

Geodata Collection and Analysis for Empowering Women in Turkana

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Science for [life]



Co-funded by
the European Union

Schedule

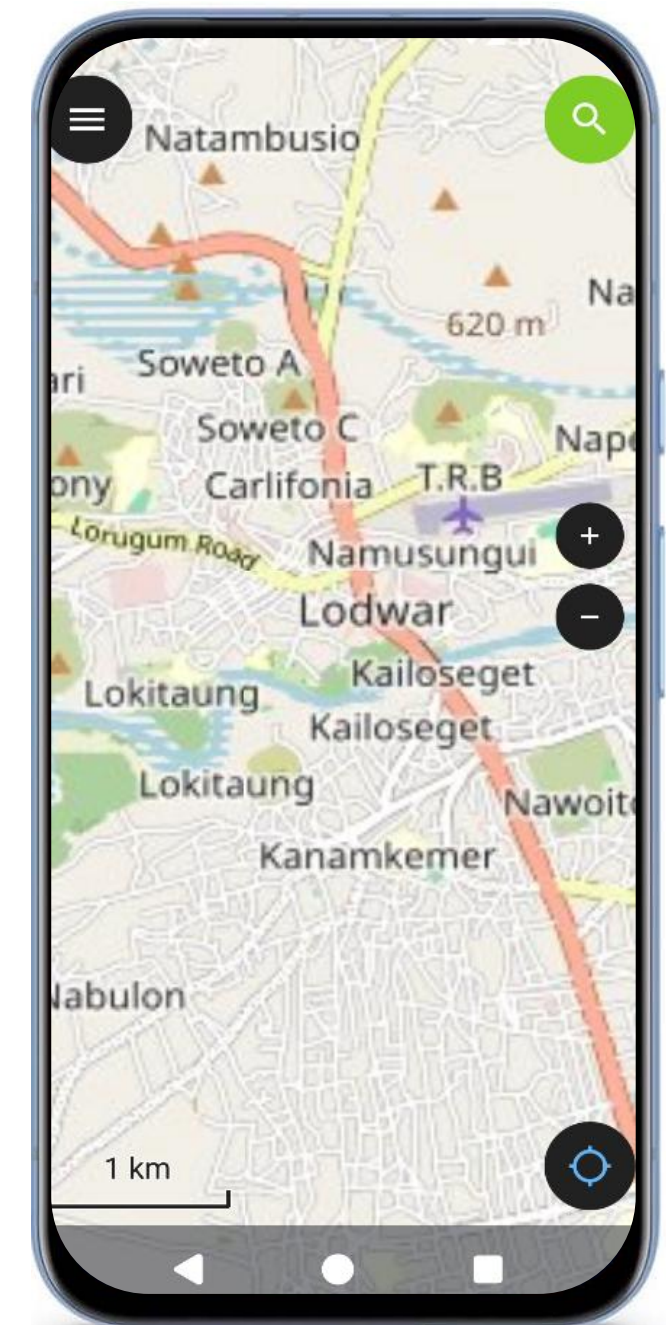
	September 25, 2025	September 26, 2025
9:00 – 10:15	Introduction to GIS	Data collection in the field
10:30 – 12:00	Visualisation of geodata	Editing data
<i>Lunch break</i>		
13:00 – 14:45	Data management and coordinate systems	Data analysis
15:00 – 17:00	Data acquisition	Map production

Day 2: QField for data acquisition in the field

Science for [life]

QGIS and QField

- **Objective:** Data collection in the field with a mobile device
- **Workflow**
 - Prepare a QGIS project and create a QField package
 - Copy the QField package to the mobile device
 - Collect data in the field
 - Copy the modified data back to the desktop computer
 - Synchronize the modified data with the original database or files



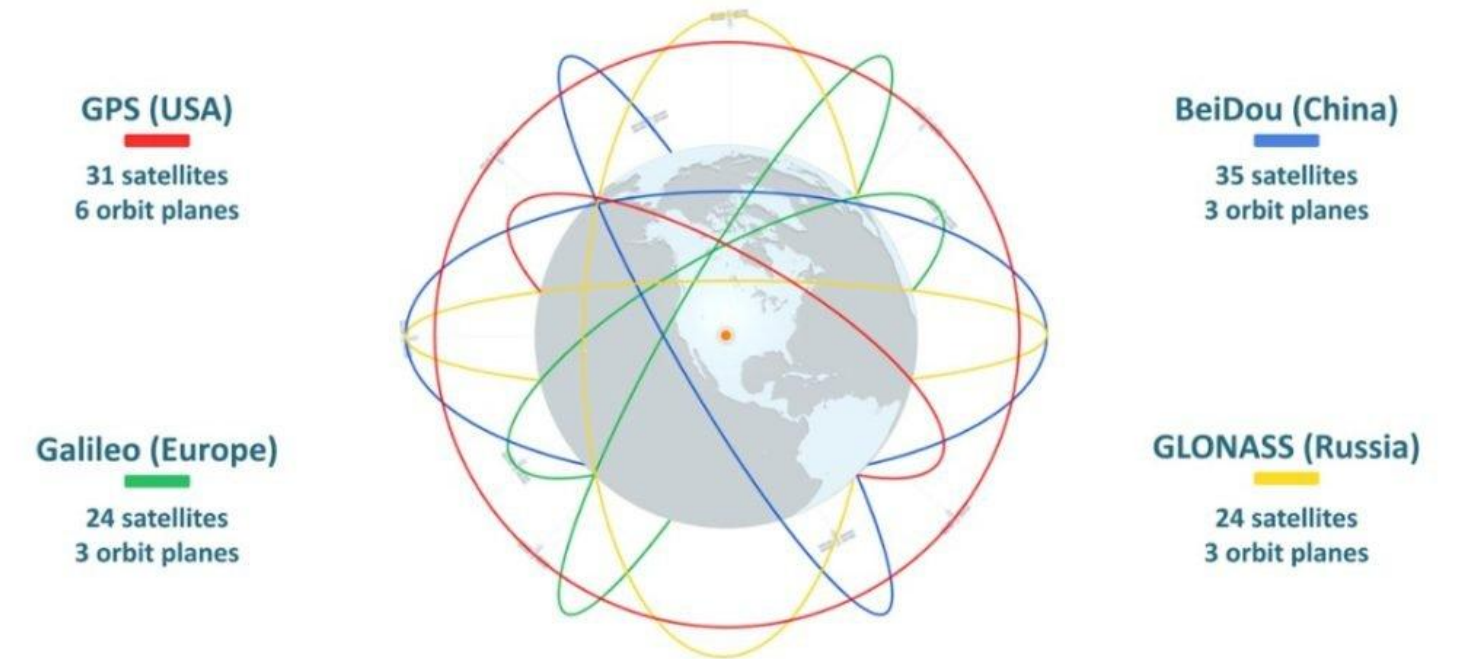
Positioning

- **Global Navigation Satellite Systems (GNSS)**

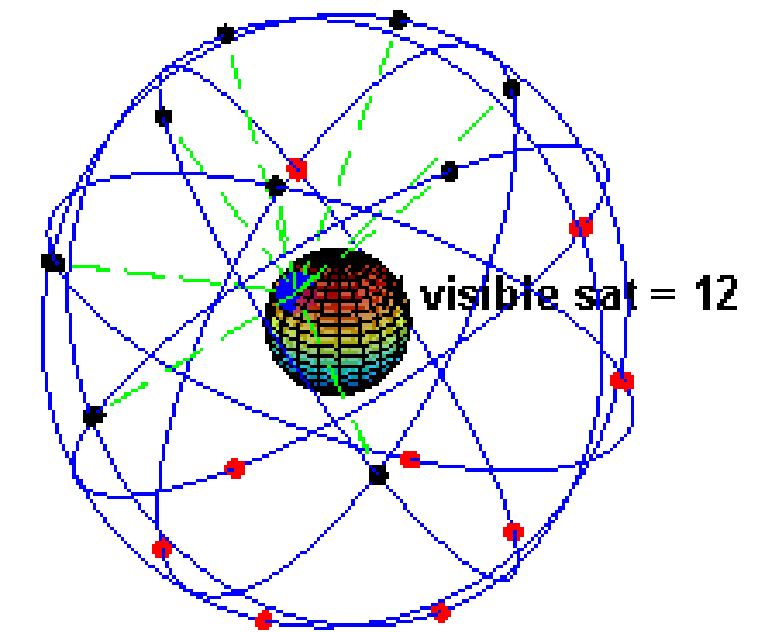
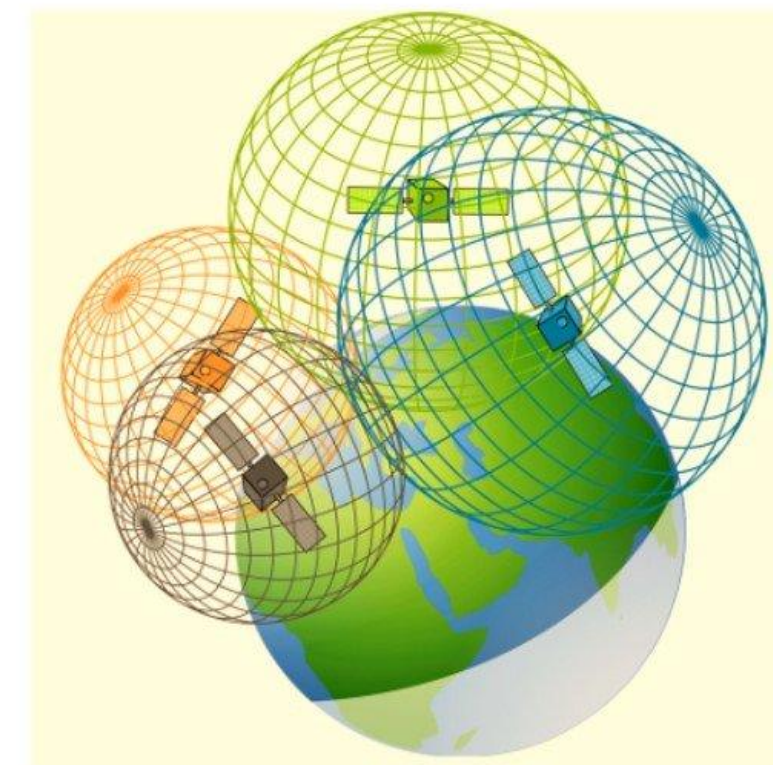
Idea:

Satellites orbit the Earth on known orbits. The position of a point on Earth is calculated by measuring the distance to the satellites. The time it takes for the signal to travel from the satellite to a receiver is measured.

By using information from at least four satellites, the receiver performs trilateration to calculate its precise latitude, longitude, altitude, and time, triangulating its position on Earth.



<https://inertiallabs.com/gnss-and-satellite-navigation-explained/>

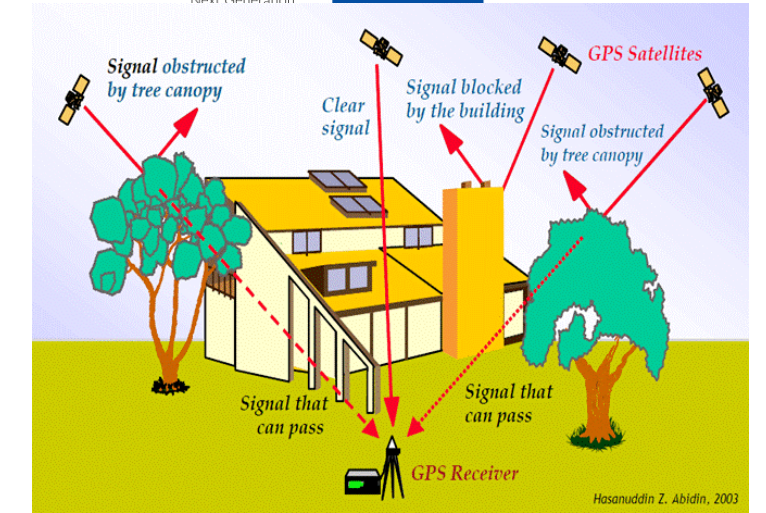


<https://inertiallabs.com/gnss-and-satellite-navigation-explained/>

Positioning

- Limitations:**

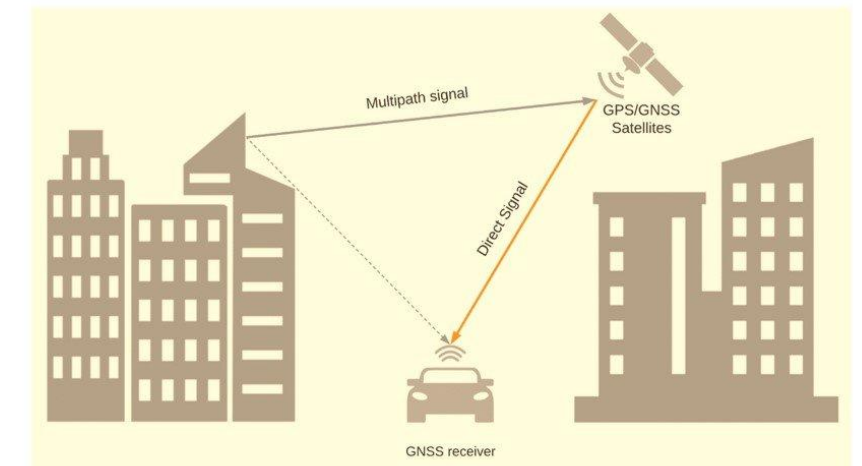
Factors limiting GNSS accuracy include signal obstruction (from buildings, trees), multipath interference (signals bouncing off surfaces), atmospheric conditions (ionospheric and tropospheric delays), poor satellite geometry (insufficient number or poor alignment of visible satellites), receiver quality, and potential intentional interference like jamming or spoofing.



https://www.researchgate.net/figure/illustration-of-obstruction-eg-tress-canopy-building-and-interference-to-GNSS-signal_fig1_332943025

- Accuracies**

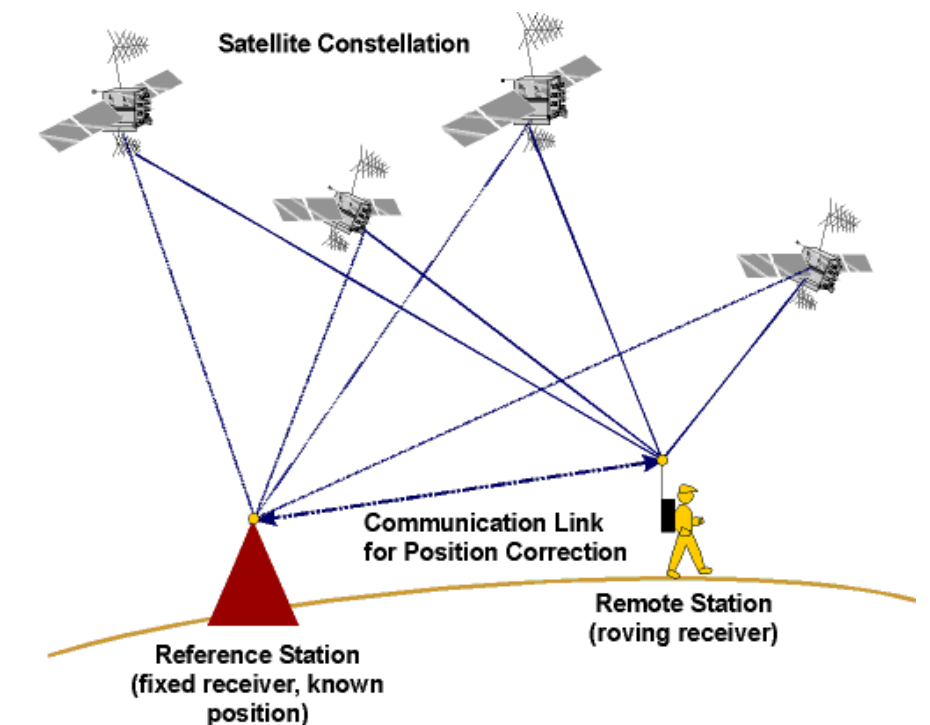
Standard GNSS receivers in mobile phones have accuracies of 2-10 meters outdoors under ideal conditions. Factors like the number of visible satellite systems, signal strength, and the device's internal sensors, such as its Inertial Measurement Unit (IMU), influence accuracy. More advanced techniques like Precise Point Positioning (PPP) and the use of raw GNSS data are improving smartphone accuracy, sometimes to the centimeter level for static measurements.



<https://inertialabs.com/gnss-and-satellite-navigation-explained/>

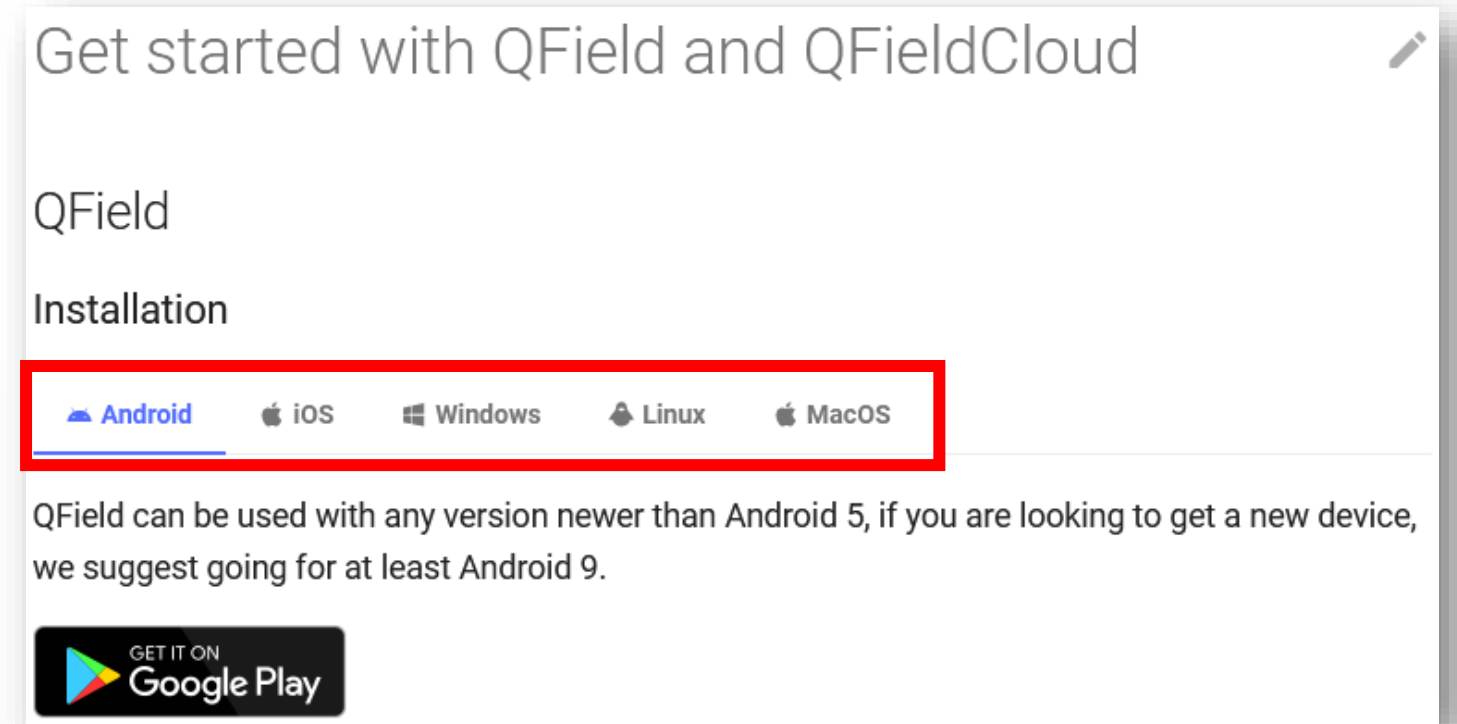
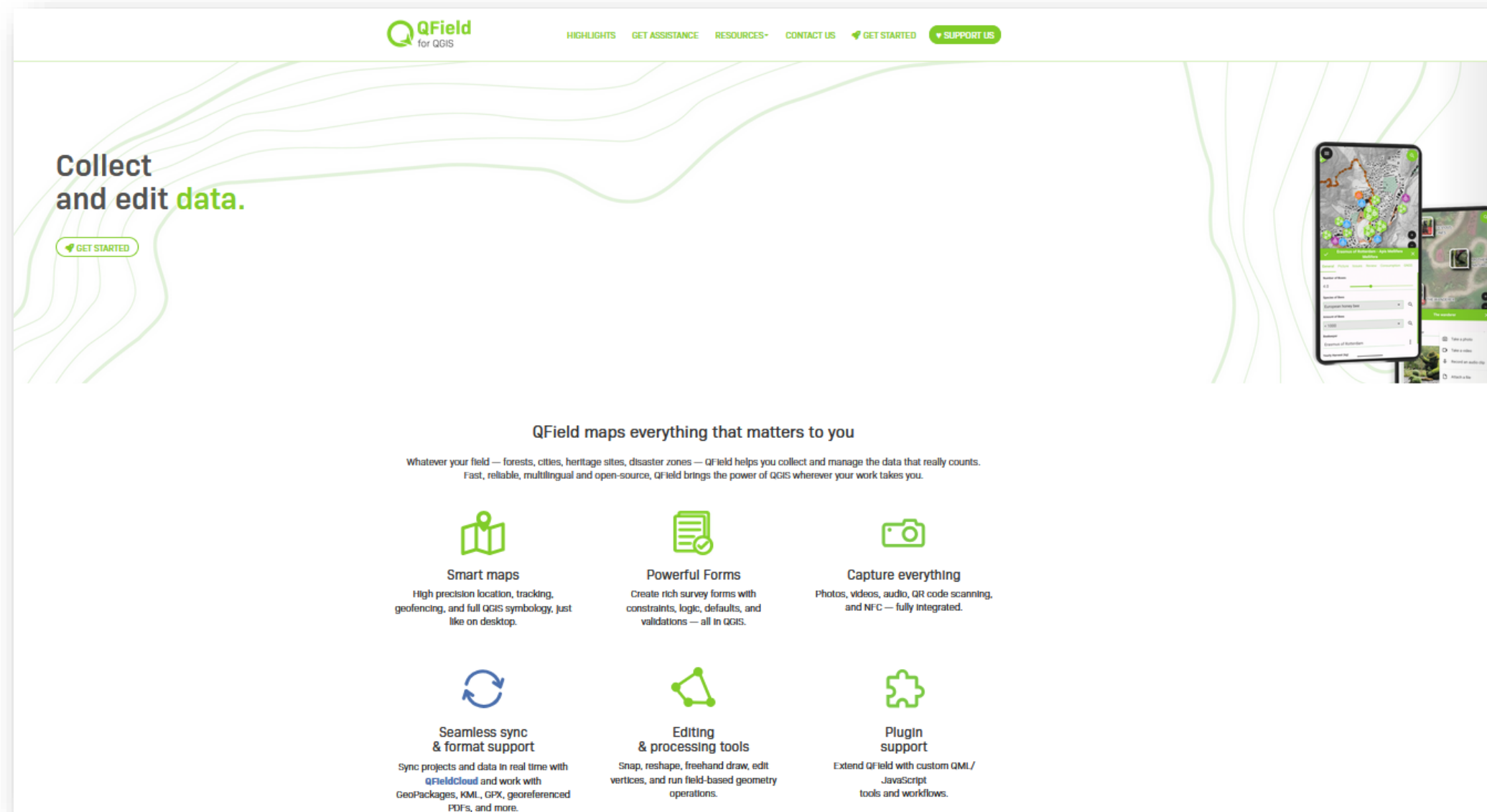
- Enhancement:**

Differential GNSS: working with correction signals.



QField

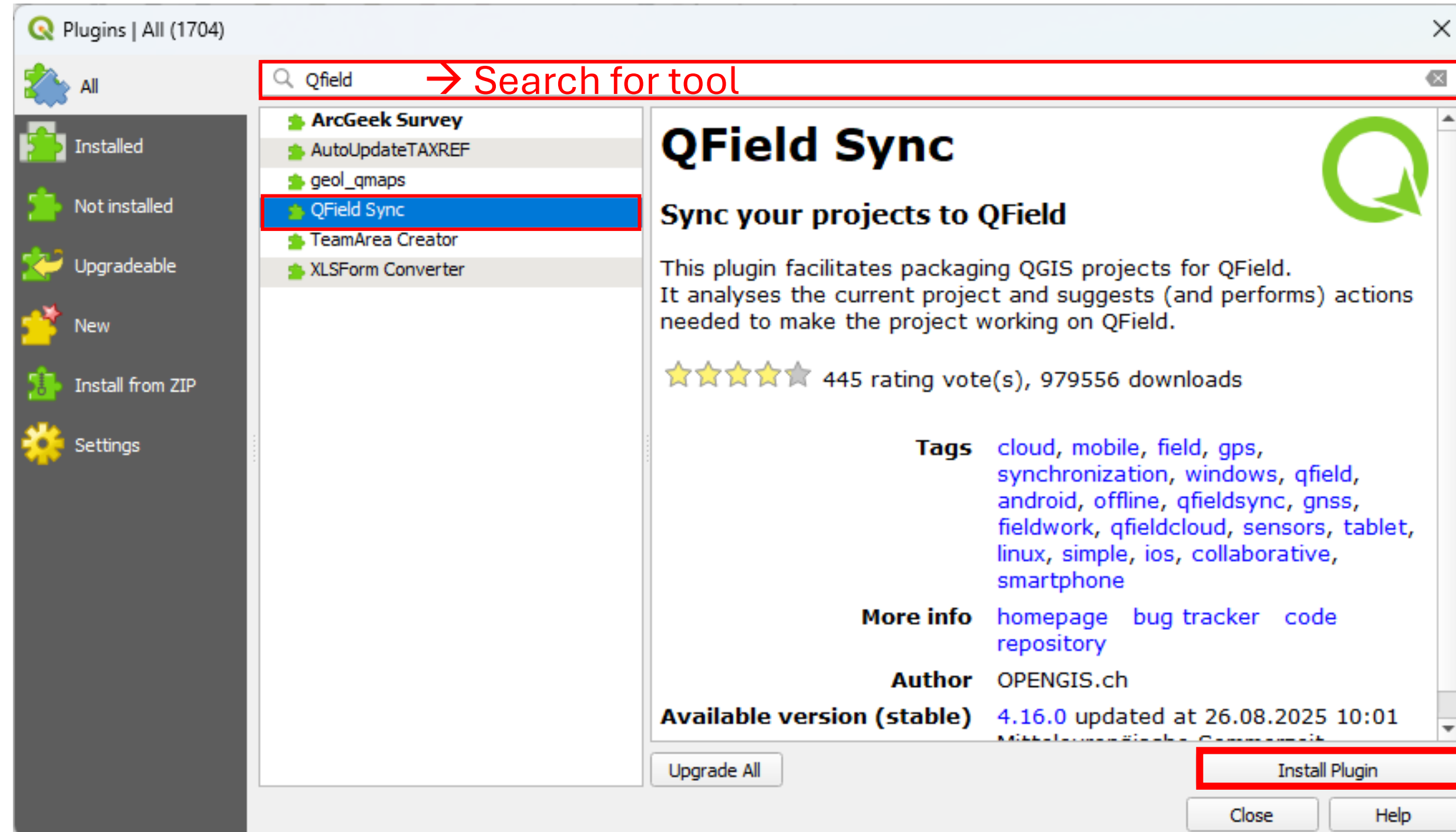
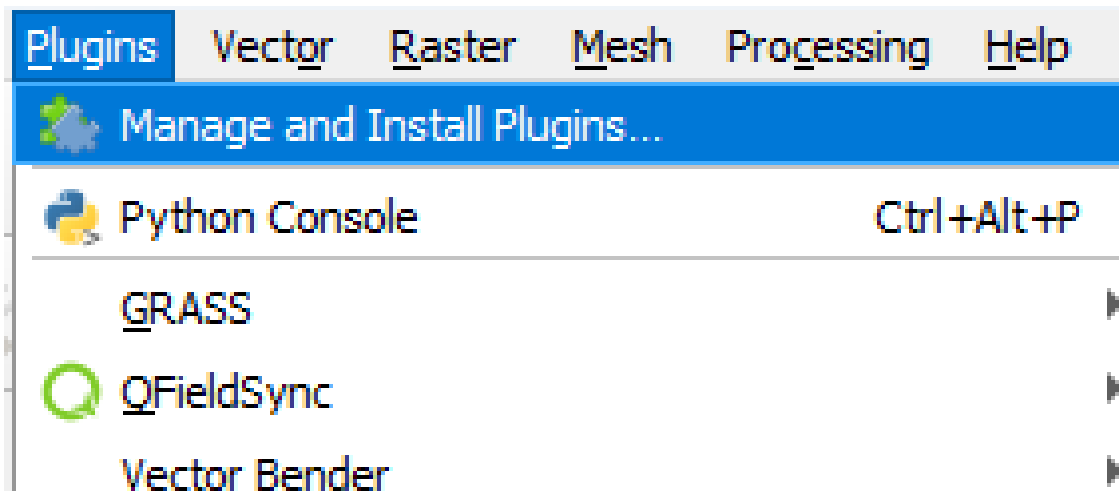
<http://qfield.org>



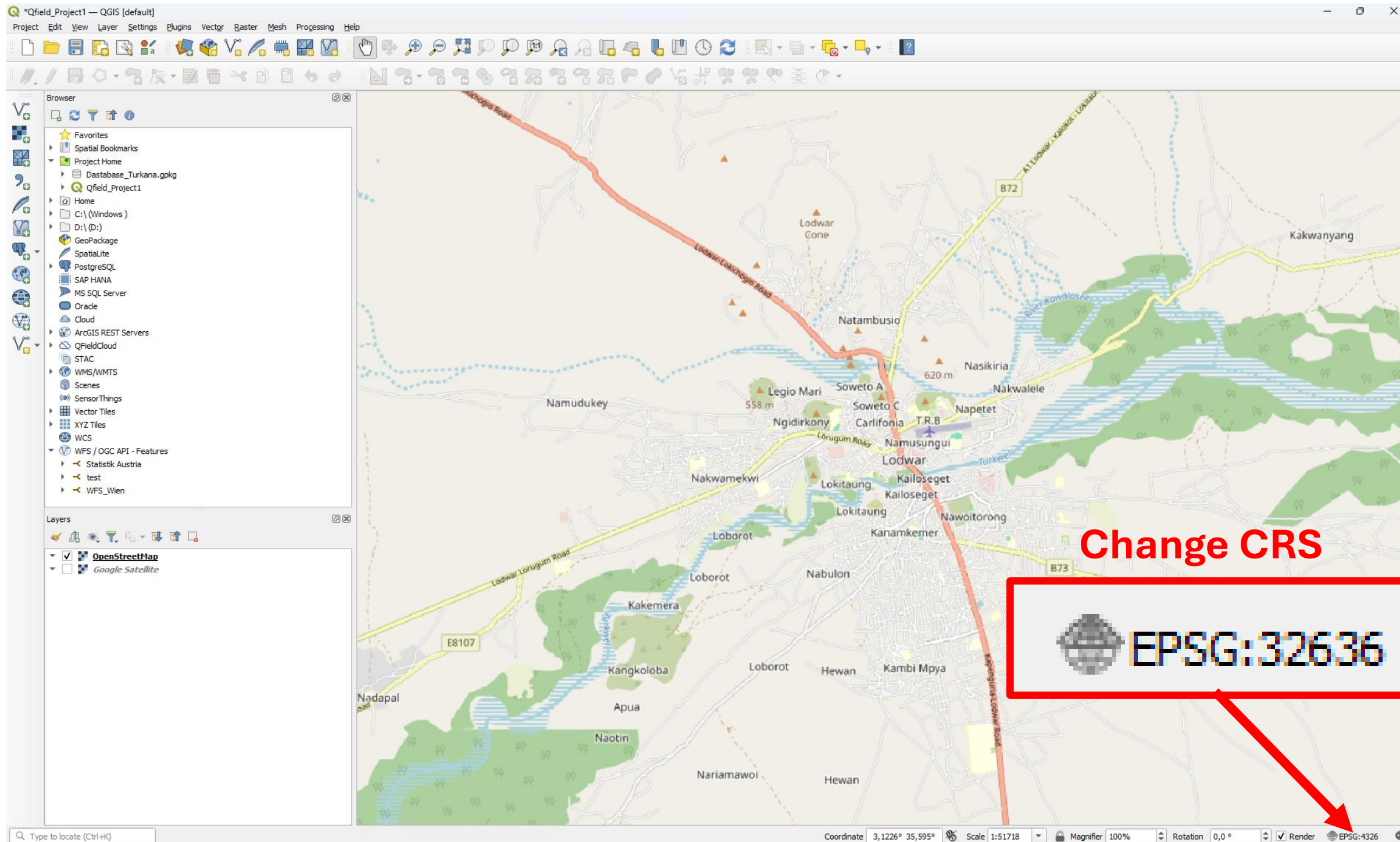
https://vimeo.com/695452246?embedded=true&source=vimeo_logo&owner=36168865

QGIS

- Plugin required



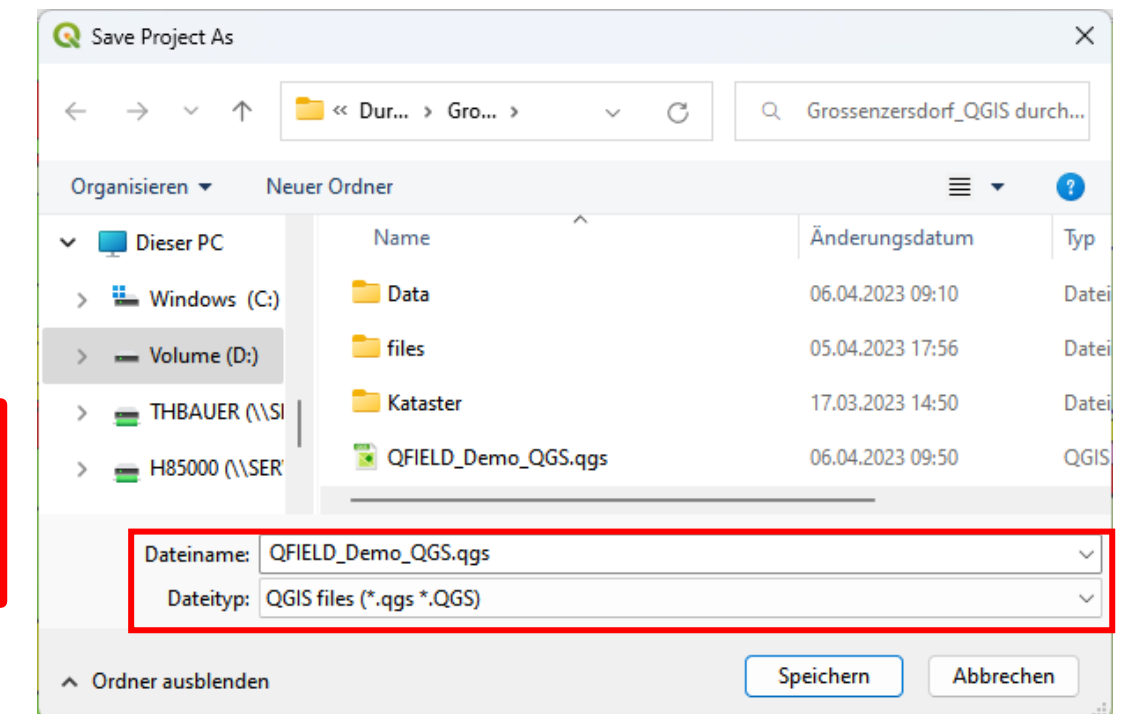
QGIS



Content (example):

- XYZ-Tiles: Google, OpenStreetMap
- Area of investigation
- Point, line, polygon data

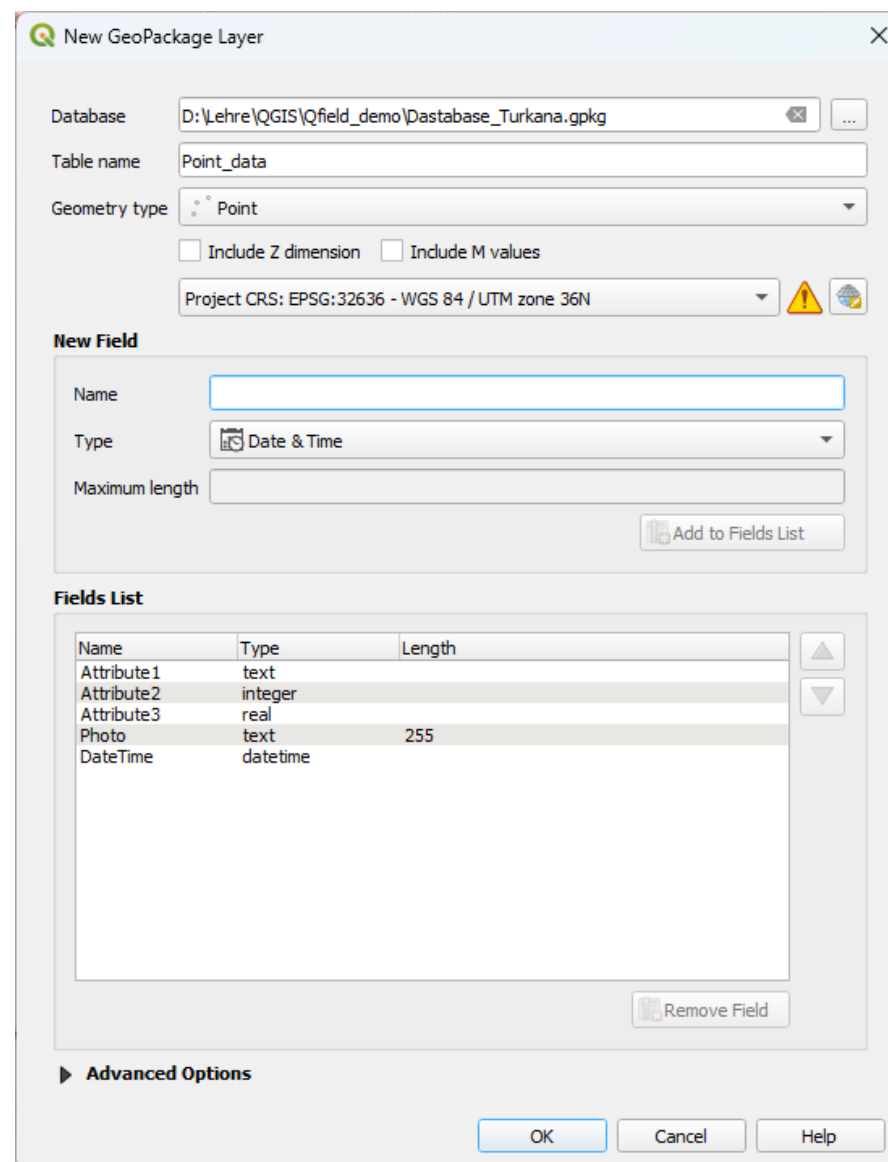
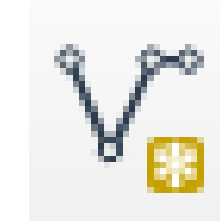
Save as .qgs



→ Save all files to one folder

QGIS

- **Definition of a layer for data acquisition in the field**
 → New Shape-File or GeoPackage

