

Android Applications for GNSS

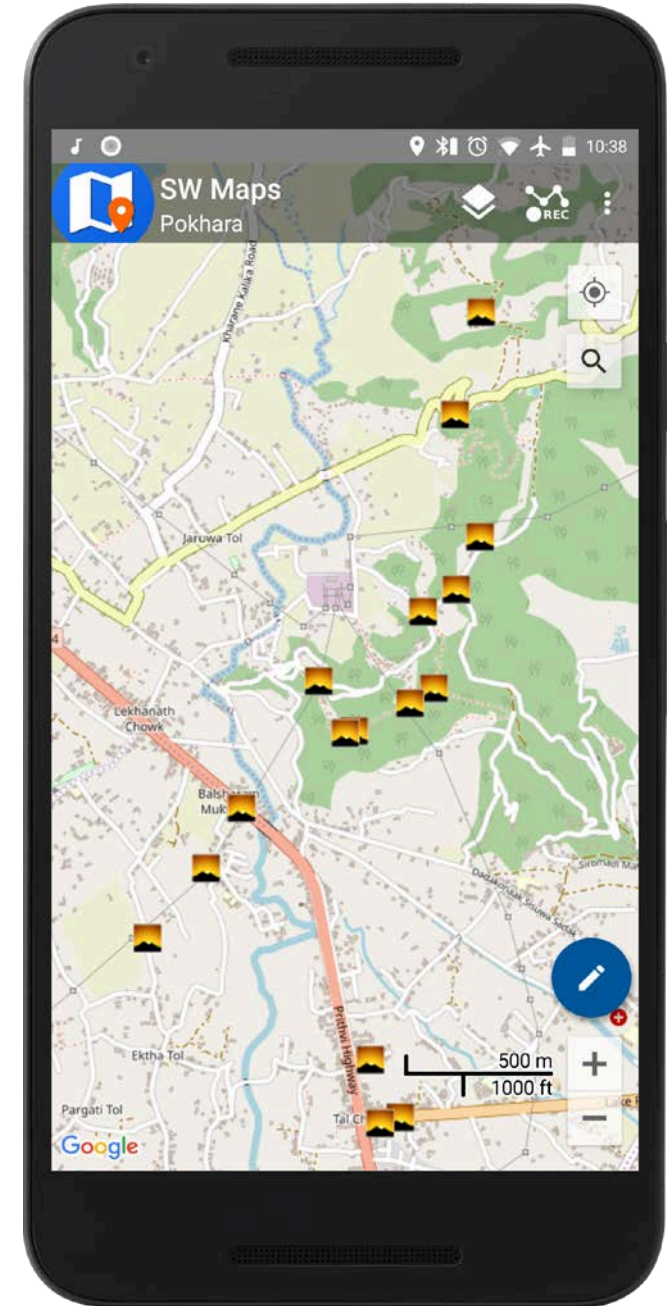
(SW Maps and RtkDroid)

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SW Maps

- **Free** Android Application for collecting, presenting and sharing geographic information
- Can be used for large scale GNSS surveys to collect detailed attribute information or just to display popular GIS data formats on Android
- Downloaded more than 100,000 times by users all over the world

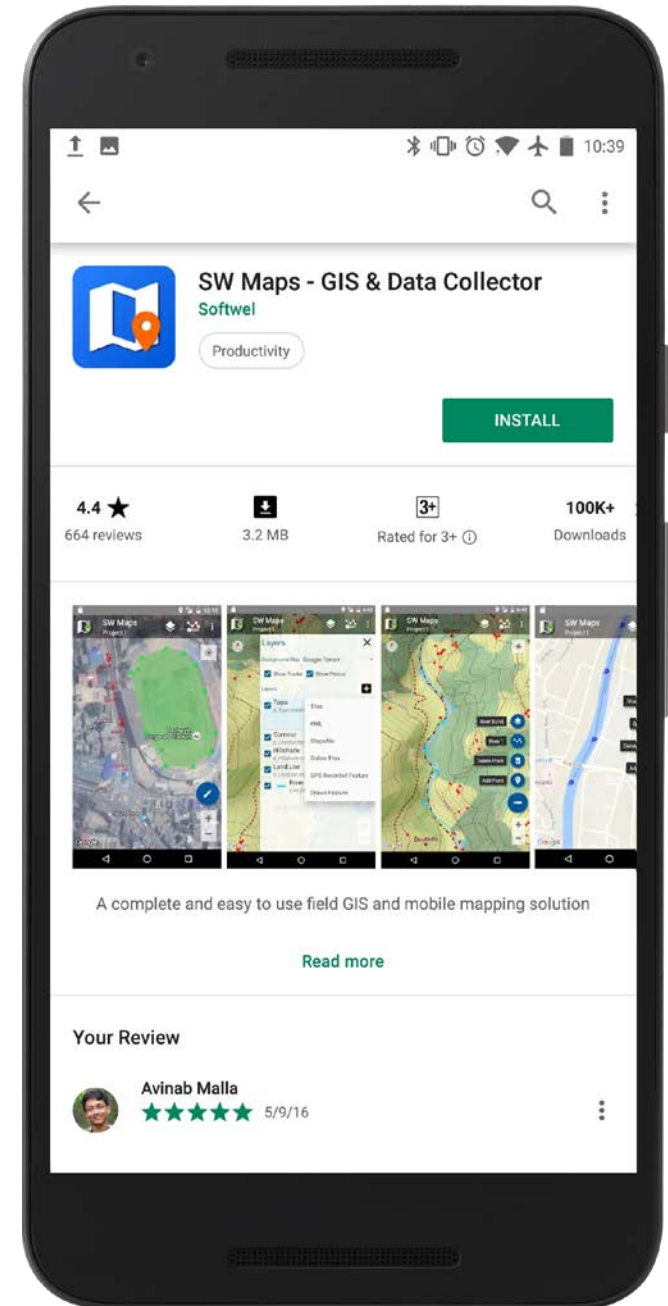


Features

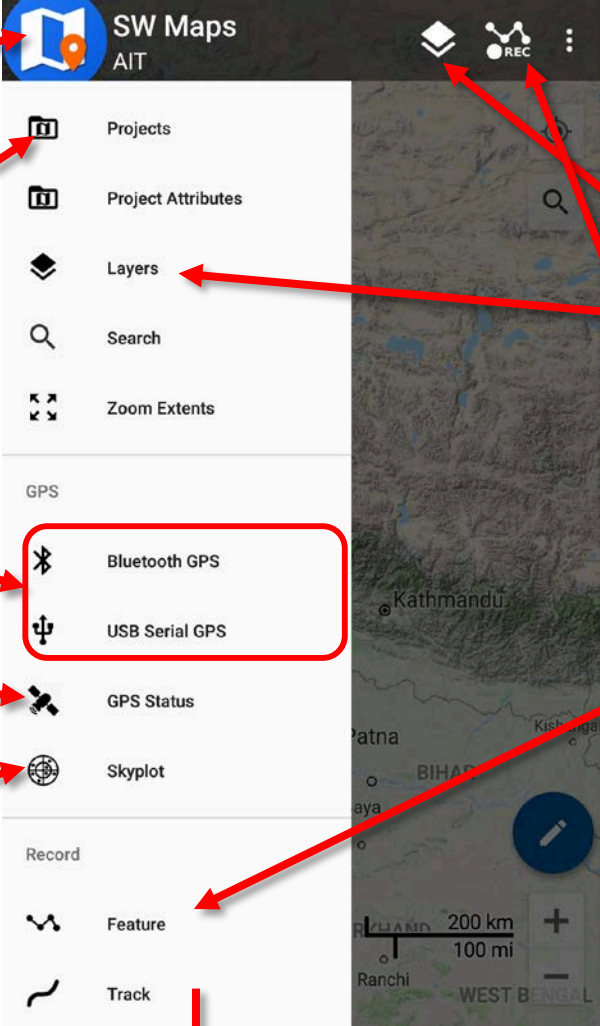
- Collect data using internal and external GNSS receivers (Bluetooth or USB). Connect RTK capable receivers for high accuracy surveying.
- Import and display popular GIS Data formats (KML, Shapefiles, GeoJSON, MbTiles)
- Google Maps or OpenStreetMap as background; Can also import and cache maps from online sources (WMS, XYZ Tiles)
- Record tracks and photos.
- Export or share collected data directly to KMZ, Shapefiles, GeoJSON and many other formats.

Installation

- Open Google Play Store
- Search for SW Maps
- Install and open app
- Allow permissions if requested (Android 6.0 and above)



App Navigation



SW Maps AIT

Projects

Project Attributes

Layers

Search

Zoom Extents

GPS

Bluetooth GPS

USB Serial GPS

GPS Status

Skyplot

Record

Feature

Track

Change Background Map

Add Recorded or Drawn Feature Layers

Import External Layers (Mbtiles/KML/SHP..)

