetland)
0 0.14 0.28 0.57 0.85 KM


25°33'45"E
25°54'50"E
26°15'55"E
26°37'E
26°58'5"E
27°19'10"E
25°29'48"S
25°41'48"S
26°53'50"S
N
W
E
S
Legend
400kV Towers
400kV Powerline
100m Powerline Servitude
50m Buffer
500m Buffer
Tower 458 (Borrow pit)
0 0.14 0.28 0.57 0.85 KM


25°33'45"E
25°54'50"E
26°15'55"E
26°37'E
26°58'5"E
27°19'10"E
25°29'48"S
25°41'48"S
26°53'50"S
N
W
E
S
Legend
400kV Towers
400kV Powerline
100m Powerline Servitude
50m Buffer
500m Buffer
Tower 493 (Wetland)
0 0.09 0.18 0.36 0.54 KM


25°33'45"E
25°54'50"E
26°15'55"E
26°37'E
26°58'5"E
27°19'10"E
25°29'48"S
25°41'48"S
26°53'50"S
N
W
E
S
Legend
400kV Towers
400kV Powerline
100m Powerline Servitude
50m Buffer
500m Buffer
Tower 537-538 (Wetland)
Tower 535-536 (Wetland)
0 0.14 0.28 0.57 0.85 KM

Appendix 11-E: Specialists Findings Mitigations.

Tower No.	Feature	Impact Risk	Mitigation Measures
6	Wetland (500 m)	Moderate	Manage runoff; avoid unnecessary disturbance and construction camps near the wetland.
11–12	Wetlands (500 m)	Moderate	Maintain natural drainage; avoid unnecessary clearing and disturbance.
26–30	Ramatlabana River (500 m)	High	Maintain natural drainage; implement erosion and sediment control; prevent contamination.
49	Seasonal dam	Moderate	Avoid contamination; no storage, refuelling or waste disposal near the dam.
56	Seasonal dam	Moderate	Minimise disturbance; manage runoff and prevent contamination.

Tower No.	Feature	Impact Risk	Mitigation Measures
104–105	Molopo River	High	Maintain 100 m river buffer; no instream work; implement erosion and pollution controls.
118–119	Seasonal wetland	High	Maintain 50 m wetland buffer; restrict access and rehabilitate disturbed areas.
136–137	Non-perennial stream	Moderate	Maintain 100 m stream buffer; preserve channel integrity and natural flow continuity.
163–164	Farm dam	Moderate	Prevent sedimentation and contamination; maintain natural drainage.
176–177	Modified wetland	Moderate	Maintain 50 m buffer; limit disturbance and control runoff.
180	Wetland	Moderate	Maintain 50 m wetland buffer; manage runoff and avoid unnecessary disturbance.
183, 193	Wetlands	Moderate	Maintain 50 m wetland buffers; avoid disturbance and manage runoff.
198	Seasonal wetland	Moderate	Maintain 50 m wetland buffer; control access and rehabilitate disturbed areas.
199	Wetland (500 m)	Moderate	Manage runoff and avoid activities that could result in indirect impacts.
210	Wetland	Moderate	Maintain 50 m wetland buffer; minimise disturbance and control stormwater runoff.
212	Wetland (500 m)	Moderate	Manage stormwater; maintain natural drainage and avoid indirect disturbance.
215–216	Borrow pit (artificial feature)	Low	Avoid unnecessary disturbance; implement standard erosion and pollution controls.
219–221	Wetland system	High	Maintain 50 m wetland buffer; avoid sensitive areas; restrict machinery and control runoff.
232	Transformed wetland	Moderate	Maintain 50 m wetland buffer; minimise disturbance and rehabilitate affected areas where required.
258	Impounded stream	High	Maintain 100 m stream buffer; preserve the natural flow path and implement erosion and stormwater controls.
280	Borrow pit (artificial feature)	Low	Avoid unnecessary disturbance; implement standard construction controls.

