SURFACE WATER IMPACT ASSESSMENT AND WALKDOWN REPORT/ COMPLIANCE STATEMENT

PROPOSED BORUTHO-NZHELELE 400kv POWERLINE WITHIN MOGALAKWENA LOCAL MUNICIPALITY UNDER WATERBERG DISTRICT, BLOUBERG, MOLEMOLE AND POLOKWANE LOCAL MUNICIPALITIES UNDER CAPRICORN DISTRICT, MAKHADO AND MUSINA LOCAL MUNICIPALITIES UNDER VHEMBE DISTRICT, LIMPOPO PROVINCE.

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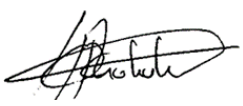
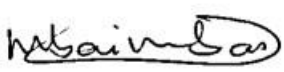
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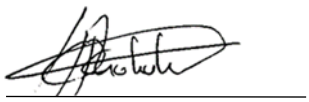
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Name	Responsibility	Signature	Date
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DECLARATION

I Maphaha Khuliso Collen, declare that:

- I act as the independent wetland specialist in this matter;
- I do not have and will not have any vested interest (either business, financial, personal or other) in the undertaking of the proposed activity, other than remuneration for work performed in terms of the Environmental Impact Assessment Regulations, 2014;
- 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 National Environmental Management Act (Act 107 of 1998), (NEMA), regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the NEMA Act, regulations and all other applicable legislation;
- As a registered member of the South African Council for Natural Scientific Professions in terms of the Natural Scientific Professions Act, 2003 (Act No. 27 of 2003), I will undertake my professional duties in accordance with the Code of Conduct of the Council, as well as any other societies of which I am a member; and
- 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 report are true and correct.



Signature of the specialist:

Date: 05/02/2025

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INDEMNITY

This report is based on survey and assessment techniques which are limited by time and budgetary Constraints relevant to the type and level of investigation undertaken. The findings, results, observations, conclusions and recommendations given in this report are based on the author's best scientific and professional knowledge as well as information available at the time of study. Although the author exercised due care and diligence in rendering services and preparing documents, he accepts no liability, and the client, by receiving this document, indemnifies the author against all actions, claims, demands, losses, liabilities, costs, damages and expenses arising from or in connection with services rendered, directly or indirectly by the author and by the use of this document.

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EXECUTIVE SUMMARY

This Surface Water Impact Assessment and Walkdown Report was prepared by Tshilimo Consulting Services (Pty) Ltd on behalf of Vhubvo Consultancy cc for the National Transmission Company of South Africa (NTCSA). The report supports the Basic Assessment Report (BAR) and tower-specific Environmental Management Programme (EMPr) for the proposed Borutho–Nzhelele 400 kV powerline, which spans approximately 250 km across six municipalities in Limpopo Province, including sensitive aquatic ecosystems.

The primary objective of the study was to identify and assess the potential impacts of the proposed powerline on surface water features such as rivers, streams, wetlands, and riparian zones and to provide appropriate site-specific mitigation measures in compliance with Government Notice 320 of March 2020 (Aquatic Biodiversity Protocols), the National Environmental Management Act (Act 107 of 1998), and the National Water Act (Act 36 of 1998).

A combination of desktop analysis (including the DFFE Screening Tool and NFEPA database) and an April 2024 walkdown field assessment was used to verify the presence, type, and ecological condition of all watercourses within 500 meters of the proposed tower footprints. The field assessment confirmed the presence of multiple seasonal rivers, depression and seep wetlands, and borrow pits, many of which exhibit varying levels of ecological disturbance, especially during the dry season.

The Present Ecological Status (PES) of the identified systems ranged from moderately modified (Category C) to seriously modified (Category E), with degradation largely driven by erosion, sand mining, overgrazing, and historic soil extraction. Systems like the Matlala River and Sand River were rated as having High Ecological Importance and Sensitivity (EIS) due to their structural integrity and role in maintaining biodiversity, while others such as wetlands at Towers 99 and 73 were more degraded but potentially restorable.

A DWS Risk Assessment Matrix was used to evaluate pre- and post-mitigation risk ratings, showing that risks can be reduced from Moderate or High to Low through appropriate interventions. These include enforcing 32 to 100-meter buffer zones, controlling erosion, restoring vegetation, and regulating construction near sensitive areas.

The study concludes that while the project traverses ecologically sensitive areas, the potential surface water impacts are manageable. With proper mitigation, buffer zone enforcement, and adherence to site-specific EMPr measures, the project can proceed without significant long-term effects on aquatic biodiversity or ecosystem function. Recommendations focus on compliance with DWS and LEDET guidelines, rehabilitation of degraded wetlands, and ongoing monitoring to ensure ecological sustainability.

1. INTRODUCTION

Tshilimo Consulting Services (Pty) Ltd was appointed by Vhubvo Consultancy cc, on behalf of the National Transmission Company of South Africa (NTCSA), to compile and update this Surface Water Impact Assessment and Walkdown Report. The purpose of this report is to inform the Basic Assessment Report (BAR) and tower-specific Environmental Management Programme (EMPr) for the proposed Borutho–Nzhelele 400 kV powerline project, located in Limpopo Province.

This report is an update and continuation of our original field-based aquatic assessment, conducted between 26 and 30 April 2024. All fieldwork, data interpretation, and specialist inputs were undertaken directly by the authors. The document has been revised to ensure alignment with the Protocol for the Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on Aquatic Biodiversity (Government Notice 320 of 2020).

The study area intersects numerous sensitive aquatic ecosystems, including NFEPA-listed rivers and wetlands, and was confirmed to have a Very High Aquatic Biodiversity Sensitivity through both the DFFE Screening Tool and site-specific verification. As such, this report is submitted as a Specialist Aquatic Impact Assessment Report, in line with the requirements of GN 320 of 2020.

In addition to protocol alignment, this report considers the latest regulatory framework under the National Water Act (Act No. 36 of 1998), specifically General Notice 4167 of 2023, which outlines the conditions under which General Authorisations (GAs) apply to water use activities, including those associated with electricity transmission infrastructure. Where tower placements or construction activities are proposed within regulated areas (e.g., within 32 m of a watercourse), this notice will guide the assessment of whether a WULA is required or a GA applies.

All findings presented in this report are considered valid within the two-year timeframe stipulated by DFFE for specialist studies. This assessment has been prepared independently and objectively by a SACNASP-registered professional, in full compliance with applicable environmental legislation and protocols.

1.1. Background

The proposed Borutho–Nzhelele 400 kV powerline spans approximately 250 kilometres, extending across several district and local municipalities in Limpopo Province. The project is a strategic national intervention by NTCSA aimed at improving electricity transmission capacity and supporting South Africa’s broader energy security objectives, including addressing persistent load shedding challenges.

The alignment traverses a variety of terrestrial and aquatic environments, including rivers, ephemeral streams, and wetlands. These watercourses vary in condition from moderately to highly modified, and many are situated within Critical Biodiversity Areas (CBAs) or Ecological Support Areas (ESAs). Given this environmental context, the project triggers the need for a specialist-level assessment of potential surface water impacts as per Government Notice 320 of March 2020.

Tshilimo Consulting Services conducted a detailed walkdown assessment in April 2024 along the proposed alignment, with the aim of:

- Verifying the sensitivity of aquatic features identified through desktop tools;
- Assessing the Present Ecological Status (PES) and Ecological Importance and Sensitivity (EIS) of watercourses within 500 m of tower locations;
- Recommending site-specific mitigation and buffer zones;
- And evaluating the applicability of regulatory triggers under the National Water Act and relevant General Authorisations (now GN 4167 of 2023).

This report therefore forms a key specialist input into the environmental assessment and authorisation process for the project.

1.2. Scope of work

The scope of work includes the following components:

- Site Sensitivity Verification
  - Verification of site-specific environmental conditions to determine whether an Impact Assessment Report or a Compliance Statement is required.
- Regional and Site-Specific Environmental Information
  - Identification of hydrological features (rivers, wetlands, streams) within 500m of the powerline/tower footprints.
  - Mapping of buffer zones (50m for wetlands, 100m for rivers).
  - Analysis of the Present Ecological Status (PES) and Ecological Importance and Sensitivity (EIS) of watercourses.
- Impact Assessment
  - Evaluation of potential impacts of the powerline on surface water resources during construction and operational phases.
  - Cumulative impact assessment, considering similar infrastructure (e.g., powerlines and renewable energy plants within a 30 km radius).
- Tower-Specific Mitigation Measures
  - Based on the April 2024 walkdown survey, site-specific recommendations for tower locations within or near watercourses.
  - Mitigation strategies to reduce potential hydrological and ecological impacts.
- Regulatory Compliance
  - Ensuring that the assessment aligns with Government Notice 320 of March 2020 (specialist assessment protocols for aquatic biodiversity impacts).
  - Compliance with National Water Act (NWA) (Act 36 of 1998) and National Environmental Management Act (NEMA) (Act 107 of 1998).

1.3. Report Limitations

This report is based on an independent, field-based walkdown assessment conducted by Tshilimo Consulting Services (Pty) Ltd between 26 and 30 April 2024. All fieldwork, data interpretation, and report compilation were undertaken by the appointed specialist team, and all findings are derived from first-hand observations unless otherwise referenced.

The following limitations are acknowledged:

- Seasonal Timing: The site assessment was conducted during the dry season, which limited the availability of visible hydrological indicators such as standing water, saturated soils, or hydrophytic vegetation. As a result, the classification of certain wetland types and assessments of functionality were constrained by the lack of active water presence during fieldwork.
- Restricted Access in Certain Areas: While the majority of accessible tower sites and buffer zones were surveyed, a few watercourses and tower locations located in remote or privately restricted areas could not be physically accessed. These features were still delineated and assessed using satellite imagery, the DFFE Screening Tool, and the NFEPA and NBA databases, supported by professional interpretation.
- Linear Project Extent: Given the 250 km linear alignment, it was not feasible to survey every point along the route. The walkdown prioritized towers and areas within 500 m of mapped watercourses, especially those flagged by the Screening Tool as having Medium to Very High sensitivity. Minor unmapped drainage lines may exist but are unlikely to significantly affect the overall findings.
- Temporal Validity: This report remains valid for a period of two years from the date of the site visit, in accordance with DFFE guidance. Should construction be delayed significantly beyond that window, a re-verification of site conditions may be necessary.

Despite these limitations, the findings are considered robust, and the assessment is compliant with the content and methodological requirements of the Aquatic Biodiversity Protocol (GN 320 of 2020), as well as relevant sections of the National Water Act (Act 36 of 1998) and General Notice 4167 of 2023.

2. PHYSICAL ENVIRONMENT

2.1. Locality

The proposed Borutho–Nzhelele 400 kV powerline project is located in Limpopo Province, South Africa, spanning approximately 250 km from the Borutho Substation (near Polokwane) to the Nzhelele Substation (near Musina). The alignment crosses three district municipalities (Vhembe, Capricorn, and Waterberg) and intersects six local municipalities:

- Vhembe District: Musina and Makhado Local Municipalities
- Capricorn District: Blouberg, Molemole, and Aganang (now part of Polokwane)
- Waterberg District: Mogalakwena Local Municipality

The route traverses rural and semi-natural areas, agricultural lands, and ecologically sensitive zones, including watercourses and wetlands of regional importance.

2.2. Vegetation

The project area lies entirely within the Savanna Biome, known for its grassy ground layer and scattered woody vegetation. It intersects two bioregions: the Mopane Bioregion in the north and the Central Bushveld Bioregion in the central and southern sections.

Vegetation by Municipality:

- Musina: Musina Mopane Bushveld (Mopane Bioregion)
- Makhado: Musina Mopane, Makhado Sweet, and Limpopo Sweet Bushveld (Central Bushveld)
- Blouberg: Makhado Sweet Bushveld (Central Bushveld)
- Molemole: Makhado Sweet Bushveld (Central Bushveld)
- Aganang: Makhado Sweet and Polokwane Plateau Bushveld (Central Bushveld)
- Mogalakwena: Makhado Sweet and Polokwane Plateau Bushveld (Central Bushveld)

Riparian areas and wetlands support more hydrophilic species, including Phragmites, Typha, and various sedges and grasses. Disturbance from grazing, agriculture, and erosion is common in several sections of the alignment.

2.3. Geology and Soil

The alignment cuts across a range of geological formations, influencing the underlying soil profiles and hydrological response of the landscape.

Geology by Municipality:

- Musina: Gumbu Group and Ecca Group
- Makhado: Gumbu Group, Malala Drift, Letaba Formation, Alldays Gneiss
- Blouberg: Clarens Formation, Alldays Gneiss, Bandelierkop and Hout River Gneiss
- Molemole: Hout River Gneiss and Bandelierkop
- Aganang: Hout River Gneiss
- Mogalakwena: Hout River Gneiss

Soil types vary from shallow, stony soils on gneiss and basalt to deeper clays and loams in low-lying areas. Areas underlain by basalts (Letaba Formation) and gneiss tend to produce

moderately fertile, erosion-prone soils, especially on disturbed slopes. Soil characteristics directly influence wetland persistence and erosion potential along the alignment.

2.4. Hydrology

The project crosses several NFEPA-classified rivers and wetlands, along with a network of seasonal drainage lines. All hydrological features fall within the Limpopo Water Management Area (WMA 1) and several key quaternary catchments.

Wetlands and Rivers by Municipality:

- Musina: Seepage wetlands (Catchments A71K, A72B)
- Makhado: Channeled valley-bottom wetlands, Sand River, Brak River, and an unnamed tributary of Sand River (Catchments A80F, A71J, A71G, A72A)
- Blouberg: Brak River (Catchments A72A, A72B, A62H)
- Molemole: Flat and depression wetlands, Mogwatsane River (Catchments A71G, A71E)
- Aganang: Seep and depression wetlands, Tshipu, Seokeng, and Matlala Rivers (Catchments A62H, A62E)
- Mogalakwena: Ephemeral channels and drainage lines (Catchment A61G)

These systems support aquatic biodiversity, seasonal water storage, and erosion control, and serve as important tributaries to larger perennial rivers like the Limpopo River, which receives water from the broader basin. Many of these rivers and wetlands were observed to be dry during the April 2024 walkdown, yet retained morphological and ecological characteristics indicative of seasonal flow and hydrological function.

2.5. Topography and Drainage

The route spans a significant elevation gradient, ranging from approximately 2,040 m above sea level in Mogalakwena to 330 m in Musina. The general drainage direction is northward, ultimately flowing into the Limpopo River, which forms the international boundary with Zimbabwe.

Topographically, the terrain is largely gently undulating, with low ridges, shallow valleys, and scattered rocky outcrops. Numerous seasonal drainage lines were recorded during the field assessment, many of which serve as headwater tributaries to perennial systems like the Sand River. These seasonal systems play a key role in flow attenuation, sediment transport, and aquatic connectivity, particularly during the summer rainfall season.

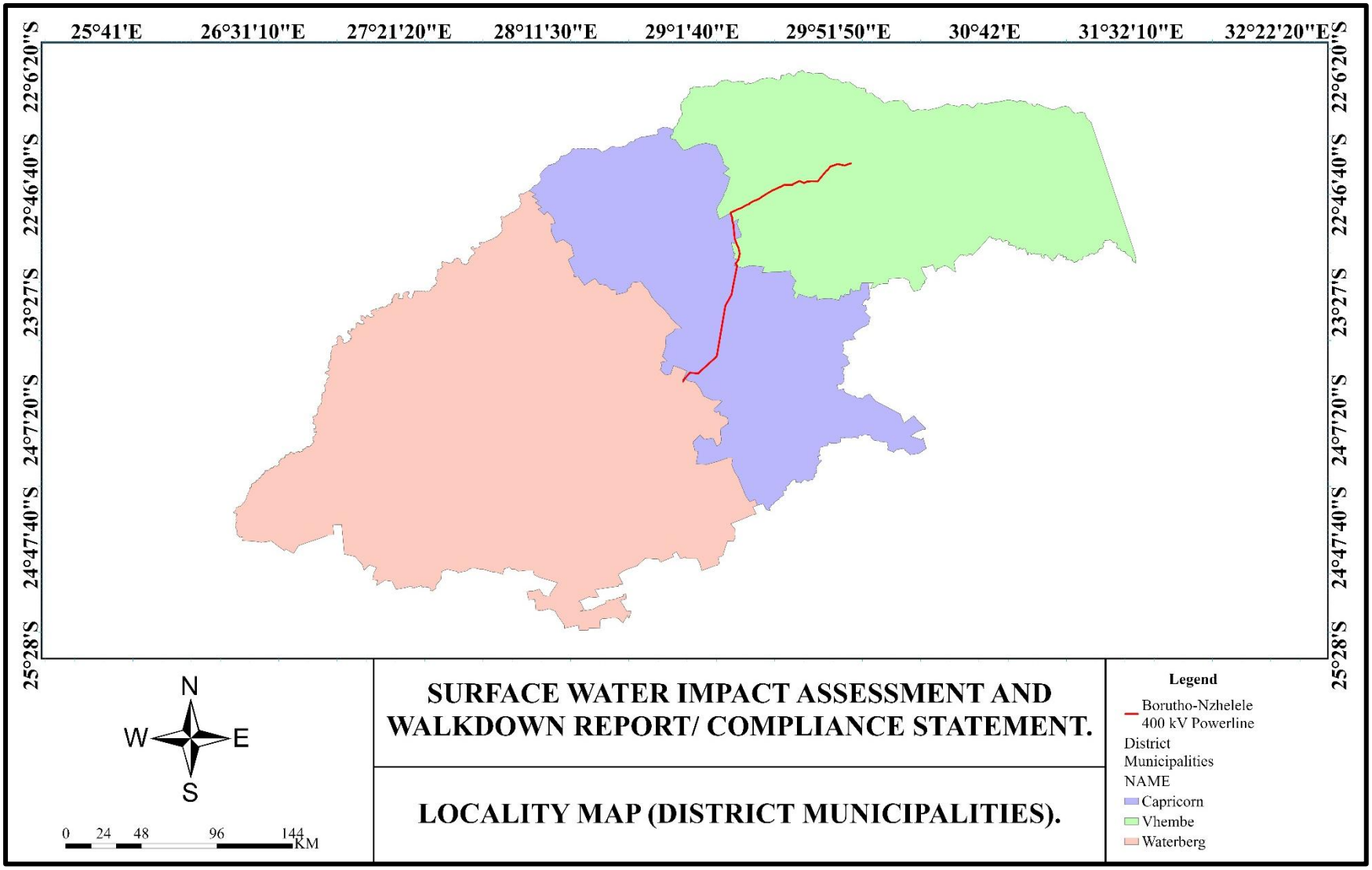


Figure 1: Locality map (District municipalities).

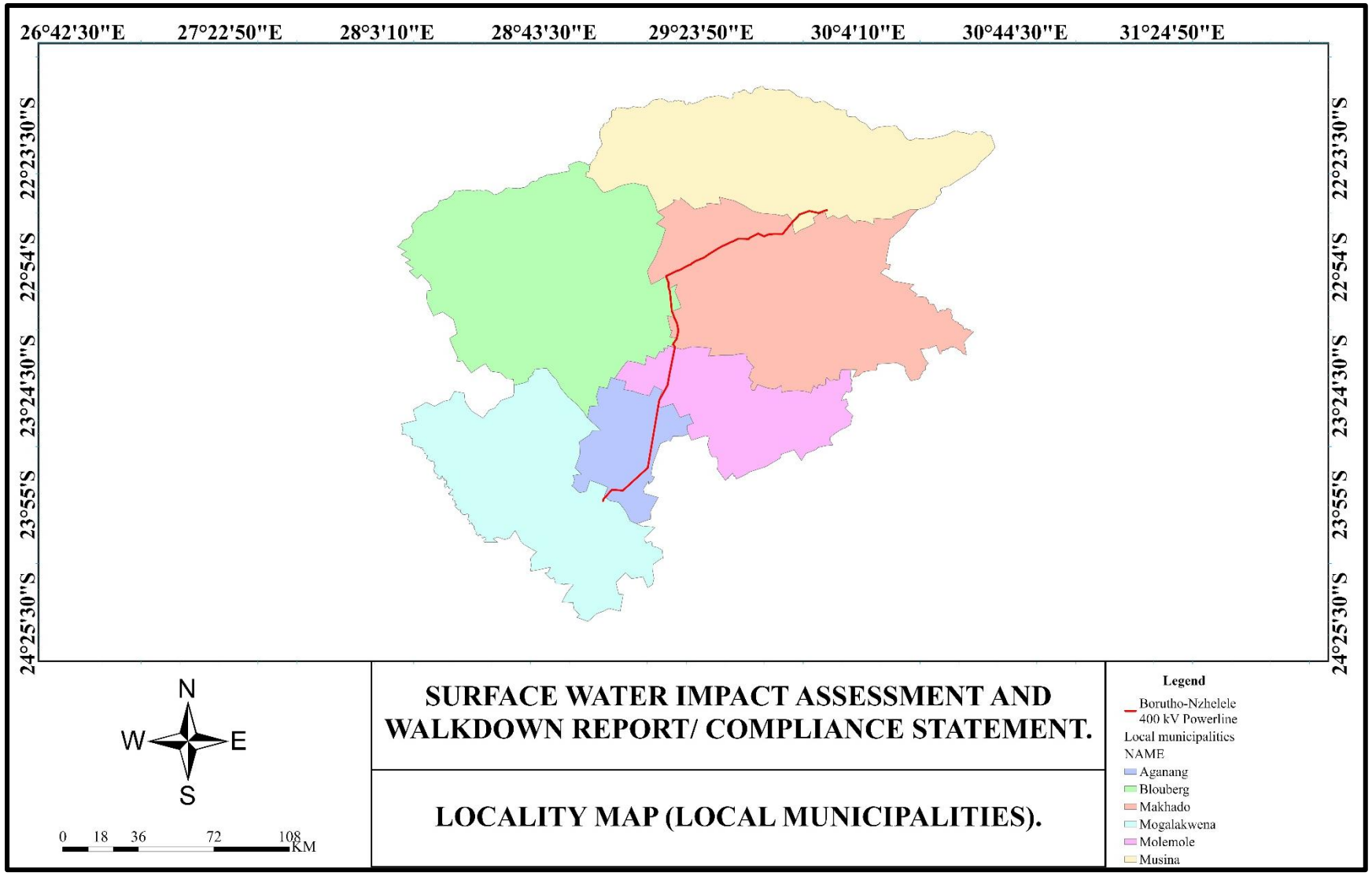


Figure 2: Locality map (Local municipalities).

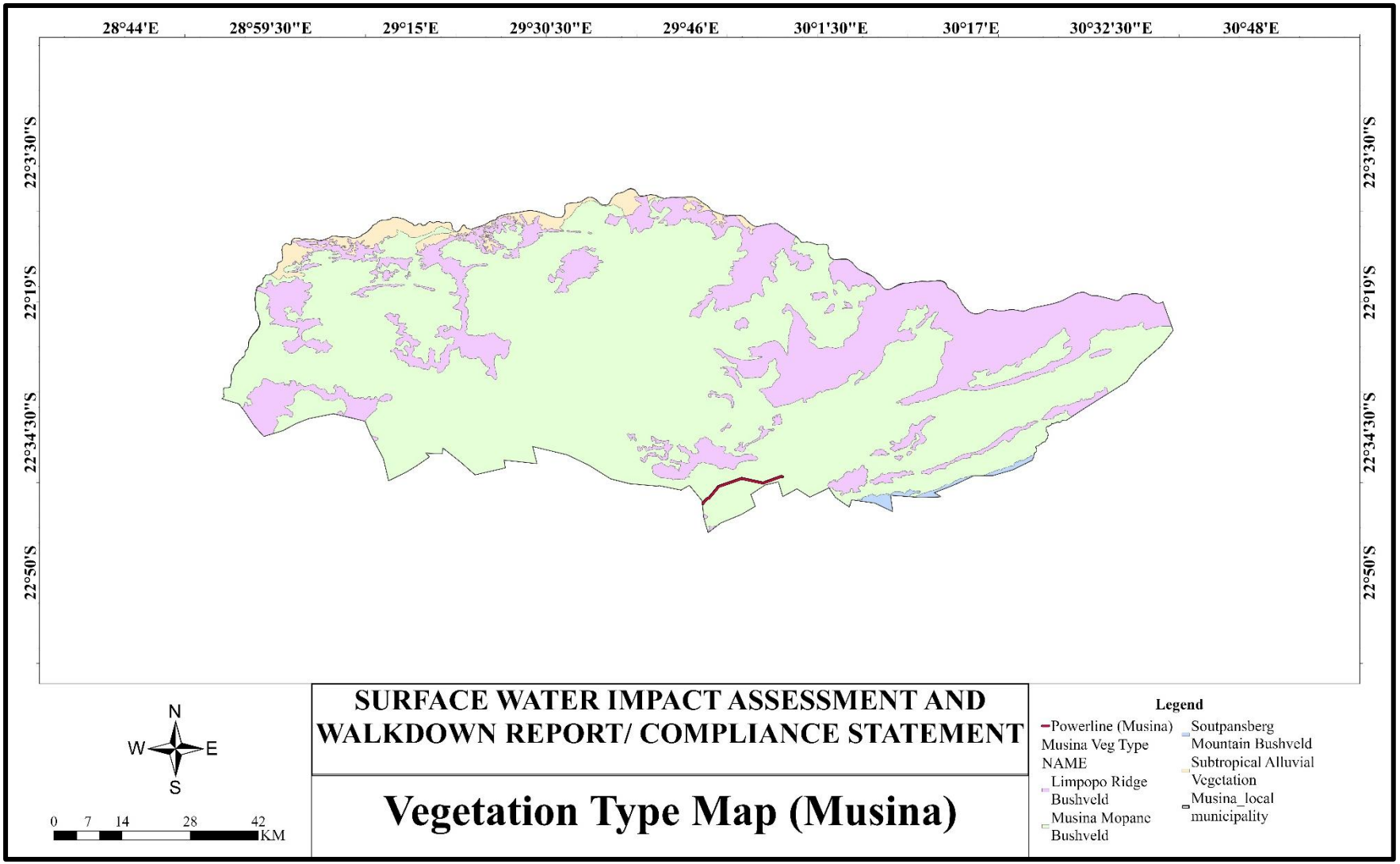


Figure 3: Vegetation Type Map (Musina Local Municipality).

