



# Uganda Open Mapping For Resilience

## ATLAS

Ggaba, Kampala  
Uganda  
September, 2018



Belgium  
partner in development



GFDRR



Humanitarian  
OpenStreetMap  
Team

Geo Gecko  
geo-intelligence excellence

# ABOUT

## **Uganda Open Mapping - Helping Uganda's communities to identify and reduce real disaster risks through open and collaborative data collection: Using the OpenStreetMap open data platform to improve disaster exposure information.**

The World Bank is supporting the Kampala Capital City Authority (KCCA) and the Government of Uganda to increase resilience against disaster and climate change risks through a comprehensive technical assistance program. One pillar of this program is to improve access to disaster-exposure data analysis and risk-related information, accelerating and empowering the decision making process.

As part of these efforts, GFDRR's Open Data for Resilience Initiative (OpenDRI) is utilizing a model which has been cultivated and refined through projects in more than 30 highly vulnerable countries. Engaging communities to map their own surroundings has proven to be a powerful and sustainable approach to building resilience. The process connects local field surveyors with international crowd-sourced community mappers, provides fundamental on-the-job training, and ultimately creates a skilled network of staff and volunteers; a network which can respond to map immediate damage from disaster, exposure metrics, and anticipated vulnerability to future disaster risks.

In Uganda's capital, increasing urban populations and changing land-use patterns are creating new challenges for mapping risk. In Kampala, improving access to baseline data (maps) and risk-related information (surveys) allows local and city-level authorities to act with more speed and confidence.

By creating up-to-date and detailed maps, it becomes possible to compile detailed, high resolution risk profiles for areas and households affected. The participatory community approach assists residents in understanding their own environment for improved decision making and increased resilience.

In this framework, the Uganda Open Mapping Program has worked to develop technical capacity at local and national level in the open mapping domain. Under the supervision of the World Bank, a team of local and international organizations (ITHACA, GeoGecko, HOT, and MapUganda) have worked with government and communities to develop open mapping capacity and demonstrate the benefits.

Local and national stakeholders (Uganda Bureau Of Statistics [UBOS], KCCA, Office of the Prime Minister Department of Disaster Preparedness and Management [OPM DDPM]) have been involved since the beginning of the project in October 2017. They have guided the team on features and attributes to be mapped, while developing their own capacities. KCCA identified the lakeside of Ggaba parish as the most suitable target area in Kampala to pilot this open

mapping for resilience project, testing and fine-tuning the operational workflows.

The three pillars of the program are:

- > Technical capacity development of government and community



- > Remote mapping complemented by field surveying



- > Unmanned Aerial Vehicles (UAV) survey imagery



Kampala is not alone in these challenges, or in applying open mapping techniques to overcome them. Kampala was chosen as one of 11 municipalities to join Open Cities Africa. The cities learn from each other's experience and have the opportunity to showcase their advancement around the continent.

This atlas and the project website are the culmination of that work, and we hope you find them useful for understanding local disaster risk exposure in Ggaba parish.

## Open Street Map

Baseline geographical data can be used for disaster risk reducing policy and interventions, and for efficient disaster response. The Open Mapping principle finds its heart not in the technology or tools it uses, or commercially interested organisations backing it, but in Open Street Map itself, the publicly owned wiki-style platform, accessible to anyone via smartphone or computer, to edit, use or develop. The techniques deployed in this project derive from Open Mapping experiences in urban planning, flood resilience, and disaster response interventions worldwide, in areas generally considered 'inaccessible' and 'precarious'. In this setting, the universal geo-spatial language of OpenStreetMap (OSM) has been used to verify and augment different datasets, whilst introducing the concept and practice of authorship amongst communities and those who serve them.

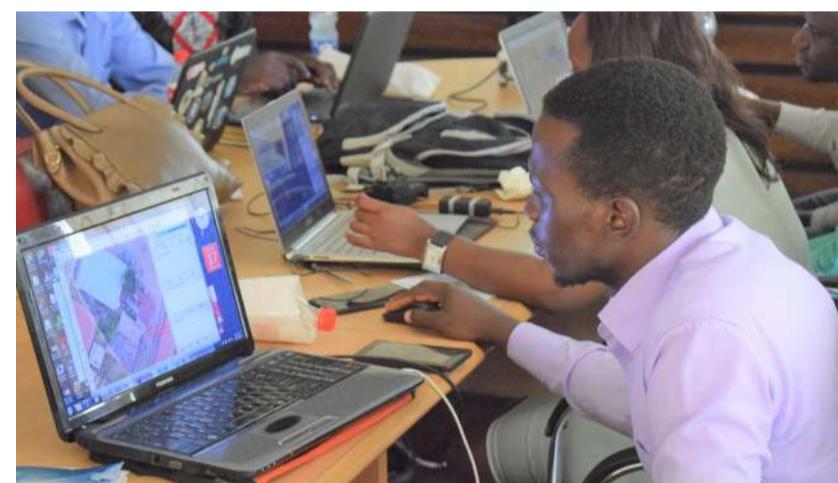
## Open Data

OpenStreetMap data is made available for use under the Open Database License (ODbL), published by the Open Data Commons. OpenStreetMap can be seen as both a resource, a methodology, and a philosophy. The benefits of the Open Data model are that knowledge is shared in an open and collaborative fashion, and community contributions and participation are on a reciprocal basis. Members (as users) of the community resources are requested and expected to share what developments they can in the public realm, in order to further gain from others' contributions.

As outlined by the OpenStreetMap Foundation, the OpenStreetMap project provides extensive map data for the entire world that you can download and use for ANY purpose you like. Although you do not have to pay anybody anything to use the data, it is required that you credit and contribute innovations to the resource and tooling where possible.



**Robert, District Council Community Chairman, gets vocal about how best to get locals to adopt smartphone tools and data understanding for the community**



**Desktop and field skills are combined**



**Editing and uploading OpenStreetMap data, community and government team members join up at KCCA Headquarters Ma-pathon**

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Read more about open  
mapping in Uganda