Tower No.	Feature	Impact Risk	Mitigation Measures
308	Depression wetland	High	Maintain 50 m wetland buffer; avoid disturbance and maintain natural drainage.
309, 311	Wetlands (500 m)	Moderate	Control runoff; maintain natural drainage and avoid construction camps near wetlands.
320–321	High-sensitivity wetland	High	Maintain 50 m wetland buffer; strict avoidance of the wetland; specialist supervision during nearby construction activities.
412	Seasonal dam	Moderate	Prevent contamination; manage runoff and avoid unnecessary disturbance.
430	Seasonal wetland	Moderate	Maintain 50 m wetland buffer; restrict access and rehabilitate disturbed areas.
436	Wetland (500 m)	Moderate	Manage runoff and avoid indirect impacts on the wetland.
437–450	Wetland system (500 m)	High	Manage stormwater and erosion; prevent indirect disturbance and contamination.
450	Borrow pit (artificial feature)	Low	Maintain a 15 m site-specific management buffer around the borrow pit; avoid unnecessary disturbance, erosion, sediment mobilisation and contamination.
493	Seasonal wetland	Moderate	Maintain 50 m wetland buffer; manage stormwater and rehabilitate disturbed areas.
500–501	Mooi River	High	Maintain 100 m river buffer; no instream work; implement erosion, sediment and pollution controls.
535–538	Wetland system	High	Maintain 50 m wetland buffer; avoid wetland areas and control runoff.
558, 560	Wetlands (500 m)	Moderate	Manage runoff; maintain natural drainage and prevent indirect impacts.
575	Disturbed wetland	Moderate	Maintain 50 m wetland buffer; avoid further disturbance and rehabilitate degraded areas where required.
540	Wetland	High	Maintain 50 m wetland buffer; avoid disturbance and implement appropriate erosion and stormwater controls.

Appendix 11-F: Section 21(c) & (i) Risk Assessment.

Tower No.	Watercourse / Wetland	Distance Category	Impact Type	Section Triggered	Consequence	Likelihood	Risk (Pre)	Risk Class	Mitigation Measures	Risk (Post)	Risk Class (Post)
6	Wetland	Within 500 m	Indirect	c & i	3	2	6	Moderate	Manage runoff	3	Low
11	Wetland	Within 500 m	Indirect	c & i	3	2	6	Moderate	Control drainage	3	Low
12	Wetland	Within 500 m	Indirect	c & i	3	2	6	Moderate	Control drainage	3	Low
26–30	Ramatlabana River	Within 500 m	Indirect	c & i	4	3	12	High	Maintain buffer; erosion control	6	Moderate
49	Seasonal dam	Outside applicable aquatic buffer	Indirect	c & i	3	3	9	Moderate	Avoid disturbance and contamination	4	Low
56	Seasonal dam	Within 500 m	Indirect	c & i	3	2	6	Moderate	Minimise disturbance	3	Low
104–105	Molopo River	Beyond 100 m	Indirect	c & i	4	3	12	High	Maintain 100 m buffer; erosion and pollution control	8	Moderate
118–119	Seasonal wetland	Beyond 50 m	Indirect	c & i	3	4	12	High	Maintain 50 m buffer; minimise disturbance	6	Moderate
136–137	Stream	Beyond 100 m	Indirect	c & i	3	3	9	Moderate	Maintain flow path and 100 m buffer	4	Low
163–164	Farm dam	Within 500 m	Indirect	c & i	3	2	6	Moderate	Manage runoff	3	Low
176–177	Wetland	Within 500 m	Indirect	c & i	3	3	9	Moderate	Control impacts and drainage	4	Low
180	Wetland	Beyond 50 m	Indirect	c & i	3	2	6	Moderate	Maintain buffer; manage runoff	4	Low
183	Wetland	Within 500 m	Indirect	c & i	3	2	6	Moderate	Manage drainage	3	Low