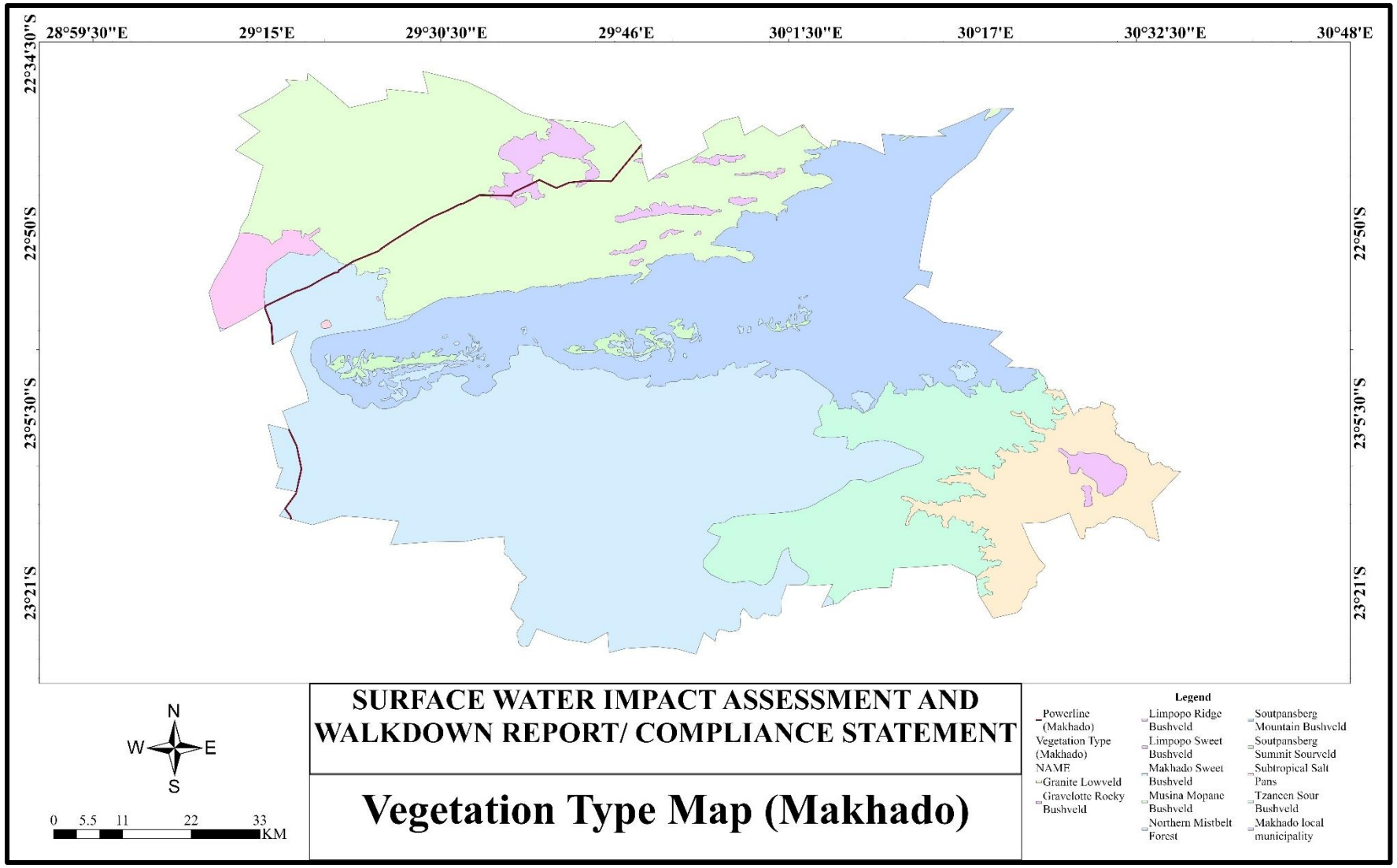


Figure 4: Vegetation Type Map (Makhado Local Municipality).

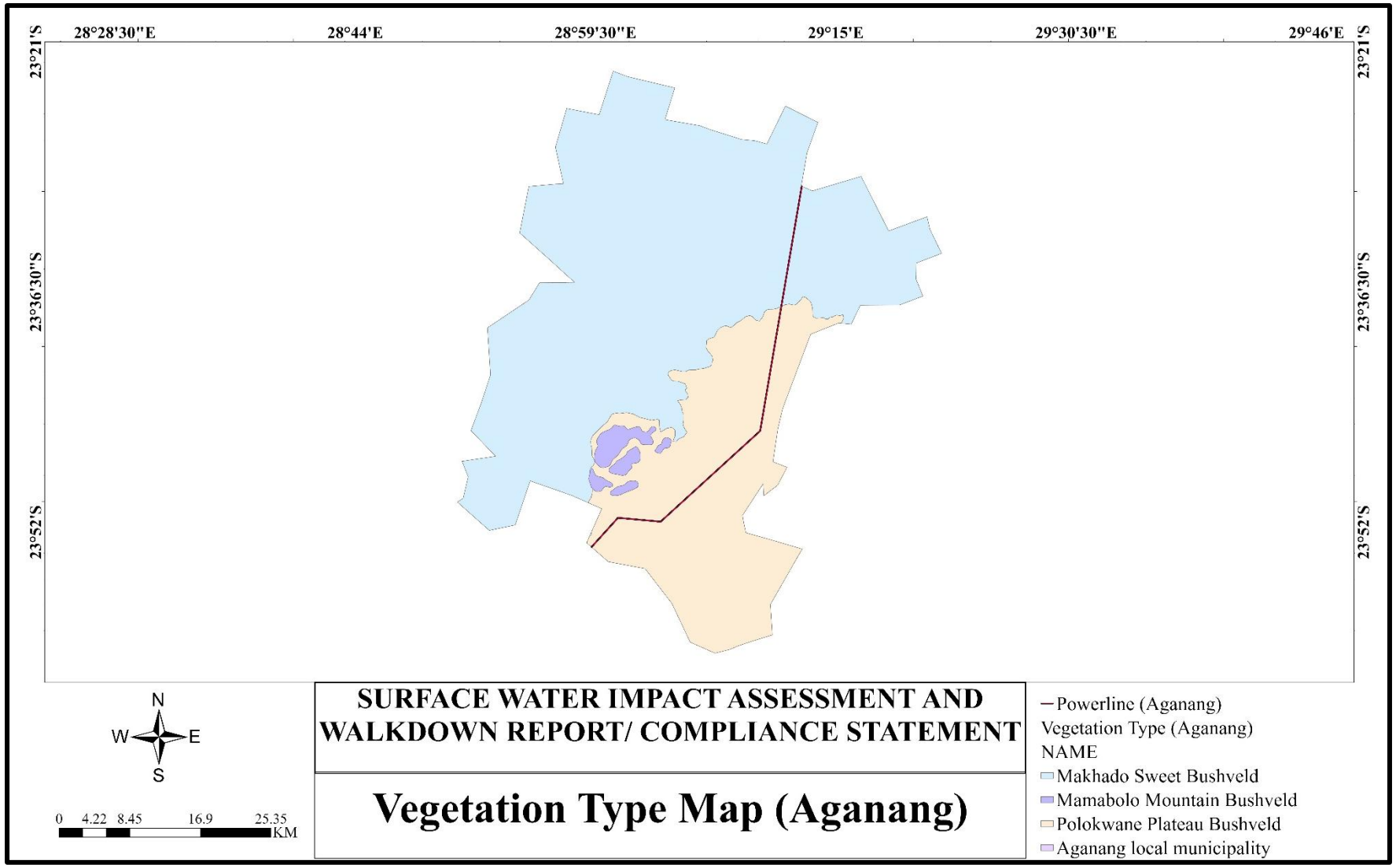


Figure 5: Vegetation type map (Aganang).

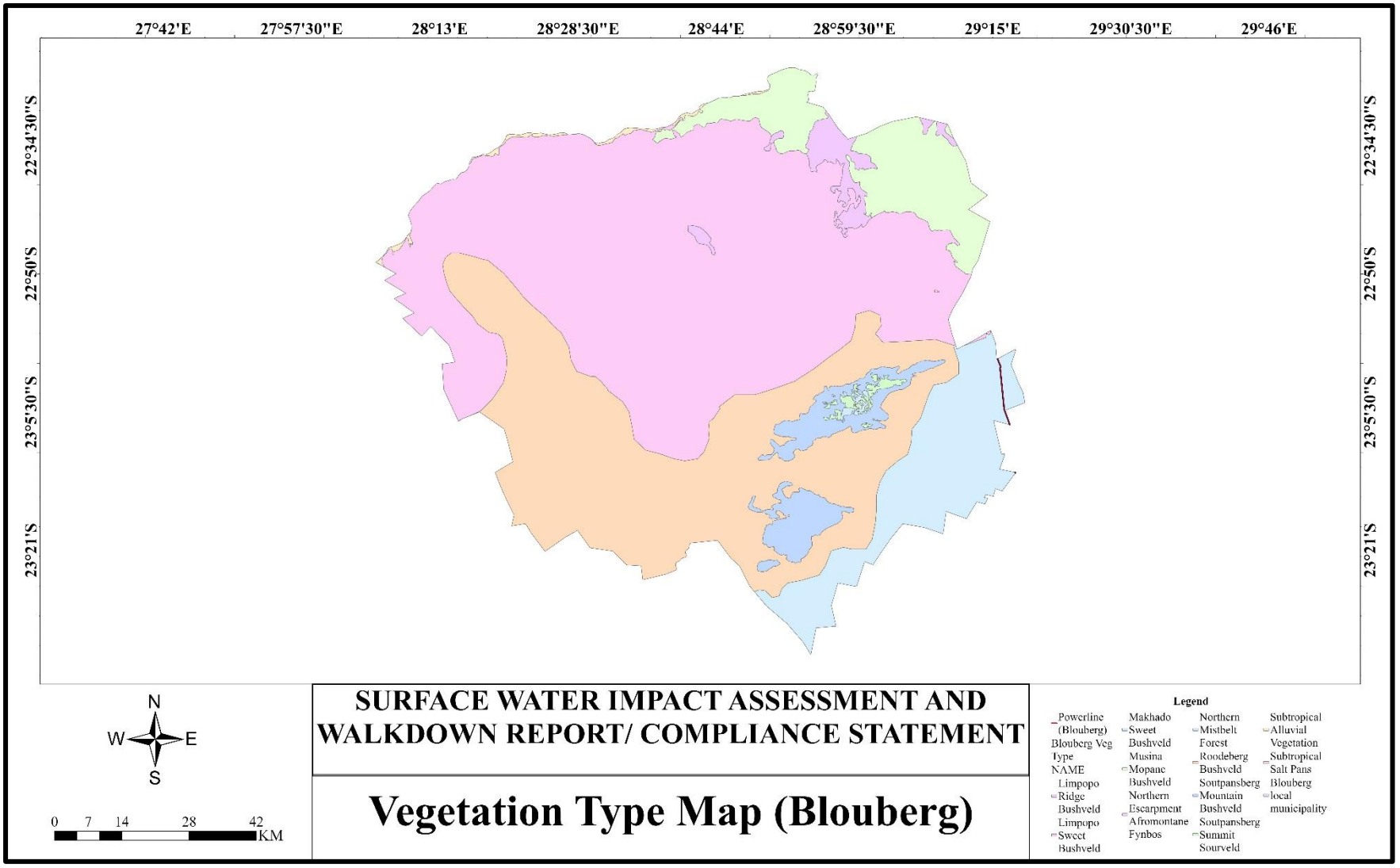


Figure 6: Vegetation type map (Blouberg).

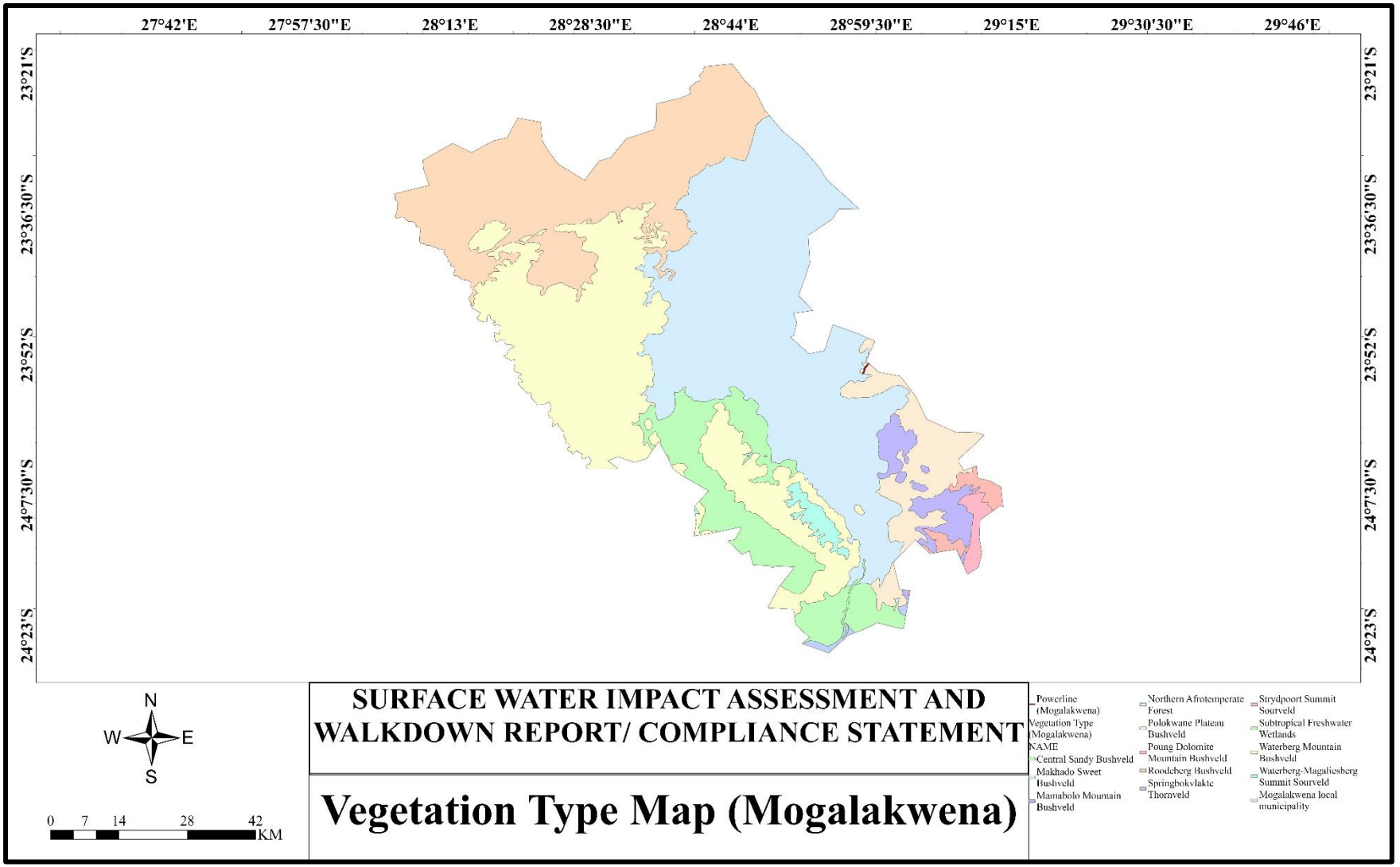


Figure 7: Vegetation type map (Mogalakwena).

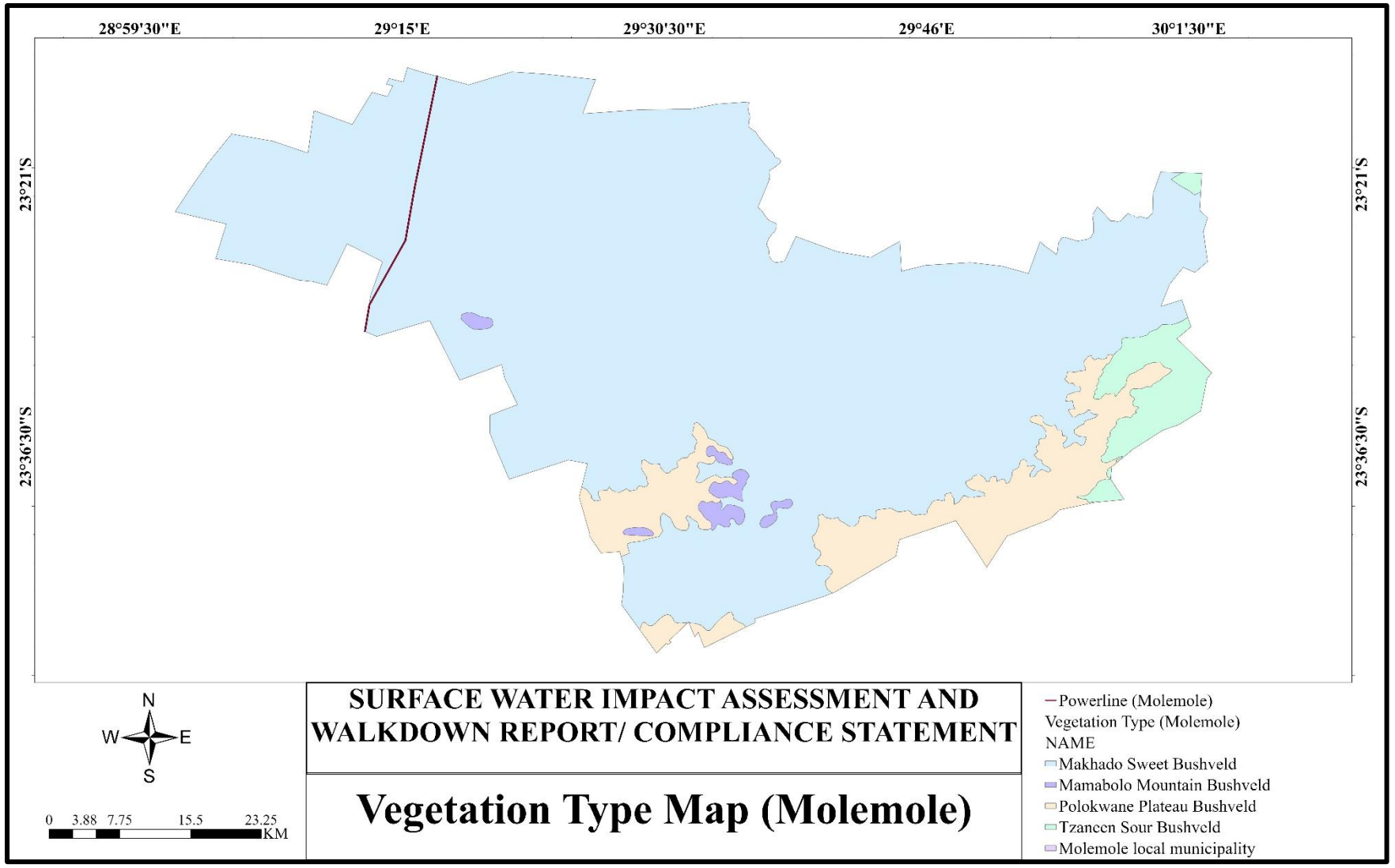


Figure 8: Vegetation type map (Molemole).

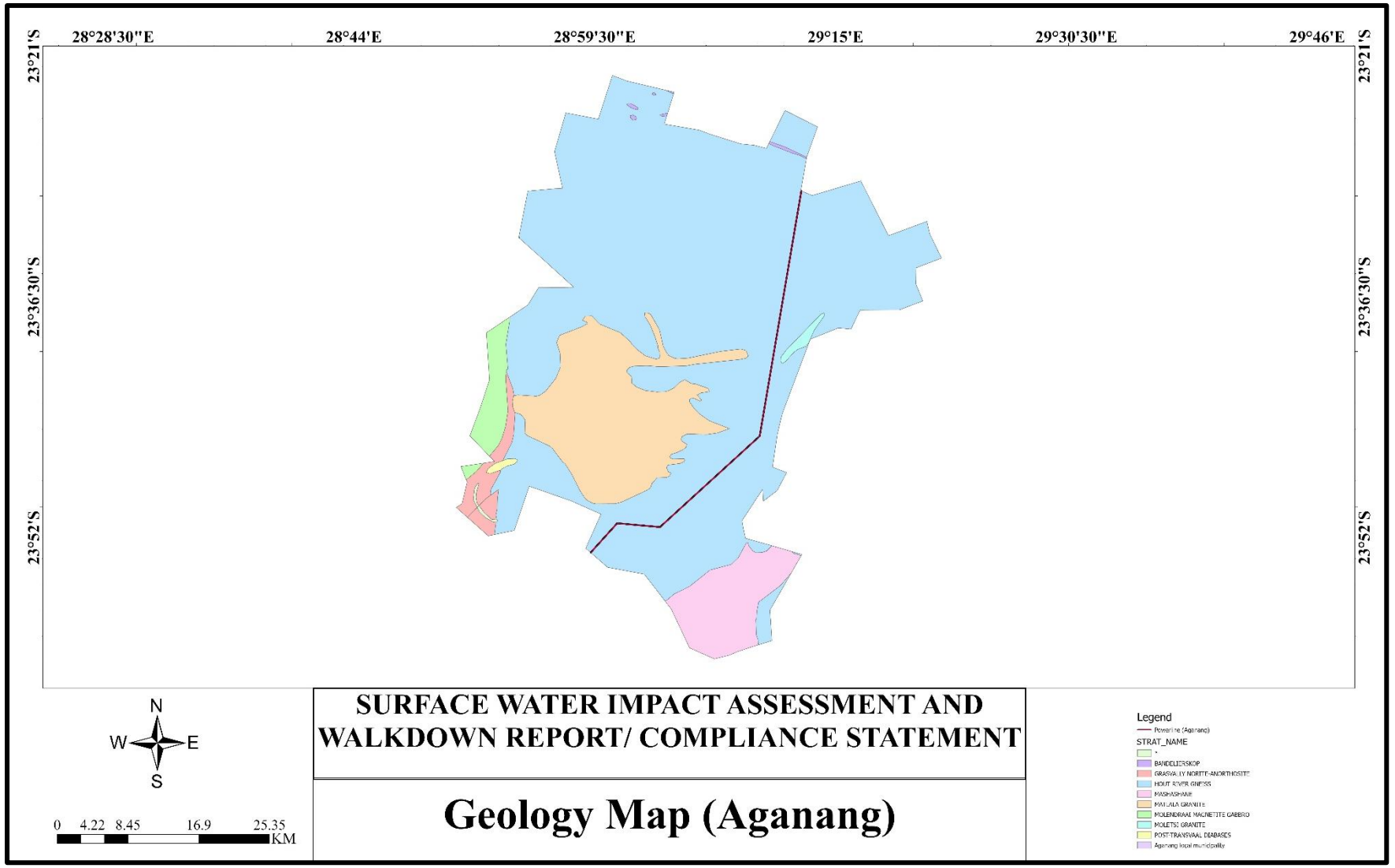


Figure 9: Geology map (Aganang).

