Interim Report

THE PROVISION OF PROFESSIONAL GEOGRAPHIC INFORMATION SYSTEMS (GIS) SERVICES FOR ENVIRONMENTAL, SOCIAL, GOVERNANCE (ESG) AND MINE PLANNING

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SECTION **1**

Introduction

Introduction

Background

The Trinity Metals Limited has hired the Ganza Green Solutions Limited to provide the profession GIS services for Environmental, Social and Governance (ESG) and mine planning. The assignment aims to establish a comprehensive and functional GIS system to support Trinity Metals Limited in integrated environmental and social planning, mine planning and operations, asset protection, and incident management across its three mining concessions (Rutongo, Musha, and Nyakabingo).

This Interim Report presents the progress made to date in the implementation of the assignment, with particular emphasis on the thematic maps and spatial analysis outputs that have been generated. It outlines the methodologies applied, the datasets compiled and processed, and the preliminary results achieved in establishing a functional and integrated GIS framework to support environmental and social planning, mine operations, infrastructure management, and risk assessment.

Following the inception phase, which defined the technical approach, scope, and work plan, the project has advanced to the development and production of key thematic maps across the concessions. These include land cover classification, mining disturbed areas, terrain analysis, hydrology mapping, road network mapping, and hazard susceptibility assessments (landslide and flood risk).

Objectives

The overall objective of the assignment is to develop and operationalize a comprehensive GIS framework that supports sustainable mining, environmental stewardship, social risk management, and asset protection across Trinity Metals' operations. Specific objectives include:

- To develop accurate and up-to-date GIS maps for all three of the Company Concessions.
- To integrate spatial data from multiple sources.
- To support analysis, visualization, and reporting.
- To create a centralized spatial database.
- To provide technical GIS training.

SECTION 2

Data Processing

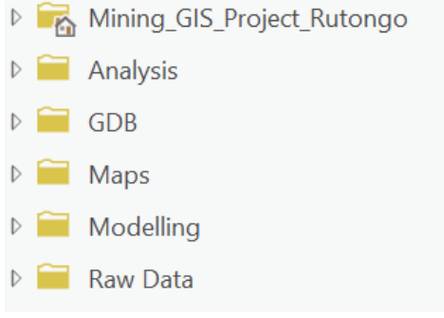
Data Processing

Data Organization

This assignment was organized in a clear to ensure that all the data collected, analysis, GIS map projects are well organized. In this respect, 3 folders were created named Musha, Rutongo, and Nyakabingo.

Each Mining Site Folder contain 5 sub-folders that include:

- Raw Data: To host all raw dataset collected in various format
- Analysis: Contain the analysis results, this includes the training samples, graphs, etc
- Maps: It host the extracted maps
- GDB: This folder contains various Geodatabase, where the cleaned and processed data will be hosted
- GIS Project: This folder hosts the ArcGIS project
- Modelling: Contain tools for modelling



Geodatabase

A geodatabase in ArcGIS is the native, primary data storage and management framework that serves as a container for spatial (vector/raster) and non-spatial (tabular) data. In this project 5 geodatabase which has datasets has been created to enable the storage of data in well organized and summarized.

Those geodatabases are as follow

- Boundaries: To host all raw dataset collected in various format
- Environment: Contain the dataset of land, hydrology, terrain
- Infrastructure: It host datasets of road network, Utility
- Mining Operation: It host the dataset for mining legacy, operation and incidents
- Socio-Economy: This contains the dataset of Facilities and the settlement

Data Processing

Projection and Coordinate System

At To ensure spatial consistency and analytical accuracy across all datasets, a unified coordinate reference system was adopted for the project.

All raster and vector datasets were standardized to *UTM Zone 35S*, which is appropriate for the geographic location of the mining concessions and supports accurate distance and area calculations. Other datasets with differing coordinate systems were re-projected using the *Project* (vector data) and *Project Raster* (raster data) tools in ArcGIS Pro.

This harmonization ensured proper layer alignment, reliable spatial overlay, and accurate geoprocessing results for terrain analysis, land cover classification, and hazard susceptibility mapping. The consistent use of a single projected coordinate system enhances the integrity, comparability, and reproducibility of all thematic mapping outputs generated under this assignment.

organizations to manage the complexity of sustainability projects while simplifying how crucial information is communicated.

Spatial Reference

Projected Coordinate System	WGS 1984 UTM Zone 36S
Projection	Transverse Mercator
WKID	32736
Authority	EPSG
Linear Unit	Meters (1.0)
False Easting	500000.0
False Northing	10000000.0
Central Meridian	33.0
Scale Factor	0.9996
Latitude Of Origin	0.0

Geographic Coordinate System	WGS 1984
WKID	4326
Authority	EPSG
Angular Unit	Degree (0.0174532925199433)
Prime Meridian	Greenwich (0.0)
Datum	D WGS 1984
Spheroid	WGS 1984
Semimajor Axis	6378137.0
Semiminor Axis	6356752.314245179
Inverse Flattening	298.257223563

Data Processing - Cleaning

All spatial datasets collected for the mining concessions — including orthophotos, digital elevation models (DEMs), and vector shapefiles were systematically processed to ensure consistency, accuracy, and usability for thematic mapping and spatial analysis. The general data processing workflow included the following steps:

1. Projection and Alignment: Re-projected to the standard project coordinate system (WGS 84 / UTM Zone 35S) to ensure proper overlay with other datasets.
2. Clipping to Concession Boundaries:
   Data for each dataset were clipped to the respective mining concession
3. Data Quality Checks: Checked for completeness, spatial resolution consistency, and visual quality.
4. Metadata: Metadata for all layers was updated to document source, processing steps, coordinate system, resolution, and limitations
5. Integration and Centralization: All processed datasets were organized within a structured geodatabase with clear folder hierarchies