<https://opencitiesproject.org/uganda/>

Download the data  
from the project

Buildings and POIs



<https://overpass-turbo.eu/s/DTt>

Drainage system



<https://overpass-turbo.eu/s/DTv>

# Partners

Government partners



Capacity development  
and Mapping

Management



Supported by



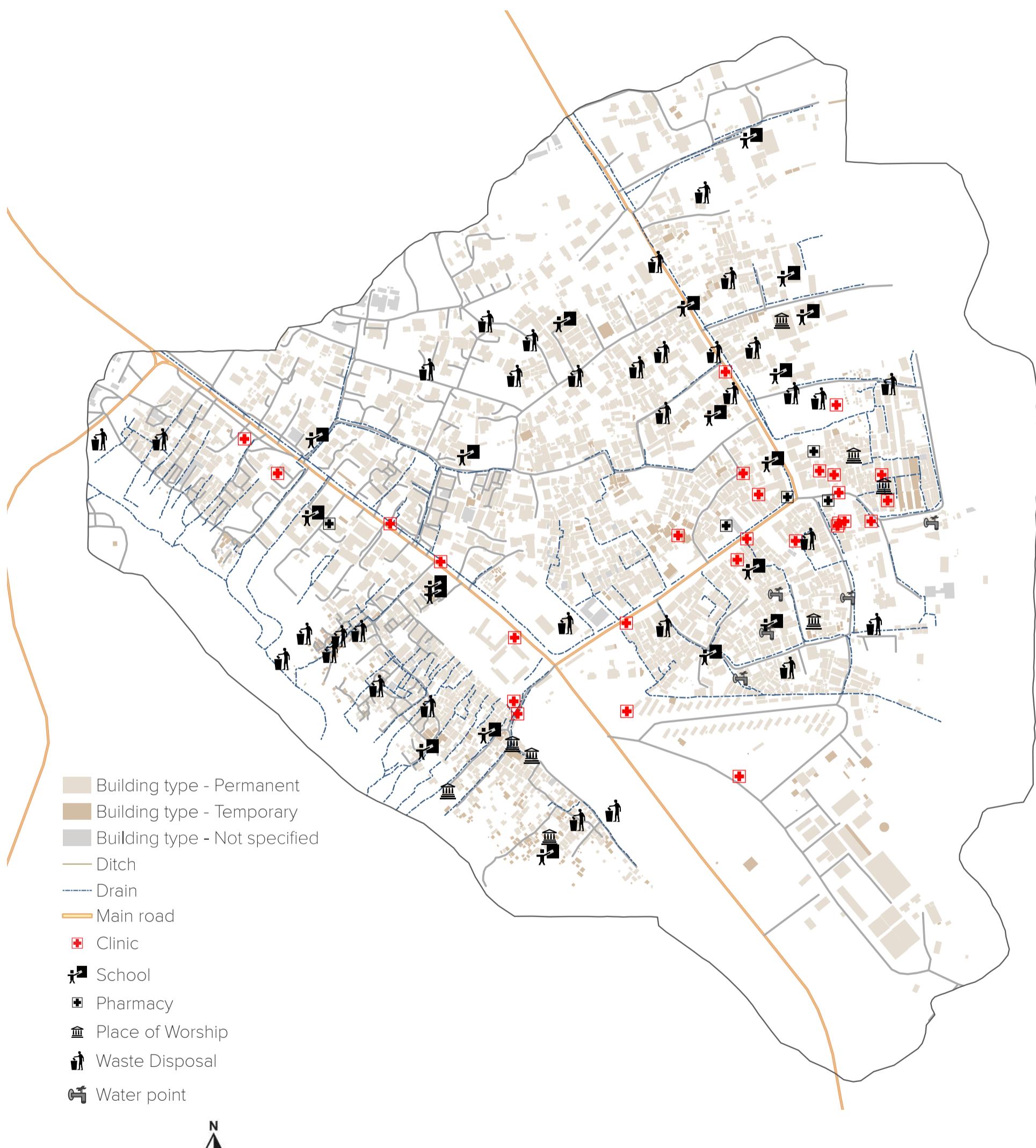
UAV flight and atlas



# ORTHOPHOTO



# VECTOR MAP

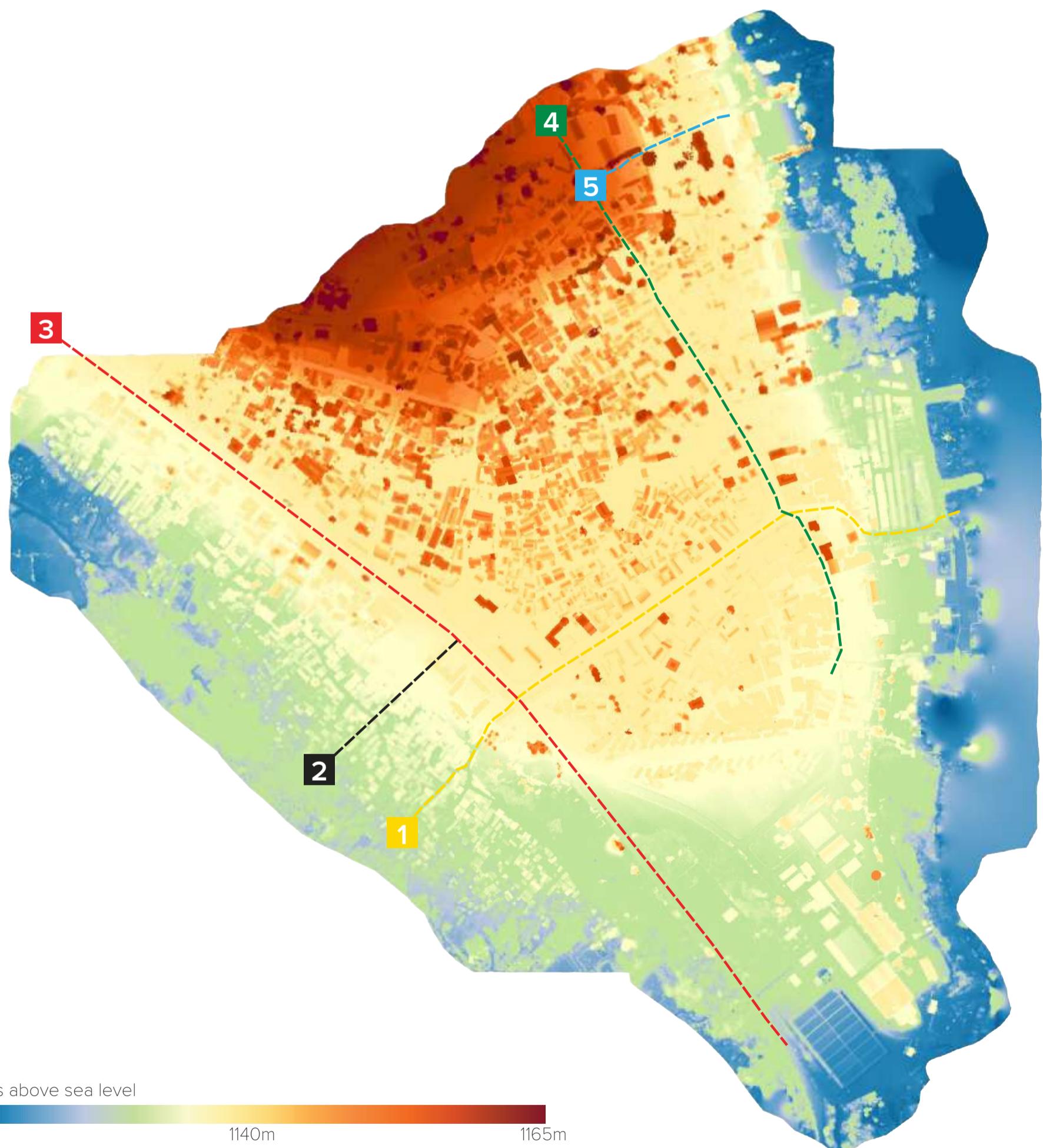


0 200 400 Meters

© OpenStreetMap contributors

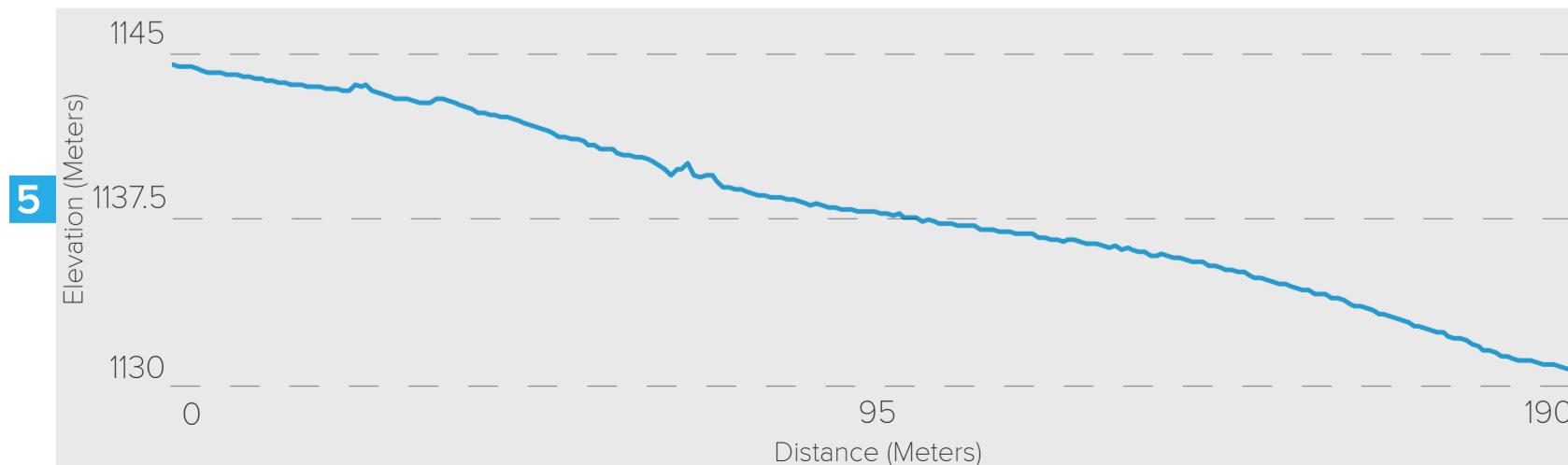
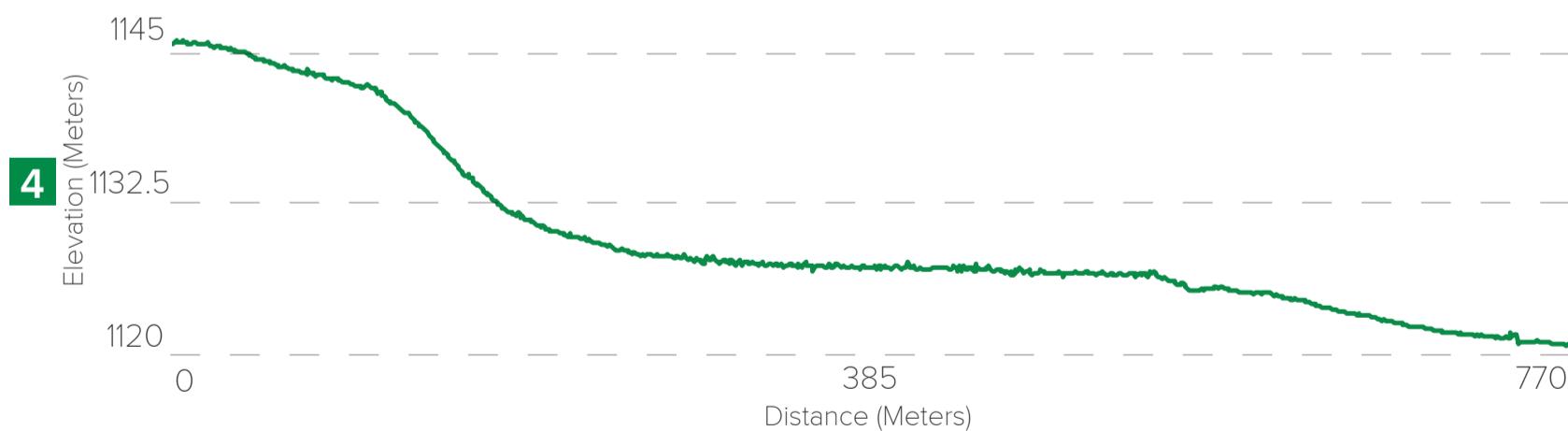
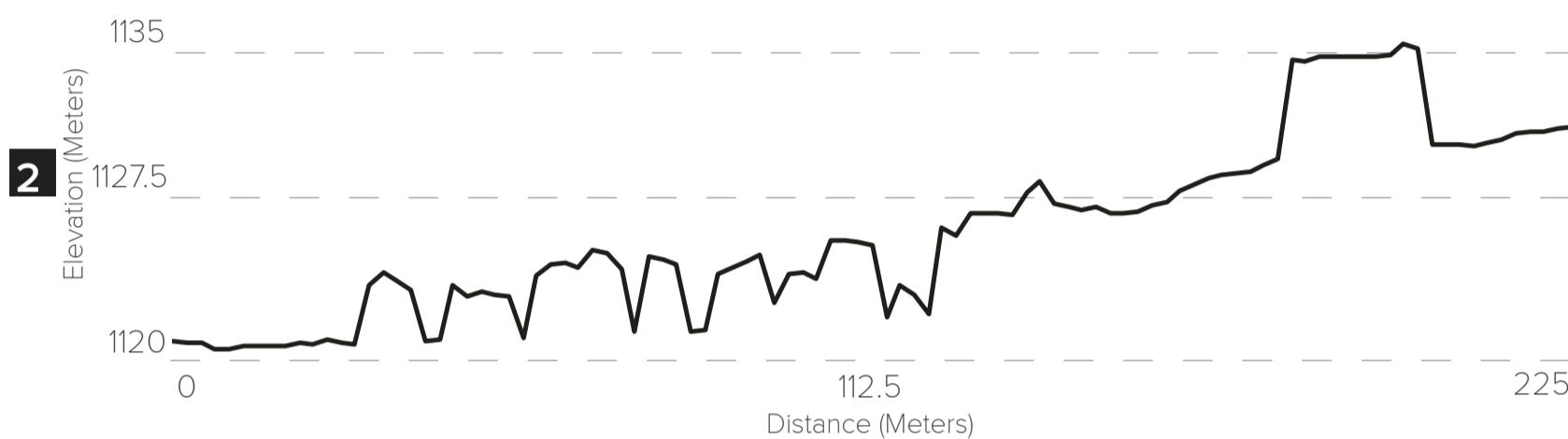
# DIGITAL SURFACE MODEL

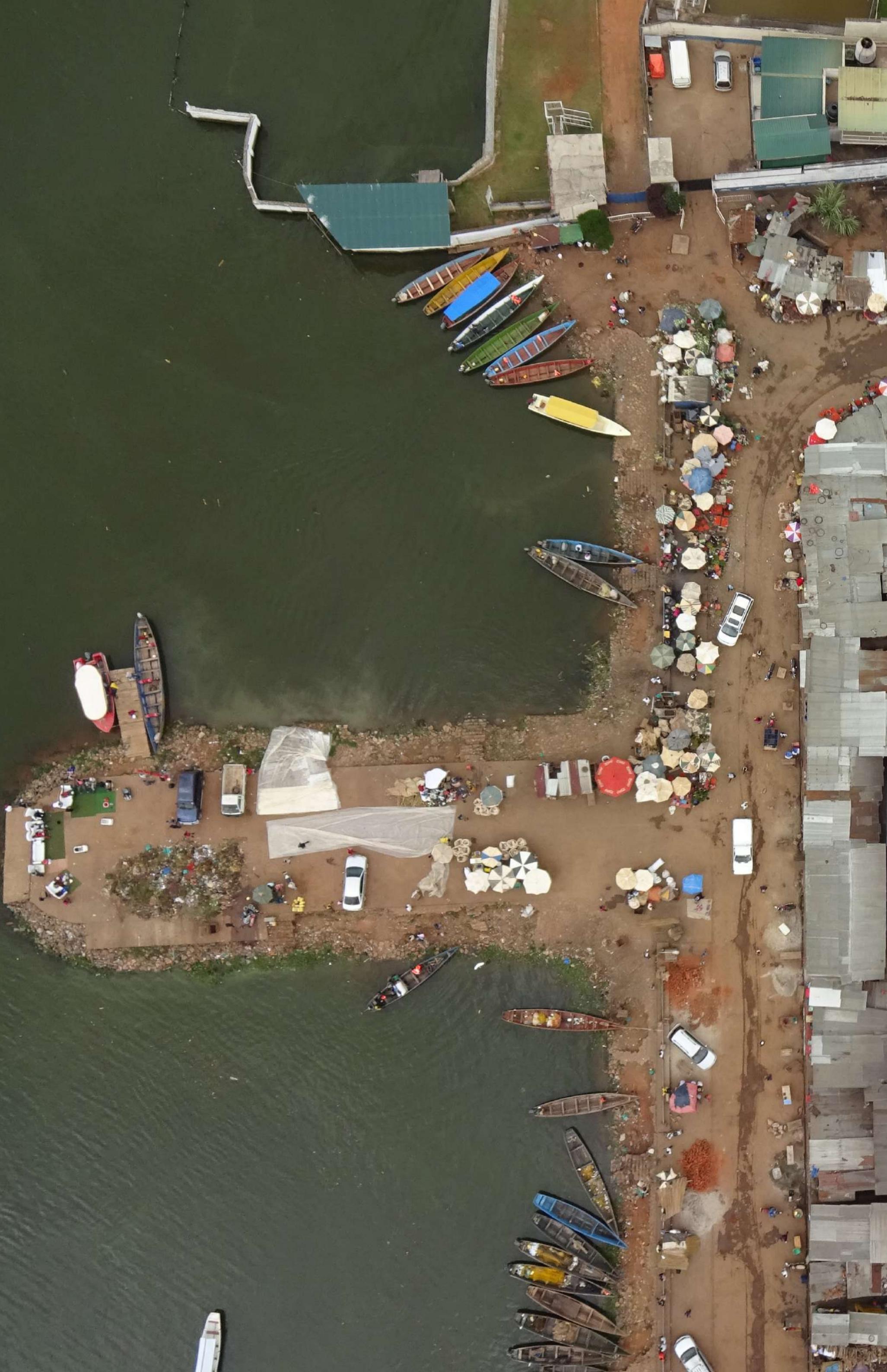
The model is a representation of the surface for the AOI. It is created by processing 354 images collected during the UAV flights. Photogrammetry is the technical term on how to generate a surface model.