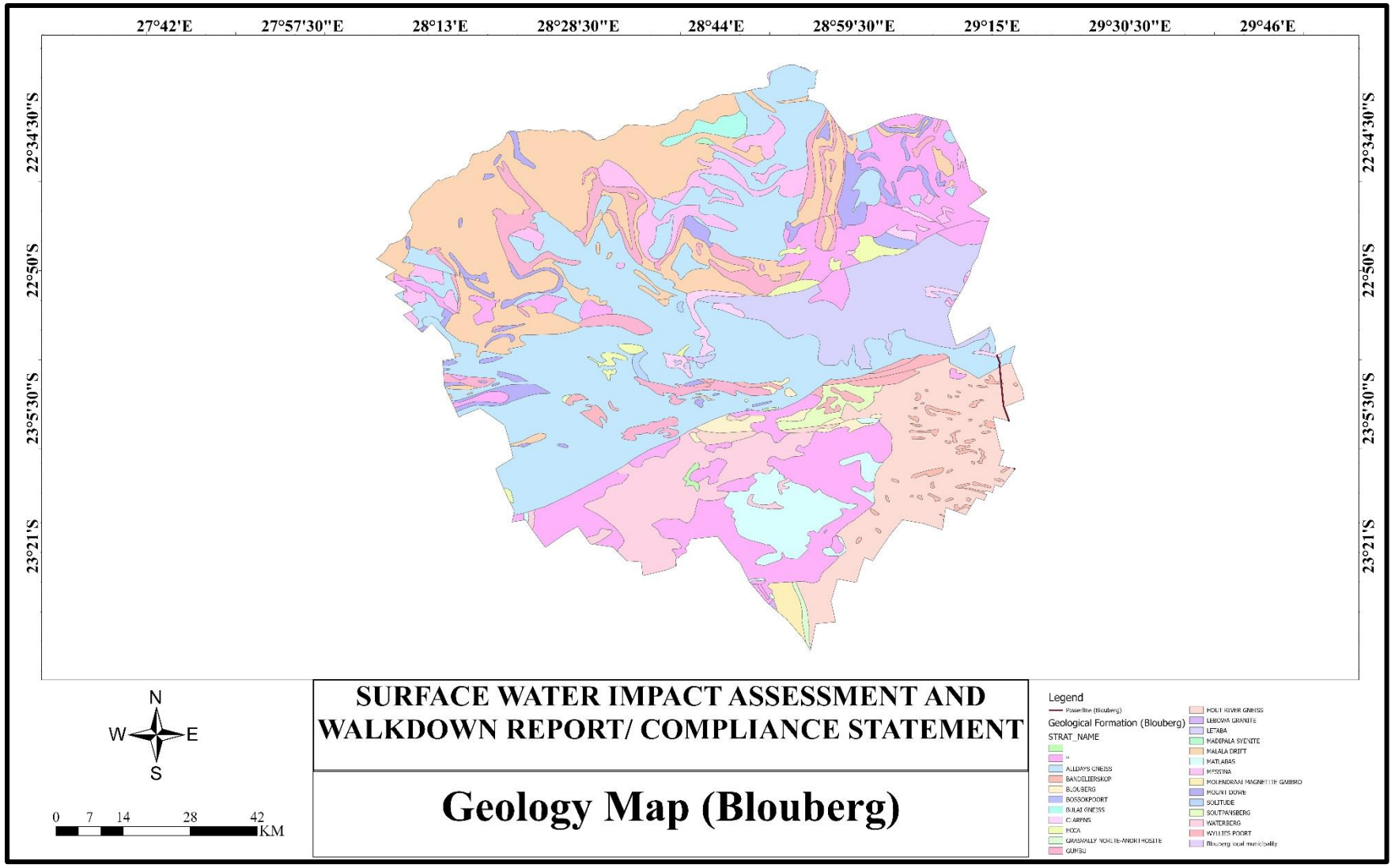


Figure 10: Geology map (Blouberg).

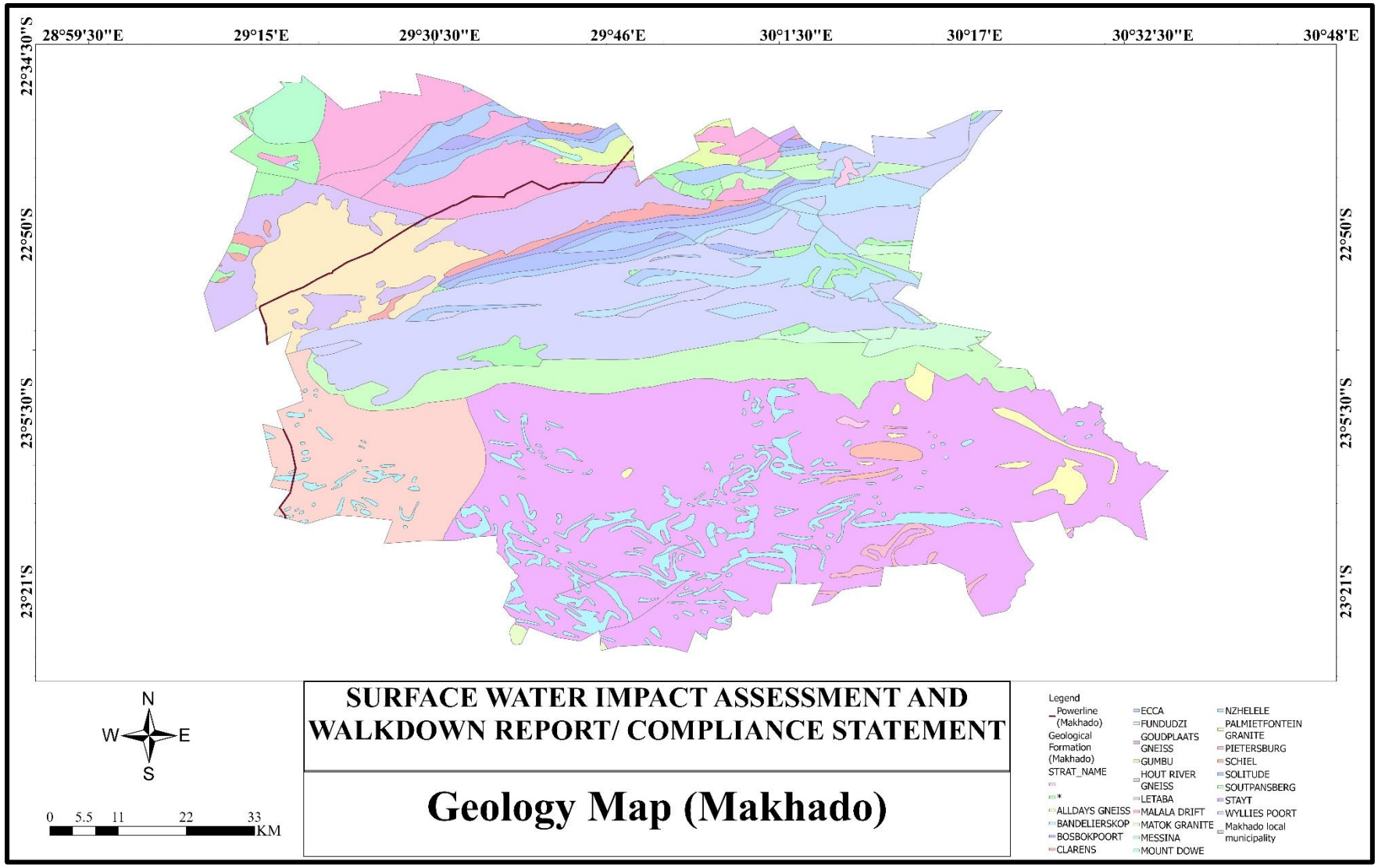


Figure 11: Geology map (Makhado).

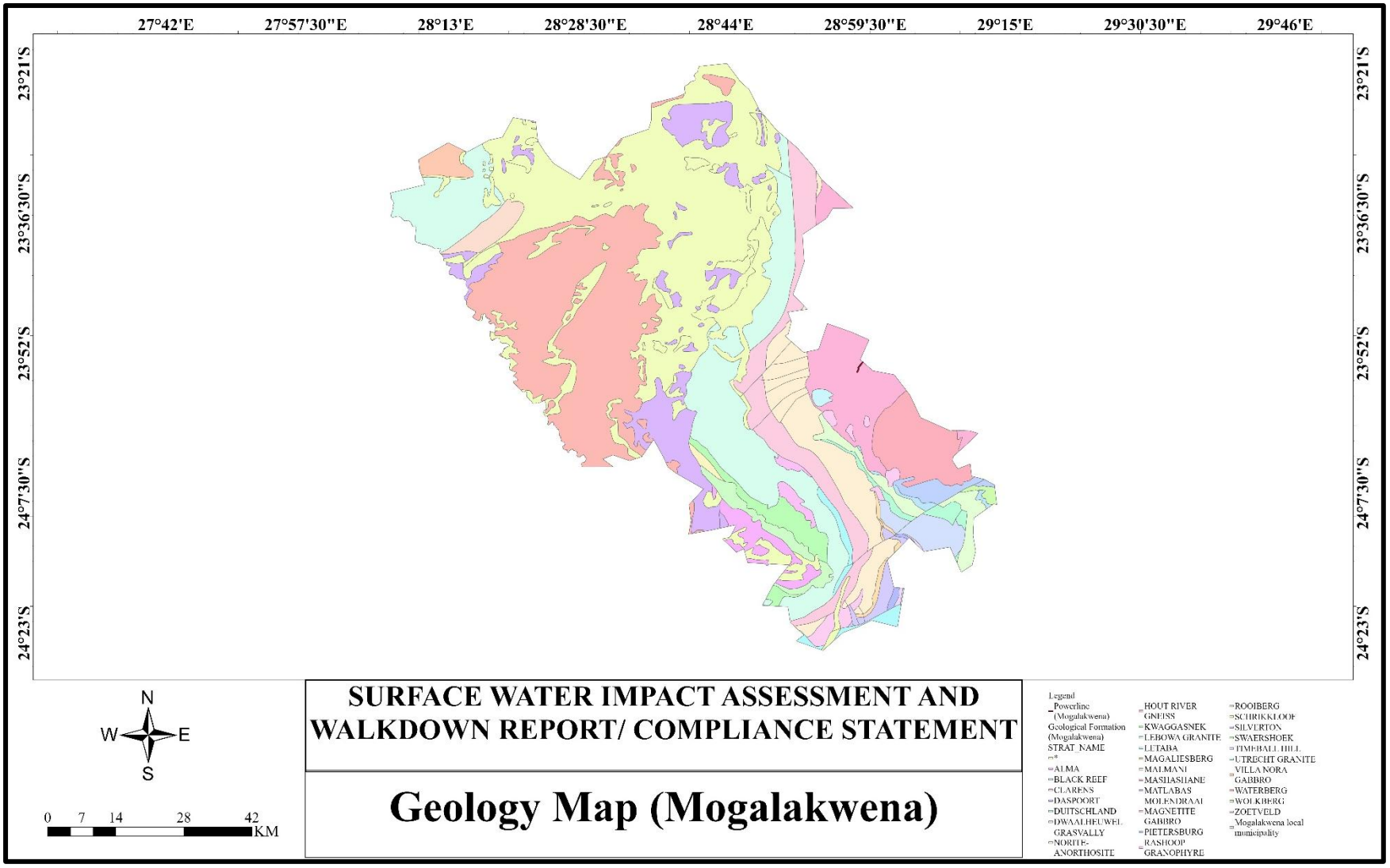


Figure 12: Geology map (Mogalakwena).

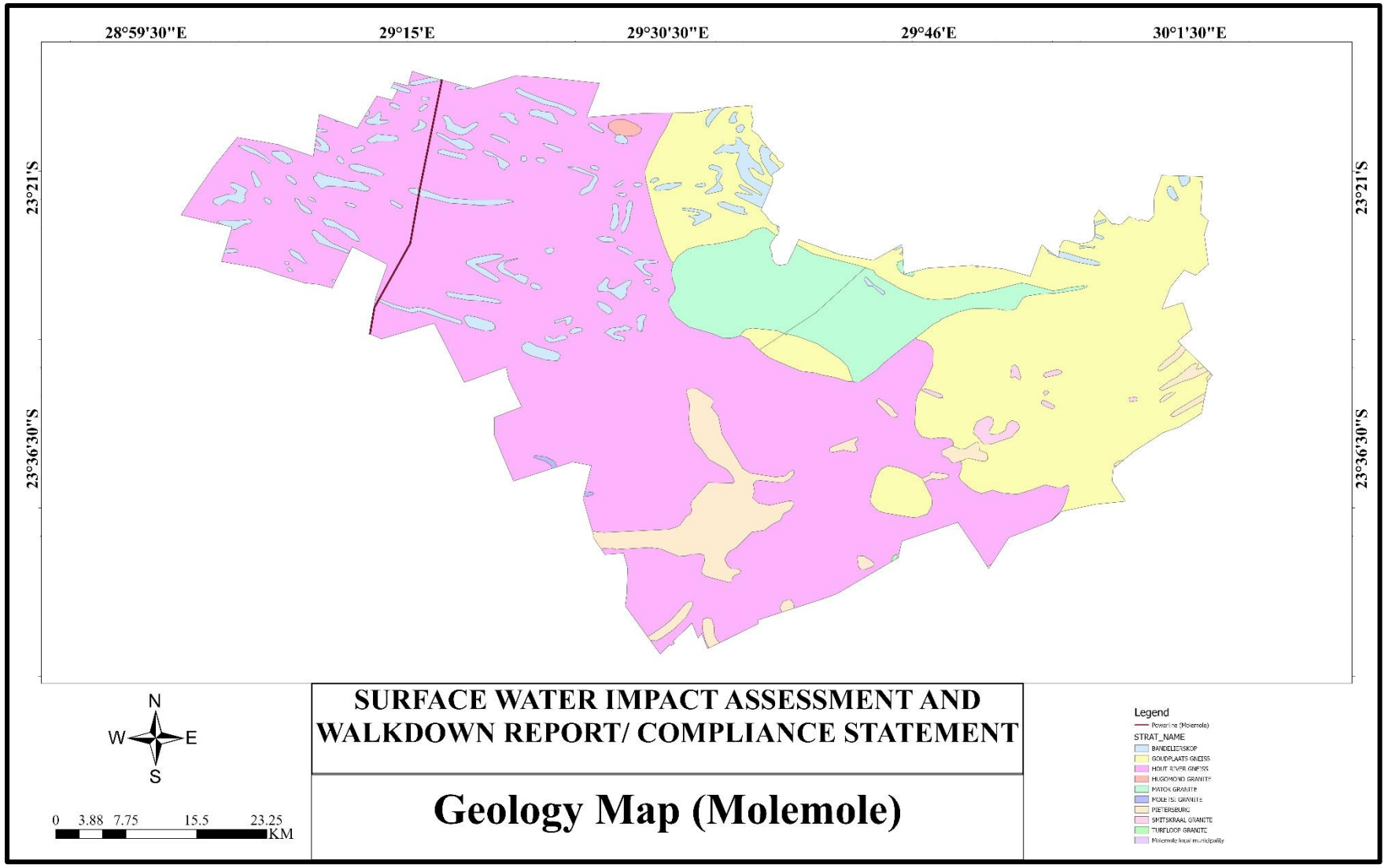


Figure 13: Geology map (Molemole).

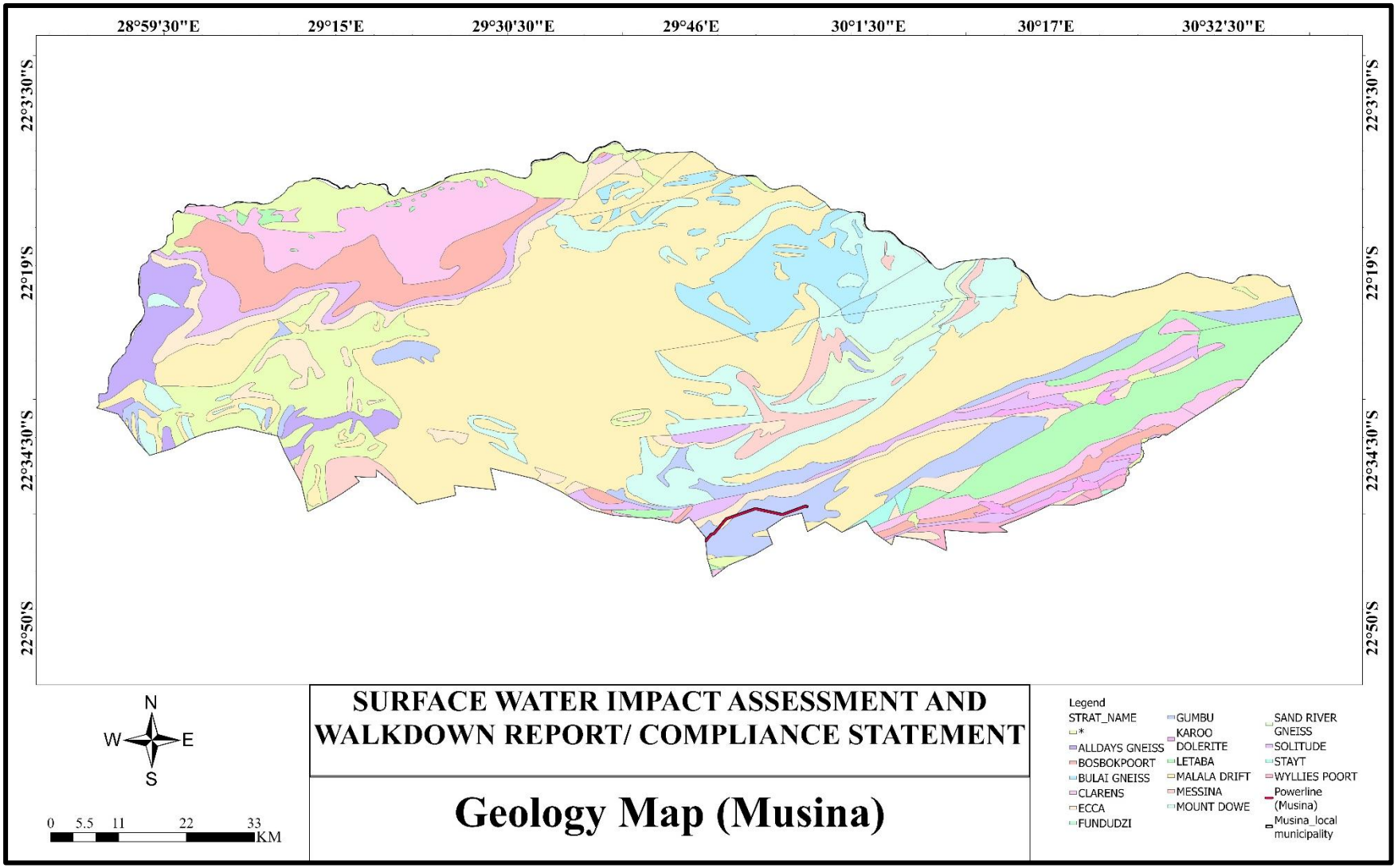


Figure 14: Geology map (Musina).

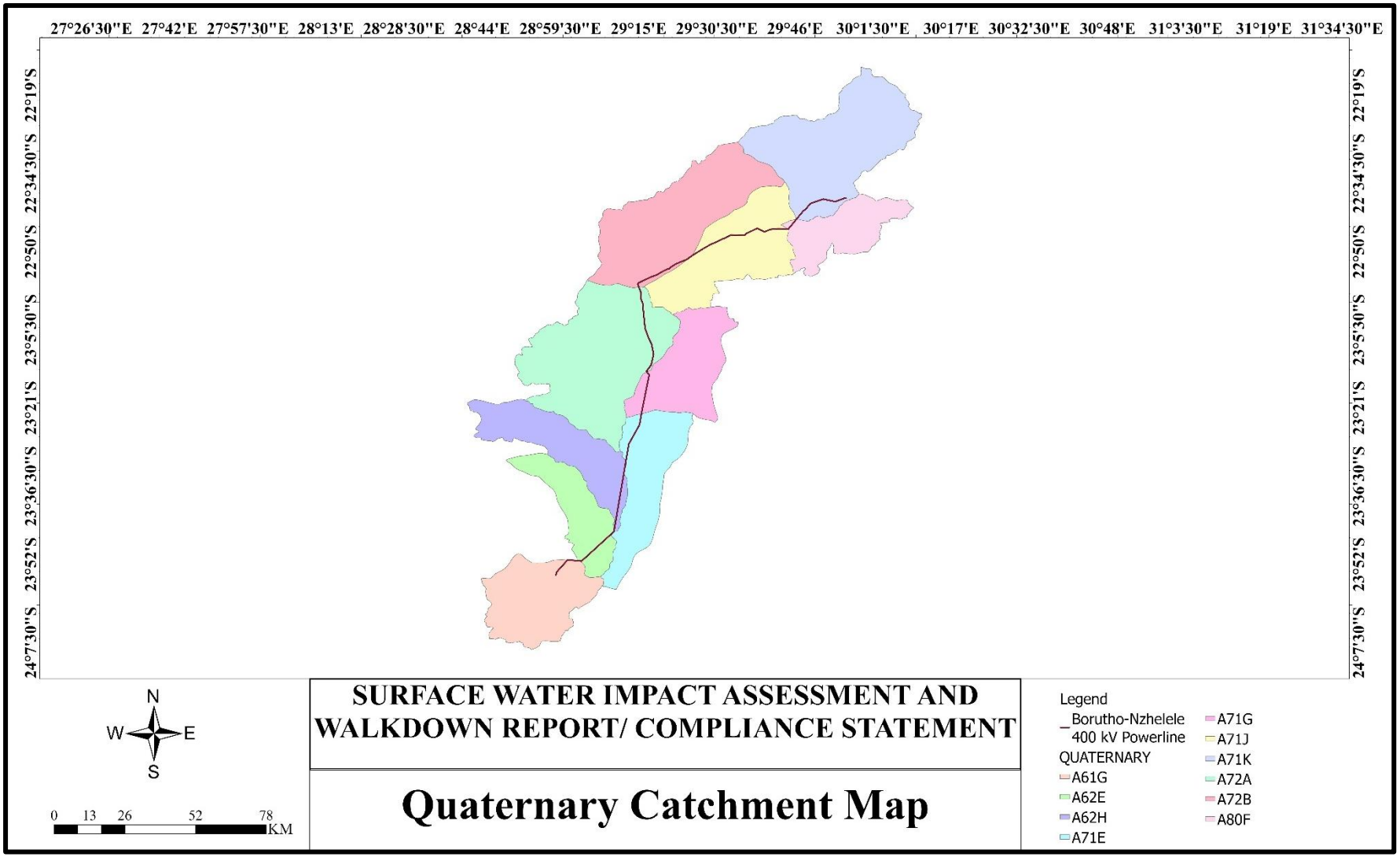


Figure 15: Quaternary catchment map.

