



FÓRUM ITABORAÍ:  
POLÍTICA, CIÊNCIA E CULTURA NA SAÚDE



# TUTORIAL FOR THE USE OF GEOTECHNOLOGIES

PRACTICAL GUIDE FOR  
THE USE OF DATA COLLECTION  
APPLICATIONS (APPS)  
IN FIELD ACTIVITIES

The content of this guide is best viewed when you position your device horizontally (landscape mode).

## TUTORIAL FOR THE USE OF GEOTECHNOLOGIES

### PRACTICAL GUIDE FOR THE USE OF DATA COLLECTION APPLICATIONS (APPS) IN FIELD ACTIVITIES

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## WHAT ARE GEOTECHNOLOGIES?

Geotechnologies are a set of technologies that allow the collection, processing, analysis and availability of spatial data and information. Geotechnologies are used in several areas, such as: Agriculture, Urban Planning, Environmental Management, Transportation, Public Health, Public Safety, etc.

What is the purpose of using geotechnologies in the work of Community Health Agents (CHA)?

The use of geotechnologies is an increase in the work process of the CHA, as it allows the acquisition of field data and its sharing with the management level, contributing to the planning and decision-making process in relation to the territories.

## WHAT ARE THE MOST USED GEOTECHNOLOGIES FOR THE FIELD WORK OF THE CHAS?

There are several tools for the purpose of field data collection. In this step-by-step, the Google Earth and SW Maps applications will be used. Both are free to use, with advantages and disadvantages over each other.







# 1) GOOGLE EARTH

It is an application with a more user-friendly interface. It is very intuitive and its great advantage is in the available languages. It presents basic features of data acquisition in the field, such as point, line and polygon. Its limitation is the dependence on an internet signal (data plan or wifi) for operation.

## 1.1) App acquisition and installation

Go to your device's app store (if it's android – play store; if it's apple – apple store) and search for the “Google Earth” app).

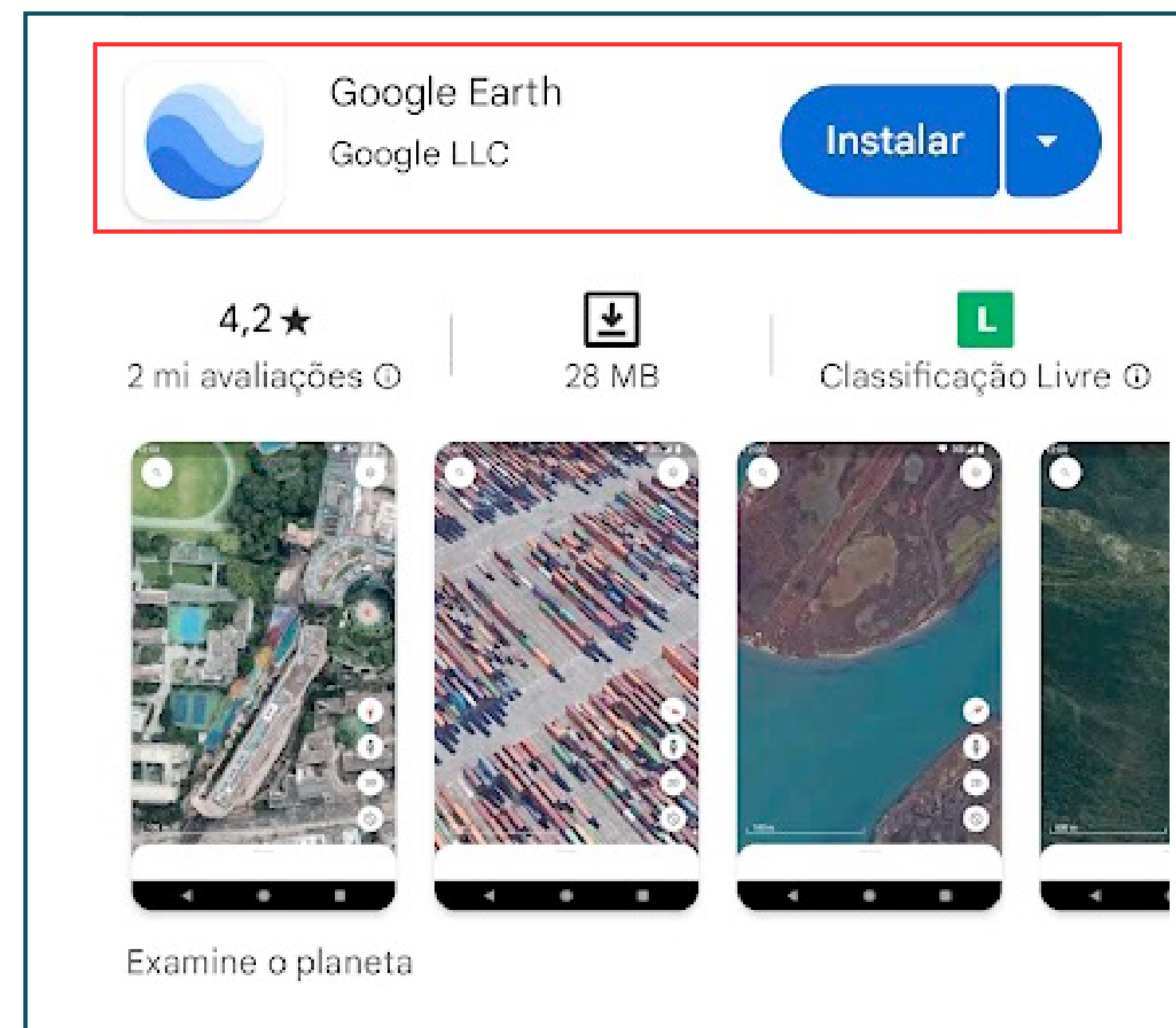


Figure 1: Installing the Application (Source: Google, c2025)

## 1.2) Application Home Screen and Project Preparation

The app works linked to your registered Android account, such as Gmail account. The same applies to Apple's equivalent. Thus, the home screen will present the possibilities of exploration from the tool and will indicate whether your project, in this case a new project to be created, will be saved on the device or in the “cloud”, which is the drive.