SECTION 3

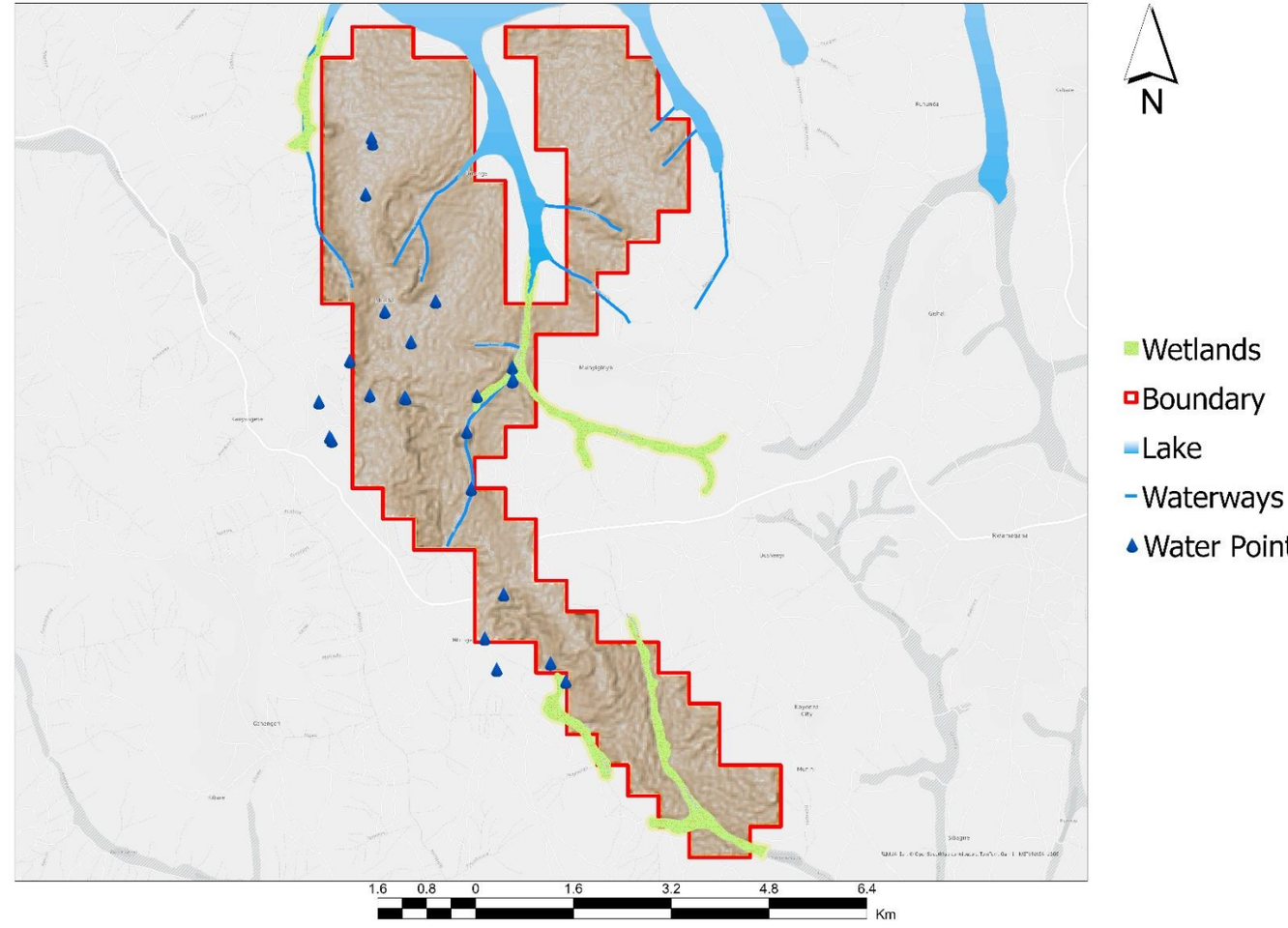
Thematic Maps

Hydrology Map

The Hydrology Map was developed to identify and visualize the surface water systems within and around the mining concessions, including rivers, wetlands, and lakes.

Data Source
Hydrocensus: Trinity Metal Ltd
Wetland:
Water Ways: Trinity Metal Ltd
Lake:
Boundary: Trinity Metal Ltd

Hydrological Features of Musha Site



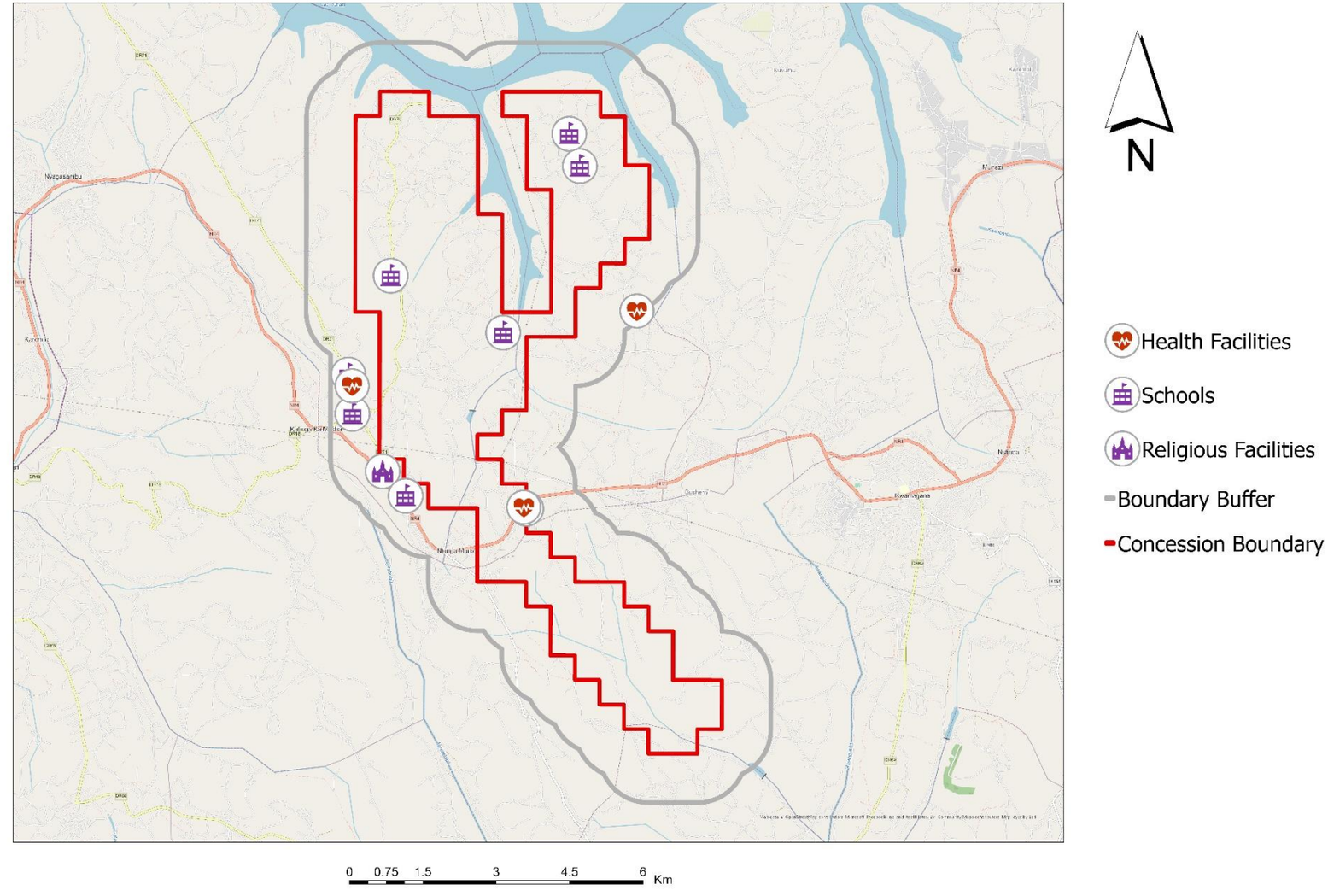
Facilities Map

The **Facility Map** illustrates the location of schools, health facilities, and religious institutions within a 1 km buffer of the mining concession boundary. Its purpose is to identify sensitive community receptors that may be influenced by mining operations and to support environmental and social risk assessment, planning, and stakeholder engagement.