# CROSS SECTIONS

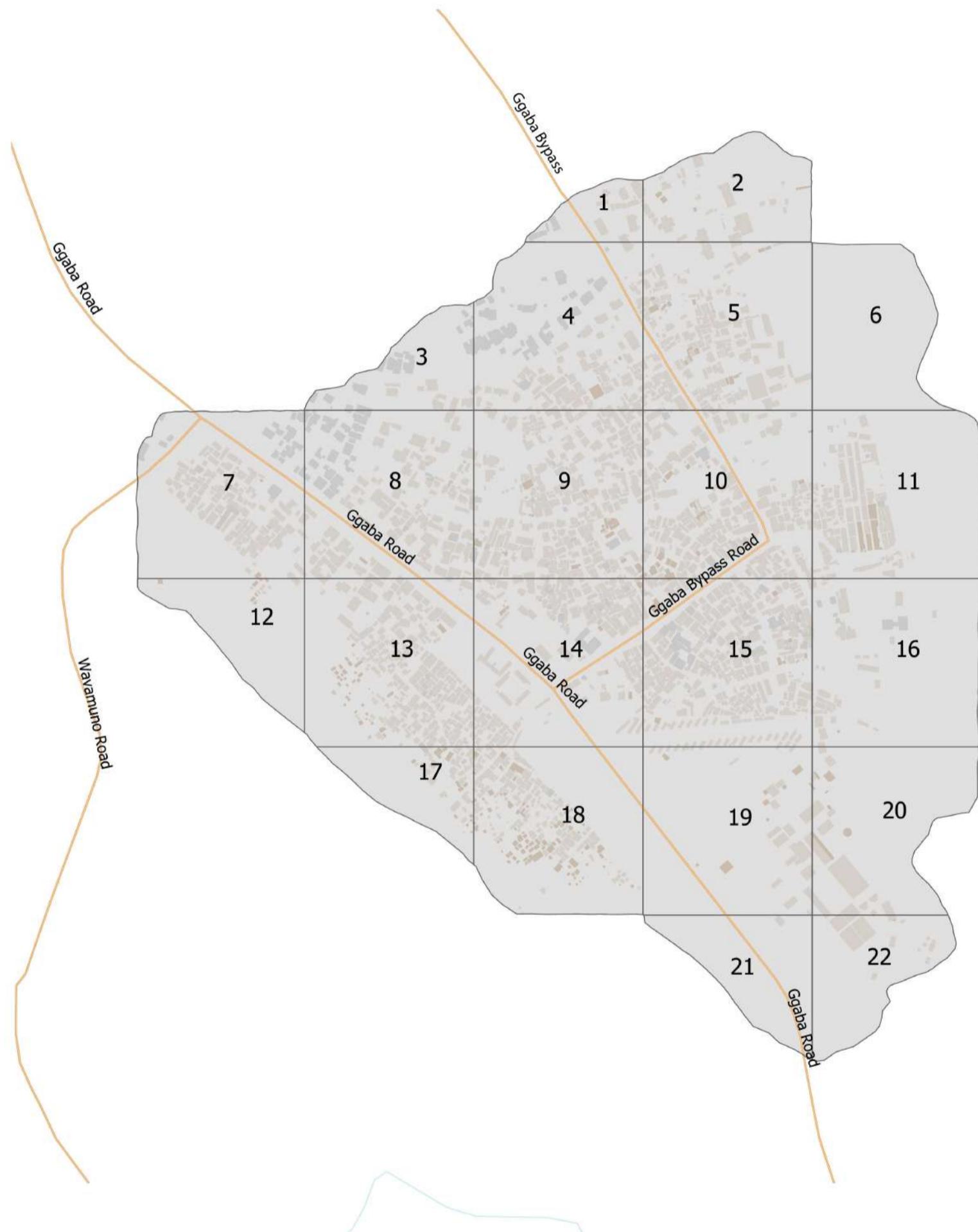
The crosssections below match the lines on the previous page by number and color



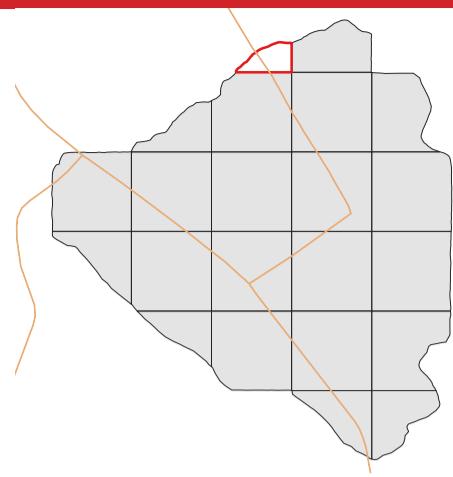




# AREA OVERVIEW MAP



# AREA 1



Feature	Count
Buildings	24
Waste disposal	0
Toilets	0
Waterpoints	0
Pharmacies	0
Clinics	0
Schools	0

Feature	Meters
Drains	147.6
Culverts	0

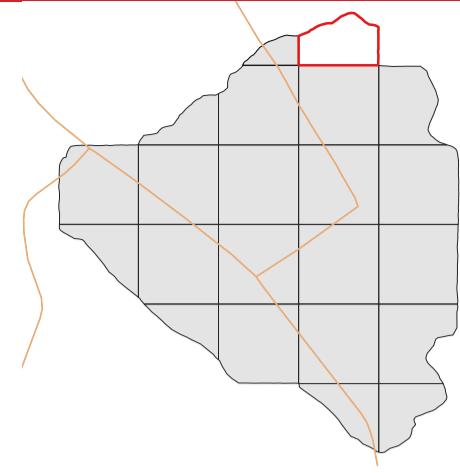
Building type - Permanent  
Building type - Not specified  
Drain



N  
0 50 100 Meters

© OpenStreetMap contributors

# AREA 2



Feature	Count
Buildings	47
Waste disposal	0
Toilets	0
Waterpoints	0
Pharmacies	0
Clinics	0
Schools	1

Feature	Meters
Drains	184.4
Culverts	0

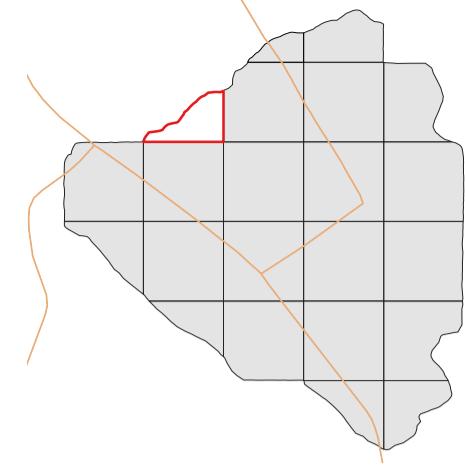
- Building type - Permanent
- Building type - Temporary
- Ditch
- - - Drain
- ☒ School
- ✗ Silt trap
- Lake



0 50 100 Meters

© OpenStreetMap contributors

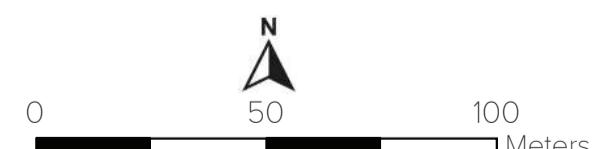
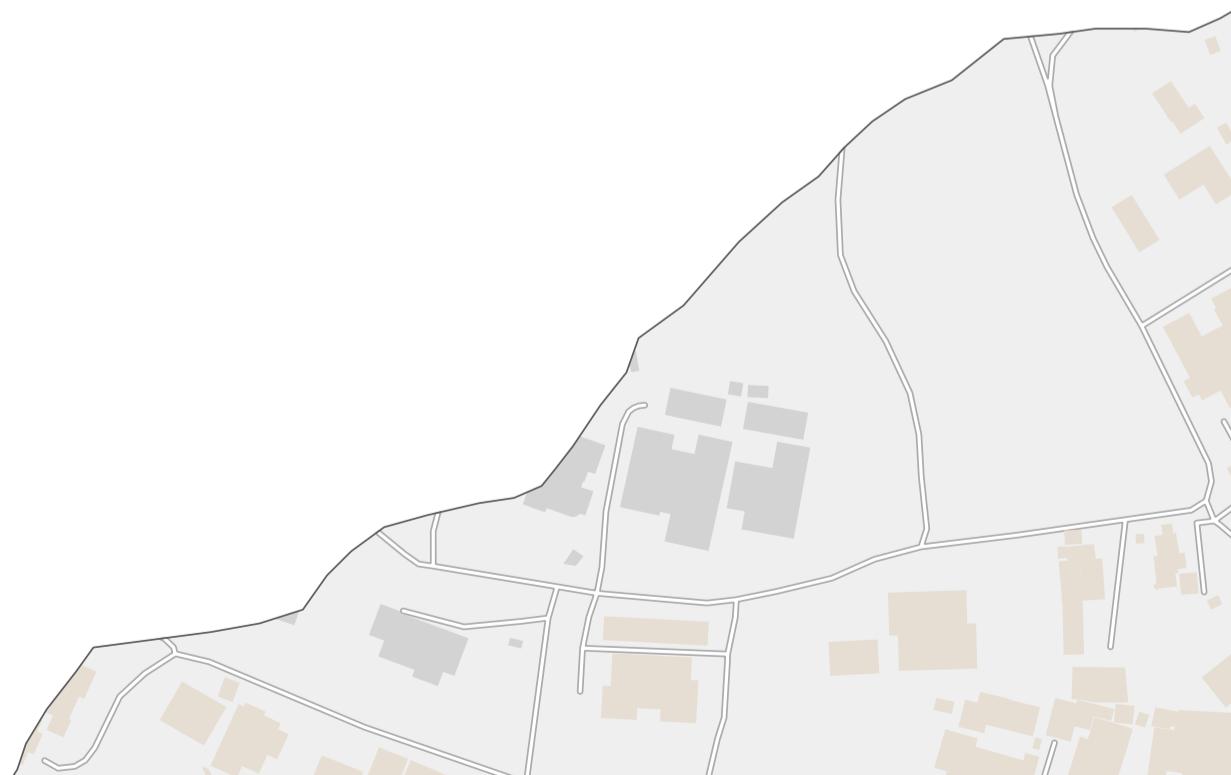
# AREA 3