Add Layer Attributes

Record Features and Tracks

Scroll Down for More

Press to open Drawer (Or slide from left edge)

Create or Open Projects

Connect External Receivers (Bluetooth OR USB)

Display GPS/GNSS Data (Position, Time, DOP...)

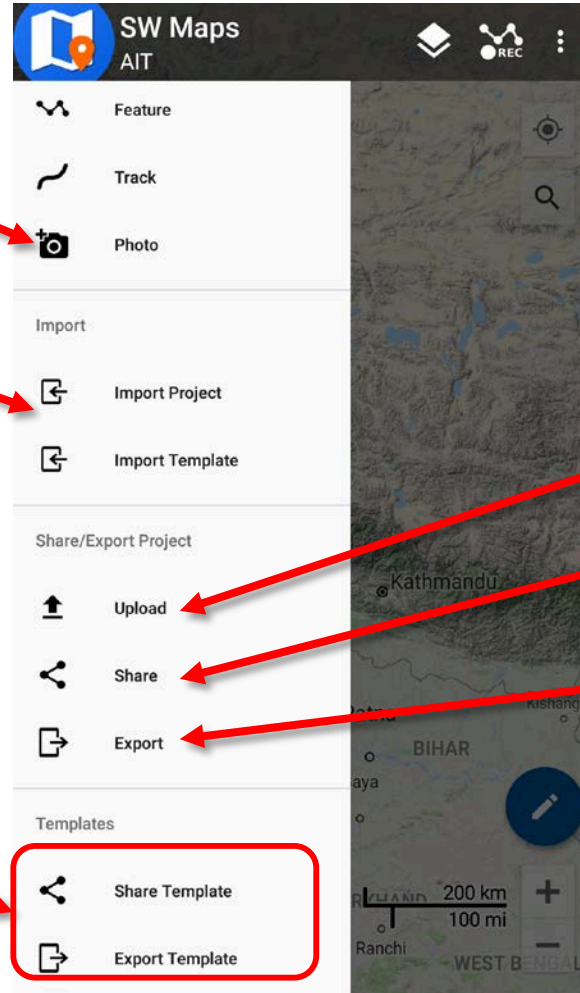
Show Satellite Skyplot

The screenshot shows the SW Maps AIT app interface. The top bar includes the app logo, title, and icons for layers, recording, and a menu. A drawer menu is open on the left, listing various features. Red arrows point from text labels to specific UI elements: the drawer icon, the 'Projects' and 'Layers' items, the 'Bluetooth GPS' and 'USB Serial GPS' items (which are highlighted with a red box), the 'GPS Status' and 'Skyplot' items, the 'Feature' and 'Track' items, the layers icon in the top bar, the recording icon, and the bottom of the drawer menu.

Take Geotagged Photos

Import Projects and
Templates from Device Storage

Save and share layer definitions
as a template for other projects



Upload Data to FTP Server

Share data to other users

Export to device storage
As KMZ, SHP, Excel...

SW Maps Folder

The screenshot shows a Windows File Explorer window for the 'SW_Maps' folder. The left sidebar shows navigation options like 'Quick access', 'Desktop', 'Downloads', 'Documents', 'Pictures', 'OneDrive', 'This PC', '3D Objects', 'Desktop', 'Downloads', 'Music', 'ONEPLUS A3003', 'Pictures', 'Videos', and 'Windows (C:)'. The main area displays several folders: 'Export', 'Photos', 'RawData', 'Templates', 'Maps', 'Projects', and 'Temp'. Below the folders are two files: 'bluetooth_devices.dat' (DAT File, 173 bytes) and 'instrument_profiles.dat' (DAT File, 0 bytes). The status bar at the bottom indicates '10 items'.

All exported files saved here → Export

Photos and Videos taken by SW Maps → Photos

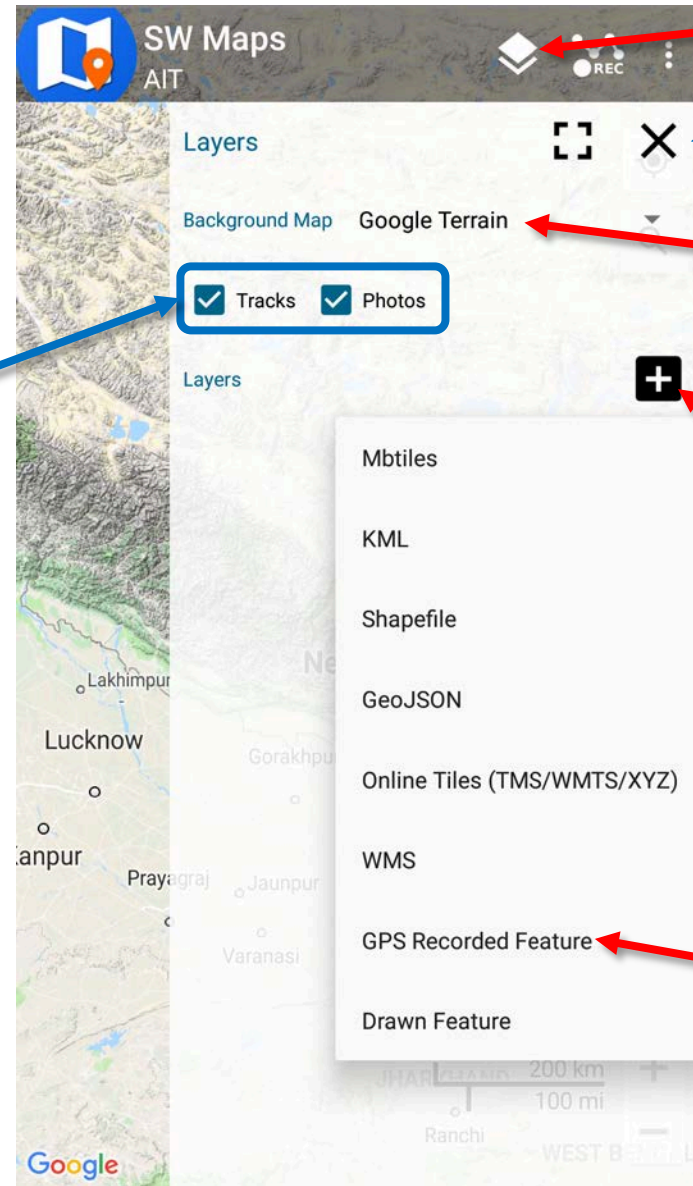
RAW GNSS Data (UBX, SBF..) → RawData

Copy project templates here → Templates

Copy GIS Data files (Mbtiles, KML, SHP, GeoJSON...) to import here, inside format specific sub-folders → Maps