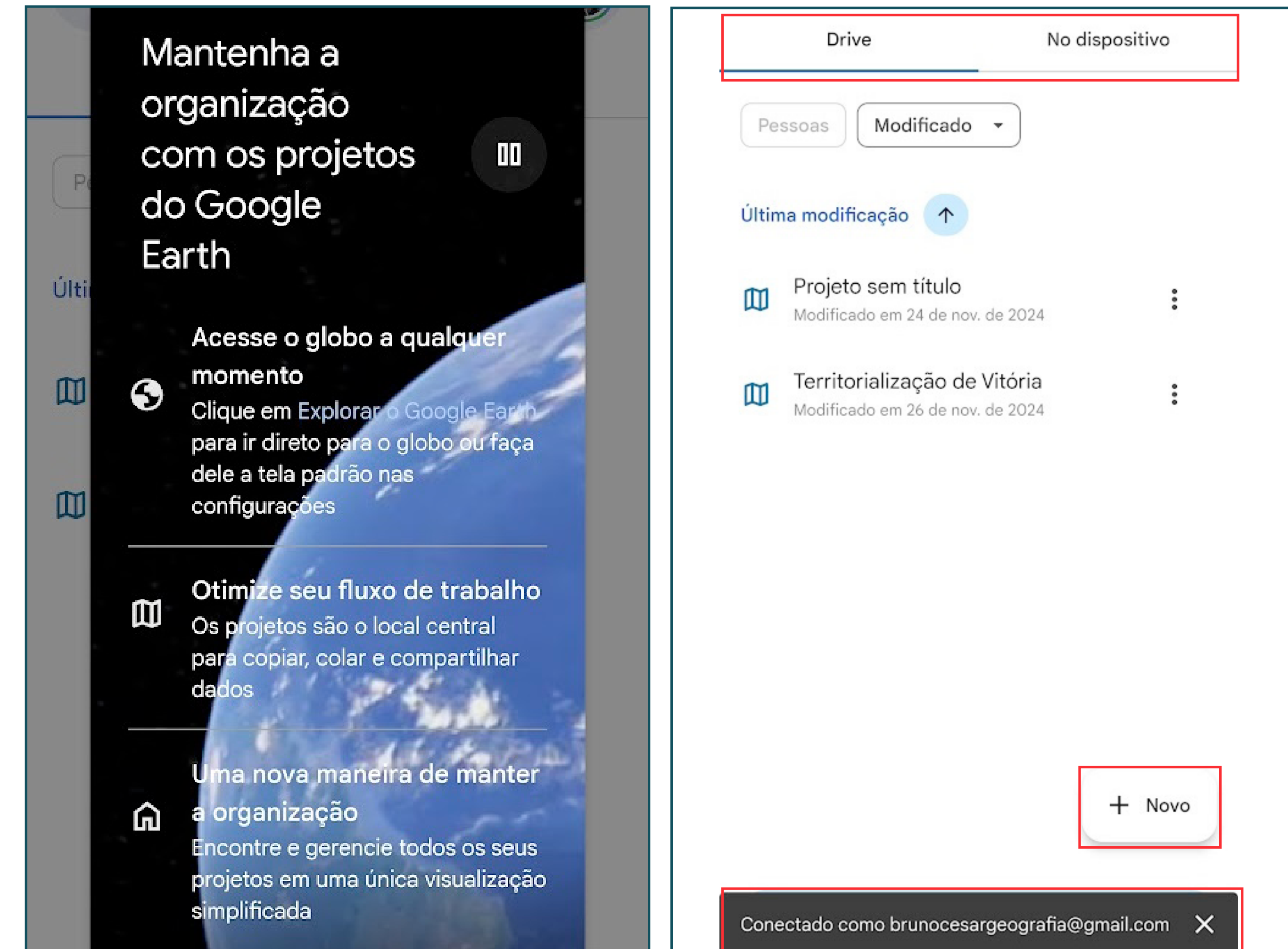


Figure 2: Starting a New Project (Source: Google, c2025)



To start the project for data collection, you will click on the “new” option, creating a new project. Note that in the example presented, there are already projects linked to the account. Once the project already exists, just click on it and continue putting the data collected in the field. When clicking on the option to create a new project, as previously discussed, several data loading options will appear, as shown in figure 03.

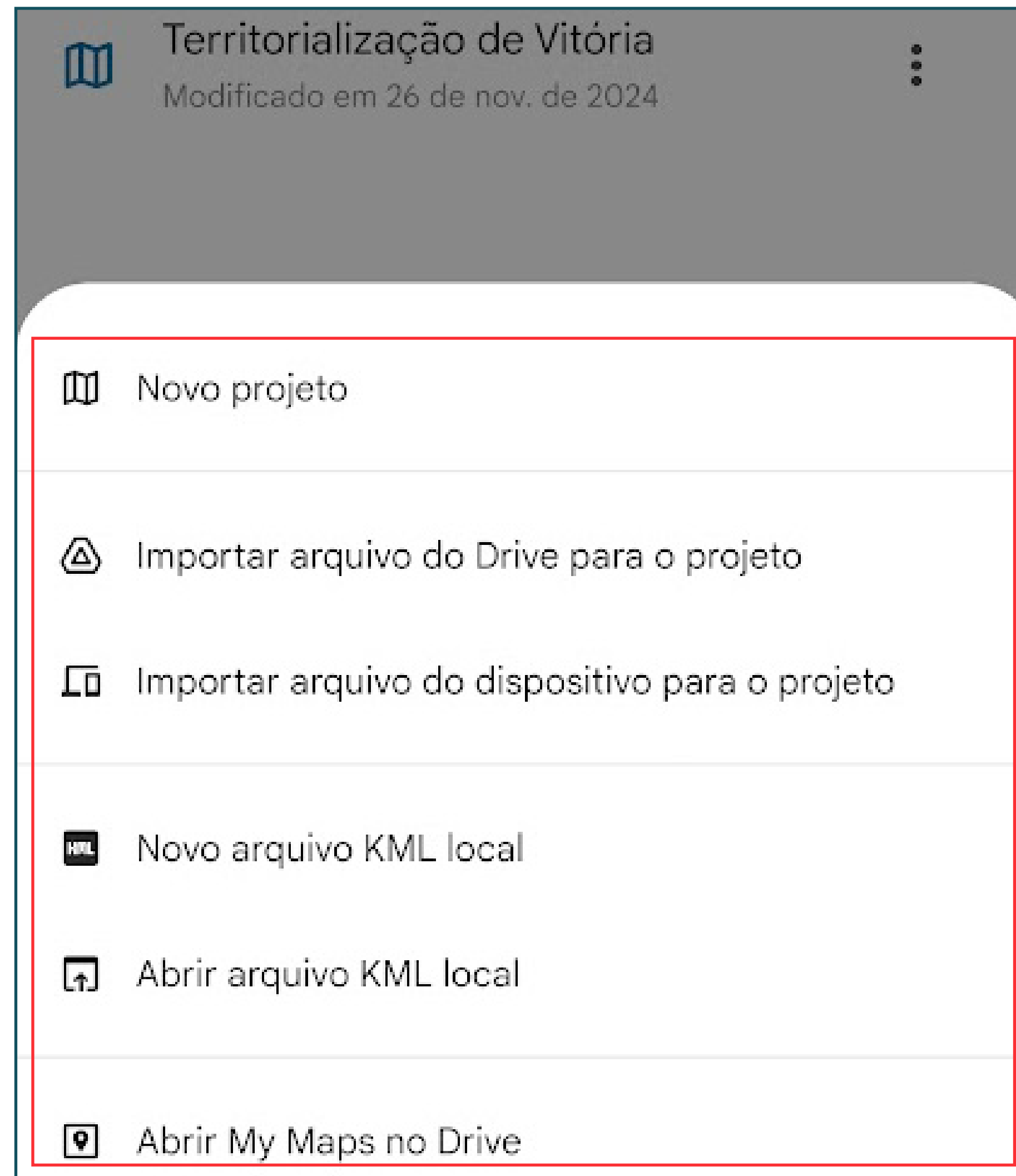


Figure 3: Starting a New Project (Source: Google, c2025)

When you create a new project, you will be asked to give it a name and you can add a brief description about the data collection project. Note that when saving the project, if the option is through the cloud, it will appear with the indication “saved in Google Drive” (figure 4).