Feature	Count
Buildings	61
Waste disposal	0
Toilets	0
Waterpoints	0
Pharmacies	0
Clinics	0
Schools	0

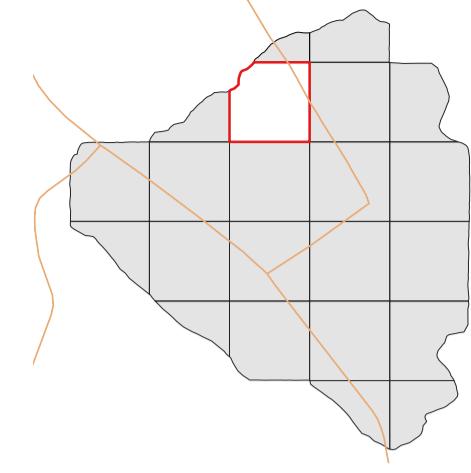
Feature	Meters
Drains	1.4
Culverts	0

■ Building type - Permanent  
■ Building type - Not specified  
--- Drain



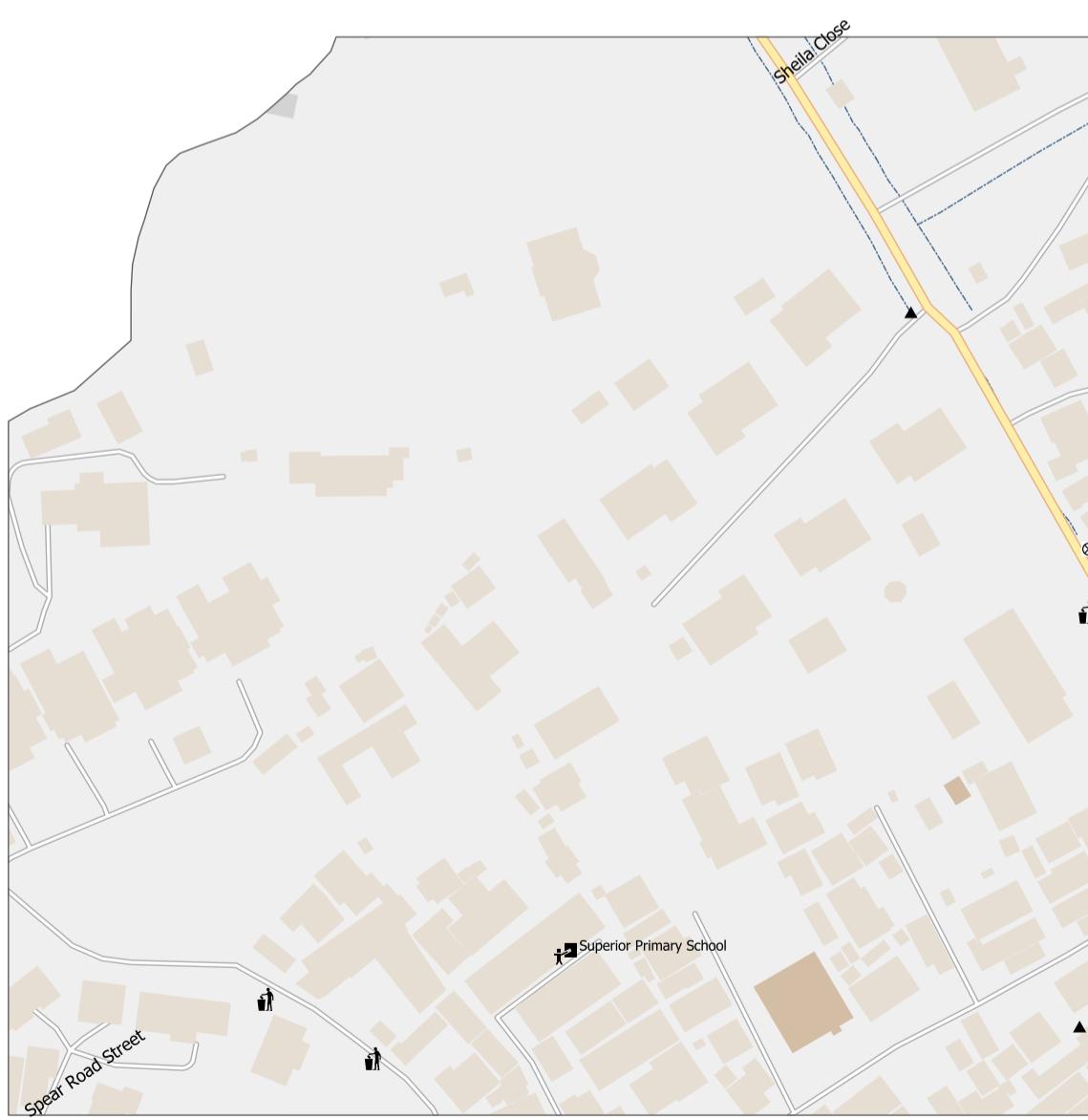
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# AREA 4



Feature	Count
Buildings	182
Waste disposal	3
Toilets	0
Waterpoints	0
Pharmacies	0
Clinics	0
Schools	1

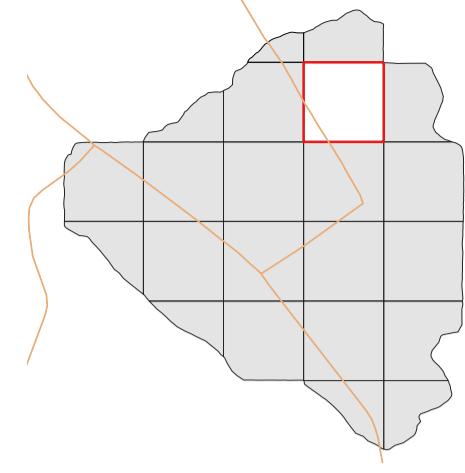
Feature	Meters
Drains	248.5
Culverts	0



0 50 100 Meters

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# AREA 5



Feature	Count
Buildings	294
Waste disposal	4
Toilets	3
Waterpoints	0
Pharmacies	0
Clinics	0
Schools	3

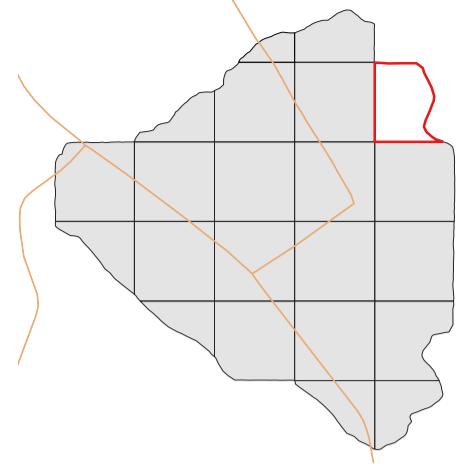
Feature	Meters
Drains	455.7
Culverts	0



0 50 100 Meters

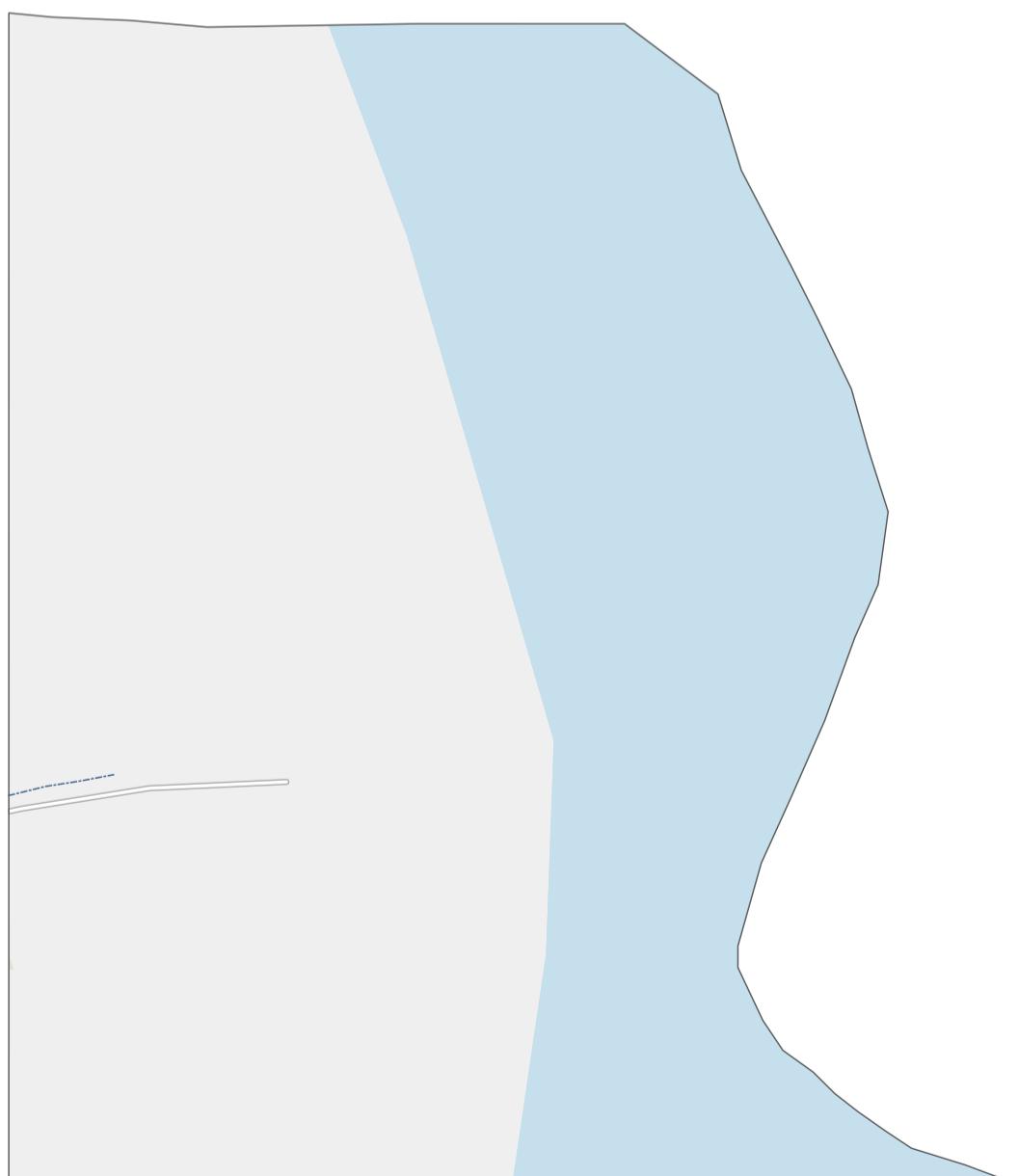
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# AREA 6

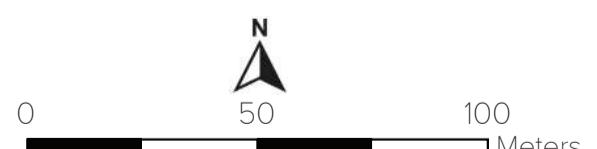


Feature	Count
Buildings	0
Waste disposal	0
Toilets	0
Waterpoints	0
Pharmacies	0
Clinics	0
Schools	0

