# Soil Suitability Analysis for Riziki Farm

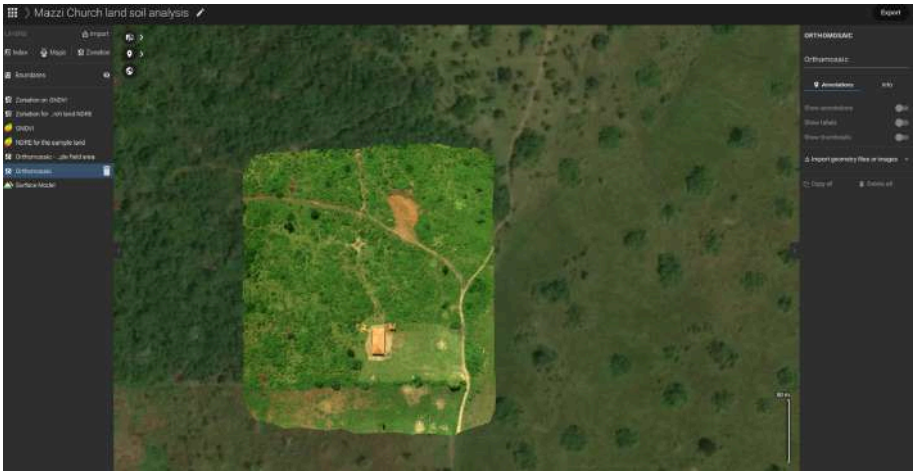


*Figure 1: Ortho mosaic for the church land plot of land*

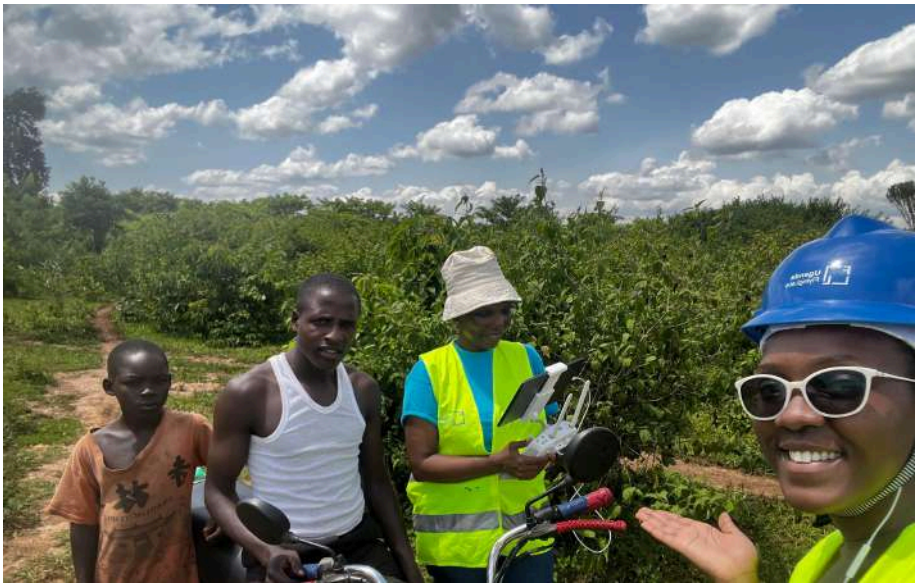

*Figure 2: After flight engagement with the community to answer their questions about the project*

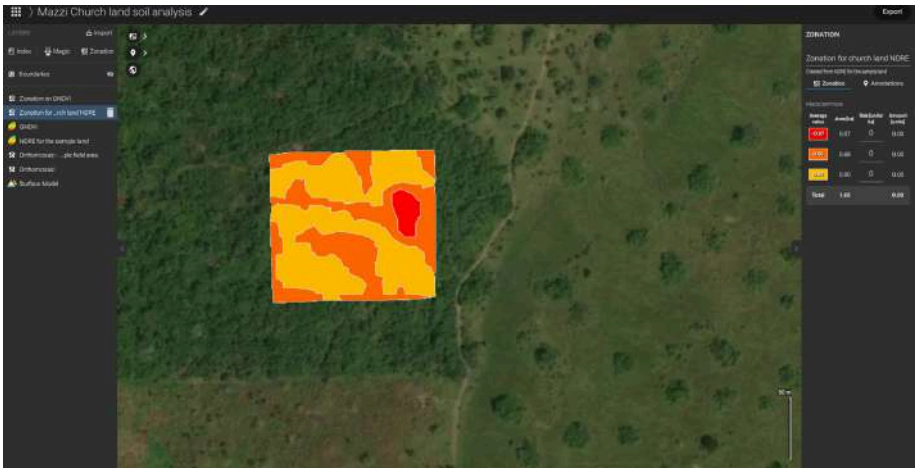


*Figure 3: NDRE zonation map for Fertilizer application basing on the Nitrogen deficiency needs of the soil*