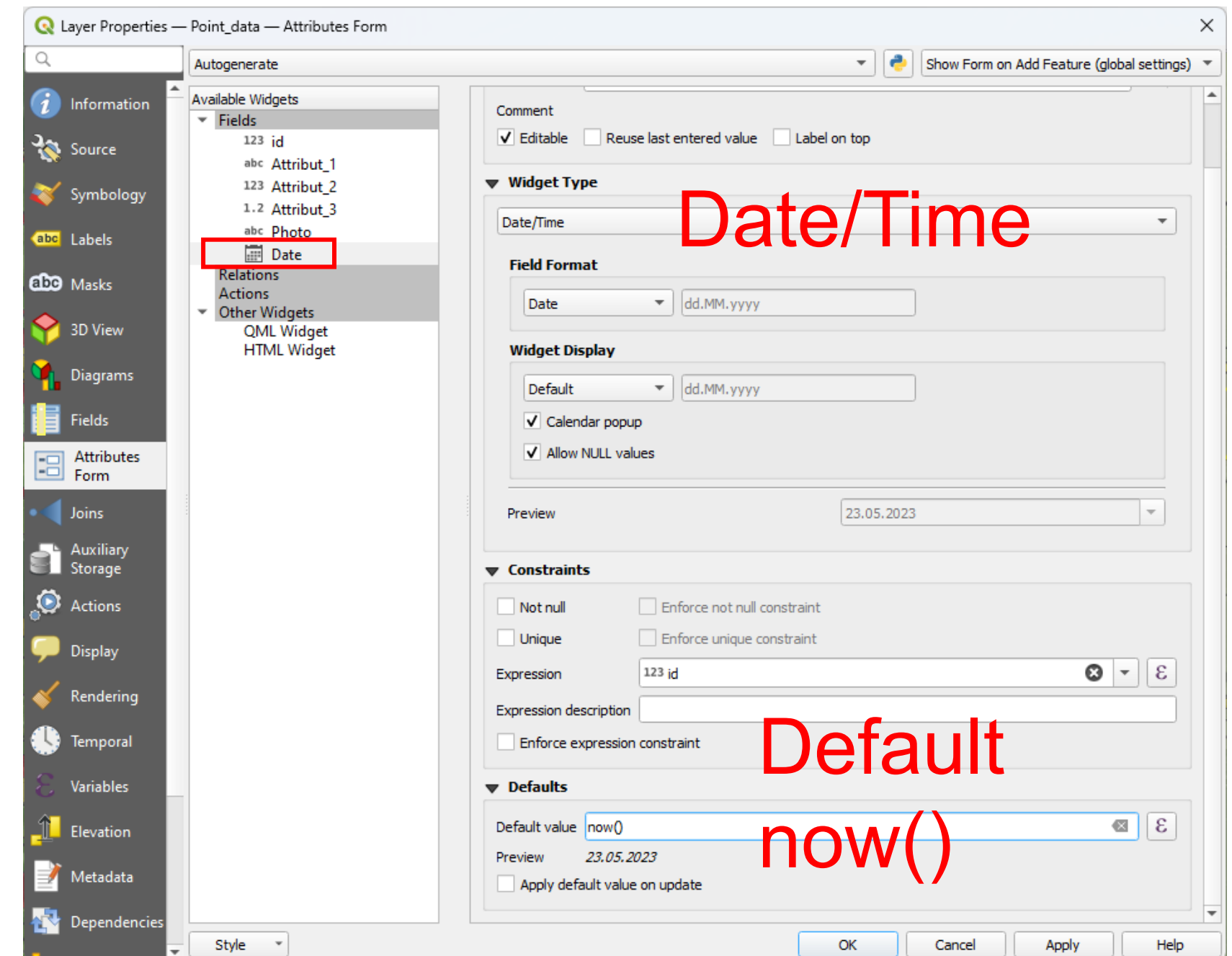
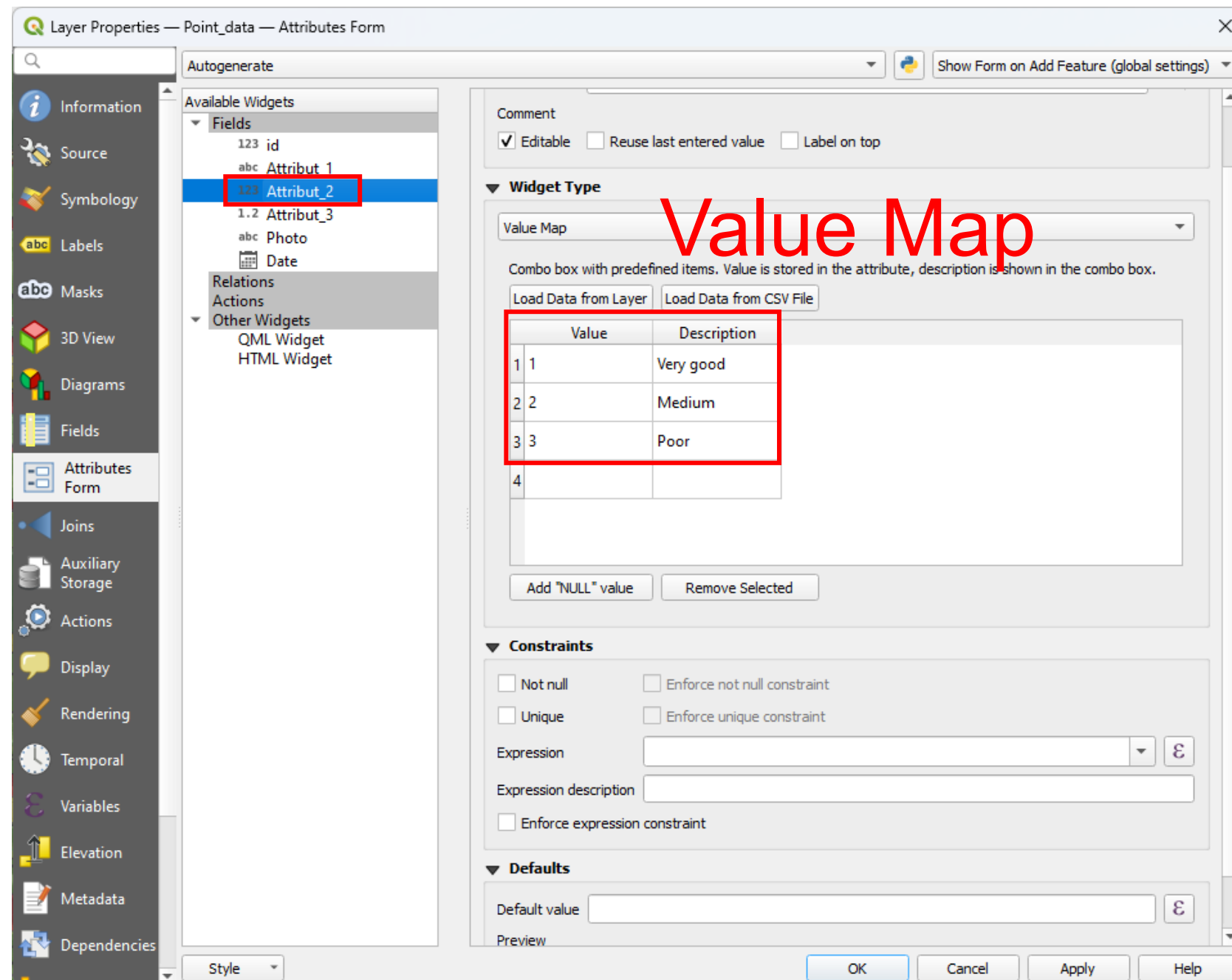


*Example:
 Attributes can be saved as Text,
 Integer, Decimal or Date*

*Photo: String (text) with length ~200
 to store even the full path*

QGIS

- **Attribute Forms: Pre-definition of values**



QGIS

- **Attribute Forms: Pre-definition of values**

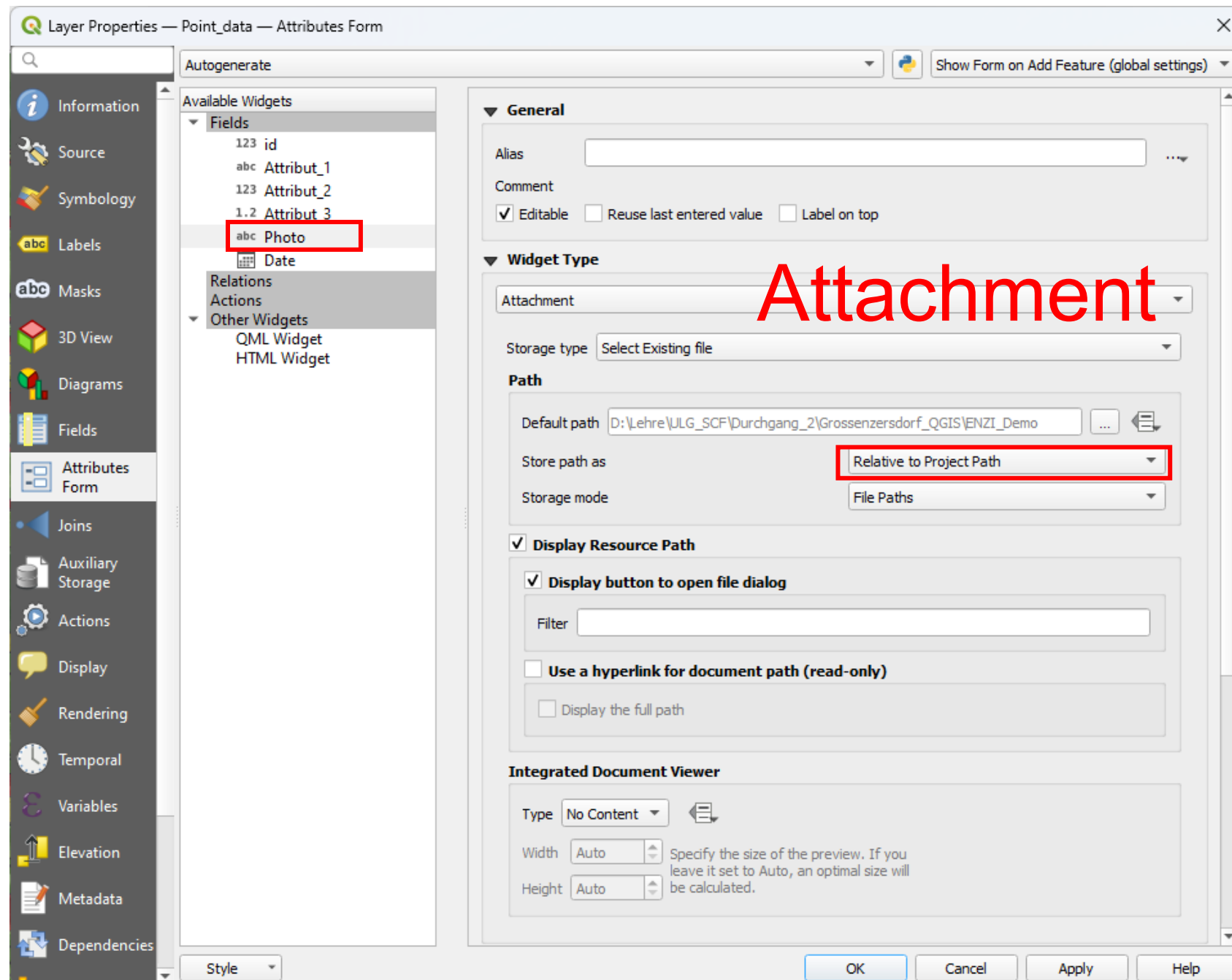
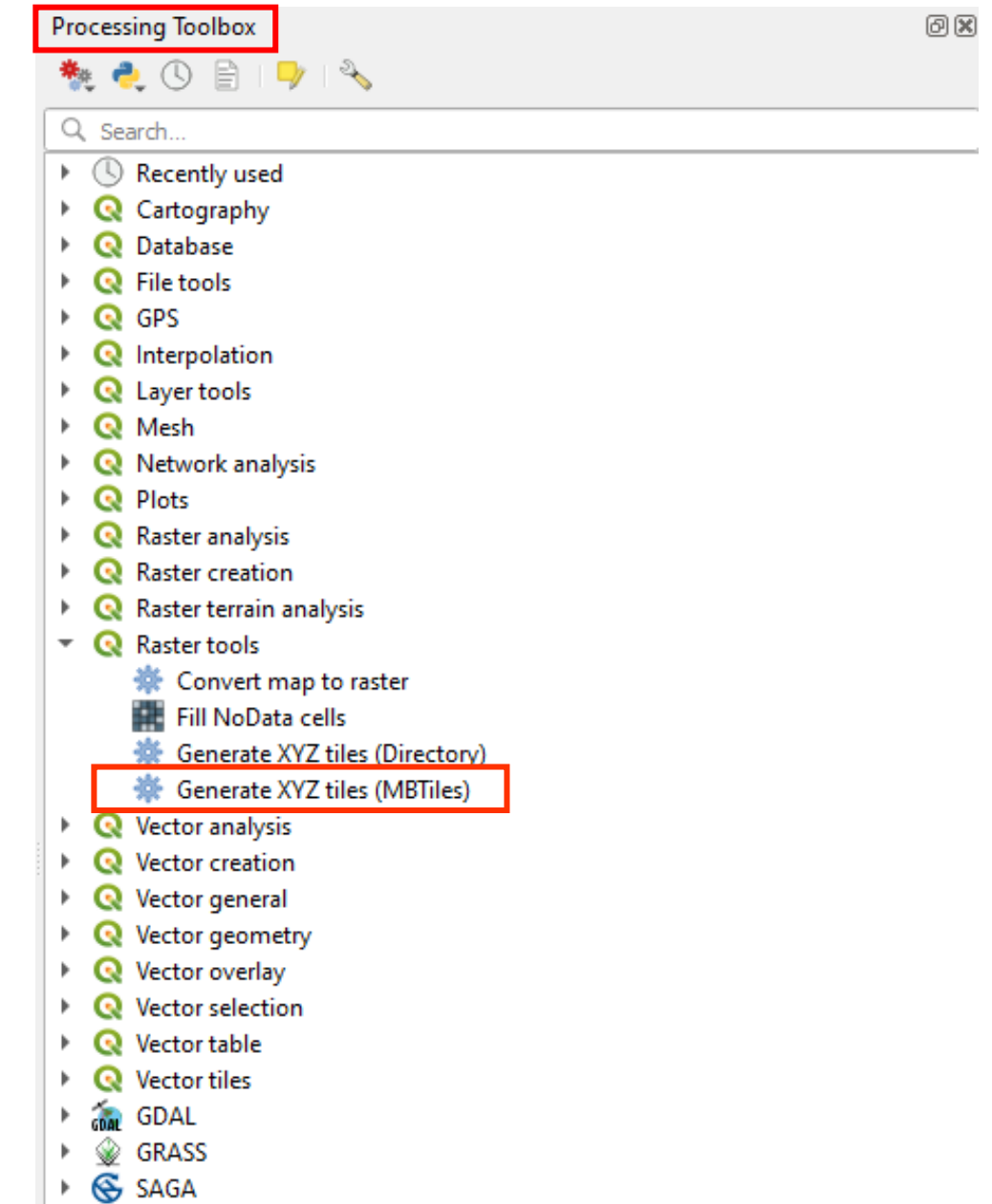
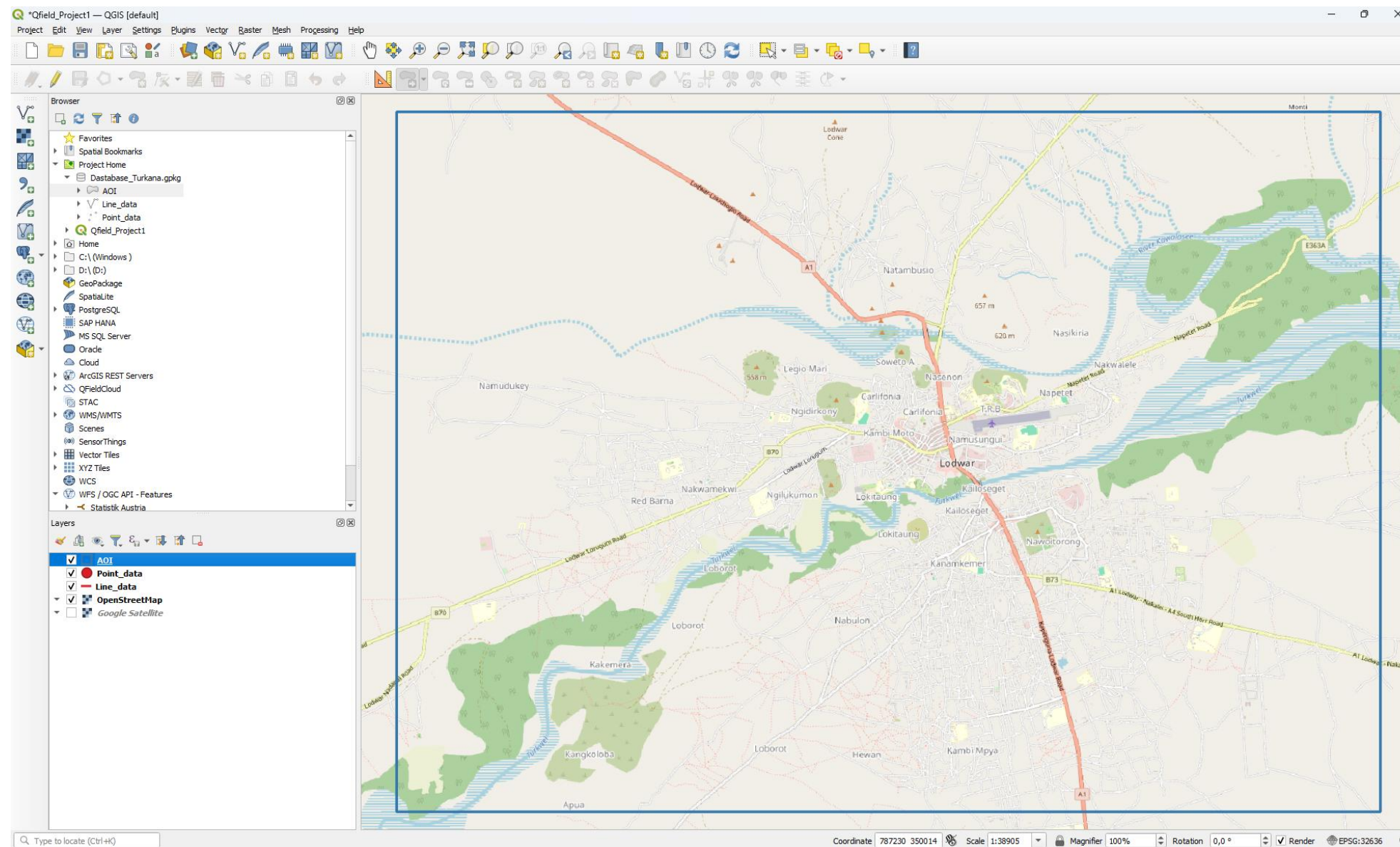


Photo in the field: save as „Attachment“ (Field type: text)

QGIS

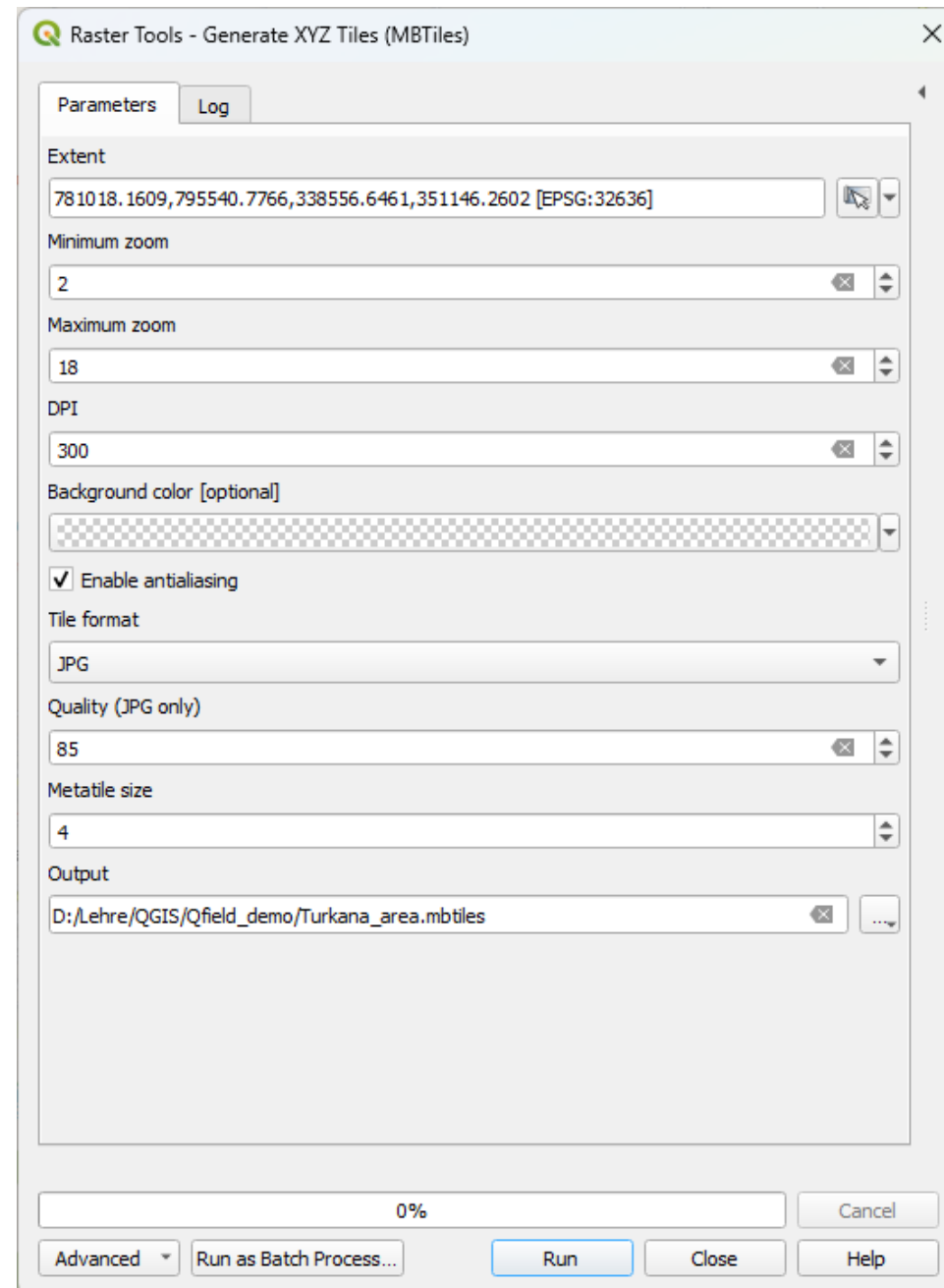
- **Basemaps in QField:** online (XYZ-Tiles,WMTS) or offline (various raster formats)

Offline: create MBTiles from WM(T)S



QGIS

- **MBTiles:** all visible layers will be converted

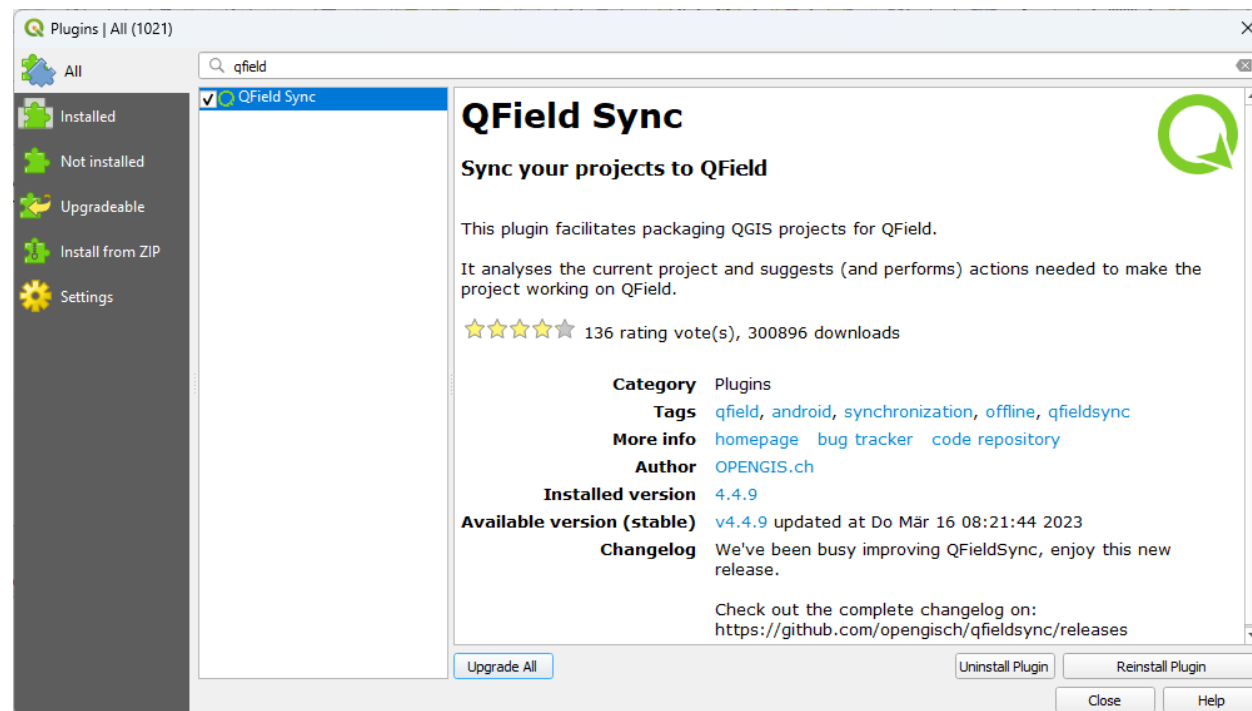


Extent: use option „Draw on Map Canvas“
Minimum zoom: 2
Maximum zoom: 18
DPI: 300
Tile format: JPG
Quality: 85
Output file: name.mbtiles

Qfield: in case of problems with MBTiles
→ Save MBTiles as TIFF
→ Load TIFF to main project

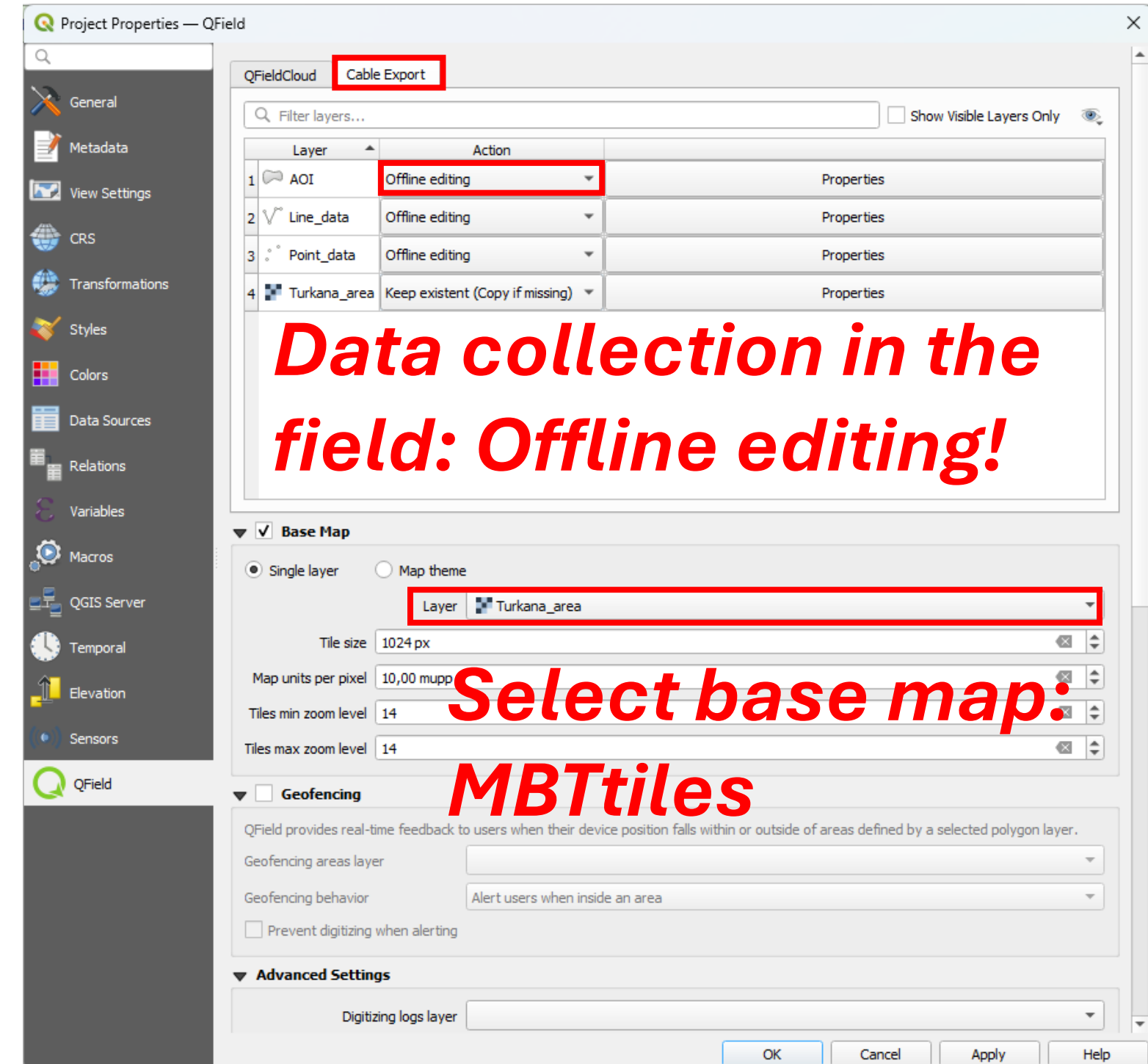
QGIS

- **Synchronisation** of data with mobile device (Plugin)



Toolbar:

QFieldCloud: registration required
Cable Export: via USB



QGIS

- **Package for QField:** all data will be copied to a new directory → first remove unwanted layers from the QGIS-project



Folder on PC:

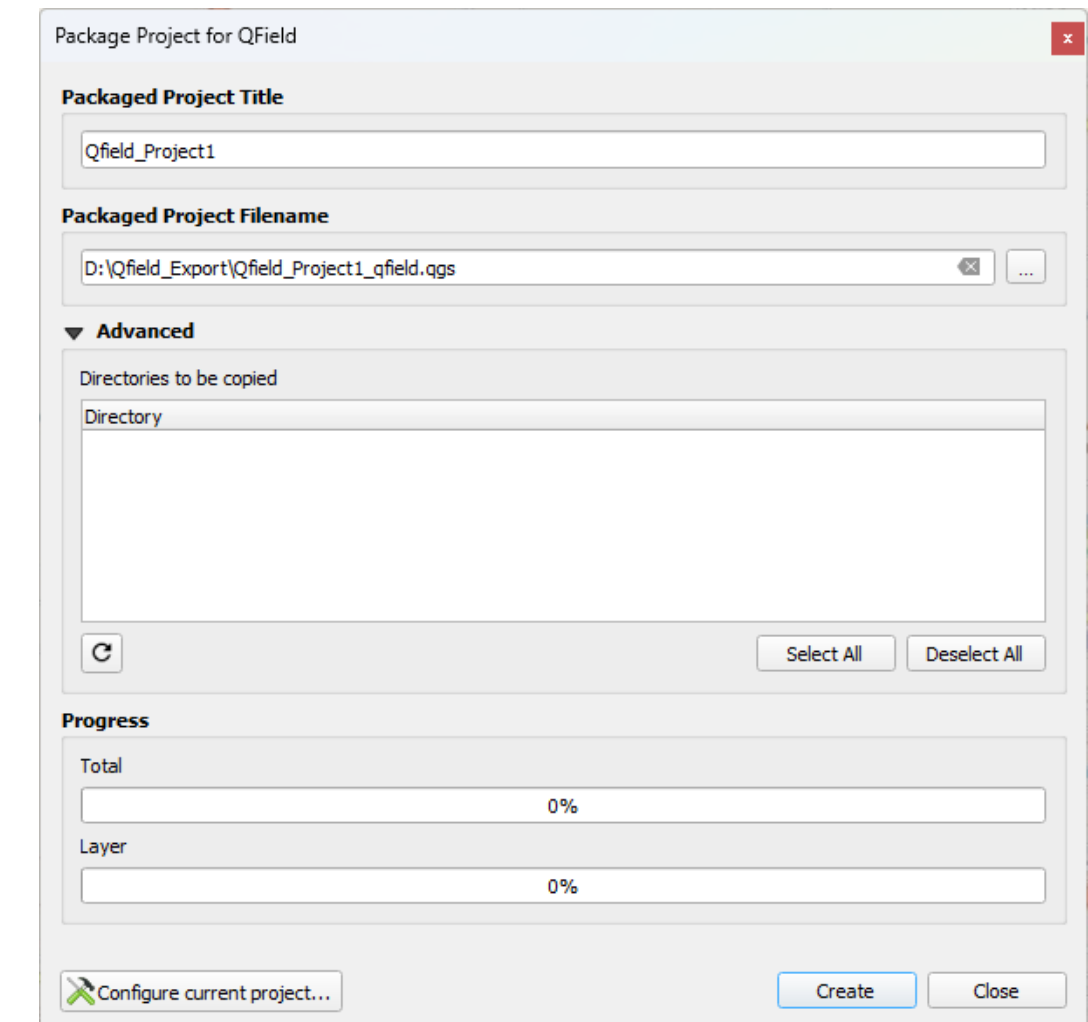
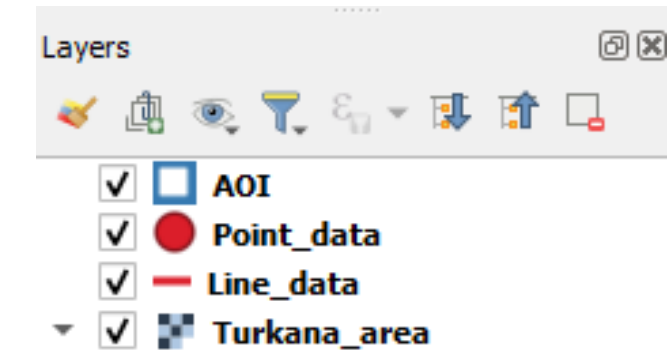
- Qfield_Export
- Qfield_Import

Folder on mobile:

- Export_from_mobile
- Import_to_mobile

Recommendation: think about a useful folder structure for import and export!

- **Copy the resulting folder to the mobile device!**
- **Check if „offline-editing“ data are copied properly**
- **In case of missing data, copy manually!**
- **QGIS Document .qgs is an „offline-project“**

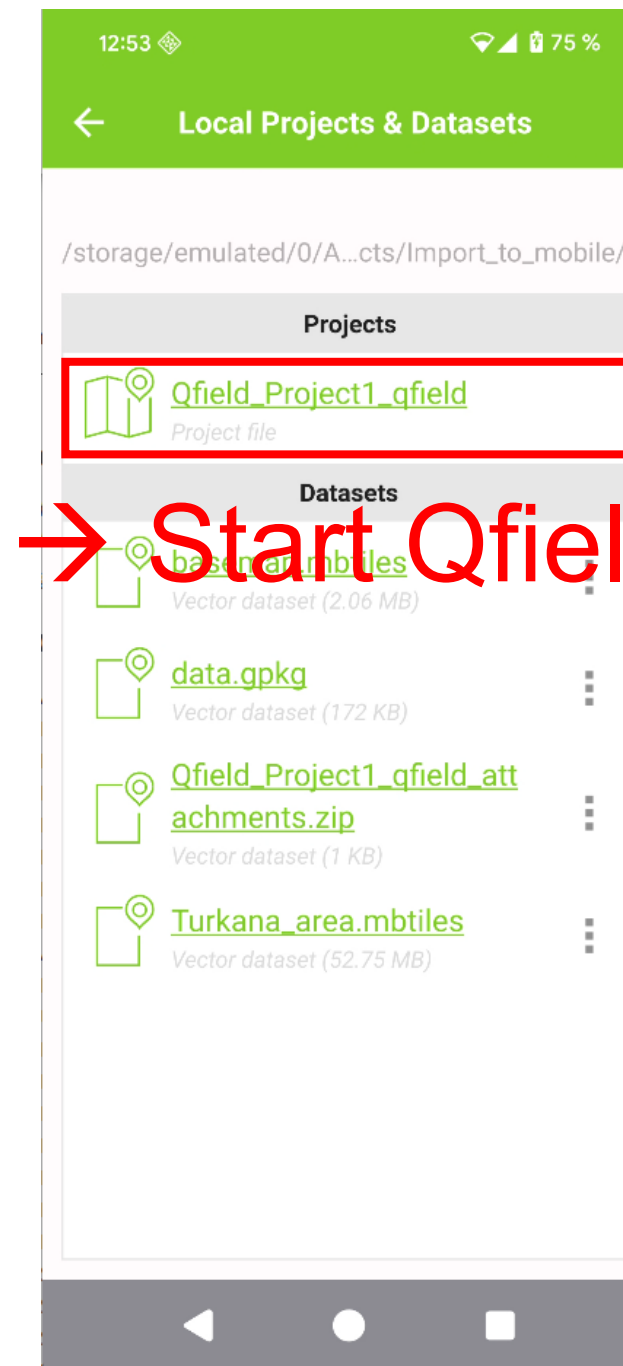
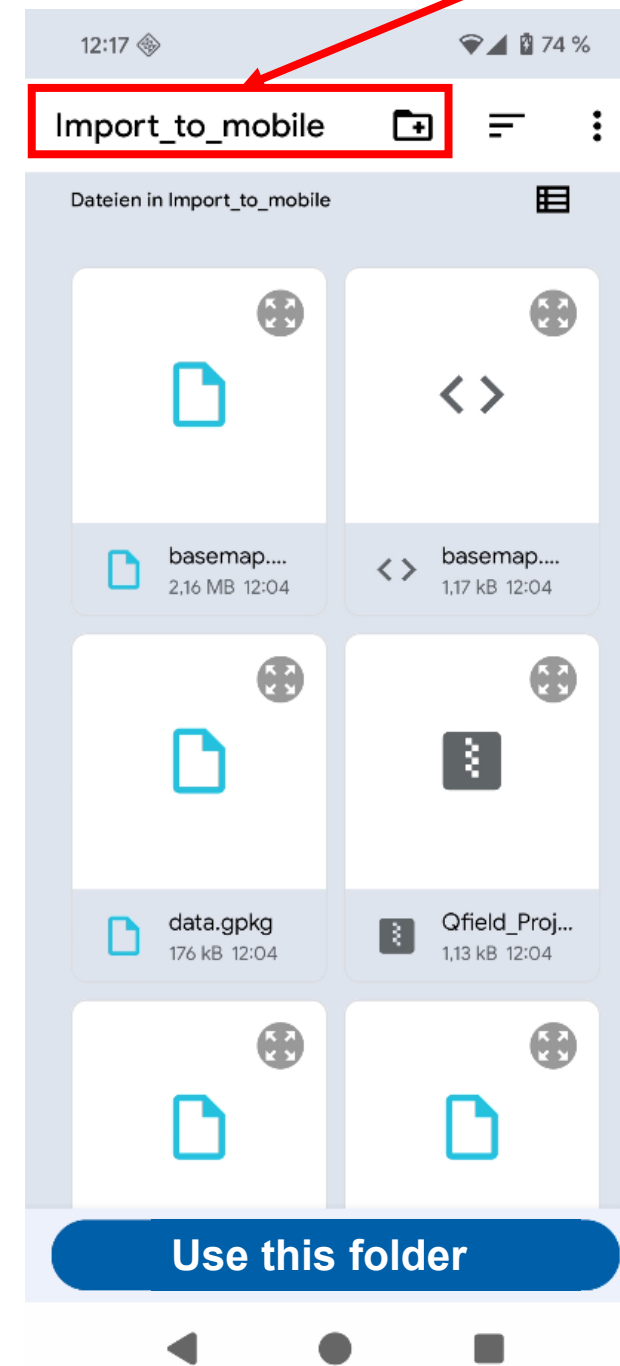
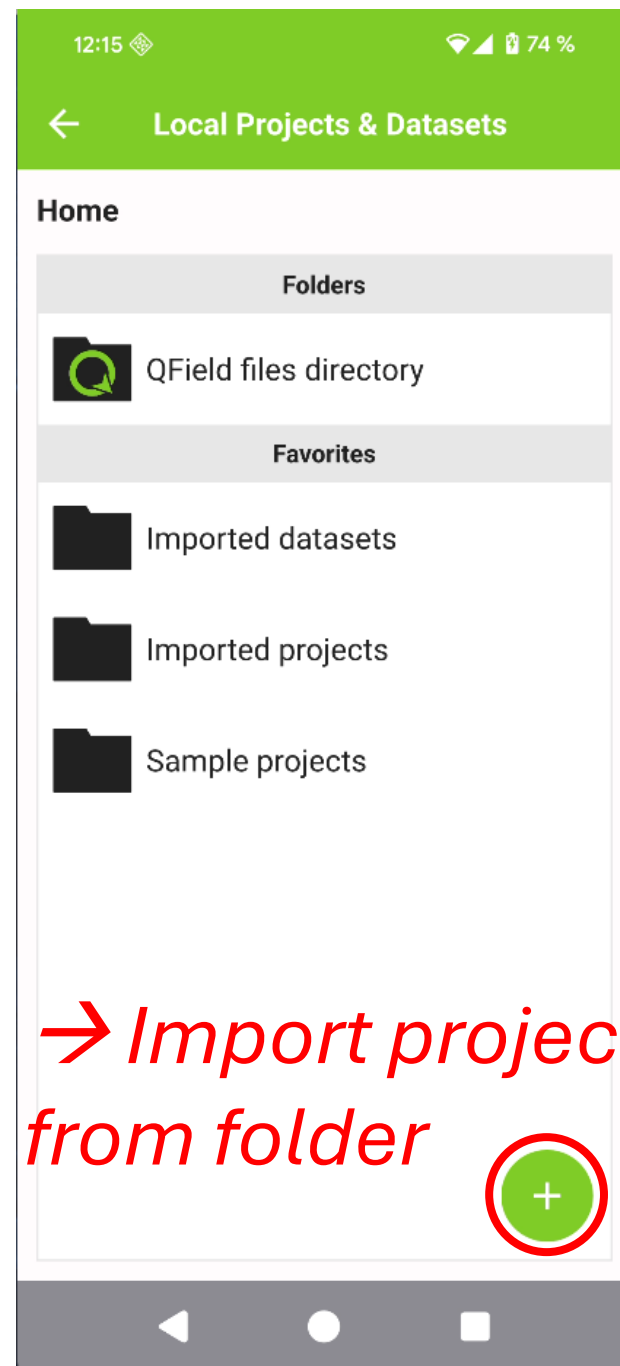
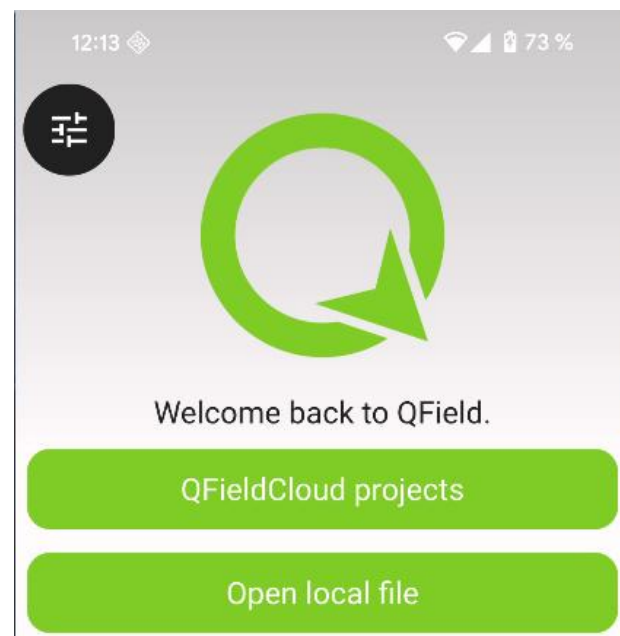