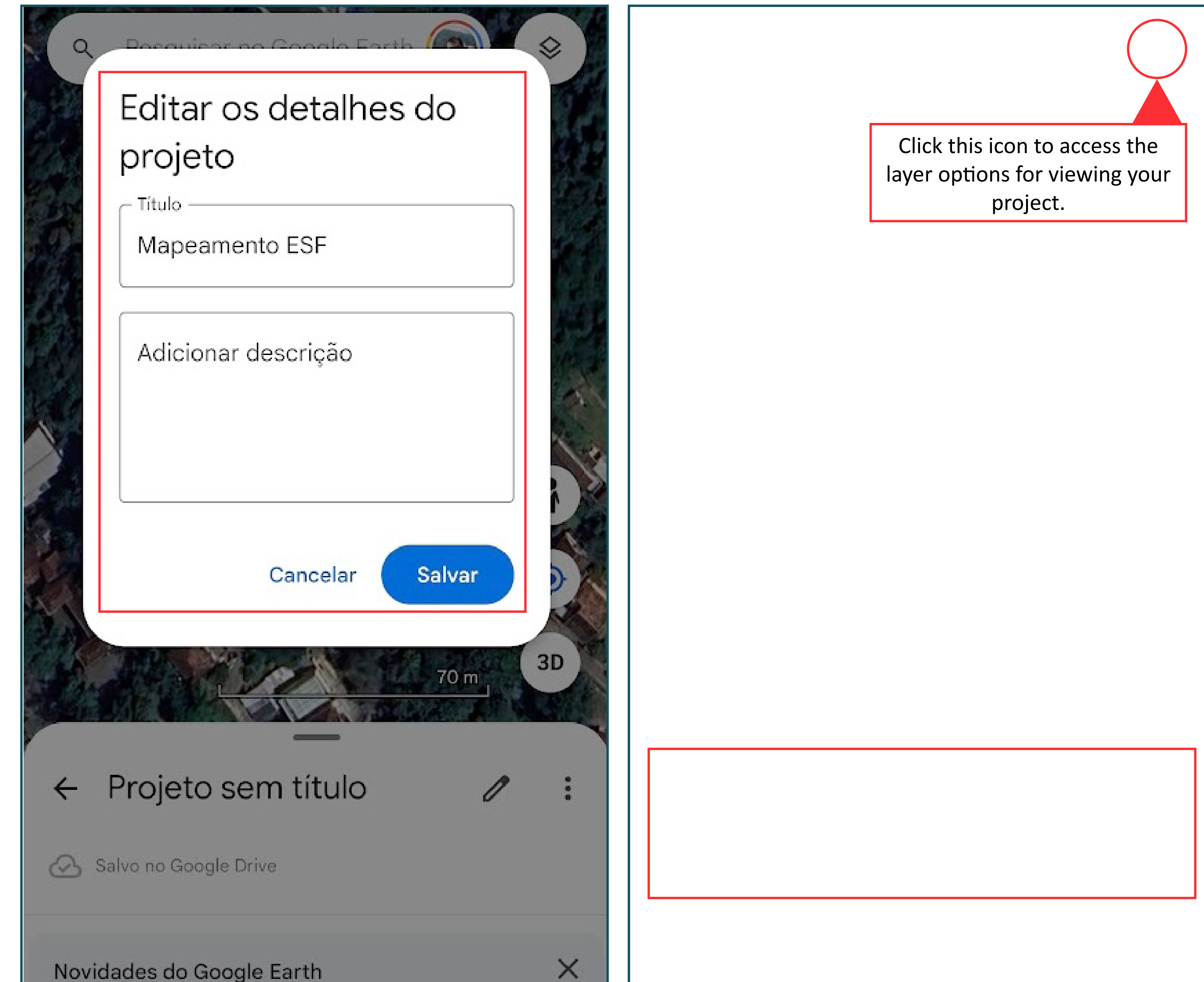


Figure 4: Editing Project Details (Source: Google, c2025)

Continuing the preparation of the project, there is the possibility for you to choose several layers that will serve as a basis for you to visualize the place where you are mapping. For this, don't forget to also enable the location of your device, because only then will it be possible to use the gps feature. The following are the base layer view options available in the application (Figure 5).

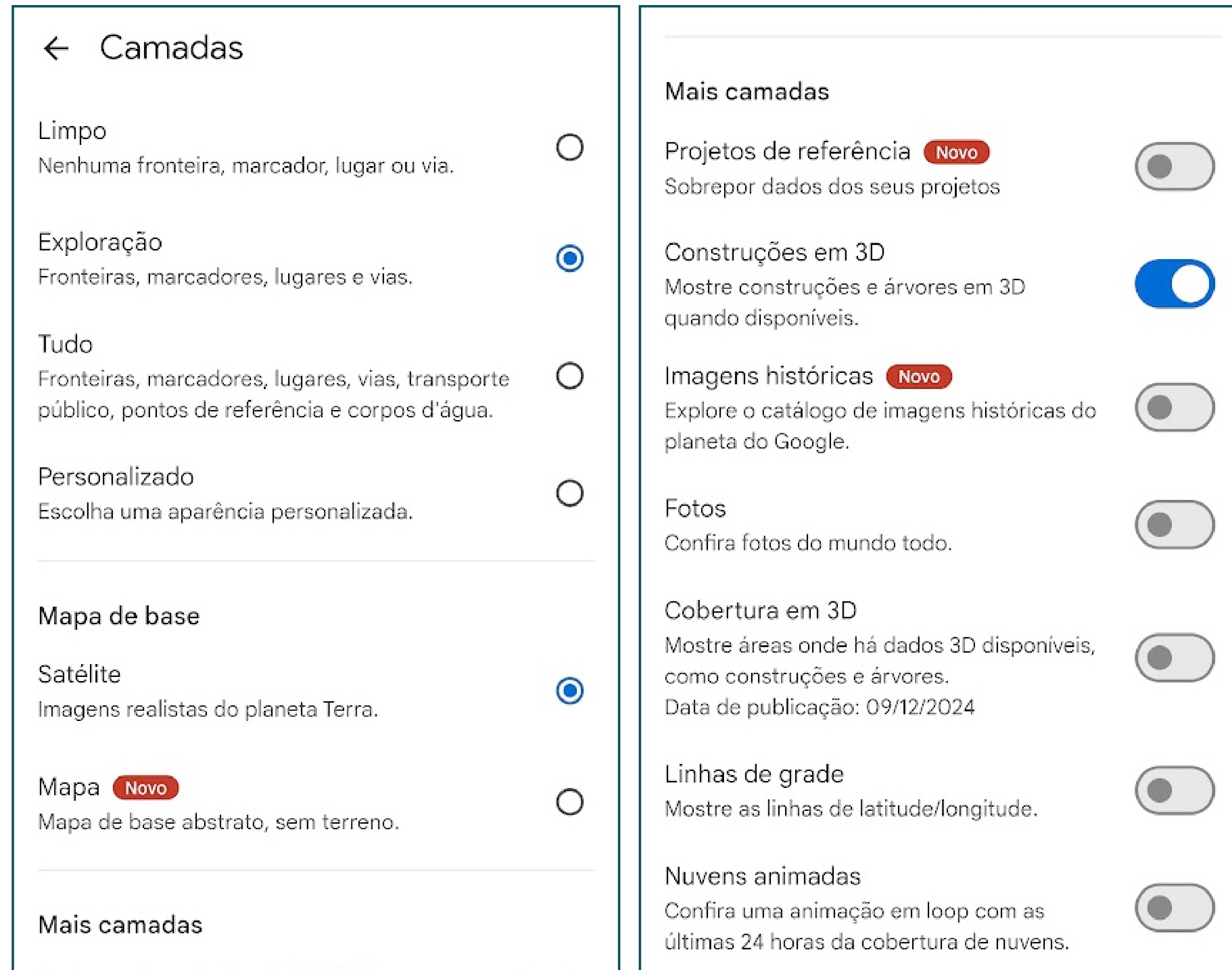


Figure 5: Visualizing Layers (Source: Google, c2025)

### 1.3) Using the tool

Once the project is finished, let's look at the vector data structures, that is, what you will draw in the project as you collect the data and information in your work process. The vector data structures are: point, line, and polygon. We use points when we want to identify a singular feature, such as a building, an institution, the residence of a community leader, or things that we can associate with a point. A line, on the other hand, we use to identify paths or routes, whether for people or transport. We use polygons when we want to define a priority area, such as environmental or social fragility. Let's observe how these structures are presented in the project (figure 6).