Project files saved here → Projects

Layers



1. Press to open Layer sidebar

Maximize/Close Sidebar

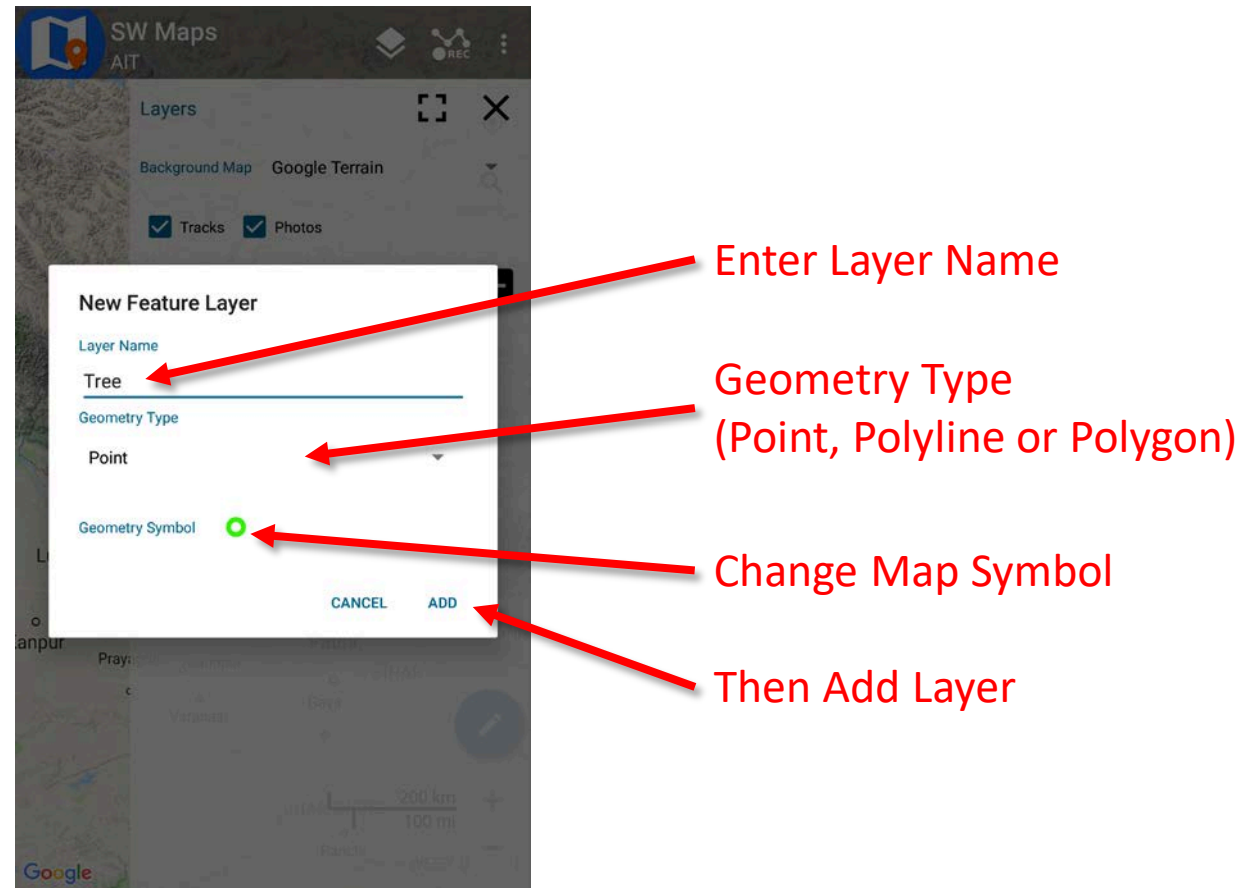
2. Change Background Layer

Toggle Track and Photo Point Layers

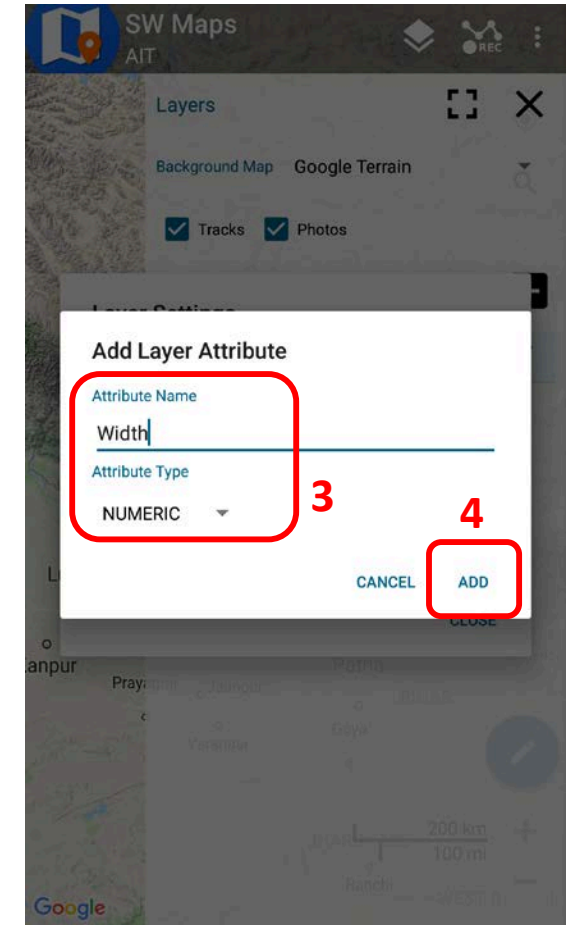
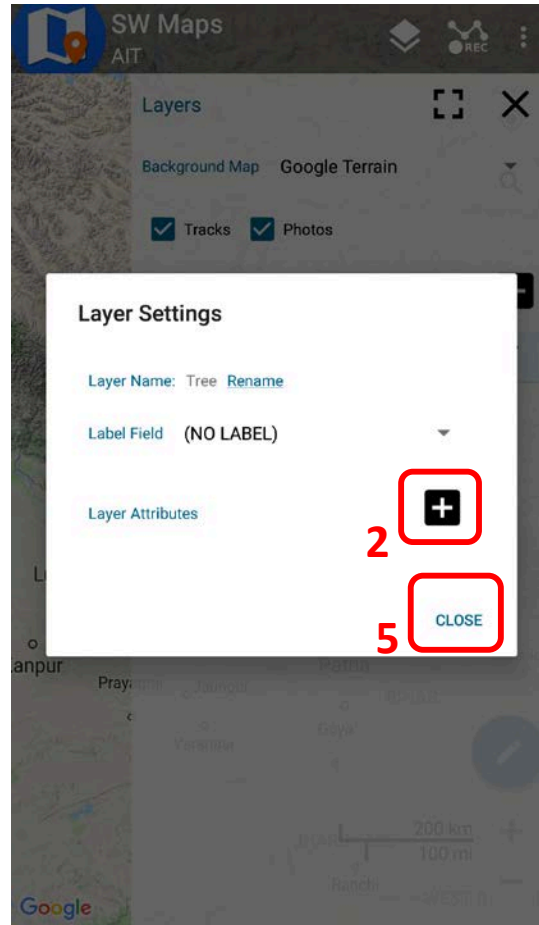
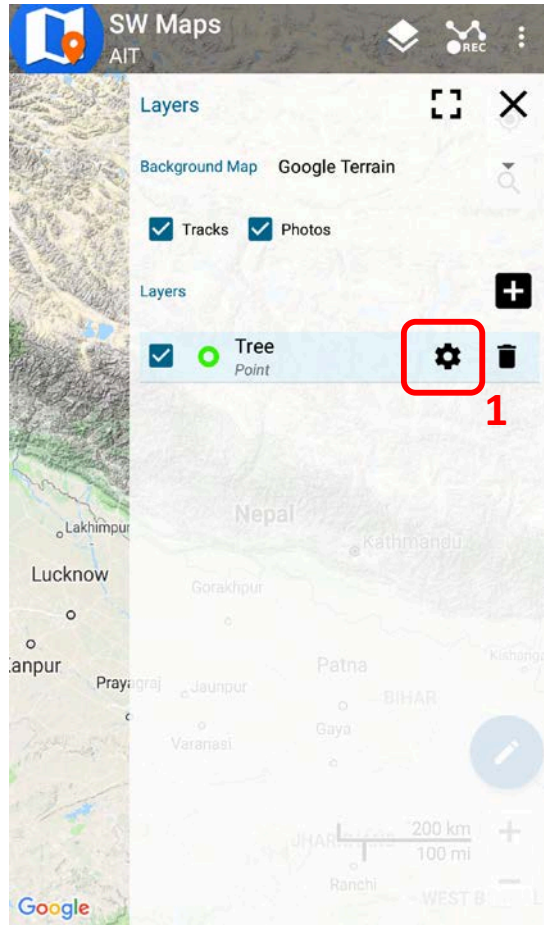
3. Press + to add layer