Data Source:
Health, Schools, Religious, sports, culture:
MININFRA

Note: Other facilities data are not yet available such as the Police stations, REG offices, and WASAC facilities have not yet been mapped at this stage.

Public Facilities Distribution Map (1 km Buffer Zone) of Musha Site

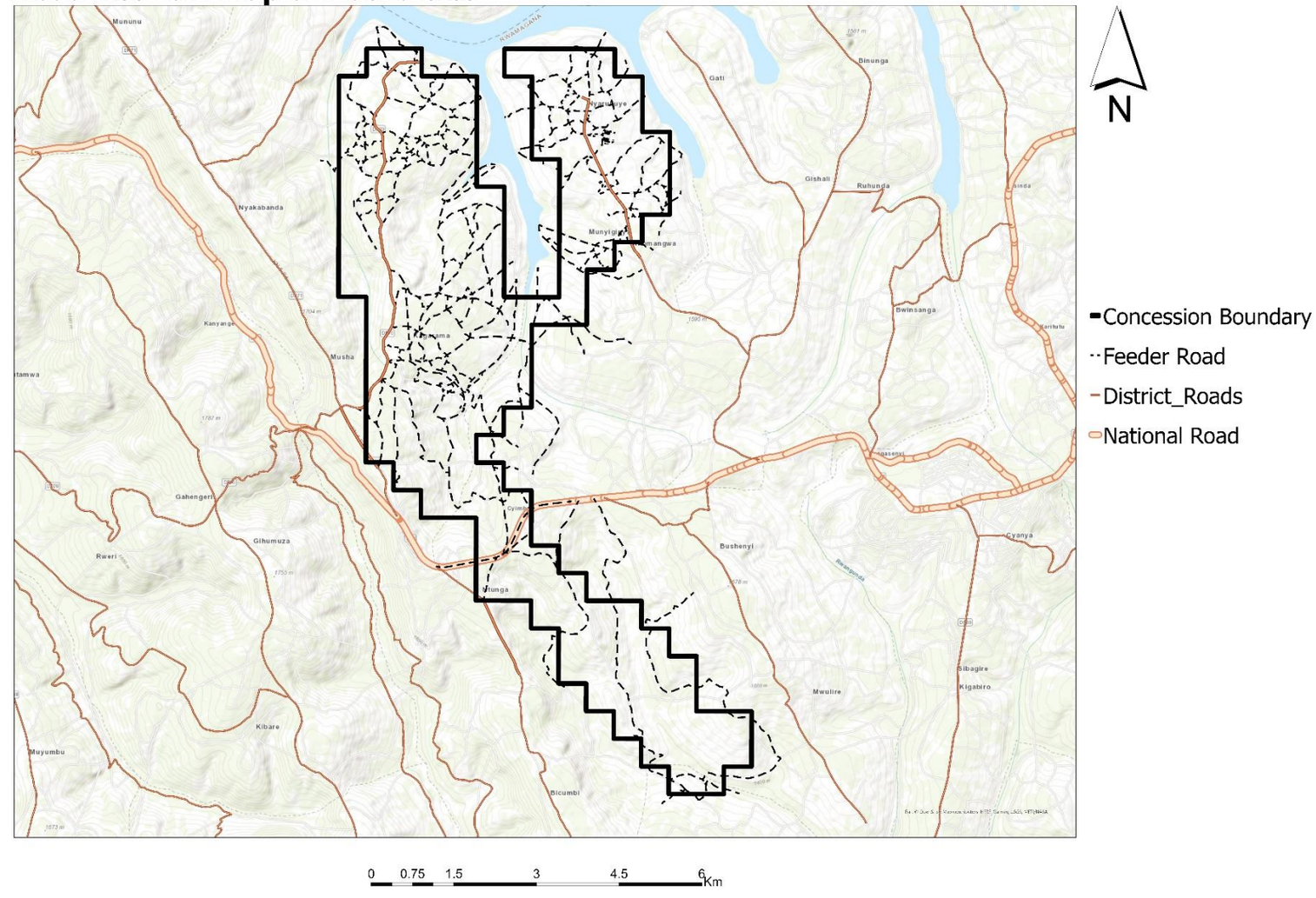


Road Network Map

The **Road Network Map** presents the spatial distribution of transportation infrastructure within and around the mining concession, including national roads, district roads, and feeder roads. The map supports operational planning, logistics management, and access assessment for mining activities.