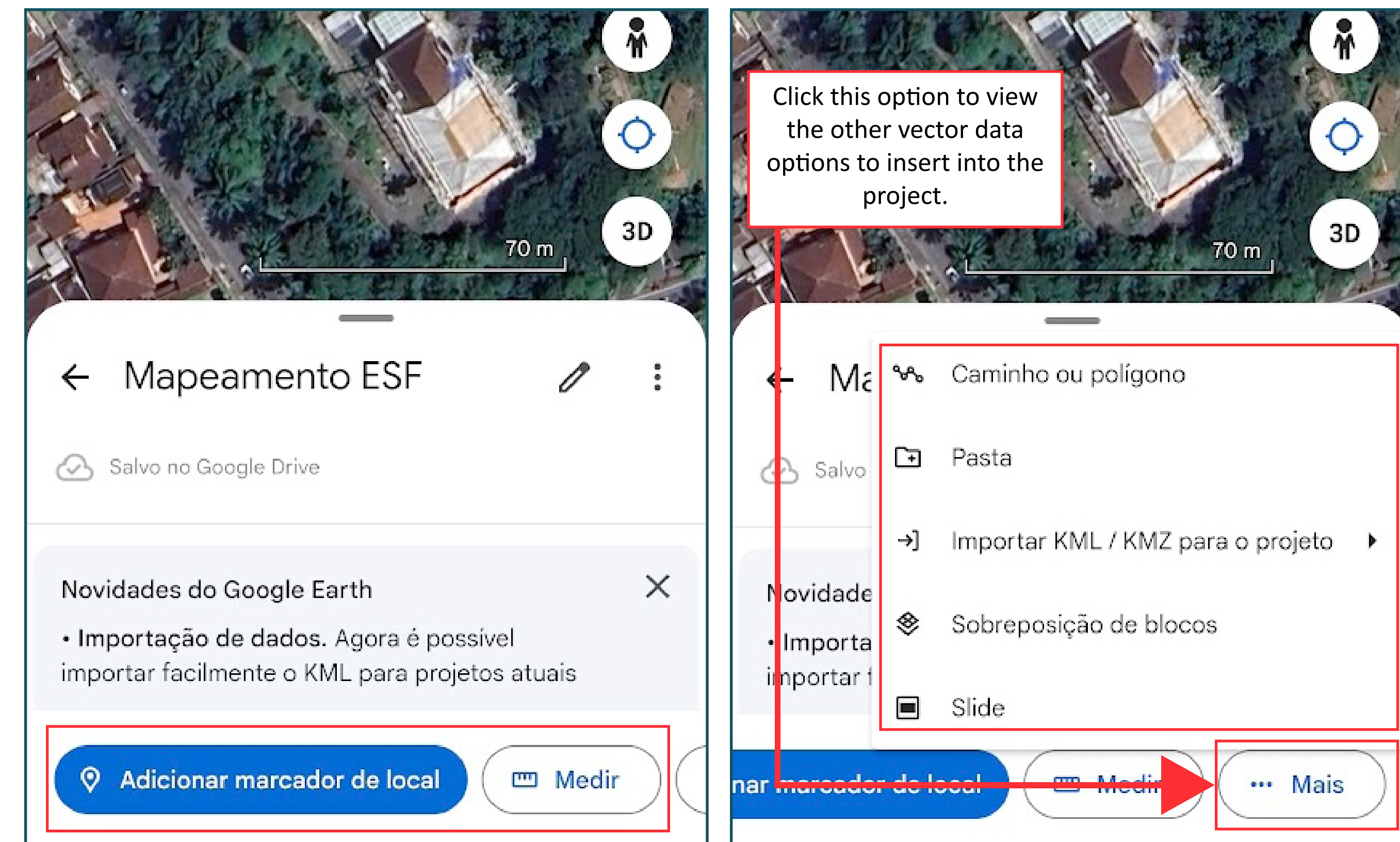


Figure 6: Choosing the Vector Data Type (Source: Google, c2025)



### 1.3) Using the tool

#### 1.3.1) Inserting Points

To insert the points, simply click on the “add a placemaker” button. Then click on the “save to project” button the point you just entered. To change the position of the stitch, simply move it using touch on your device’s screen, swiping. After doing this procedure, name the feature you marked with a dot. Note that you can change the settings of your stitch, such as size and colors (figure 7).

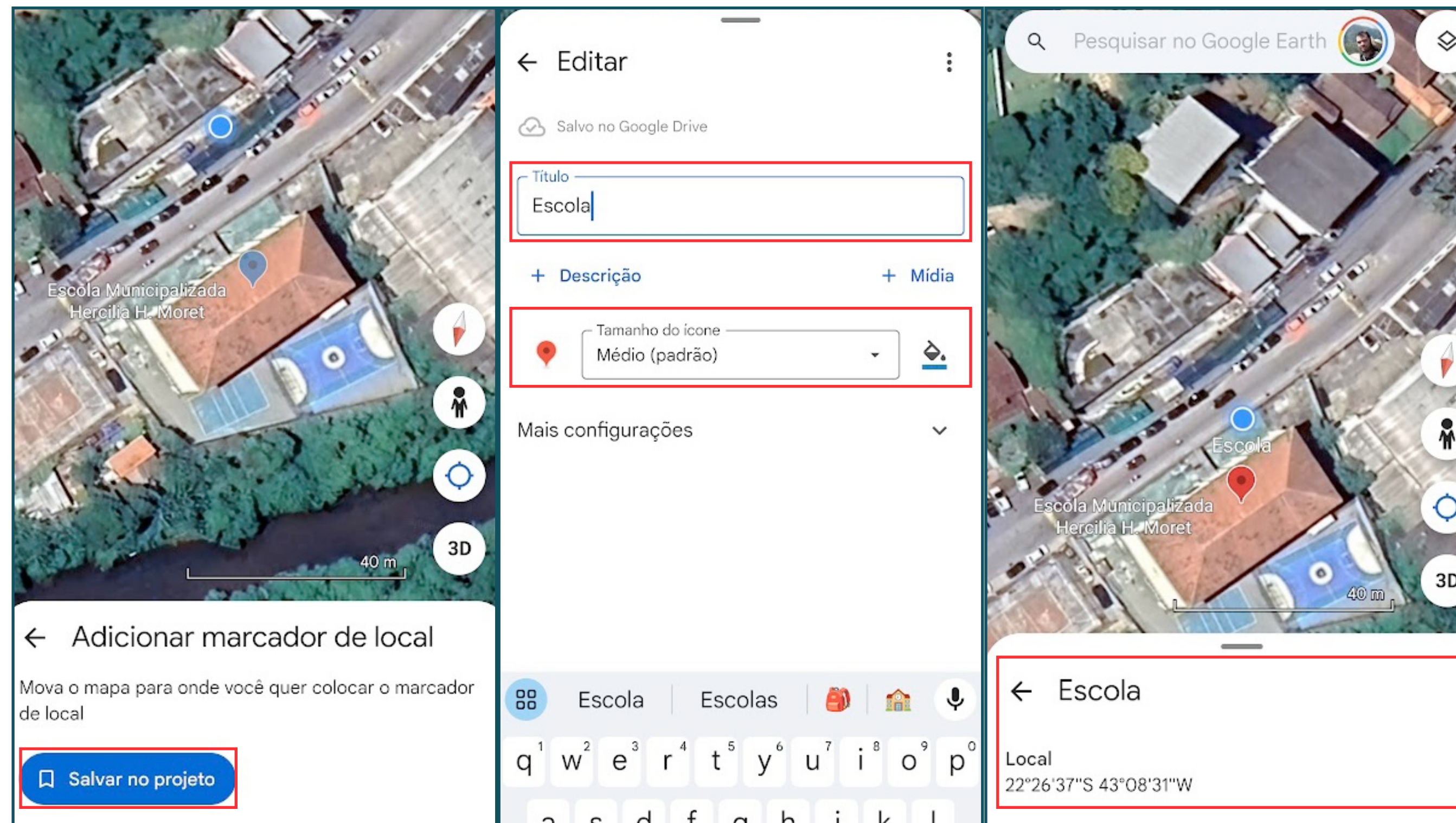


Figure 7: Inserting Points (Source: Google, c2025)

Note that when you modify the configuration of the vector data structure, it already appears with the formatting you established. In addition, when you enter the point and save, the name is already saved, as well as its geographic coordinates (latitude and longitude).