Tower No.	Watercourse / Wetland	Distance Category	Impact Type	Section Triggered	Consequence	Likelihood	Risk (Pre)	Risk Class	Mitigation Measures	Risk (Post)	Risk Class (Post)
193	Wetland	Within 500 m	Indirect	c & i	3	2	6	Moderate	Manage drainage	3	Low
198	Wetland	Beyond 50 m	Indirect	c & i	3	3	9	Moderate	Maintain buffer; rehabilitation	4	Low
199	Wetland	Within 500 m	Indirect	c & i	3	2	6	Moderate	Manage drainage	3	Low
210	Wetland	Beyond applicable aquatic buffer	Indirect	c & i	3	3	9	Moderate	Minimise disturbance; control stormwater	4	Low
212	Wetland	Within 500 m	Indirect	c & i	3	3	9	Moderate	Stormwater control	4	Low
215–216	Borrow pit – artificial feature	Artificial feature	Indirect / precautionary	N/A	2	2	4	Low	Standard erosion and pollution controls	2	Low
219–221	Wetland system	Beyond 50 m	Indirect	c & i	4	4	16	High	Maintain 50 m buffer; strict avoidance	8	Moderate
232	Transformed wetland	Beyond applicable aquatic buffer	Indirect	c & i	3	2	6	Moderate	Minimise disturbance; rehabilitation	4	Low
258	Impounded stream	Beyond 100 m	Indirect	c & i	3	3	9	Moderate	Maintain flow path; erosion and stormwater control	4	Low
280	Borrow pit – artificial feature	Artificial feature	Indirect / precautionary	N/A	2	2	4	Low	Standard erosion and pollution controls	2	Low
308	Depression wetland	Beyond 50 m	Indirect	c & i	3	4	12	High	Maintain 50 m buffer; avoid disturbance	6	Moderate

Tower No.	Watercourse / Wetland	Distance Category	Impact Type	Section Triggered	Consequence	Likelihood	Risk (Pre)	Risk Class	Mitigation Measures	Risk (Post)	Risk Class (Post)
309	Wetland	Within 500 m	Indirect	c & i	3	3	9	Moderate	Stormwater control	4	Low
311	Wetland	Within 500 m	Indirect	c & i	3	2	6	Moderate	Manage runoff	3	Low
320–321	High-sensitivity wetland	Beyond 50 m	Indirect	c & i	5	3	15	High	Strict avoidance; maintain wetland buffer	6	Moderate
412	Seasonal dam	Outside applicable aquatic buffer	Indirect	c & i	3	3	9	Moderate	Manage runoff; prevent contamination	4	Low
430	Wetland	Beyond 50 m	Indirect	c & i	3	3	9	Moderate	Maintain buffer; rehabilitation	4	Low
436	Wetland	Within 500 m	Indirect	c & i	3	2	6	Moderate	Manage runoff	3	Low
437–450	Wetland system	Within 500 m	Indirect	c & i	4	3	12	High	Maintain buffers; stormwater control	6	Moderate
450	Borrow pit – artificial feature	15 m site-specific management buffer	Precautionary management	N/A	2	2	4	Low	Maintain 15 m setback; control erosion, sediment and contamination	2	Low
493	Wetland	Beyond 50 m	Indirect	c & i	3	3	9	Moderate	Maintain buffer; rehabilitation	4	Low
500–501	Mooi River	Beyond 100 m	Indirect	c & i	5	4	20	Very High	Maintain 100 m buffer; no instream disturbance; erosion control	8	Moderate
535–536	Wetland	Within 500 m	Indirect	c & i	3	3	9	Moderate	Stormwater control	4	Low

Tower No.	Watercourse / Wetland	Distance Category	Impact Type	Section Triggered	Consequence	Likelihood	Risk (Pre)	Risk Class	Mitigation Measures	Risk (Post)	Risk Class (Post)
537–538	Wetland system	Within 500 m	Indirect	c & i	4	3	12	High	Maintain buffers; control runoff	6	Moderate
558	Wetland	Within 500 m	Indirect	c & i	3	2	6	Moderate	Minimise disturbance	3	Low
560	Wetland	Within 500 m	Indirect	c & i	3	3	9	Moderate	Manage drainage	4	Low
575	Wetland	Beyond 50 m	Indirect	c & i	4	2	8	Moderate	Maintain buffer; limit disturbance	6	Moderate
540	Wetland	Beyond 50 m	Indirect	c & i	4	3	12	High	Maintain 50 m buffer; erosion and stormwater control	6	Moderate

Appendix 11-G: Author and Reviewer CVs.