Data Source:
National, District, Feeder Roads: MININFRA

Road Network Map of Musha Site



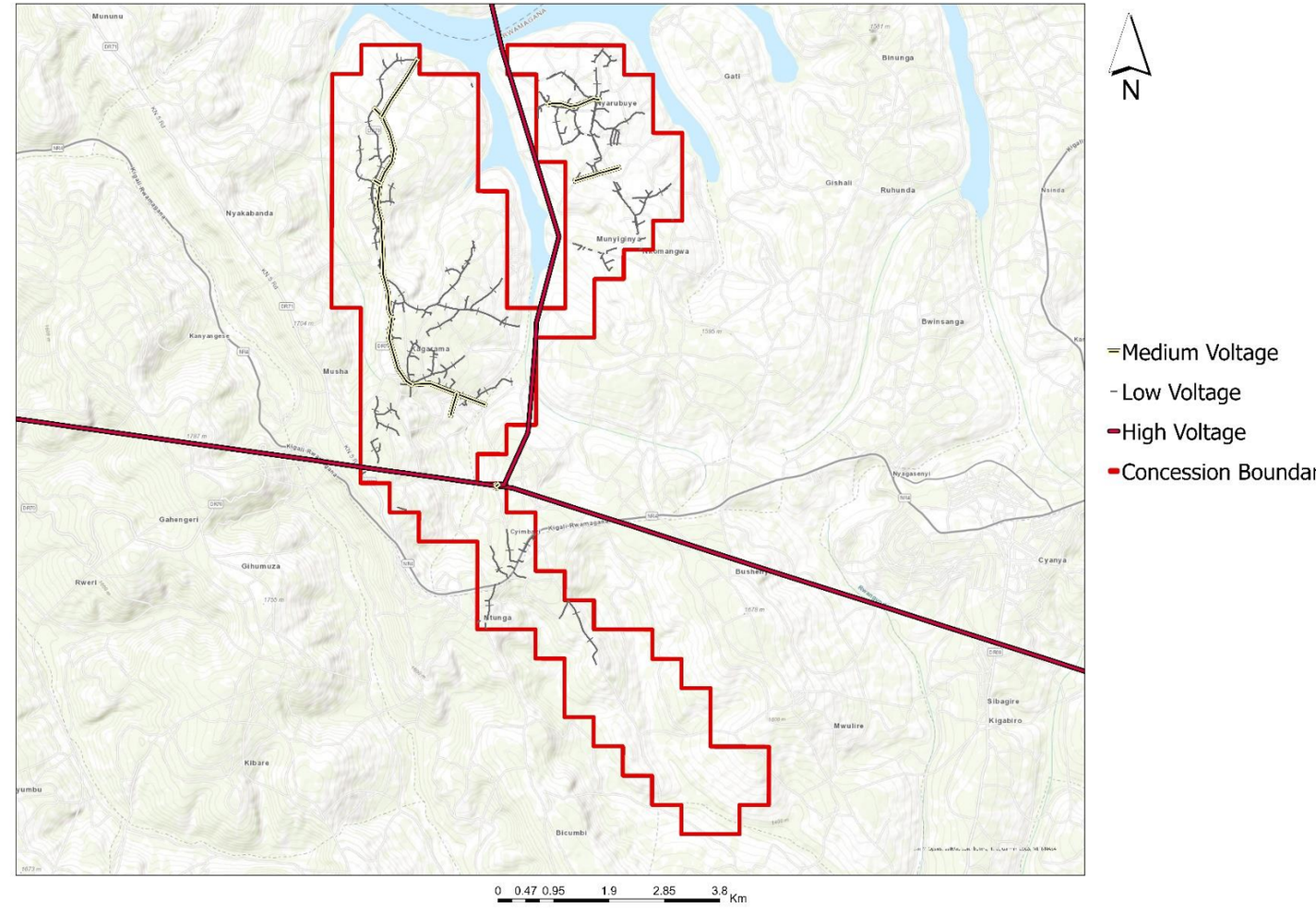
Electricity Transmission Lines

The **Electricity Transmission Lines Map** illustrates the distribution of existing power infrastructure within and around the mining concession, including high voltage, medium voltage, and low voltage lines. The map supports infrastructure planning, operational coordination, and assessment of potential risks related to construction and mining activities near electrical networks.

It also provides a basis for ensuring safety compliance, protecting critical utilities, and coordinating with relevant authorities during project implementation and expansion.

Data Source:
Low, Medium, and High Voltage: MININFRA

Electricity Transmission Lines of Musha Site



Slope

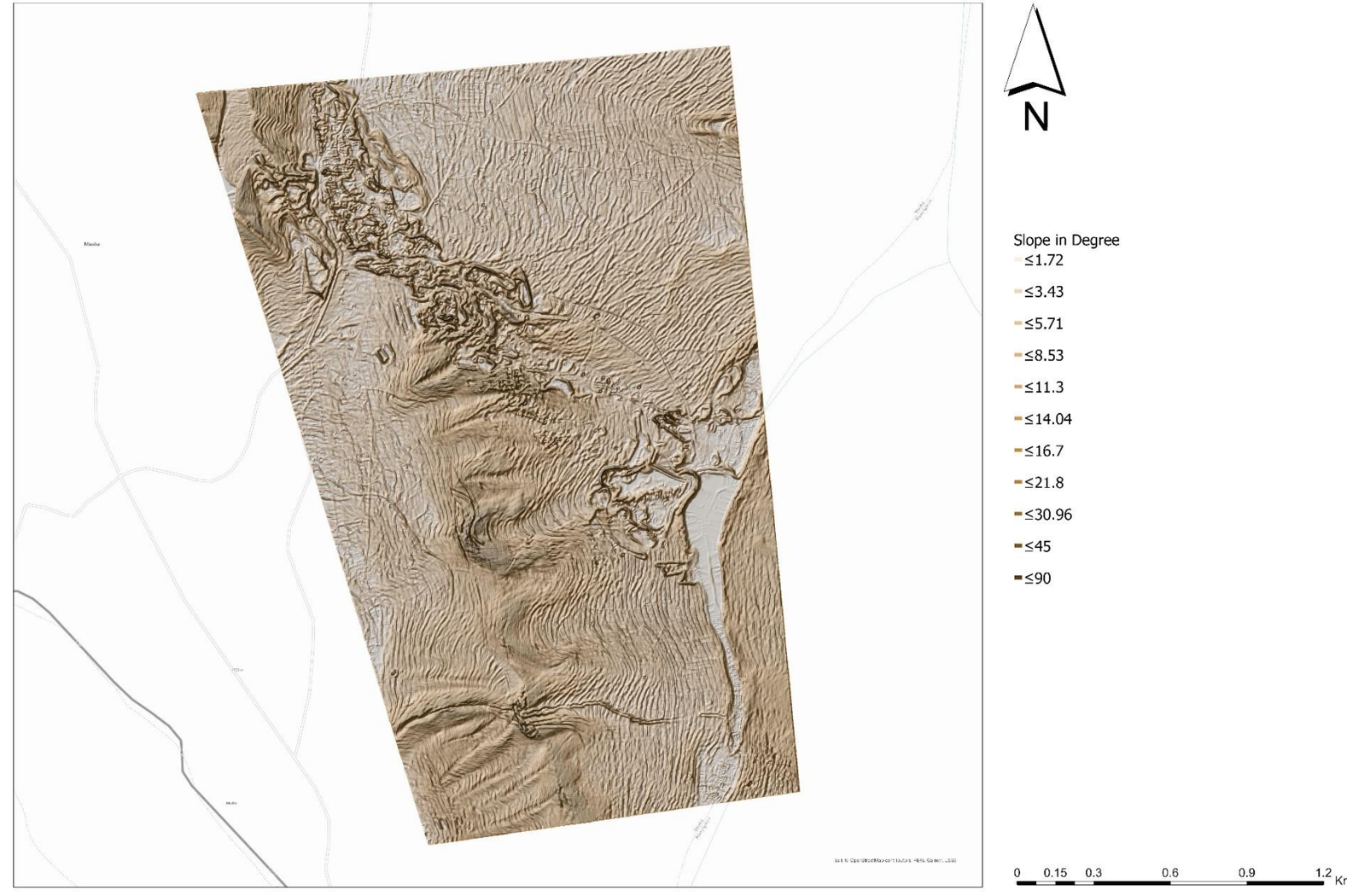
The **Slope Map** was generated from a 1.5 m resolution Digital Terrain Model (DTM) derived from LiDAR data to assess terrain steepness across the concession area.