QField

- Start QField on your mobile and load project

Export_from_mobile

Import_to_mobile



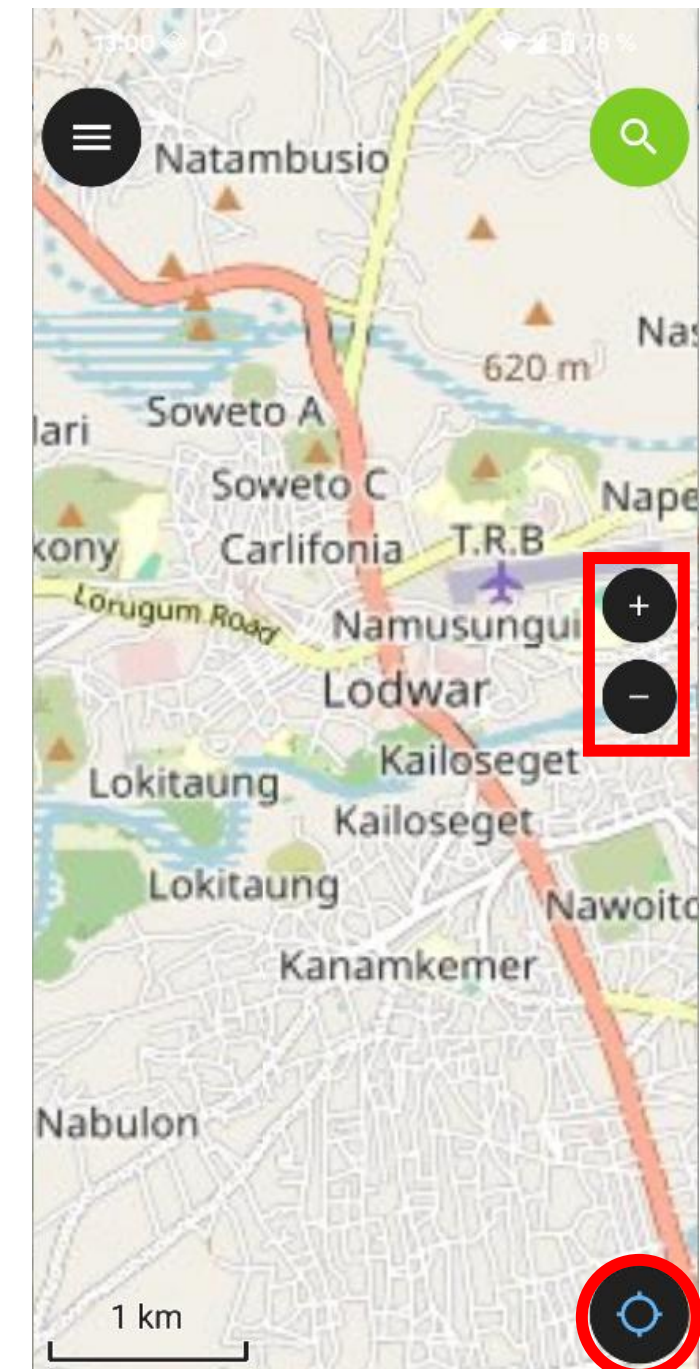
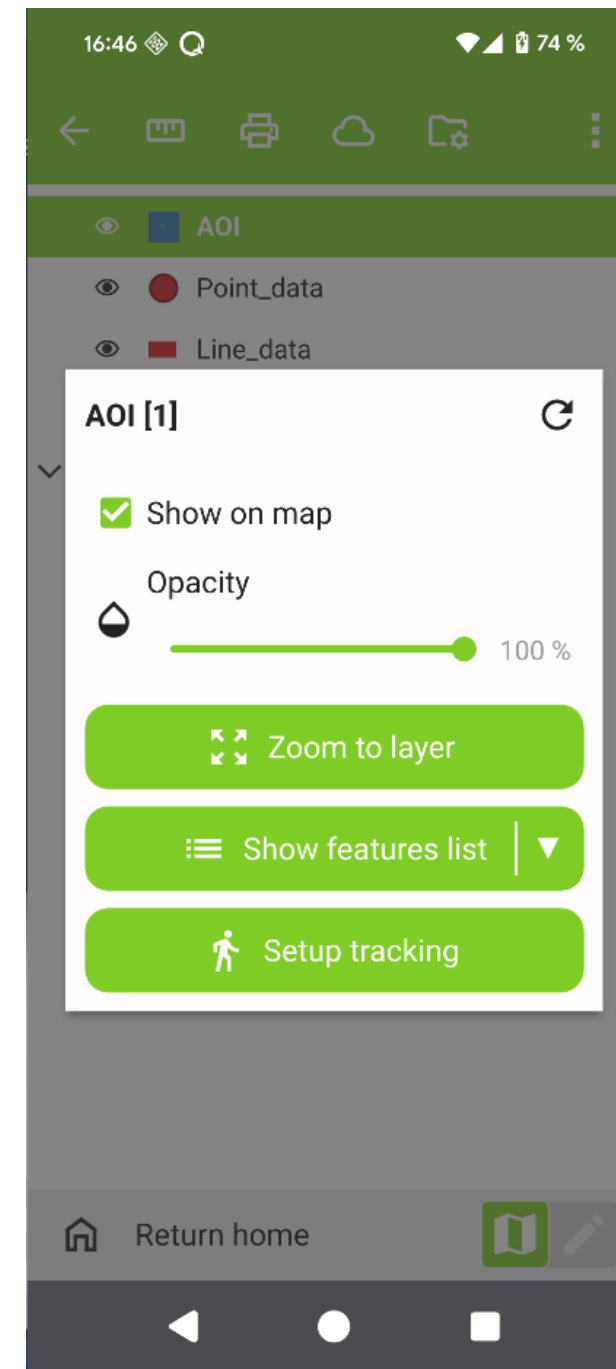
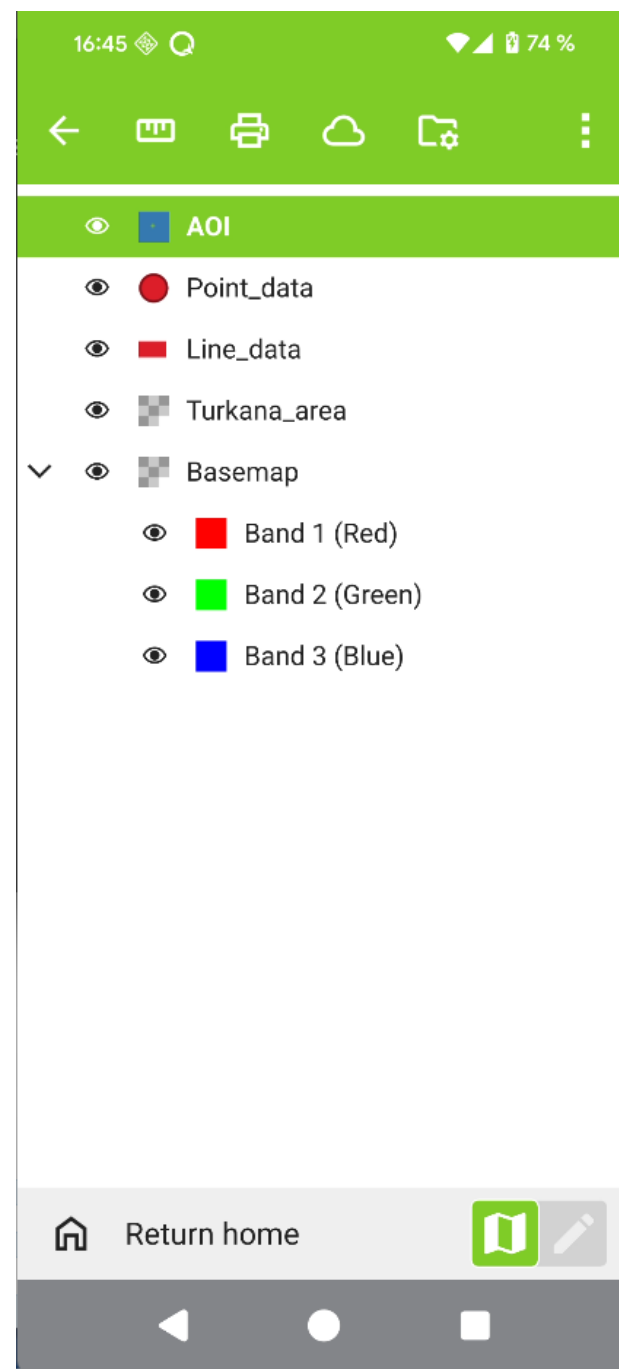
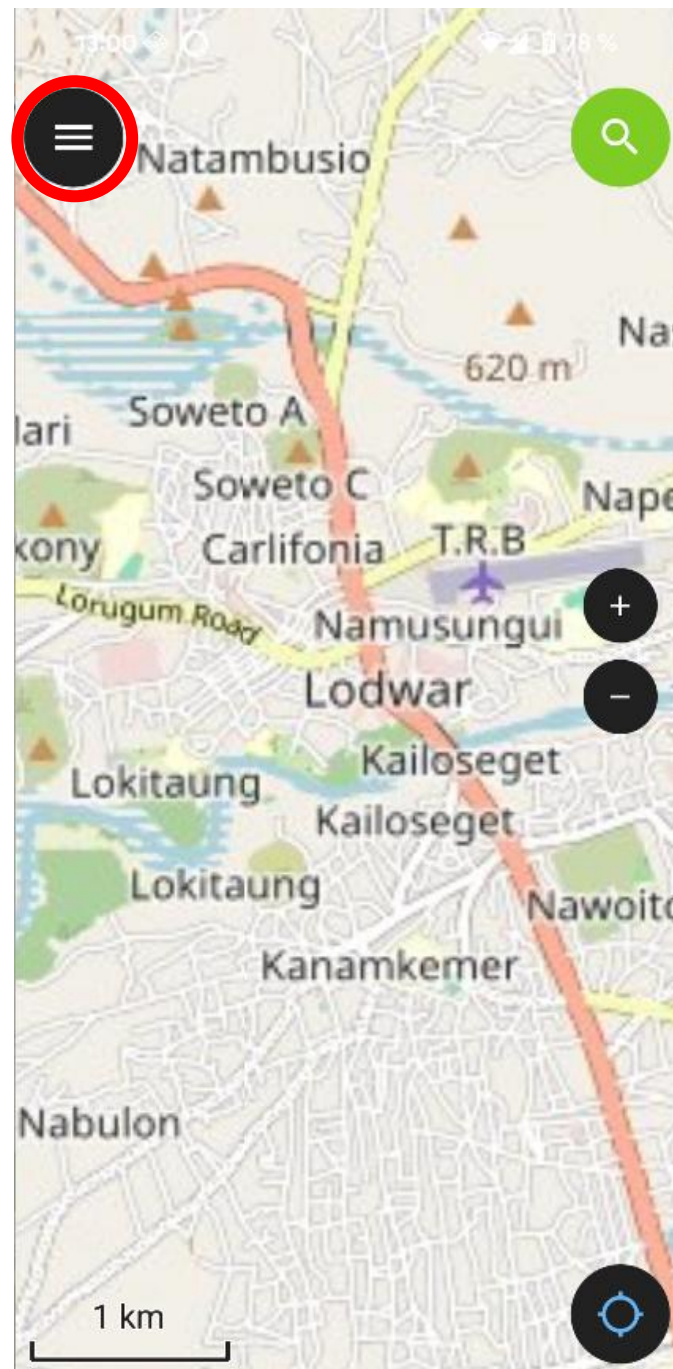
→ Open local file

→ Import projects from folder

→ Start Qfield-Project

QField

- **Layer visibility, activation of positioning service**

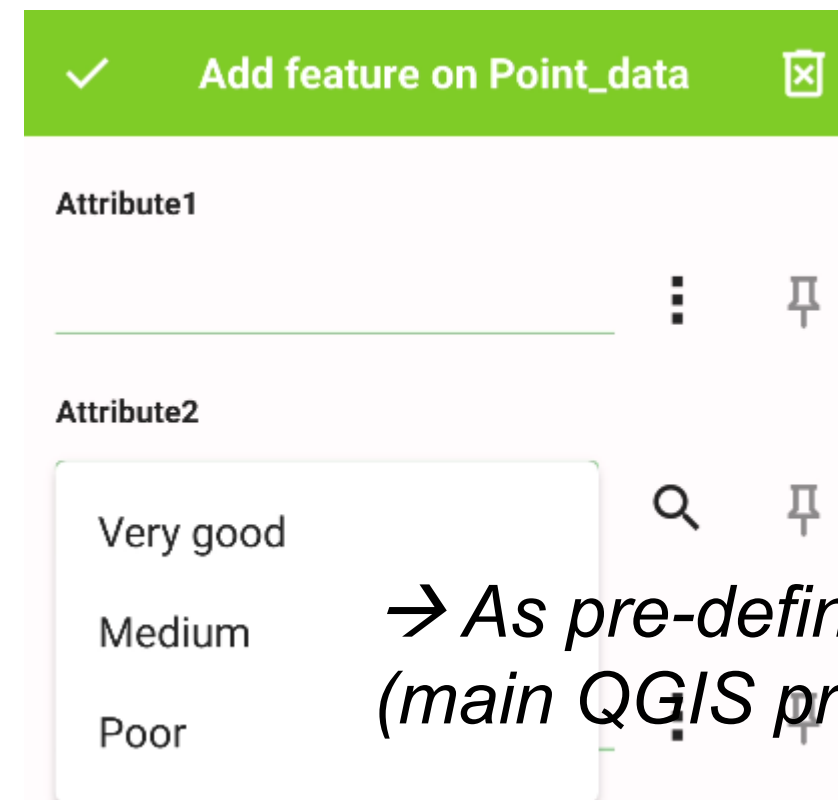
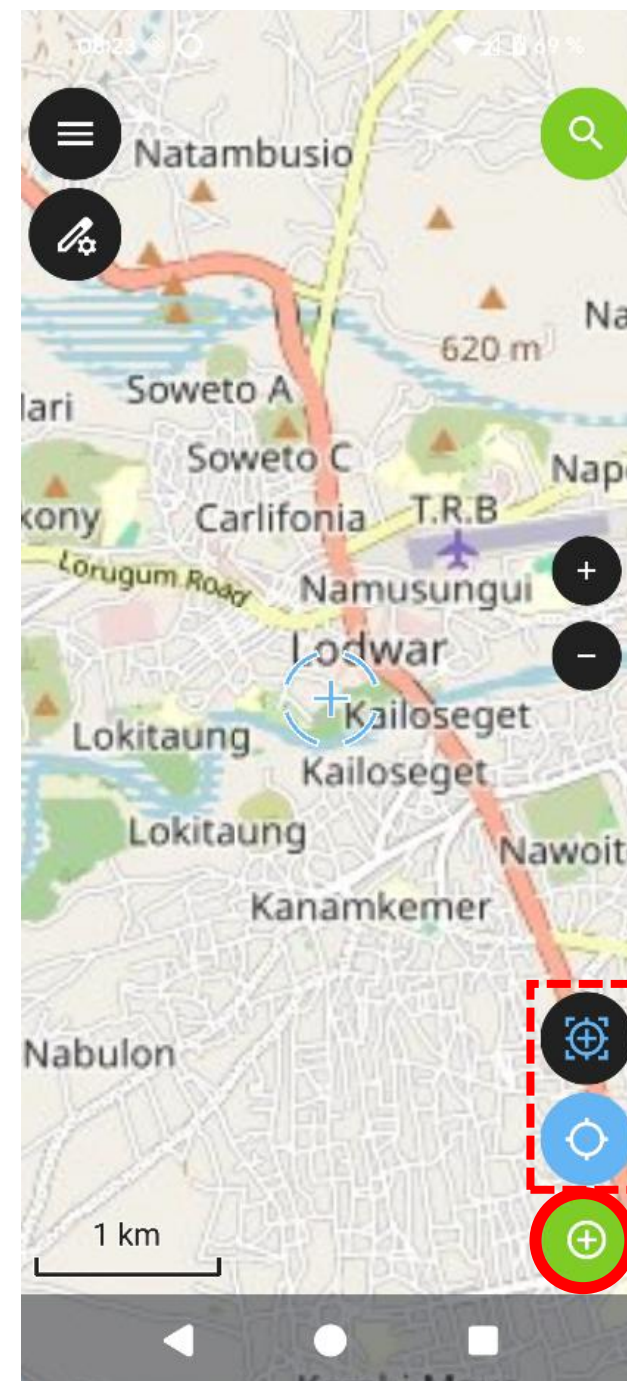
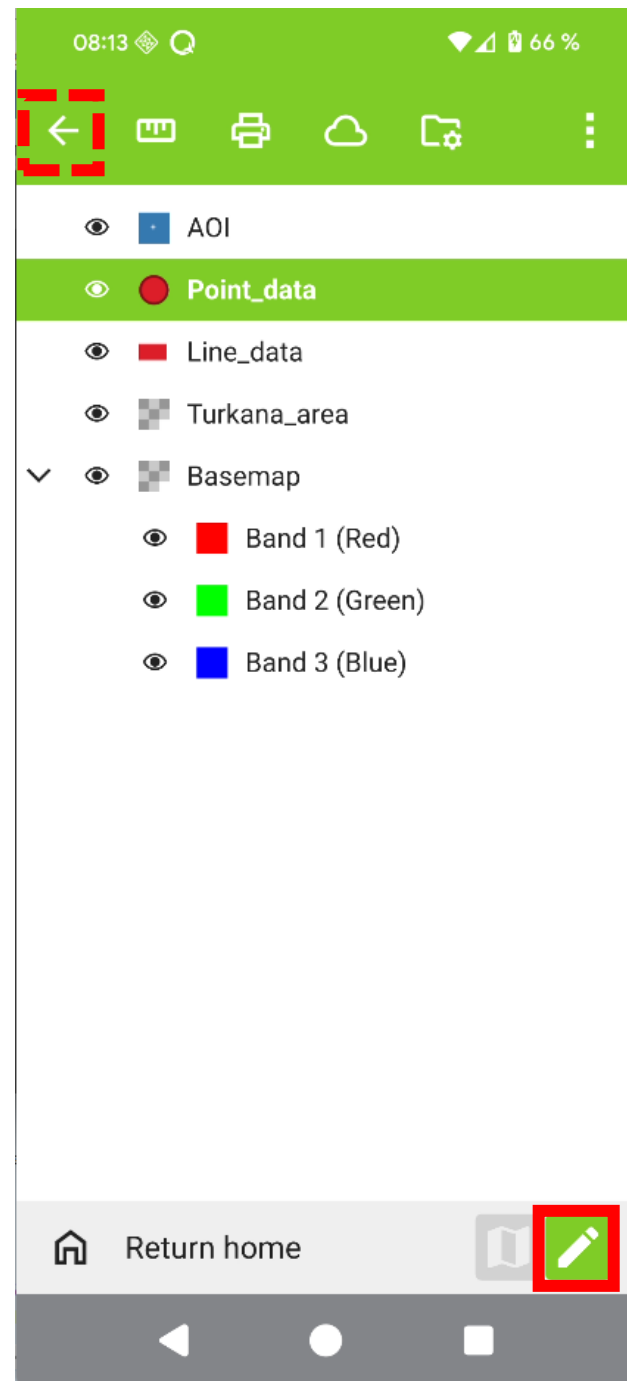


Zoom

Positioning

QField

- Data collection – Point data



→ Fill out Attributes

→ As pre-defined in the Attributes form (main QGIS project)

Positioning:

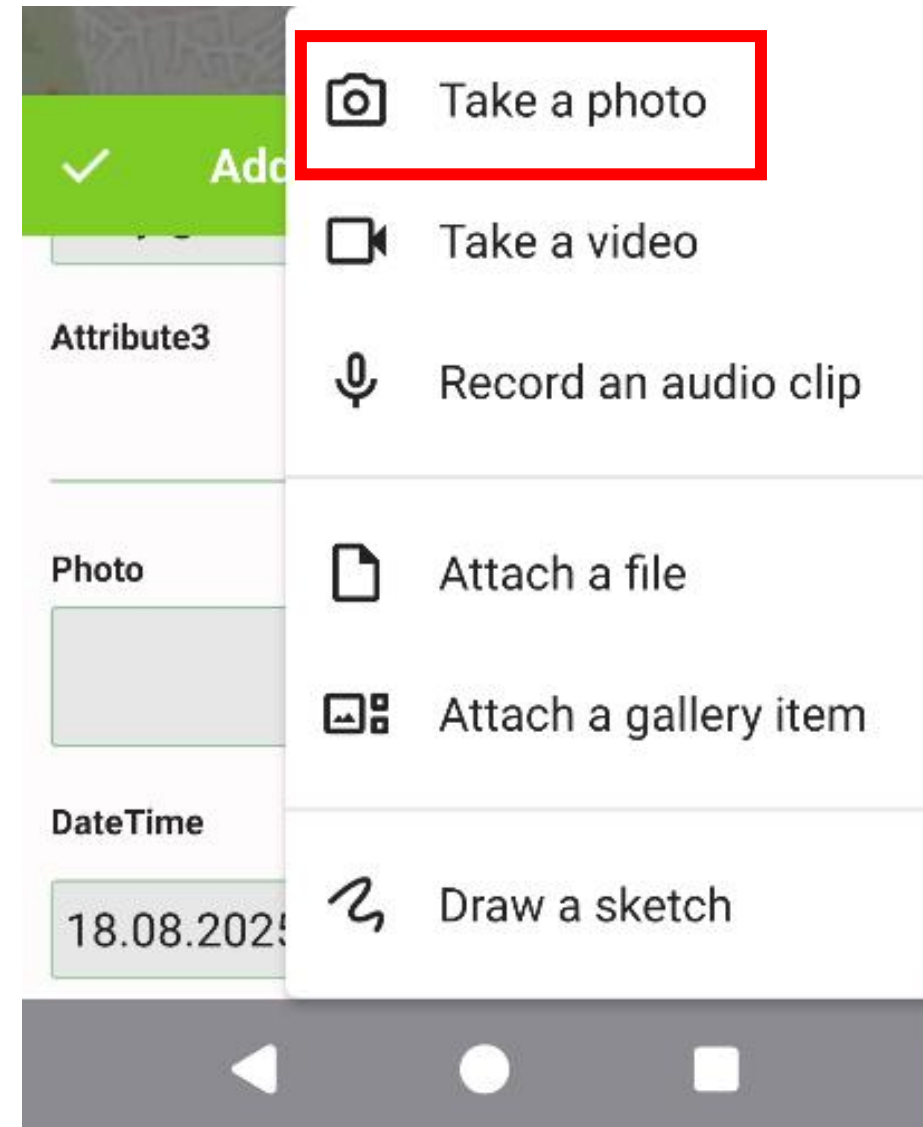
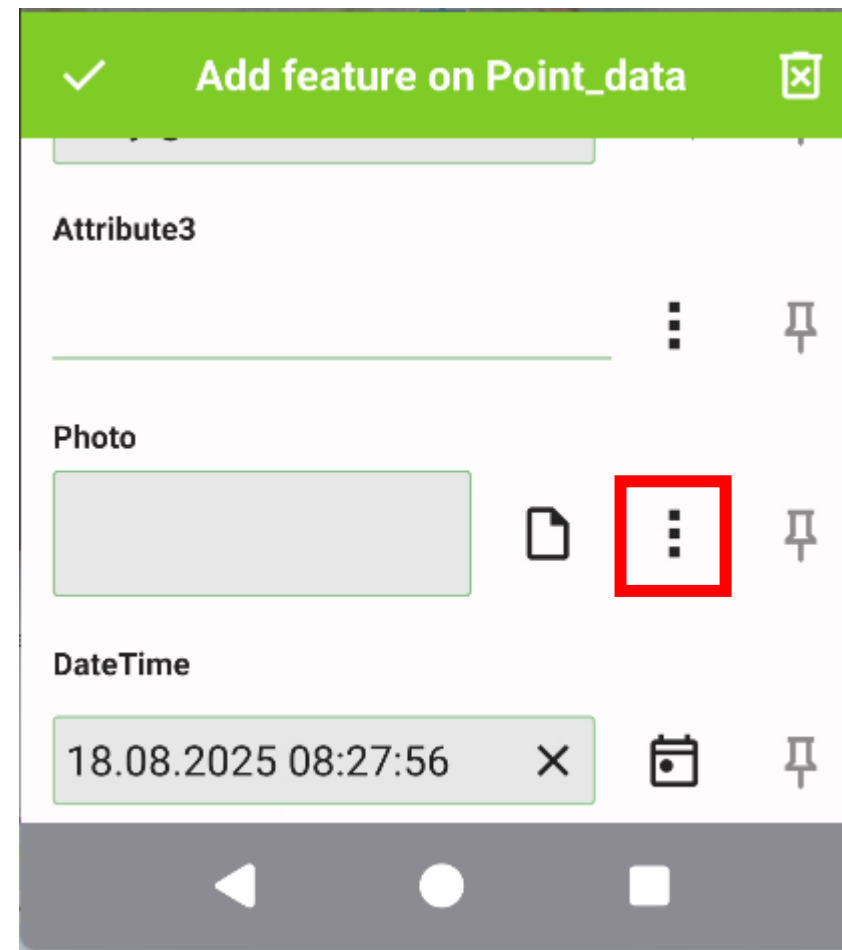
→ Lock cursor to position

→ Move to position

→ Add point to the position

QField

- **Attach photo to point**

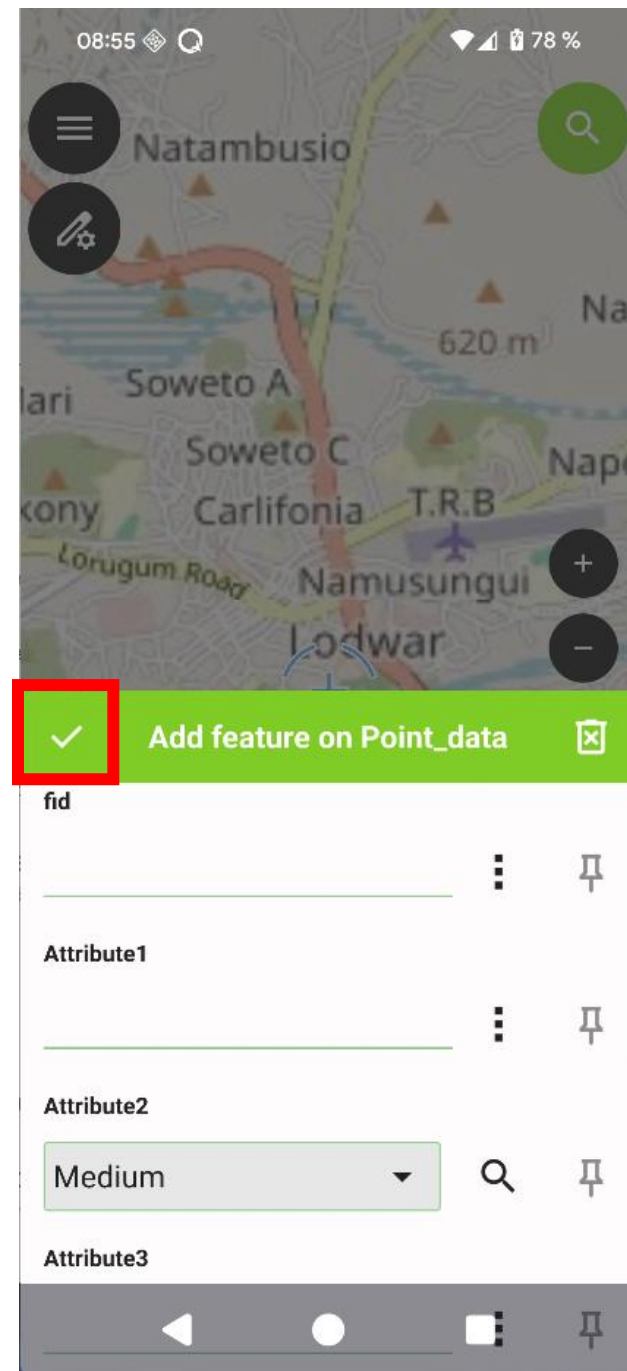


→ **Take photo and confirm:**



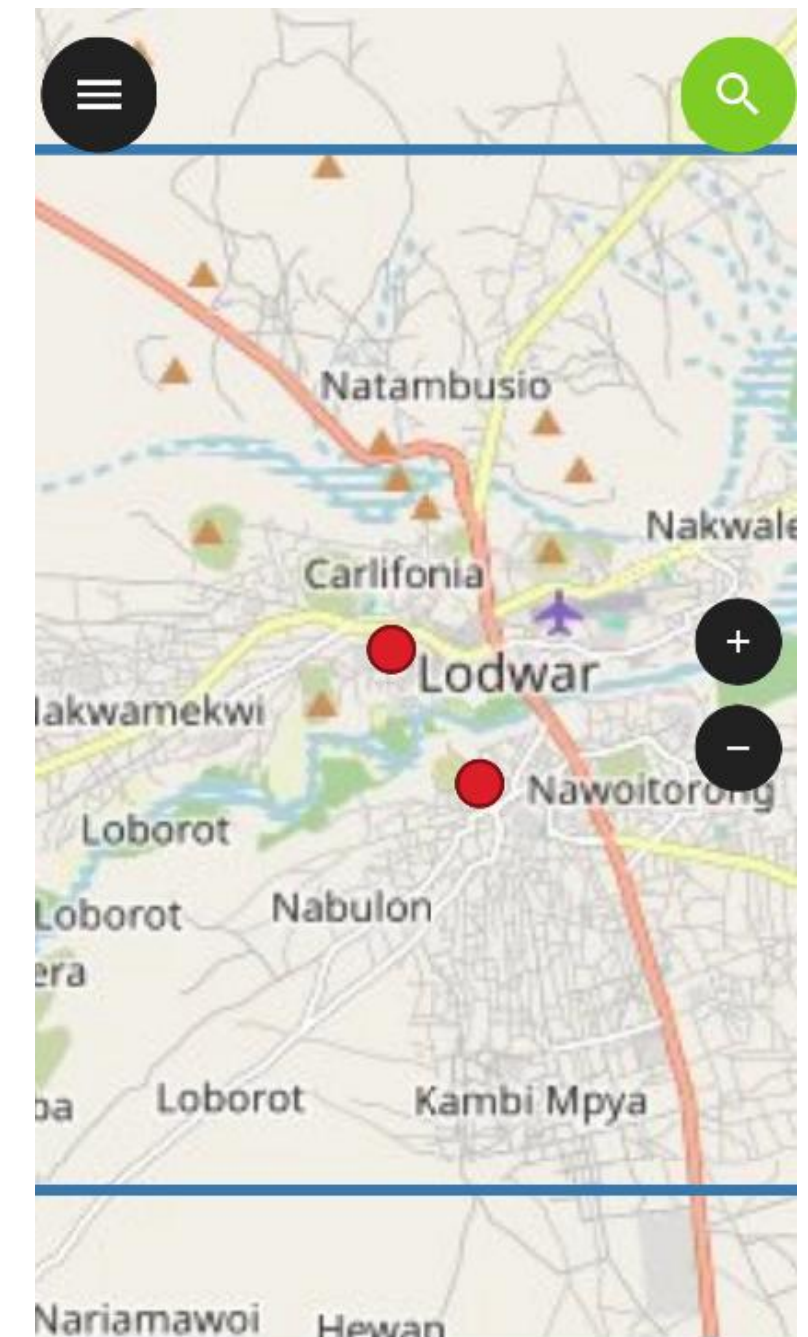
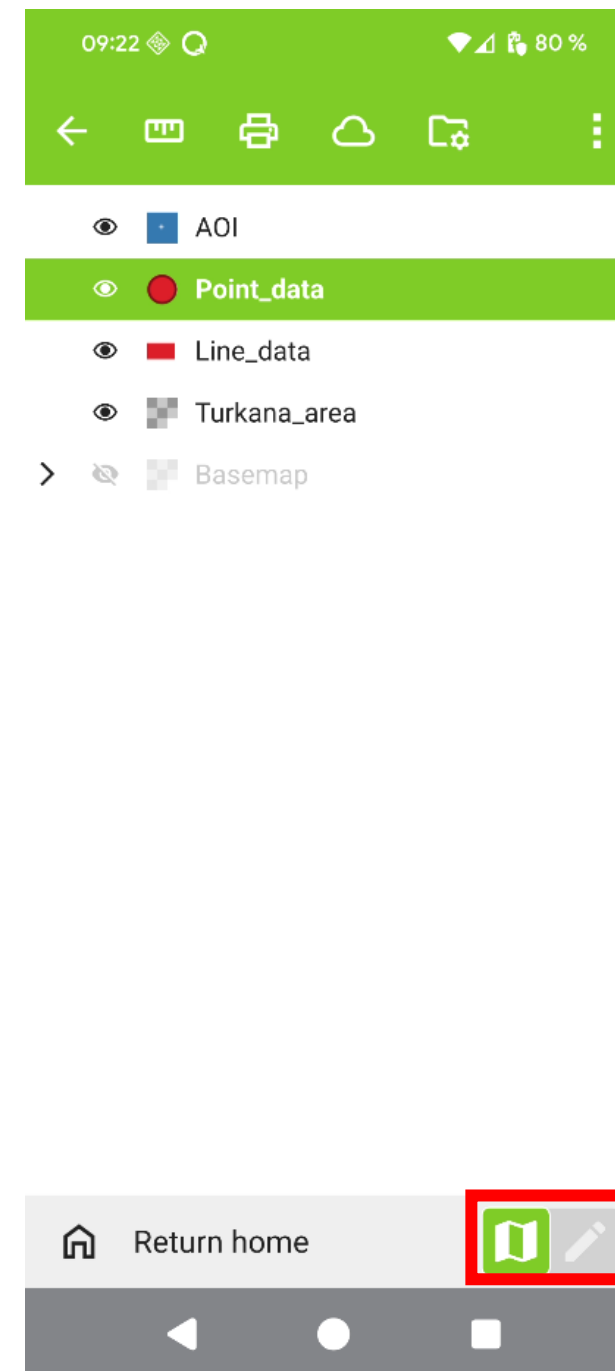
QField

- **Confirm Point data**



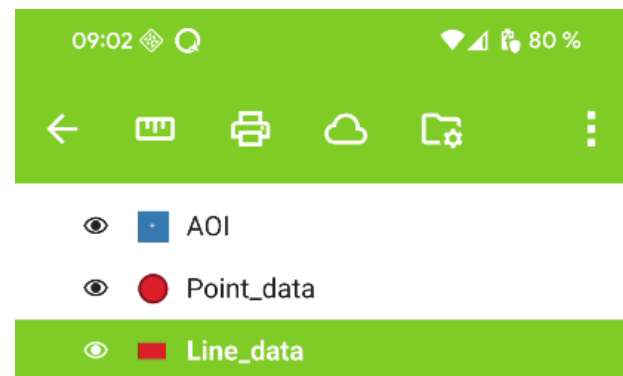
Confirm with  **!**

- **Stop data collection at the end**

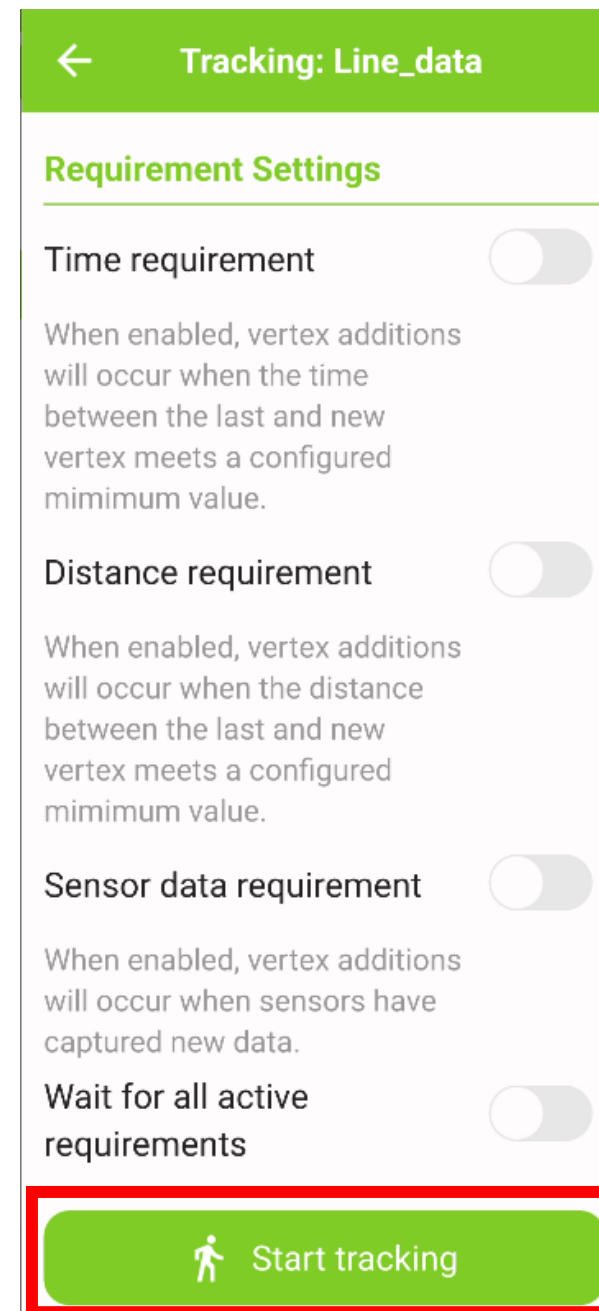
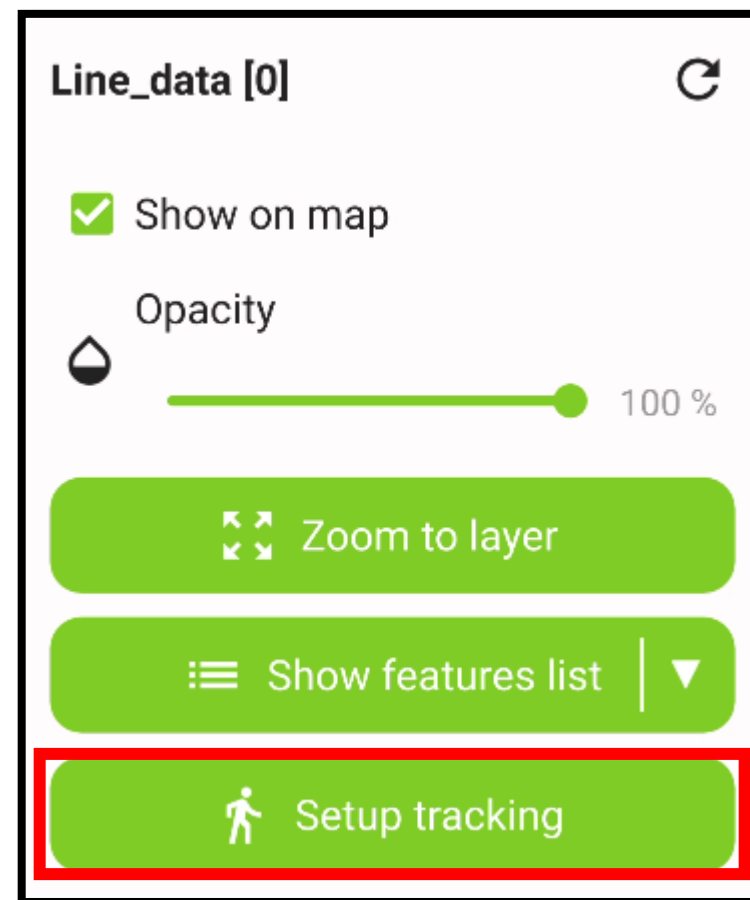