#### 1.3.2 - Inserting lines and polygons

To insert lines you will have to click on the “plus” button, where more vector structure options will open. Both for the insertion of lines and for the construction of polygons, the procedure will be the same. Choose the “path or polygon” option. The path or polygon will be traced from the moment you move the screen, positioning the points where you want. Once it’s where you want it, click the “add point” button. Go on doing this as a segment, a line, and the path will begin to be traced. If you want to make a polygon, you just need to make this movement of inserting points and lines around the area you want to highlight. At the end, finish by adding the last point to the starting point, to close the polygon. The option “close shape” will appear. Click on it and click “save to project”. This way your polygon will be created with the name you will give, the perimeter and the area of the polygon. Figure 8 shows the construction of the path through the line feature, as well as the polygon. At the end, it is possible to see the features created within the project, in this case the point, the line and the polygon created.

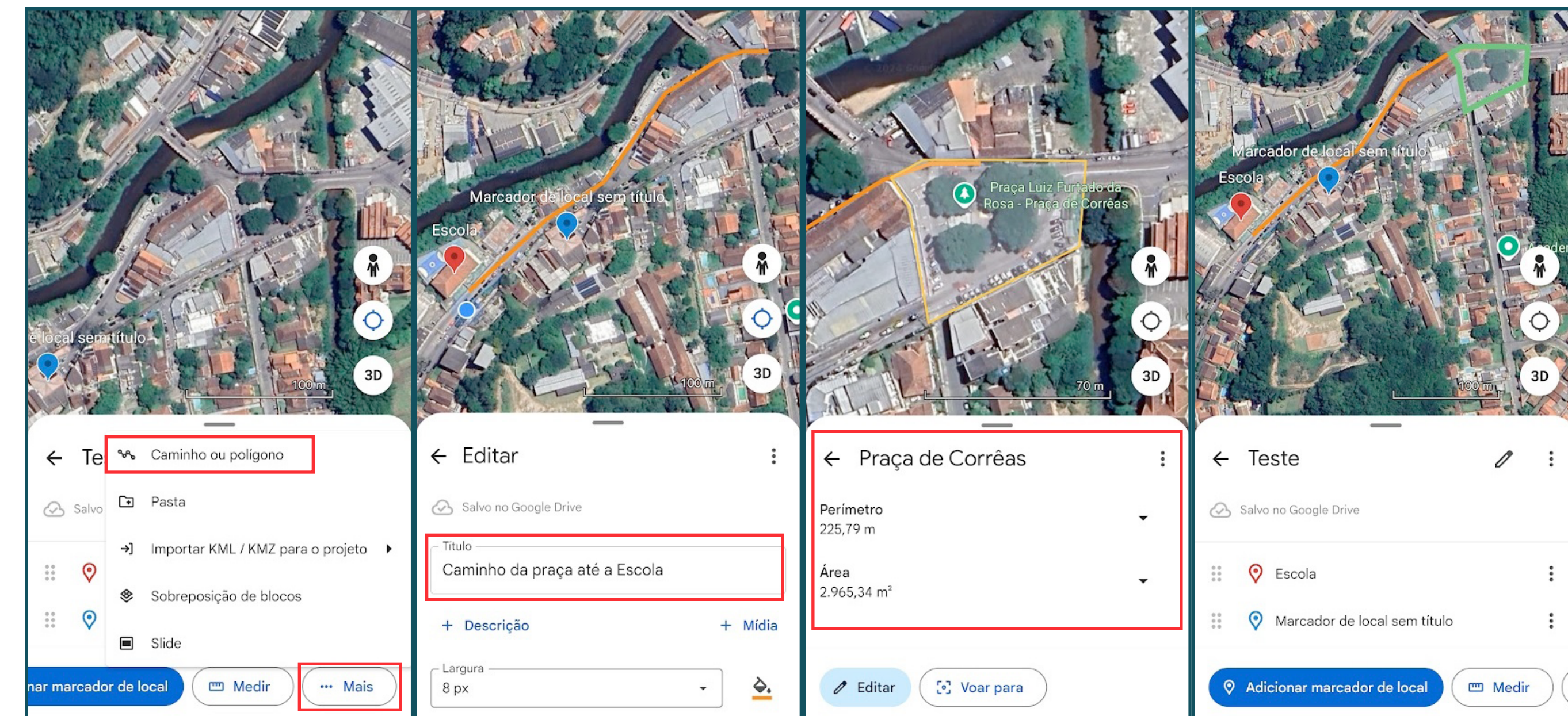


Figure 8: Inserting Lines and Polygons (Source: Google, c2025)



### 1.3.3 – Exporting the data

Once you have used all the resources available with the Google Earth application for your field mapping, it will be necessary to share this data with a professional who supports the analysis, or even so that you can do it in a data analysis program. To do this, click on the icon with 3 dots, next to the name of your file and select the option “Export file with KML”. Then, a sharing options window will appear for you to choose where you will send the file.