The slope classification provides a basis for terrain suitability analysis and environmental risk assessment.

Note: The available LiDAR data did not fully cover the entire concession boundar therefore, slope analysis is limited to the areas where DTM data was available.

Data Source
DTM 1.5m: Trinity Ltd

Slope Gradient Map of Musha Site



Land Cover

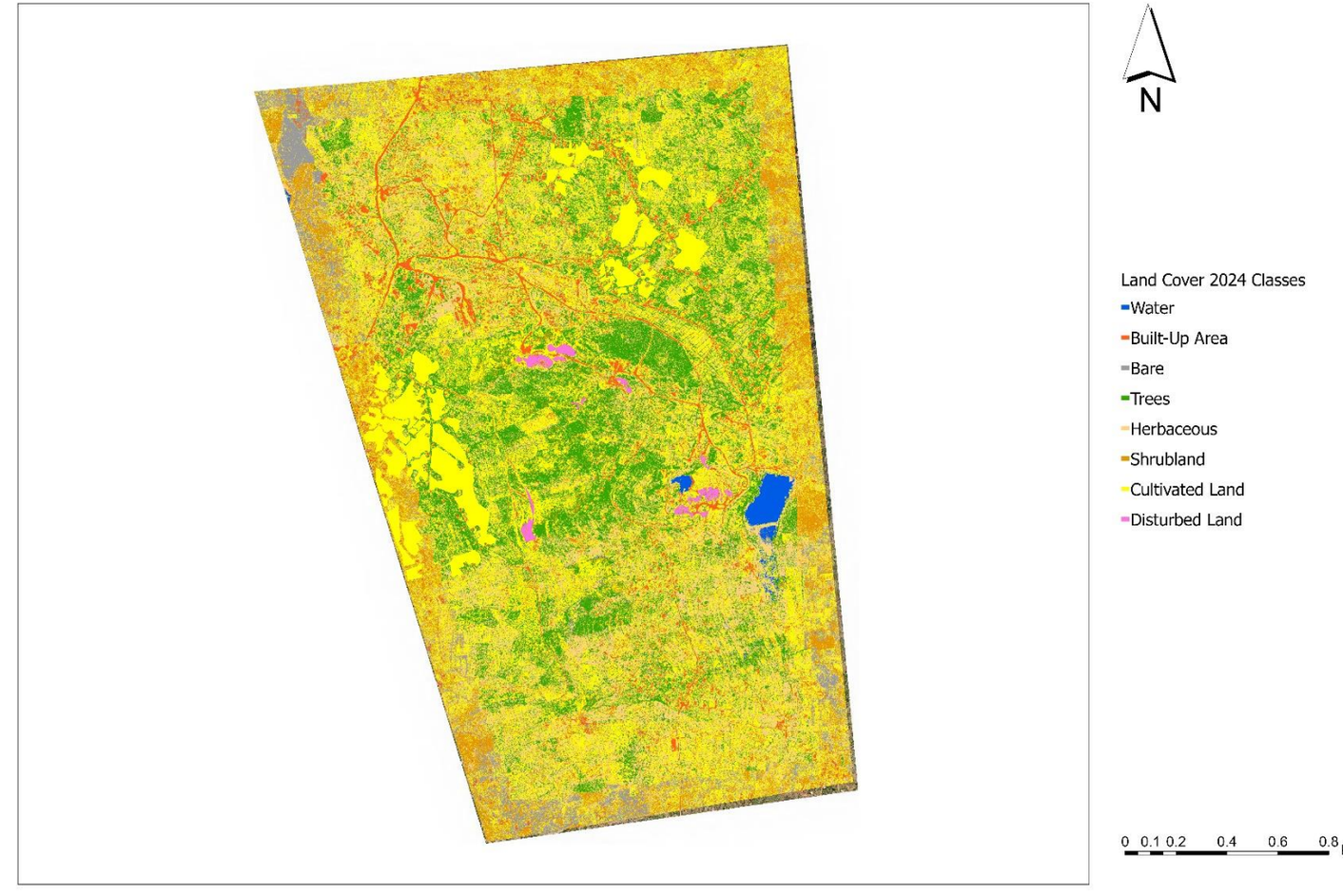
The **Land Cover Map** illustrates the spatial distribution of key land cover types within the mining concession, including water, forest, shrubland, herbaceous, developed areas, mining disturbed land, and barren land.

Data Source:

Imagery: Trinity Metal Ltd

Note: The available airbus imagery did not fully cover the entire concession boundary; therefore, land cover classification analysis is limited to the areas where data was available.

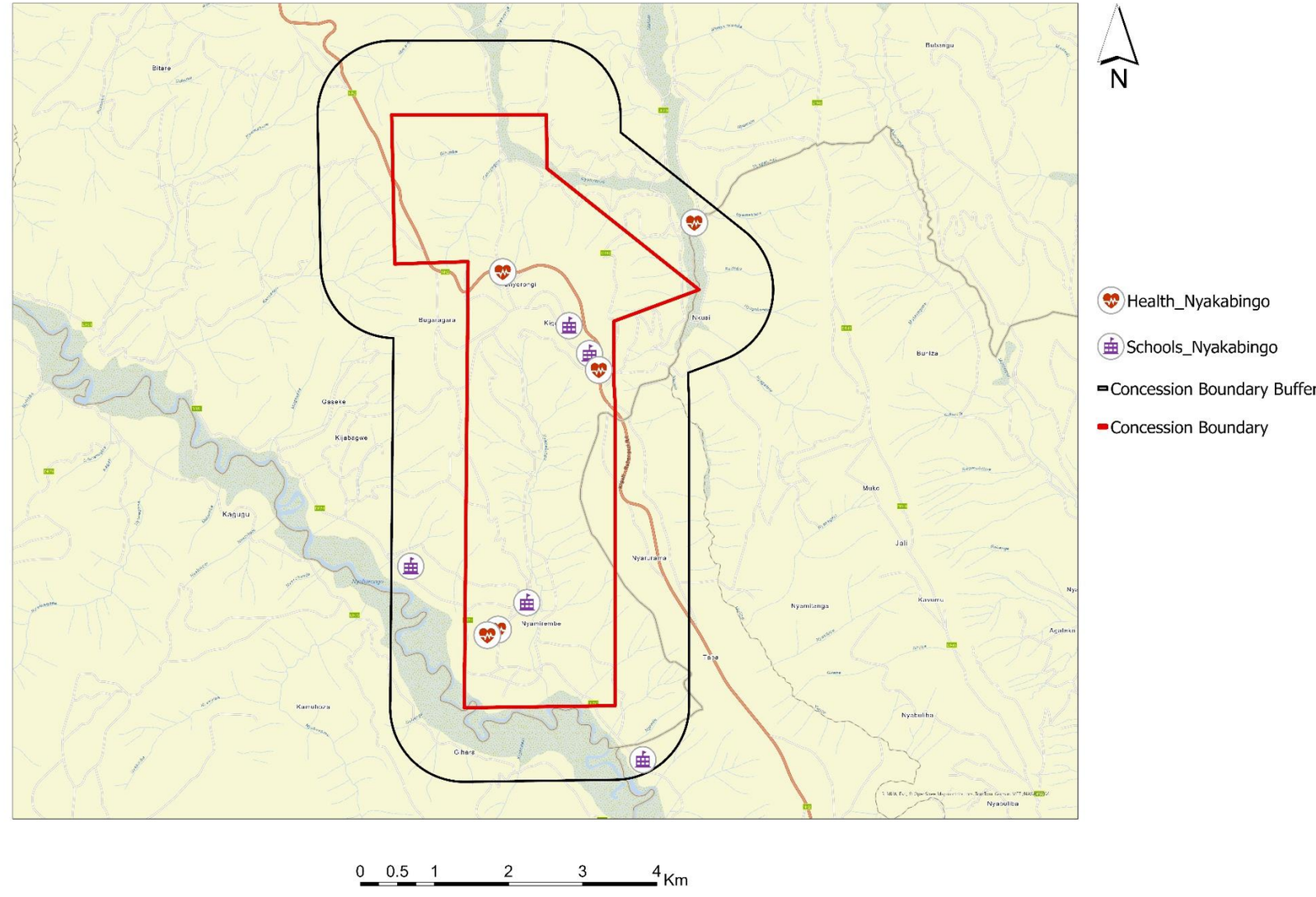
Land Cover 2024 Classification of Musha Site