QField

- **Collection of Line data:** Record your path during field work

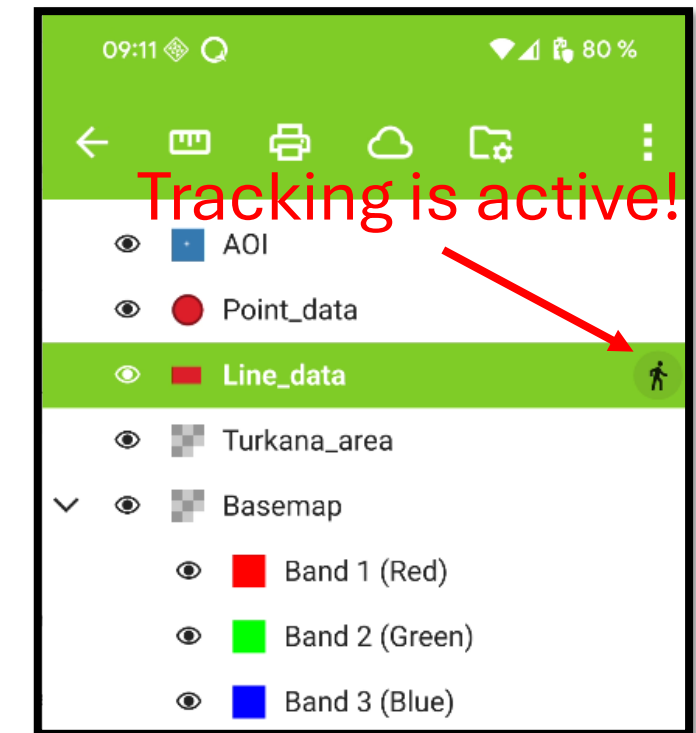


→ 1. Double click on Line data

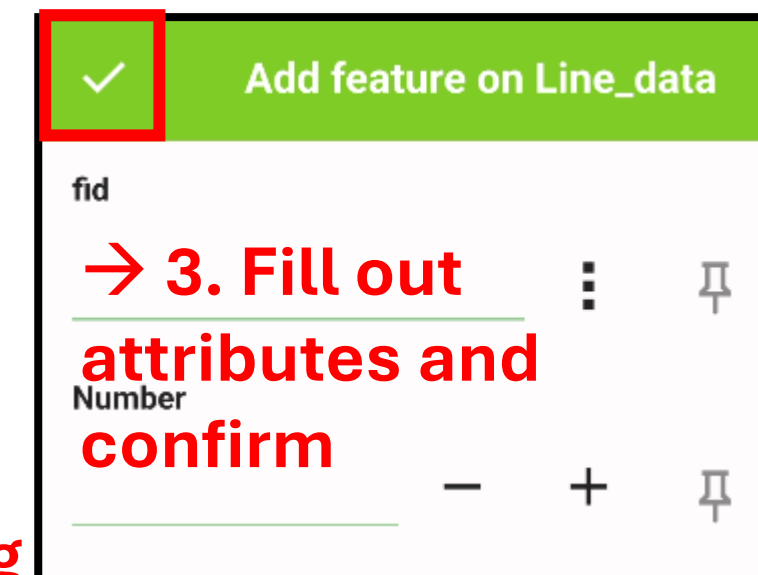


→ Keep defaults

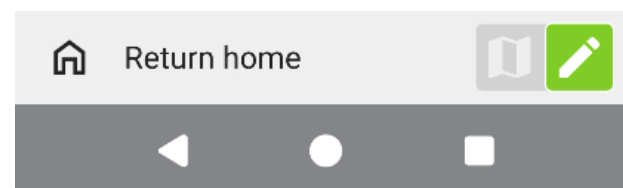
→ 2. Start tracking



4. Stop tracking at the end:
double-click on Line data
and choose Stop tracking!

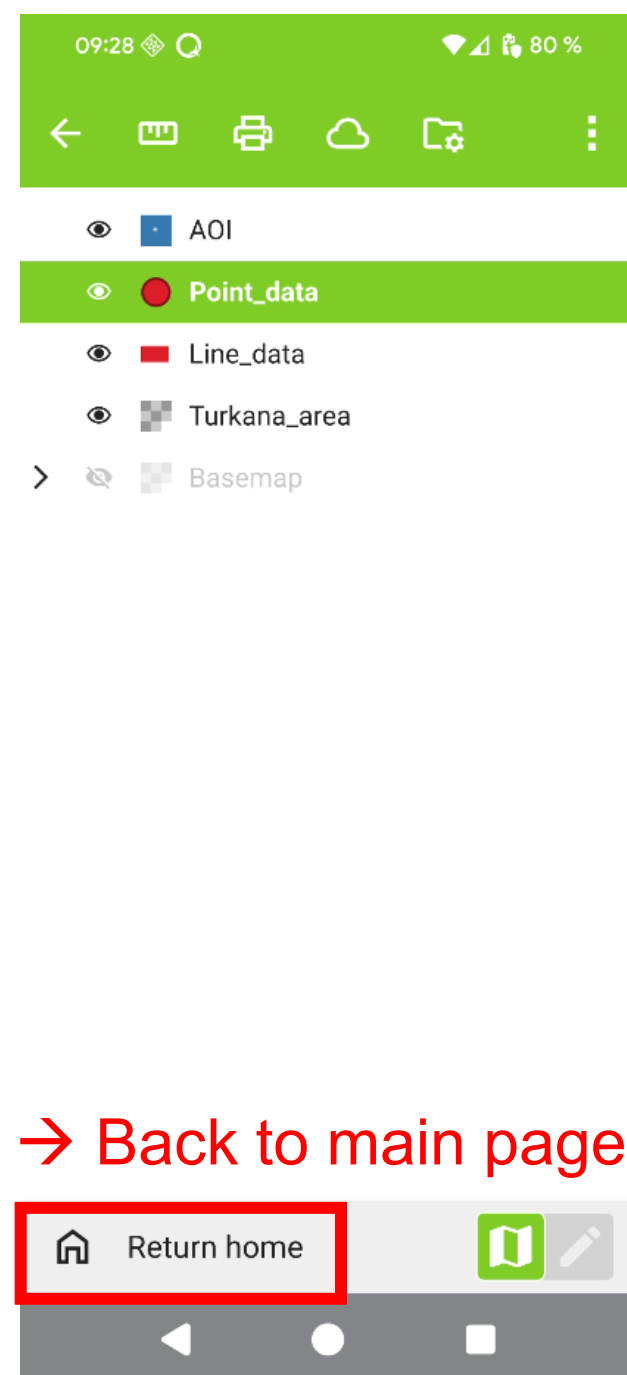
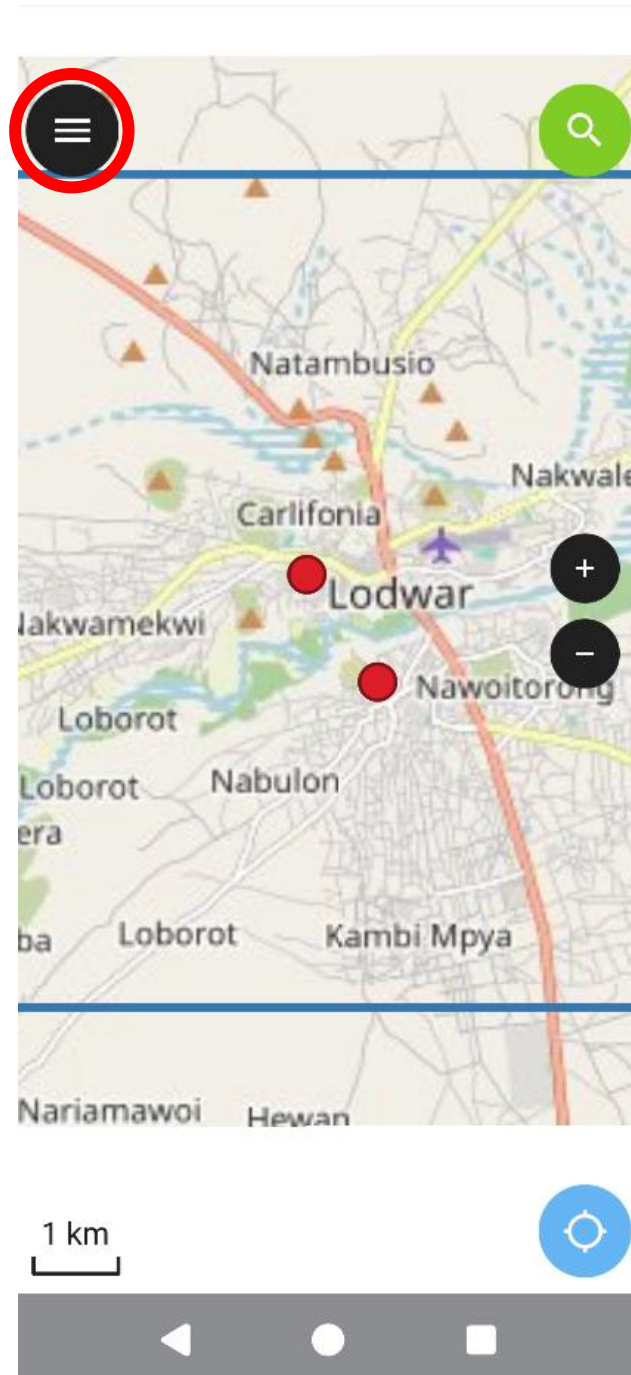


→ 3. Fill out
attributes and
confirm

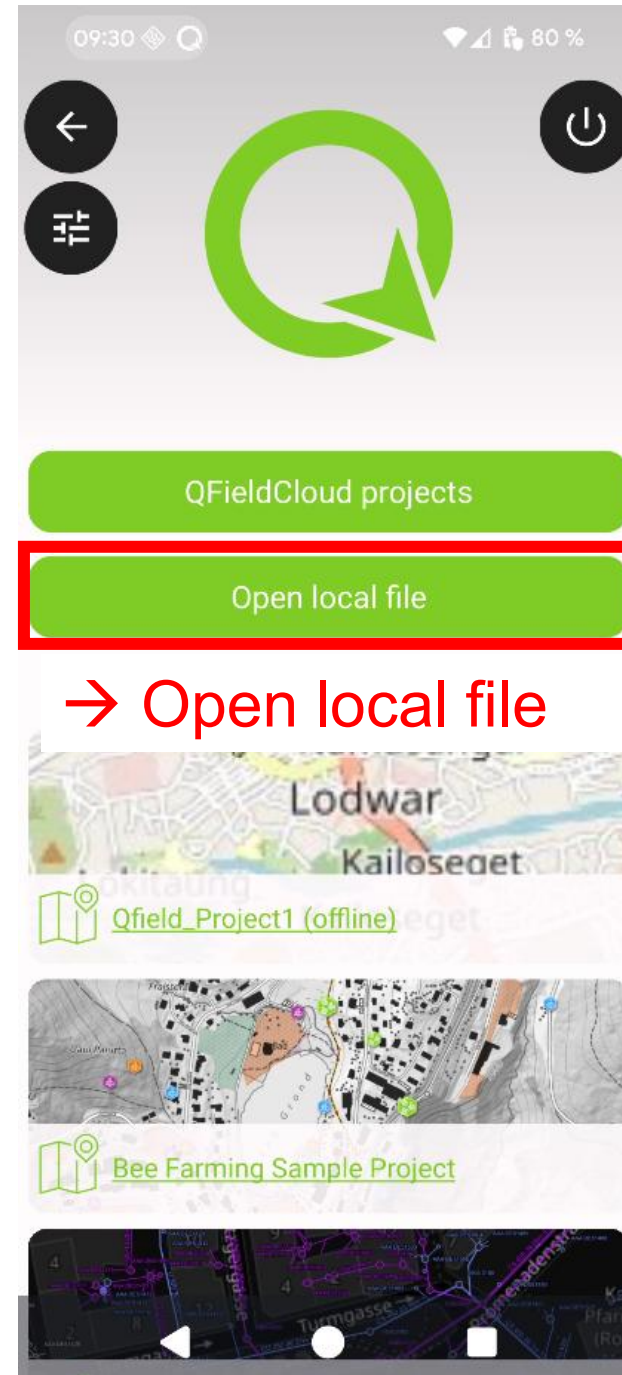


QField

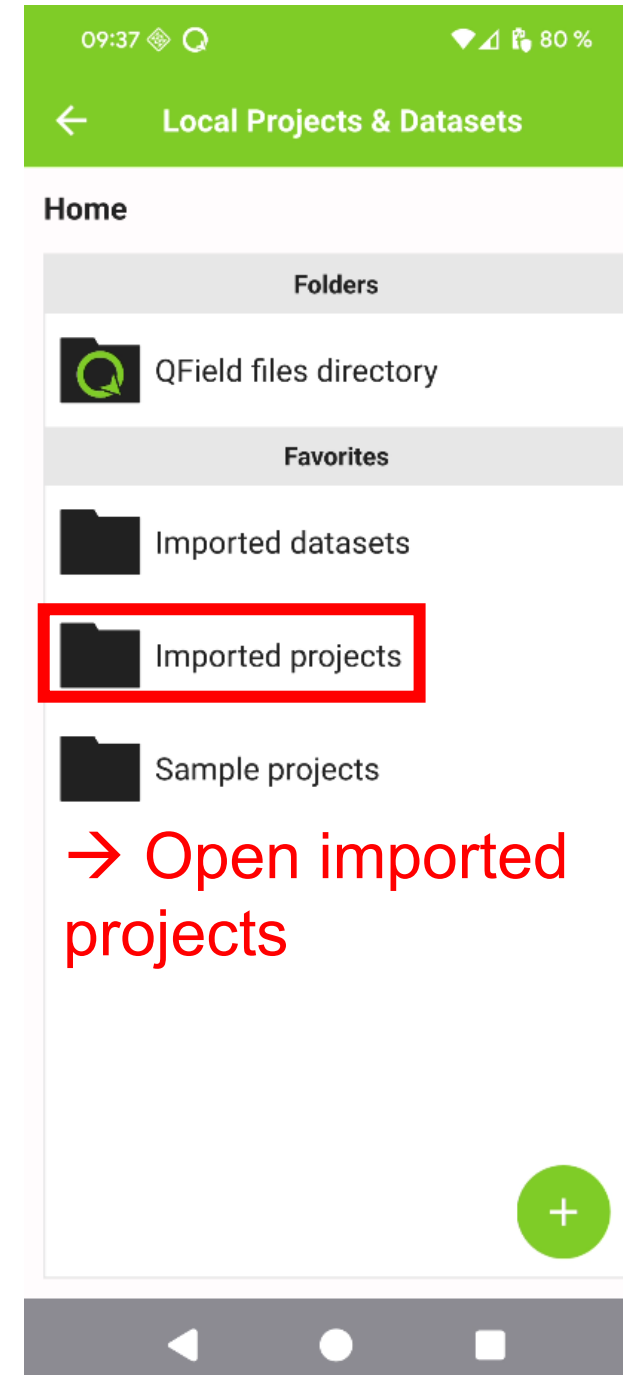
• Transfer back to QGIS



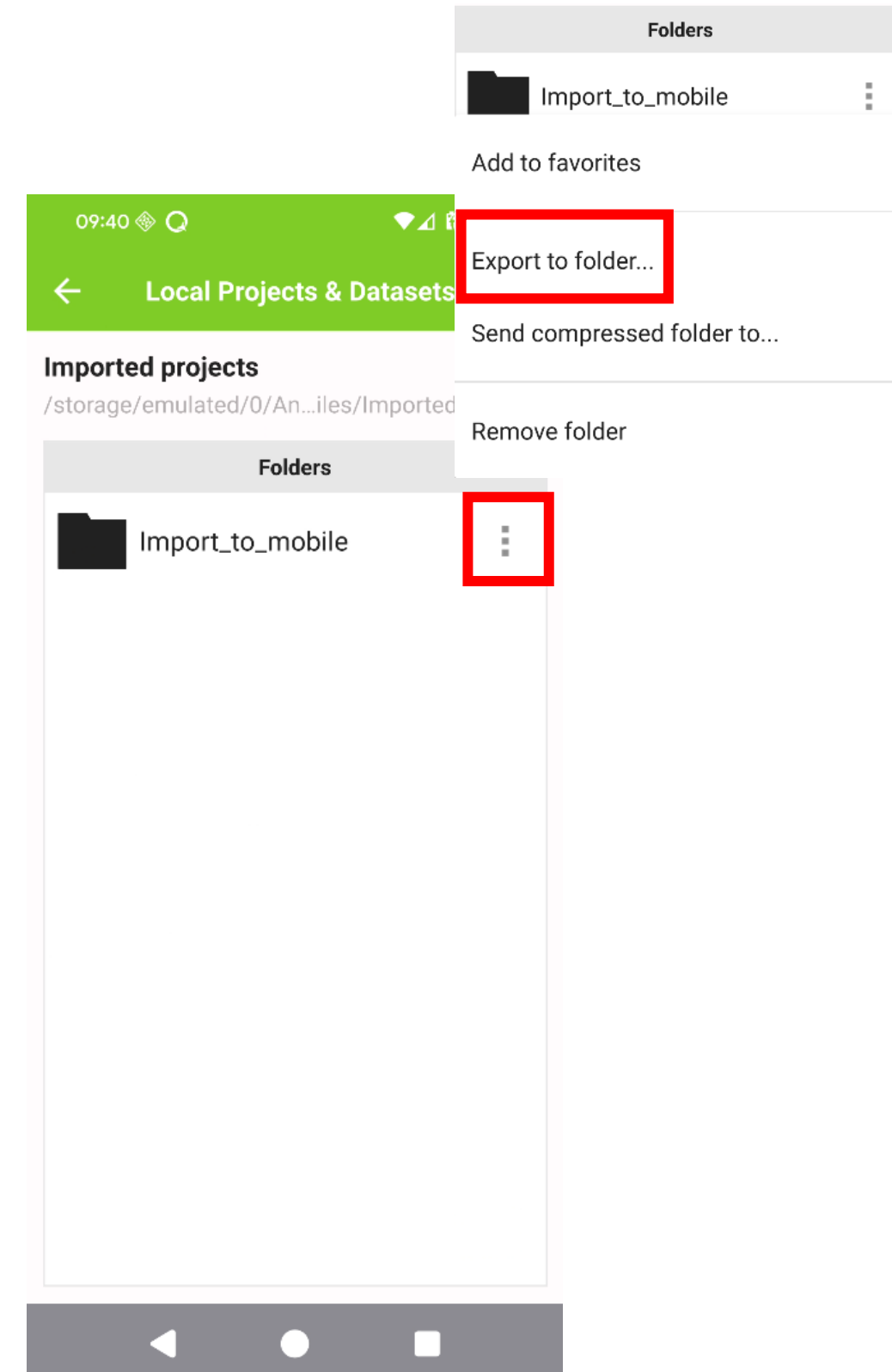
→ Back to main page



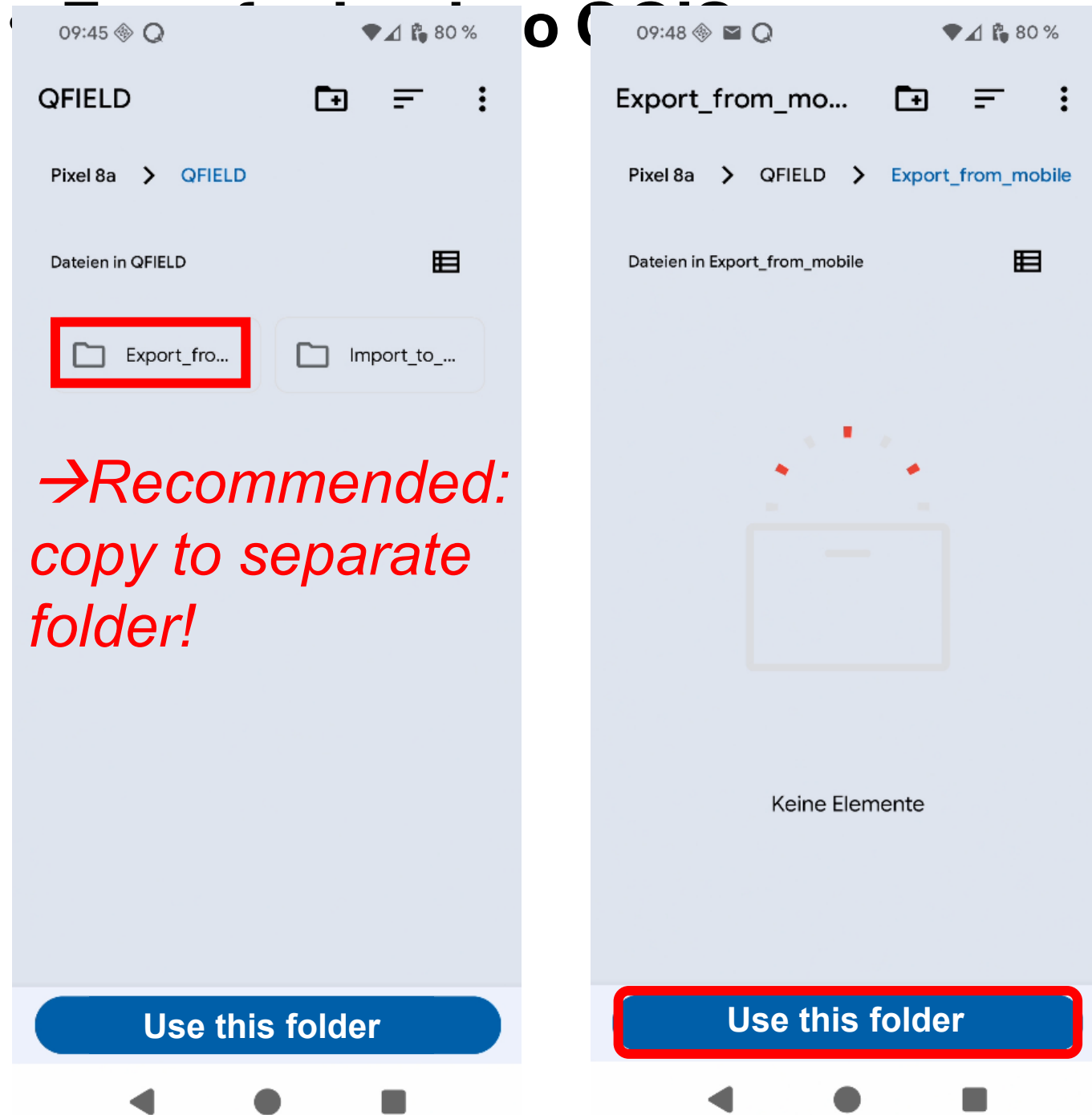
→ Open local file



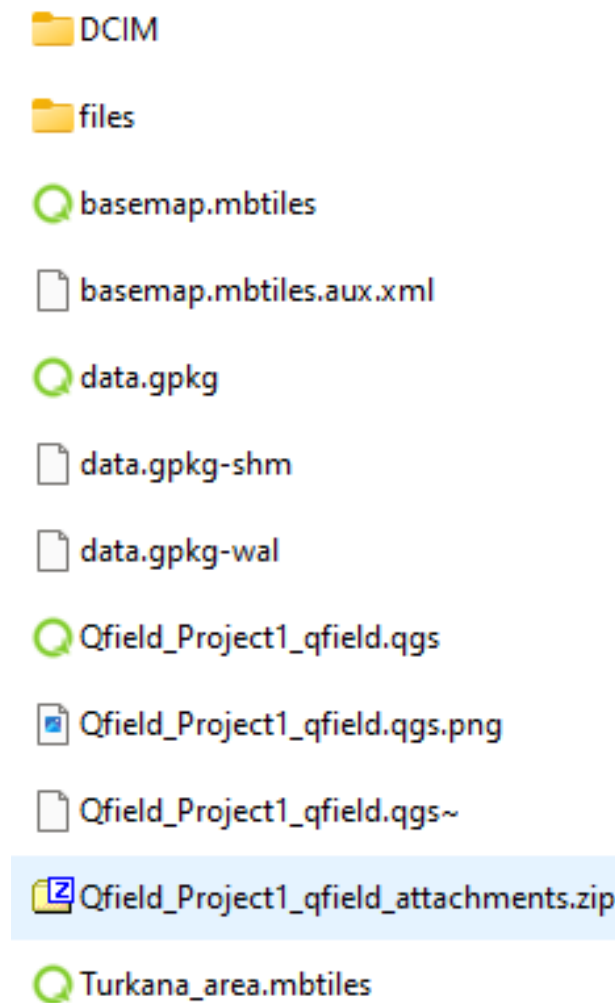
→ Open imported projects



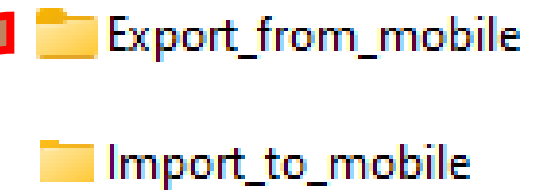
QField



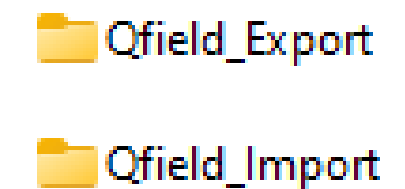
Copy the resulting content from the folder back to the computer!



Folder on mobile:



Folder on PC:

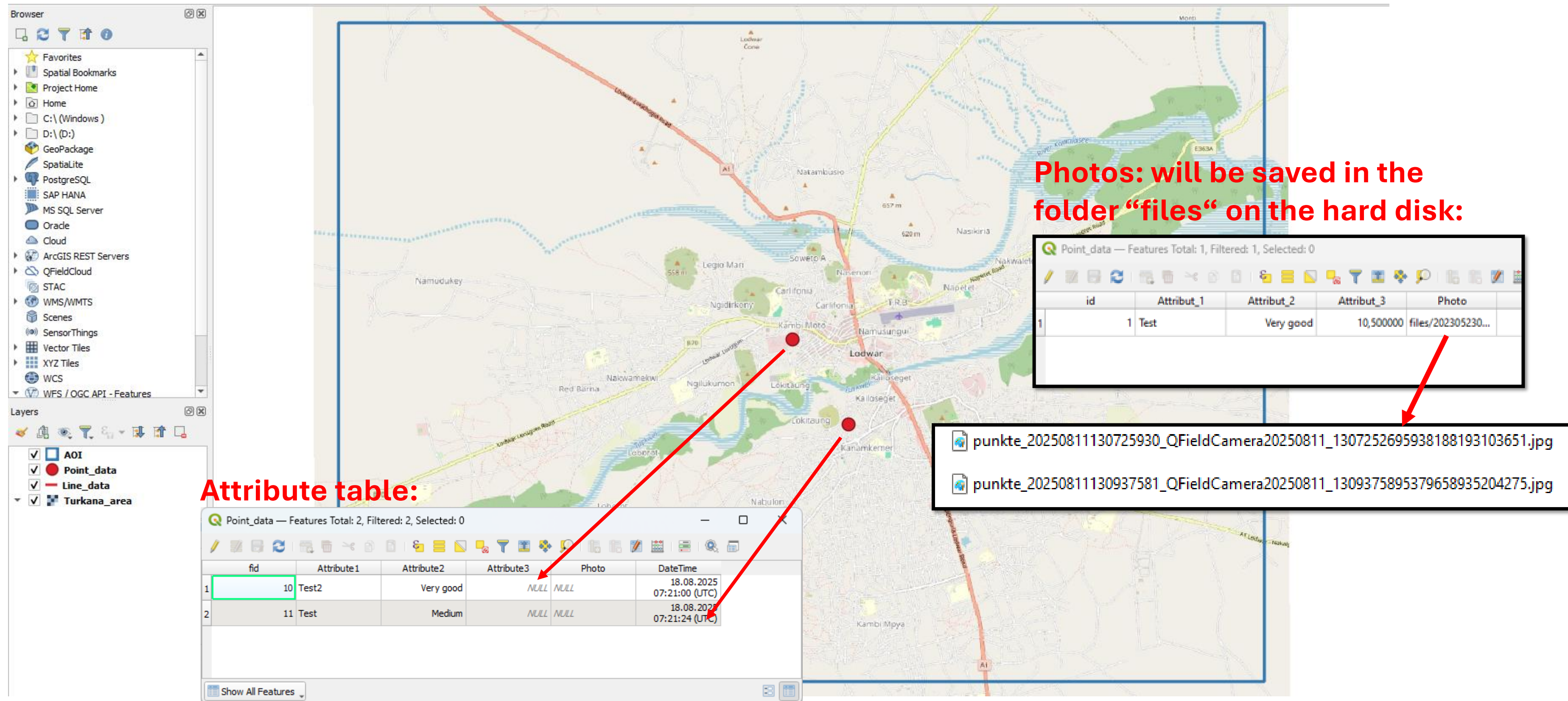


QGIS

- Synchronize from QField

The screenshot displays the QGIS desktop environment. The main map area shows a geographic map with a blue rectangular selection box. In the top toolbar, the 'Synchronize Project' icon (a cube with a green arrow) is highlighted with a red square. A file explorer window is open, showing the path 'D:\QField_PC' with two folders, 'Qfield_Export' and 'Qfield_Import', the latter being selected. A red arrow points to the 'Qfield_Import' folder with the text '→ Select folder!'. The 'Synchronize Project' dialog box is open on the right, with the 'Qfield_Import' folder path entered in the 'Select the QField Project Folder' field. Under the 'Advanced' section, 'QGIS_main' is checked in the 'Directories to be copied' list. The 'Synchronize' button at the bottom of the dialog is also highlighted with a red square. The status bar at the bottom shows coordinates (779699 344395), scale (1:47938), and other settings.

QGIS



Photos: will be saved in the folder "files" on the hard disk:

Attribute table:

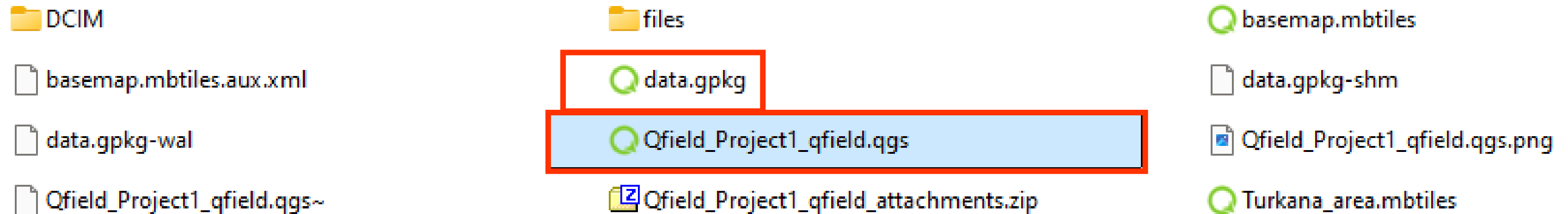
id	Attribut_1	Attribut_2	Attribut_3	Photo
1	1 Test	Very good	10,500000	files/202305230...

fid	Attribute1	Attribute2	Attribute3	Photo	DateTime
1	10 Test2	Very good	NULL	NULL	18.08.2025 07:21:00 (UTC)
2	11 Test	Medium	NULL	NULL	18.08.2025 07:21:24 (UTC)

punkte_20250811130725930_QFieldCamera20250811_1307252695938188193103651.jpg
 punkte_20250811130937581_QFieldCamera20250811_1309375895379658935204275.jpg

QGIS

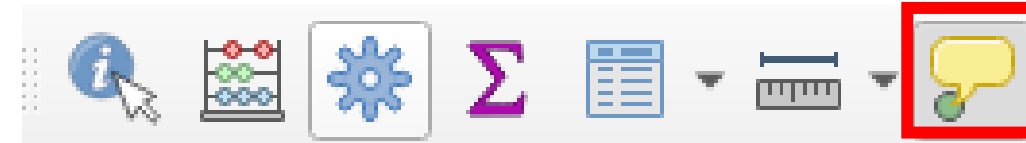
- **Trouble shooting** (*in case synchronization fails*)



- *QGIS project for QField (offline-project) can be re-opened with QGIS*
- *Database (.gpkg) or Shape-File can be opened in the original QGIS project*
- *Copy content to a new folder on PC*

QGIS

- Display photo using „Map Tips“ (Attribute toolbar):



The screenshot shows the QGIS interface with the 'Display' action highlighted in the Attribute toolbar. The 'HTML Map Tip' dialog is open, showing the following configuration:

- Display Name:** Photo
- Enable map tips:**
- HTML Map Tip:**

```

```

Annotations in the HTML code highlight the following parts:

- file:/// + folder + attribute Photo* (points to the src attribute)
- Size* (points to width and height attributes)
- Rotation* (points to the style attribute)

HTML code (example):

```

```

QGIS

- Display photo using „Map Tips“ (Attribute toolbar):



Change search radius

The screenshot shows the QGIS interface with a map of agricultural fields. A yellow polygon highlights a specific area. A popup window displays a photo of a cornfield. The attribute table for the selected feature is shown below:

id	Attribut_1	Attribut_2	Attribut_3
1	1 Test	Very good	10,

The Settings menu is open, showing various options:

- Settings
- Plugins
- Vector
- Raster
- Data
- User Profiles
- Style Manager...
- Custom Projections...
- Keyboard Shortcuts...
- Interface Customization...
- Options...

The Options dialog for Map Tools is open, showing the Identify tool settings:

- Search radius for identifying features and displaying map tips: 10.00
- Highlight color: [Red]
- Buffer: 0.50 mm
- Minimum width: 1.00 mm

Day 2: Editing data

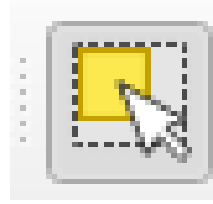
Modify features

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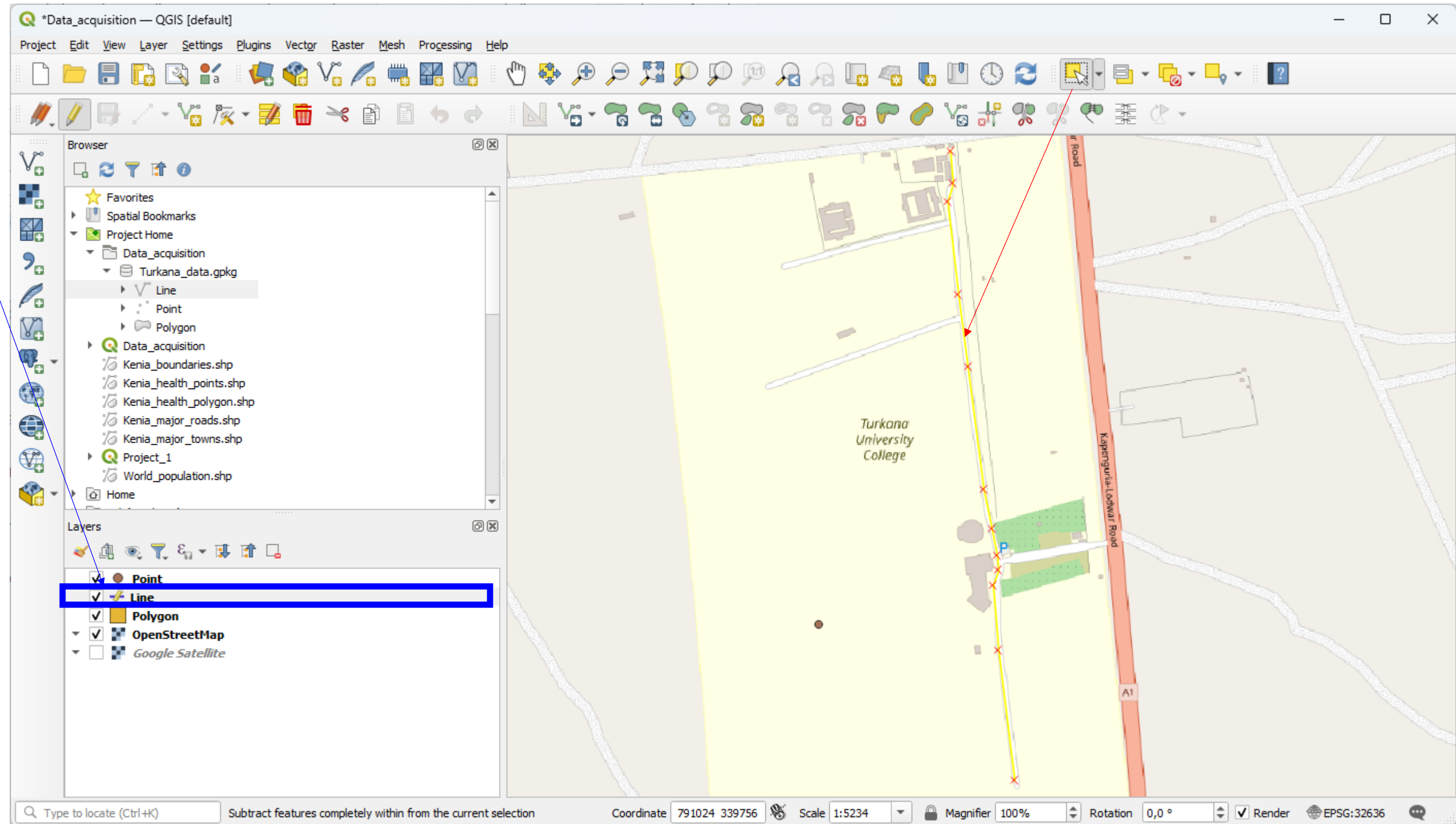
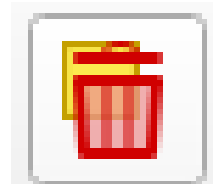
Delete feature

1. Highlight layer

2. Select feature



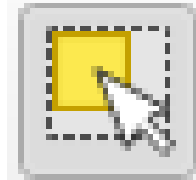
3. Delete feature



Edit vertices

- **Refine objects**

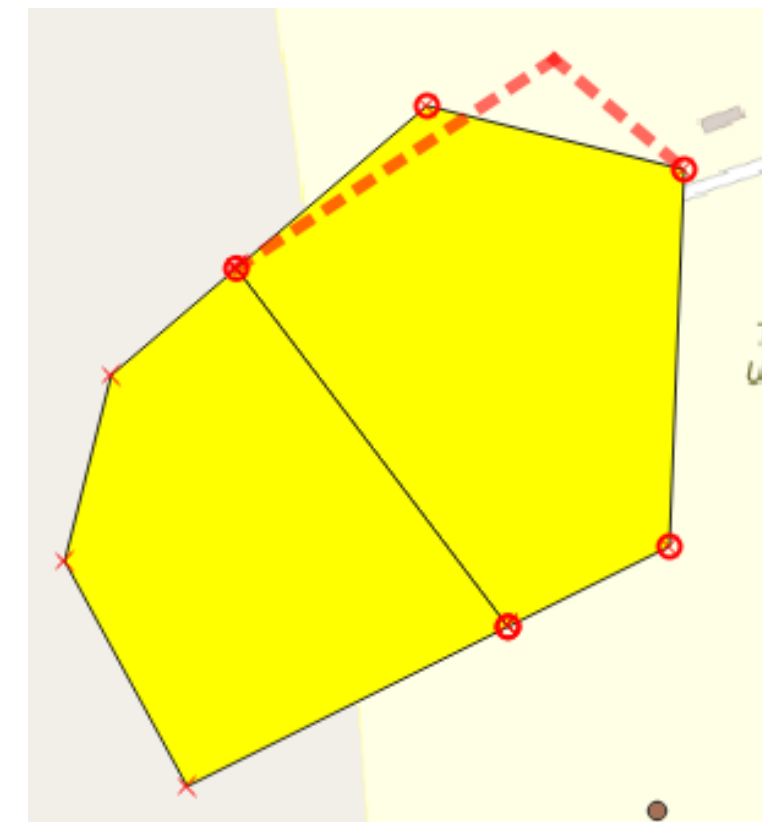
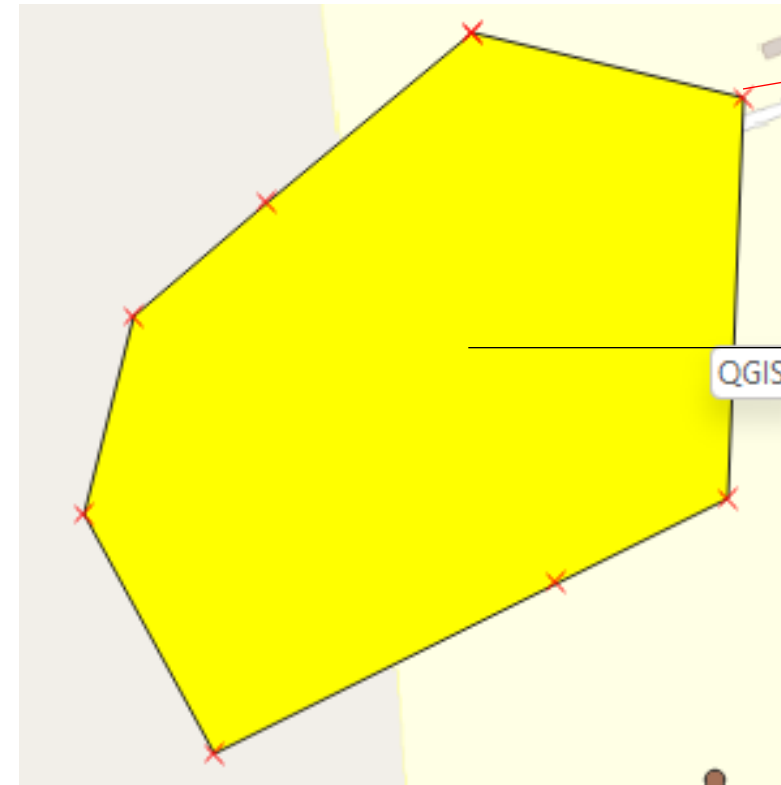
- Select object