4. Select Layer Type
(We will add a GPS Recorded Feature layer for recording features using GNSS)

Add GPS/GNSS Recorded Feature Layer



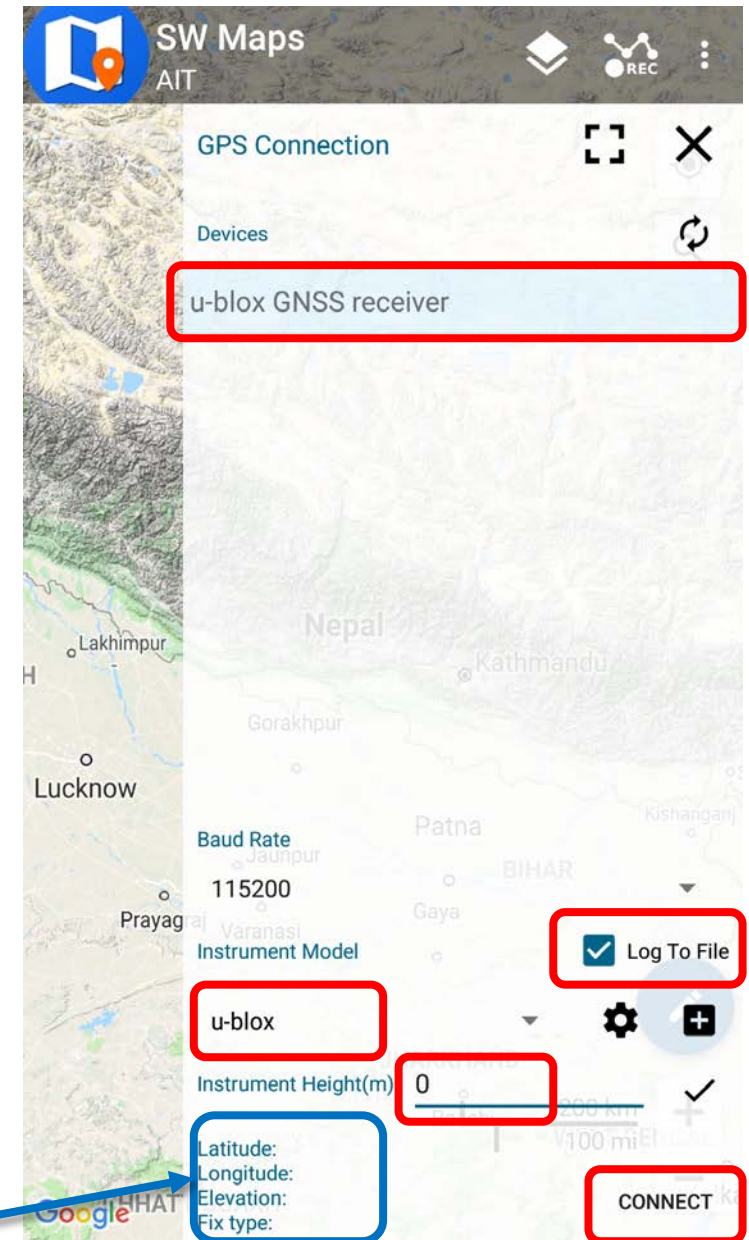
Feature Attributes



Also try adding a Photo Attribute

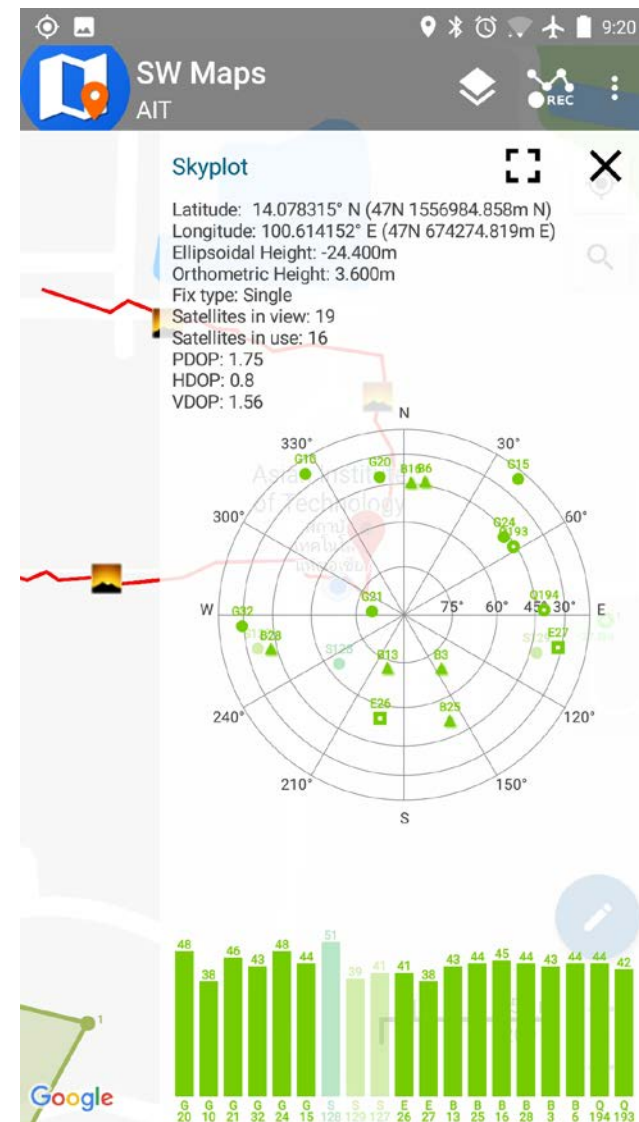
Connecting u-blox External Receiver

- Connect u-blox receiver to phone USB port using OTG cable (You may also need to enable OTG Storage in some devices)
- From Navigation drawer, select **USB Serial GPS**. List of connected devices will appear.
- Select **u-blox GNSS receiver**
- Set Instrument Model to **u-blox**
- Check **Log to File**
- Set Instrument Height
- Press **Connect**



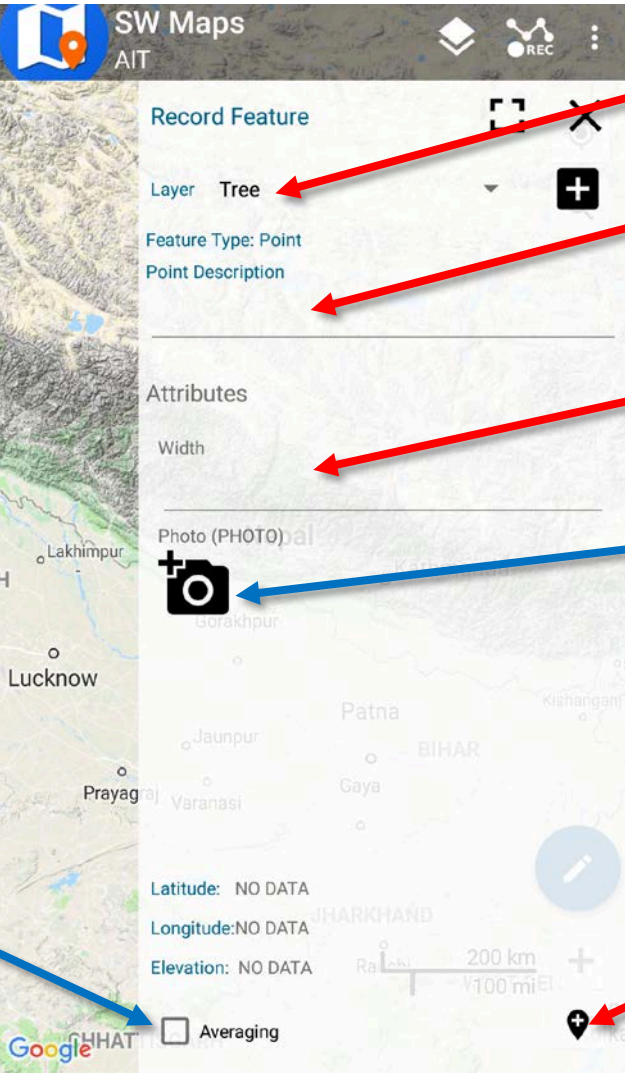
Coordinates Here

GNSS Data and Skyplot



- ubx and sbf files are saved in SW_Maps/RawFiles Folder

Record Feature



Select Layer

Type in feature remarks (if required)

Enter Attribute Data

(Photos can only be taken after recording the feature)