Facilities Map

Facility Map illustrates the location of schools, health facilities, and religious institutions within a 1 km buffer of the mining concession boundary. Its purpose is to identify sensitive community receptors that may be influenced by mining operations and to support environmental and social risk assessment, planning, and stakeholder engagement.

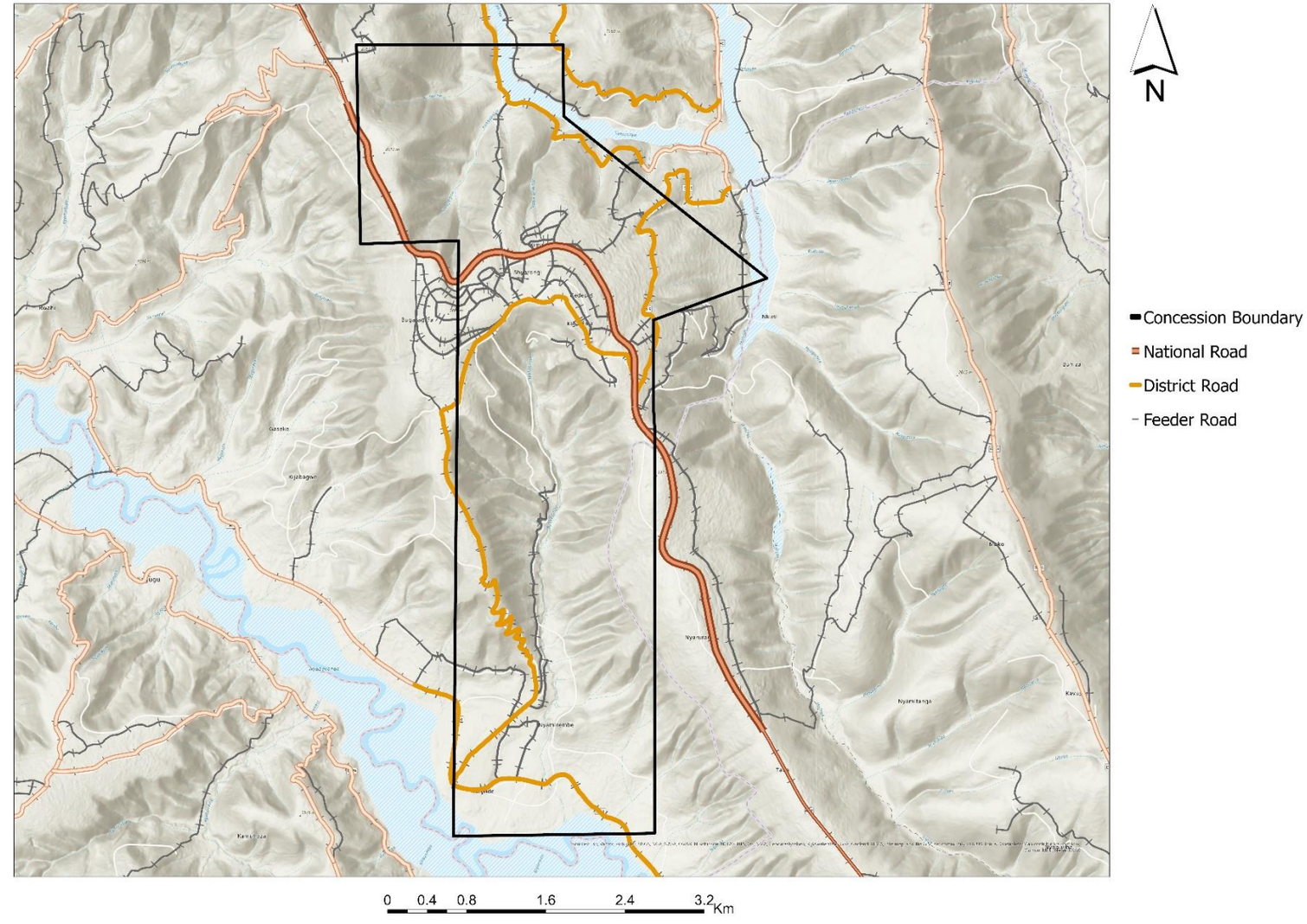
Public Facilities Distribution of Nyakabingo Site



Road Network Map

The **Road Network Map** presents the spatial distribution of transportation infrastructure within and around the mining concession, including national roads, district roads, and feeder roads. The map supports operational planning, logistics management, and access assessment for mining activities.