- Vertex tool:



- Delete vertex: click on vertex, press Delete
- Move vertex: click on vertex, hold mouse button, move to new position
- Add vertex: click on edge, move to correct position

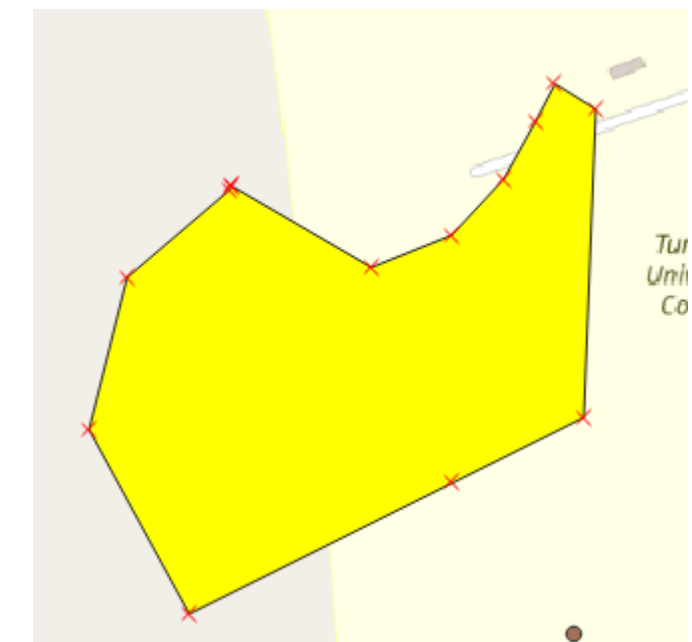
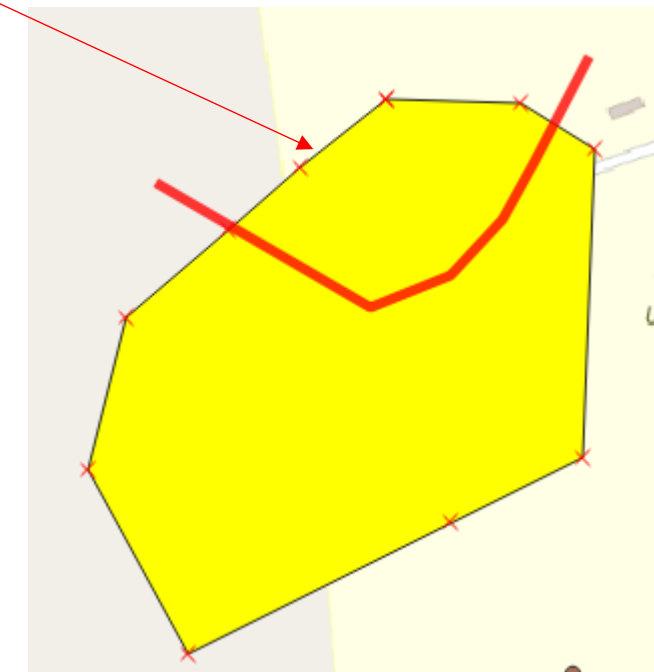


Modifying features

- **Advanced Digitizing Toolbar**

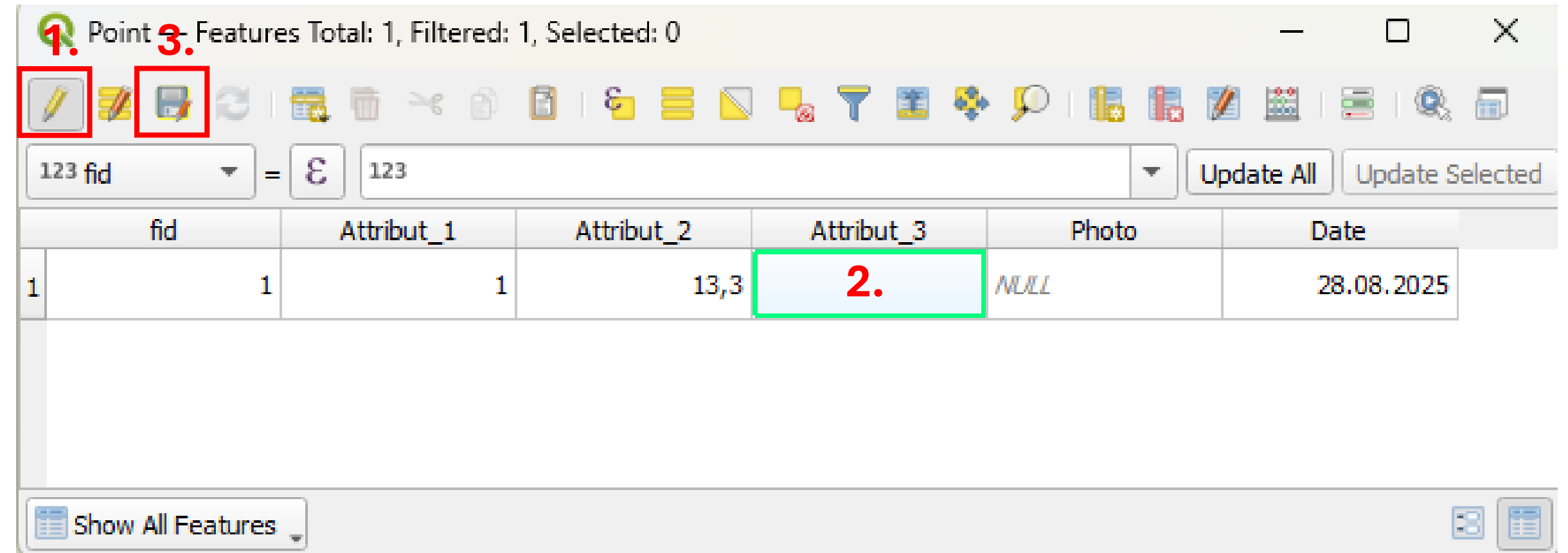
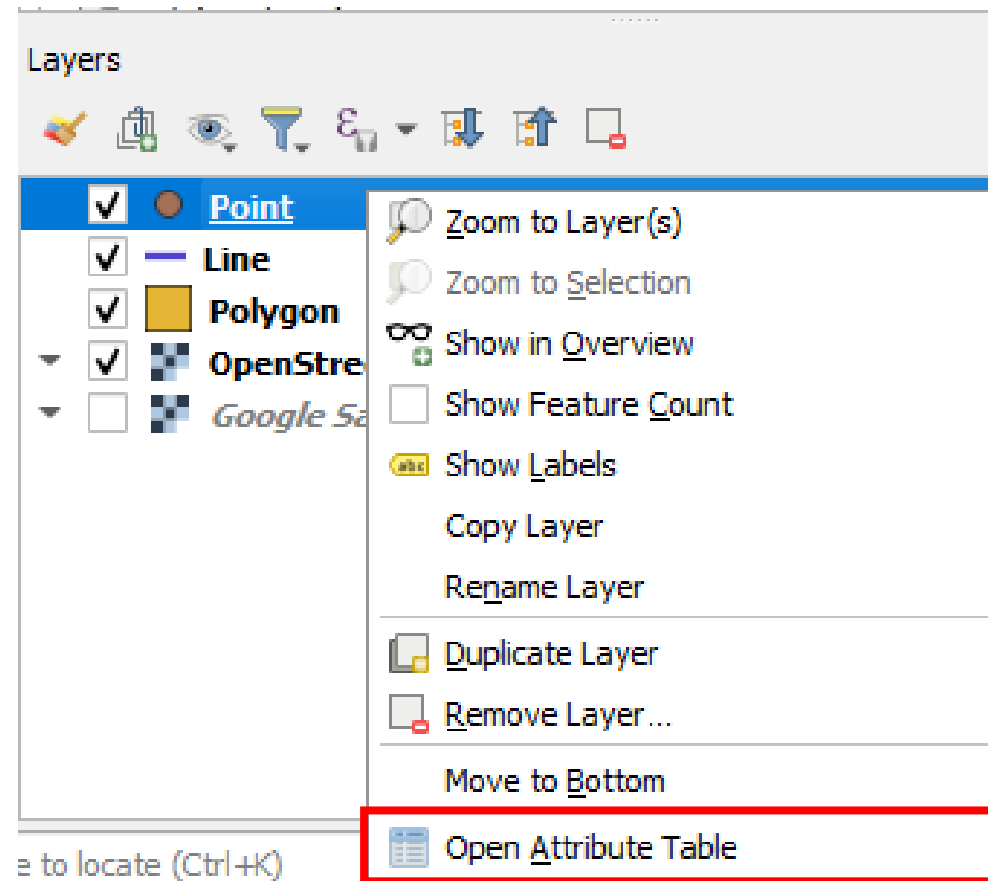


- Turn on advanced digitization tools (control panel)
- Move object, rotate object, scale object,...
- Fill Ring: Create island polygon
- Reshape features: Changing lines and boundaries
- Split features
- Merge selected features



Edit attributes

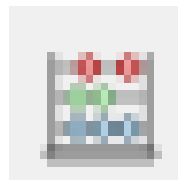
- **Attribute table**



1. Start editing
2. Edit the cell
3. Save edits
4. (1.) Stop editing

Edit attributes

- Field calculator



World_population — Features Total: 651, Filtered: 651, Selected: 0

	WB_2013	WB_2014	WB_2015	WB_2016	WB_2017	WB_2018	WB_2019
1	06,00000000...	53466,00000000...	52878,00000000...	52245,00000000...	51586,00000000...	50908,00000000...	50209,0000...
2	06,00000000...	53466,00000000...	52878,00000000...	52245,00000000...	51586,00000000...	50908,00000000...	50209,0000...
3	06,00000000...	53466,00000000...	52878,00000000...	52245,00000000...	51586,00000000...	50908,00000000...	50209,0000...
4	NULL	NULL	NULL	NULL	NULL	NULL	NULL
5	NULL	NULL	NULL	NULL	NULL	NULL	NULL
6	NULL	NULL	NULL	NULL	NULL	NULL	NULL
7	NULL	NULL	NULL	NULL	NULL	NULL	NULL
8	NULL	NULL	NULL	NULL	NULL	NULL	NULL
9	NULL	NULL	NULL	NULL	NULL	NULL	NULL
10	NULL	NULL	NULL	NULL	NULL	NULL	NULL
11	64,00000000...	88765,00000000...	89409,00000000...	89969,00000000...	90468,00000000...	90926,00000000...	91364,0000...
12	64,00000000...	88765,00000000...	89409,00000000...	89969,00000000...	90468,00000000...	90926,00000000...	91364,0000...
13	64,00000000...	88765,00000000...	89409,00000000...	89969,00000000...	90468,00000000...	90926,00000000...	91364,0000...
14	675,00000000...	106807,00000000...	107906,00000000...	108727,00000000...	108735,00000000...	108908,00000000...	109203,0000...

World_population — Field Calculator

Only update selected features

Create a new field Update existing field

Create virtual field

Output field name: Difference

Output field type: 123 Integer (32 bit)

Output field length: 10 Precision: 3

Expression: "WB_2024" - "WB_2023"

Feature: Afghanistan

Preview: 1192731

Buttons: OK, Cancel, Apply, Help

New field or update existing field

← Definition of output field

← Enter expression

← Double click to add field names, expressions, ...

← Pay attention to Preview, if expression is valid!



→ Save edits and stop editing at the end!

Day 2: Data analysis

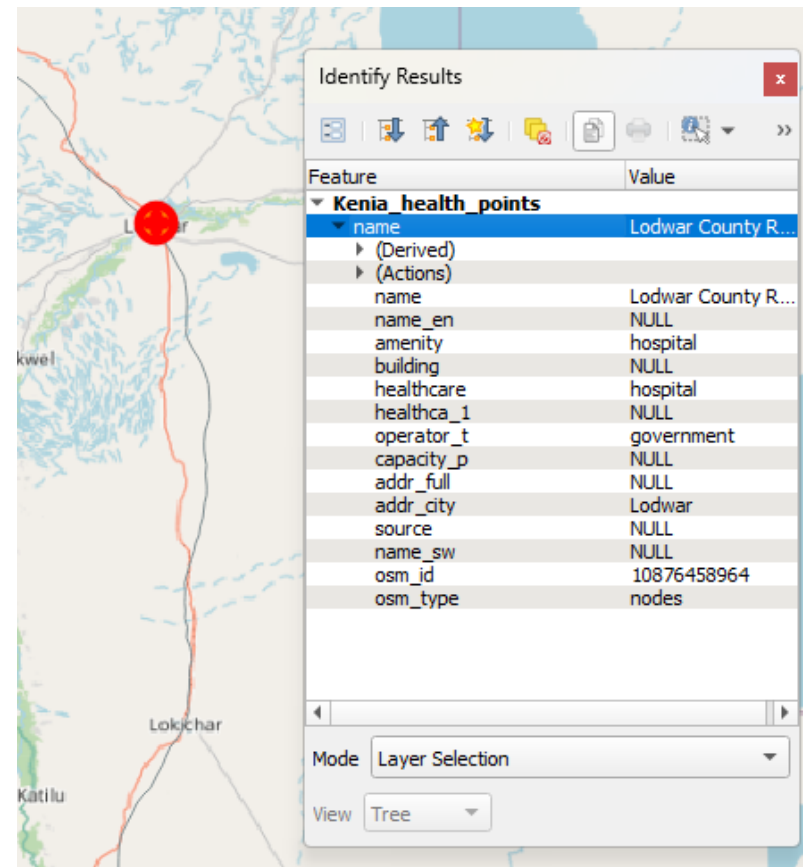
Geoprocessing

Science for [life]

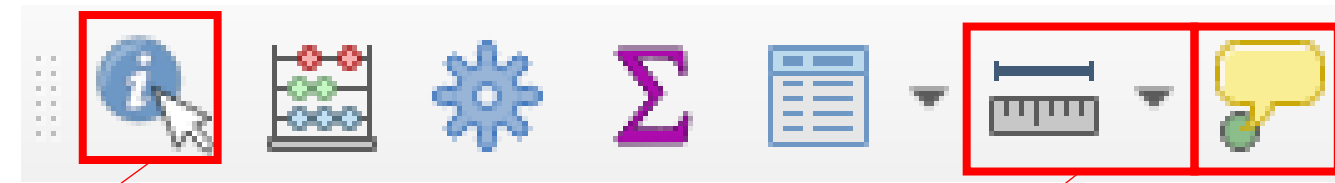
Basic analysis tools

- Attributes toolbar

- Identify features

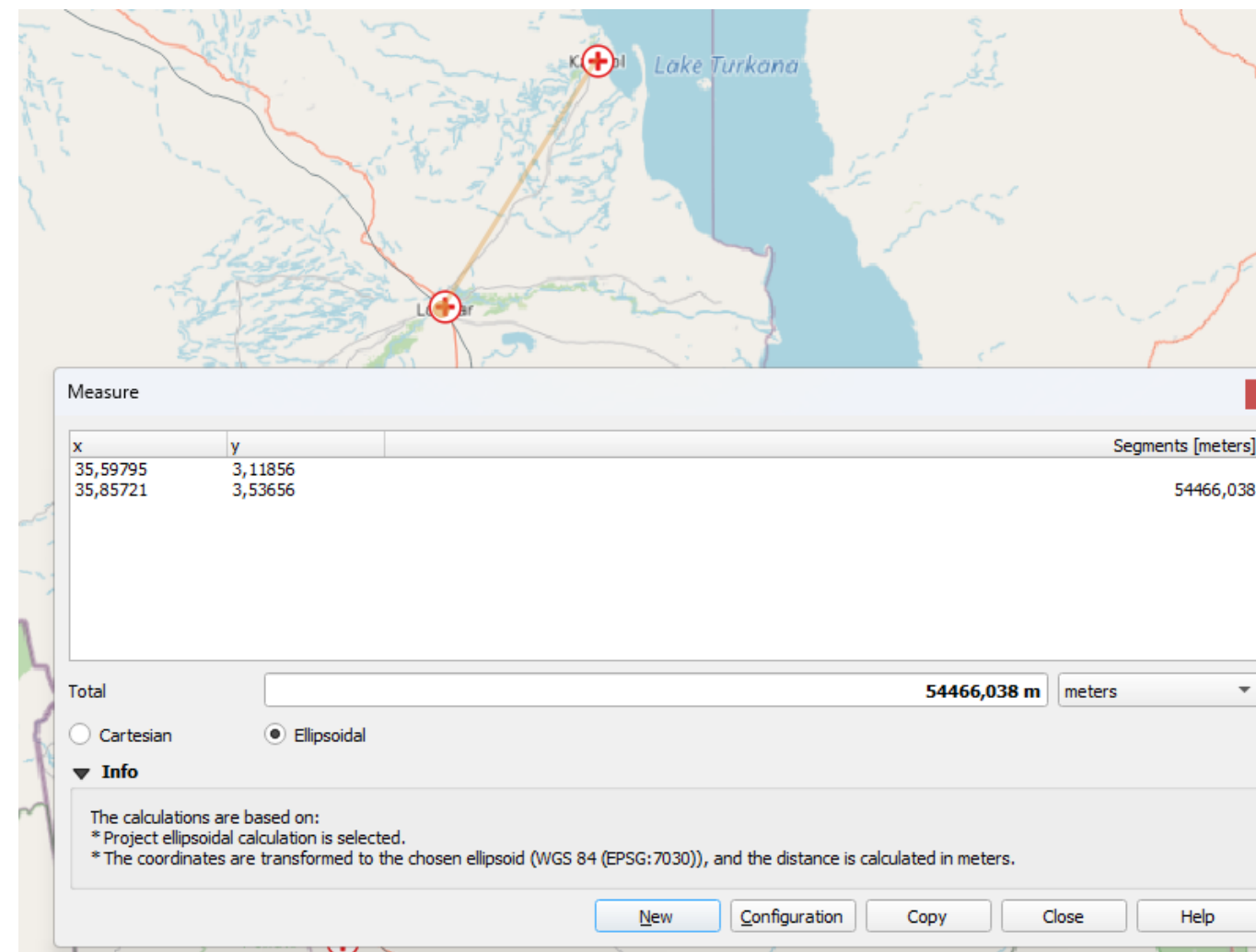
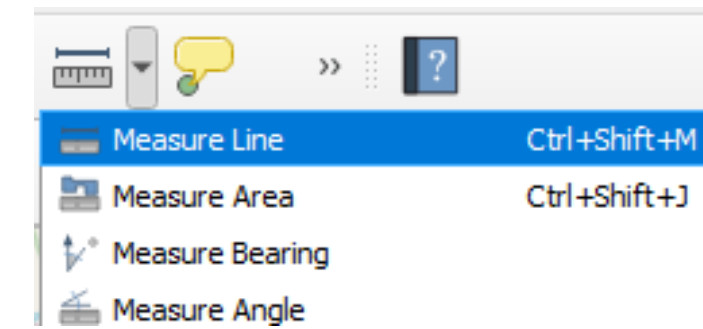


→ Content of attribute table for single feature



- Measurements

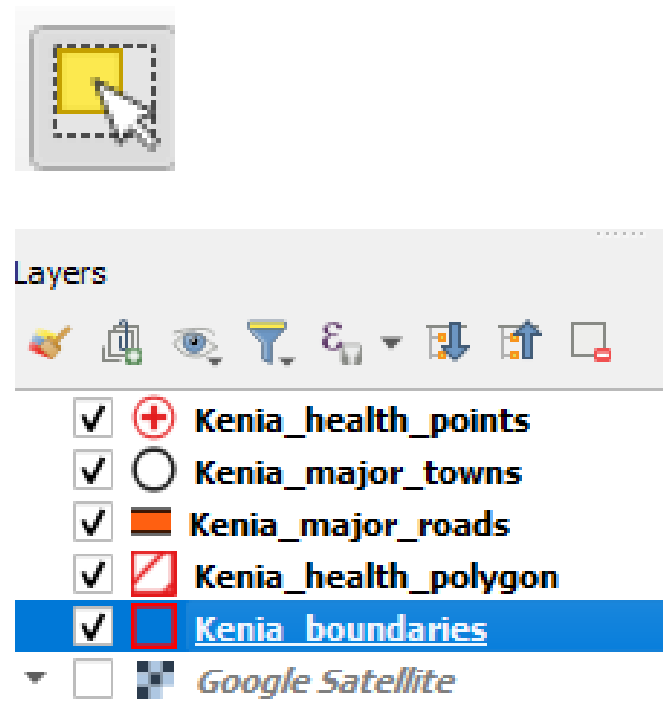
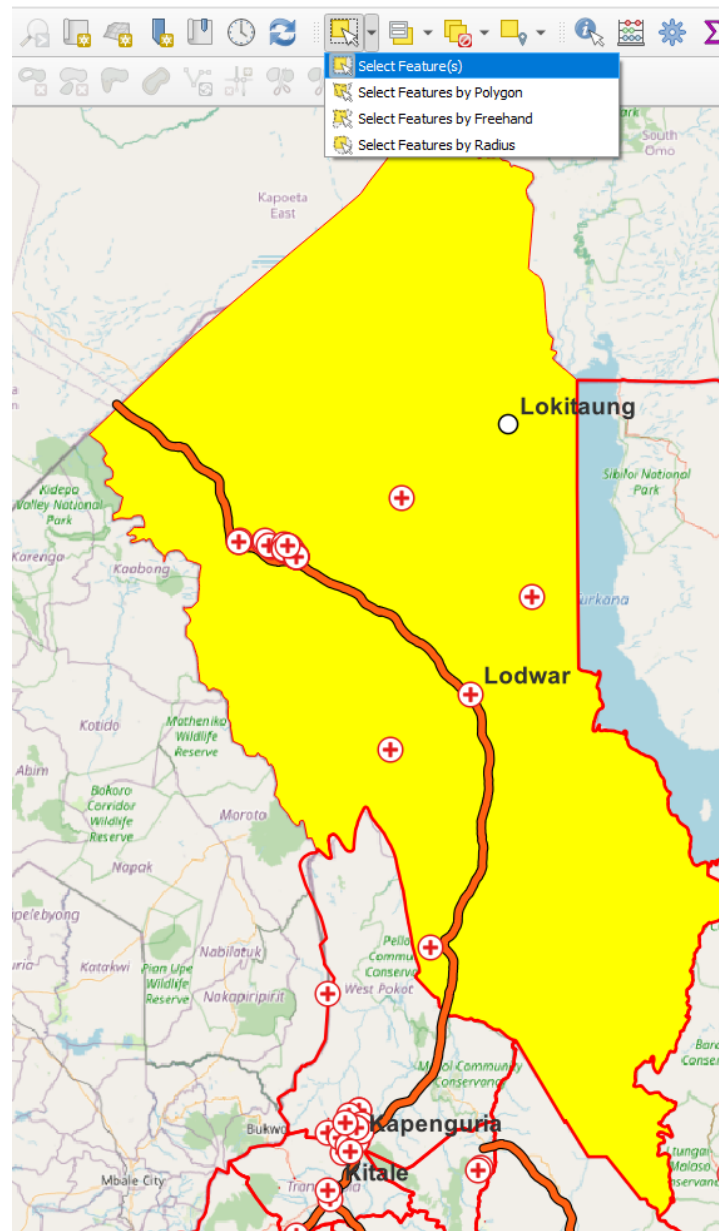
- Show Map Tips



Selection

- Select features by area or single click

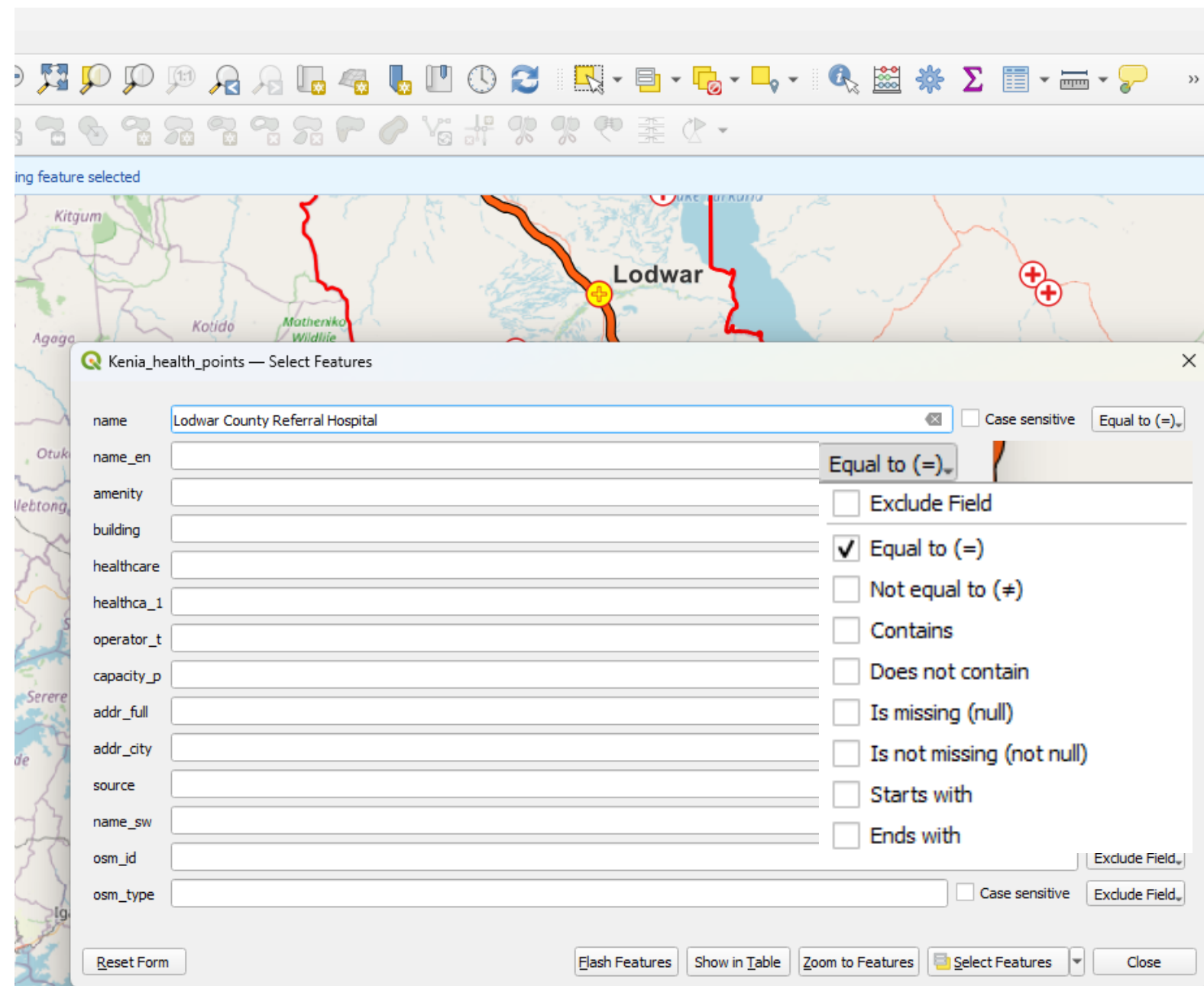
- Deselect features



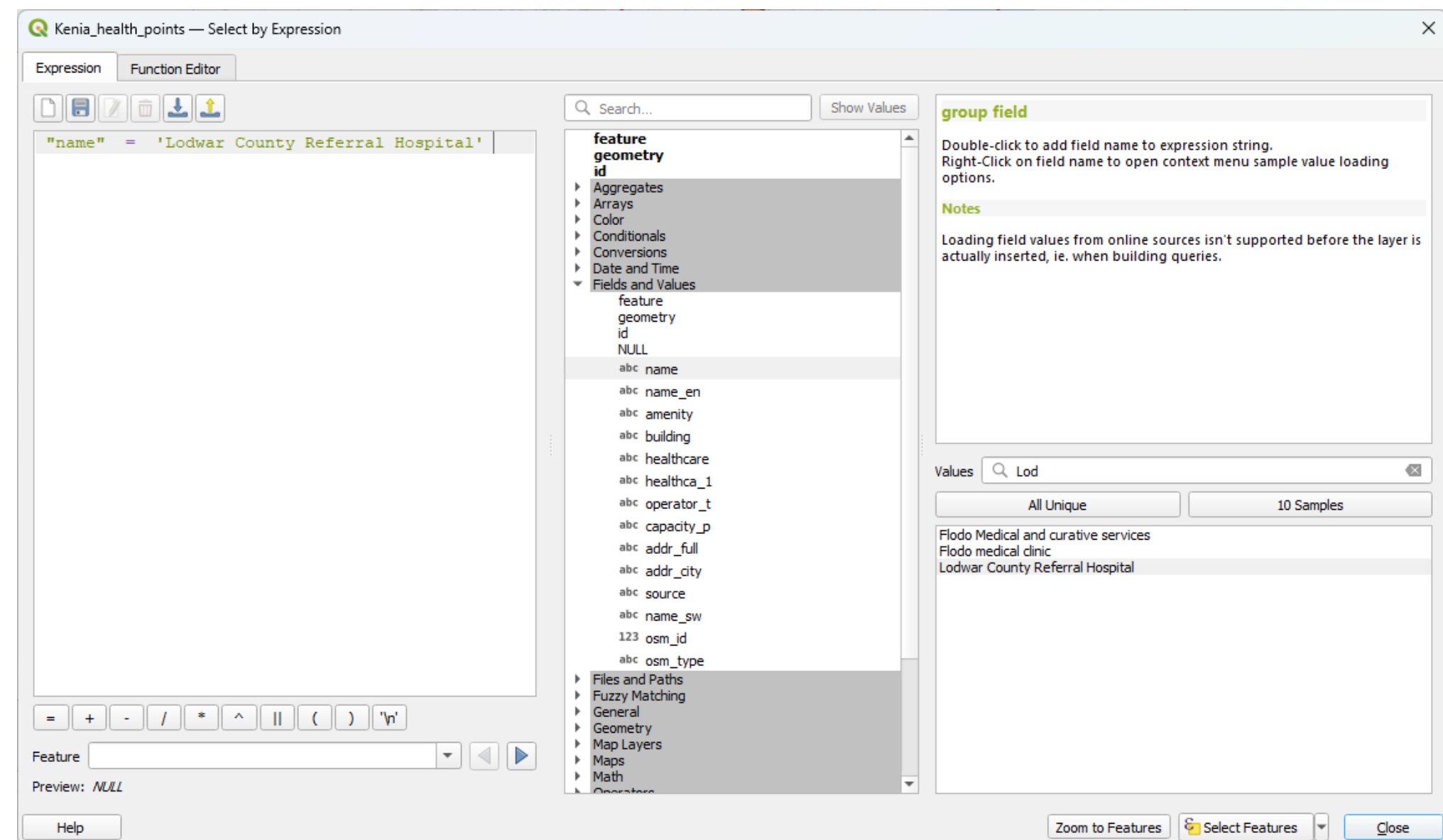
→ Highlight layer to select features from

Selection

- Select features by value 

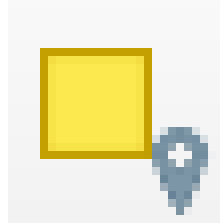


- Select features by expression 



Selection

- **Select by location**



Vector Selection - Select by Location

Parameters Log

Select features from
Kenia_health_points [EPSG:4326]

Where the features (geometric predicate)

intersect touch
 contain overlap
 disjoint are within
 equal cross

By comparing to the features from
Kenia_boundaries [EPSG:4326]

Selected features only

Modify current selection by
creating new selection

0%

Advanced Run as Batch Process... Run Close Help

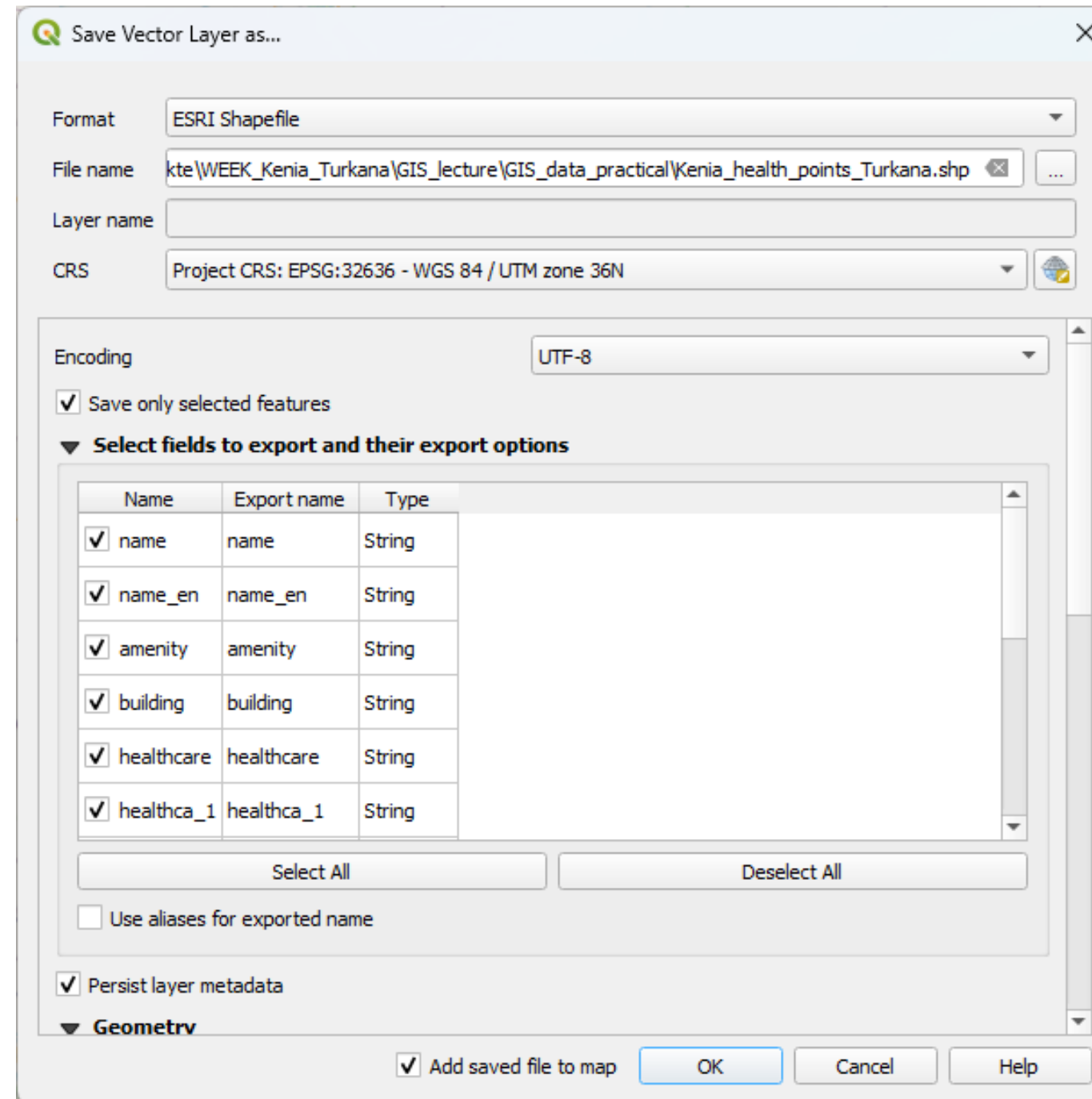
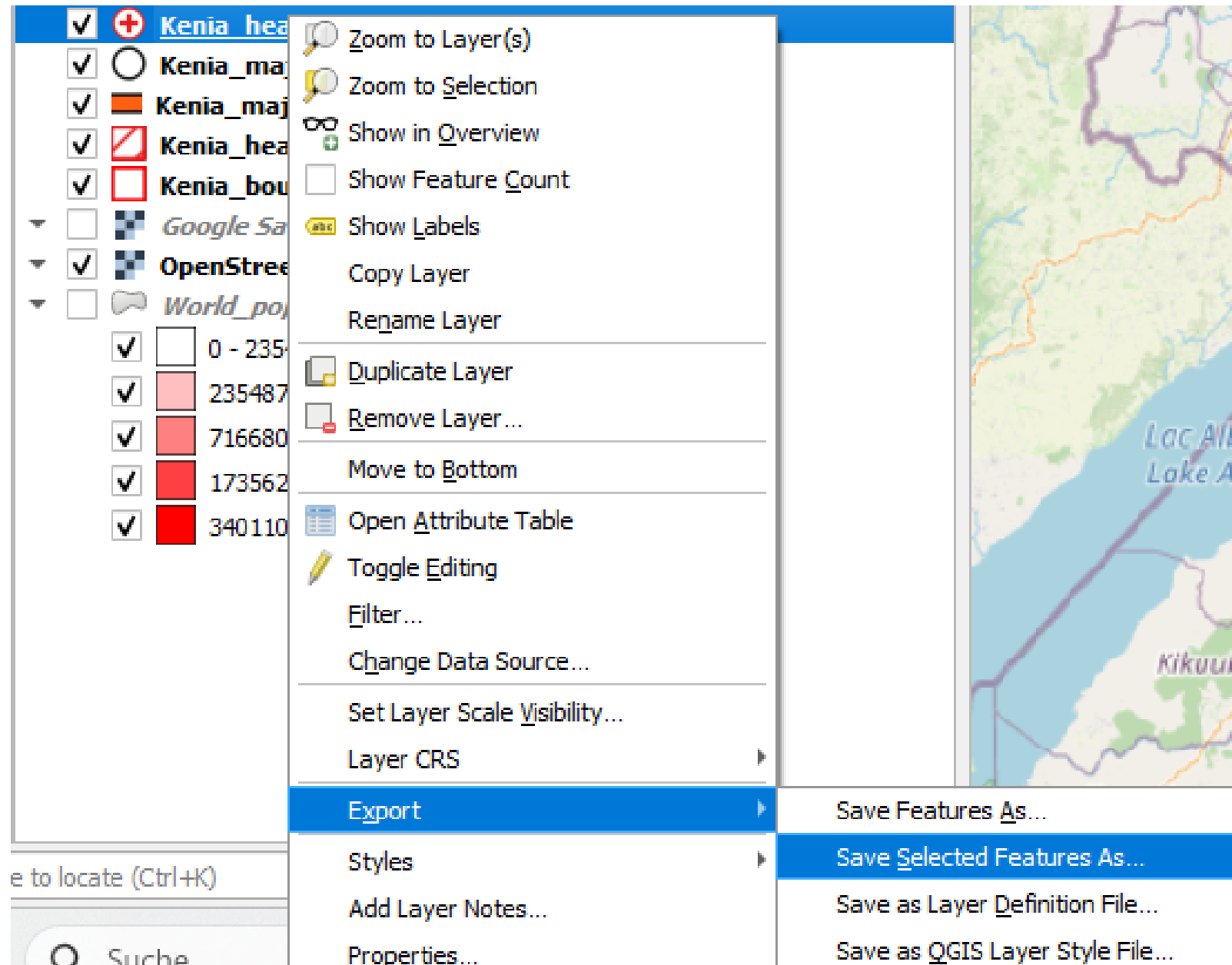
Select by location

This algorithm creates a selection in a vector layer. The criteria for selecting features is based on the spatial relationship between each feature and the features in an additional layer.