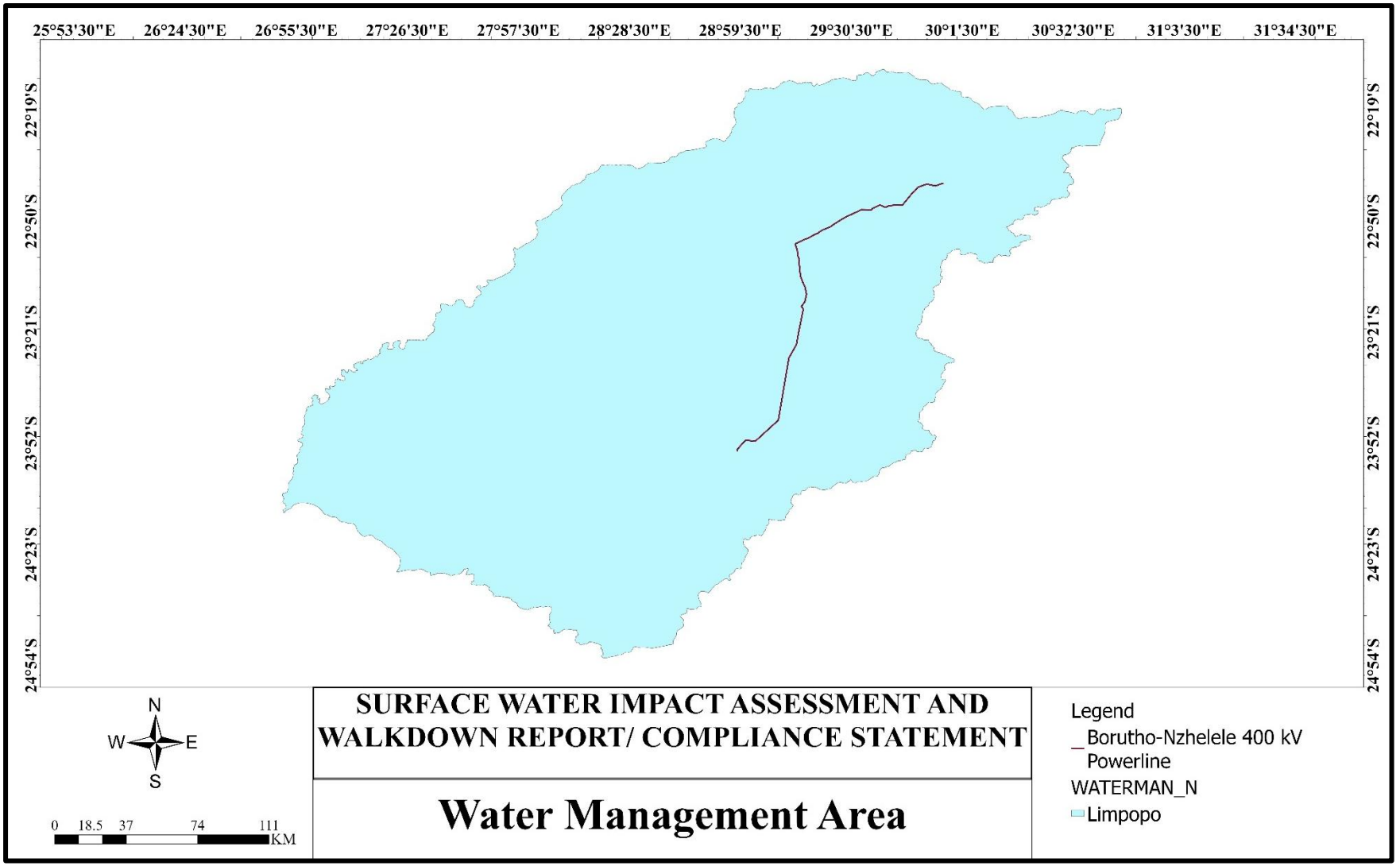


Figure 16: Water management area.

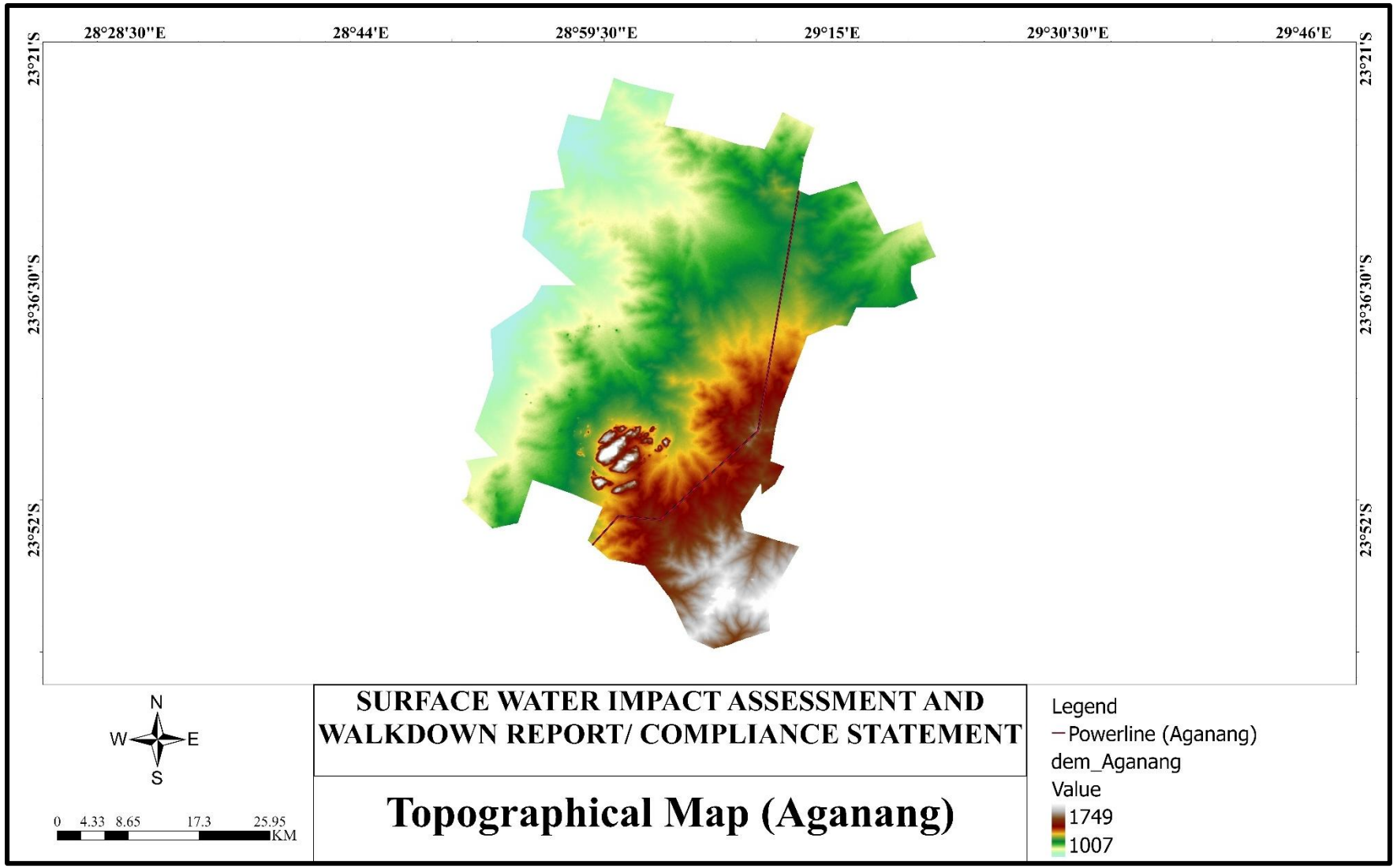


Figure 17: Topographical map (Aganang).

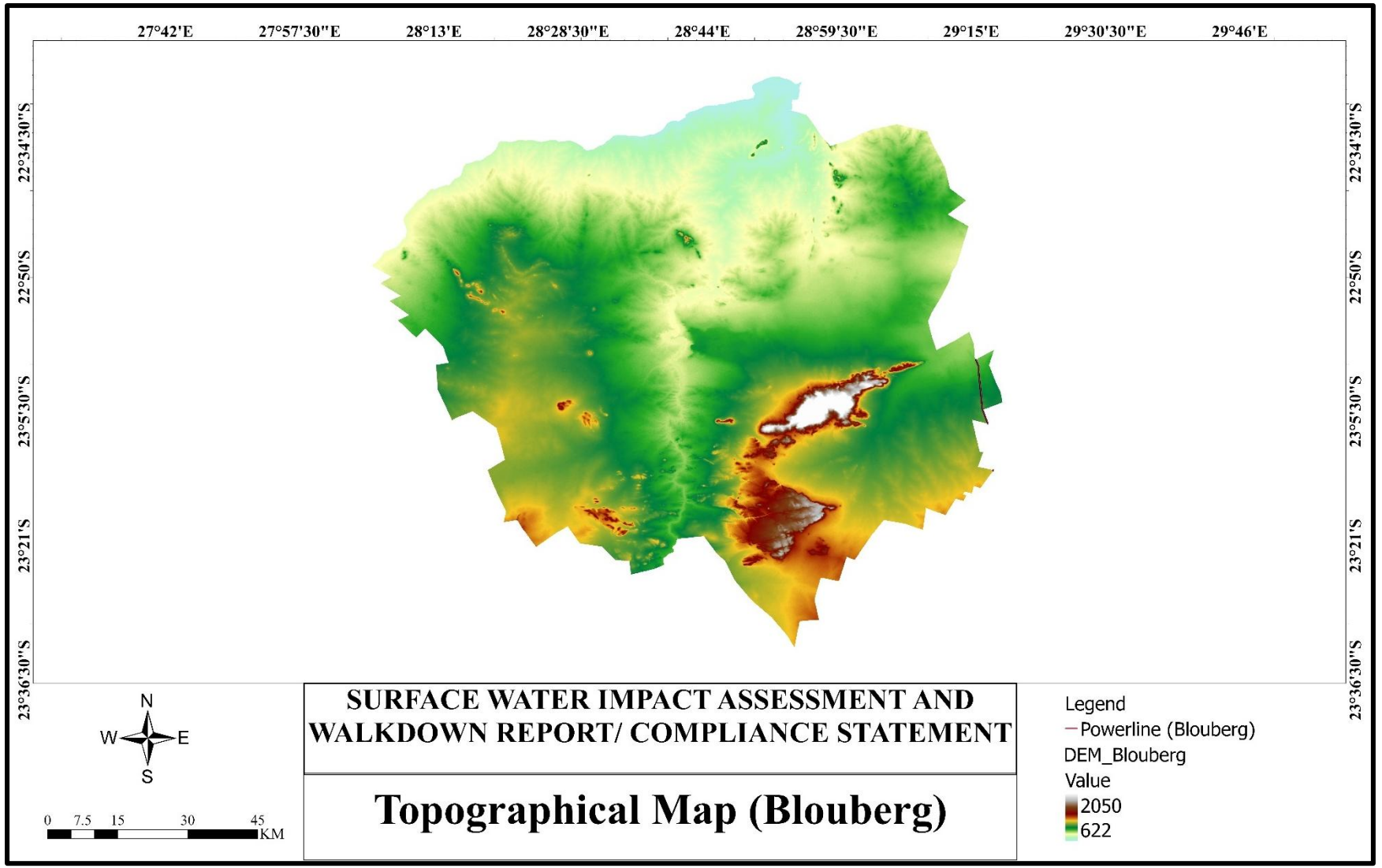


Figure 18: : Topographical map (Blouberg).

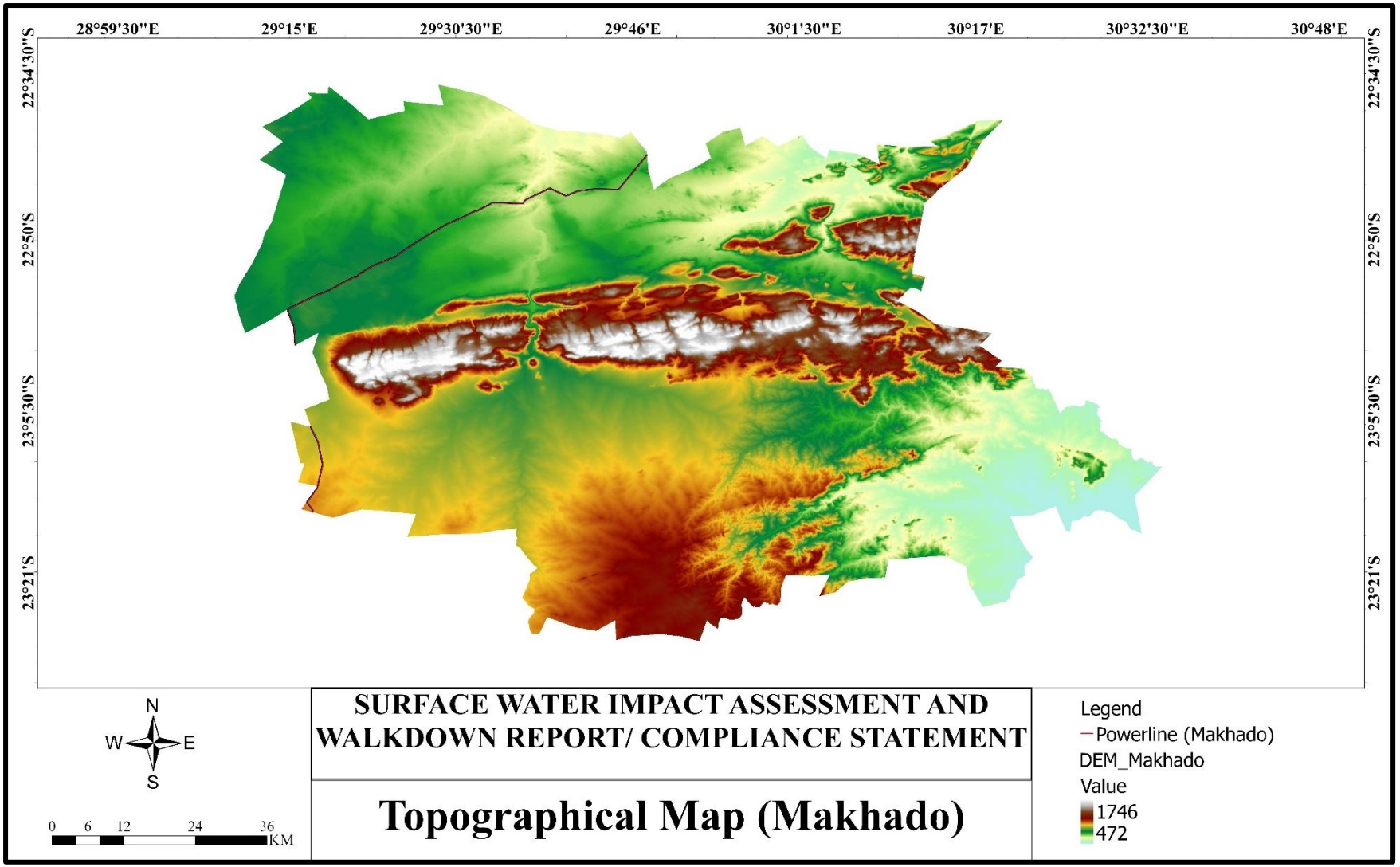


Figure 19: : Topographical map (Makhado).

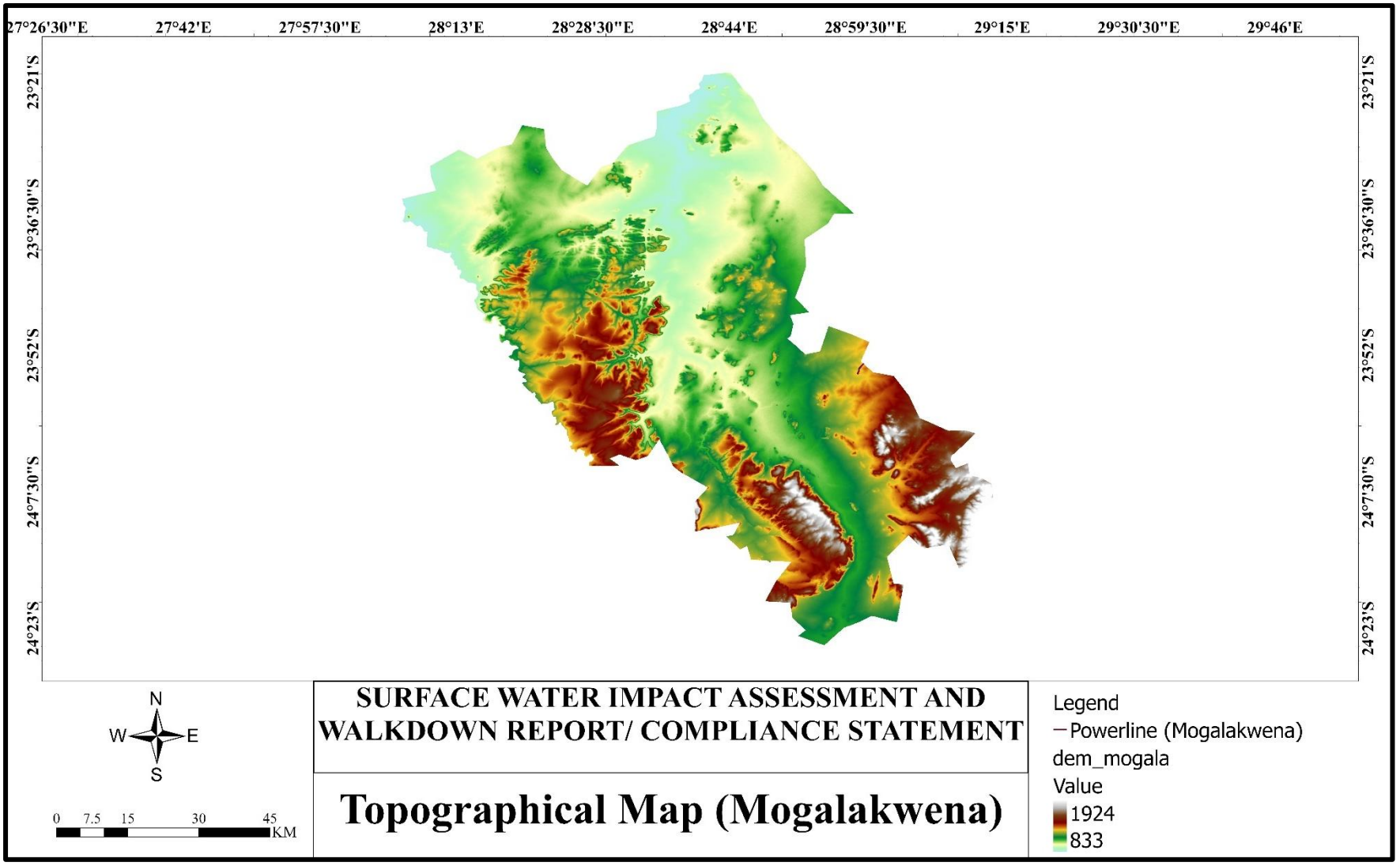


Figure 20: : Topographical map (Mogalakwena).

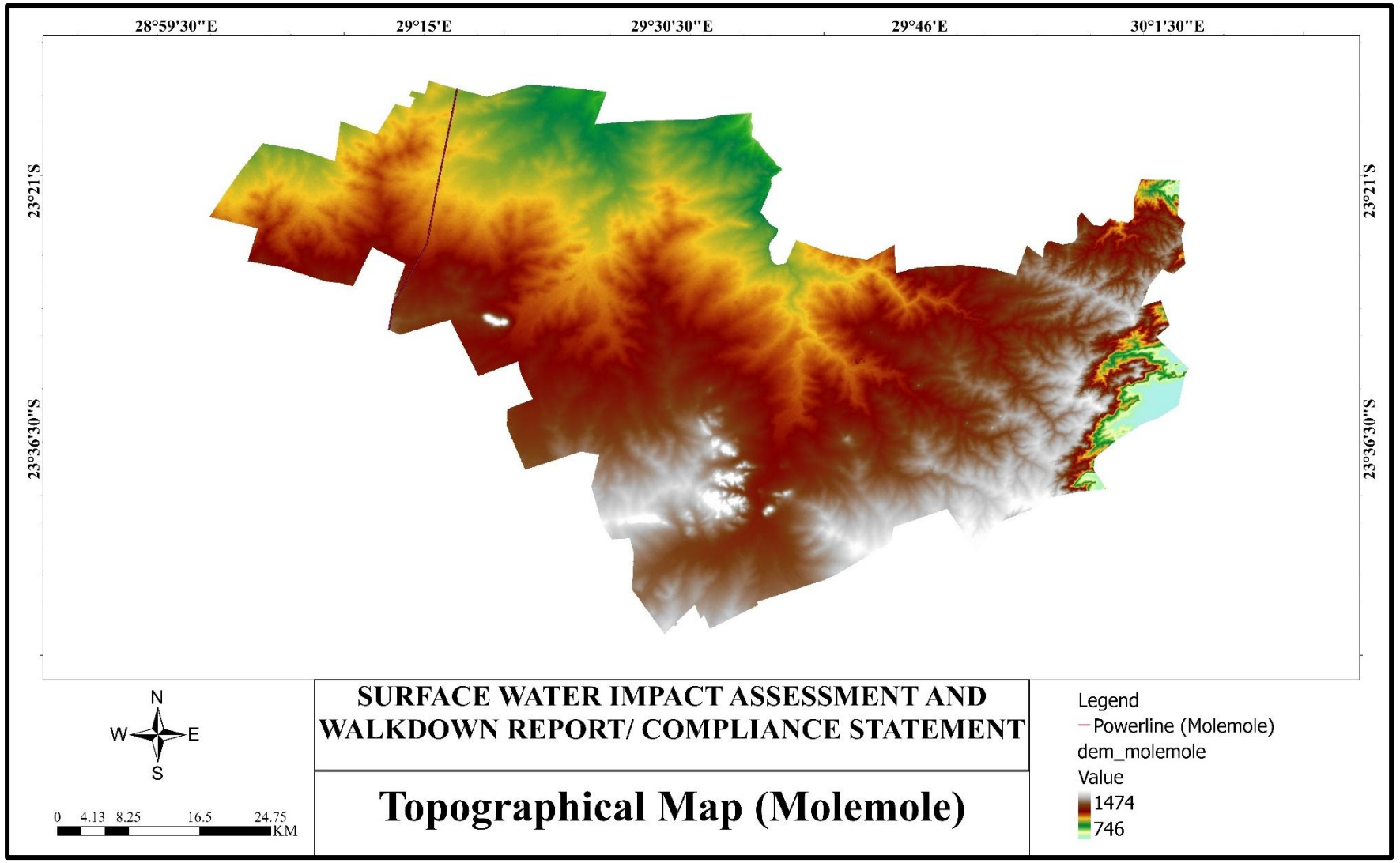


Figure 21: : Topographical map (Molemole).

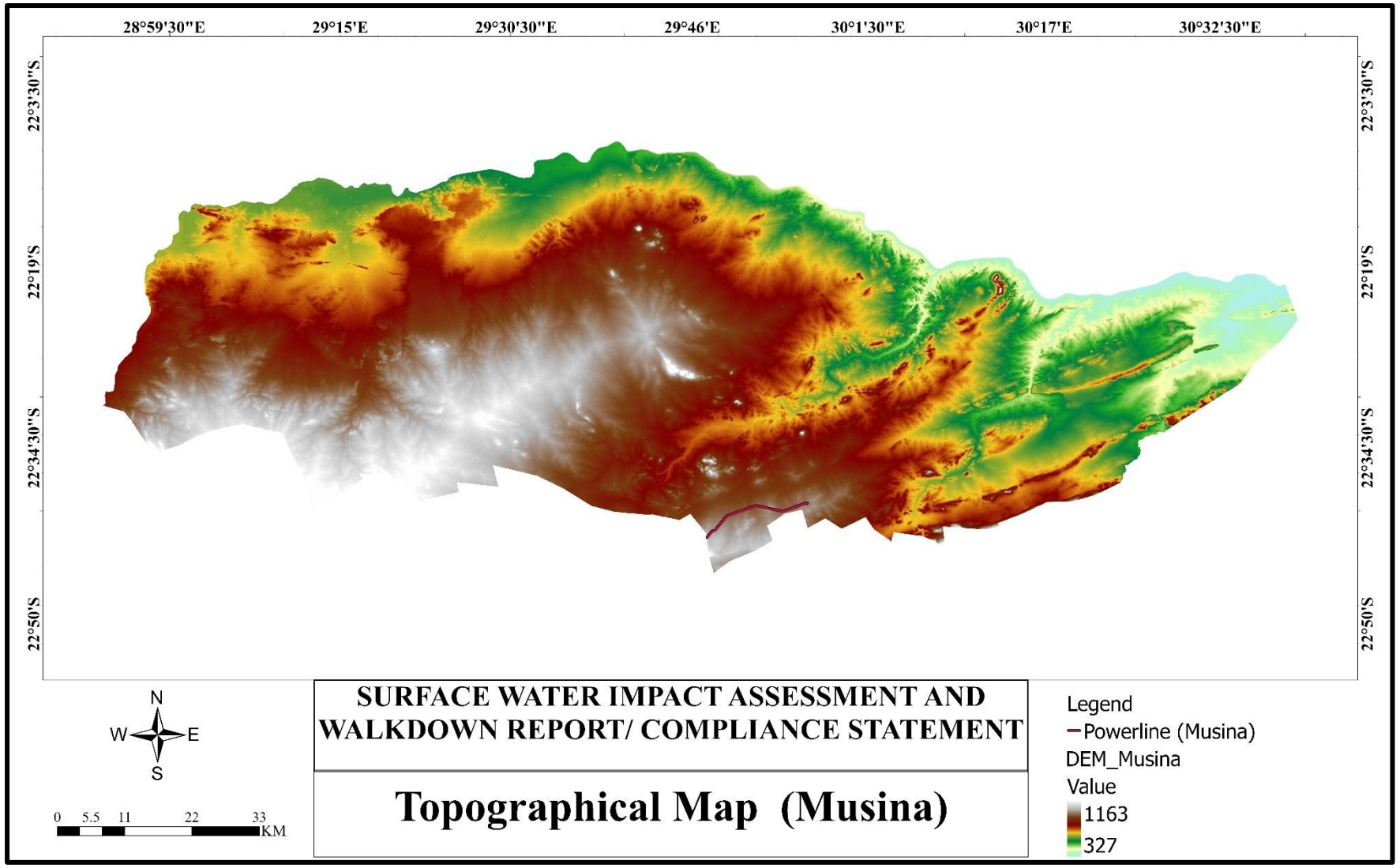


Figure 22: : Topographical map (Musina).