Feature	Meters
Drains	22.6
Culverts	0

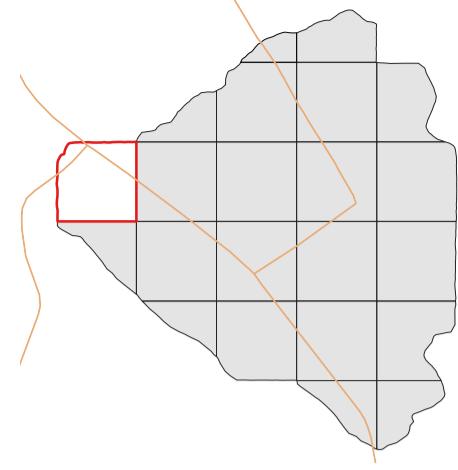


— Drain  
Lake



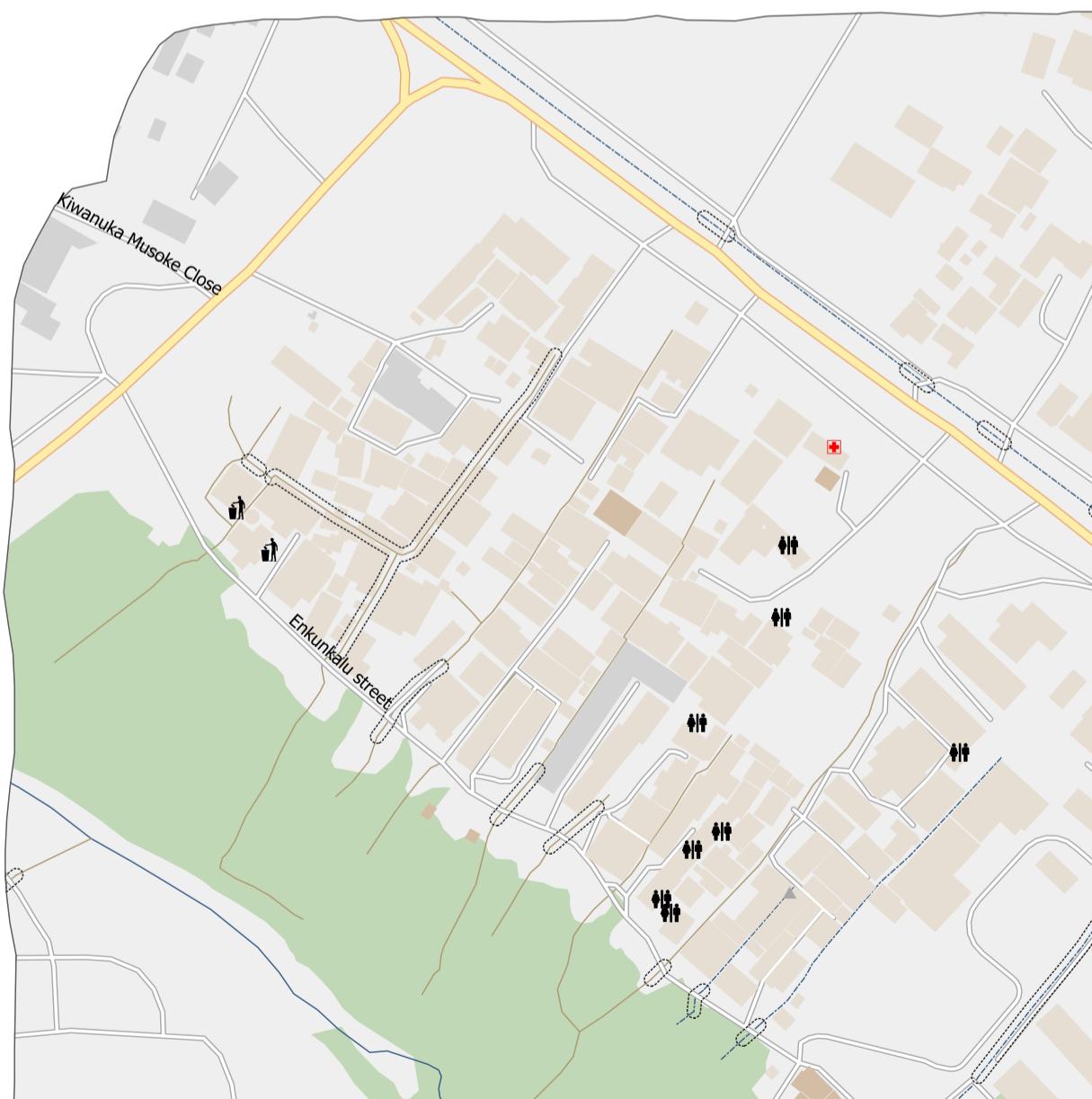
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# AREA 7

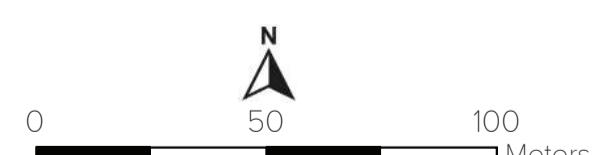


Feature	Count
Buildings	242
Waste disposal	2
Toilets	8
Waterpoints	0
Pharmacies	0
Clinics	1
Schools	0

Feature	Meters
Drains	378.6
Culverts	256,5

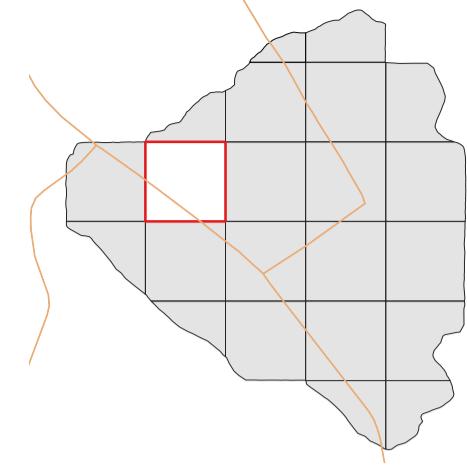


- Building type - Permanent
- Building type - Temporary
- Building type - Not specified
- Culvert
- Ditch
- - - Drain
- Stream
- ▲ Drain Begins
- ✚ Clinic
- Public Toilet
- ✖ Waste Disposal
- Wetland



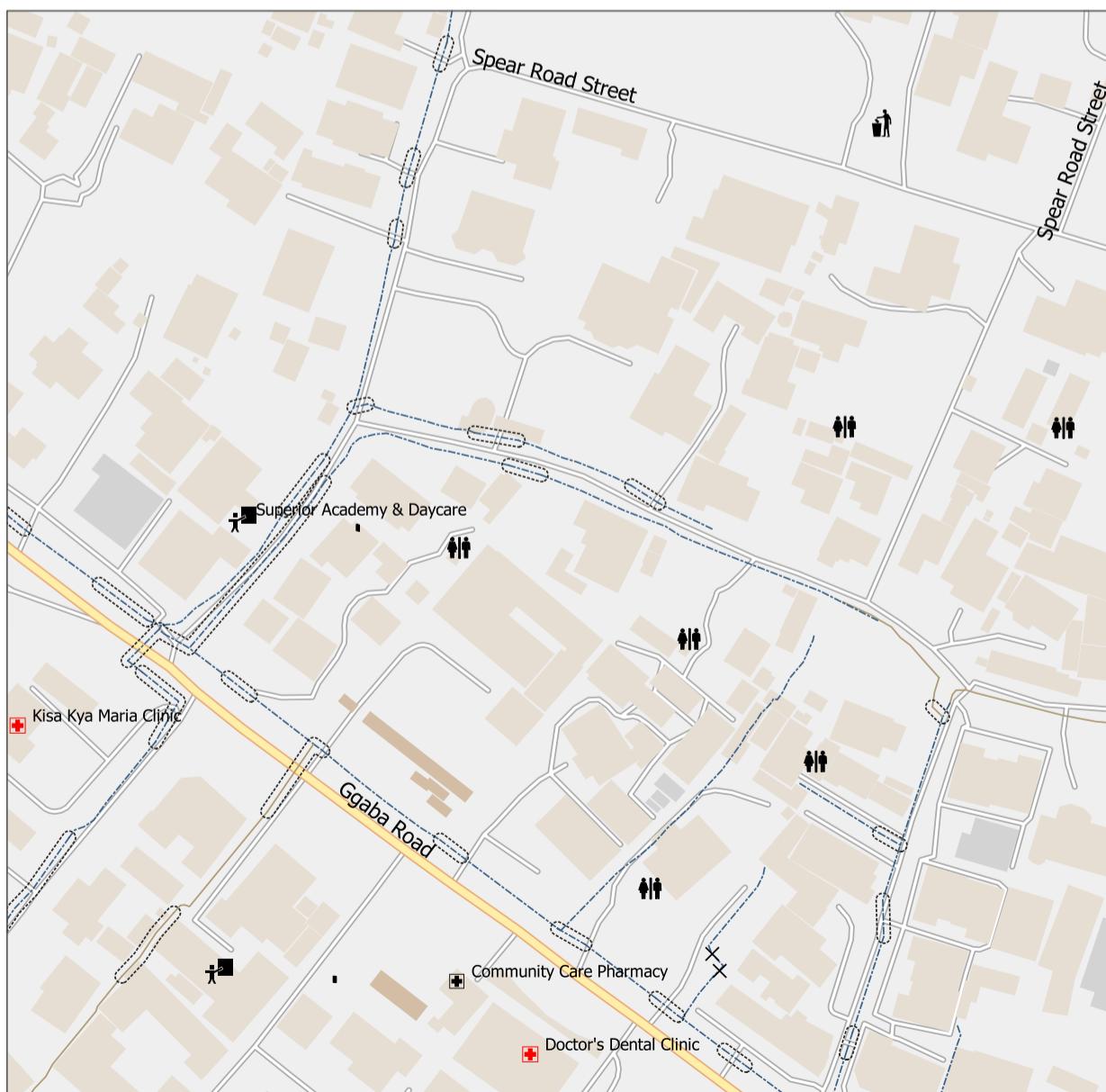
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# AREA 8

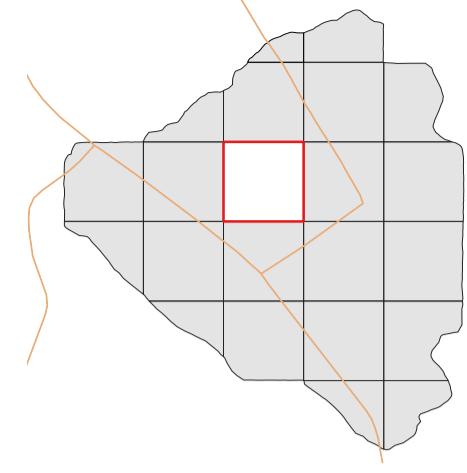


Feature	Count
Buildings	233
Waste disposal	1
Toilets	6
Waterpoints	0
Pharmacies	1
Clinics	2
Schools	2

Feature	Meters
Drains	1025.2
Culverts	279.5



# AREA 9



Feature	Count
Buildings	452
Waste disposal	4
Toilets	8
Waterpoints	0
Pharmacies	0
Clinics	0
Schools	1

Feature	Meters
Drains	6.6
Culverts	10.5

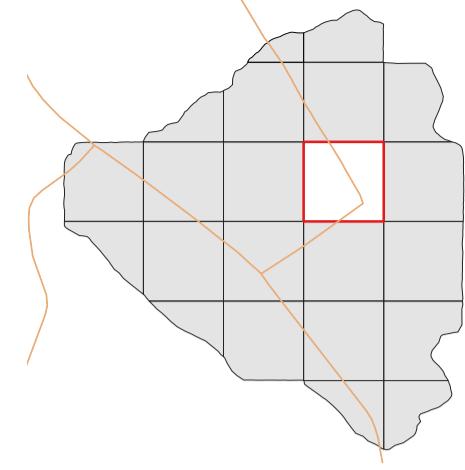


- Building type - Permanent
- Building type - Temporary
- Building type - Not specified
- Culvert
- Ditch
- Drain
- School
- Public Toilet
- Waste Disposal
- Drain Begins
- Drain Ends