Example: select all health points which are withing Turkana district.

Export selected features

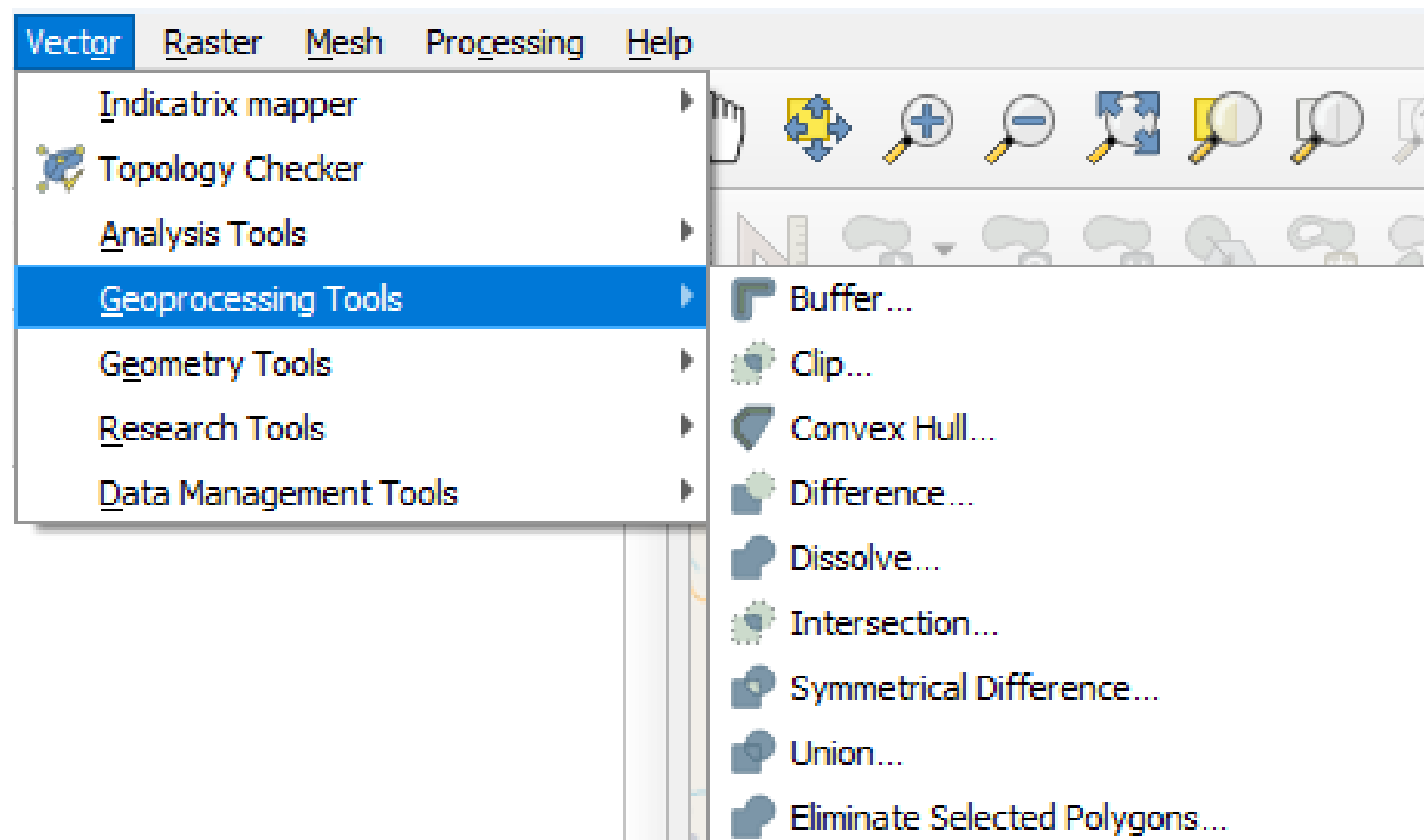
- Create a new layer with just the selected objects



- Data type
- New name
- Coordinate reference system
- Attribute fields to export
- ...

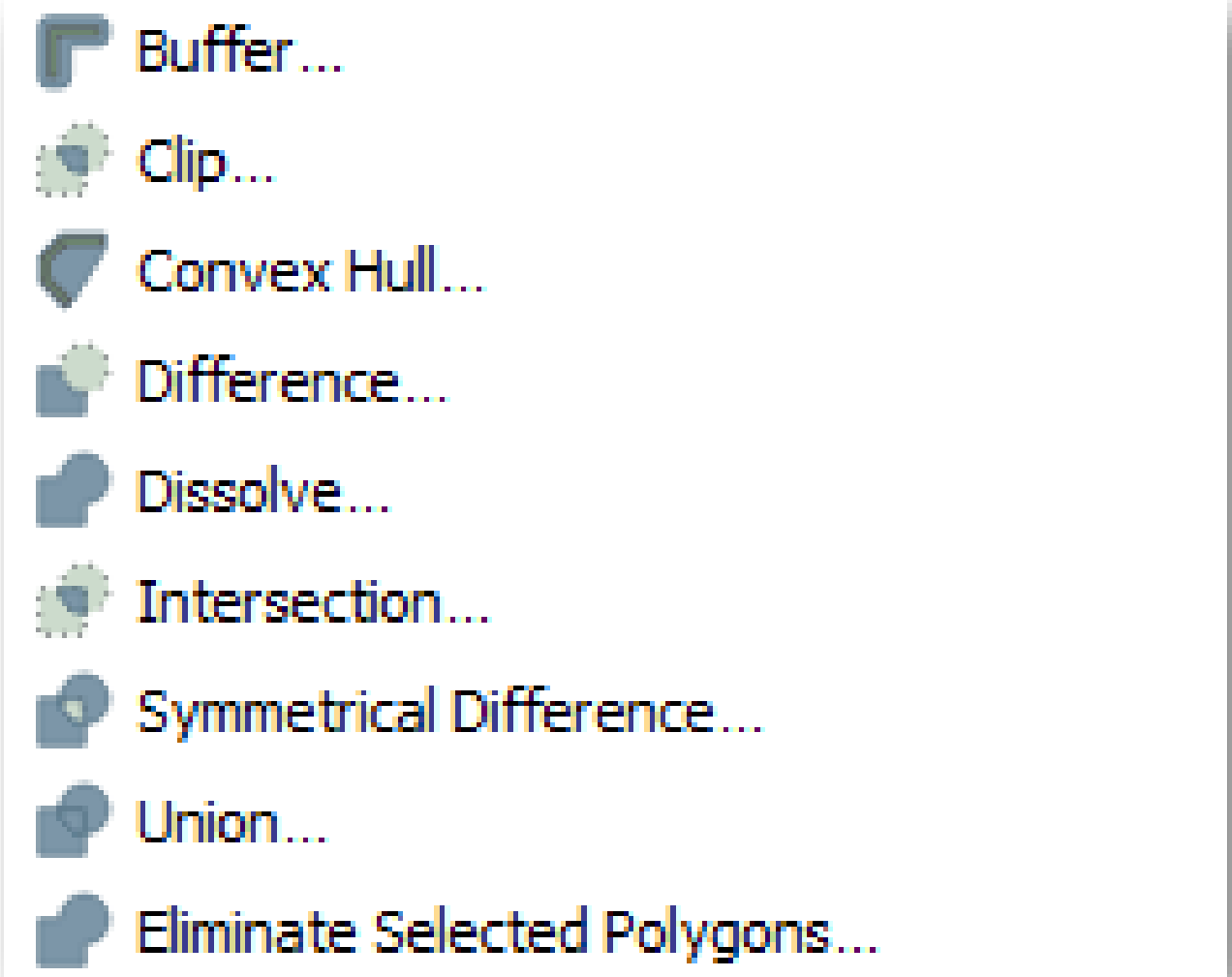
Geoprocessing

- QGIS geoprocessing involves using specialized tools within the QGIS GIS software **to manipulate spatial data, creating new datasets** by performing operations like buffering (creating zones around features), clipping (extracting features within a boundary), dissolving (aggregating features), unioning (combining layers), and intersecting (finding overlapping areas). These tools are fundamental for data preparation, analysis, and generating insights for decision-making in fields such as urban planning, agriculture, and environmental management



Geoprocessing

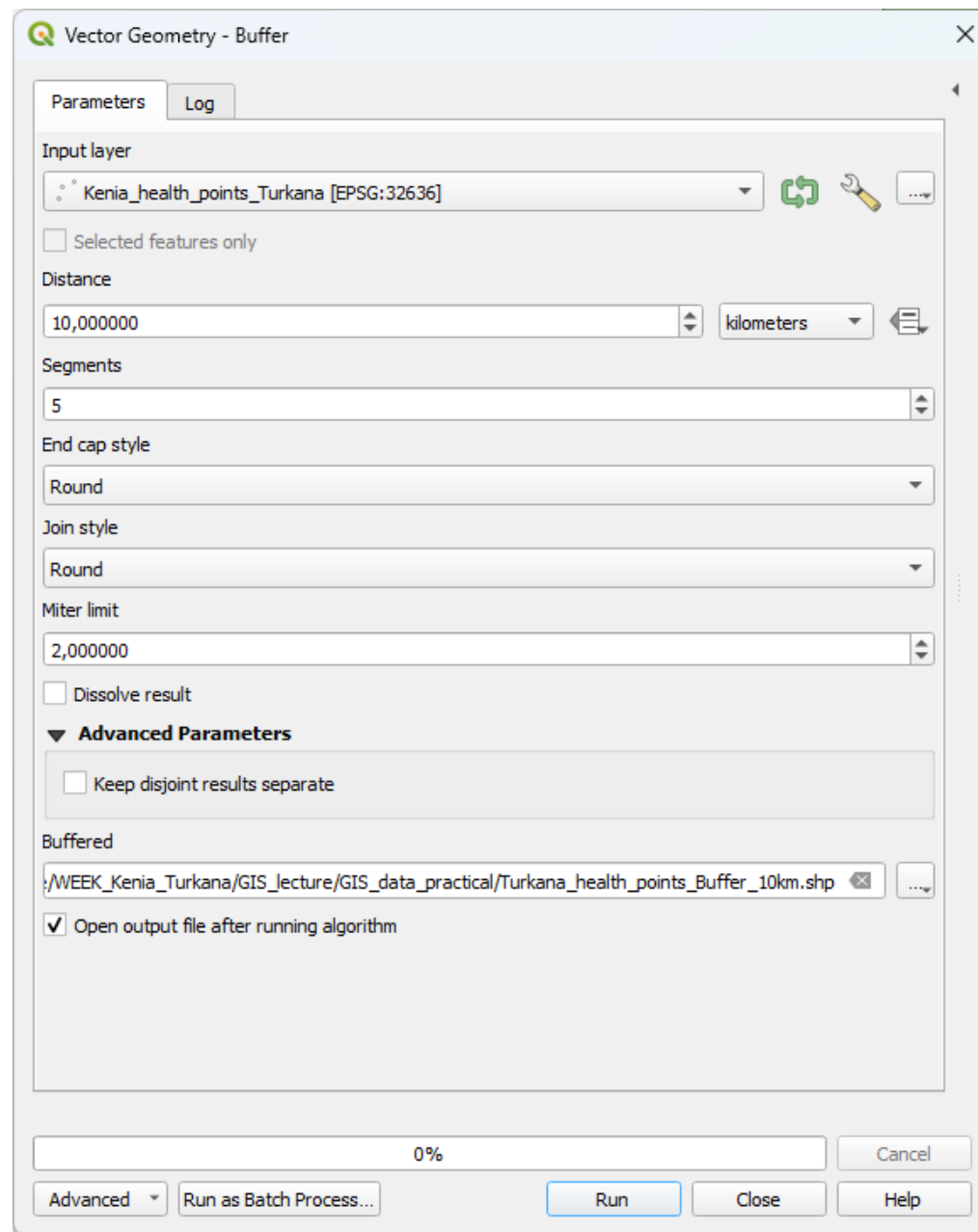
- **Buffer**
- **Clip**
- **Difference**
- **Dissolve**
- **Intersection**
- **Union**



Output: always a new layer.
 Either permanent (saved on
 harddisk asShape-File or
 GeoPackage) or temporary.

Buffer

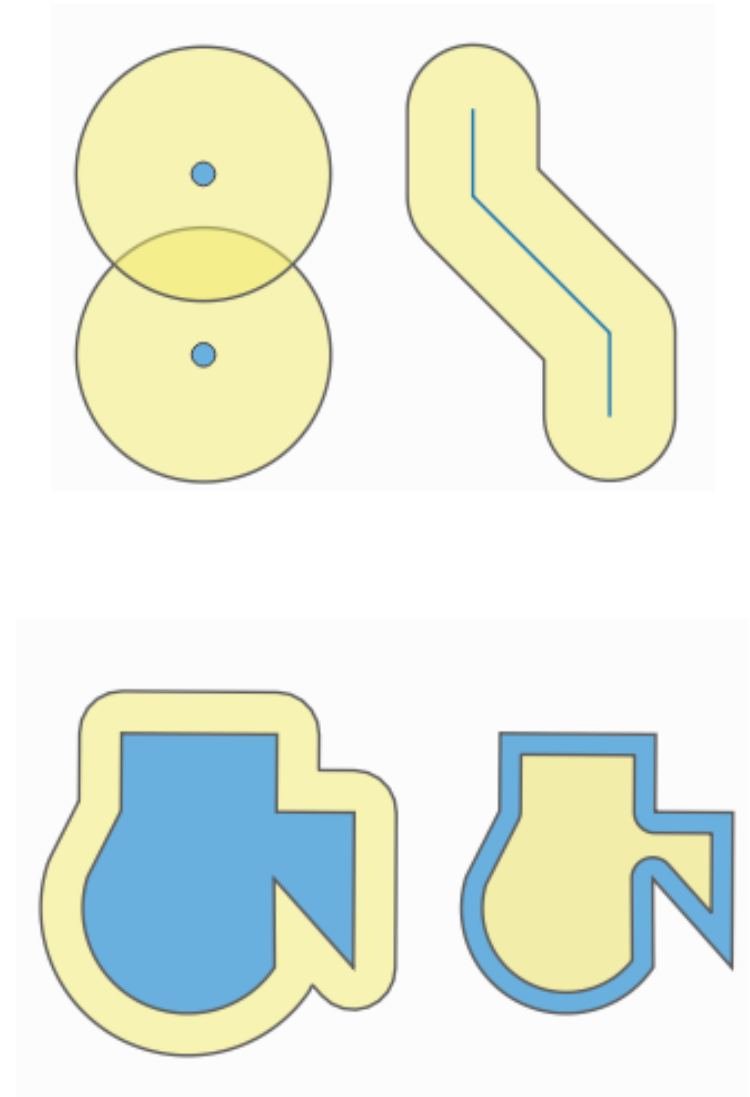
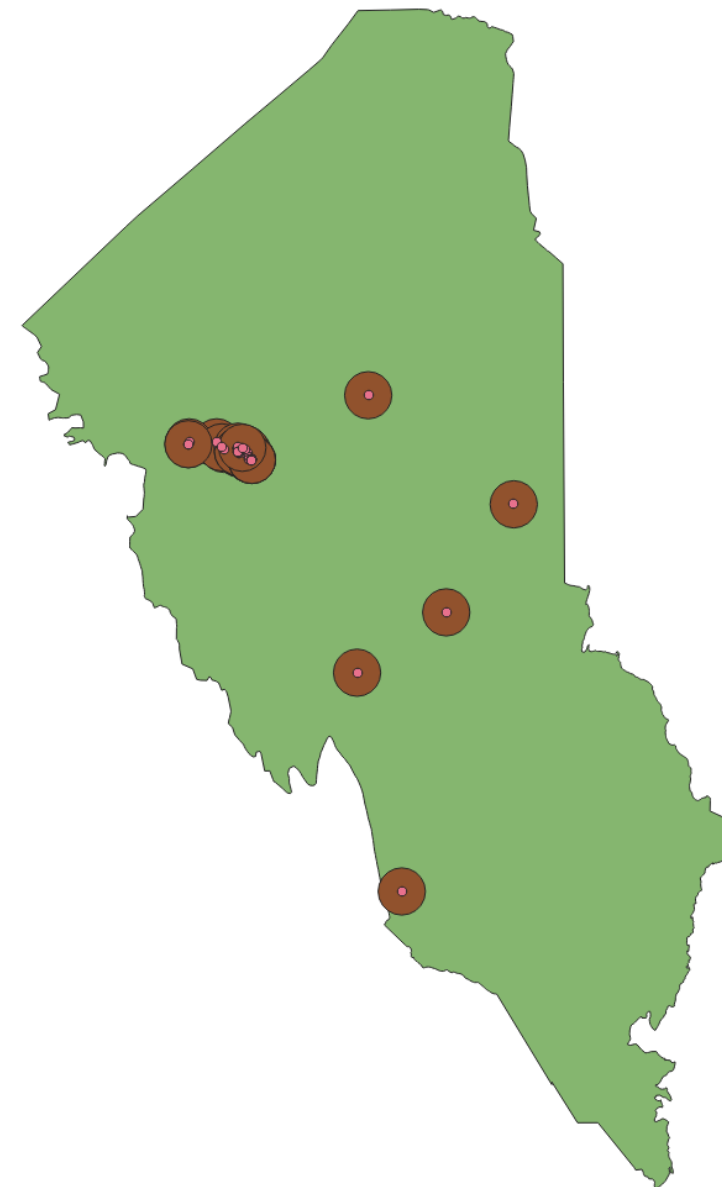
- **Proximity:** Computes a buffer area for all the features in an input layer, using a fixed or data defined distance. It is possible to use a negative distance for polygon input layers. In this case the buffer will result in a smaller polygon (setback).



→ Input

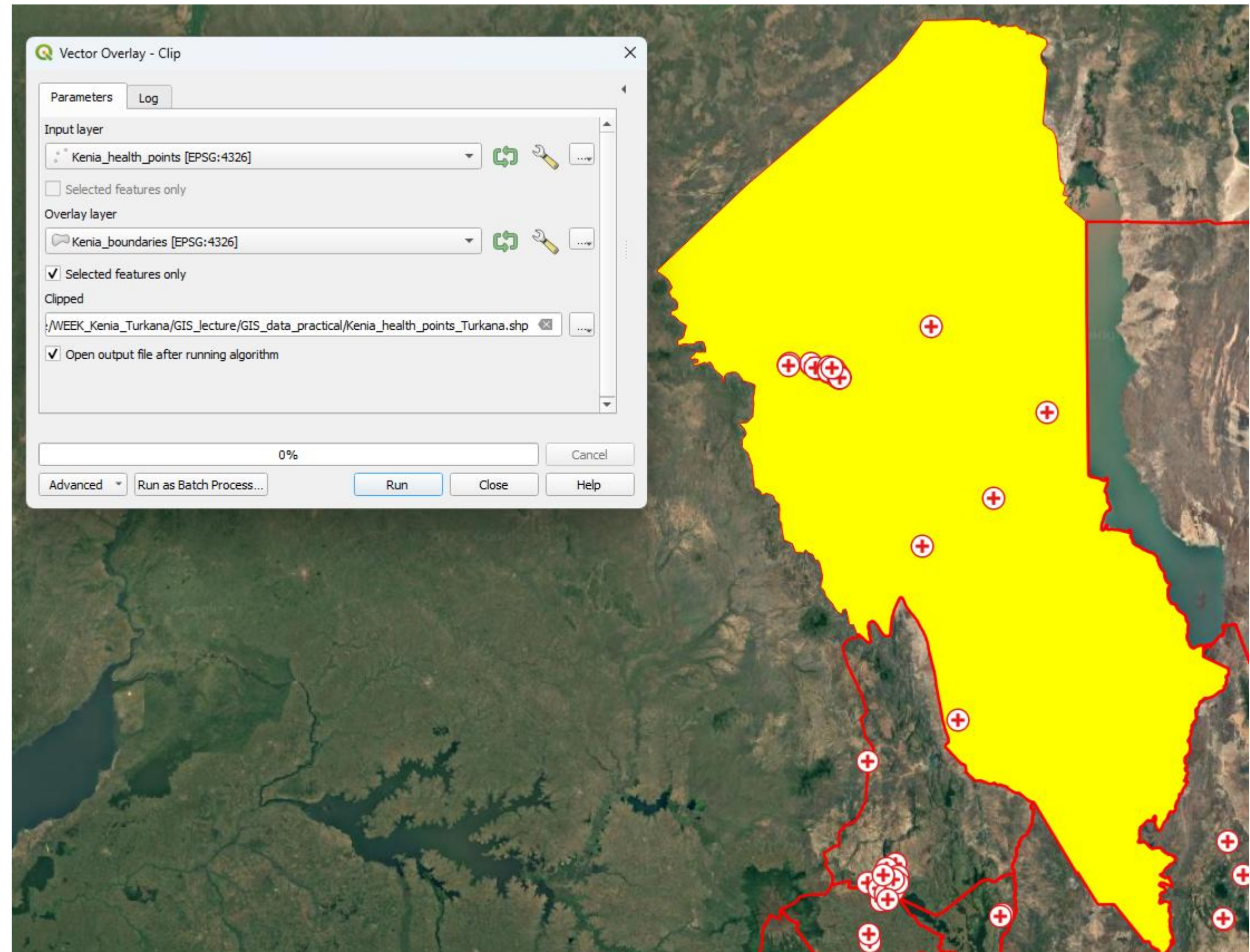
→ Distance (depends on CRS of the layer!)

→ Output layer (Shape-File or GPKG)



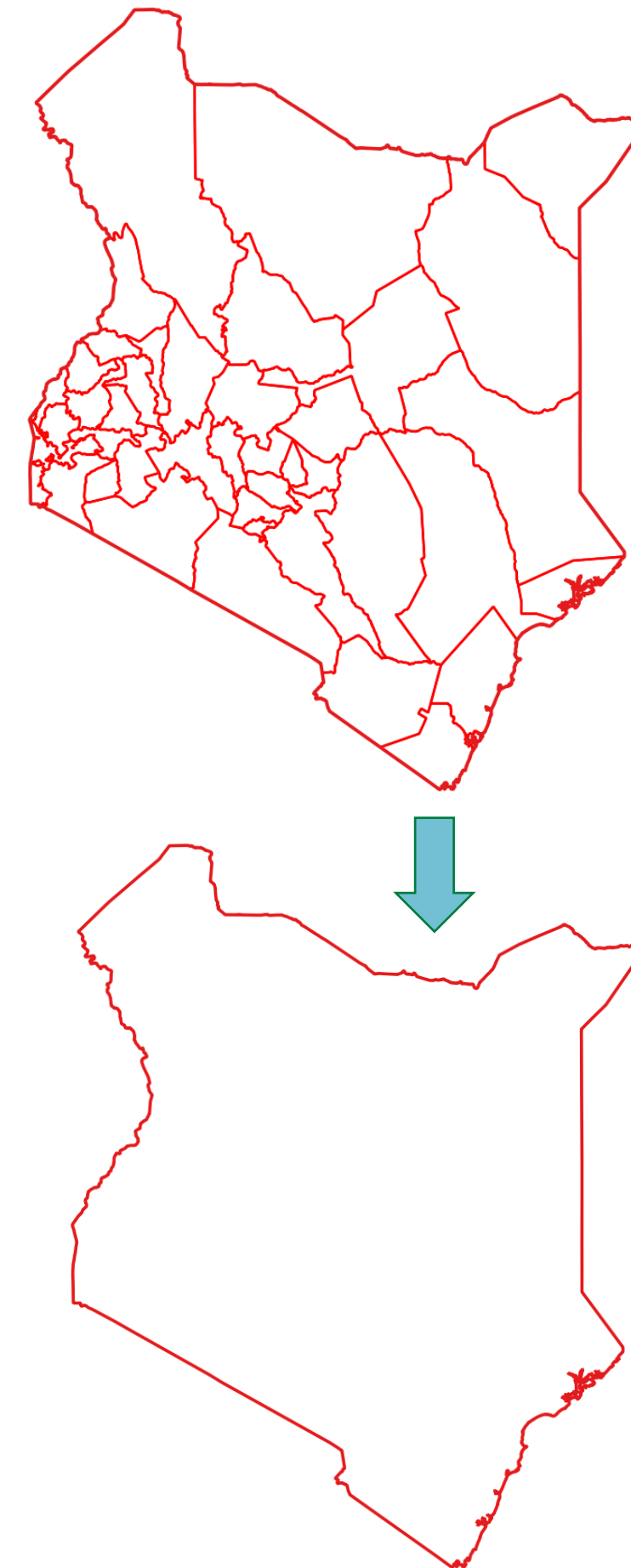
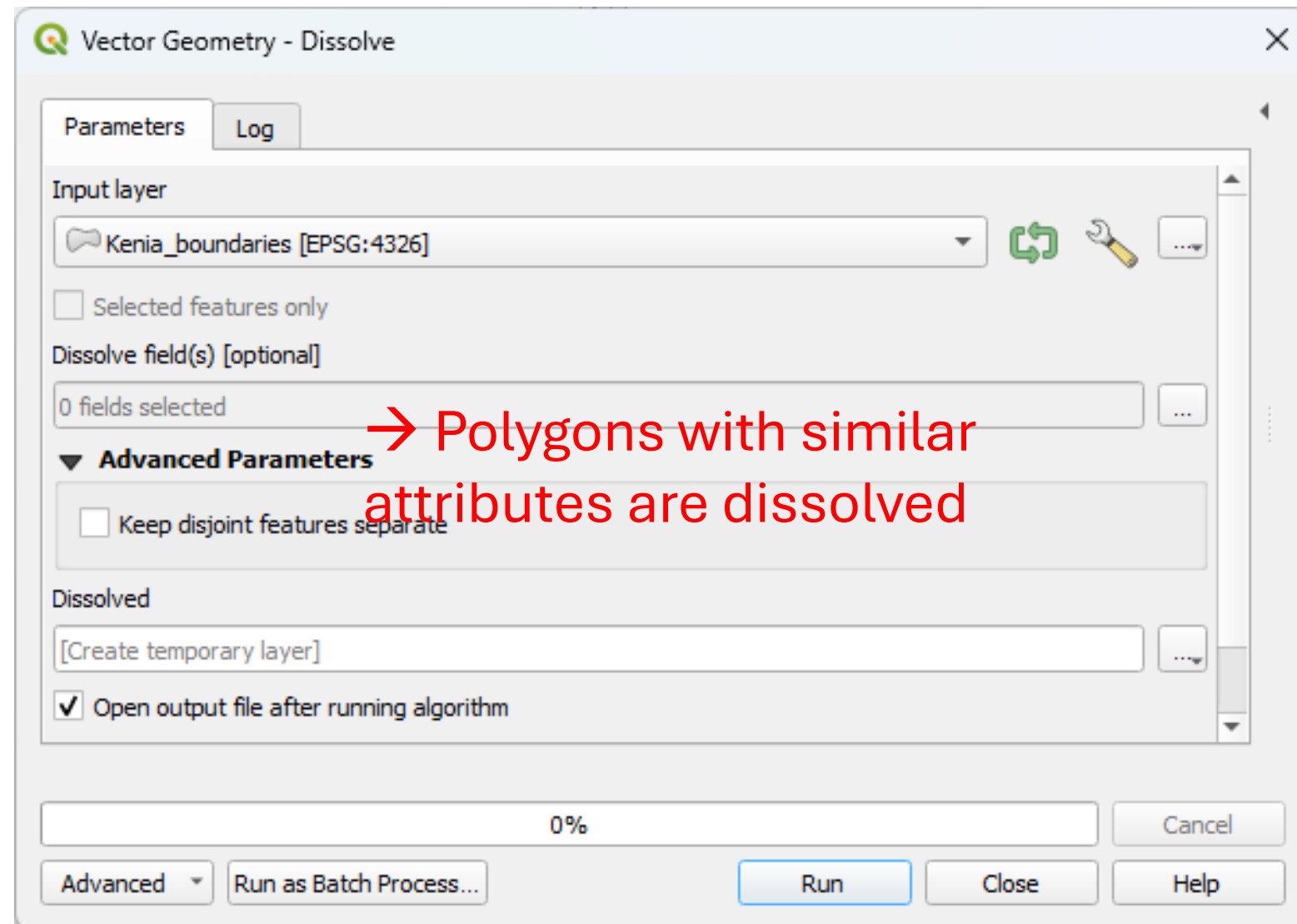
Clip

- Clip objects:** Clips a vector layer using the features of an additional polygon layer. Only the parts of the features in the input layer that fall within the polygons of the overlay layer will be added to the resulting layer.



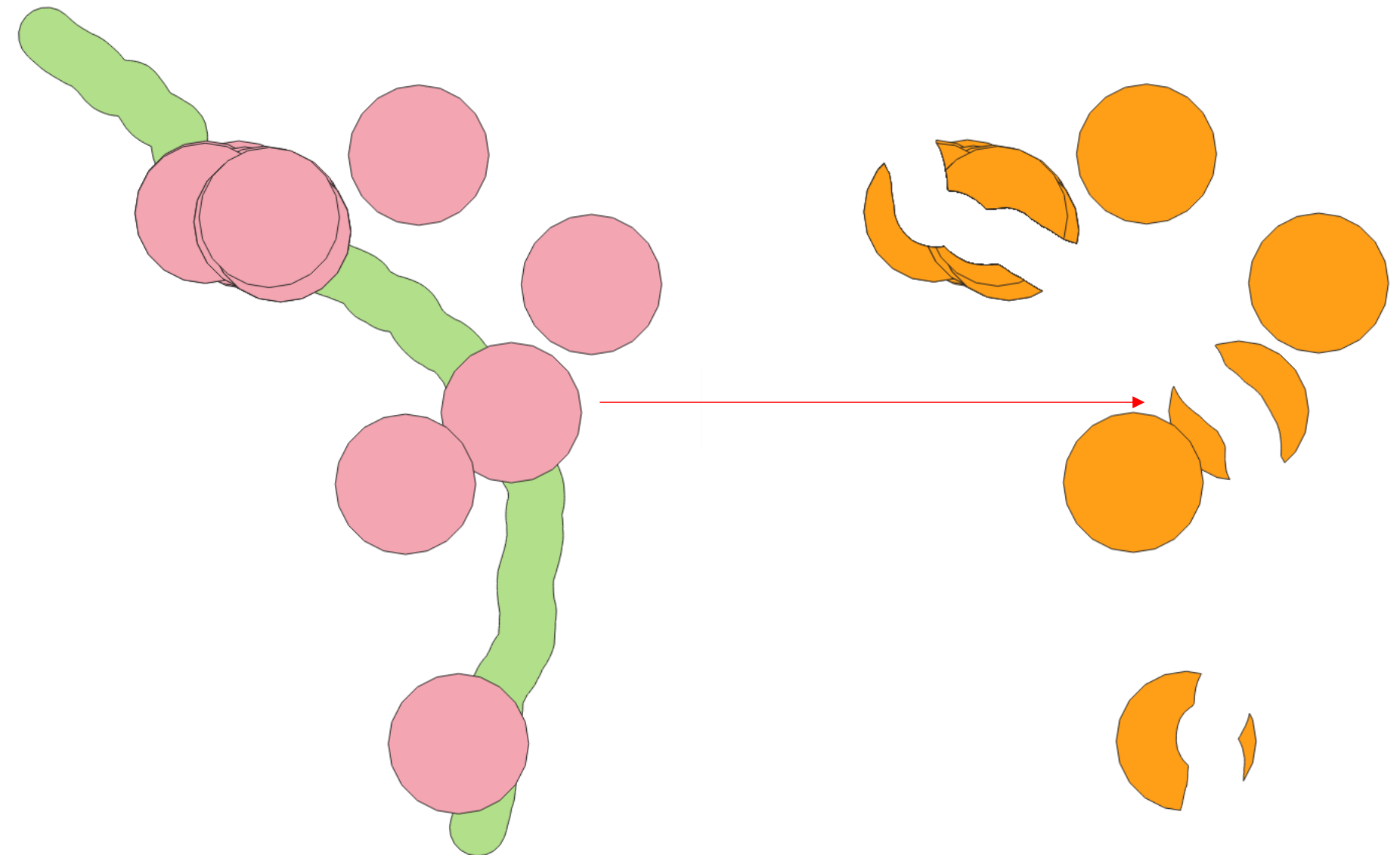
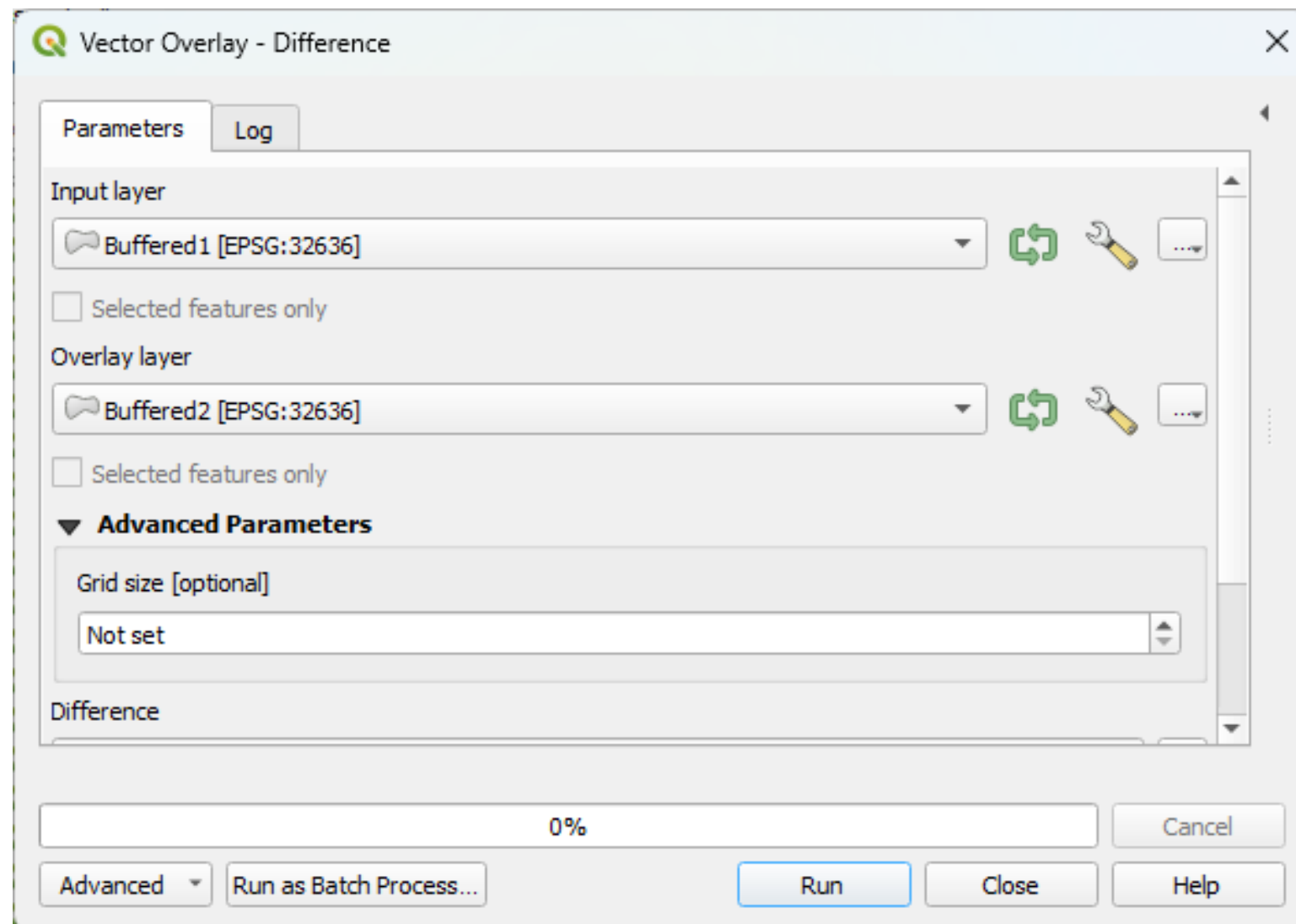
Dissolve

- Dissolving objects based on shared attribute. Leads to connected features (adjacent polygons) or multipart features.



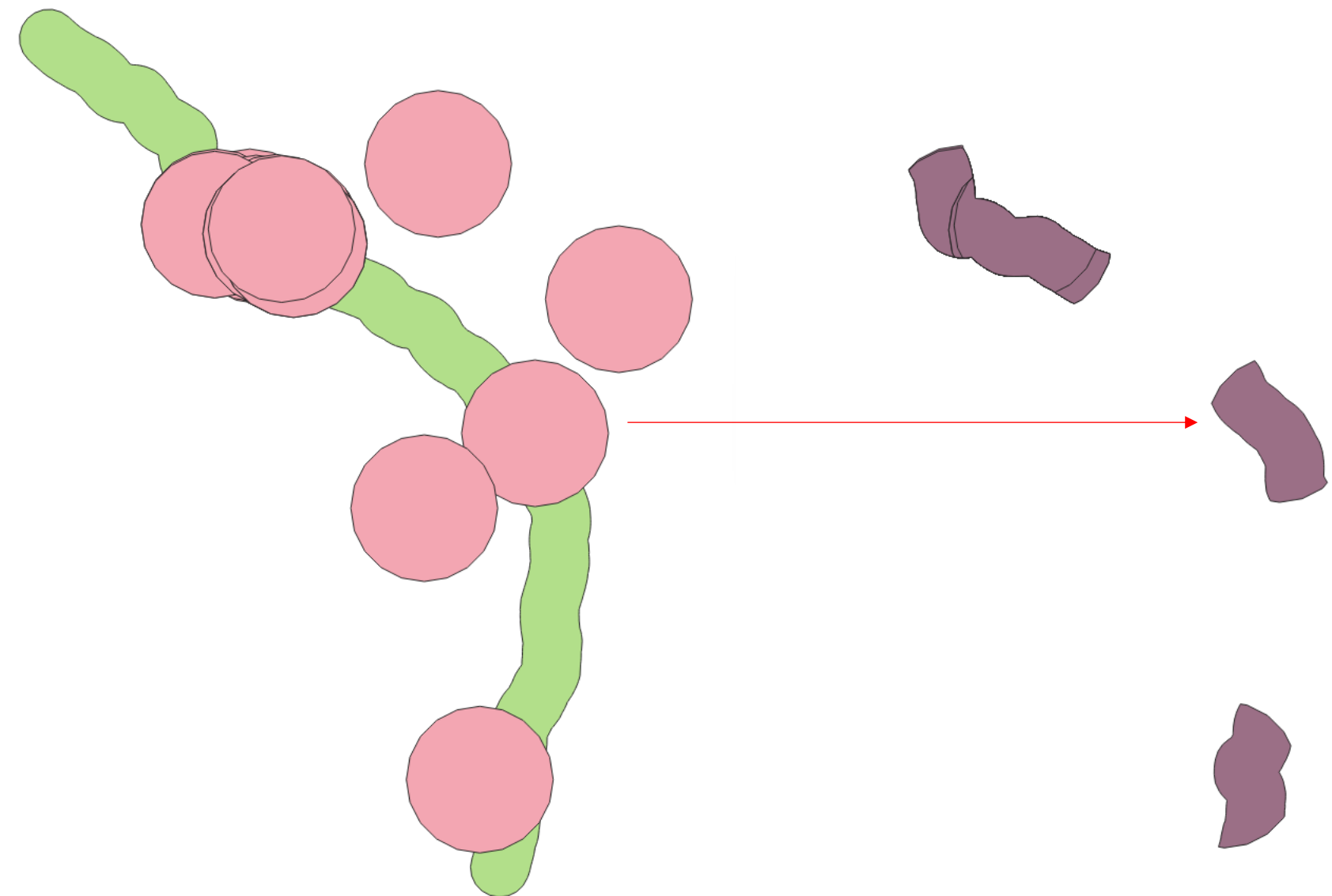
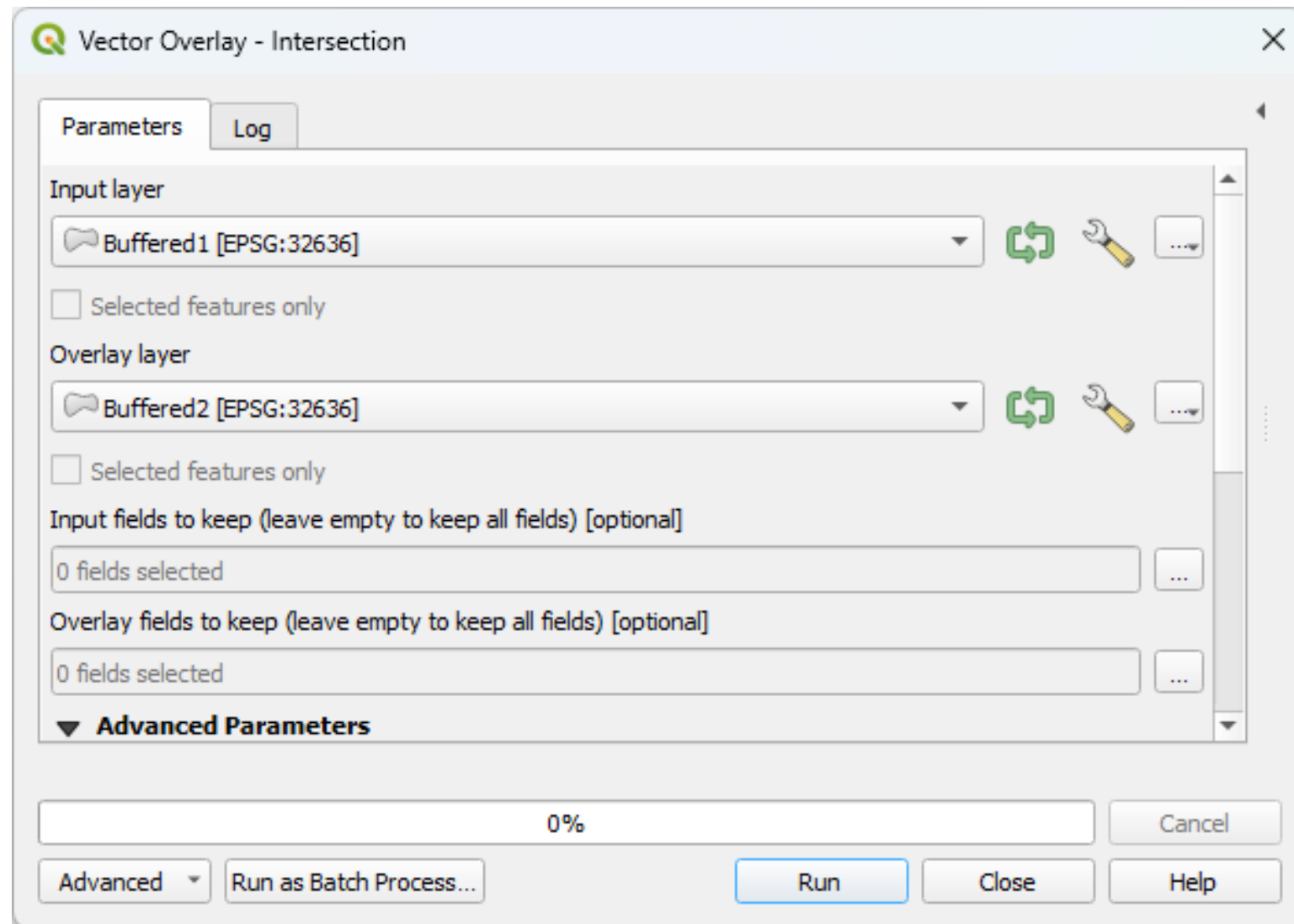
Difference

- Extracts features from the input layer that don't fall within the boundaries of the overlay layer.