3. METHODOLOGY FOR ASSESSMENT

3.1. Site Sensitivity Verification

The assessment process begins with site sensitivity verification. This involves using the DFFE Screening Tool to initially determine the environmental sensitivity of the site. The sensitivity of identified surface water features is then verified during the site assessment. This verification process is crucial as it guides the decision on whether a full Impact Assessment Report or a Compliance Statement is required for the project.

3.2. Regional and Site-Specific Environmental Information

Following site sensitivity, regional and site-specific environmental information is incorporated into the assessment. This involves utilising data from sources such as the DFFE Screening Tool and the NFEPA database. A key component of this step is describing the hydrological baseline receiving environment to provide context for the assessment.

A site assessment is a critical component of the environmental impact assessment process, particularly in the context of proposed developments like the Borutho-Nzhelele 400kV Powerline. Breakdown of what a site assessment entails:

3.2.1. Purpose of Site Assessment

- The primary purpose of a site assessment is to:
  - Verify environmental sensitivity: This involves confirming the sensitivity of identified environmental features, such as aquatic ecosystems, during an on-the-ground survey.
  - Gather site-specific information: This includes detailed data on the ecological characteristics, hydrological conditions, and other relevant environmental factors present at the site.
  - Inform impact assessment: The findings of the site assessment directly contribute to a more accurate and comprehensive impact assessment, allowing for the identification of potential risks and the development of appropriate mitigation measures.

3.2.2. Key Components of a Site Assessment

- Wetland Identification and Delineation:
  - This involves using established guidelines (e.g., DWAF guidelines) and indicators (terrain unit, soil form, soil wetness, and vegetation) to identify and map wetland areas.
  - The process includes determining wetland boundaries and providing detailed delineations with maps and descriptions.
- Functional Assessment of Wetlands:
  - This evaluates the ability of wetlands to provide ecosystem services.
  - Methods like WET-EcoServices may be used to assess and rate the importance and degree to which these services are provided.
- Determination of Ecological Status and Sensitivity:
  - This involves assessing the Present Ecological Status (PES) of wetlands by quantifying the impacts of human activity on wetland health.

- It also includes determining the Ecological Importance and Sensitivity (EIS) of wetlands, often adapting methods from DWS.

- Ecological Classification and Description:
  - This involves using classification systems (e.g., SANBI's) and approaches (e.g., the hydrogeomorphic (HGM) approach) to classify and describe the ecological features of the site.
- River and Watercourse Assessments:
  - Site assessments also involve identifying and characterising rivers, streams, and other watercourses.
  - This may include assessing their ecological condition, flow patterns, and connectivity.
- Walkdown Surveys:
  - These are on-the-ground surveys, such as the April 2024 walkdown survey, which are crucial for verifying site-specific conditions and informing mitigation measures.

3.2.3. Integration with DFFE Requirements

- Site assessments must align with the requirements of the Department of Forestry, Fisheries, and the Environment (DFFE). This includes:
  - Site Sensitivity Verification: As mentioned on section 3.1, this is a core component of the DFFE process.
  - Informing Impact Assessment Reports or Compliance Statements: The outcomes of the site assessment determine whether a full Impact Assessment Report or a Compliance Statement is required.
  - Providing data for regional and site-specific environmental information: Site assessments contribute critical data that is incorporated into the broader environmental context of the project.

3.3. Present Ecological Status (PES) assessment

WET-Health Version 2 consists of a series of three tools developed to assess the Present Ecological State (PES) or "ecological health" of wetland ecosystems of different hydrogeomorphic types at three different levels of detail/resolution. These tools build on previous assessment methods, including WET-Health Version 1 and Wetland-IHI, in response to the need that was identified to develop a refined and more robust suite of tools for the assessment of the PES of wetland ecosystems in South Africa (Macfarlane et al, 2020).

WET-Health is designed to assess the PES of a wetland by scoring the perceived deviation from a theoretical reference condition, where the reference condition is defined as the un-impacted condition in which ecosystems show little or no influence of human actions. In thinking about wetland health or PES, it is thus appropriate to consider 'deviation' from the natural or reference condition, with the ecological state of a wetland taken as a measure of the extent to which human impacts have caused the wetland to differ from the natural reference condition. (Macfarlane et al, 2020).

Whilst wetland features vary considerably from one wetland to the next, wetlands are all broadly influenced by their climatic and geological setting and by three core inter-related drivers, namely hydrology, geomorphology and water quality. The biology of the wetland (in

which vegetation generally plays a central role) responds to changes in these drivers, and to activities within and around the wetland. The interrelatedness of these four components is illustrated schematically in Figure 1 below and forms the basis of the modular-based approach adopted in WET-Health Version 2. (Macfarlane et al, 2020).



Figure 23: Diagram representing the four key components of Wetland PES considered in WET- Health Version 2. (Macfarlane et al, 2020).

In WET-Health, the natural reference condition of a wetland is inferred from conceptual models relating to the selected hydro-geomorphic (HGM) wetland type, the selected hydro-geological type setting and knowledge of vegetation attributes of similar wetlands in the region. PES is then assessed by evaluating the extent to which anthropogenic activities have altered wetland characteristics across the four inter- related components of wetland health, as follows:

- **Geomorphology** in this context is assessed by assessing changes to (i) geomorphic processes and (ii) the geomorphic structure of the wetland. Geomorphic processes in this context, refers to those physical processes that are currently shaping and modifying wetland form and evolution, whilst geomorphic structure refers to the three-dimensional shape of sediment deposits on which wetland habitat is established. Whilst catchment drivers (similar to those assessed in the hydrology module) are integrated as part of the assessment, impacts are ultimately assessed based on an understanding of the degree to which within-wetland geomorphic processes and the associated structure of the wetland have been altered by anthropogenic activities. The module also accounts for differences in geomorphic processes in wetlands characterised by clastic (minerogenic) sedimentation and those characterised by organic sediment accumulation (peat).
- **Water quality** is defined as the physico-chemical attributes of the water in a wetland. It is assessed based on considering both potential diffuse runoff from landuses within the wetland and from the areas surrounding the wetland, together with point-source discharges of pollution entering directly into the wetland and/or into streams that flow into that wetland.

- **Vegetation** is defined in this context as the structural and compositional state of the vegetation within a wetland. This module evaluates changes in vegetation composition and structure as a consequence of current and historic on-site transformation and/or disturbance. Whilst the assessor needs to have some knowledge of vegetation in a particular region, the method does not require the assessor to be able to identify all wetland plant species. The emphasis is rather on identifying alien and ruderal (weedy) species that indicate disturbance and assessing their occurrence relative to common naturally occurring indigenous species, including those that are naturally dominant in the wetland. (Macfarlane et al, 2020).

3.3.1. Levels of assessment

Three different levels of assessment have been developed to account for a broad range of user requirements, ranging from regional assessments involving thousands of wetlands through to detailed site- based assessments used to identify specific stressors and impacts on a single wetland for management and rehabilitation planning. In each instance, the assessment is based initially on a landcover assessment that seeks to provide an initial indication of wetland condition based on a generic understanding of the impacts of different land-uses on catchment and wetland processes and characteristics. The assessment is refined for more detailed assessments by integrating finer-scale mapping, and a combination of additional desktop and site-based indicators to refine and improve the accuracy of the assessments. The following three levels of assessment are catered for in the method:

- **Level 1A (desktop-based, low resolution)**, is an entirely desktop-based assessment and uses only pre-existing landcover data (i.e. no interpretation of aerial imagery by an assessor is required) and for which default impact intensity scores have been allocated for each component of wetland PES. In many cases, particularly when applied at a national level, it is not possible to delineate the upslope catchment of each of the individual wetlands. Instead, the landcover types in a GIS buffer around a wetland and within a "pseudo-catchment" selected to represent the true catchment (such as a sub-quaternary catchment) is used as a coarse proxy of the impacts on the wetland arising from its upslope catchment. Impacts arising from the wetland and catchment are then integrated through structured algorithms to provide a coarse indication of wetland health.
- **Level 1B (desktop-based, high resolution)**, is also largely desktop-based using pre-existing landcover data but makes a few finer distinctions than Level 1A in terms of landcover types and usually requires interpretation of the best available aerial imagery in order to do so. This also allows the pre-defined land- cover types to be mapped more accurately. Furthermore, the upslope catchment of each wetland can be individually delineated at this level, and landcover in this area is used as a proxy of the impacts on a wetland arising from its upslope catchment. As for Level 1A, impacts arising from within individual wetlands are inferred from landcover types occurring within the delineated wetlands.
- **Level 2 (rapid field-based assessment)** starts with landcover mapping, but is refined by assessing a range of catchment and wetland-related indicators that are known to affect wetland health. Impacts arising from the upslope catchment of a wetland are inferred from landcover mapping but are refined based on additional information (e.g. for plantations, the user must indicate whether the trees making up the plantations are

eucalypts or pines and/or wattle). Landcover types occurring within the wetland are used as the starting point for assessing human impacts arising from within the wetland. However, this initial assessment is refined considerably by sub-dividing the wetland into relatively homogenous "disturbance units" and answering a suite of site-based wetland questions which provide a more direct assessment of change (e.g. the density, depth and orientation of artificial drainage channels, and the texture of the soil in the wetland). (Macfarlane et al, 2020).

A level 2 wetland assessment was undertaken to determine the PES of the wetland system. The PES assessment is concluded by completing the following process:

Table 1: Outline of steps involved in the Level 1 assessment (Macfarlane et al, 2020).

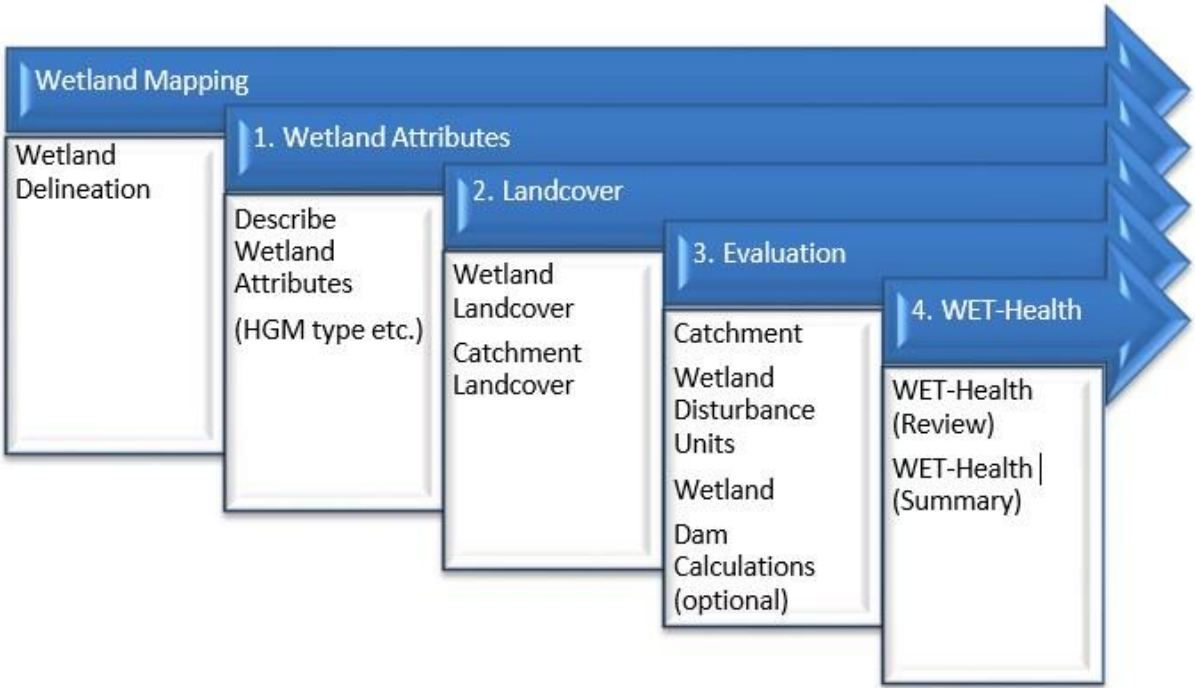


Table 2: PES categories (Macfarlane et al, 2020).

ECOLOGICAL CATEGORY	DESCRIPTION	IMPACT SCORE*	PES SCORE (%)*
A	Unmodified, natural.	0-0.9	90-00
B	Largely natural with few modifications. A slight change in ecosystem processes is discernible and a small loss of natural habitats and biota may have taken place.	1-1.9	80-89
C	Moderately modified. A moderate change in ecosystem processes and loss of natural habitats has taken place but the natural habitat remains predominantly intact	2-3.9	60-79
D	Largely modified. A large change in ecosystem processes and loss of natural habitat and biota and has occurred.	4-5.9	40-59
E	Seriously modified. The change in ecosystem processes and loss of natural habitat and biota is great but some remaining natural habitat features are still recognizable.	6-7.9	20-39
F	Critically modified. Modifications have reached a critical level and the ecosystem processes have been modified completely with an almost complete loss of natural habitat and biota.	8-10	0-19

The determination of the probable Trajectory of Change of the wetland is also evaluated. This is rated and presented as indicated in Table 4-4.

Table 3: Trajectory of Change classes, scores and symbols used to represent anticipated changes to wetland integrity (Macfarlane et al, 2008).

Trajectory class	Description	Symbol
Improve markedly	Likely to improve substantially over the next 5 years	↑↑
Improve	Likely to improve slightly over the next 5 years	↑
Remain stable	Likely to remain stable over the next 5 years	→
Deteriorate slightly	Likely to deteriorate slightly over the next 5 years	→
Deteriorate markedly	Likely to deteriorate substantially	↓↓

3.4. Wetland Ecological Importance and Sensitivity (EIS)

The ecological importance and sensitivity assessment were conducted according to the guidelines as discussed by DWAF (1999). DWAF defines "ecological importance" of a water resource as an expression of its importance to the maintenance of ecological diversity and function on local and wider scales. "Ecological sensitivity", according to DWAF (1999), refers to the system's ability to resist disturbance and its capability to recover from disturbance once it has occurred. The Ecological Importance and Sensitivity (EIS) analysis provides a guideline for the determination of the Ecological Management Class (EMC).

In the method outlined by DWAF (1999) a series of determinants for EIS are assessed for the wetlands on a scale of 0 to 4 (Table 4-5), where 0 indicates no importance and 4 indicates very high importance. The median of the determinants is used to determine the EIS and EMC of the wetland unit (Table 4-6).

Table 4: Score sheet for the determination of ecological importance and sensitivity (DWAF, 1999).

Determinant	Score	Confidence
Primary determinants		
Rare and endangered species		
Species/taxon richness		
Diversity of Habitat types or features		
Migration route/breeding and feeding site for wetland species		
Sensitivity to changes in the natural hydrological regime		
Sensitivity to water quality changes		
Flood storage, energy dissipation and particulate/element removal		
Modifying determinants		
Protected status		
Ecological integrity		

Table 5: Ecological Importance and Sensitivity (EIS) categories and the interpretation of median scores for biotic and habitat determinants (DWAF, 1999).

EIS Category	Range of Mean	Recommended Ecological Management Class[3]
Very high Wetlands that are considered ecologically important and sensitive on a national or even international level. The biodiversity of these wetlands is usually very sensitive to flow and habitat modifications.	>3 and <=4	A
High Wetlands that are considered to be ecologically important and sensitive. The biodiversity of these wetlands may be sensitive to flow and habitat modifications.	>2 and <=3	B
Moderate Wetlands that are considered to be ecologically important and sensitive on a provincial or local scale. The biodiversity of these wetlands is not usually sensitive to flow and habitat modifications.	>1 and <=2	C
Low/marginal Wetlands that are not ecologically important and sensitive at any scale. The biodiversity of these wetlands is ubiquitous and not sensitive to flow and habitat modifications.	>0 and <=1	D

3.5. Recommended Ecological Category (REC)

"A high management class relates to the flow that will ensure a high degree of sustainability and a low risk of ecosystem failure. A low management class will ensure marginal maintenance of sustainability but carries a higher risk of ecosystem failure." (DWAF, 1999).

The Recommended Ecological Category (REC) is determined based on the results obtained from the Present Ecological State (PES), reference conditions and Ecological Importance and Sensitivity (EIS) of the aquatic resource. This is then followed by realistic recommendations, mitigation, and rehabilitation measures to achieve the desired REC.

A system may receive the same class for the PES, as the REC if the system is deemed to be in good condition and therefore must stay in good condition. Otherwise, an appropriate REC should be assigned in order to prevent any further degradation as well as to enhance the PES of the riparian system (Table 4-7).

Table 6: Recommended Ecological Category (REC) classes.

Class (% of total)	Description
A	Unmodified, natural.
B	Largely natural with few modifications.
C	Moderately modified.
D	Largely modified.

3.6. Impact Assessment

A comprehensive impact assessment is then conducted. This includes identifying and describing potential impacts that may result from the proposed activity, considering both the

construction and operation phases. The assessment involves evaluating the extent, duration, magnitude, probability, and reversibility of these potential impacts. [cite: 1.3, 2, 3, 4] The significance of the impacts is evaluated using a defined scoring system. [cite: 1.3, 5, 6] As part of this assessment, a cumulative impact assessment is also included, which considers similar infrastructure such as powerlines and renewable energy plants within a 30km radius.

Table 7: Impact assessment methodology.

ASPECTS	SCORE
The impacts are assessed as either having a:	
Negative effect (i.e., at a `cost' to the environment),	-
Positive effect (i.e., a `benefit' to the environment),	+
Neutral effect on the environment.	
Extent of the Impact	
Site (site only),	1
Local (site boundary and immediate surrounds),	2
Regional (within the district municipalities),	3
National	4
International.	5
Duration of the Impact	
The length that the impact will last is described as either:	
Immediate (<1 year)	1
Short term (1-5 years),	2
Medium-term (5-15 years),	3
Long-term (ceases after the operational life span of the project),	4
Permanent.	5
Magnitude of the Impact	
The intensity or severity of the impacts is indicated as either:	
None,	0
Minor,	2
Low,	4
Moderate (environmental functions altered but continue),	6
High (environmental functions temporarily cease), or	8

Very high / Unsure (environmental functions permanently cease).	10
Probability of Occurrence	
The likelihood of the impact occurring is indicated as either:	
None (the impact will not occur),	0
Improbable (probability very low due to design or experience)	1
Low probability (unlikely to occur),	2
Medium probability (distinct probability that the impact will occur),	3
High probability (most likely to occur)	4
Definite.	5
Reversibility	
The degree to which an impact is reversible:	
Completely reversible	1
Partly reversible	2
Barely reversible	3
Irreversible	4

Significance of an impact
S= (E+D+M) P
Where E is Extent, D is Duration, M is Magnitude, and P is Probability

Table 8: Impact Rating.

Score	Significance	Description of Significance
(<30)	Low	The activity will have a low impact on the environment. This impact would not directly influence the decision to develop in the area.
(30-60)	Medium	Medium Impact – the activity will have a medium impact on the environment. The impact could influence the decision to develop in the area unless mitigated.
(>60)	High	The activity will have a high impact on the environment. The impact must influence the decision to develop in the area.

3.7. Mitigation and Recommendations

The final stage of the methodology focuses on mitigation and recommendations. This involves describing recommended mitigation measures for the impacts that were identified in the previous step. Tower-specific mitigation measures, derived from the April 2024 walkdown survey, are provided. Recommendations are also developed for the footprint areas, aimed at limiting impacts on wetland areas within the 500m regulated area.

4. RESULTS

4.1. Desktop Assessment: Description of the Receiving Environment

A desktop assessment was conducted as the initial step in evaluating the aquatic environment within the proposed Borutho–Nzhelele 400 kV powerline corridor. This assessment integrates data from national and provincial freshwater biodiversity databases, GIS datasets, and online environmental screening tools to establish a baseline understanding of the hydrological and ecological setting of the project area.

4.1.1. Water Management Area and Sub-Water Management Areas

The entire alignment falls within the Limpopo Water Management Area (WMA 1), a strategic water region covering the Limpopo River and its associated catchments.

The powerline route intersects several Sub-Water Management Areas (SWSAs), including:

- Matlala River (A62E, A62H)
- Seokeng and Tshipu Rivers (A71G, A72A)
- Sand River (A80F)
- Mogwatsane River (A71E, A71K)

These catchments contribute to the broader Limpopo River system, which is of national and transboundary importance, influencing flow into Botswana, Zimbabwe, and Mozambique.

4.1.2. National Freshwater Ecosystem Priority Areas (NFEPA)

According to the NFEPA database, the project intersects several FEPA rivers and wetlands, which are considered critical to freshwater ecosystem functioning and biodiversity conservation:

- FEPA Rivers:
  - Brak River
  - Sand River
  - Seokeng River
  - Tshipu River
  - Matlala River
  - Mogwatsane River
- NFEPA Wetlands:
  - Channelled valley-bottom wetlands
  - Depression wetlands
  - Flat wetlands
  - Seep wetlands

These features are prioritised for protection due to their contribution to ecological connectivity, aquatic habitat support, flood attenuation, and water quality regulation. The figures which show all the NFEPA features are presented on Annexures 1.

4.1.3. National Biodiversity Assessment (NBA, 2018)

According to the NBA 2018:

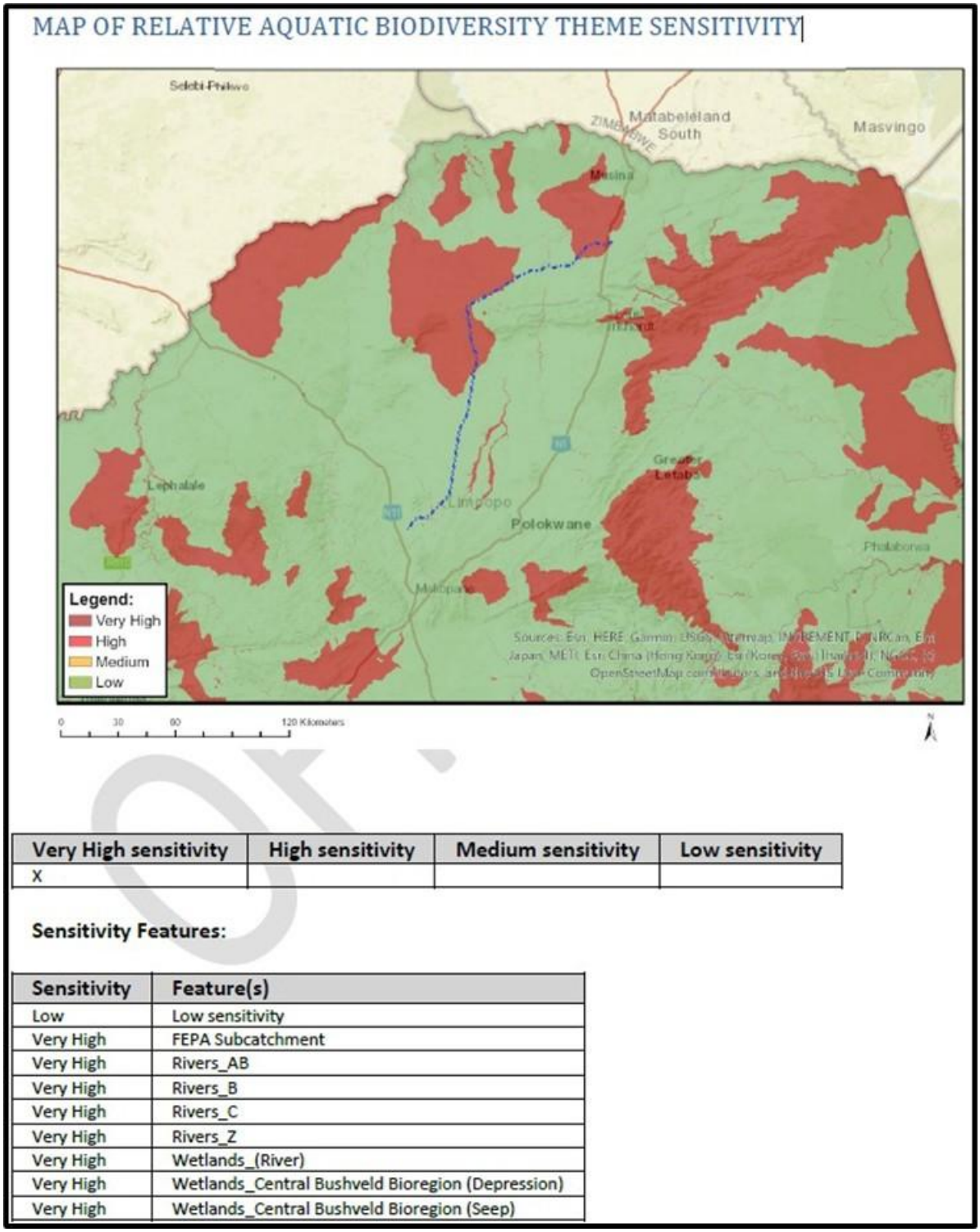
- Several wetlands and river reaches within the study area are classified as Endangered or Vulnerable, based on degradation trends and ecosystem pressure indicators.
- Key threats in these systems include:
  - Livestock grazing and trampling
  - Soil extraction from borrow pits
  - Erosion and siltation
  - Sand mining activities (e.g., Sand River)
- Portions of the alignment fall within Critical Biodiversity Areas (CBAs) and Ecological Support Areas (ESAs), where aquatic ecosystems play a key role in maintaining downstream flow and biodiversity.