CV OF AUTHOR (HYDROLOGY / WETLAND SPECIALIST)

CURRICULUM VITAE

MAPHAHA KHULISO COLLEN

Professional Natural Scientist (Pr.Sci.Nat)

SACNASP Registration No.: 130272

Hydrologist

PERSONAL DETAILS

Full Name: Maphaha Khuliso Collen

Nationality: South African

Profession: Hydrologist / Environmental Scientist

Current Position: Director & Lead Hydrologist

Company: Tshilimo Consulting Services (Pty) Ltd

Company Registration: 2021/969303/07

Address: 733 Kendall Avenue, Wolmer, Pretoria, 0182

Contact Number: 061 417 7904

Email: khuliso@tshilimoconsulting.co.za

PROFESSIONAL SUMMARY

Maphaha Khuliso Collen is a registered Professional Natural Scientist (Pr.Sci.Nat) with SACNASP and the Director of Tshilimo Consulting Services (Pty) Ltd. He is a highly experienced hydrologist and environmental specialist with extensive practical and professional expertise in hydrology, geohydrology, aquatic biodiversity, wetland delineation, floodline determination, and Water Use Licence Application (WULA)-related studies. He has led and authored numerous specialist assessments for mining, infrastructure, energy, municipal, and industrial developments across South Africa, working in close alignment with NEMA, the National Water Act, and associated DFFE, DWS, and DMRE regulatory frameworks.

PROFESSIONAL REGISTRATIONS

South African Council for Natural Scientific Professions (SACNASP)

Registration: Pr.Sci.Nat: 130272

EDUCATIONAL QUALIFICATIONS

Bachelor of Earth Sciences (Hydrology & Water Resources)

University of Venda (UNIVEN)

Completed: 2018

CORE AREAS OF EXPERTISE

Surface Water Hydrology

Geohydrological Impact Assessments (GHIA)

Groundwater Monitoring & Assessment

MODFLOW Numerical Groundwater Modelling (ModelMuse)

Aquatic Biodiversity Assessments (GN 320)

Wetland Delineation & Functional Assessment (WET-Health, WET-EcoServices)

Floodline Determination (HEC-RAS)

Water Use Licence Applications (Section 21(c) & (i))

Risk Assessment Matrices & Compliance Statements

Wetland Rehabilitation & Offset Planning

Environmental Impact Assessments (EIA & BAR)

PROFESSIONAL EXPERIENCE

Director & Lead Hydrologist

Tshilimo Consulting Services (Pty) Ltd | 2021 - Present

Founder and Director of a Level 1 B-BBEE environmental consulting firm.

Leads hydrological, geohydrological, aquatic and wetland specialist studies nationwide.

Acts as independent specialist for EIAs, BARs, WULAs, and Mining Right Applications.

Oversees technical quality assurance, specialist sign-off, and regulatory alignment.

TECHNICAL SOFTWARE & TOOLS

ModelMuse (MODFLOW 6 & MODFLOW-2005)

HEC-RAS & HEC-HMS

ArcGIS Pro & QGIS

SWAT & SWMM (working knowledge)

Microsoft Office Suite

PROFESSIONAL ATTRIBUTES

Strong regulatory interpretation and compliance skills

Extensive field-based assessment experience

Proven report writing and specialist sign-off capability

High level of professional integrity and independence

Experienced in multidisciplinary project coordination

AVAILABILITY

Available for hydrological, geohydrological, aquatic and wetland specialist appointments nationwide.

PROJECTS UNDERTAKEN BY

Maphaha Khuliso Collen (Pr.Sci.Nat - SACNASP 130272)

Mining & Prospecting Projects

Geohydrological Impact Assessment (GHIA) – Heavy Mineral Sands Project from Alexander Bay to Port Nolloth, Northern Cape

Role: Author & Field Specialist (MODFLOW numerical modelling, baseline assessment)

Wetland Impact Assessment – Vast Mineral Sands (Pty) Ltd, Richtersveld, Northern Cape

Role: Independent Specialist Reviewer & Signatory (EA, WML & WULA support)

Wetland Impact Assessment & Rehabilitation Plan - Bila Chrome Mine, Mooinooi, North West.