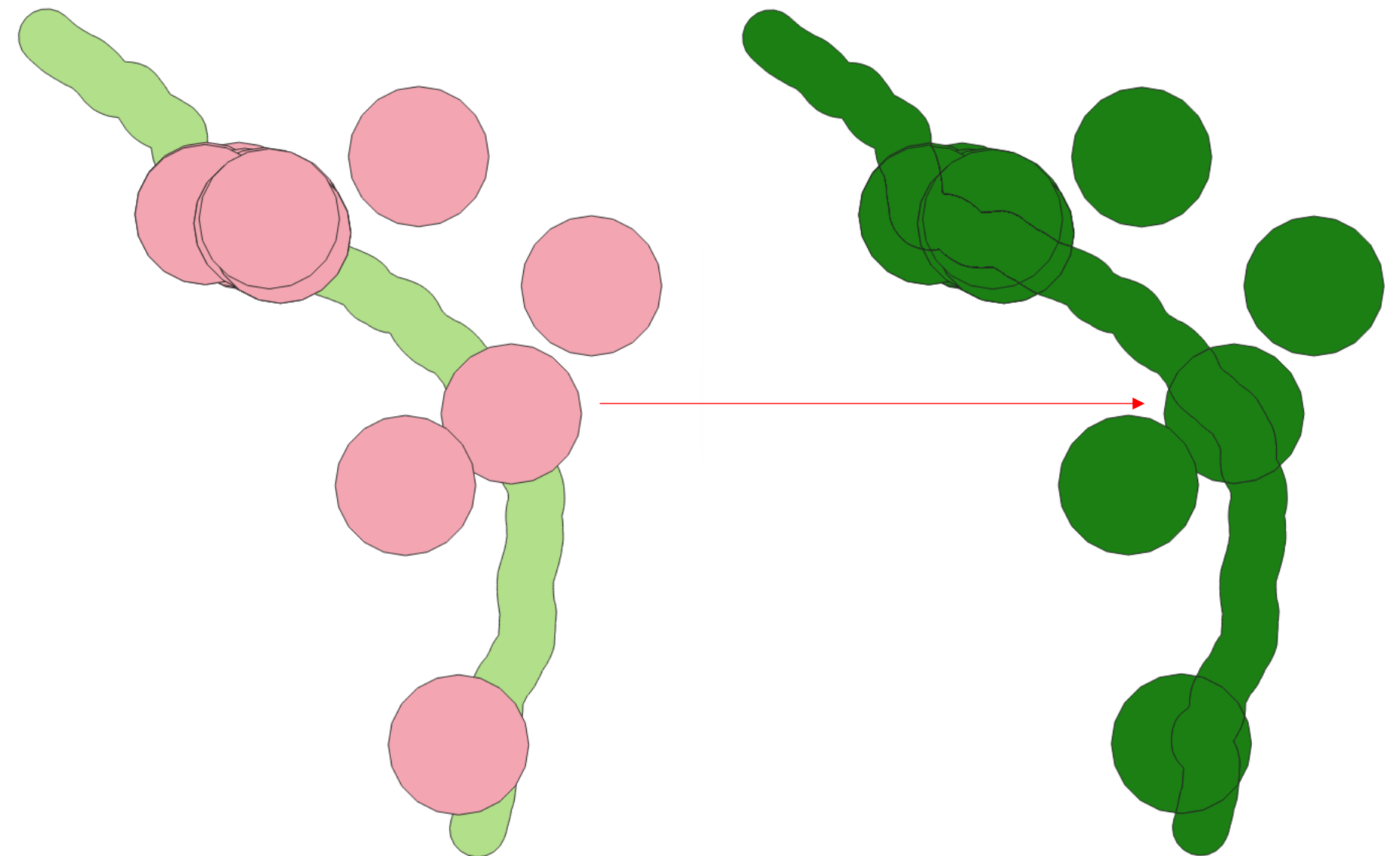
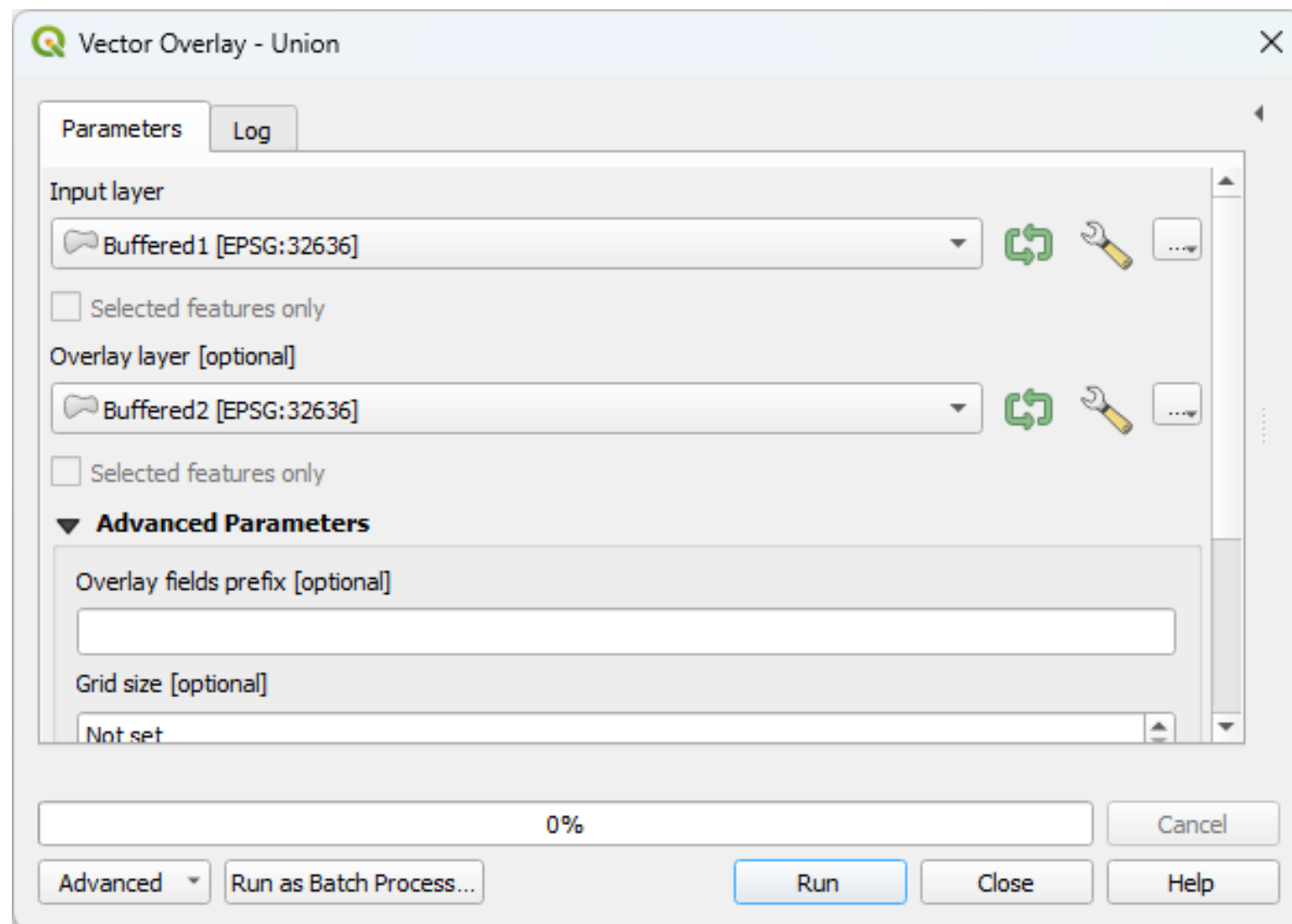
Intersect

- An Intersect is an analytical operation that can be used to select any part of a feature that intersects with one or more other features.



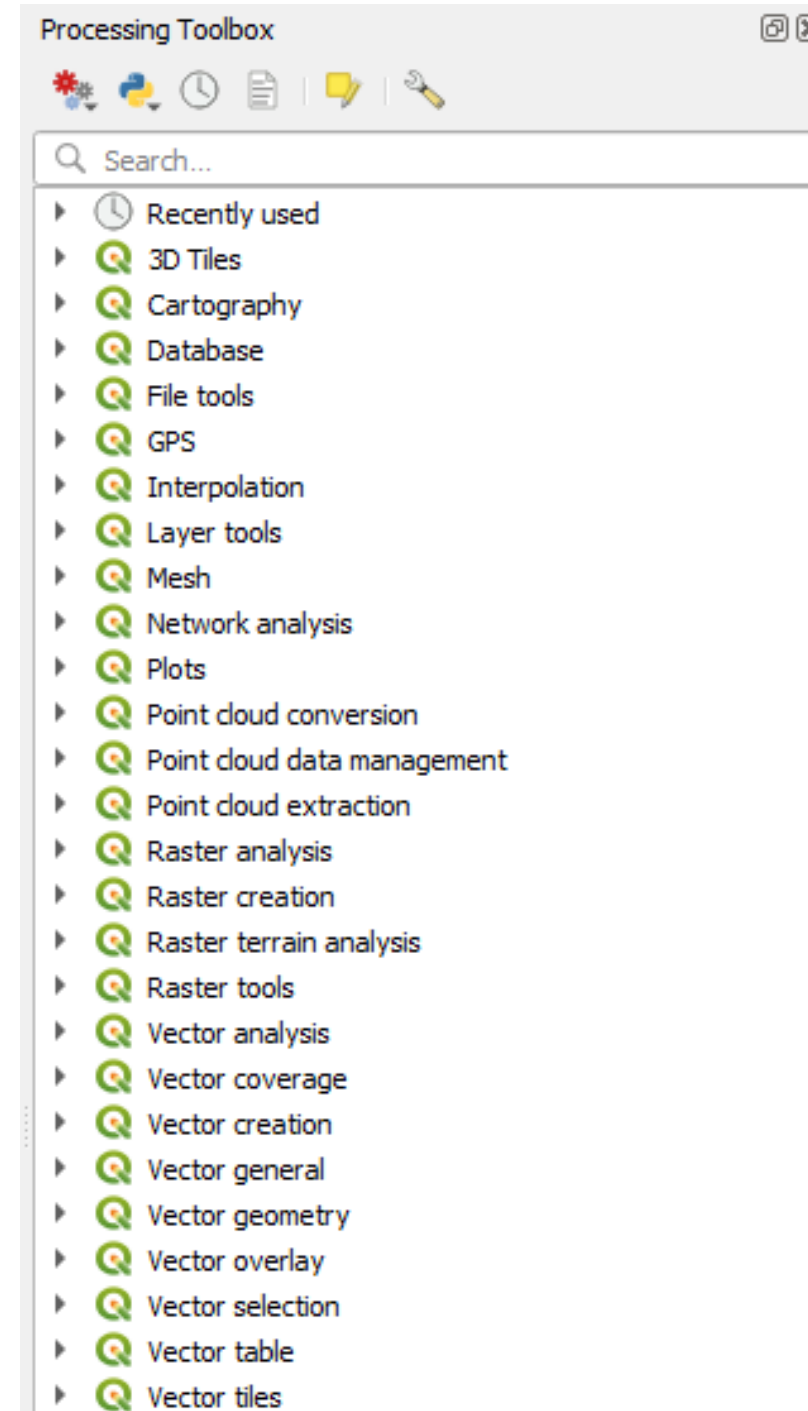
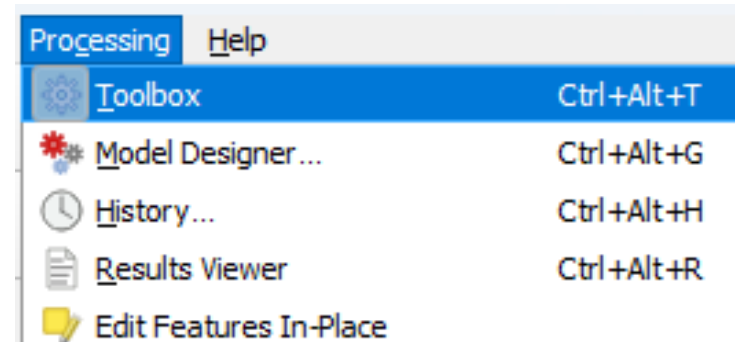
Union

- Union checks overlapping features within an input layer and creates separate features for overlapping and non-overlapping parts.



Processing Toolbox

- QGIS offers many more tools to analyse vector and data for different purposes.



- Vector analysis
 - Basic statistics for fields
 - Climb along line
 - Count points in polygon
 - DBSCAN clustering
 - Distance matrix
 - Distance to nearest hub (line to hub)
 - Distance to nearest hub (points)
 - Join by lines (hub lines)
 - K-means clustering
 - List unique values
 - Mean coordinate(s)
 - Nearest neighbour analysis
 - Overlap analysis
 - Shortest line between features
 - ST-DBSCAN clustering
 - Statistics by categories
 - Sum line lengths

- Raster analysis
 - Cell stack percent rank from value
 - Cell stack percentile
 - Cell stack percentrank from raster layer
 - Cell statistics
 - Equal to frequency
 - Fuzzify raster (gaussian membership)
 - Fuzzify raster (large membership)
 - Fuzzify raster (linear membership)
 - Fuzzify raster (near membership)
 - Fuzzify raster (power membership)
 - Fuzzify raster (small membership)
 - Greater than frequency
 - Highest position in raster stack
 - Less than frequency
 - Lowest position in raster stack
 - Raster boolean AND
 - Raster boolean OR
 - Raster calculator
 - Raster calculator (virtual)
 - Raster layer properties
 - Raster layer statistics
 - Raster layer unique values report
 - Raster layer zonal statistics
 - Raster surface volume
 - Reclassify by layer
 - Reclassify by table

Plugins

- Many tools developed by the user community for sophisticated analysis

The screenshot displays the QGIS Plugins Manager window. On the left, a sidebar lists various plugin categories: All, Installed, Not installed, Upgradeable, New, Install from ZIP, and Settings. The main area shows a list of plugins, with 'Processing' selected and highlighted in blue. A red box highlights the search bar at the top of the plugin list, with the text '→ Search for tools' next to it. To the right, a detailed view of the 'Processing' plugin is shown. It includes a warning message: 'This is a core plugin, so you can't uninstall it'. Below this, the plugin name 'Processing' is displayed in large bold text, followed by the subtitle 'Spatial data processing framework for QGIS'. Further details include the category 'Analysis', more info links for 'homepage', 'bug tracker', and 'code repository', the author 'Victor Olaya', and the installed version '2.12.99'. At the bottom of the details panel, there are buttons for 'Upgrade All', 'Uninstall Plugin', 'Reinstall Plugin', 'Close', and 'Help'. A red arrow points from the text '→ If a tool is not working, check if tool is active or reinstall.' to the 'Reinstall Plugin' button.

Day 2: Map production

Layouting

Science for [life]

Maps

A map is a symbolized representation of reality, such as a portion of the Earth's surface, designed to communicate spatial information effectively.

Key Characteristics of Maps

- **Scale:**

A map is a scaled model of reality, meaning distances on the map are proportional to actual distances on Earth.

- **Symbols & Legend:**

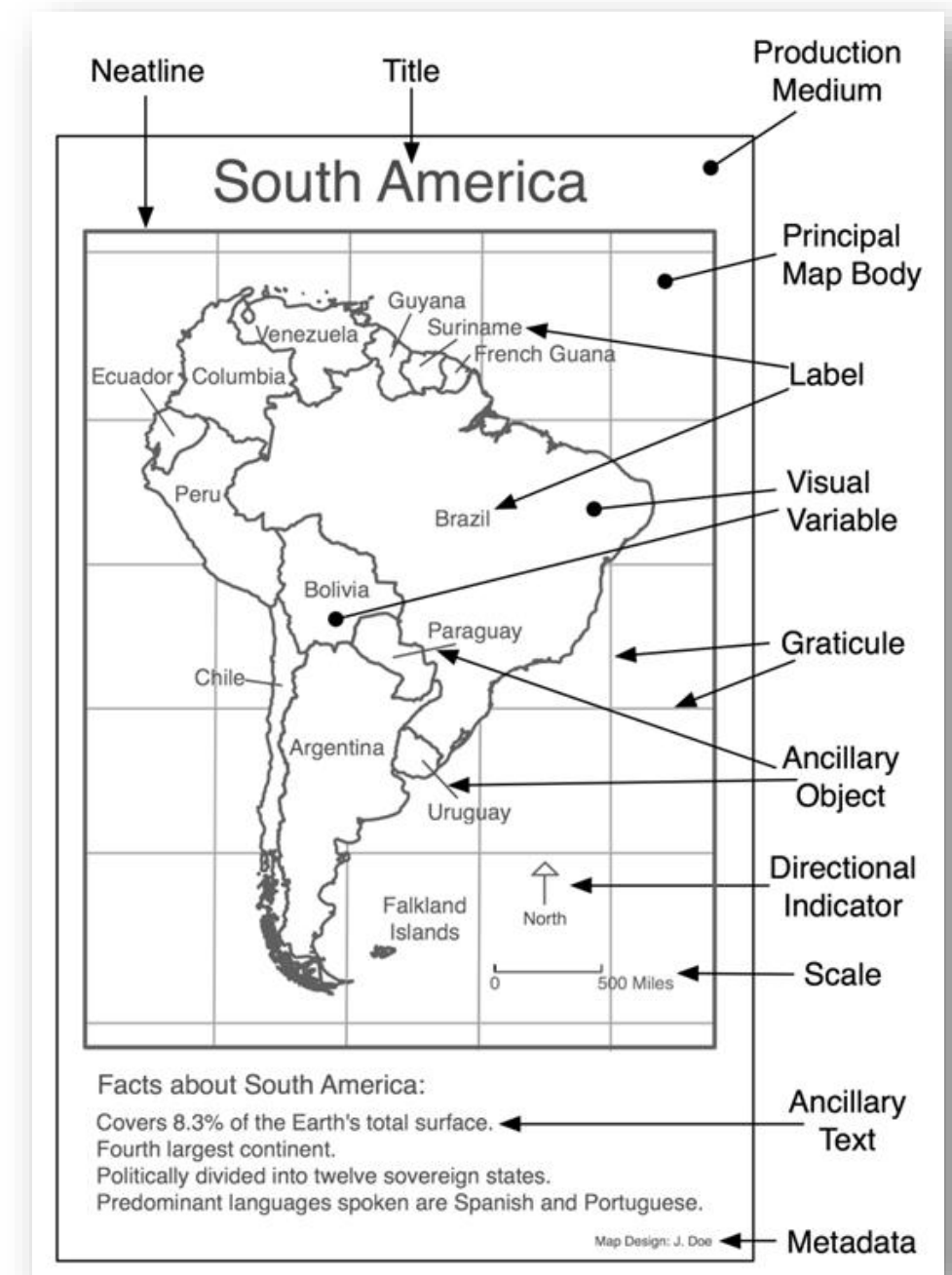
Maps use symbols to represent features like cities, rivers, and roads, and a legend (or key) explains what these symbols mean.

- **Title:**

Every map has a title that clearly states the subject of the map, such as "World Map" or "Vegetation Map".

- **Direction:**

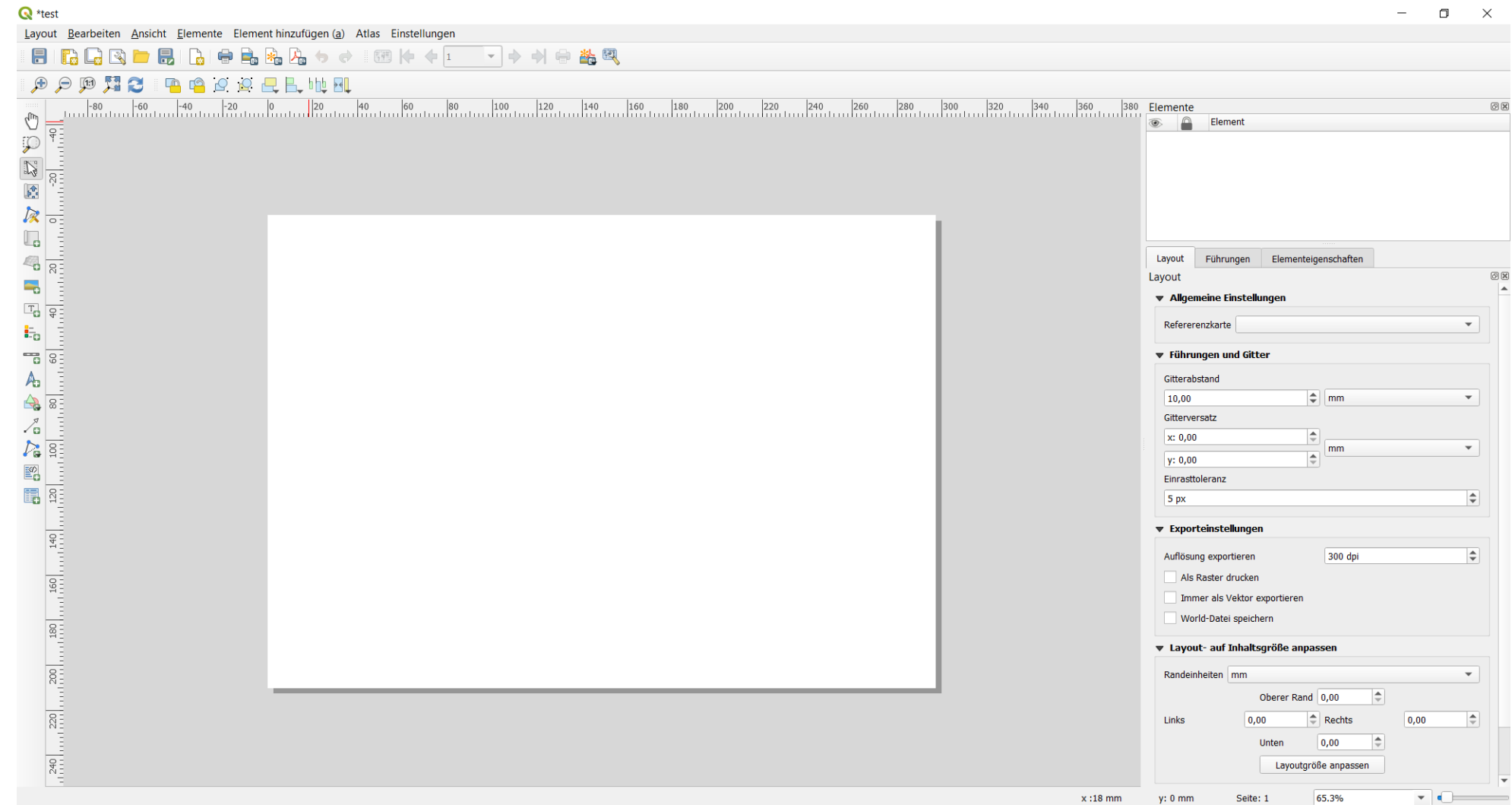
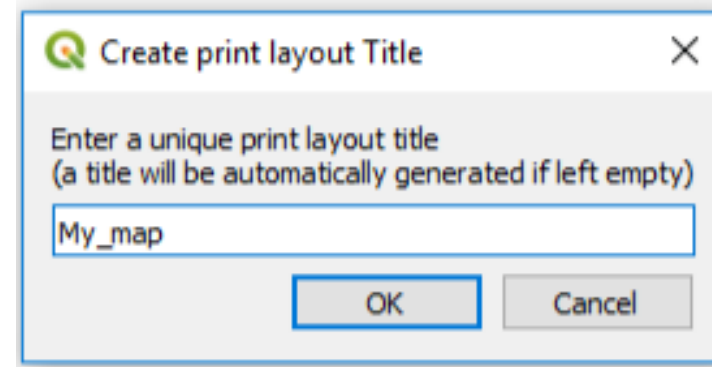
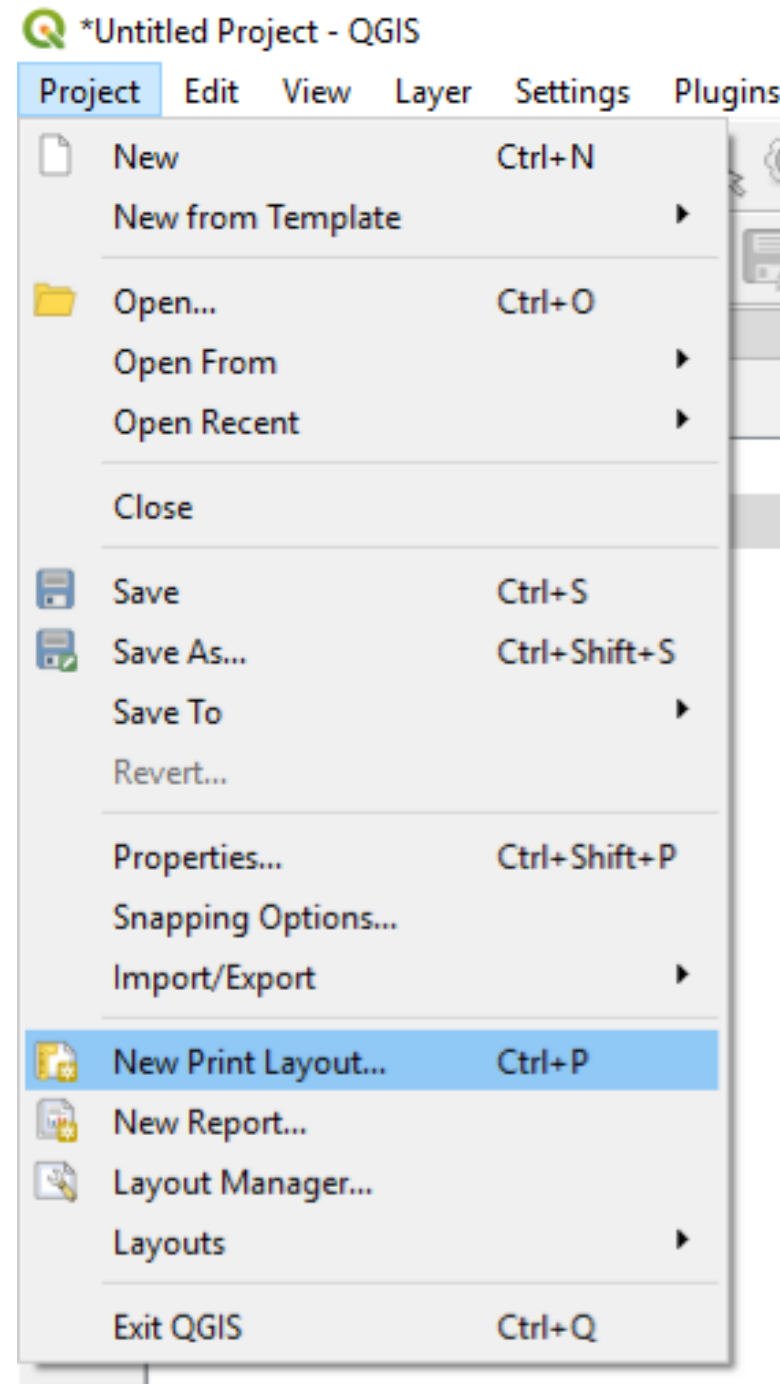
A compass rose or directional indicator shows the direction (usually North) so that other directions can be determined



<https://open.maricopa.edu/gist/chapter/4-2-map-design-and-map-elements/>

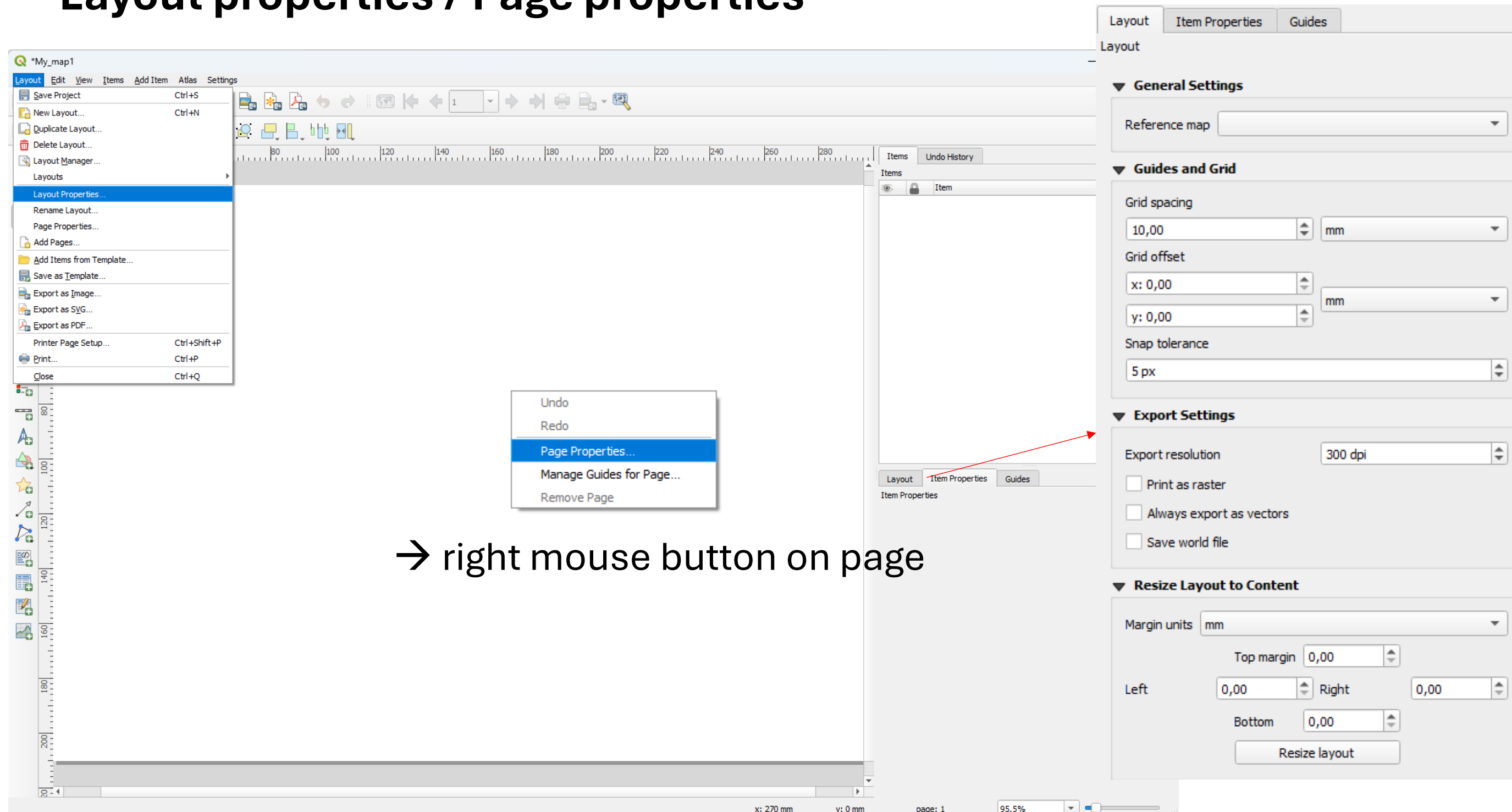
QGIS: Designing a map

- **Print layout** → *new window but part of the main project*

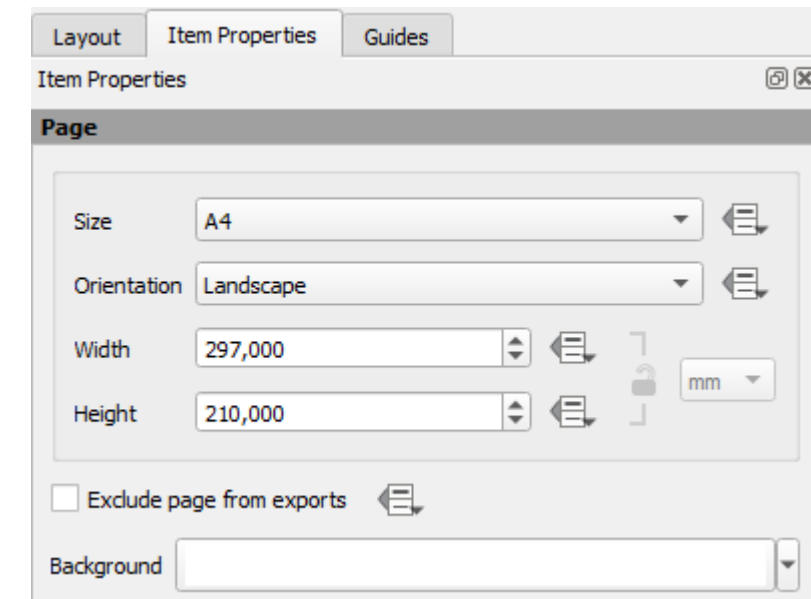


QGIS: Designing a map

- **Layout properties / Page properties**



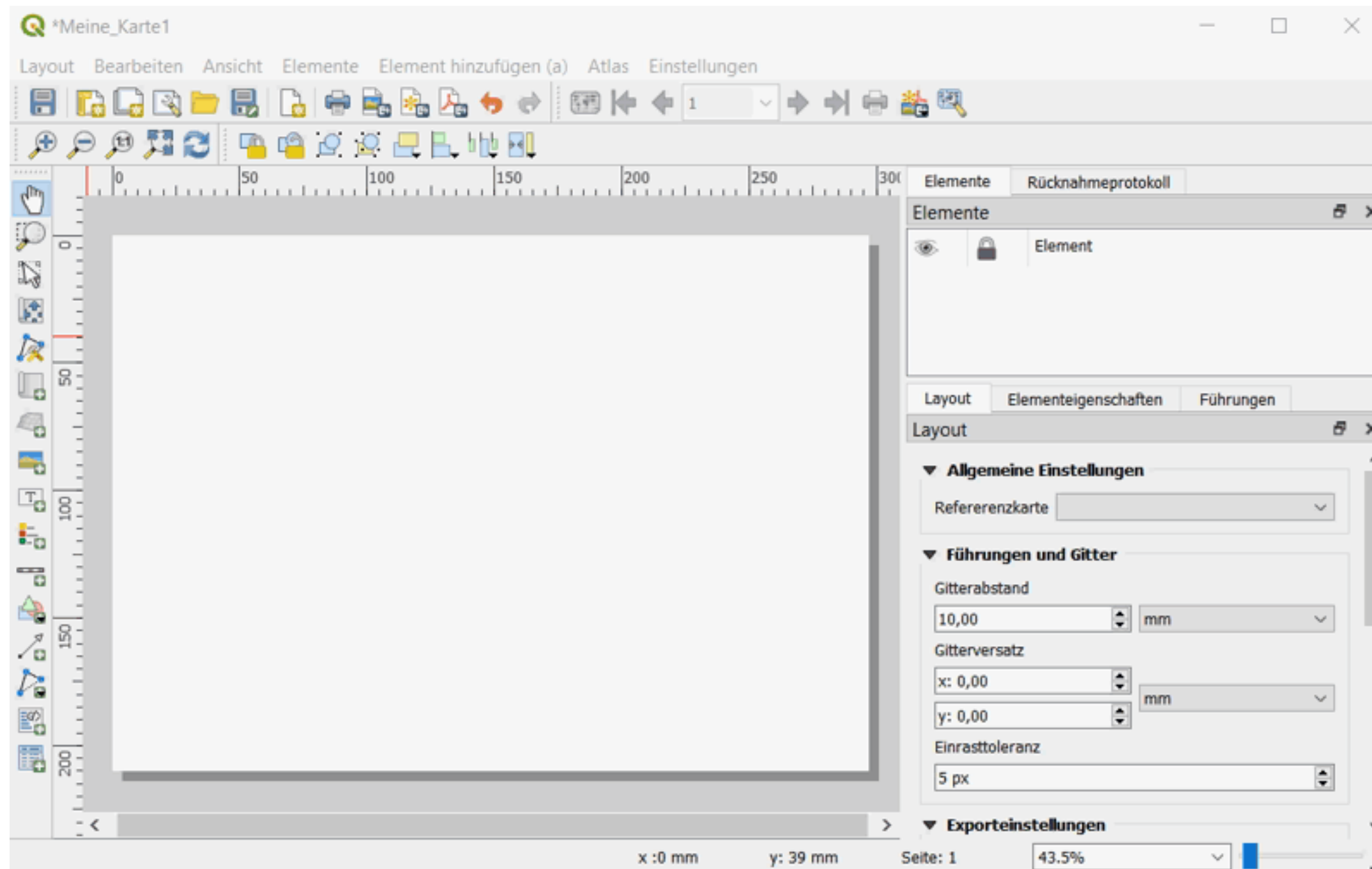
→ right mouse button on page



→ Size of the map
→ Orientation

QGIS: Designing a map

- Add map  → *Compilation of the content is related to the main program!*

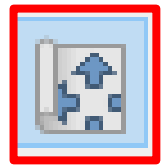


Draw a rectangle: all visible layers are transferred

QGIS: Designing a map



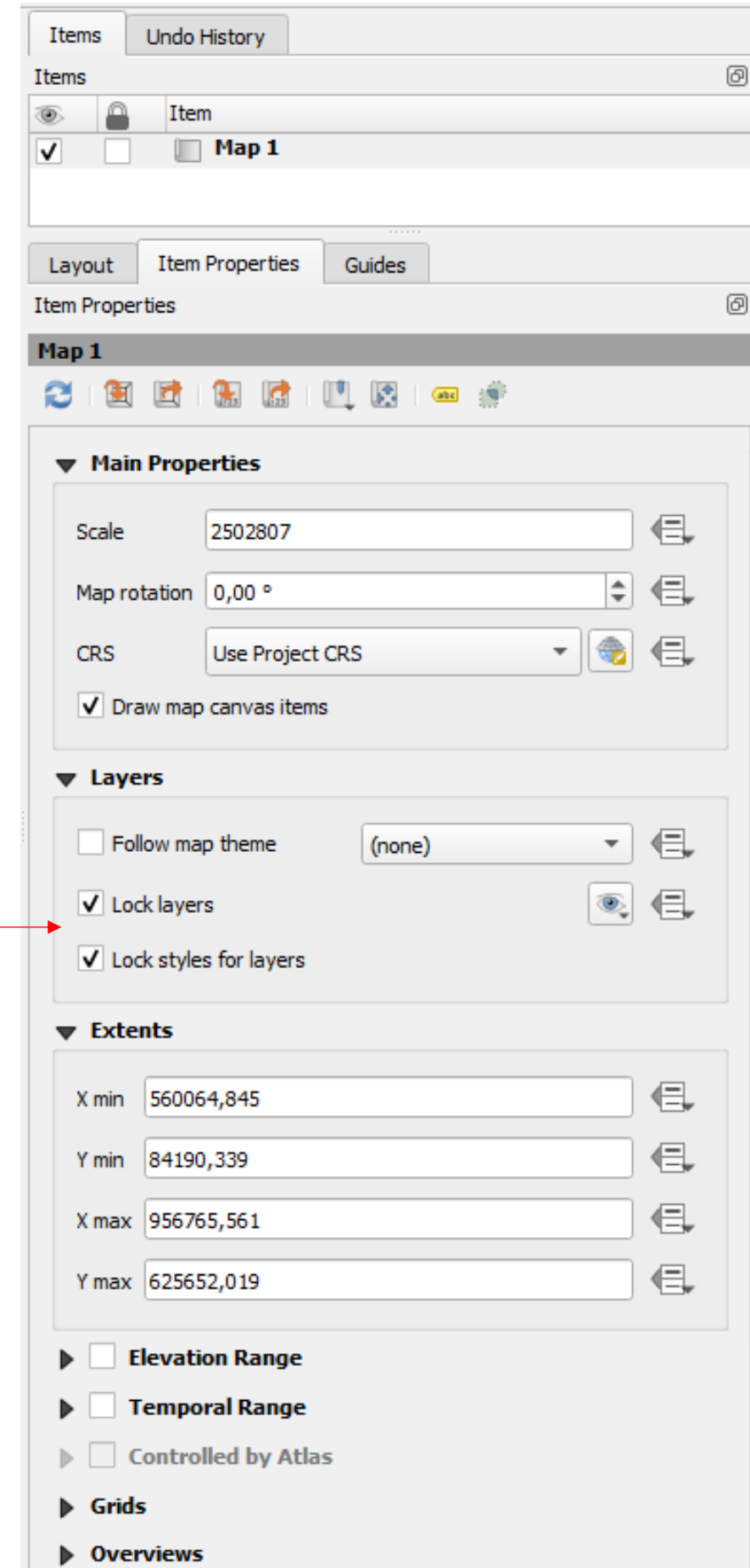
- **Select/move entry:** Select map elements, move, resize them