Road Network of Nyakabingo Site

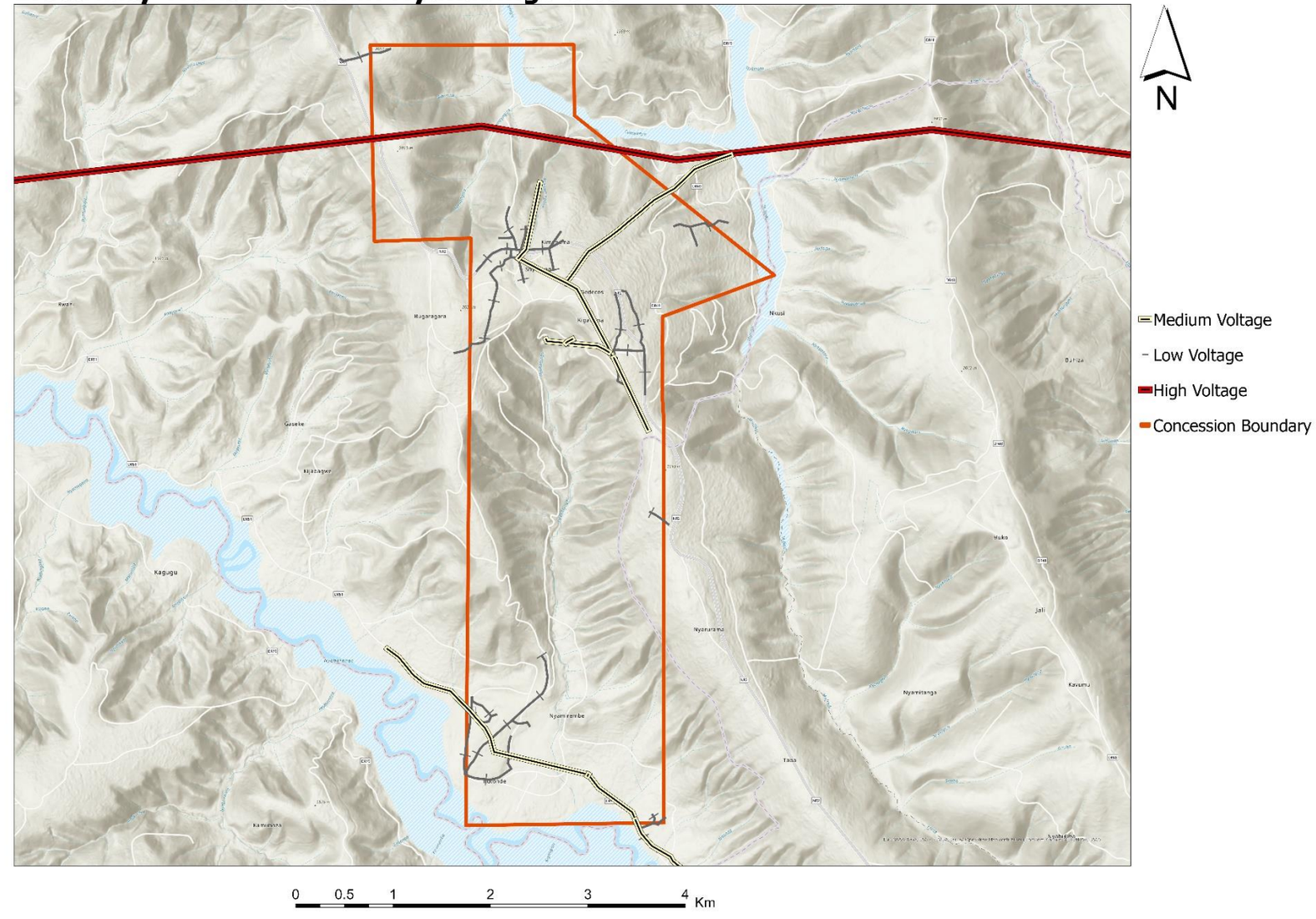


Electricity Transmission Lines

The **Electricity Transmission Lines Map** illustrates the distribution of existing power infrastructure within and around the mining concession, including high voltage, medium voltage, and low voltage lines. The map supports infrastructure planning, operational coordination, and assessment of potential risks related to construction and mining activities near electrical networks.

It also provides a basis for ensuring safety compliance, protecting critical utilities, and coordinating with relevant authorities during project implementation and expansion.

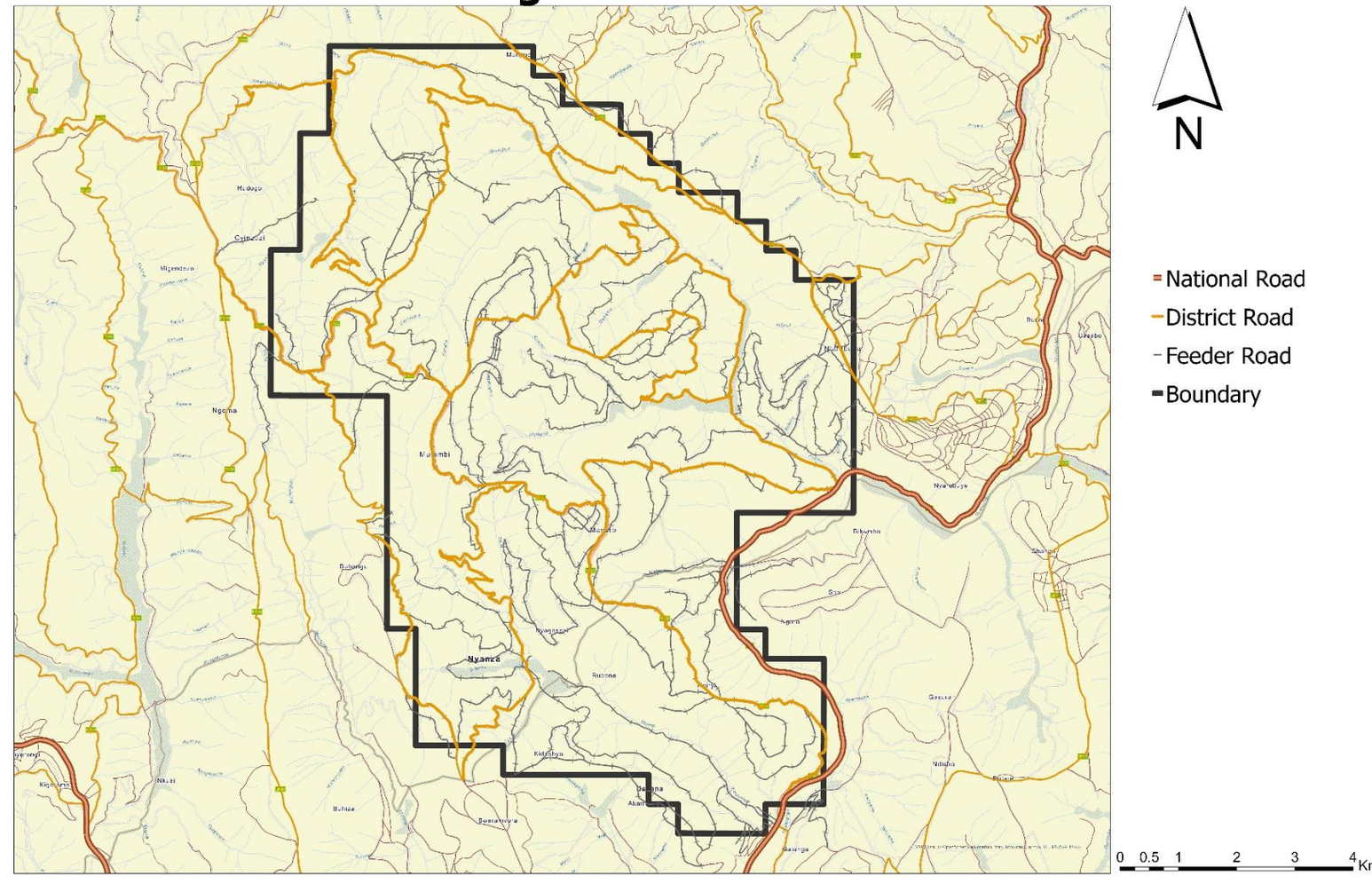
Electricity Transmission in Nyakabingo Site