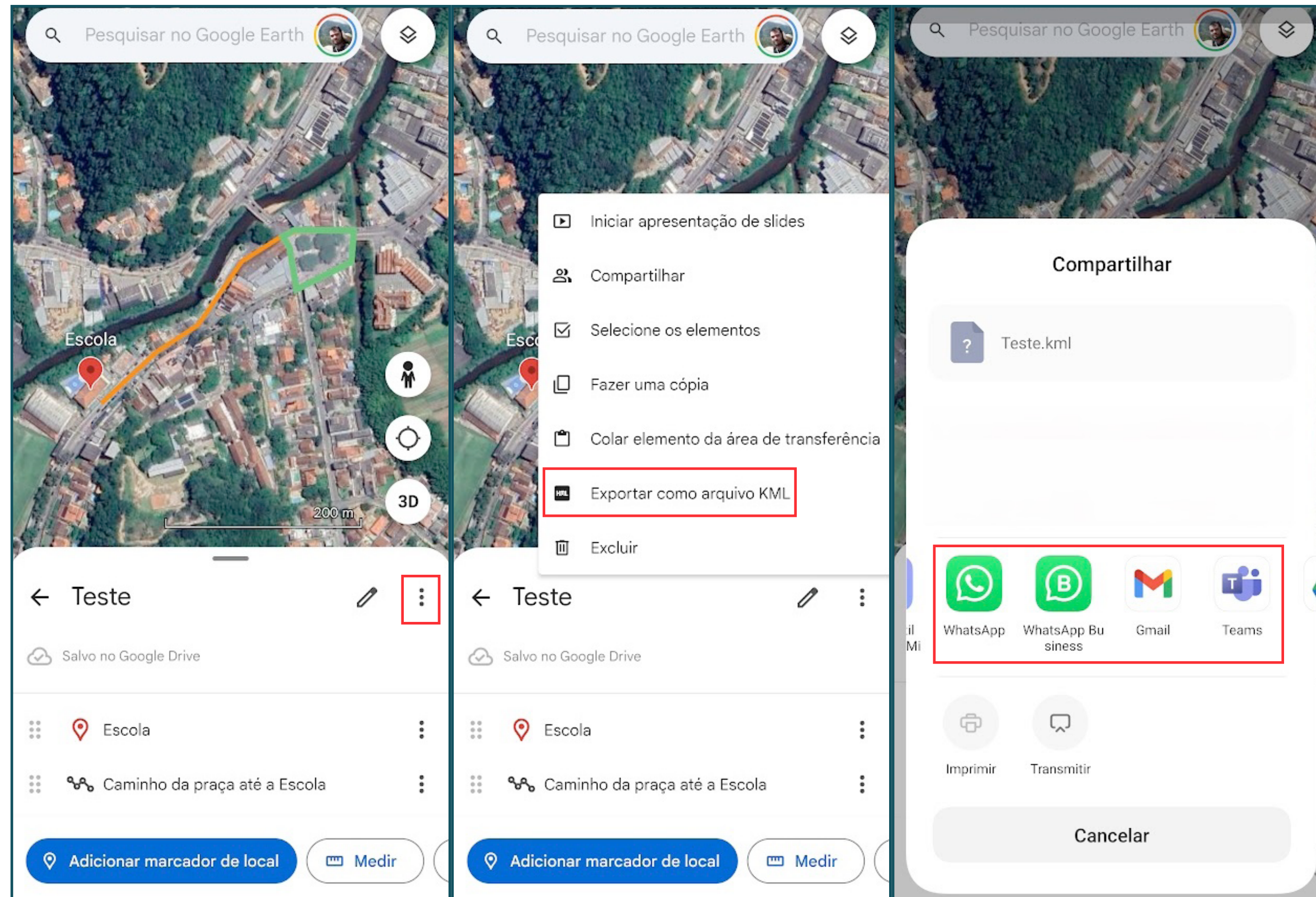


Figure 9: Exporting Data (Source: Google, c2025)



## 2) SW MAPS

It is an application with a less user-friendly interface, mainly due to the language (it is in English). This is a limitation compared to Google Earth. However, it is an application that can be used without internet (runs offline). In addition to this aspect, the SW Maps application is much more complete in terms of features, such as recording images already with the locations (georeferenced), recording the paths taken during activities (tracking), among others. Let's check out these features in more depth.

### 2.1) Acquisition and installation of the application

Go to your device's app store (if it's android – play store; if it's apple – apple store) and search for the “SW Maps” app).

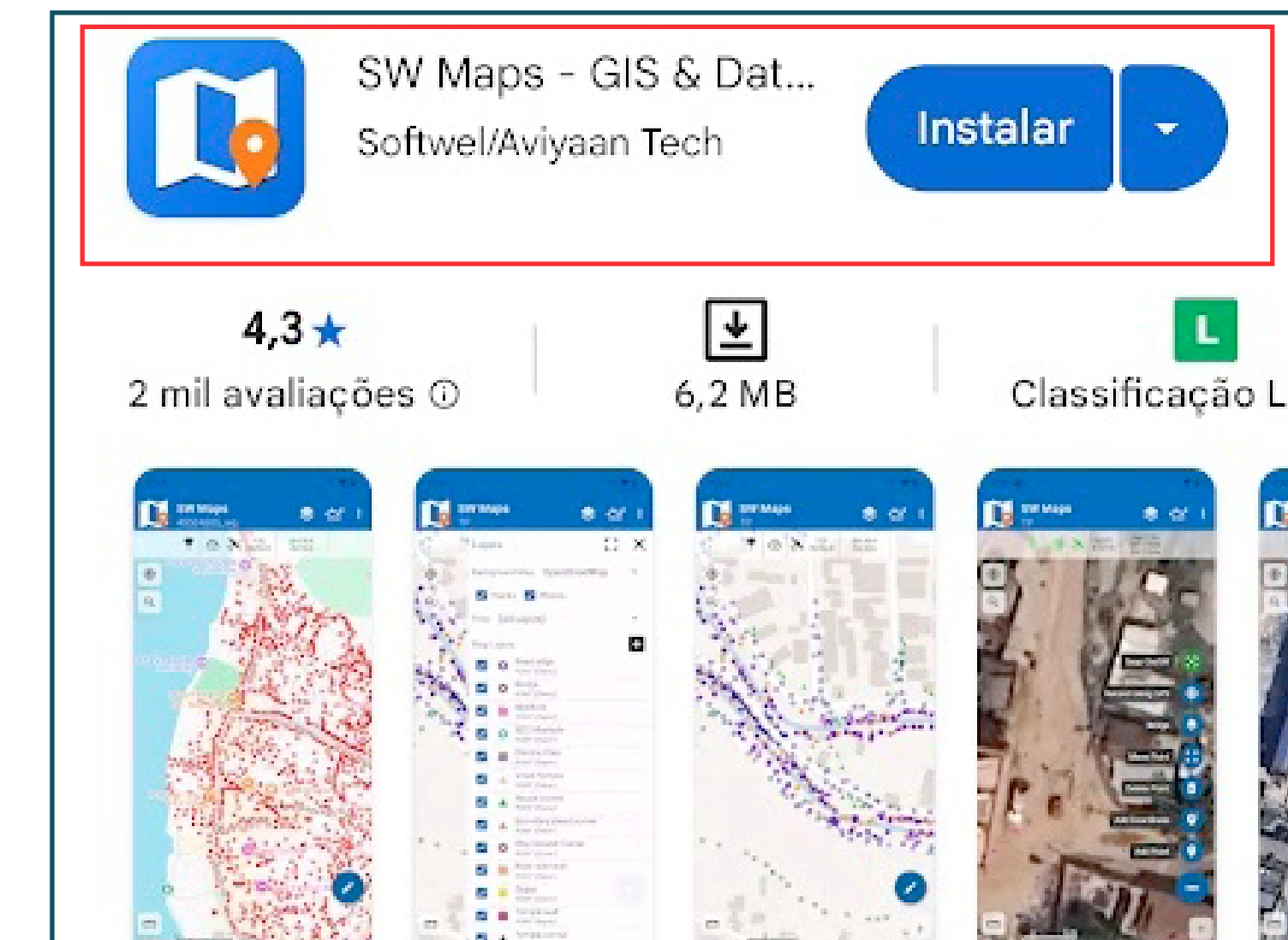


Figure 10: Application Installation (Source: Aviyaan Tech, c2025)



After the installation is done, you will open the app for the first time. Enable all the tools that the application requests, especially the location, as it will be essential to use the device's gps device.