0 50 100 Meters

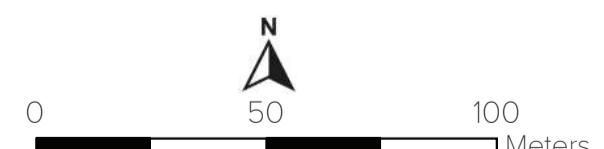
© OpenStreetMap contributors

# AREA 10



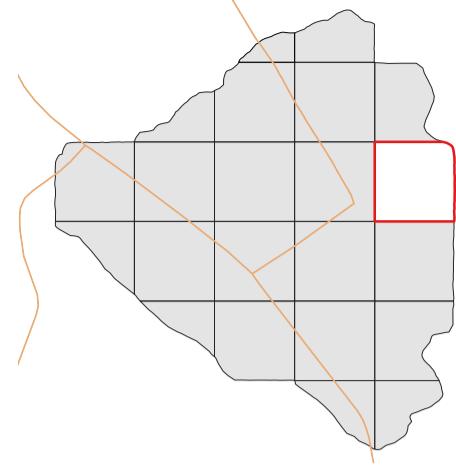
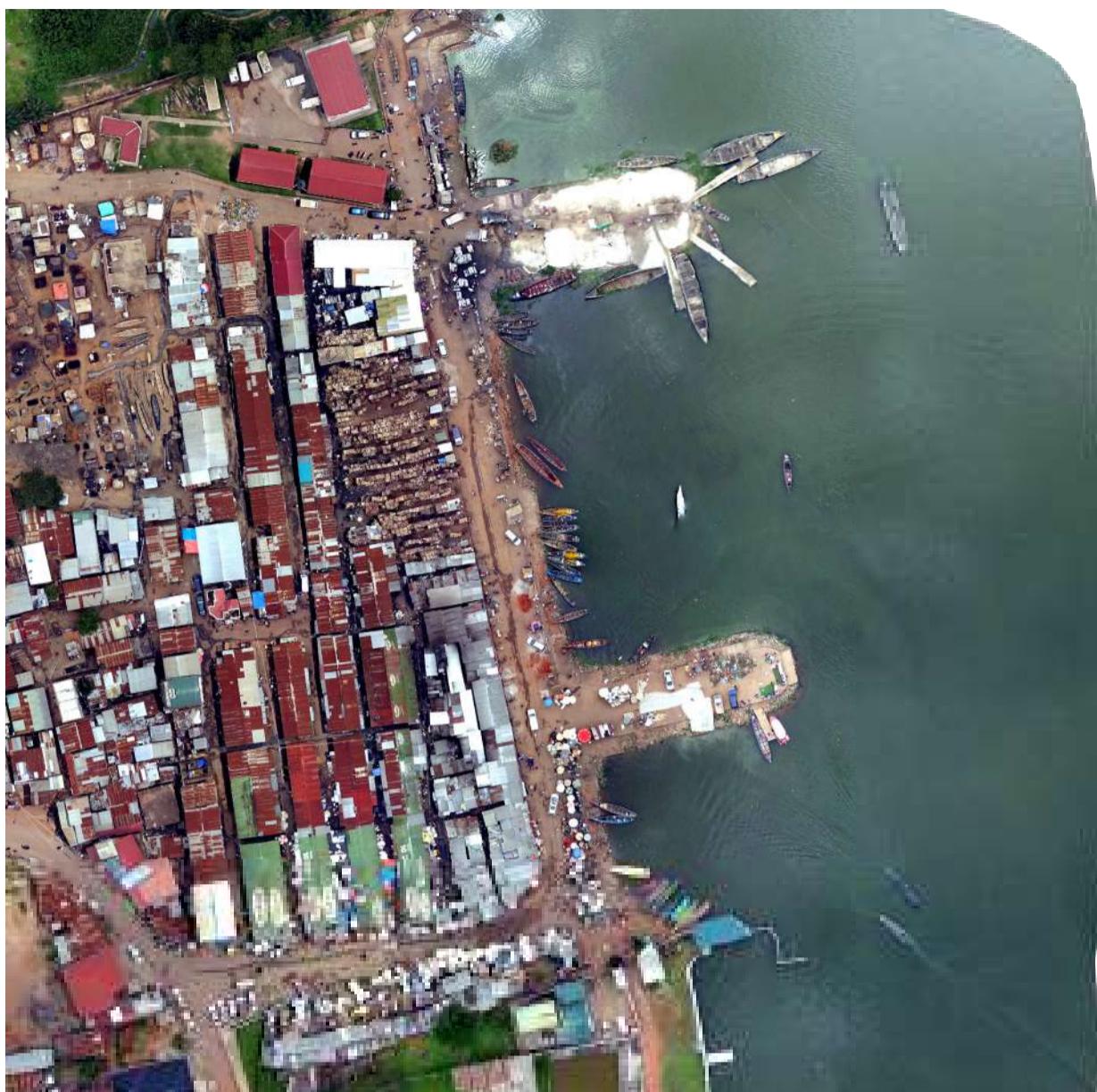
Feature	Count
Buildings	365
Waste disposal	4
Toilets	4
Waterpoints	0
Pharmacies	3
Clinics	10
Schools	3

Feature	Meters
Drains	283.9
Culverts	0



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# AREA 11



Feature	Count
Buildings	314
Waste disposal	1
Toilets	3
Waterpoints	1
Pharmacies	1
Clinics	6
Schools	0

Feature	Meters
Drains	571.5
Culverts	0

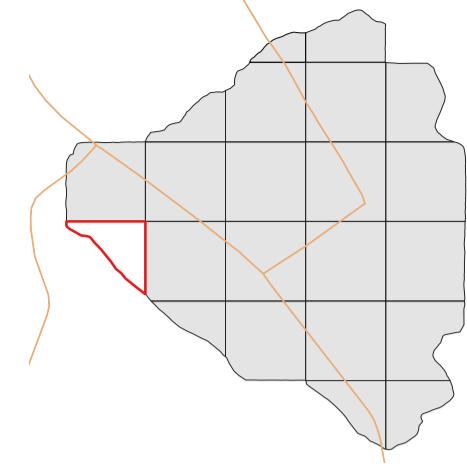


- Building type - Permanent
- Building type - Temporary
- Building type - Not specified
- Ditch
- - - Drain
- Clinic
- Market place
- Place of Worship
- Pharmacy
- Water point
- Public Toilet
- Waste Disposal
- ▲ Drain Begins
- ⊗ Drain Bridge
- ▲ Drain Ends
- ✗ Silt trap
- Lake

0 50 100 Meters

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# AREA 12

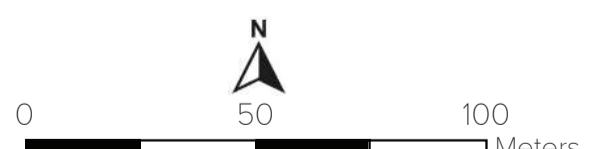


Feature	Count
Buildings	32
Waste disposal	0
Toilets	0
Waterpoints	0
Pharmacies	0
Clinics	0
Schools	0

Feature	Meters
Drains	2.2
Culverts	0

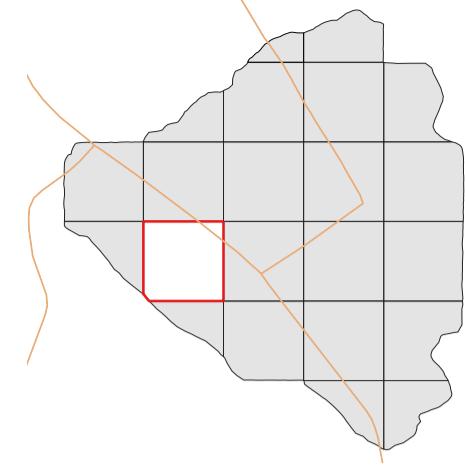


- Building type - Permanent
- Building type - Temporary
- Building type - Not specified
- Ditch
- - - Drain
- Stream
- Wetland



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# AREA 13



Feature	Count
Buildings	448
Waste disposal	7
Toilets	18
Waterpoints	0
Pharmacies	0
Clinics	1
Schools	2

Feature	Meters
Drains	557.6
Culverts	136.9

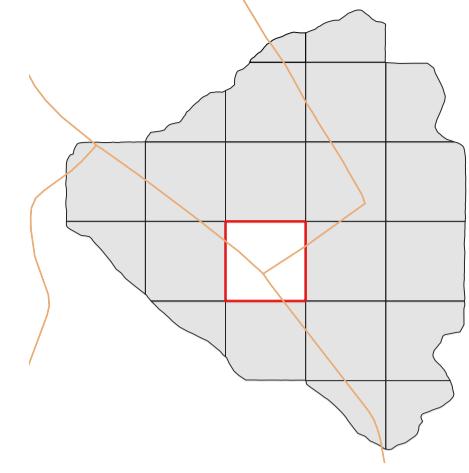


- Building type - Permanent
- Building type - Temporary
- Building type - Not specified
- Culvert
- Ditch
- - - Drain
- Stream
- School
- Clinic
- Public Toilet
- Waste Disposal
- ⊗ Drain Bridge
- ▲ Drain Ends
- × Silt trap
- Wetland

0 50 100 Meters

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# AREA 14



Feature	Count
Buildings	367
Waste disposal	2
Toilets	14
Waterpoints	0
Pharmacies	0
Clinics	4
Schools	0

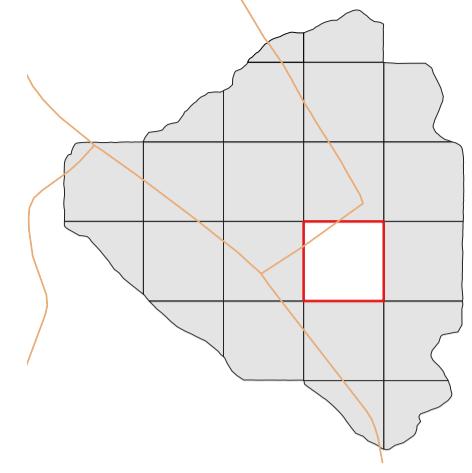
Feature	Meters
Drains	678.9
Culverts	7.6



■ Building type - Permanent  
 ■ Building type - Temporary  
 ■ Building type - Not specified  
 □ Culvert  
 — Ditch  
 - - - Drain  
 + Clinic  
 ☰ Place of Worship  
 ☺ Public Toilet  
 🚮 Waste Disposal  
 ▲ Drain Begins  
 ✕ Drain Bridge  
 △ Drain Ends

N  
 0 50 100 Meters  
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# AREA 15



Feature	Count
Buildings	621
Waste disposal	2
Toilets	21
Waterpoints	4
Pharmacies	0
Clinics	1
Schools	3