Role: Lead Specialist & Field Specialist

Groundwater Monitoring Programme - Leeuwpoort Landfill Site, Emalahleni, Mpumalanga

Role: Author & Field Specialist

Powerline & Energy Infrastructure Projects

Aquatic & Wetland Assessment - Aurora–Juno 400kV Transmission Line, Western Cape

Role: Author & Field Specialist

Wetland & Aquatic Impact Assessment - Demeter–Lulamisa 400kV Powerlines, Gauteng

Role: Author & Field Specialist

Surface Water Impact Assessment -Tabor-Nzhelele 400kV Powerline, Limpopo

Role: Author & Field Specialist

Aquatic & Wetland Assessments - Multiple Eskom / NTCSA powerline and substation projects across Gauteng, Limpopo, Western Cape, Mpumalanga

Role: Author & Field Specialist

Roads & Transport Infrastructure

Aquatic Biodiversity Compliance Statement & Section 21(c) and (i) Risk Matrix -

SANRAL N14 Section 13 Road Upgrade, North West

Role: Author & Field Specialist

Aquatic Biodiversity Theme Compliance Statement -N18 Sections 3, 5 & 6 Road Upgrade, North West

Role: Author & Field Specialist

Surface Water Impact Assessment & Walkdown Report - Road & linear infrastructure projects

Role: Author & Field Specialist

Floodline & Hydrological Studies

Floodline Assessment (1:50 & 1:100 year) – Barkly West Development (Erf 711 & 4005), Northern Cape

Role: Lead Hydrologist & Field Specialist

Floodline Assessment - Winterveld & Soshanguve Water and Sewer Pipeline, City of Tshwane

Role: Lead Hydrologist & Field Specialist

Floodline Determination & Hydrological Assessments - Various municipal infrastructure projects

Role: Lead Hydrologist

Industrial, Port & Urban Developments

Aquatic & Wetland Assessment - Port of East London Security Fencing & Access Road Upgrade, Eastern Cape

Role: Lead Specialist & Field Specialist

Wetland Offset Study - Richards Bay Industrial Development Zone (RBIDZ), KwaZulu-Natal

Role: Lead Specialist & Field Specialist (SANBI Offset Guidelines)

Water Use Licence & Compliance Support

Section 21(c) and (i) Risk Assessments - Multiple projects nationwide

Aquatic Biodiversity Compliance Statements (GN 320)

Wetland Delineations, PES, EIS & Buffer Determinations

Groundwater & Surface Water Monitoring Programmes

Role across all: Independent Specialist, Author, Field Specialist & Signatory

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General Scope Across All Projects

Wetland delineation and classification

Aquatic biodiversity assessments (GN 320)

Hydrological and geohydrological modelling

MODFLOW numerical groundwater modelling

Floodline determination (HEC-RAS)

WULA and DMRE regulatory support

Specialist reporting and authority-ready documentation

SWAT & SWMM (working knowledge)

REFERENCES

Available on request.

SACNASP

South African Council for Natural Scientific Professions

herewith certifies that

Khuliso Collen Maphaha

Registration Number: 130272

is a registered scientist

in terms of section 20(3) of the Natural Scientific Professions Act, 2003
(Act 27 of 2003)
in the following field(s) of practice (Schedule 1 of the Act)

Environmental Science (Professional Natural Scientist)

Effective **3 March 2021** Expires **31 March 2027**



President of Council

Chief Executive Officer

To verify this certificate scan this code

CV OF AUTHOR (INDEPENDENT AQUATIC BIODIVERSITY REVIEWER)

CURRICULUM VITAE

TAKALANI MUDAU

Professional Natural Scientist (Pr.Sci.Nat.) - Ecological Science

SACNASP Registration No.: 117970

EAPASA Registration No.: 2019/1859

PERSONAL DETAILS

Full Name: Takalani Mudau

Nationality: South African

Profession: Ecologist / Aquatic Biodiversity Specialist

Current Position: Managing Director – Mveledzo Environmental & Safety Solutions

Contact Number: 081 434 4234

Email: mudaut2010@gmail.com

Driver's Licence: Code 10 (C1)

PROFESSIONAL SUMMARY

Takalani Mudau is a registered Professional Natural Scientist (Pr.Sci.Nat.) in Ecological Science with SACNASP and a registered Environmental Assessment Practitioner (EAPASA). He has extensive experience in aquatic biodiversity assessments, freshwater ecology, wetland rehabilitation, river health monitoring, environmental audits, and regulatory compliance studies in terms of NEMA and the National Water Act.