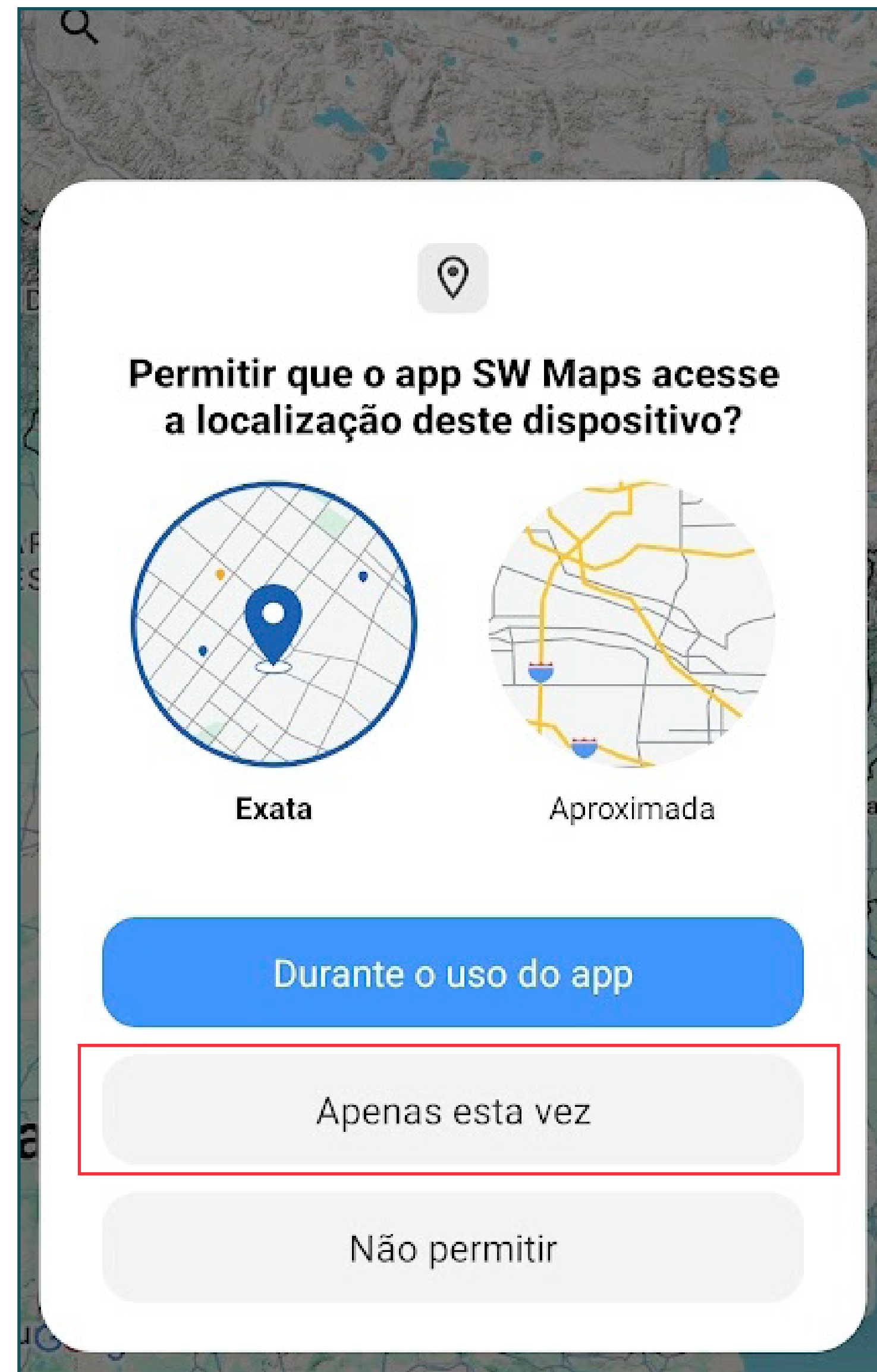


Figure 12: Enabling Phone Location Tools (Source: Aviyaan Tech, c2025)

## 2.2 – Application home screen and project preparation

The home screen presents the icons for accessing the tools available in the application. In it, we observe the location icon, which will enable the use of gps to locate the equipment. However, before using location, it is essential to check the number of satellites available. To generate the location, it is necessary that there are at least three satellites available (figure 12). To check this information, click on the red icon, representing a satellite emitting signal.

Once you have checked the availability of satellites, it will be possible to obtain the location of the equipment that is in use (figure 12).

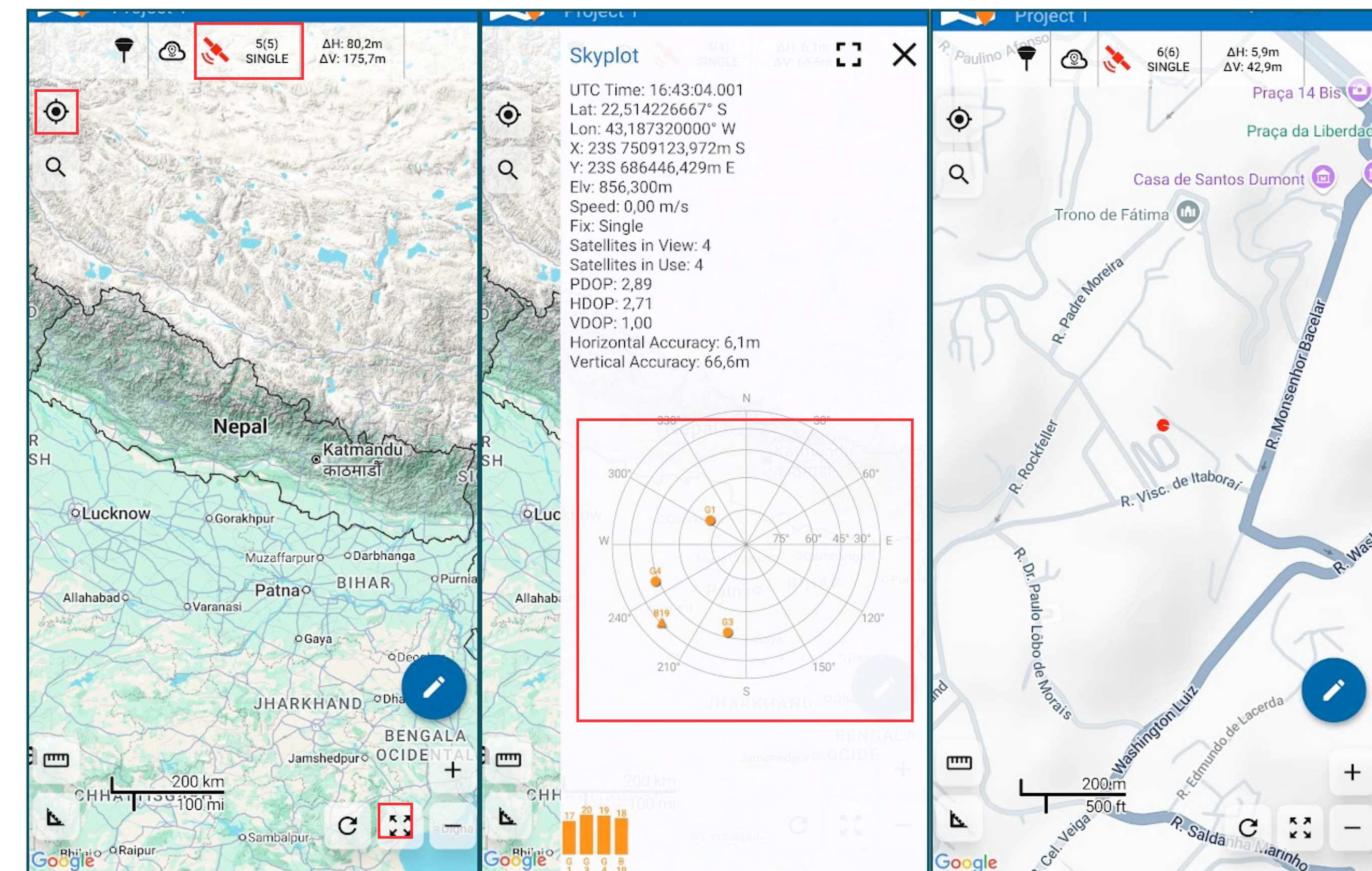


Figure 12: Locating and finding Yourself in the Application (Source: Aviyaan Tech, c2025)



### 2.3) Use of the tool

Initially, the basemap displays only the streets or terrain. To be able to add satellite imagery, click on the icon that represents two layers, one on top of the other, in the upper right part of the device, go to the “background map” layer and choose the “Google Satellite” option (figura 13).