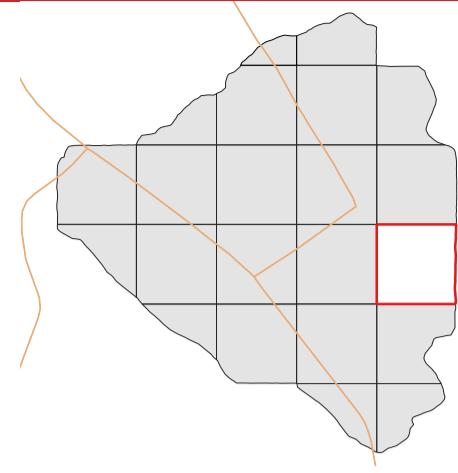
Feature	Meters
Drains	200.6
Culverts	0



0 50 100 Meters

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# AREA 16



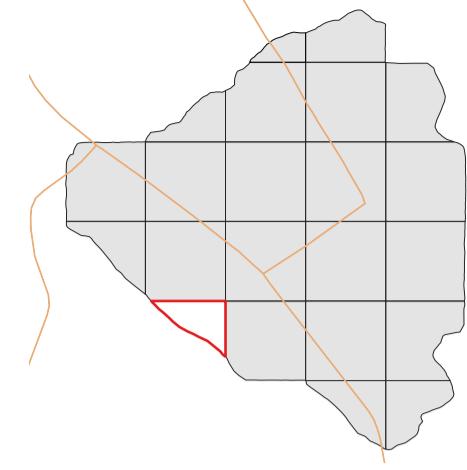
Feature	Count
Buildings	83
Waste disposal	1
Toilets	3
Waterpoints	0
Pharmacies	0
Clinics	0
Schools	0

Feature	Meters
Drains	248.5
Culverts	0



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# AREA 17

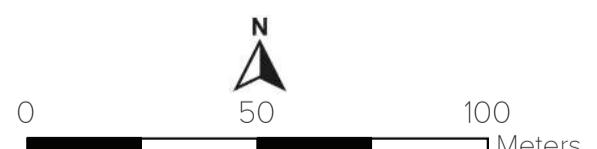


Feature	Count
Buildings	69
Waste disposal	0
Toilets	1
Waterpoints	0
Pharmacies	0
Clinics	0
Schools	1

Feature	Meters
Drains	6.0
Culverts	6.0

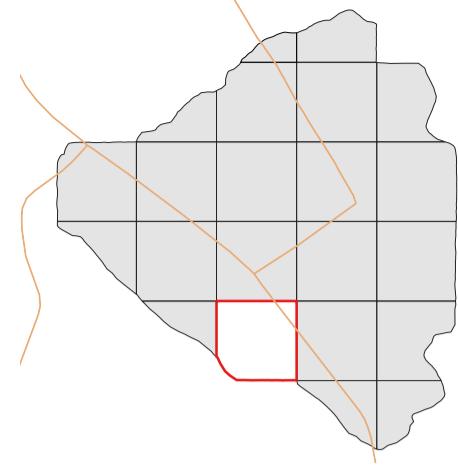


- Building type - Permanent
- Building type - Temporary
- Building type - Not specified
- Culvert
- Ditch
- - - Drain
- Stream
- ⛪ Place of Worship
- 🏫 School
- 🚻 Public Toilet
- ▲ Drain Ends
- Wetland



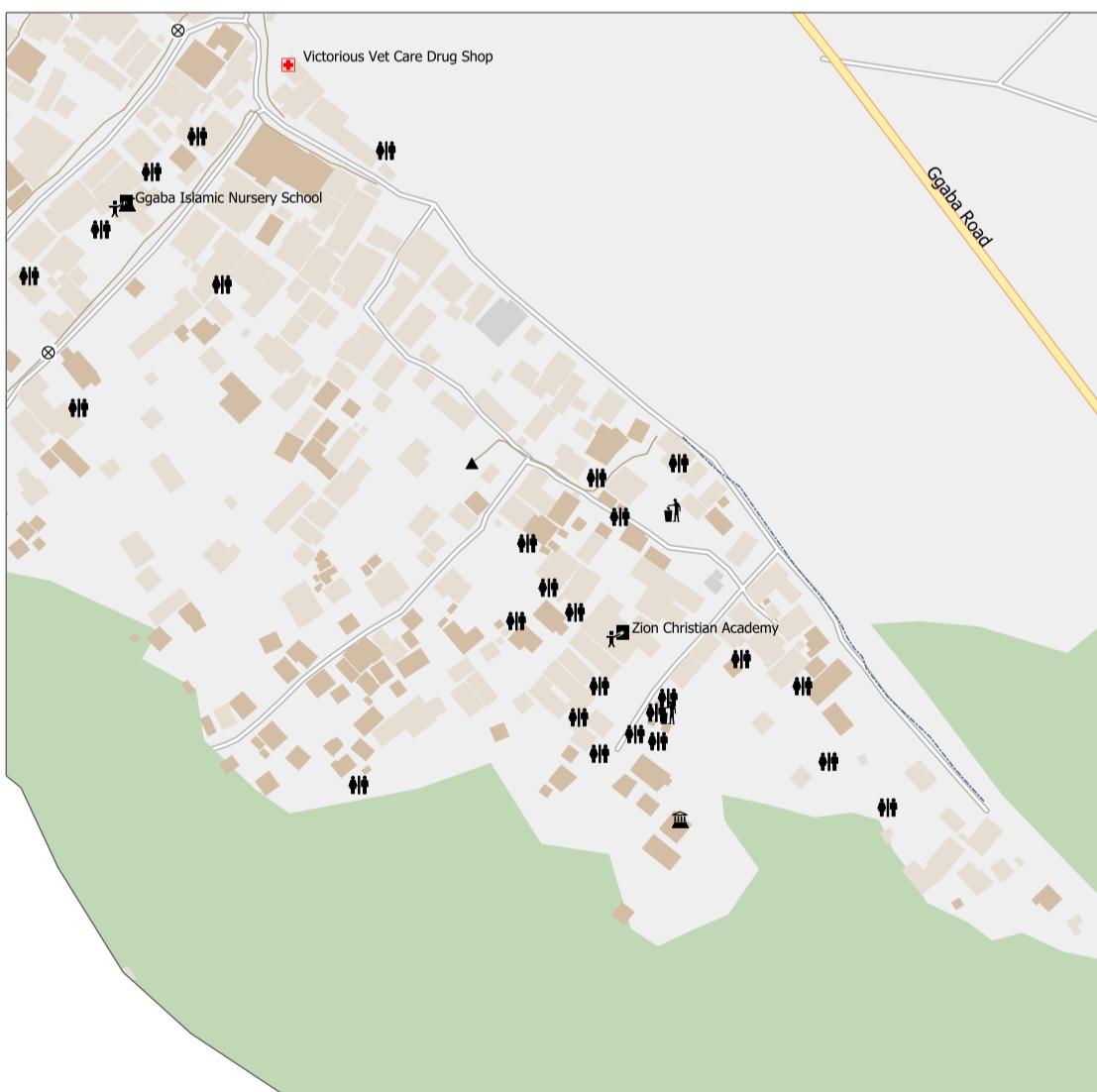
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# AREA 18



Feature	Count
Buildings	316
Waste disposal	2
Toilets	26
Waterpoints	0
Pharmacies	0
Clinics	1
Schools	2

Feature	Meters
Drains	108.4
Culverts	0

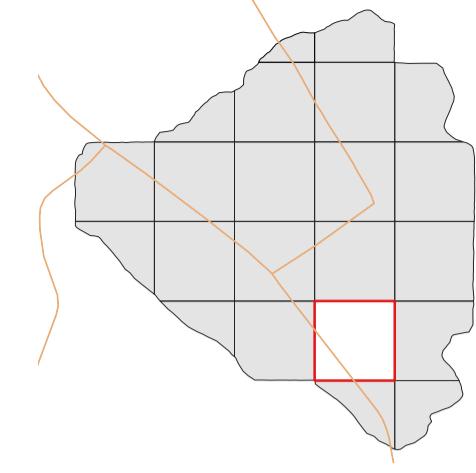


- Building type - Permanent
- Building type - Temporary
- Building type - Not specified
- Ditch
- - - Drain
- Place of Worship
- School
- Public Toilet
- Waste Disposal
- Clinic
- ⊗ Drain Bridge
- ▲ Drain Ends
- Wetland

0 50 100 Meters

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# AREA 19



Feature	Count
Buildings	48
Waste disposal	0
Toilets	0
Waterpoints	0
Pharmacies	0
Clinics	1
Schools	0

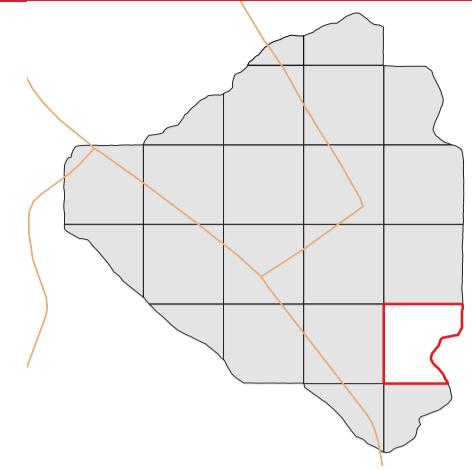
Feature	Meters
Drains	0
Culverts	0



0 50 100 Meters

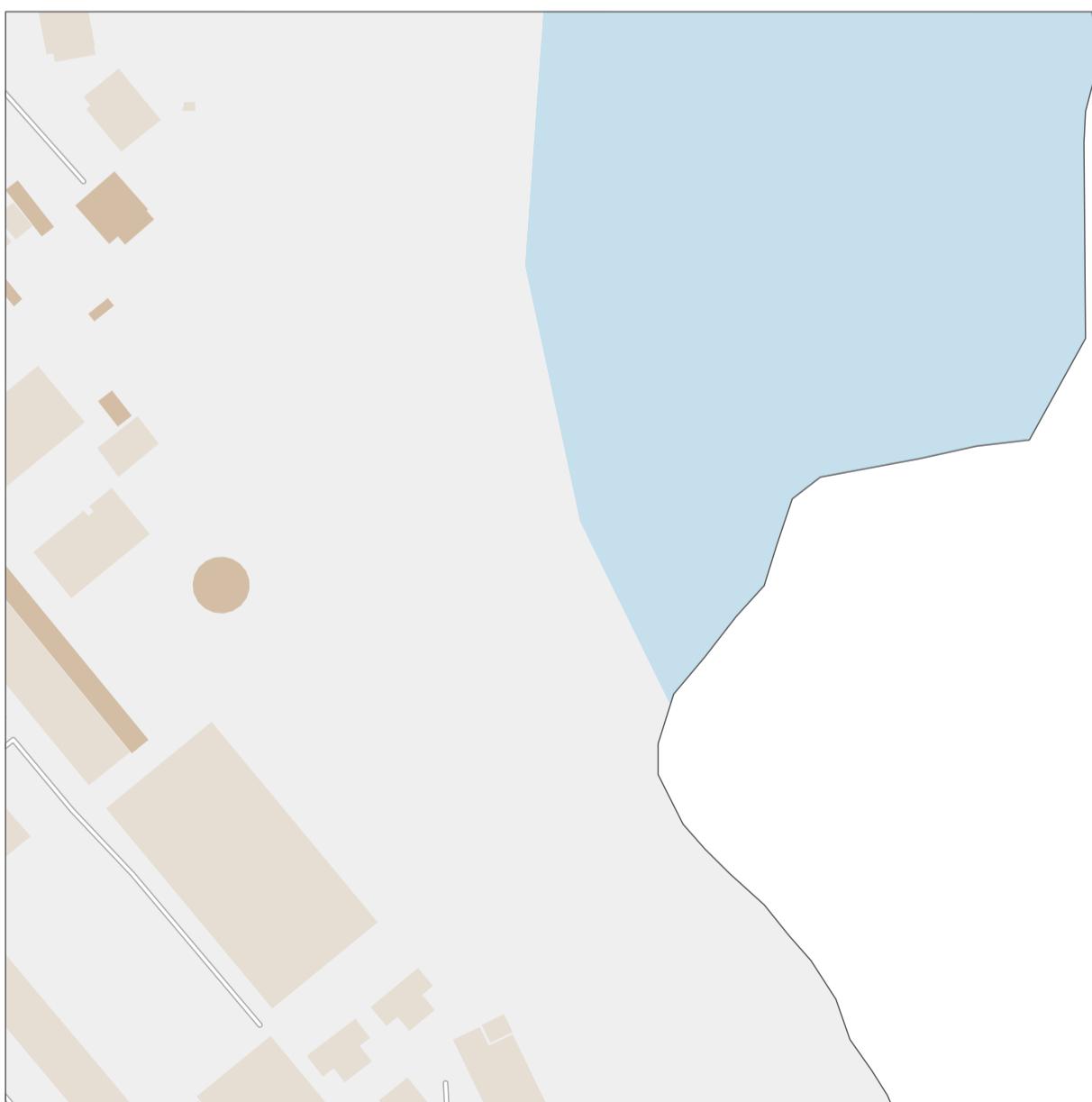
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# AREA20