4.1.4. Fish Sanctuaries

A review of the SANBI Fish Sanctuary and Freshwater Species Priority Areas indicates no formal fish sanctuaries directly intersect the powerline alignment. However, certain river systems (e.g., the Sand and Matlala Rivers) may support important aquatic fauna, especially during wetter months, highlighting the need to protect aquatic habitat connectivity.

4.1.5. Sensitivity Mapping

The DFFE Screening Tool classifies the alignment predominantly as Very High Aquatic Biodiversity Theme Sensitivity due to the combination of NFEPA subcatchments, sensitive wetland types, and threatened rivers. See Figure 24 for spatial representations.



Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
X			

Sensitivity Features:

Sensitivity	Feature(s)
Low	Low sensitivity
Very High	FEPA Subcatchment
Very High	Rivers_AB
Very High	Rivers_B
Very High	Rivers_C
Very High	Rivers_Z
Very High	Wetlands_(River)
Very High	Wetlands_Central Bushveld Bioregion (Depression)
Very High	Wetlands_Central Bushveld Bioregion (Seep)

Figure 24: DFFE screening tool for Powerline.

4.2. Field Assessment: Walkdown Verification of Aquatic Features

A comprehensive field walkdown was conducted from 26 to 30 April 2024 to verify aquatic features identified during the desktop study and to assess the Present Ecological Status (PES) and Ecological Importance and Sensitivity (EIS) of rivers, wetlands, and drainage lines within 500 meters of the proposed tower positions.

The assessment was carried out by Tshilimo Consulting Services (Pty) Ltd and included on-site verification of wetland boundaries, river morphology, vegetation composition, signs of disturbance, and flow patterns. The walkdown route prioritised towers near mapped NFEPA features, high-sensitivity screening tool zones, and known aquatic ecosystems.

4.2.1. Observed Aquatic Features

Multiple aquatic features were recorded along the alignment, including:

- Seasonal Rivers (e.g., Matlala River, Seokeng River, Tshipu River, Sand River)
- Seep and Depression Wetlands (e.g., near Towers 73 and 99)
- Dry drainage lines with erosion and vegetation indicators of intermittent flow
- Borrow pits and disturbed areas functioning as artificial aquatic features

Refer to Annexures 2 for geotagged photographs and Annexures 1 for mapped locations of verified watercourses.

4.2.2. Key Observations by Location

Below is a summary of site-specific observations. Full data tables and photographic evidence are included in the Annexures 2 and Annexures 3.

Tower/Feature	Watercourse Type	Condition & Key Observations	PES	EIS
Tower 9	Seasonal River	Dry, defined riverbed with intact shrub layer; moderate grazing pressure	C	Moderate
Towers 12–13	Borrow Pit (Artificial)	Severely disturbed area; compacted soil, sparse grasses	D	Low
Tower 14	Seasonal River	Dry channel, erosion evident; signs of past water flow	C	Moderate
Matlala River	Seasonal River	Pools of water; rocky substrate with riparian vegetation	C	High
Tower 39	Borrow Pit	Degraded, actively accessed; limited ecological function	D	Low
Tower 41–42	Seasonal River	Severely eroded, unstable banks; vegetation stressed	D	Low–Mod
Tower 46–47	Seasonal River	Dry, rocky bed with resilient vegetation; erosion potential	C	Moderate
Tower 49–51	Seasonal Stream	Dry but visible drainage path and channelised features	C	Moderate
Seokeng River	Seasonal River	Flat grassland, sparse cover; highly stressed system	D	Low
Tshipu River	Seasonal River	Sandy bed, shrubs and Acacia; moderate biodiversity support	C	Moderate
Tower 73	Seasonal Wetland (degraded)	Dry, compacted; signs of past saturation; no wetland vegetation	D	Low–Mod
Tower 99	Seasonal Wetland (grazed)	Completely dry, overgrazed, compacted; no hydrophytic indicators	E	Low

Tower/Feature	Watercourse Type	Condition & Key Observations	PES	EIS
Sand River	Perennial River	Standing water, tall reeds and riparian trees; sand mining noted	C	High
Tower 402–403	Seasonal Stream	Narrow channel, compacted soil; resilient grasses	C	Moderate

4.2.3. Field Methodology

The field assessment followed national protocols and guidance:

- Wetlands were delineated using the DWAF (2005) guidelines, based on three indicators:
  - Terrain Unit Indicator (e.g., valley bottoms, concave slopes)
  - Soil Form and Wetness Indicators (e.g., redoximorphic features, mottling)
  - Vegetation Indicators (e.g., presence of hydrophytes, ruderal vs. indigenous species)
- Rivers and streams were assessed using the WET-Health v2 and PES/EIS methodologies, focusing on:
  - Hydrological alterations
  - Physical disturbance (e.g., erosion, sand mining)
  - Vegetation condition and connectivity

4.2.4. Site Observations and Ecological Condition

During the field walkdown conducted in April 2024, multiple locations were assessed across the semi-arid project corridor to verify aquatic features and evaluate their ecological condition. Observations focused on identifying river and wetland systems, assessing vegetation composition, and recording signs of erosion, anthropogenic disturbance, and ecological resilience. The route primarily intersected seasonal rivers, ephemeral wetlands, and disturbed areas such as borrow pits, each contributing to a better understanding of the aquatic biodiversity context in the dry season.

At Tower 9, a seasonal river approximately 250 meters away displayed a visible but dry channel, with compacted soils and scattered vegetation including *Dodonea viscosa*, Aloe-like succulents, and dormant grasses evidence of previous seasonal moisture. Between Towers 12 and 13, a disturbed borrow pit revealed reddish-brown lateritic soils and minimal vegetation cover, though some ecological resilience was observed in the form of pioneer grasses (*Cenchrus, Panicum, Imperata*) and a central Acacia tree. Tower 14 revealed a fully dry seasonal riverbed with distinct gullies and steep, unstable banks clear indicators of high-flow erosion during past rainfall events.



Dodonea viscosa



Aloe



Acacia tree

The Matlala River, a key NFEPA river in the area, retained small pools of standing water despite the dry season. Its rocky, erosion-resistant bed and surrounding vegetation, including scattered shrubs and grasses, suggested relatively intact ecological function and hydrological integrity. In contrast, Tower 39's borrow pit was heavily degraded, with limited vegetation and signs of regular human activity, likely related to soil extraction. Nearby, a dry stream between Towers 39 and 41 exhibited defined drainage channels and vegetation characteristic of past water flow, including drought-tolerant shrubs and scattered trees.



Matlala River



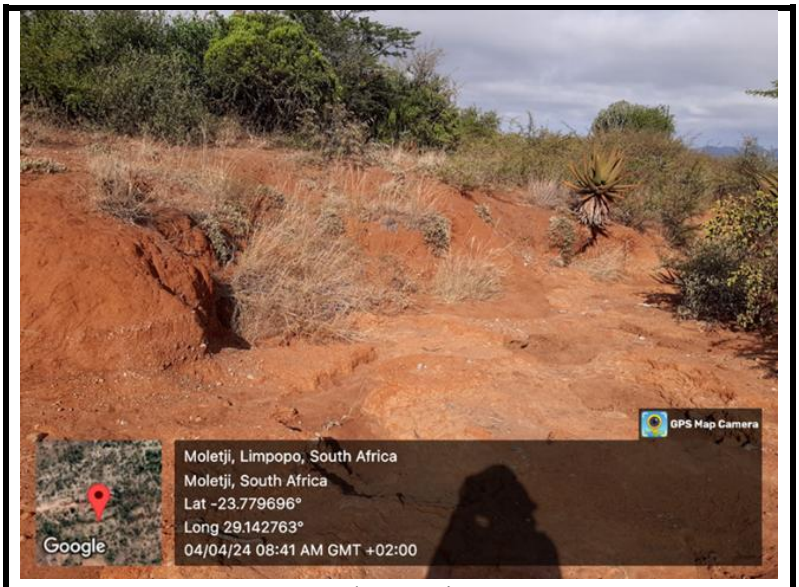
borrow pit

Severe erosion was observed between Towers 41 and 42 along a seasonal riverbed, where steep slopes, active gullies, and stressed vegetation reflected significant vulnerability to further degradation. A dry river near Towers 46 and 47, adjacent to Lepotlako Village, was rocky and lined with *Dodonea viscosa* and *Acacia* trees. Although it lacked water at the time of assessment, the substrate and topography supported flow and erosion during rains.



seasonal river

In Moletji, between Towers 49 and 51, an unidentified streambed exhibited distinct gullies, dry grasses, Aloe succulents, and small shrubs. Soil layering and erosion patterns confirmed episodic water movement. The Seokeng River region was largely flat, with sparse grasses and dry soil, although slight undulations indicated the potential for sheet runoff and localised erosion during wet periods.



Seokeng River

The Tshipu River was dry, with sandy substrates and *Acacia*-dominated riparian zones. While the sandy conditions promote drainage and occasional groundwater recharge, they also contribute to erosion risks during peak runoff. The wetland near Tower 73 was dry and lacked hydrophytic vegetation; dominant vegetation included Acacia trees and dormant grasses, suggesting a transitional wetland condition during the dry season.



Tshipu River

At Tower 99, a dry wetland was observed in a highly degraded state due to active cattle grazing. The absence of water and hydrophytic species confirmed low functionality during the site visit. Similarly, a seasonal stream between Tower 331 and the Sand River exhibited no water flow but retained evidence of past flow through channel depressions and scattered vegetation. The Sand River itself was the most ecologically complex system observed: patches of standing water, riparian trees, and Phragmites australis colonies indicated retained ecological function, although human impacts such as sand mining were evident along its banks.



wetland next to Tower 99



Sand River

Finally, between Towers 402 and 403, a narrow seasonal stream with reddish lateritic soils appeared to receive upstream seepage flow. While dry at the time, signs of erosion and water movement were visible, and streambanks supported dry grasses and scattered trees. Overall, these site-specific observations informed the aquatic feature classification, Present Ecological Status (PES), Ecological Importance and Sensitivity (EIS), and buffer recommendations that follow in this report (see Annexures 1 and 2 for mapped locations and photos).



Seasonal stream

4.3. Wetland Indicators

Wetland delineation during the field assessment followed the Department of Water Affairs and Forestry (DWAF, 2005) guideline, which relies on three key indicators: terrain unit, soil form and wetness, and vegetation characteristics. These indicators were applied during the April 2024 walkdown to verify the presence, extent, and ecological condition of wetlands identified in the desktop study and sensitivity screening.

4.3.1. Terrain Unit Indicator

Wetlands were typically located in low-lying areas, including valley bottoms, depressions, and toe-slopes. These geomorphic positions are consistent with channelled valley-bottom and depression wetland types identified on the NFEPA layer. Terrain analysis helped distinguish wetlands from upslope seasonal drainage features, particularly in flat or gently undulating landscapes.

4.3.2. Soil Form and Soil Wetness Indicators

At various locations, particularly near Towers 73 and 99, soil pits and visual inspections revealed characteristics associated with seasonally saturated soils, such as:

- Redoximorphic features (mottling, grey-blue colours)
- Gleyed soil horizons
- Evidence of alternating wet-dry cycles, such as cracking or iron concretions

However, in some degraded or dry wetlands (Tower 99), compaction and surface disturbance from grazing obscured or disrupted these indicators, making field verification more reliant on vegetation and terrain cues.



Wetland on Tower 99

4.3.3. Vegetation Indicators

Vegetation composition varied considerably, depending on the level of disturbance and recent rainfall. In more intact wetlands (near Matlala River and portions of the Sand River floodplain), hydrophytic species such as *Phragmites australis* and moisture-tolerant grasses were observed, particularly in depressions or areas of residual surface water. In contrast, many wetlands appeared dormant or dry during the site visit, with limited presence of obligate wetland species. Common species in these zones included Acacia spp., *Dodonea viscosa*, and various drought-tolerant grasses, which are more indicative of a dry-phase seasonal wetland than an upland system.



Phragmites australis



Dodonea viscosa



Acacia spp

4.4. Determining the Present Ecological Status (PES) of wetlands

The PES assessment evaluates the current state of aquatic ecosystems compared to their natural, unimpacted condition. Based on observed indicators - such as channel modification, vegetation condition, erosion, and anthropogenic disturbance - each site is rated from A (Natural) to F (Critically Modified).

Table 9: PES Results.

Site/Feature	PES Category	Justification
Tower 9 (Seasonal River)	C	Natural channel remains but dry-season stress evident. Vegetation mostly intact but impacted by grazing.
Towers 12 – 13 (Borrow Pit)	D	Disturbed topography from soil extraction. Natural vegetation recovering but impacted.
Tower 14 (Seasonal River)	C	Dry, eroded riverbed. Natural features present but erosion and vegetation stress observed.
Matlala River	C	Rocky substrate intact; pools of water and vegetation indicate moderate ecological integrity.
Tower 39 (Borrow Pit)	D	Soil mining and human access have disrupted vegetation. Acacia trees persist.
Tower 39 - 41 (Seasonal Stream)	C	Stream morphology mostly intact; moderate vegetation disturbance due to dryness.
Tower 41 - 42 (Seasonal River)	D	Severe erosion and loss of slope stability. Sparse, stressed vegetation.
Tower 46 – 47 (Seasonal River)	C	Rocky channel, intact vegetation buffer. Dry but structurally functional.
Tower 49 - 51 (Unknown Stream)	C	Evidence of past flow. Vegetation includes drought-tolerant species.
Seokeng River	D	Grassland dominance and low plant density reflect aridity and possible overgrazing.
Tshipu River	C	Sandy riverbed and natural vegetation present, despite grazing pressure.
Wetland at Tower 73	D	Dry, non-functioning wetland. No hydrophytic vegetation observed.
Wetland at Tower 99	E	Completely dry with no wetland indicators; extensive cattle grazing.
Tower 331 - Sand River (Seasonal Stream)	C	Natural features remain, despite dry conditions.
Sand River	C	Partially dry with standing water, vegetation buffer intact, but sand mining evident.
Tower 402 – 403 (Unknown Stream)	C	Narrow stream, compacted soil; surrounding vegetation shows resilience.

4.5. Ecological Importance and Sensitivity (EIS)

This assessment estimates the conservation value and sensitivity of wetlands and rivers based on biodiversity support, ecosystem service provision, and the site's rarity. Ratings range from Low, Moderate, High, to Very High.

Table 10: EIS results.

Site/Feature	EIS Rating	Justification
Tower 9 (Seasonal River)	Moderate	Provides seasonal flow and habitat for resilient species.
Towers 12 – 13 (Borrow Pit)	Low	Heavily disturbed. Limited ecological services currently provided.
Tower 14 (Seasonal River)	Moderate	Seasonal hydrology supports ecosystem functions, but erosion reduces resilience.
Matlala River	High	Rocky substrate and presence of standing water provide refugia and promote biodiversity.
Tower 39 (Borrow Pit)	Low	Human disturbance and sparse vegetation limit ecological functioning.
Tower 39 - 41 (Seasonal Stream)	Moderate	Supports vegetation and may contribute to local hydrology during wet seasons.
Tower 41 - 42 (Seasonal River)	Low - Moderate	Erosion risk reduces function, but some biodiversity retained.
Tower 46 – 47 (Seasonal River)	Moderate	Structural integrity retained; drought-resistant flora present.
Tower 49 - 51 (Unknown Stream)	Moderate	Evidence of diverse flora including Aloe suggests moderate ecological support.
Seokeng River	Low	Limited ecological functioning observed during current dry phase.
Tshipu River	Moderate	Vegetation and sandy substrate support ecosystem services such as infiltration.
Wetland at Tower 73	Low–Moderate	Ecological role diminished due to dryness but may recover post-rainfall.
Wetland at Tower 99	Low	Completely dry, overgrazed, no wetland function currently visible.
Tower 331 - Sand River (Seasonal Stream)	Moderate	Still retains some ecological role in water regulation and connectivity.
Sand River	High	Biodiversity hotspot with reeds, tall trees, and functional hydrology; at risk from sand mining.
Tower 402 – 403 (Unknown Stream)	Moderate	Vegetation and erosion features indicate potential seasonal importance.

4.6. Integration of PES and EIS Scores

The integration of Present Ecological Status (PES) and Ecological Importance and Sensitivity (EIS) provides a holistic understanding of the health, resilience, and conservation value of the wetland and riparian systems assessed during the site visits. The PES scores reflect the degree of ecological modification each system has undergone, while EIS ratings identify the relative importance of these systems for biodiversity support, ecosystem services, and sensitivity to disturbance.

Across the assessed sites, many wetland and river systems were found to be in a moderately to largely modified ecological state (PES categories C to D). This degradation is primarily attributed to seasonal drought, erosion, and human activities such as soil extraction, cattle grazing, and sand mining. For example, wetlands near Tower 99 and Tower 73 were rated D

and E, respectively, due to severe drying, vegetation loss, and trampling. Despite this, their EIS ratings remained Low to Moderate, indicating that while ecological functioning is currently limited, these systems may retain value for local water regulation and could recover if restored or protected.

In contrast, the Sand River and Matlala River demonstrated moderately modified PES scores (Category C) yet were assigned High EIS ratings due to the presence of permanent pools, hydrophytic vegetation like Phragmites australis, and their role in maintaining riparian biodiversity and sediment transport. These systems also showed greater structural integrity and evidence of supporting wildlife, making them critical ecological corridors despite being seasonally dry.

Several seasonal streams and borrow pits such as those near Tower 12-13, Tower 39, and Tower 41-42 exhibited low PES and low-to-moderate EIS scores. These sites have undergone significant anthropogenic alteration and support sparse vegetation, but still provide limited ecological services, especially during the wet season.

The integration of PES and EIS scores highlights key management priorities. Systems with high EIS and moderate PES, like the Sand River, require protection and monitoring to prevent further degradation. Conversely, wetlands with low PES and EIS, such as Tower 99, offer opportunities for rehabilitation and restoration, especially if their historical ecological role can be confirmed through further hydrological and soil assessments.

Overall, the semi-arid environment presents unique challenges for wetland conservation, as many systems are ephemeral and sensitive to both natural and anthropogenic stressors. Thus, integrated PES-EIS evaluations are essential for informing land-use decisions, prioritising conservation actions, and supporting climate-resilient ecosystem management in the region.

4.7. Verified Aquatic Sensitivity and Report Classification

The DFFE Screening Tool classified the aquatic biodiversity theme sensitivity of the proposed Borutho - Nzhelele 400 kV powerline corridor as Very High across most of the alignment. This initial classification is based on the presence of multiple National Freshwater Ecosystem Priority Area (NFEPA) rivers and wetlands, Critical Biodiversity Areas (CBAs), and a variety of aquatic systems mapped in proximity to the planned tower placements. These features include perennial and seasonal rivers, seeps, depression wetlands, and valley-bottom wetlands situated in sensitive sub-catchments.

Field verification undertaken during the April 2024 walkdown confirmed the presence of these aquatic features. Numerous rivers including the Sand River, Matlala River, Seokeng River, and Tshipu River as well as several wetlands and dry drainage systems, were observed within the study area. While some systems were in a dormant phase due to the dry season, many retained visible wetland or riverine characteristics, including defined channels, erosion features, vegetation patterns, and terrain indicators consistent with wetland conditions.

The verified condition of these features varied across the alignment. Systems such as the Sand River and Matlala River showed signs of moderate ecological integrity with the presence of riparian vegetation, standing water, and rocky, erosion-resistant substrates. Conversely, several wetlands particularly those near Tower 73 and Tower 99 were found to be heavily degraded, with compacted soils, active grazing, and little to no hydrophytic vegetation present. Despite

varying levels of ecological condition, the overall sensitivity remains high due to the diversity of aquatic ecosystem types, their spatial connectivity, and their functional role in the landscape.

In line with the Protocol for the Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on Aquatic Biodiversity (GN 320 of 2020), the combination of:

- Verified Very High sensitivity areas,
- The presence of NFEPA rivers and wetlands,
- Ecological linkages to CBAs/ESAs, and
- Observed ecosystem functions,

qualifies this submission as a Specialist Aquatic Impact Assessment Report, rather than a compliance statement. The report meets the full protocol requirements, including:

- Sensitivity verification with field data
- Classification of aquatic features
- Assessment of Present Ecological Status (PES) and Ecological Importance and Sensitivity (EIS)
- Identification of potential impacts
- Mitigation measures and buffer zone recommendations
- Regulatory considerations, including applicability of General Authorisation (GN 4167 of 2023)

This verified sensitivity and ecological importance inform the risk assessment, construction planning, and environmental management measures detailed in the sections that follow.

5. IMPACT ASSESSMENT

The DWS Risk Assessment Matrix evaluates potential impacts of activities on watercourses using a combination of impact severity, extent, duration, likelihood, and reversibility. These factors are used to derive a risk class (Low, Moderate, or High) which informs mitigation requirements and regulatory decisions.

5.1. Identified Impacts

Based on your site visit observations, the following potential impacts were identified:

Table 11: Impact table.

Impact Type	Source of Impact
Habitat disturbance	Soil extraction (borrow pits), grazing
Erosion and sedimentation	Bare slopes and steep, unstable banks
Vegetation loss	Overgrazing, clearing, and trampling
Flow alteration	Sand mining (e.g., Sand River)
Pollution risk	Cattle presence, foot traffic, runoff

Table 12: Impact rating before mitigation.

Impact Description	Severity	Duration	Extent	Probability	Reversibility	Significance	Risk Class
Loss of wetland vegetation (Tower 99, 73)	2	3	2	4	3	42	Moderate
Erosion of seasonal riverbanks (Tower 14, 41 - 42)	3	3	3	4	2	48	High
Habitat modification from borrow pits (Towers 12 - 13, 39)	3	2	2	3	3	33	Moderate
Flow disruption from sand mining (Sand River)	3	4	3	4	2	60	High
Livestock-related disturbance (Tower 99 wetland)	2	3	2	4	4	44	Moderate

Table 13:Impact rating after mitigation.

Impact Description	Severity	Duration	Extent	Probability	Reversibility	Significance	Risk Class
Loss of wetland vegetation (Tower 99, 73)	1	2	1	2	4	16	Low
Erosion of seasonal riverbanks (Tower 14, 41 - 42)	2	2	2	3	3	27	Low
Habitat modification from borrow pits (Towers 12 - 13, 39)	2	2	1	2	4	18	Low
Flow disruption from sand mining (Sand River)	2	3	2	3	3	36	Low
Livestock-related disturbance (Tower 99 wetland)	1	2	1	2	4	16	Low

5.2. Cumulative Impact Assessment

A cumulative impact assessment (CIA) was conducted to evaluate the combined effects of the proposed Borutho–Nzhelele 400 kV powerline in relation to other existing or proposed infrastructure within a 30 km radius, particularly focusing on surface water resources. While the proposed alignment does not follow the exact same route as other powerlines, it intersects several shared quaternary catchments and sensitive aquatic ecosystems, raising concerns about potential cumulative pressures.

The assessment considered KML datasets of surrounding powerlines (as provided with the appointment letter), catchment boundaries, and National Freshwater Ecosystem Priority Area (NFEPA) features. The focus was on identifying areas where multiple infrastructure developments may result in repeated disturbances to the same watercourses, wetlands, or sub-catchments.

