

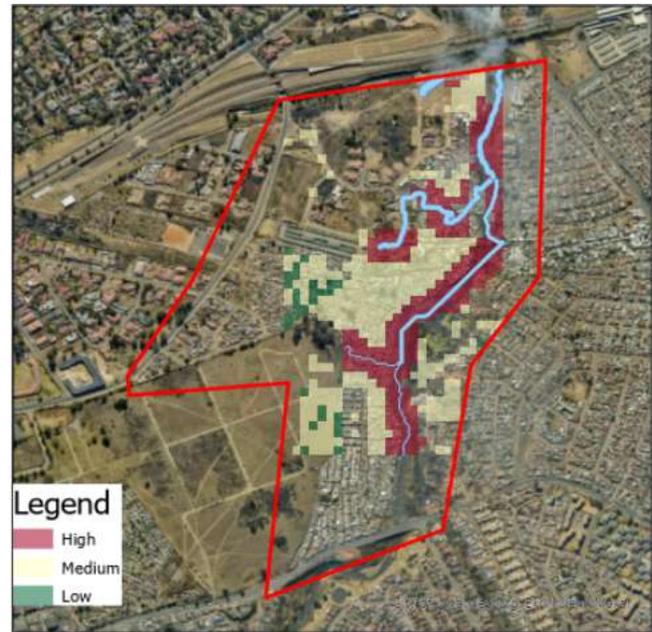
The Use of Drones in Disaster Preparedness, Mitigation and Response



Stjwetla Informal Settlement, Alexandra Township, North of Johannesburg - South Africa



*South Africa Flying Labs Team
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Flood risk map with an overlay of highest water accumulation

| OVERVIEW | |
|------------------------|--|
| Flying Labs | South Africa Flying Labs |
| Geographic area | Alexandra Stjwetla Informal Settlement, North of Johannesburg - South Africa |
| Date range | April - June 2022 |
| Sector program | AidRobotics |
| Main SDGs | GOAL 11: Sustainable Cities and Communities GOAL 13: Climate Action |

| SCOPE | |
|----------------------------------|---|
| Project stakeholders | Gauteng eGovernment Department City of Johannesburg (CoJ) Youth of Alexandra South Africa Flying Labs United Nations International Children’s Fund South Africa (UNICEF SA) |
| People impacted | City of Johannesburg Community of Alexandra (Stjwetla Informal Settlement) Youth of Alexandra |
| Number of people impacted | 2000+ people |
| Challenge | Every year during the rainy season, the Jukskei River bursts its banks resulting in people from Stjwetla Informal Settlement being affected by the flooding. No map currently exists that forms the basis for disaster response planning, response and mitigation. At this point the response teams can only come in aerially or on foot which can be costly in both human life and financially. |
| Scope | The project aimed at creating a use case to demonstrate to the city how drones can be used to map an area for purposes of preparing for natural and unnatural disasters. In addition, to also create a map of the informal settlement to identify shacks on floodlines and ensure the council can use this as a basis for disaster preparedness and planning. This interactive map will be used as a basis: |

| | |
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| | <ol style="list-style-type: none"> 1. for critical decision-making based on current and reliable information, 2. to identify access routes for response teams during disaster and areas prone to flooding and fire hazards and areas which can be used as assembly points, 3. and for spatial planning for the council. |
| Outcome | <ol style="list-style-type: none"> 1. A mitigation plan for potential disasters in the Stjwetla Informal Settlement comprising of: <ol style="list-style-type: none"> a. a high resolution orthomosaic, b. a Digital Elevation Model (DEM), c. a flood risk analysis, d. and a fire risk analysis. 2. Recommendations of access routes for fire and other emergency response teams. 3. A presentation to various stakeholders to inform their decisions including a much wider project of mapping the entire township. |
| Impact | <p>This project will potentially lead to replanning of the informal settlement to ensure the shacks on floodlines are moved. It will also help in reducing the use of fire prone materials and increasing the distances between the shacks to minimise fire risks. Finally, it will facilitate generation of access routes for emergency response teams in case of disaster.</p> |
| Next steps | <p>Mapping the entire township and eventually training the community on disaster awareness and mitigation in conjunction with the City of Johannesburg (CoJ). Facilitate a workshop with the CoJ planning, Emergency Management Services and Environmental Management Planning, to make them consider enrolling in a Disaster Management Course.</p> |

| COMMUNITY ENGAGEMENT AND STAKEHOLDER SUPPORT | |
|--|--|
| Consent for data acquisition | Meetings were held with community leaders, councillors and youth. Presentations were made on the value that will accrue based on the work to be performed. |
| Activities to engage with the community | <p>Meeting 1 was on awareness training with youth and Small Medium and Micro Enterprises (SMMEs) at the Alexandra Sports Complex.</p> <p>Meeting 2 was held with the Gauteng eGovernment department at the eGovernment Offices.</p> <p>Meeting 3 involved data acquisition and awareness including stakeholders like UNICEF, Corporate Governance and Traditional Affairs (COGTA) dept. , and the Youth at the Alex soccer ground.</p> <p>Meeting 4 consisted of feedback sessions with the youth, local government and community on June 17, 2022. This session was held virtually.</p> <p>A virtual feedback session was also done with UNICEF SA.</p> |
| Community groups engaged with | Government officials, community in general, young people, representatives of community-based organisations |
| Community attendance | <p>Meeting 1: 19</p> <p>Meeting 2: 4</p> <p>Meeting 3: 27</p> |
| Community feedback | The community was excited about the initiative and wanted more involvement in use of Fourth Industrial Revolution (4IR) technologies and ensuring youth in the area is involved. |
| Stakeholder support | The program outputs were shared with the team in accessible formats depending on the exposure of the relevant stakeholders. Low resolution maps which are less resource intensive were produced so that they can be opened from computers with less capacity. The community members and others were also encouraged to download and use GoogleEarth Pro. |

| DATA ACQUISITION | |
|--|-------------------------------|
| Size of area | 150 ha (1.5 km ²) |
| Drone | DJI Phantom Pro 4 |
| Sensor(s) | RGB |
| Flight plan software | PIX4Dcapture |
| Flight height | 80 meters above ground |
| GSD (Accuracy) | 2.63 cm/pix |
| Number of images acquired | 2028 images |
| Number of flights | 5 flights |
| Time invested in data acquisition | 4 hours |
| Georeferencing | Onboard GPS |

| DATA PROCESSING & ANALYSIS | |
|---|---|
| Processing software | Agisoft Metashape |
| Processing time | 08 hrs:08 min:13 sec |
| Data products | Point cloud, orthomosaic, Digital Elevation Model (DEM) |
| Analysis tools | ArcGIS Online, ArcGIS Pro |
| Analysis outputs | Flood risk map, fire risk map |
| Final outputs shared with stakeholders | Orthomosaic, DEM, flood risk map, fire risk map, presentation |
| Data sharing | Google Drive and other online tools, email |