Record Point

Enable/Disable Location Averaging

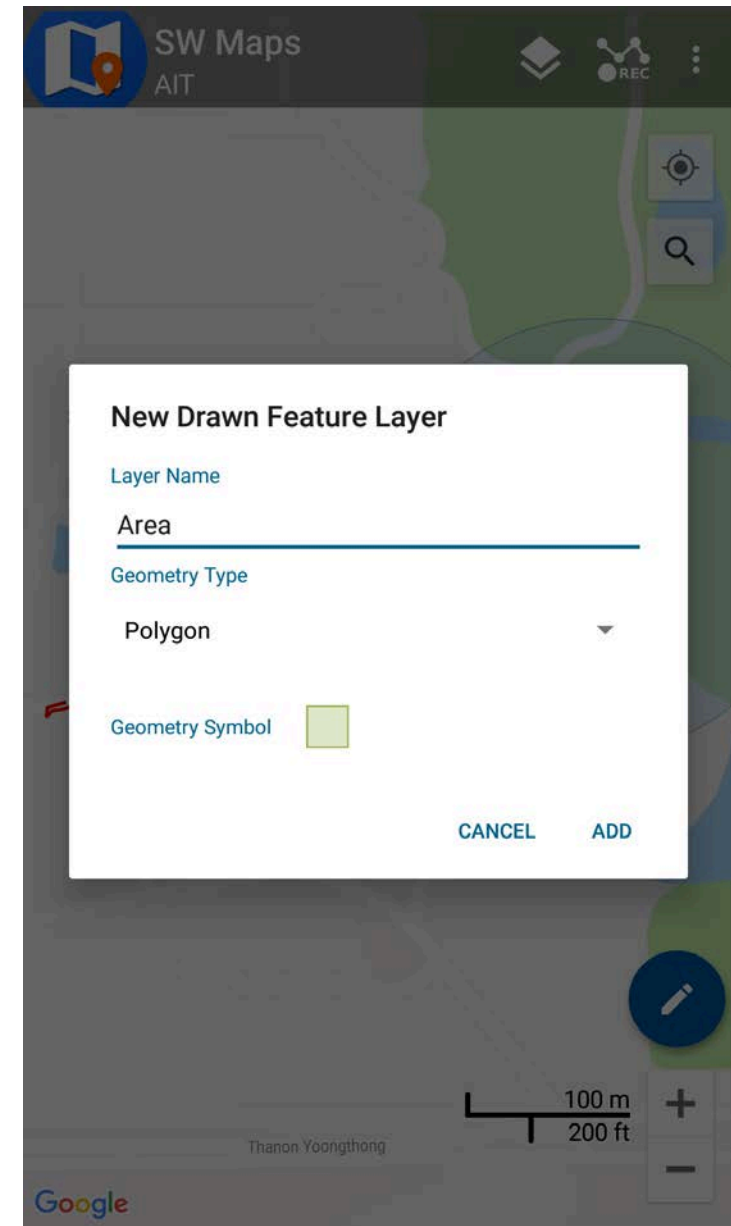
Averaging

Drawing Features

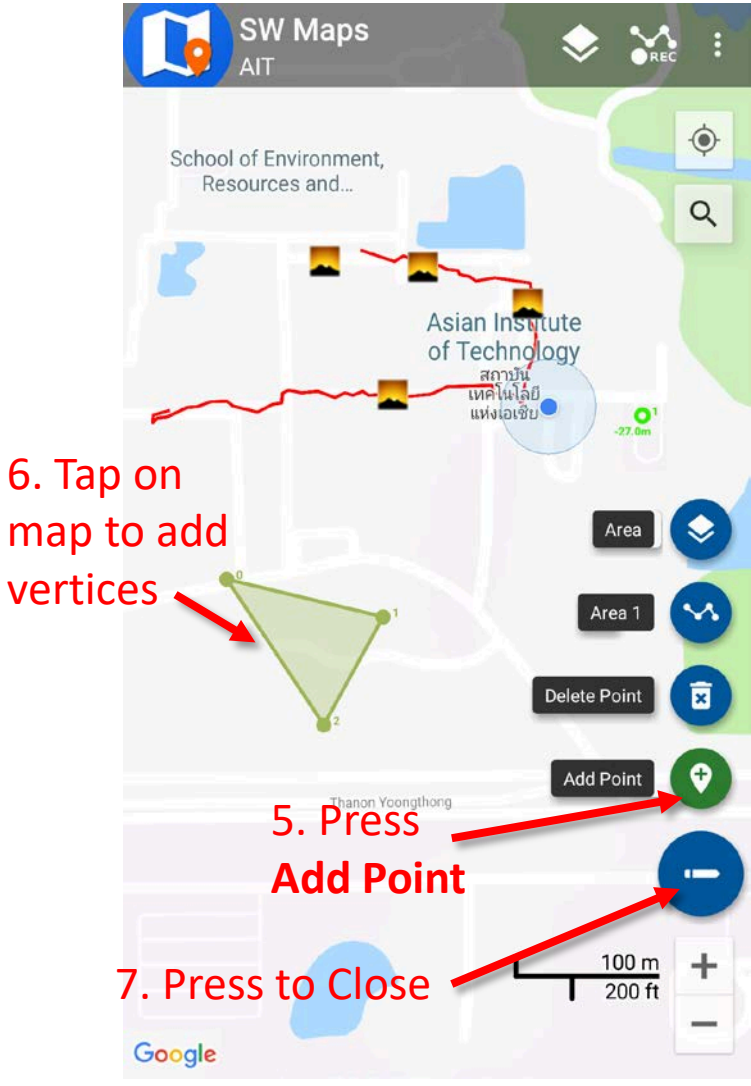
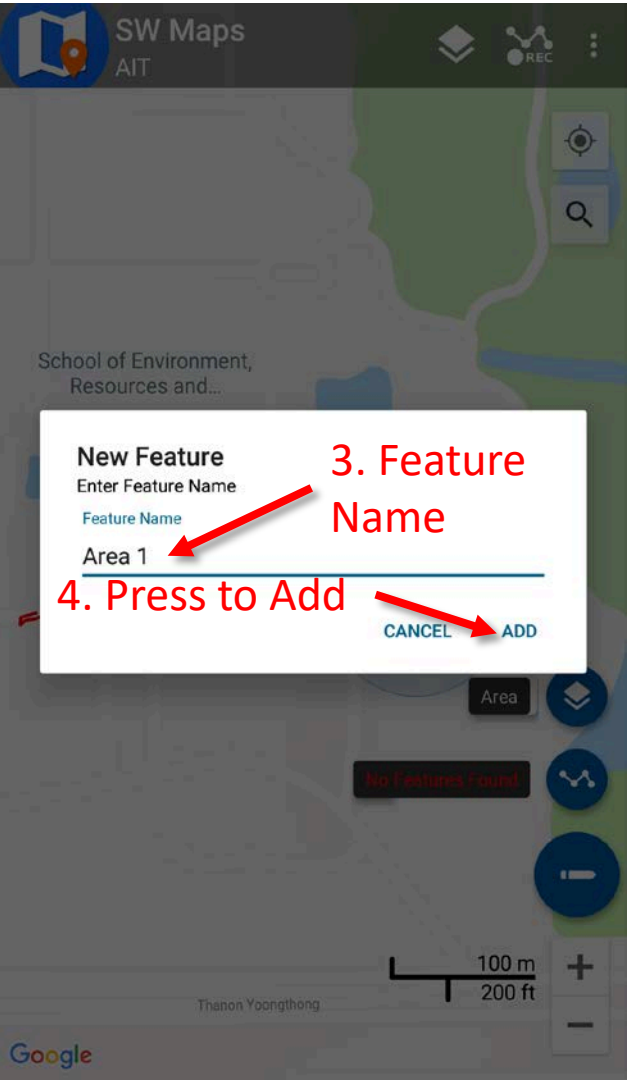
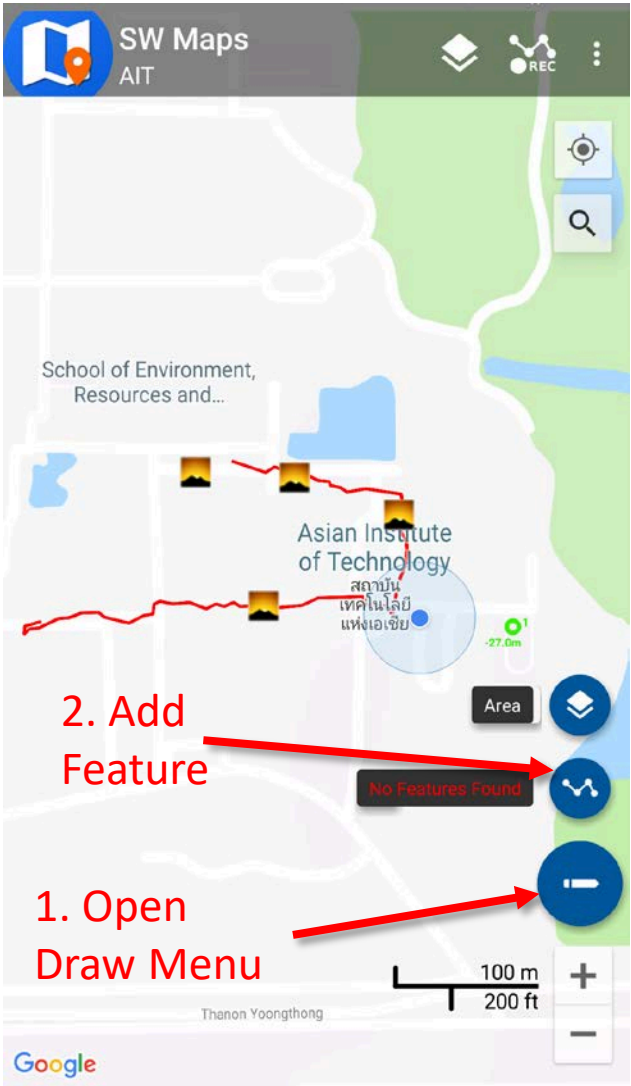
1. Add a Drawn Feature Layer