5.2.1. Catchment-Level Overlap

Several quaternary catchments intersected by the proposed alignment A71K, A80F, A71G, A62E, and A61G are also intersected by other existing or planned linear infrastructure, though often at different points. Additionally, catchments A72A and A72B are particularly important as two or more powerlines occur in close spatial proximity, especially near the Brak River, a designated NFEPA river in A72B, which is crossed by multiple lines.

This spatial overlap increases the risk of:

- Repeated vegetation clearance and soil disturbance
- Flow modification from multiple watercourse crossings
- Erosion, sedimentation, and habitat fragmentation

5.2.2. NFEPA and Ecological Sensitivity

The Brak River (A72B) is a key feature of concern due to its NFEPA status and multiple crossing points. Without coordinated mitigation, cumulative activities in this river and its sub-catchment could degrade its ecological function and compromise its role in regional freshwater biodiversity.

Other catchments (A62E for the Matlala River and A71K for seep wetlands) also support sensitive aquatic ecosystems that, while only intersected by the proposed line, may be affected by broader catchment-level disturbances if unmanaged.

Table 14: Cumulative Impact Summary by Catchment.

Catchment Code	Watercourse(s)	NFEPA Status	Overlap with Other Lines	Cumulative Impact Risk	Recommended Mitigation
A72B	Brak River	NFEPA River	Yes	High	Enforce 100 m buffer; coordinated mitigation with adjacent projects.
A72A	Seokeng River, wetlands	Near NFEPA River	Yes (routes in close proximity)	Moderate	Shared access planning; erosion and sedimentation control.
A71K	Seep wetlands	Moderate sensitivity	No (but within same catchment)	Moderate	Monitor flow alterations; avoid wetland disturbance.
A80F	Sand River tributary	NFEPA nearby	No (same catchment)	Moderate	Enforce buffer zone; prevent cross-drainage interference.
A62E	Matlala River	NFEPA River, High EIS	Yes (same catchment, different location)	Moderate	Riparian protection; minimize instream activity.
A61G	Ephemeral drainage lines	Not NFEPA	No (but shares substation – Borutho)	Low	Apply standard construction-phase mitigation (e.g., erosion control).

6. BUFFER ZONE

6.1. DWS Buffer Zone Guidelines

The Department of Water and Sanitation (DWS), under General Authorisations (GN 509 of 2016) and GN 704 of 1999, recommends buffer zones to protect watercourses from direct and indirect impacts. These include:

- 32 meters from the edge of a river, stream, or wetland for activities that may affect the resource, especially in urban or transformed landscapes.
- For pristine or sensitive wetlands, the buffer may be 50 meters or more, depending on the Ecological Importance and Sensitivity (EIS) and Present Ecological Status (PES) of the wetland.
- The width of the buffer may increase with:
  - Higher risk of erosion
  - Steeper slopes
  - Sensitive habitat or endangered species presence
  - Land use intensity near the watercourse

Buffers are intended to act as a protective filter zone, maintaining ecological function, water quality, and habitat integrity.

6.2. LEDET Buffer Zone Requirements

LEDET, as the competent environmental authority in Limpopo, follows national norms but also applies site-specific conditions in its Environmental Authorisations (EAs) and Screening Tool protocols. General guidance includes:

- A minimum buffer of 32 meters from the edge of a wetland or riparian zone is enforced for listed activities (especially under Listing Notices 1 and 3 of the NEMA EIA Regulations).
- For High or Very High sensitivity features, LEDET may require buffer zones of 50–100 meters or more depending on:
  - Wetland type and function
  - Ecosystem status (e.g. if it's part of a Critical Biodiversity Area or Ecological Support Area)
  - Anticipated development pressure or degradation risk
- LEDET may require a wetland delineation and functional assessment report, followed by a site-specific buffer zone determination—usually undertaken by a SACNASP-registered specialist.

Based on field assessment findings:

- For seasonal wetlands with Moderate PES and Moderate EIS (e.g. Tower 73), a 50-meter buffer would be appropriate.
- For severely degraded wetlands with Low EIS (e.g. Tower 99), a 32-meter buffer would still apply, though restoration might be prioritized.
- For systems like the Sand River, with High EIS and sensitive riparian vegetation, a 100-meter buffer would be ideal to maintain ecological function and regulate hydrology and sediment transport.

Table 15: Buffer Zones.

Ecosystem Type	PES & EIS Level	Recommended Buffer (DWS/LEDET)
Seasonal wetland (Moderate)	PES: C, EIS: Moderate	50 meters
Degraded wetland (Low)	PES: D–E, EIS: Low	32 meters
Perennial or important river	PES: C, EIS: High	100 meters
Wetland in CBA/ESA	Any PES, EIS: High	50 meters (case-specific)

Table 16: Watercourses and Recommended Buffer Zones (LEDET & DWS).

Watercourse / Location	Type	PES	EIS	Recommended Buffer Zone
Seasonal River (Tower 9)	Seasonal River	C	Moderate	50 meters
Borrow Pit (Towers 12–13)	Anthropogenic / Pit	D	Low	32 meters
Seasonal River (Tower 14)	Seasonal River	C	Moderate	50 meters
Matlala River	Seasonal River	C	High	100 meters
Borrow Pit (Tower 39)	Anthropogenic / Pit	D	Low	32 meters
Seasonal Stream (Tower 39–41)	Seasonal Stream	C	Moderate	50 meters
Seasonal River (Tower 41–42)	Seasonal River	D	Low–Moderate	50 meters
Seasonal River (Tower 46–47)	Seasonal River	C	Moderate	50 meters
Unknown Stream (Tower 49–51)	Seasonal Stream	C	Moderate	50 meters
Seokeng River	Seasonal River	D	Low	32 meters
Tshipu River	Seasonal River	C	Moderate	50 meters
Wetland (Tower 73)	Seasonal Wetland	D	Low–Moderate	50 meters
Wetland (Tower 99)	Seasonal Wetland	E	Low	32 meters
Stream to Sand River (Tower 331)	Seasonal Stream	C	Moderate	50 meters
Sand River	Perennial River	C	High	100 meters
Unknown Stream (Tower 402–403)	Seasonal Stream	C	Moderate	50 meters

7. WATER USE LICENSE APPLICATION (WULA) CONSIDERATION

7.1. Regulatory Framework

The management and protection of South Africa's water resources are governed by the National Water Act (No. 36 of 1998), which regulates water use activities through Section 21 of the Act. Any activity that may result in the abstraction, storage, diversion, impeding, or alteration of the flow of water in a watercourse; or that may pollute or degrade a water resource, requires authorisation from the Department of Water and Sanitation (DWS).

In December 2023, Government Notice 4167 of 2023 replaced previous General Authorisations (GAs) and established the conditions under which specific water uses may proceed without the need for a full Water Use License Application (WULA). Activities that exceed the GA thresholds, or that occur within sensitive catchments such as Strategic Water Source Areas (SWSAs), must however undergo a full licensing process.

The Aquatic and Surface Water Assessment for the proposed Borutho–Nzhelele 400 kV Powerline identified several watercourses (including rivers, wetlands, and ephemeral drainage lines) within the 32 m regulatory buffer defined by the Act. Accordingly, the project's interaction with these features must be reviewed 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).

7.2. Application to the Proposed Project

The proposed transmission line traverses approximately 250 km across six local municipalities within the Vhembe, Capricorn, and Waterberg Districts. Construction activities will be limited to tower foundation excavation, access road establishment, and stringing operations. The project does not involve any abstraction, storage, discharge, or alteration of water quality and therefore does not trigger Section 21(a), (b), (e), (f), (g), (h), or (j) of the Act.

However, several tower positions and access routes are located within 32 m of delineated rivers, streams, or wetlands, as confirmed during the April 2024 walk-down assessment. These areas are expected to fall under Section 21(c) and (i) water uses. The risk magnitude for these temporary, localised activities is considered Low to Moderate after implementation of mitigation measures (refer to the Risk Matrix in Section 5).

To ensure legal compliance, the following process is recommended:

- Verification of regulated areas and activity types by a DWS Regional Office prior to construction;
- Submission of a GA verification under GN 4167 of 2023 for qualifying activities; and
- Lodgement of a full WULA should any activity exceed GA thresholds or occur within a Strategic Water Source Area.

7.3. Strategic Water Source Area (SWSA) Context

The Vivo–Dendron - Waterpoort corridor forms part of the Limpopo Strategic Water Source Area (SWSA) as delineated by the Limpopo Spatial Development Framework (LSDF) and the National Water Resource Strategy (NWRS II). These SWSAs supply disproportionately large volumes of high-quality water to downstream ecosystems and users and are critical for sustaining both surface and groundwater systems. The Vivo–Waterpoort region specifically

contributes to recharge of the Limpopo River Basin and supports numerous local wetlands and riparian habitats.

Although this report focuses on surface water as guided by Government Notice 320 of 2020 (Aquatic Biodiversity Protocol), the assessment recognises the hydrological inter-connectivity between surface and subsurface flow within this SWSA. The powerline development does not involve groundwater abstraction or dewatering, but any in-stream construction within this sensitive landscape must adopt a precautionary approach consistent with Integrated Water Resource Management (IWRM) principles.

Accordingly, Tshilimo Consulting Services recommends that:

- The project proponent engage DWS for early screening and alignment regarding SWSA sensitivity and the applicability of GN 4167 of 2023;
- Site-specific method statements be developed for all tower installations or access tracks crossing delineated wetlands or rivers;
- Buffer zones of 32 m (minimum) for rivers and 50 m (recommended) for wetlands be maintained, with reinstatement and revegetation after construction; and
- Ongoing monitoring of surface and subsurface drainage behaviour be undertaken to ensure that no long-term hydrological alteration occurs within the SWSA.

8. CONCLUSION AND RECOMMENDATIONS

8.1. Conclusion

The Surface Water Impact Assessment and Walkdown Report for the proposed Borutho - Nzhelele 400 kV Powerline was undertaken by Tshilimo Consulting Services (Pty) Ltd to evaluate potential impacts on surface water features within the project corridor. The study followed the requirements of Government Notice 320 of 2020 (Aquatic Biodiversity Protocol) under the National Environmental Management Act (Act 107 of 1998) and the National Water Act (Act 36 of 1998), focusing specifically on surface water systems such as rivers, drainage lines, wetlands, and riparian zones.

The assessment confirmed the presence of several non-perennial and seasonal rivers and wetlands along the powerline alignment, including the Sand River, Matlala River, Seokeng River, Tshipu River, and Mogwatsane River, as well as valley-bottom and seep wetlands. These systems play vital ecological roles in flow regulation, sediment retention, and water-quality improvement. Based on field verification, their Present Ecological State (PES) ranges from Category C (moderately modified) to Category E (seriously modified), primarily due to historical agricultural and land-use disturbances.

The study acknowledges that sections of the project traverse the Vivo–Dendron - Waterpoort region, which is recognised in the Limpopo Spatial Development Framework (LSDF) as a Strategic Water Source Area (SWSA) and part of the Soutpansberg hydrological system. These SWSAs supply disproportionate volumes of surface and groundwater to downstream catchments and are critical for aquifer recharge, flood regulation, and water-quality maintenance. While this study's scope was limited to surface water, the hydrological interconnectivity between surface and groundwater systems in the SWSA has been acknowledged and integrated into the final report.

Accordingly, the importance of strategic wetlands and riparian zones within the Vivo–Waterpoort area has been recognised. These wetlands, though not always formally designated (e.g., Ramsar sites), serve as key ecological infrastructure for baseflow maintenance, infiltration, and pollution attenuation. The study concludes that the proposed transmission line (being a linear infrastructure project with limited ground disturbance) poses low to moderate risk to surface hydrology, provided that mitigation, buffer zones, and DWS consultation measures are strictly implemented.

The project therefore remains environmentally acceptable from a surface water perspective, subject to the conditions and management actions outlined below.

8.2. Recommendations

To ensure full compliance with the National Water Act (Act 36 of 1998) and to align with the LSDF's strategic protection objectives for the Vivo–Dendron SWSA, the following recommendations are made:

- Water Use Licensing and DWS Consultation
  - The project proponent must consult the Department of Water and Sanitation (DWS) to verify the applicability of General Authorisation (GN 4167 of 2023) for construction activities within 32 m of delineated watercourses and determine whether a Water Use License Application (WULA) is required.

- Any tower foundations, access routes, or crossings within wetlands or riparian areas are deemed Section 21(c) and (i) water uses (impeding/diverting flow and altering bed/banks of a watercourse) and must be formally authorised before construction.
- DWS consultation will also ensure that surface and groundwater linkages within the Vivo–Dendron SWSA are appropriately managed, even though groundwater assessment was beyond the current study's scope.

- Wetland and Riparian Protection
  - Maintain a minimum buffer of 32 m for rivers and 50 m for wetlands, consistent with DWS and LEDET guidelines, with no construction, stockpiling, or fuel storage allowed within these zones.
  - Where unavoidable crossings occur, utilise temporary bridging structures or culverts designed to maintain natural drainage patterns and minimise sedimentation.
  - Rehabilitate all disturbed areas post-construction by re-grading, de-compacting soils, and re-establishing indigenous hydrophilic vegetation.
  - Implement erosion- and sediment-control measures (e.g., silt fences, straw bales, stormwater trenches) to prevent downstream siltation.
- Strategic Water Source Area (SWSA) Stewardship
  - Recognise that wetlands and rivers within the Vivo - Waterpoort corridor form part of a Strategic Water Source Area. Activities in these areas must adopt a precautionary approach, ensuring that no alteration occurs to natural hydrological regimes or aquifer recharge processes.
  - Construction Method Statements must explicitly reference SWSA sensitivity and include procedures to manage stormwater runoff, soil erosion, and vegetation clearing within the Soutpansberg catchment.
  - Promote collaborative management with DWS, Limpopo Department of Economic Development, Environment and Tourism (LEDET), and local municipalities to align with Integrated Water Resource Management (IWRM) principles.
- Monitoring and Compliance
  - Conduct pre- and post-construction monitoring of wetlands and river crossings to assess any changes in morphology, vegetation cover, and flow behaviour.
  - Document all observations and corrective actions in a Surface Water Monitoring Register, to be submitted to DWS upon request.
  - Apply an adaptive management approach—if signs of erosion, sedimentation, or channel alteration appear, mitigation measures should be reinforced immediately.

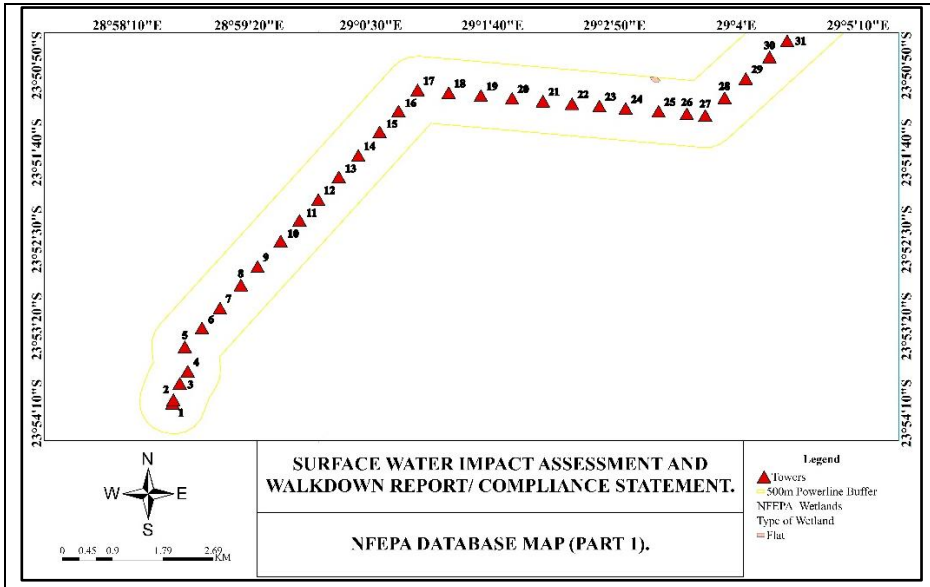
The proposed Borutho-Nzhelele 400 kV Powerline can proceed from a surface water and wetland management perspective, provided that all mitigation, buffer, and regulatory compliance measures are implemented. The study acknowledges the Strategic Water Source Area context of the Vivo–Dendron-Waterpoort region and incorporates appropriate recommendations to safeguard both surface and subsurface hydrological processes.

Through continued collaboration with DWS and adherence to GN 320 of 2020, GN 4167 of 2023, and the National Water Act, the project can achieve full environmental compliance while

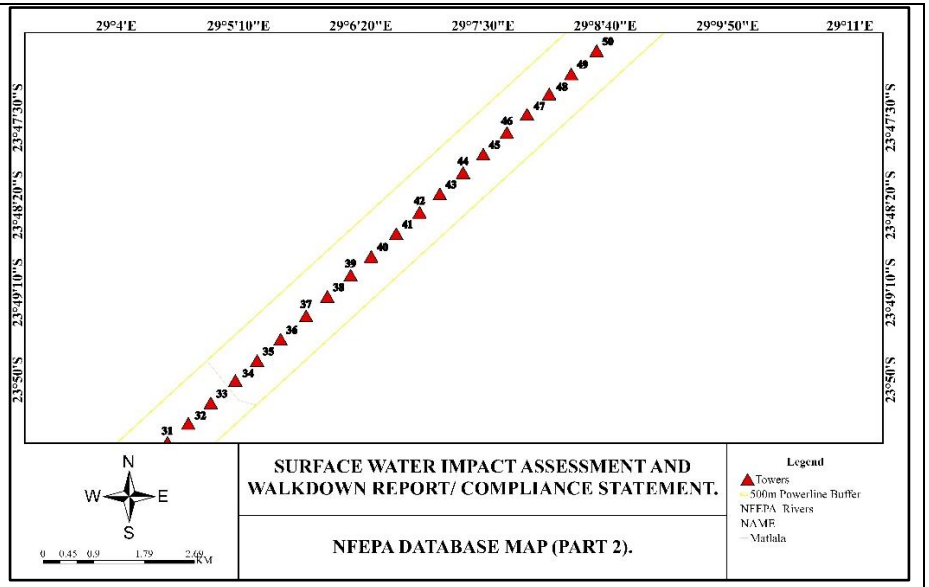
maintaining the integrity and functionality of aquatic ecosystems within the Limpopo Water Management Area 1.

9. ANNEXURES

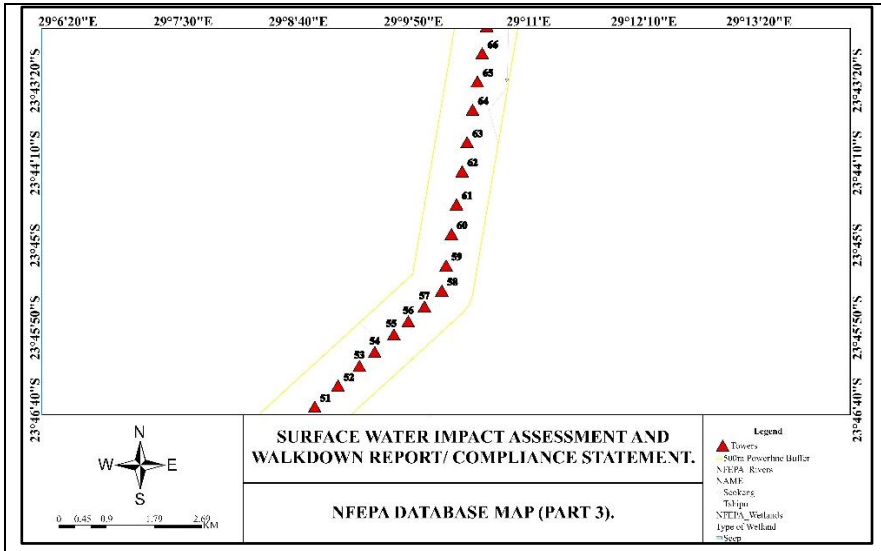
Annexures 1: NFEPA features within 500 meters of Powerline Buffer.



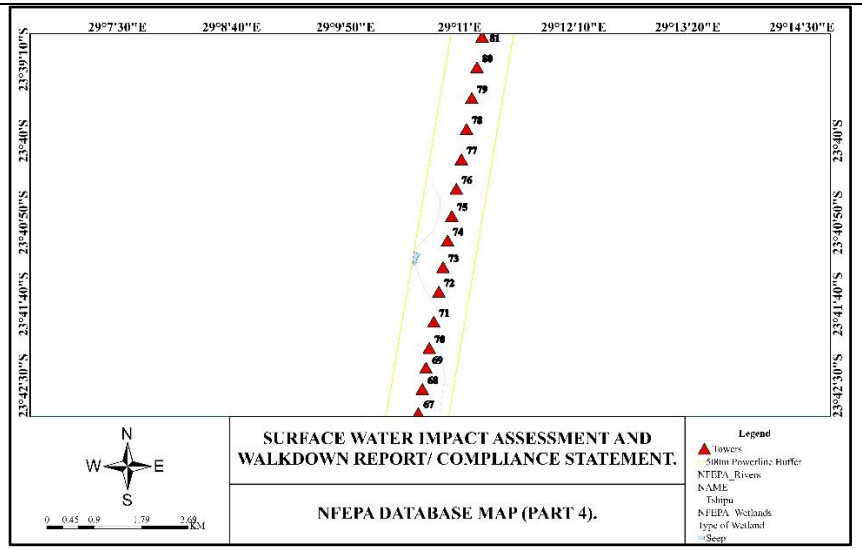
Flat wetlands within Tower 24 and 25.



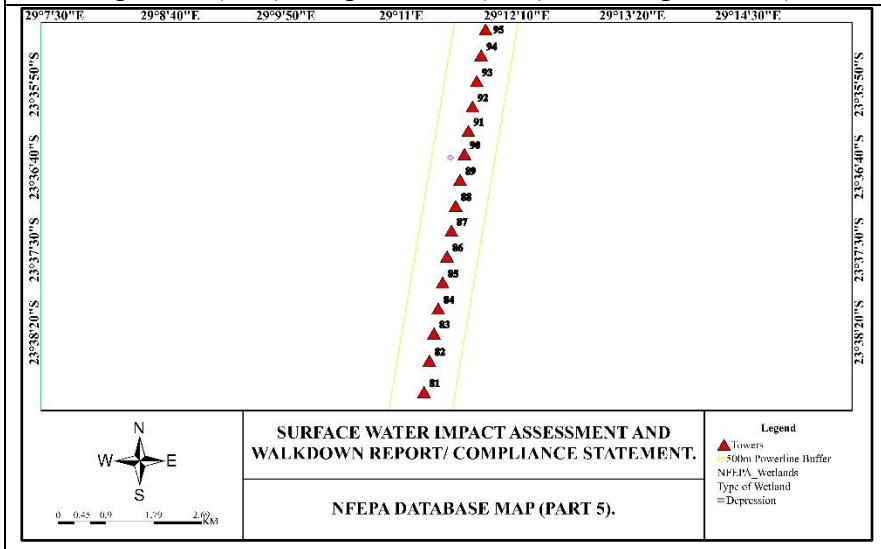
Matlala river between Tower 33 and 34.



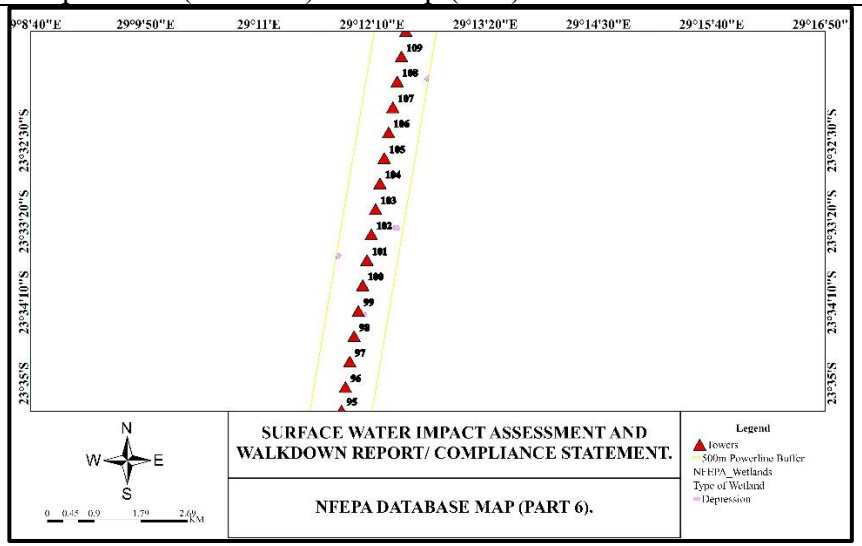
Seokeng River (T54), Seep wetland (T65) and Tshipu River (T63-T66).