He has conducted and reviewed numerous ecological and aquatic assessments for mining, infrastructure, municipal, and industrial developments across South Africa.

PROFESSIONAL REGISTRATIONS

South African Council for Natural Scientific Professions (SACNASP)

Registration: Pr.Sci.Nat. - Ecological Science

Reg. No.: 117970

Environmental Assessment Practitioners Association of South Africa (EAPASA)

Registration No.: 2019/1859

EDUCATIONAL QUALIFICATIONS

Bachelor of Science Honours in Botany

University of Venda

Major subjects included:

Plant Ecology

Freshwater Ecology

Plant Ecophysiology

Ethnobotany

Research Methodology

Bachelor of Science in Environmental Sciences

University of Venda

Major subjects included:

Conservation Biology

Ecology (Plant & Animal)

Zoology

Limnology (Freshwater Ecology)

Cell Biology

Animal Phylogeny

CORE AREAS OF EXPERTISE

Aquatic Biodiversity Assessments (GN 320)

Freshwater Ecology & Limnology

SASS5 River Health Sampling

Wetland Delineation & Rehabilitation

Riparian Vegetation Assessment

Ecological Impact Assessments (EIA & BAR)

Environmental Management Programmes (EMPr)

Water Use Licence Applications (WULA)

Aquatic Monitoring & River Management

Alien Invasive Plant Studies

Environmental Auditing & Compliance Monitoring

Water Quality Monitoring (pH, EC, Nitrates, E. coli)

PROFESSIONAL EXPERIENCE

Managing Director

Mveledzo Environmental & Safety Solutions

August 2021 - Present

Responsibilities include:

Leading ecological and aquatic biodiversity studies

Conducting wetland rehabilitation and maintenance

Preparing EMPr and compliance reports

Environmental audits and mine performance assessments

Water use licence applications and monitoring

Contaminated land assessment and rehabilitation

Project Leader

Divhani Environmental & Engineering Solutions

July 2017 - July 2021

Responsibilities included:

Biodiversity assessments for developments

Alien plant studies

Wetland rehabilitation

Environmental authorisation applications

ECO services and safety audits

Aquatic monitoring and river health assessments

Ecological, Bio-Aquatic & Project Intern

Johannesburg City Parks & Zoo

August 2014 - July 2015

Key functions:

SASS5 macroinvertebrate sampling

Wetland rehabilitation

Aquatic monitoring and river management

Bio-monitoring of freshwater systems

Dam and impoundment management

Research & Laboratory Support

University of Venda

2012 - 2013

Water quality analysis (pH, EC, turbidity, nitrates, orthophosphate, E. coli)

Wetland and river health assessments

Ecological field data collection

Herbarium specimen preparation

TECHNICAL SKILLS

SASS5 sampling methodology

Wetland delineation techniques

Aquatic ecosystem integrity assessment

Environmental legislation interpretation (NEMA, NWA, NEMBA, MPRDA)

Report writing & scientific data analysis

Project management and environmental auditing

MS Office Suite

PROFESSIONAL ATTRIBUTES

Strong leadership and organisational skills

Advanced scientific report writing capability

Regulatory compliance expertise

Multidisciplinary coordination

High professional integrity and independence

REFERENCES

Available upon request.

SACNASP

South African Council for Natural Scientific Professions

herewith certifies that

Takalani Mudau

Registration Number: 117970

is a registered scientist

in terms of section 20(3) of the Natural Scientific Professions Act, 2003
(Act 27 of 2003)
in the following field(s) of practice (Schedule 1 of the Act)

Ecological Science (Professional Natural Scientist)

Effective **24 January 2018** Expires **31 March 2027**



President of Council

Chief Executive Officer

To verify this certificate scan this code

Appendix 11-H: Specialist Declaration form.

forestry, fisheries & the environment

Department:
Forestry, Fisheries and the Environment
REPUBLIC OF SOUTH AFRICA

Private Bag X447, Pretoria, 0001, Environment House, 473 Steve Biko Road, Pretoria, 0002 Tel: +27 12 399 9000, Fax: +27 86 625 1042