Name: Area

Type: Polygon

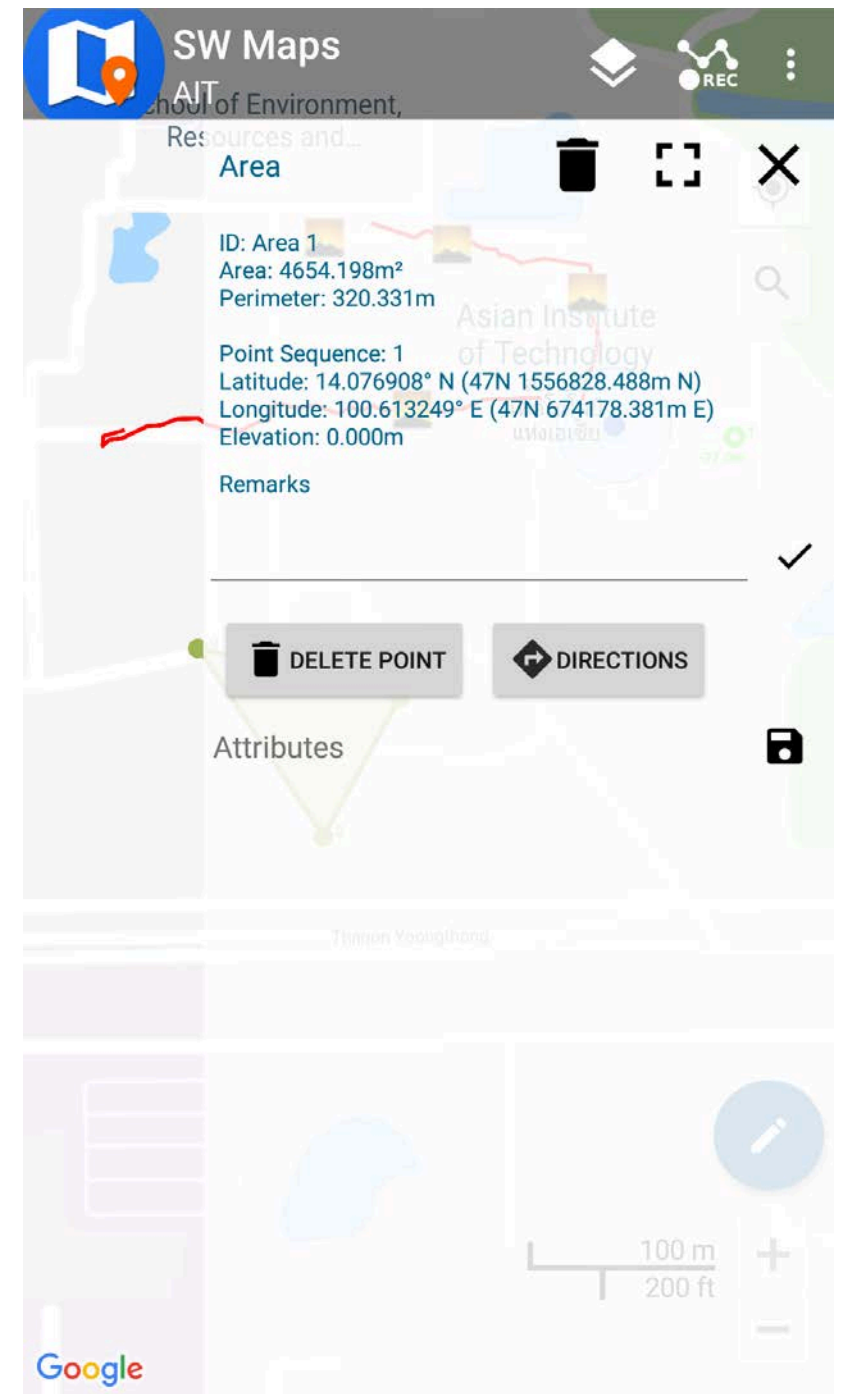


Drawing Features

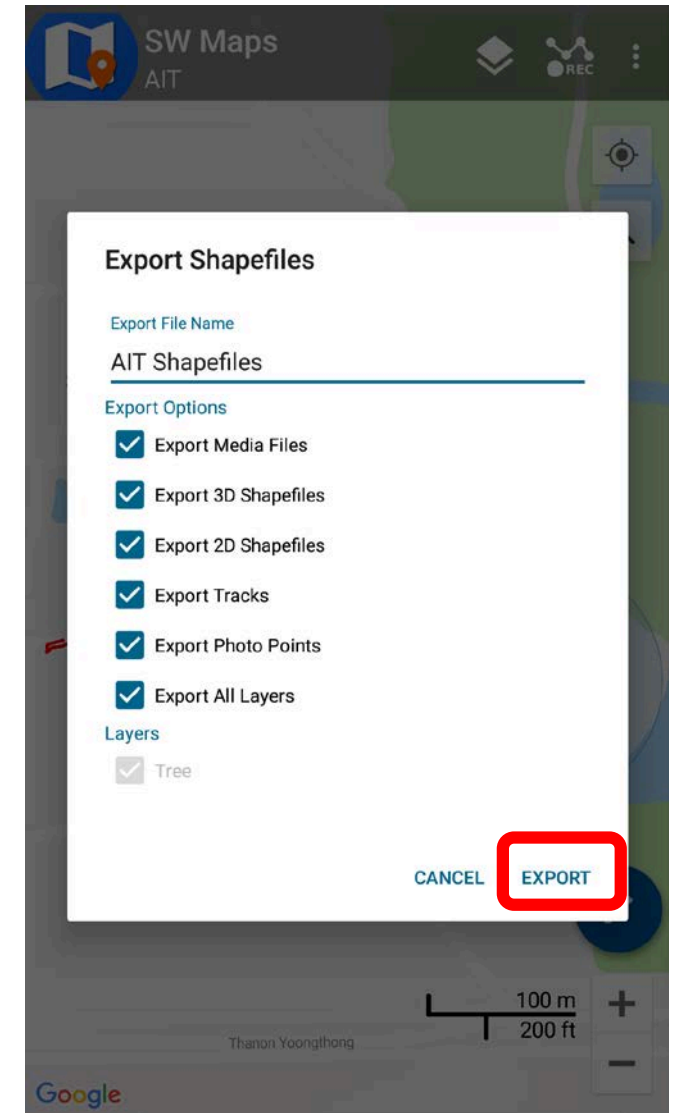
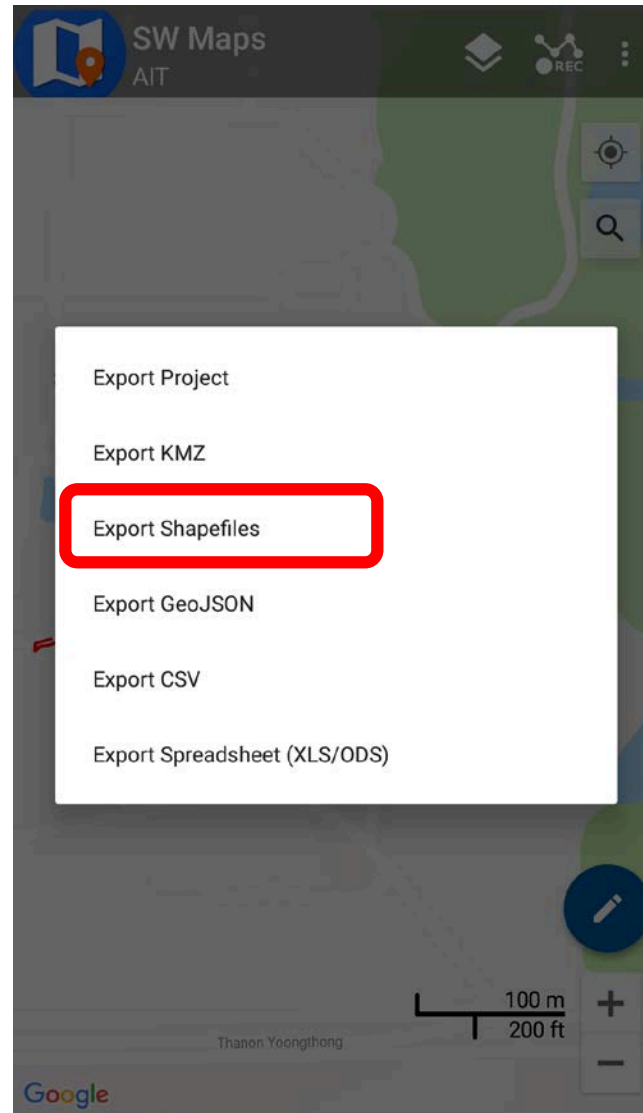
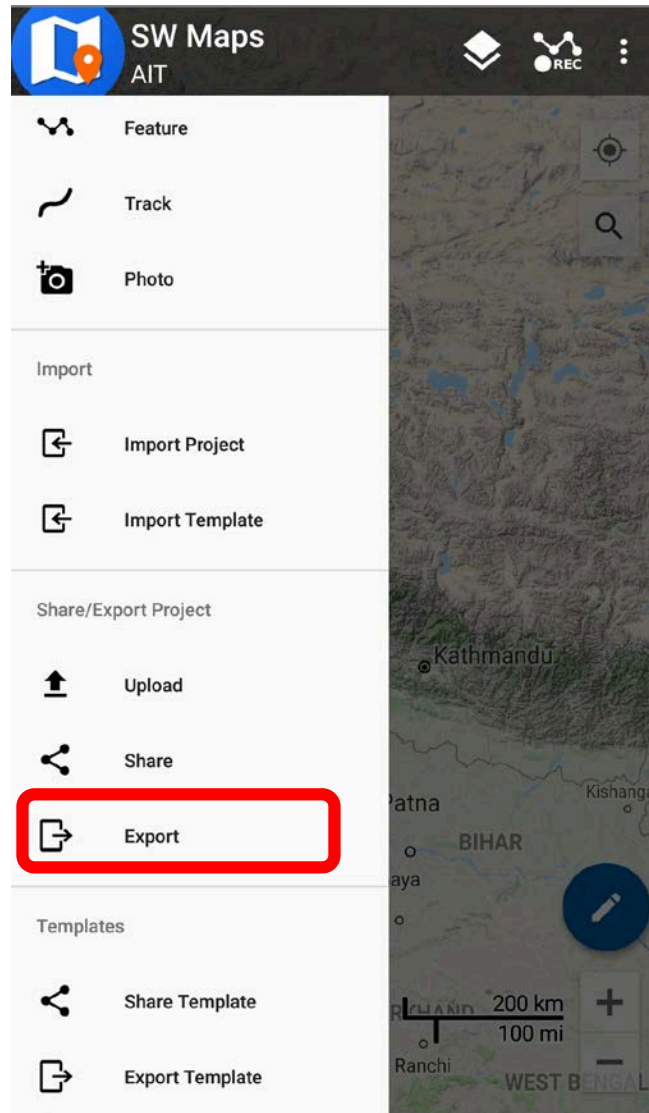


Tap a feature point to open its properties.