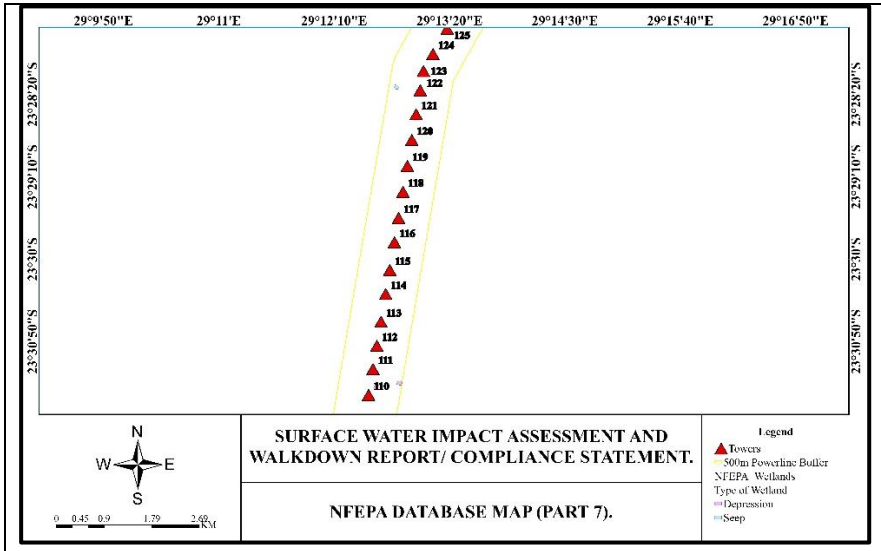
Tshipu River (T67-T76) and Seep (T73)



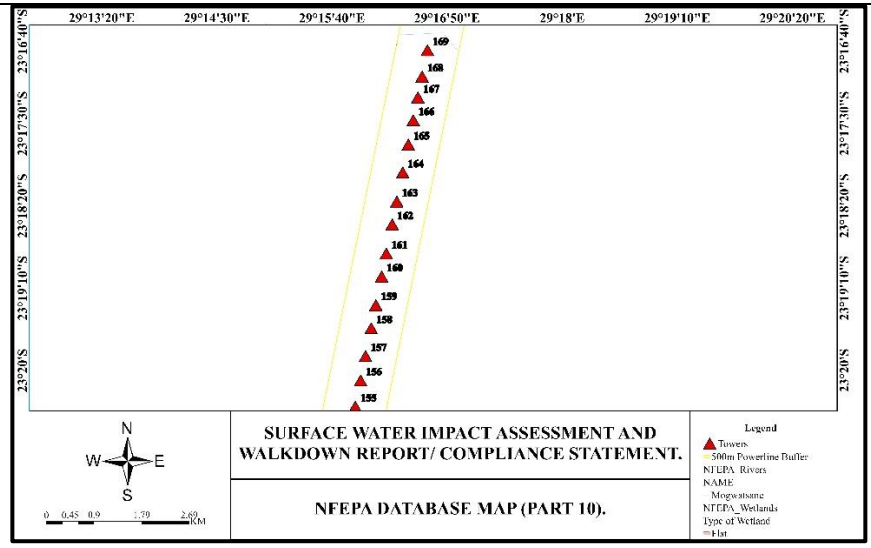
Depression wetland (between T89 and T90).



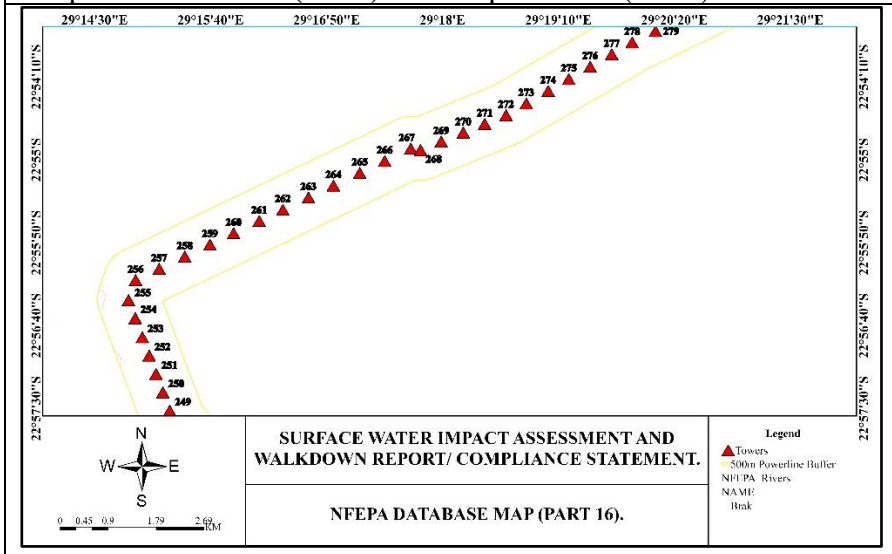
Depression wetlands on T101 and T102.



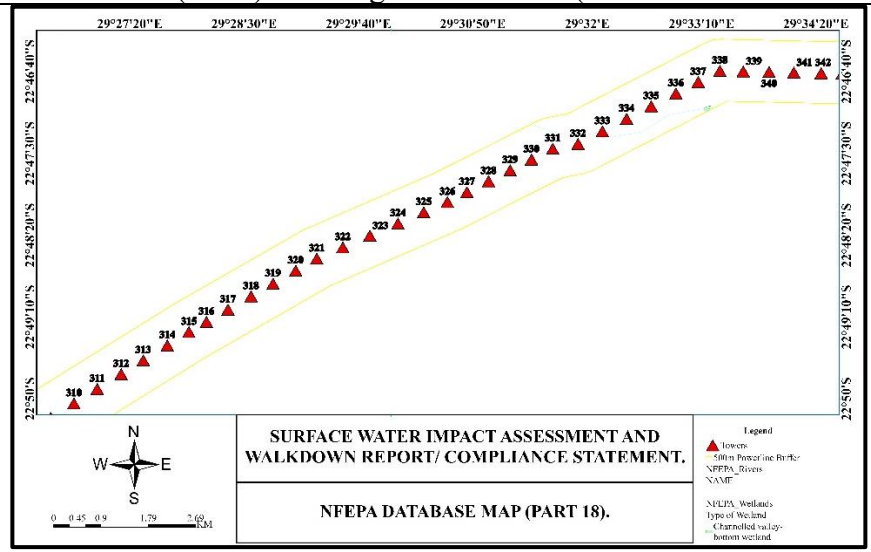
Despression wetland (T110) and Seep wetland (T121).



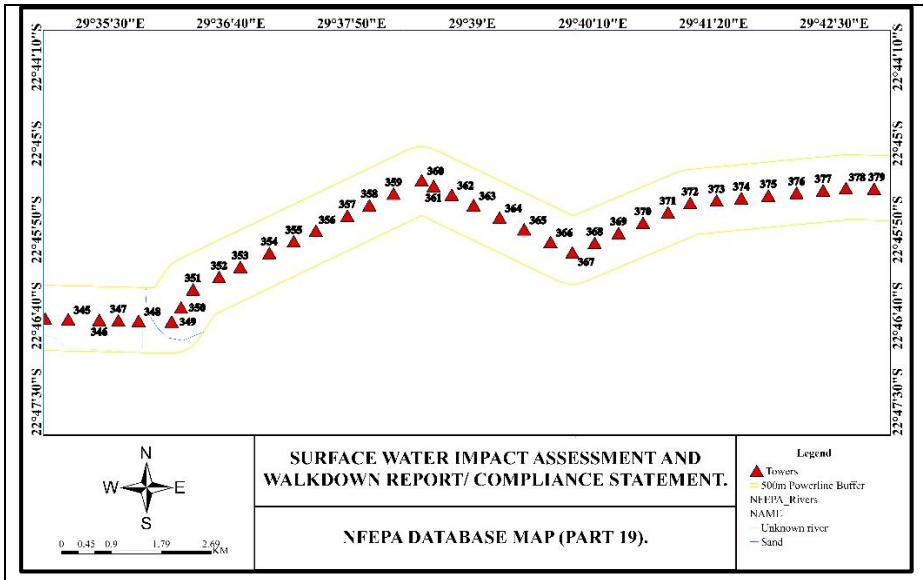
Flat wetland (T169) and Mogwatsane River (between T169 and T170).



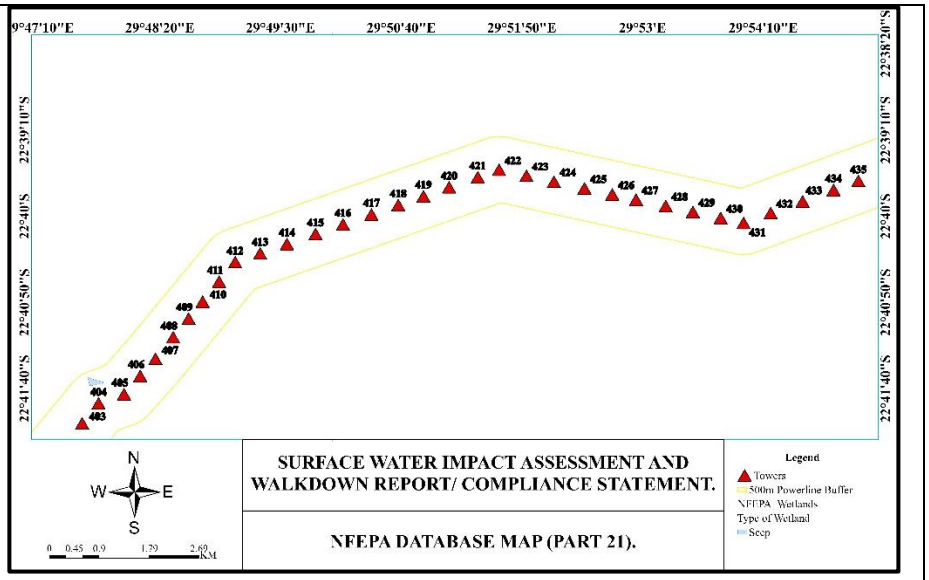
Brak River (T251-T255)



Unknown river (T332) and Channelled Valley Bottom Wetland (T336)



Unknown River (T344-T348) and Sand River (Between T348-T349)



Seep wetland (T404)

Annexures 2: Watercourses features during site Visit.



Seasonal river within +/-250 meters buffer of the Tower 9.



Matlala River



Seasonal river close to Tower 14



Seasonal River Between Tower 41 and 42.



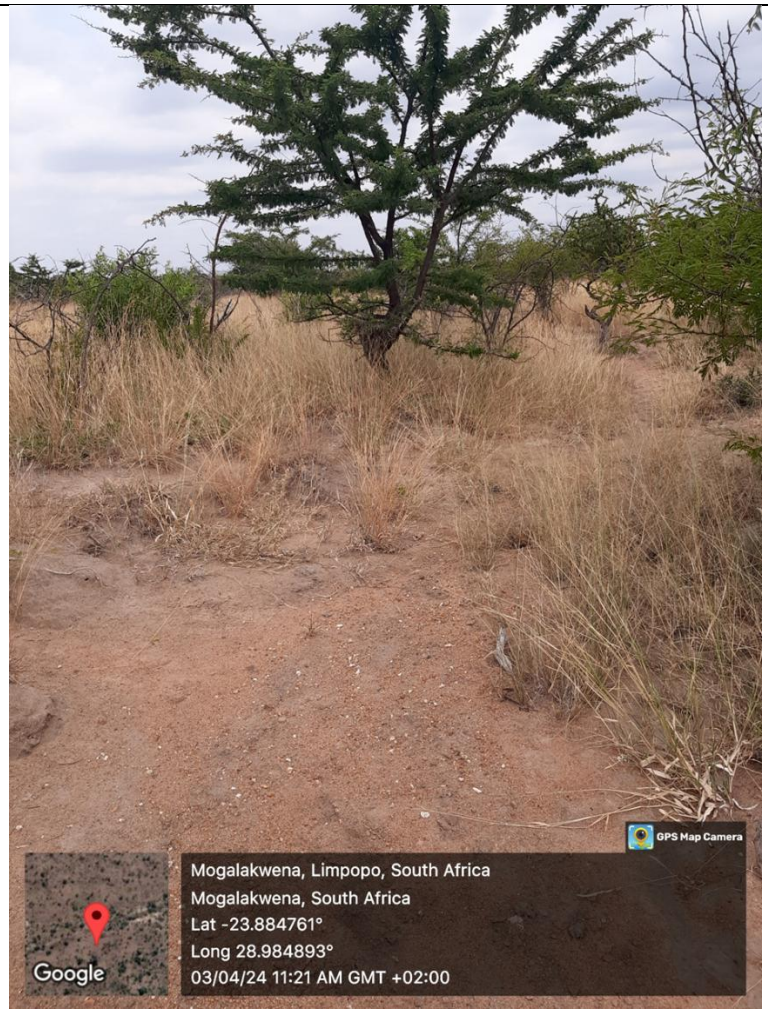
Borrow pit on Tower 39



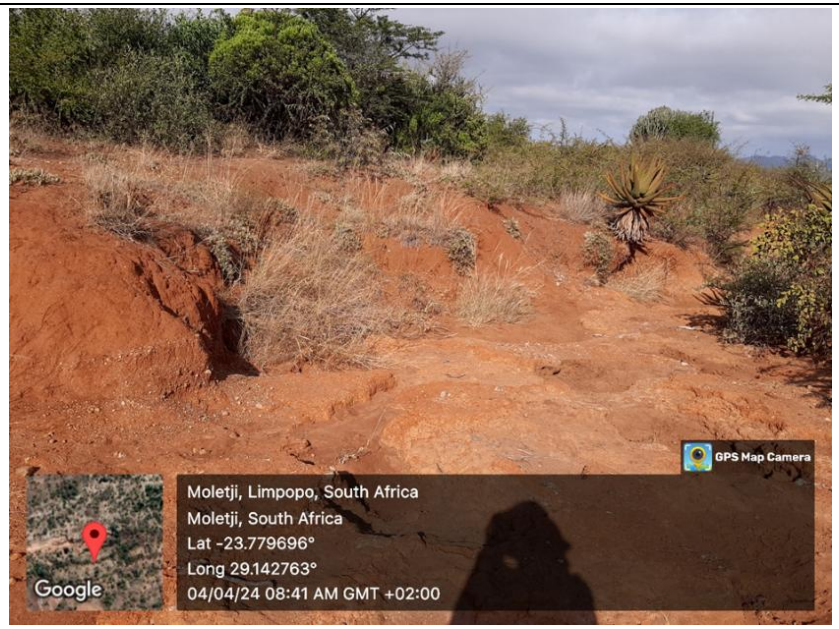
Unknown seasonal stream (from Tower 39 to Seasonal River between Tower 40 and 41)



Unknown stream between Tower 402 and 403



Borrow pit between Tower 12 and 13.



Unknown stream (Tower 49 to 51)



Tshipu River



Seasonal River between Tower 46 and 47.



Seokeng River



Sand River



Wetland (Tower 73)



Wetland on Tower 99



Unknown seasonal stream (Tower 331 to Sand River)

Annexures 3: Other site visit pictures.



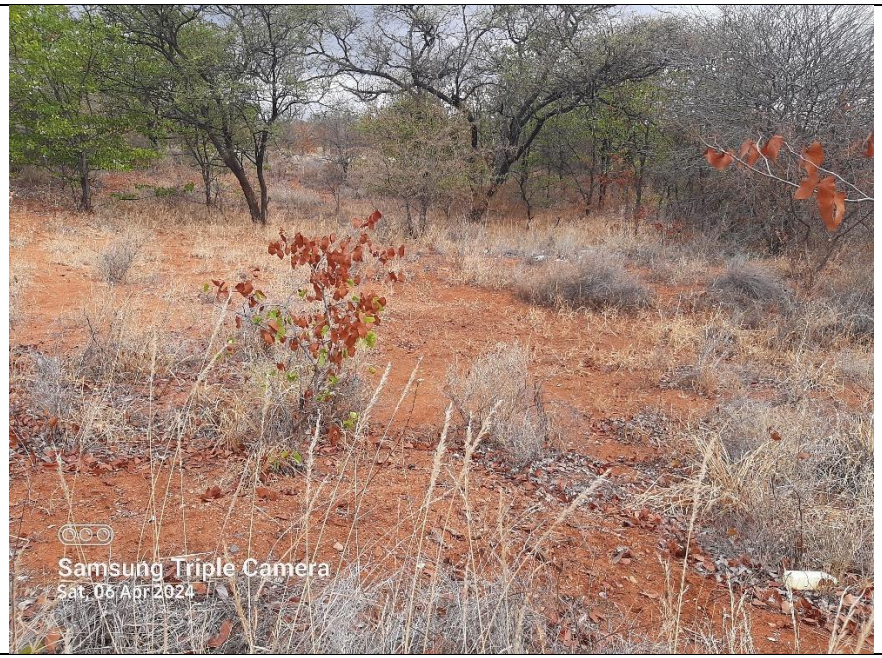



Samsung Triple Camera
Wed, 03 Apr 2024


Samsung Triple Camera
Wed, 03 Apr 2024


Samsung Triple Camera
Thu, 04 Apr 2024


Samsung Triple Camera
Sat, 06 Apr 2024


Samsung Triple Camera
Sat, 06 Apr 2024


Samsung Triple Camera
Sat, 06 Apr 2024



Annexures 4: Tower Location Summary Table - Watercourse Sensitivity and Buffer Zones.

Tower No.	Watercourse Name / Feature	Watercourse Type	PES	EIS	Buffer Zone (m)	Notes / Sensitivity
Tower 9	Seasonal River	Seasonal River	C	Moderate	50	Dry, defined channel, resilient vegetation
Towers 12 - 13	Borrow Pit	Anthropogenic	D	Low	32	Soil disturbed, sparse vegetation
Tower 14	Seasonal River	Seasonal River	C	Moderate	50	Dry channel with erosion, unstable banks
Matlala River	Matlala River	Seasonal River	C	High	100	Standing water, rocky bed, riparian zone intact

Tower No.	Watercourse Name / Feature	Watercourse Type	PES	EIS	Buffer Zone (m)	Notes / Sensitivity
Tower 39	Borrow Pit	Anthropogenic	D	Low	32	Degraded, compacted soil, human activity
Tower 39 - 41	Seasonal Stream	Seasonal Stream	C	Moderate	32–50	Visible flow path, minimal vegetation stress
Tower 41 - 42	Seasonal River	Seasonal River	D	Low - Moderate	32–40	Severely eroded, little vegetation
Tower 46 - 47	Seasonal River (near Lepotlako Village)	Seasonal River	C	Moderate	32–50	Rocky bed, shrubs, dry stream channel
Tower 49 - 51	Unknown Stream (Moletji area)	Seasonal Stream	C	Moderate	32–50	Dormant grasses, signs of past water flow
—	Seokeng River	Seasonal River	D	Low	32	Flat grassland, sparse vegetation
—	Tshipu River	Seasonal River	C	Moderate	32–50	Sandy bed, scattered shrubs and grasses
Tower 73	Seasonal Wetland	Seasonal Wetland	D	Low - Moderate	32–50	Dry wetland, compacted soils, cattle grazing impact
Tower 99	Seasonal Wetland	Seasonal Wetland	E	Low	32	Highly degraded, no visible wetland vegetation
Tower 331	Seasonal Stream to Sand River	Seasonal Stream	C	Moderate	32–50	Flow evident during wet season, good connectivity
—	Sand River	Perennial River	C	High	50–100	Riparian trees, reeds, sand mining activity noted
Towers 402 - 403	Seasonal Stream	Seasonal Stream	C	Moderate	32–50	Narrow stream with signs of past flow, resilient vegetation

Annexures 5: Tower-Specific Sensitivity and Mitigation Summary.

Tower Name	Latitude	Longitude	Aspect	Sensitivity	Mitigation (General during Construction)
Tower 9	-23.4567	29.1234	Seasonal River (250 m away)	Moderate	Enforce 50 m buffer; control erosion; no stockpiling in buffer zone.
Tower 12–13	-23.4578	29.1245	Borrow Pit	Low	Rehabilitate disturbed area; restrict access; install silt traps.
Tower 14	-23.4601	29.1289	Seasonal River (dry)	Moderate	Stabilize slopes; monitor stormwater flow; avoid wet-season excavation.
Tower 39	-23.4702	29.1321	Disturbed borrow pit	Low	Revegetate post-construction; prevent topsoil loss.
Tower 41 - 42	-23.4721	29.1333	Eroded seasonal channel	Low–Moderate	Install erosion barriers; maintain 32 m buffer; phased vegetation clearing.
Tower 73	-23.4987	29.1500	Dry seasonal wetland (degraded)	Low–Moderate	Limit construction footprint; enforce 50 m buffer; monitor during rains.
Tower 99	-23.5100	29.1700	Overgrazed dry wetland	Low	Enforce 32 m buffer; limit machinery access; restoration post-works.
Tower 331	-23.5500	29.2200	Seasonal stream to Sand River	Moderate	Maintain riparian zone; avoid in-channel works; use geotextiles.
Tower 402 - 403	-23.5900	29.2500	Ephemeral stream	Moderate	Delineate no-go zones; manage runoff; reseed disturbed areas.

CV OF SPECIALIST

Personal Details:
Name: Maphaha Khuliso Collen
Contact Number: +27 61 417 7904 | +27 72 270 4778 (ALT)
Email: Khulisoco@gmail.com
Location: Pretoria North, South Africa

Professional Summary:

An experienced hydrologist with extensive expertise in water quality monitoring, environmental impact assessments, and hydrogeological studies. Proficient in hydrological modeling, groundwater assessments, and environmental compliance, ensuring effective management and mitigation of water resource impacts. Skilled in project management, GIS applications, and regulatory reporting to support sustainable water resource management.

Key Skills:

- Groundwater and surface water monitoring
- Environmental impact assessments (EIA)
- Hydrological and hydrogeological modeling (QSWAT, ARCSWAT, HEC-RAS, MODFLOW)
- Wetland delineation and assessment
- Water quality monitoring and data analysis
- GIS applications for environmental assessments
- Compliance with environmental legislation and Water Use License (WUL) conditions
- Project management and reporting
- Strong analytical and problem-solving skills

Software Proficiency:

- HEC-RAS, QGIS, ARCSWAT, QSWAT, and Storm Water Management Model (SWMM)
- Microsoft Office Suite (Excel, Word, PowerPoint)

Education:
University of Venda

- **Bachelor of Earth Science in Hydrology and Water Resources** (2009 – 2018)

- Specialized in Water Quality Principles, Hydrogeology, Environmental Impact Assessment, Water Treatment Processes, and Resource Evaluation.

Work Experience:

Surface Hydrologist | Tshilimo Consulting Services | Pretoria, Gauteng *(Nov 2023 – Present)*

- Conduct groundwater and surface water monitoring.
- Perform site inspections and environmental assessments.
- Provide GIS support for hydrological and environmental studies.
- Prepare compliance reports and water resource management plans.

Surface Hydrologist (Freelance) | Munevhula (Pty) Ltd | Midrand, South Africa *(April 2023 – Present)*

- Conduct hydrological impact assessments and water resource evaluations.
- Perform EIA studies and prepare regulatory reports.
- Execute wetland delineation and surface water assessments.
- Support environmental monitoring projects.

Wetland Ecologist (Freelance) | Matavha Environmental (Pty) Ltd | Centurion, South Africa
(July 2022 – April 2024)

- Conduct wetland impact assessments and hydrological studies.
- Evaluate watercourse conditions and prepare regulatory documentation.
- Support environmental compliance monitoring.

Hydrologist | Mveledzo Environmental and Safety Solution | Nelspruit, Mpumalanga *(Aug 2021 – Jan 2022)*

- Conducted surface and groundwater impact assessments.
- Performed water sampling and quality analysis.
- Assisted in environmental and safety inspections.

Relevant Projects:

- Groundwater and surface water monitoring programs for industrial sites.
- Wetland assessment and impact studies for infrastructure developments.
- Hydrological and floodline assessments for municipal projects.
- Water quality monitoring and compliance reporting under WUL conditions.

- Hydrogeological assessments for contamination investigations.
- Surface water impact assessment for proposed development projects.

Professional Affiliations:

SACNASP (PR.SCI.NAT 130272)

References:
Available upon 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 fields(s) of practice (Schedule 1 of the Act)

Environmental Science (Candidate Natural Scientist)

Effective **3 March 2021** Expires **31 March 2026**

Chairperson

Chief Executive Officer

To verify this certificate scan this code