Road Network Map

The Road Network Map presents the spatial distribution of transportation infrastructure within and around the mining concession, including national roads, district roads, and feeder roads. The map supports operational planning, logistics management, and access assessment for mining activities.

Road Network in Rutongo Site



Hydrology Map

The Hydrology Map was developed to identify and visualize the surface systems within and around the mining concessions, including rivers, wetlands, and lakes.

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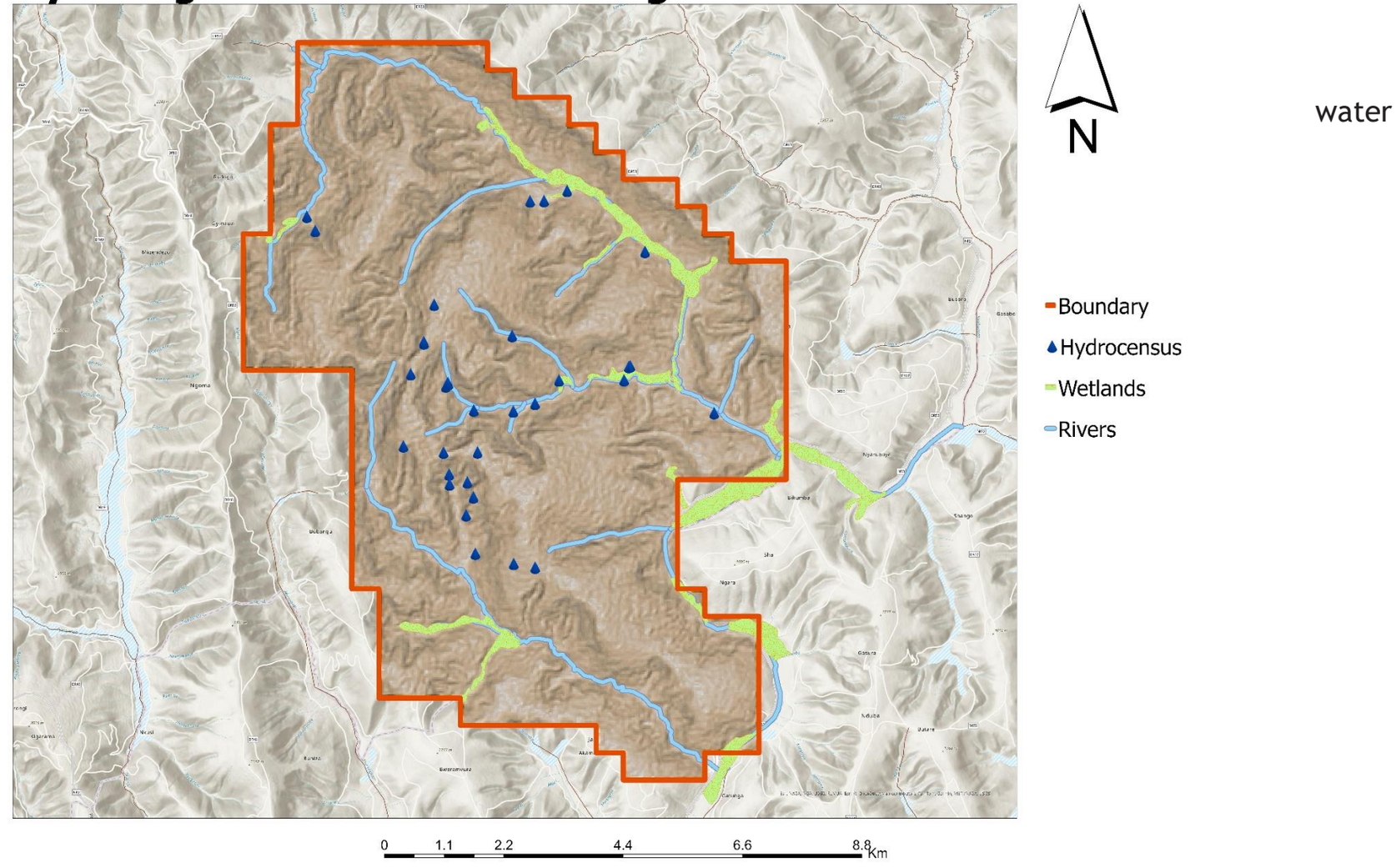
Hydrocensus: Trinity Metal Ltd
Wetland:
Water Ways: Trinity Metal Ltd
Lake:
Boundary: Trinity Metal Ltd

Hydrological Features of Rutongo Site



water

SECTION 4

Key Actions

Key Action

Summary of Work Done

- Established geodatabase and organized all spatial data for the three mining concessions.
- Generated thematic maps for:

  - Hydrology: rivers, wetlands, lakes, and flood susceptibility.
  - Facilities: schools, health facilities, religious institutions (1 km buffer).
  - Road Network: national, district, and feeder roads.
  - Electricity Transmission Lines: high, medium, and low voltage lines.
  - Land Cover: classified into water, forest, shrubland, herbaceous, developed, mining disturbed, and barren land.
  - Slope / Terrain: derived from 1.5 m DTM (LiDAR) to support terrain analysis.

Data Challenges

- LiDAR and Airbus data coverage does not fully extend across all concession boundaries, limiting slope and terrain analysis.
- Certain facilities have not yet been mapped: police stations, REG offices, WASAC facilities

Recommended Next Steps

Subscribe to ArcGIS Online:

- To enable web map creation, dashboards, and easier data sharing among project stakeholders.
- Recommended license bundles: Starter / Creator / GIS Professional (minimum users to match project needs).