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| OVERVIEW | |
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| **Flying Labs** | Uganda Flying Labs |
| **Geographic area** | Mazzi, Luweero, Uganda |
| **Date range** | 11th June, 2025 |
| **Sector program** | Agriculture |
| **Main SDGs** | GOAL 1: No Poverty<br>GOAL 2: Zero Hunger<br>GOAL 9: Industry, Innovation and Infrastructure |

| SCOPE | |
|---|---|
| **Project stakeholders** | Riziki Farm |
| **People impacted** | Farm Management |
| **Number of people impacted** | 5 people |
| **Problem statement** | Due to soil nutrient deficiencies and high termite population within some marshy colonies, Riziki Farm is huge and under-utilized. In order for the client to increase land productivity it was important to determine which specific crops were best suited for their soil type, ensuring long-term sustainable growth. |
| **Project objectives** | ● To assess soil fertility across four identified land parcels.<br>● To determine suitability for maize and coffee cultivation.<br>● To generate spatially tailored fertilizer recommendations. |
| **Scope** | Within the scope of the project, we aimed to:<br>I. Interface with and engage stakeholders for project reconnaissance.<br>II. Curate soil sampling and lab analysis with the support of Makerere University.<br>III. Deploy drone imaging while using the Normalise Difference Red Edge (NDRE) index for one plot.<br>IV. Use Satellite Normalise Difference Vegetation Index (NDVI) to analyze three inaccessible plots.<br>V. Create soil suitability maps.<br>VI. Provide a final recommendation report shared with the client. |
| **Outcome** | The expected outcomes of the project include:<br>1. To align NDRE and NDVI maps with lab results, to confirm the effectiveness of the use of drone imagery and satellite imagery. |

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| | 2. To cover four zones, assess and categorize them by level of fertility.<br>3. To develop fertilizer application zones, while also determining whether organic or synthetic fertilizer is best suited to the various areas.<br>4. To determine appropriate nutrient quantities.<br>5. To develop recommendations for both maize and coffee cultivation.<br><br>The actions/decisions that were taken after sharing the outcomes include:<br>1. Client prioritized treatment of nutrient-deficient zones.<br>2. Planning staggered maize and coffee cultivation.<br>3. Initiated future consideration for further drone integration. |
| **Impact** | ● More efficient input use.<br>● Potential for yield increase.<br>● Shift toward data-driven practices.<br>● Empowered team with decision maps. |
| **Challenges** | ● Inaccessibility of three plots due to heavy rains, closing off the routes to the land parcels (resolved using Sentinel-2 images).<br>● Lab result turnaround delays. |
| **Next steps** | 1. Integrate drone imagery for monitoring crop and soil health.<br>2. Follow-up with impact surveys in order to ensure that the applied prescribed fertilizer yielded the expected harvest.<br>3. Train field staff on interpretation of the fertilizer application maps.<br>4. Collaborating with agronomists on nutrient and fertilizer applications for estimates and quantities. |

| COMMUNITY ENGAGEMENT AND STAKEHOLDER SUPPORT | |
|---|---|
| **Consent for data acquisition** | Consent received from the farm owner. |
| **Community engagement activities** | Informal session with farm staff on June 11th, 2025. |
| **Community groups engaged with** | Farm Management, Community in General |

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| **Community attendance** | 4 people. |
| **Community feedback** | The community expressed an interest in knowing the use of the drone and how it is being utilized. |
| **Stakeholder support** | Shared maps and reports in visual formats for planning Targeted fertilizer application. |

| **DATA ACQUISITION** | |
|---|---|
| **Size of area** | Church Land Plot: approx. 2 hectares (0.02 km²) |
| **Drone** | DJI Phantom 4 Multispectral |
| **Sensor(s)** | Multispectral Sensor (DJI Multispectral) |
| **Flight plan software** | Ground Station Pro Mission Planner |
| **Flight height** | 63 m AGL |
| **GSD (Accuracy)** | 3.3 cm/pix |
| **Number of images acquired** | 127 |
| **Number of flights** | 1 |
| **Time invested in data acquisition** | 25 MINUTES |
| **Georeferencing** | Onboard GPS |

| **DATA PROCESSING & ANALYSIS** | |
|---|---|
| **Processing software** | PIX4Dfields |
| **Processing time** | 1 hour 30 minutes |
| **Data products** | • Orthomosaic<br>• Soil Nutrient (NDRE Map)<br>• Fertilizer Prescription maps |
| **Analysis tools** | • PIX4Dfields<br>• Sentinel open access Hub |
| **Analysis outputs** | Normalise Difference Red End (NDRE) & Normalise Difference Vegetation Index (NDVI) |
| **Final outputs shared with stakeholders** | Fertilizer prescription maps and a report |
| **Data sharing** | Email |