You can edit attributes, delete vertices or get directions to a point using Google Maps.



Exporting Data



Things to Try

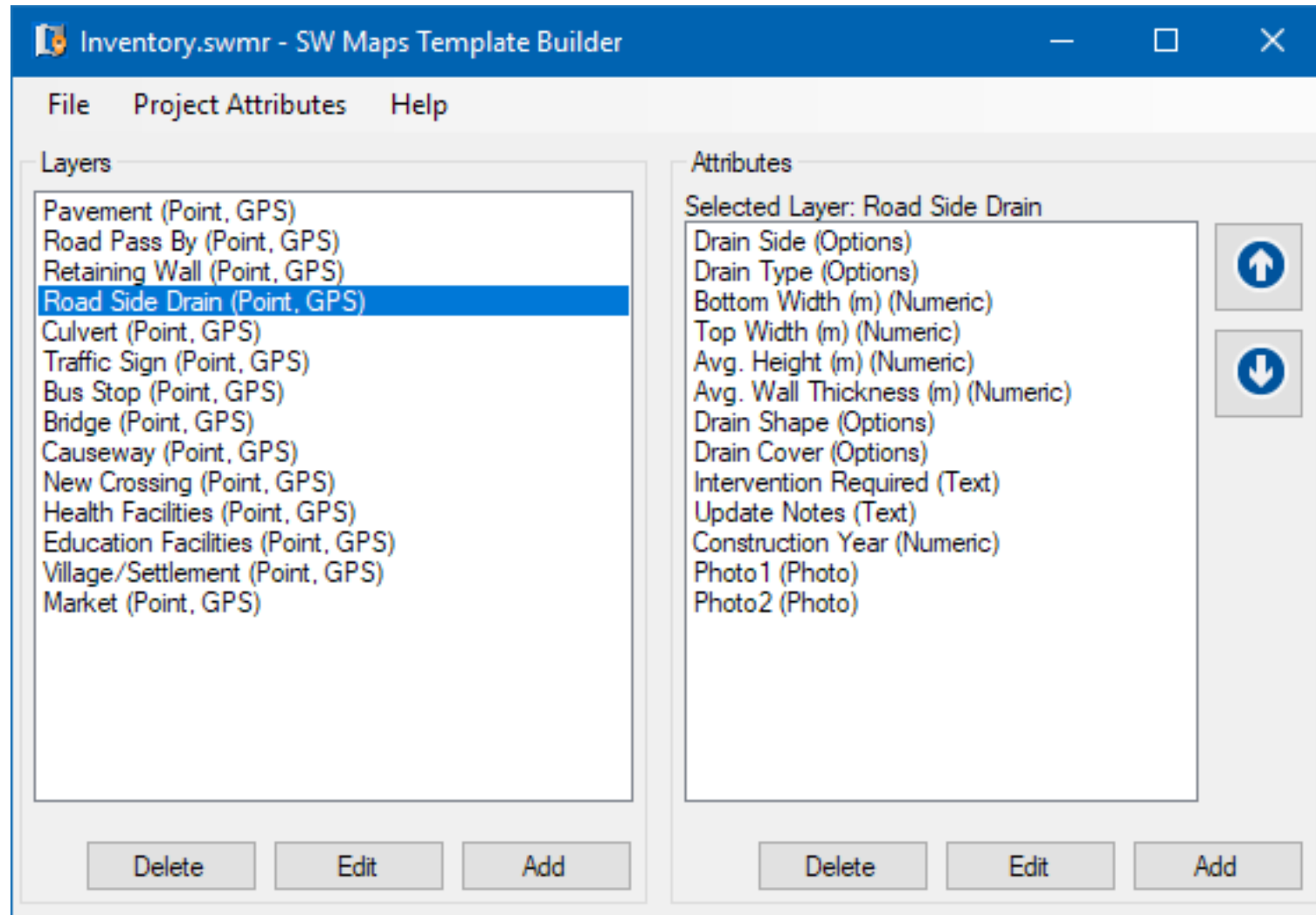
- Record a Line Feature
- Record a Polygon
- Add an Options Attribute Field (Dropdown choices)
- Edit attributes after saving feature (Hint: Tap the feature on map)
- Take a Photo Point (Select **Photo** from drawer)
- Record a track
- Export data to KMZ, copy to computer and open in Google Earth
- Measure length and area by drawing lines and polygons

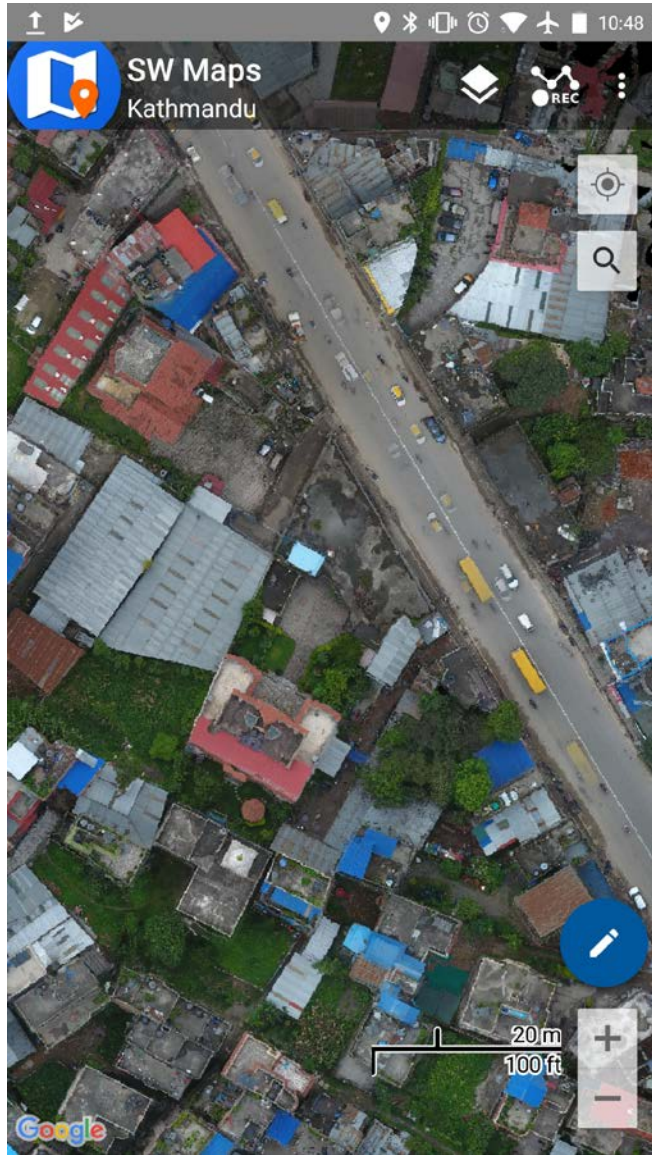
Templates

- Projects once created can be exported as a template for other projects.
- Useful when many surveyors and instruments are deployed to collect the same type of data
- Templates can be made on a Windows PC using the **SW Maps Template Builder** tool, or exported from any existing project using SW Maps