- **Move element content:** Readjust the map (the mouse wheel can be used to change the scale)

- **Elements:**

Lock layers: if good settings fit.
Additional: Lock layer styles

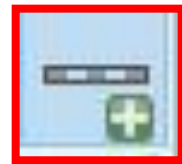


→ Items can be deleted here

→ Adjust scale

QGIS: Designing a map

Scale bar or scale number

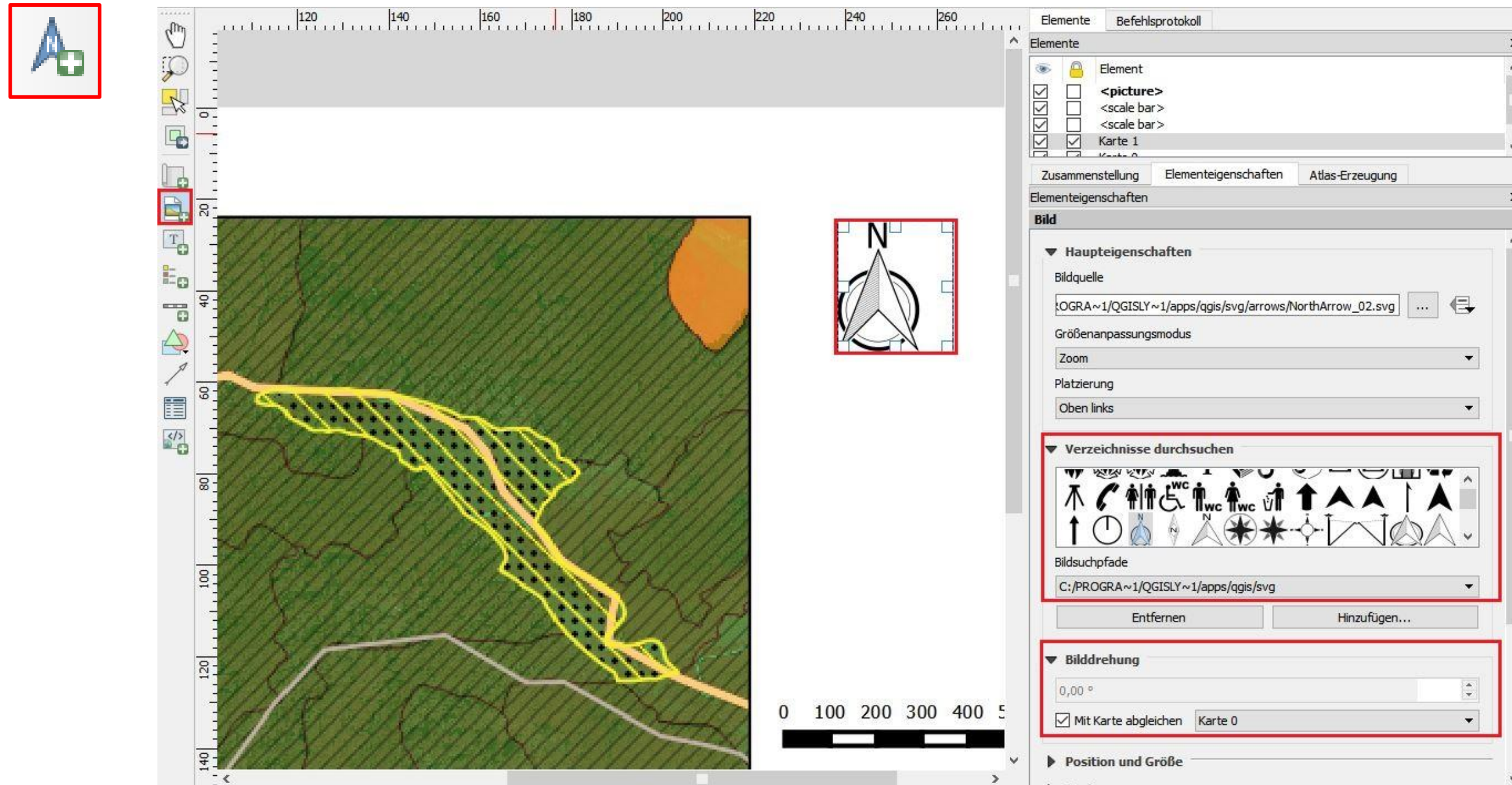


The screenshot displays the QGIS interface. The main map area shows a geographical region with a red boundary and several red circular markers with white crosses. Labels on the map include Lokitaung, Lodwar, Kapenguria, Kitale, and Maralal. A scale bar at the bottom left of the map indicates 25 and 50 km. The right-hand panel shows the 'Scalebar' properties dialog, which is currently active. The dialog has tabs for 'Items', 'Layout', 'Item Properties', and 'Guides'. The 'Item Properties' tab is selected, showing the following settings:

- Main Properties:**
 - Map: Map 1
 - Style: Single Box
- Units:**
 - Scalebar units: Kilometers
 - Label unit multiplier: 1,000000
 - Label for units: km
 - Number format: Customize
 - Method: Average Top, Middle and Bottom Scales
- Segments:**
 - Segments: left 0, right 2
 - Fixed width: 25,000000 units (selected)
 - Fit segment width: 50,00 mm
 - Height: 3,00 mm
 - Right segments subdivisions: 1
 - Subdivisions height: 1,50 mm

QGIS: Designing a map

- North arrow:** Button or these are located in the installation directory. The easiest way is to go to the browse directories section.

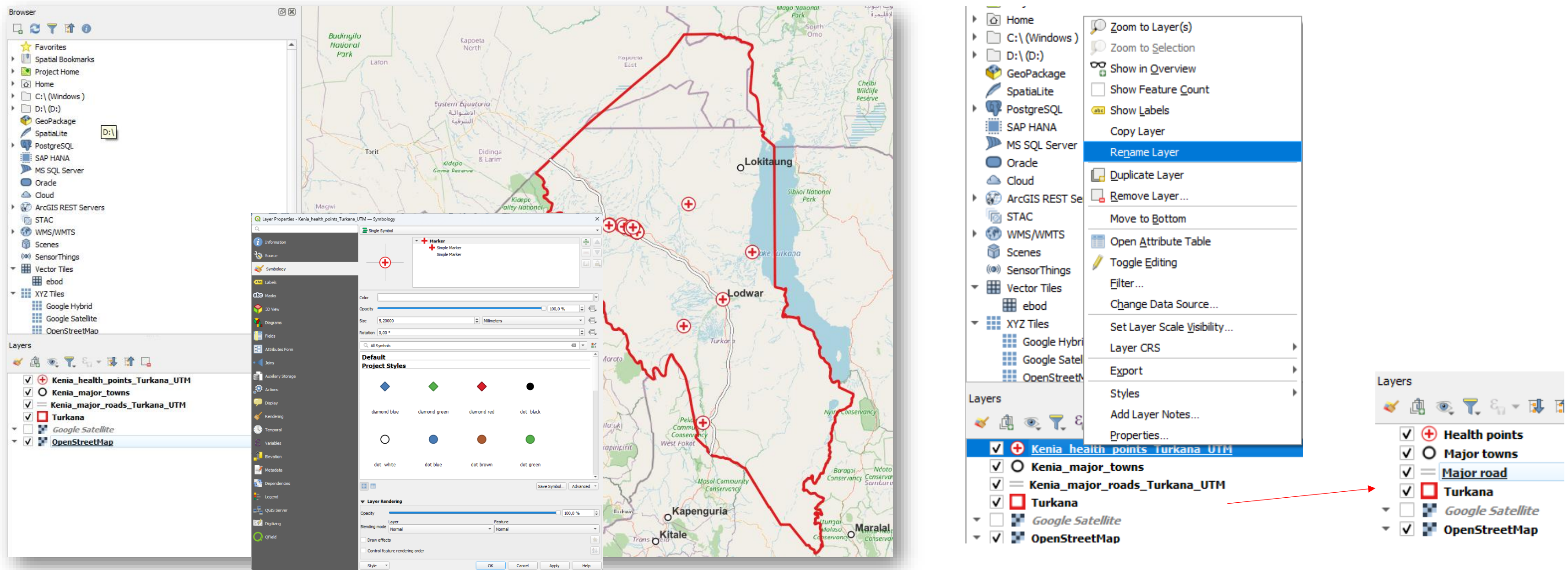


The screenshot displays the QGIS interface during map design. On the left, a toolbar contains various tools, with a red box highlighting the 'Add Image' icon (a blue arrow pointing to a green plus sign). The main map area shows a green field with yellow and orange lines, and a north arrow symbol is placed on the map. A scale bar is visible at the bottom of the map. On the right, the 'Elemente' (Elements) panel lists map components, and the 'Elementeigenschaften' (Element Properties) panel is open for the selected north arrow. This panel includes:

- Bildquelle (Image Source):** A text field containing the path `:\OGRA~1\QGISLY~1\apps\qgis\svg\arrows\NorthArrow_02.svg`.
- Größenanpassungsmodus (Size Adjustment Mode):** A dropdown menu set to 'Zoom'.
- Platzierung (Placement):** A dropdown menu set to 'Oben links' (Top Left).
- Verzeichnisse durchsuchen (Search Directories):** A section with a grid of icons for various symbols, including north arrows, and a search path field set to `C:/PROGRA~1/QGISLY~1/apps/qgis/svg`.
- Bilddrehung (Image Rotation):** A section with a rotation angle set to `0,00 °` and a checked option 'Mit Karte abgleichen' (Align with Map) set to 'Karte 0'.

QGIS: Designing a map

- Legende:** is supposed to explain map content. Symbols and colors are taken from the main QGIS program (abbreviations or codes should be explained!).

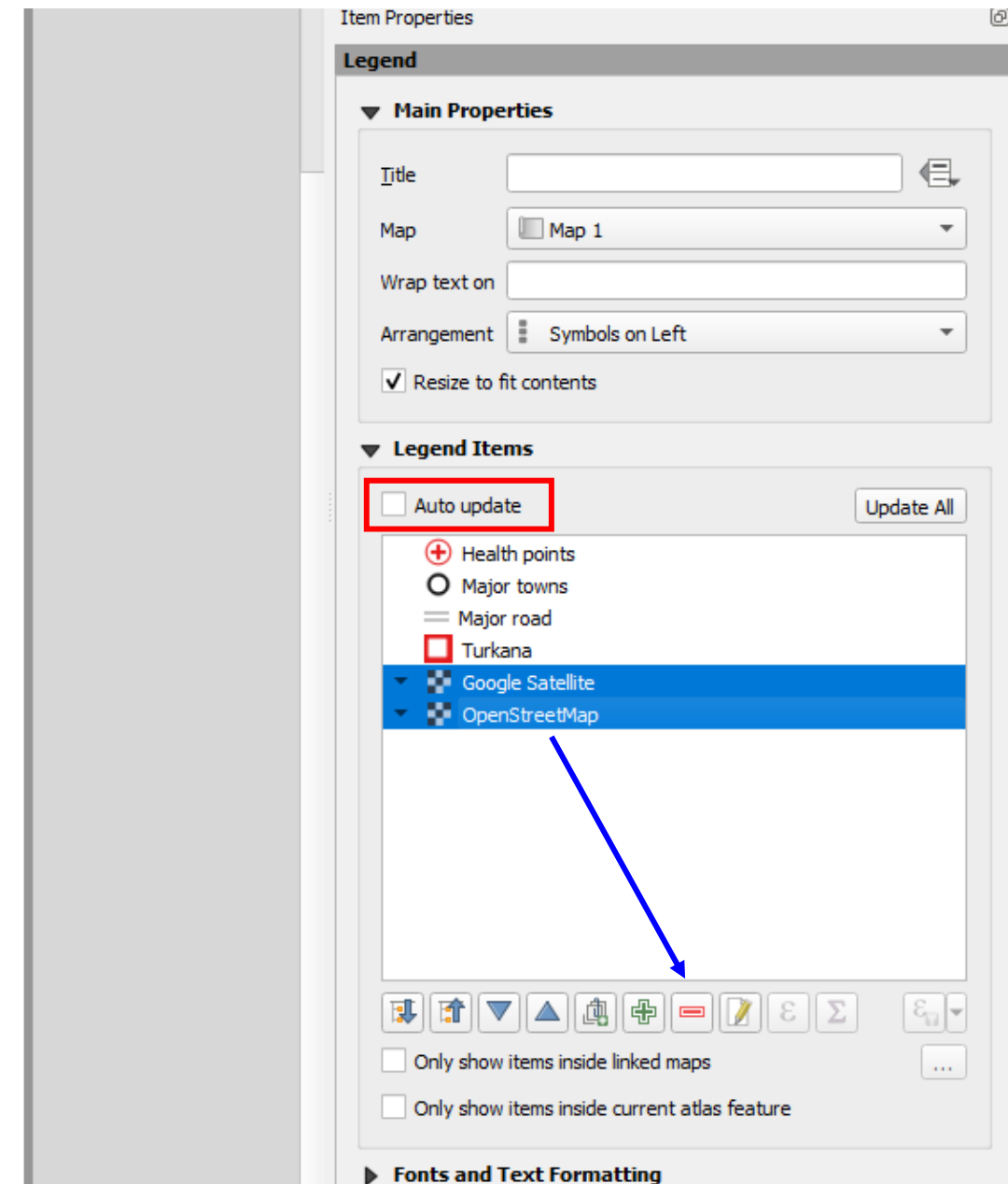
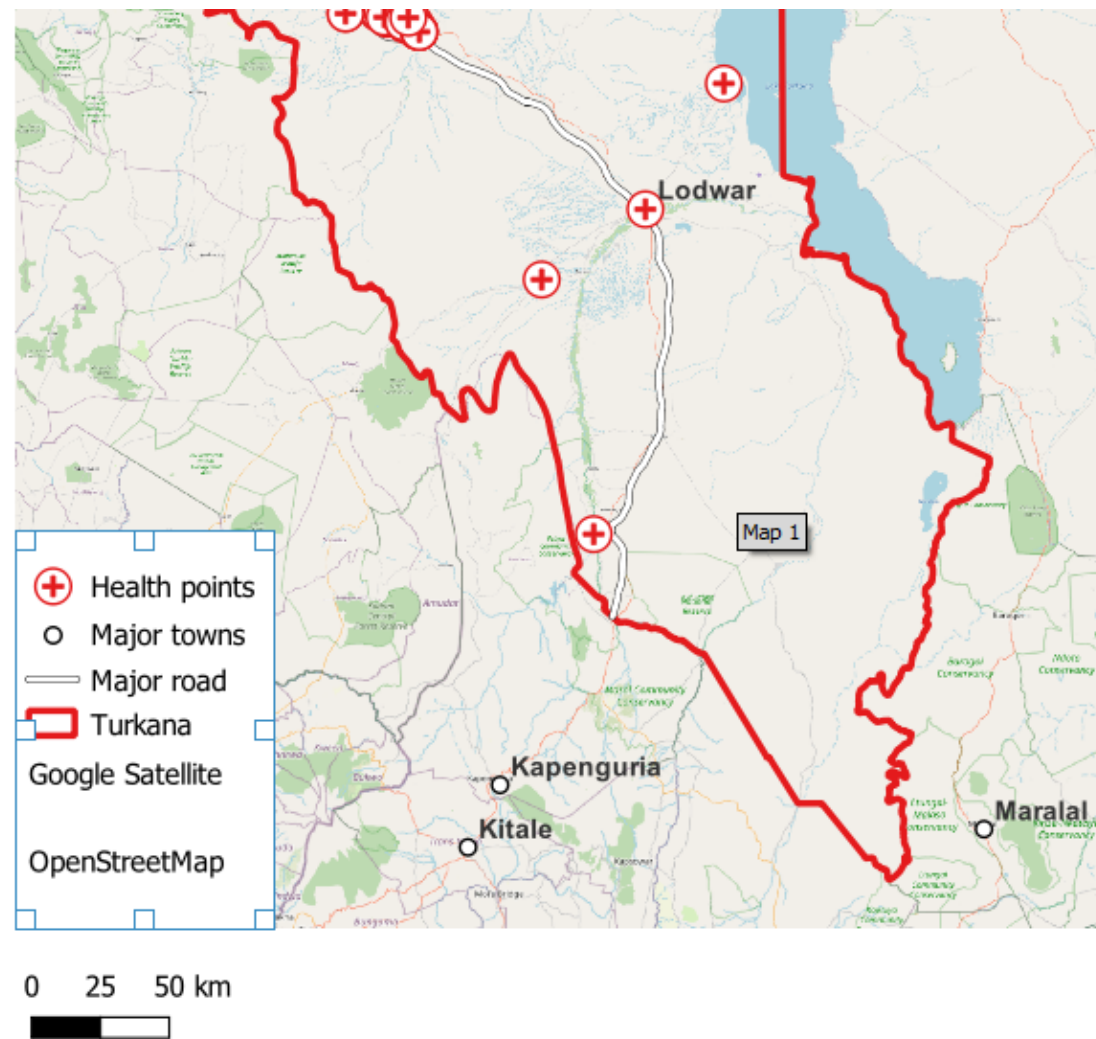
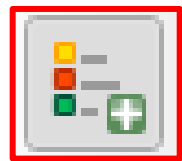


The screenshot displays the QGIS interface with several key components:

- Browser:** Shows the file system structure on the left, including Favorites, Project Home, and various data sources like GeoPackage, PostgreSQL, and OpenStreetMap.
- Layers:** A list of layers is shown in the bottom-left, including 'Kenia_health_points_Turkana_UTM', 'Kenia_major_towns', 'Kenia_major_roads_Turkana_UTM', 'Turkana', 'Google Satellite', and 'OpenStreetMap'.
- Layer Properties:** The 'Kenia_health_points_Turkana_UTM' layer is selected, and its 'Symbology' tab is active. It shows a 'Single Symbol' of a red diamond with a white center. The 'Default Project Styles' section displays various symbol options like 'diamond blue', 'diamond green', 'diamond red', 'dot black', etc.
- Context Menu:** A right-click context menu is open over the map, listing actions such as 'Zoom to Layer(s)', 'Zoom to Selection', 'Show in Overview', 'Show Feature Count', 'Show Labels', 'Copy Layer', 'Rename Layer', 'Duplicate Layer', 'Remove Layer...', 'Move to Bottom', 'Open Attribute Table', 'Toggle Editing', 'Filter...', 'Change Data Source...', 'Set Layer Scale Visibility...', 'Layer CRS', 'Export', 'Styles', 'Add Layer Notes...', and 'Properties...'. The 'Rename Layer' option is highlighted in blue.
- Layers Panel (Bottom Right):** A smaller version of the Layers panel is shown, with 'Kenia health points turkana UTM' selected and highlighted in blue. A red arrow points from this panel to the 'Layers' panel in the main interface.

QGIS: Designing a map

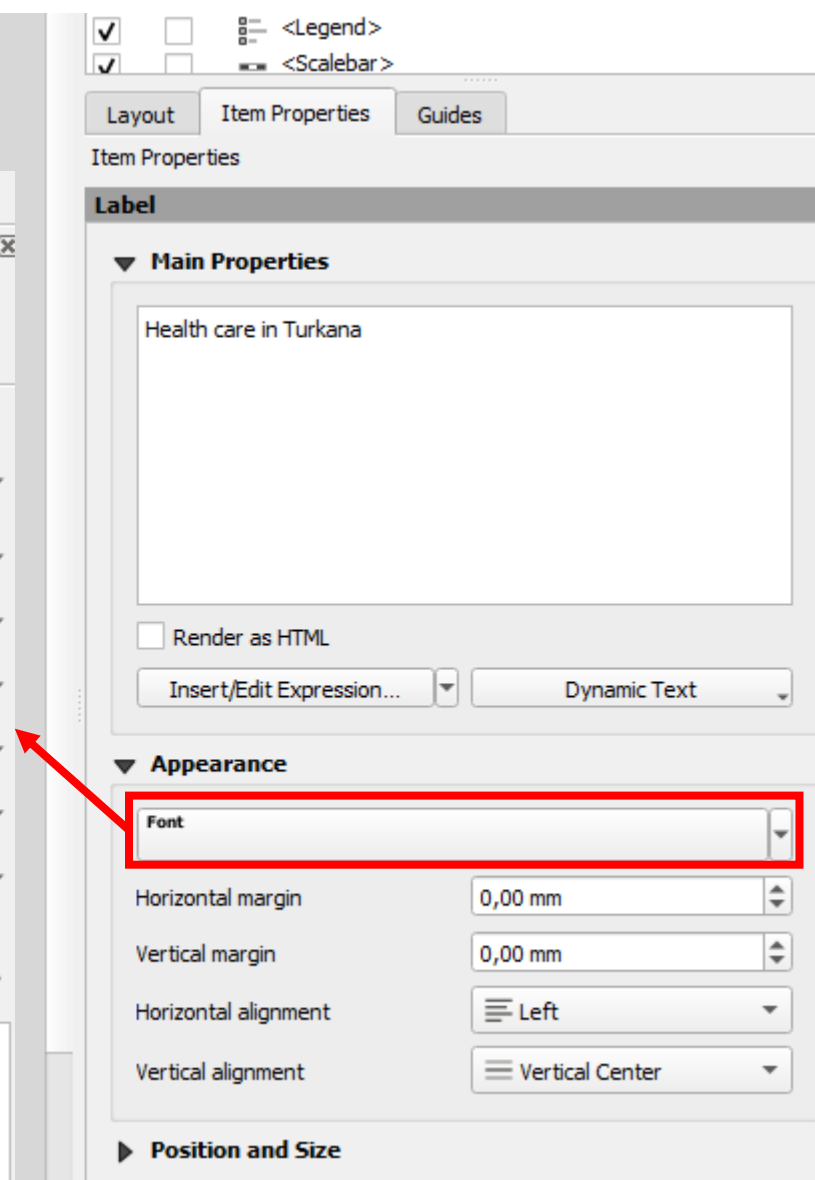
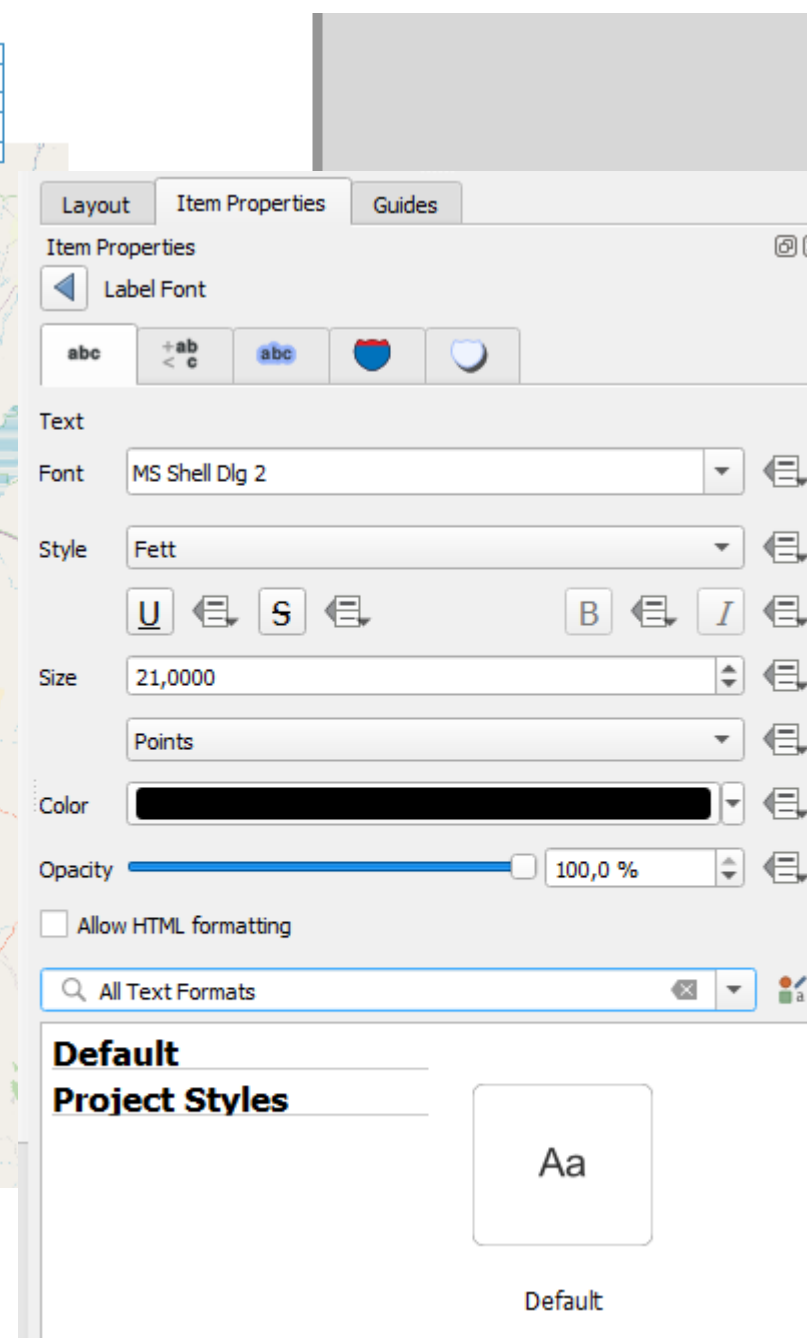
- Add legend:** remove those layers that do not appear in the map or do not need to be explained (e.g. Google satellite).



→ Turn Auto update off

QGIS: Designing a map

- Title, text, and other elements



QGIS: Designing a map

- **Grid**

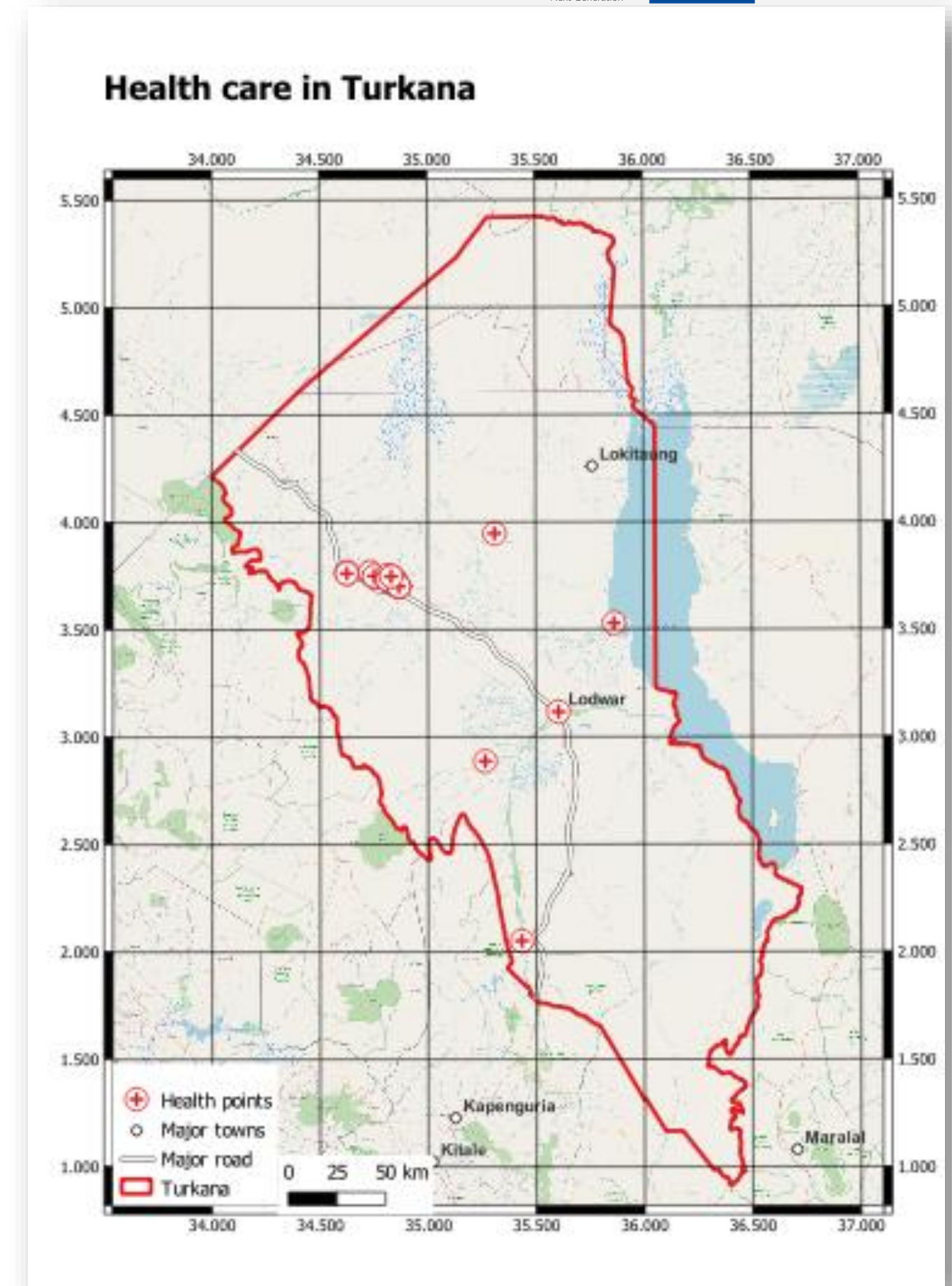
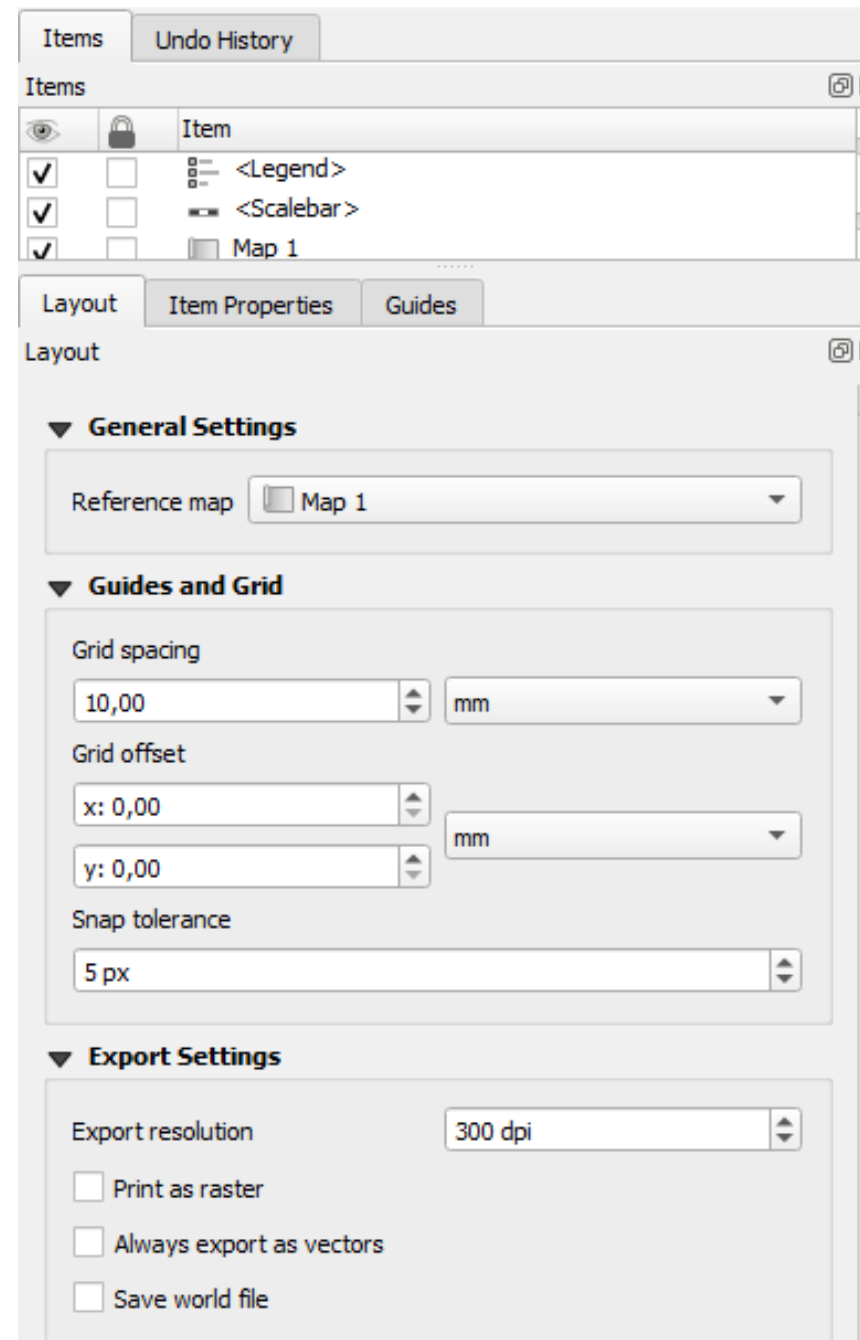
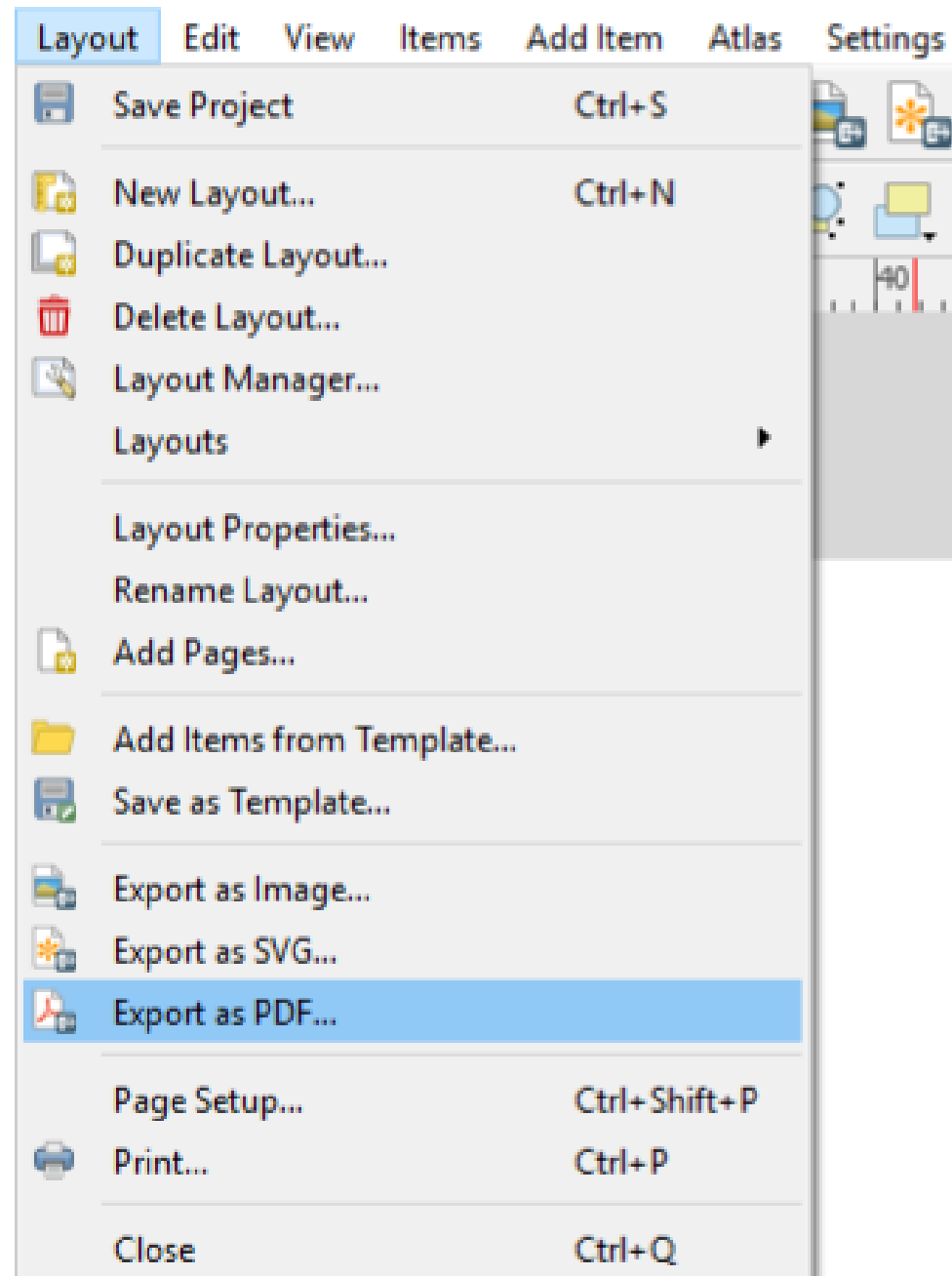


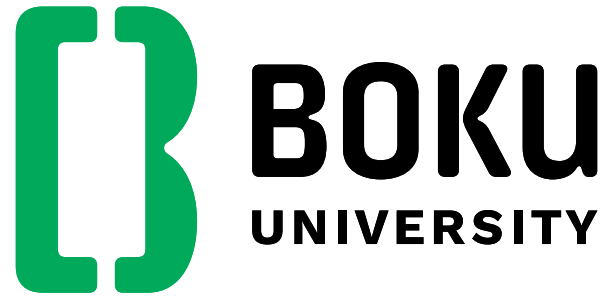
Map 1
 Follow map theme (none)
 Lock layers
 Lock styles for layers
Extents
 X min: 560064,845
 Y min: 90663,277
 X max: 956765,561
 Y max: 619179,081
 Elevation Range
 Temporal Range
 Controlled by Atlas
Grids
 Add Grid
 Remove Grid
 Save Grid
 Up Arrow
 Down Arrow
 Grid 1

Layout | Item Properties | Guides
 Item Properties
 Map Grid Properties
 Enable grid
Appearance
 Grid type: Solid
 CRS: EPSG:4326 - WGS 84
 Interval: Map Units
 X: 0,500000000000
 Y: 0,500000000000
 Offset: X 0,000000000000
 Y 0,000000000000
 Line style: [Solid Line]
 Blend mode: Normal
Frame
 Draw Coordinates
 Format: Decimal
 Left: Show All
 Outside Frame
 Horizontal
 Right: Show All
 Outside Frame
 Horizontal
 Top: Show All

QGIS: Designing a map

- **Export as image or PDF:**





Thank you!

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