SPECIALIST DECLARATION FORM – AUGUST 2023

Specialist Declaration form for assessments undertaken for application for authorisation in terms of the National Environmental Management Act, Act No. 107 of 1998, as amended and the Environmental Impact Assessment (EIA) Regulations, 2014, as amended (the Regulations)

REPORT TITLE
Aquatic and Wetland Assessment for the Proposed Transmission Line and Associated Infrastructure (Tower 1 to Pluto Substation)

Kindly note the following:

1. This form must always be used for assessment that are in support of applications that must be subjected to Basic Assessment or Scoping & Environmental Impact Reporting, where this Department is the Competent Authority.
2. This form is current as of August 2023. It is the responsibility of the Applicant / Environmental Assessment Practitioner (EAP) to ascertain whether subsequent versions of the form have been published or produced by the Competent Authority. The latest available Departmental templates are available at https://www.dffe.gov.za/documents/forms.
3. An electronic copy of the signed declaration form must be appended to all Draft and Final Reports submitted to the department for consideration.
4. The specialist must be aware of and comply with *'the Procedures for the assessment and minimum criteria for reporting on identified environmental themes in terms of sections 24(5)(a) and (h) and 44 of the act, when applying for environmental authorisation - GN 320/2020)'*, where applicable.

1. SPECIALIST INFORMATION

Title of Specialist Assessment	Aquatic and Wetland Assessment
Specialist Company Name	Tshilimo Consulting Services (Pty) Ltd
Specialist Name	Khuliso Collen Maphaha
Specialist Identity Number	8806255879084
Specialist Qualifications:	BSc Earth Sciences (Hydrology and Water Resources)
Professional affiliation/registration:	SACNASP (Reg. No. 130272)
Physical address:	733 Kendall Ave, Pretoria North, Wolmer, 0182
Postal address:	733 Kendall Ave, Pretoria North, Wolmer, 0182
Postal address	733 Kendall Ave, Pretoria North, Wolmer, 0182
Telephone	+27 68 904 9912
Cell phone	+27 61 417 7904
E-mail	khuliso@tshilimoconsulting.co.za

B·L

SPECIALIST DECLARATION FORM – AUGUST 2023

3. UNDERTAKING UNDER OATH/ AFFIRMATION

MAPHAHA KHULISO COLLEN

I, _ Click or tap here to enter text._____, swear under oath / affirm that all the information submitted or to be submitted for the purposes of this application is true and correct.

Signature of the Specialist

TSHILIMO CONSULTANCY SERVICES

Click or tap here to enter text.

Name of Company

23/04/2026

Click or tap here to enter text.

Date

2026/04/23

Click or tap here to enter text.

Signature of the Commissioner of Oaths

7201518-6 Constable Dobelo R.L

Click or tap to enter a date.

Date

SUID-AFRIKAANSE POLISIEDIENS
PRETORIA NOORD
2026 -04- 23
PRETORIA NORTH
COMMUNITY SERVICE CENTRE
SOUTH AFRICA POLICE SERVICE

SPECIALIST DECLARATION FORM – AUGUST 2023

2. DECLARATION BY THE SPECIALIST

I, MAPHAHA KHULISO COLLEN declare that –

- I act as the independent specialist in this application;
- I am aware of the procedures and requirements for the assessment and minimum criteria for reporting on identified environmental themes in terms of sections 24(5)(a) and (h) and 44 of the National Environmental Management Act (NEMA), 1998, as amended, when applying for environmental authorisation which were promulgated in Government Notice No. 320 of 20 March 2020 (i.e. "the Protocols") and in Government Notice No. 1150 of 30 October 2020.
- 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 Act, Regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, Regulations and all other applicable legislation;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing –
  - any decision to be taken with respect to the application by the competent authority; and;
  - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- All the particulars furnished by me in this form are true and correct; and
- I realise that a false declaration is an offence in terms of Regulation 48 and is punishable in terms of section 24F of the NEMA Act.