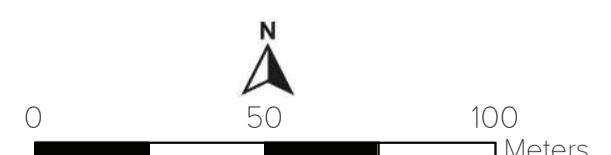


Feature	Count
Buildings	27
Waste disposal	0
Toilets	0
Waterpoints	0
Pharmacies	0
Clinics	0
Schools	0

Feature	Meters
Drains	0
Culverts	0

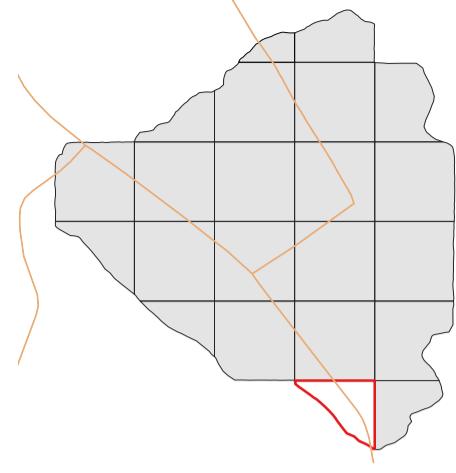


Building type - Permanent  
Building type - Temporary  
Lake



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# AREA 21

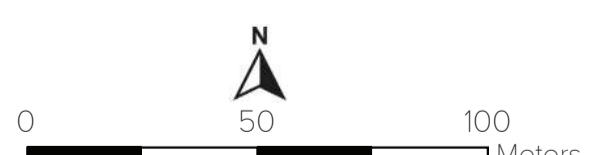


Feature	Count
Buildings	1
Waste disposal	0
Toilets	0
Waterpoints	0
Pharmacies	0
Clinics	0
Schools	0

Feature	Meters
Drains	0
Culverts	0

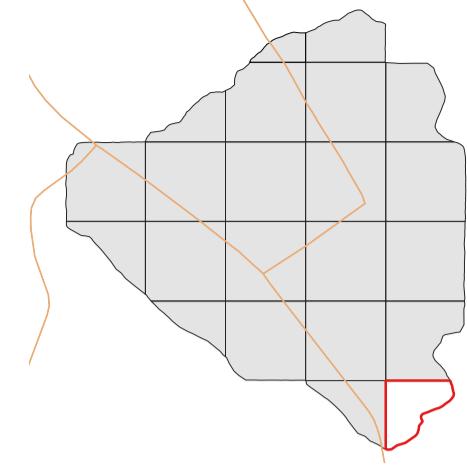


Building type - Permanent  
Wetland



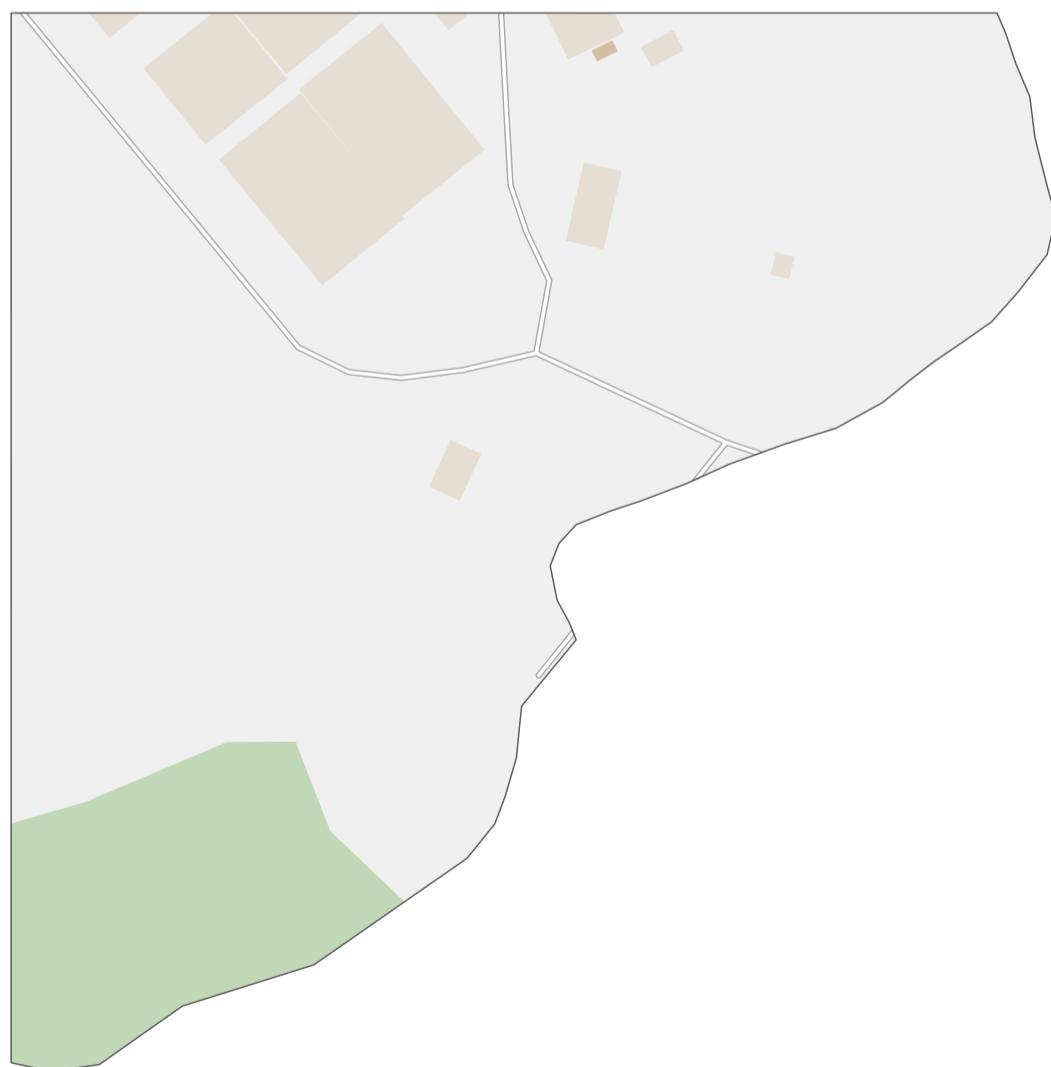
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# AREA 22

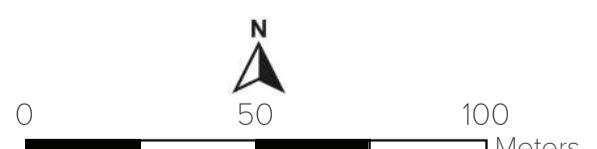


Feature	Count
Buildings	13
Waste disposal	0
Toilets	0
Waterpoints	0
Pharmacies	0
Clinics	0
Schools	0

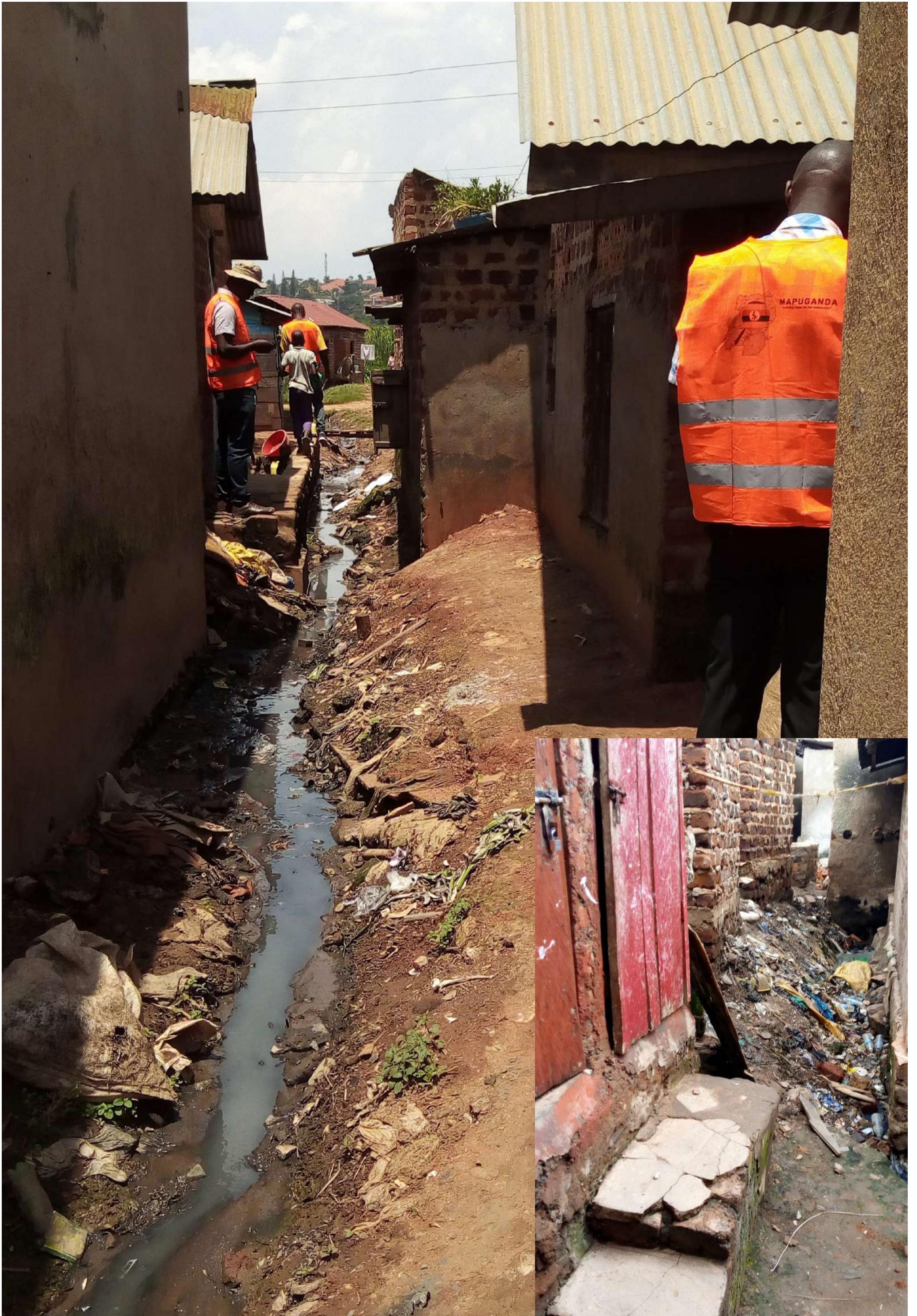
Feature	Meters
Drains	0
Culverts	0



Building type - Permanent  
Building type - Temporary  
Wetland



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Intrepid UOM surveyors know their neighbourhood and its problems.



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