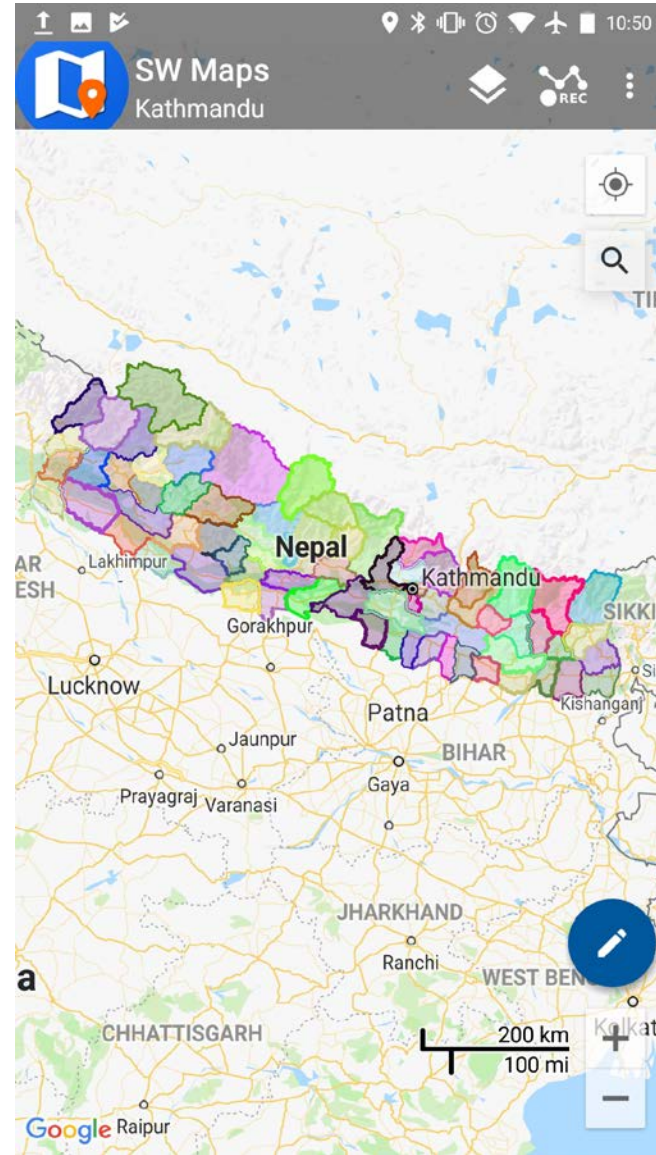
http://swmaps.softwel.com.np/template_builder

Template Builder

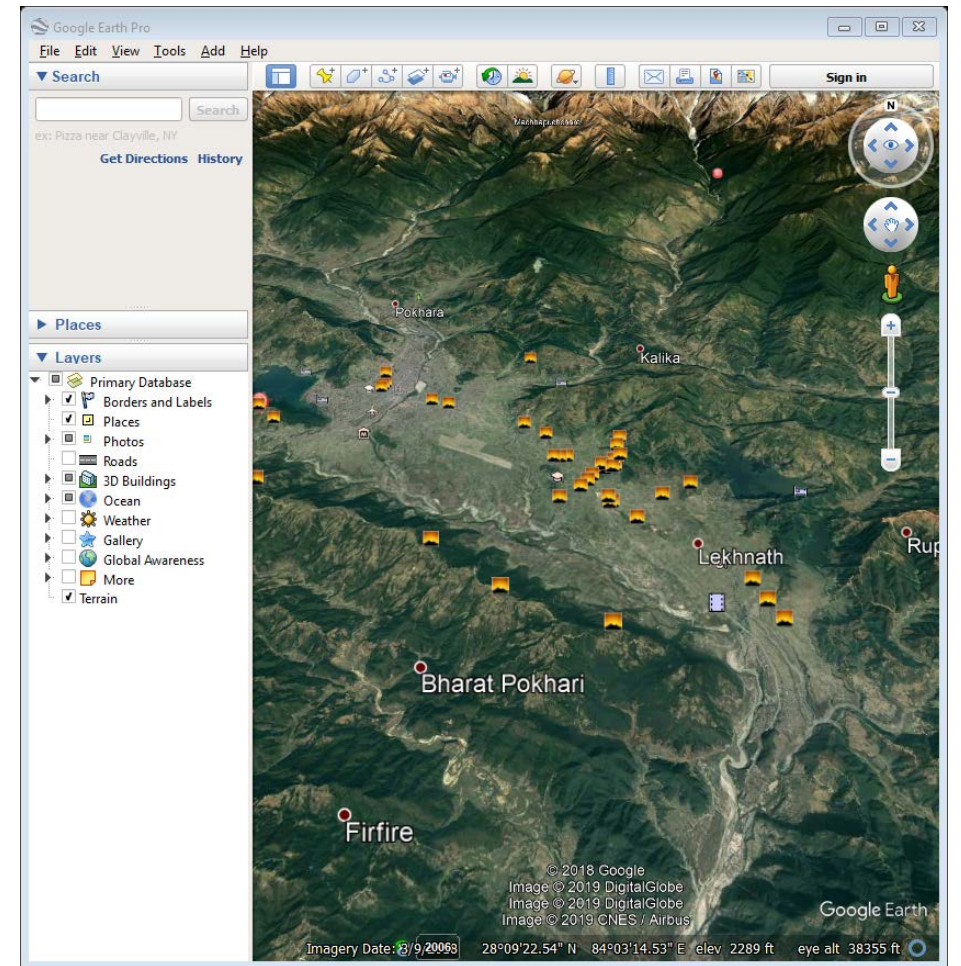




Drone Imagery Mbtiles



Shapefile Categorized Styling



Exported KMZ in Google Earth

User Manual

- SW Maps

<http://swmaps.softwel.com.np/assets/resources/manual.pdf>

- Template Builder

<http://swmaps.softwel.com.np/assets/resources/TemplateBuilderManual.pdf>

Rtkdroid: RTK in Android

- Android app for low cost RTK
- Currently under testing, not distributed to public
- Uses u-blox receiver connected via USB for rover data, RTCM 3 from NTRIP for correction
- Uses RTKLIB 2.4.3b31 for RTK processing
- Sets location of Android device using a mock location provider so all other apps use RTK positioning

RtkDroid ABOUT

SETUP SKYPLOT

Rover Mode Kinematic (RTK) ▼

Elevation Mask 20 ▼

Ambiguity Resolution Continuous ▼

Satellites

GPS + QZSS + GAL

GPS + GLONASS + QZSS + GAL

GPS + BEIDOU + QZSS + GAL

Rate: 5Hz ▼

NTRIP Settings

Address

Port

2101

Mount Point

A01

Username

user

START ROVER

Set Rover Mode
(Single/Kinematic/Static)

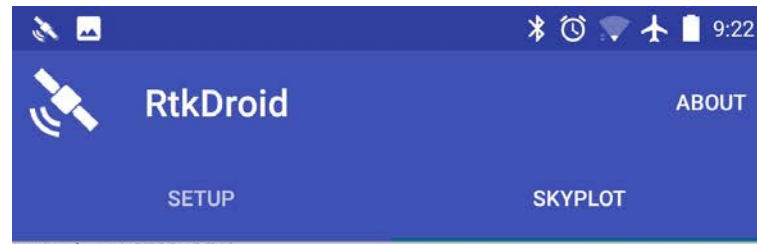
Ambiguity Resolution Mode
(Continuous/ Instantaneous/ Fix and Hold)

Select GNSS Satellites to use

Data Output rate
(Position fixes per second)

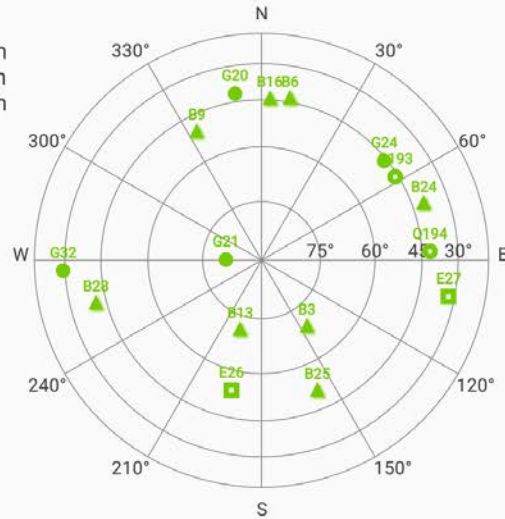
Enter NTRIP Caster Settings

Press to Start Rover

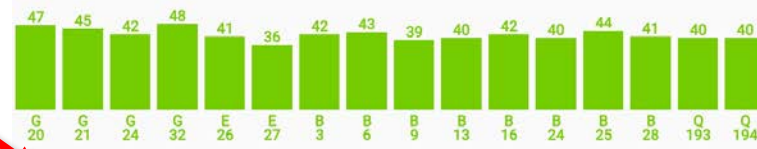


Position Output

Latitude: 14.07831256°
Longitude: 100.61413945°
Elevation: -28.783m
Fix type: Single
Satellites: 16
PDOP: 4.4
HDOP: 2.6
VDOP: 3.6
SDX: 0.000m
SDY: 0.000m
SDZ: 0.000m



Files being recorded
(File Size)



NMEA: 2019_01_16_09_21_19.txt(14KB)
UBX: 2019_01_16_09_21_19.ubx(125KB)

Record UBX

STOP RECORDING

Start/Stop Recording

RtkDroid

- For installation files and more information, contact Dr. Dinesh Manandhar at dinesh@iis.u-tokyo.ac.jp

- YouTube Video Demo

https://www.youtube.com/watch?v=Z_C33io_8S4

Thank You