Signature of the Specialist

TSHILIMO CONSULTING SERVICES (PTY) LTD

Name of Company:

23/04/2026

Date

R.L

forestry, fisheries
& the environment
Department:
Forestry, Fisheries and the Environment
REPUBLIC OF SOUTH AFRICA

Private Bag X447, Pretoria, 0001, Environment House, 473 Steve Biko Road, Pretoria, 0002 Tel: +27 12 399 9000, Fax: +27 86 625 1042

SPECIALIST DECLARATION FORM – AUGUST 2023

Specialist Declaration form for assessments undertaken for application for authorisation in terms of the National Environmental Management Act, Act No. 107 of 1998, as amended and the Environmental Impact Assessment (EIA) Regulations, 2014, as amended (the Regulations)

REPORT TITLE
Aquatic Biodiversity and Surface Water Impact Assessment

Kindly note the following:

1. This form must always be used for assessment that are in support of applications that must be subjected to Basic Assessment or Scoping & Environmental Impact Reporting, where this Department is the Competent Authority.
2. This form is current as of August 2023. It is the responsibility of the Applicant / Environmental Assessment Practitioner (EAP) to ascertain whether subsequent versions of the form have been published or produced by the Competent Authority. The latest available Departmental templates are available at https://www.dffe.gov.za/documents/forms.
3. An electronic copy of the signed declaration form must be appended to all Draft and Final Reports submitted to the department for consideration.
4. The specialist must be aware of and comply with *'the Procedures for the assessment and minimum criteria for reporting on identified environmental themes in terms of sections 24(5)(a) and (h) and 44 of the act, when applying for environmental authorisation - GN 320/2020)'*, where applicable.

1. SPECIALIST INFORMATION

Title of Specialist Assessment	Aquatic Biodiversity and Surface Water Impact Assessment and Sensitivity Verification Report
Specialist Company Name	Mveledzo Environmental & Safety Solutions
Specialist Name	Takalani Mudau
Specialist Identity Number	8810025446083
Specialist Qualifications:	BSc Environmental Sciences (University of Venda), BSc Honours in Botany (University of Venda) – including Freshwater Ecology & Limnology
Professional affiliation/registration:	Professional Natural Scientist (Pr.Sci.Nat.) – Ecological Science (SACNASP Registration No.: 117970)
Physical address:	136 2nd St, Randjespark, Midrand, 1685
Postal address:	136 2nd St, Randjespark, Midrand, 1685
Postal address	136 2nd St, Randjespark, Midrand, 1685
Telephone	012 065 0999
Cell phone	081 434 4234
E-mail	Mudaut2010@gmail.com

SPECIALIST DECLARATION FORM – AUGUST 2023

2. DECLARATION BY THE SPECIALIST

I, Takalani Mudau declare that –

- I act as the independent specialist in this application;
- I am aware of the procedures and requirements for the assessment and minimum criteria for reporting on identified environmental themes in terms of sections 24(5)(a) and (h) and 44 of the National Environmental Management Act (NEMA), 1998, as amended, when applying for environmental authorisation which were promulgated in Government Notice No. 320 of 20 March 2020 (i.e. "the Protocols") and in Government Notice No. 1150 of 30 October 2020.
- 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 Act, Regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, Regulations and all other applicable legislation;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing –
  - any decision to be taken with respect to the application by the competent authority; and;
  - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- All the particulars furnished by me in this form are true and correct; and
- I realise that a false declaration is an offence in terms of Regulation 48 and is punishable in terms of section 24F of the NEMA Act.

Signature of the Specialist

Mveledzo Environmental & Safety Solutions

Name of Company:

12 Feb 2026

Date

SPECIALIST DECLARATION FORM – AUGUST 2023

3. UNDERTAKING UNDER OATH/ AFFIRMATION

I, Mudzadi Tshikalanga, swear under oath / affirm that all the information submitted or to be submitted for the purposes of this application is true and correct.

Signature of the Specialist

Mveledzo Environmental & Safety Solutions

Name of Company

12/02/2026

Date

7256206 4
CST
MAMELO

Click or tap here to enter text.

Signature of the Commissioner of Oaths

2026-02-12

Click or tap to enter a date.

Date

SUID-AFRIKAANSE POLISIEDIENS
PRETORIA NOORD
2026 -02- 12
PRETORIA NORTH
COMMUNITY SERVICE CENTRE
SOUTH AFRICA POLICE SERVICE