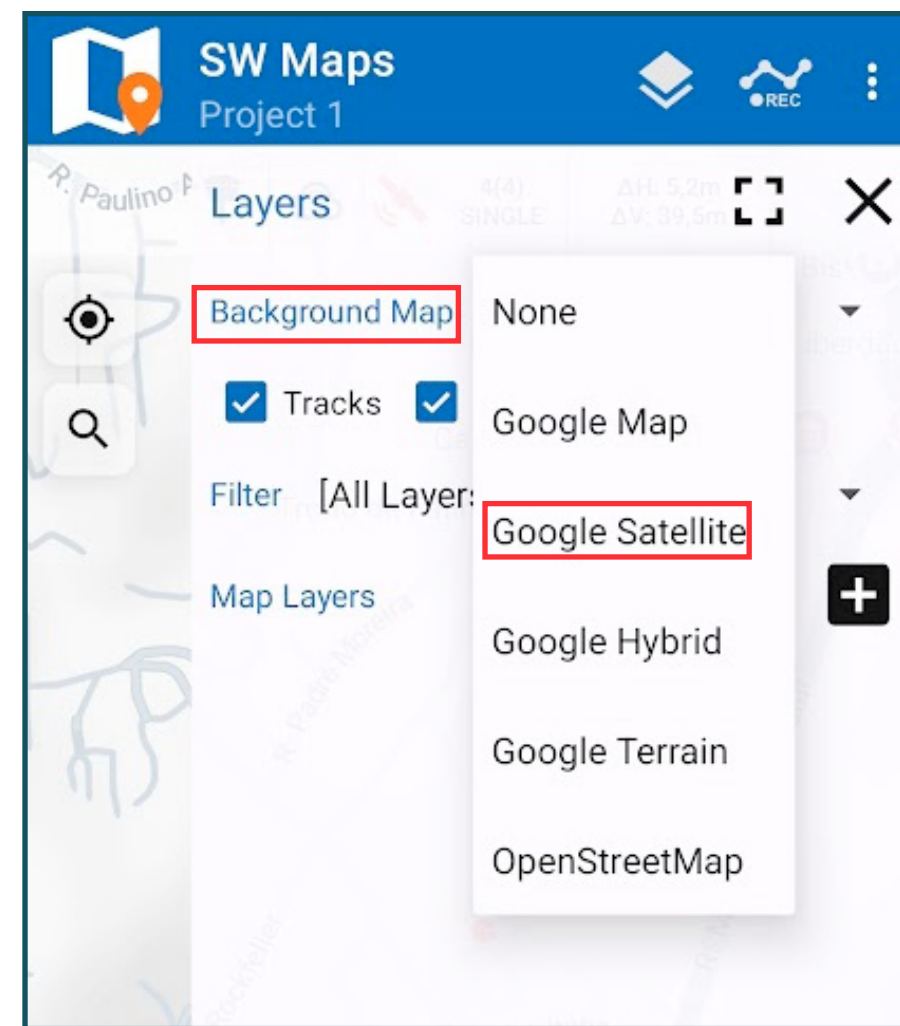


Figure 13: Adding the Background Image (Source: Aviyaan Tech, c2025)

Now that satellite imagery has been enabled, along with the location of your device, you will prepare the project to start mapping. SW Maps also allows you to create (vector) drawing elements such as points, lines, and polygons. To create a project and start mapping, click the icon that represents a pen at the bottom right of the application. Since it's your first time using the tool, you'll see a message saying there's no drawing layer in the project, asking if you want to create one. Click on the “yes” option. We will start with the simplest feature to draw, which is the point. Name your point drawing layer, choose the geometry type (point), and choose the symbology of the point (cross, triangle, circle, etc.), as well as the color. Click “ok” and then click “add” to add the point layer. That's it, you've created the point layer and you're ready to start mapping.

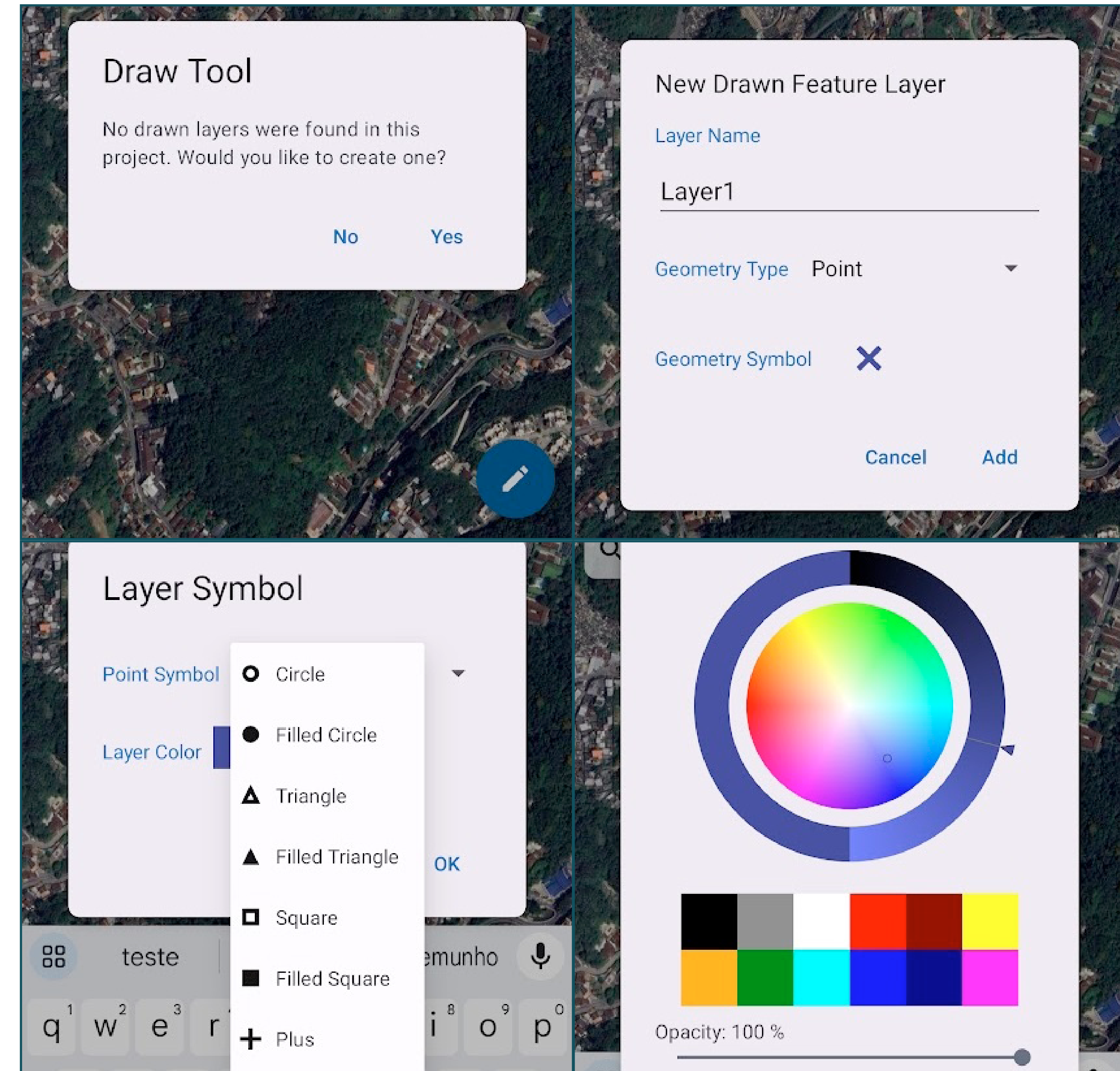


Figure 14: Creating Drawing Layer (Source: Aviyaan Tech, c2025)



### 2.3.1) Inserindo pontos

In SW Maps it is possible to enter points in two ways: manually or through the GPS itself. To insert manually, click the pen icon again. You'll see that they'll open other icons for you. Click on the "add point" option and then click on the desired location, observing the satellite image. It is important to check that the add dot icon is green, indicating that you are enabled to add dots. Once you have created the point, with just one click, tap on the pen icon to close the list of tools and click again on the created point. An information window will open about the created point, showing information such as the time of the point registration, the location coordinates (in latitude and longitude), among other information that appears automatically. To identify your point, click where it says "remarks" to name your point. After that, click on the icon that looks like a "v", to check. When you do this, a message will appear saying "saved". It means that your point has been saved. Click on the "x" at the top right of this window to close and move on to the next point. If you want to check if the information you entered is really saved, just click again on the point created. Then the info window will open and the saved info will be there. To continue mapping, restart the process described.

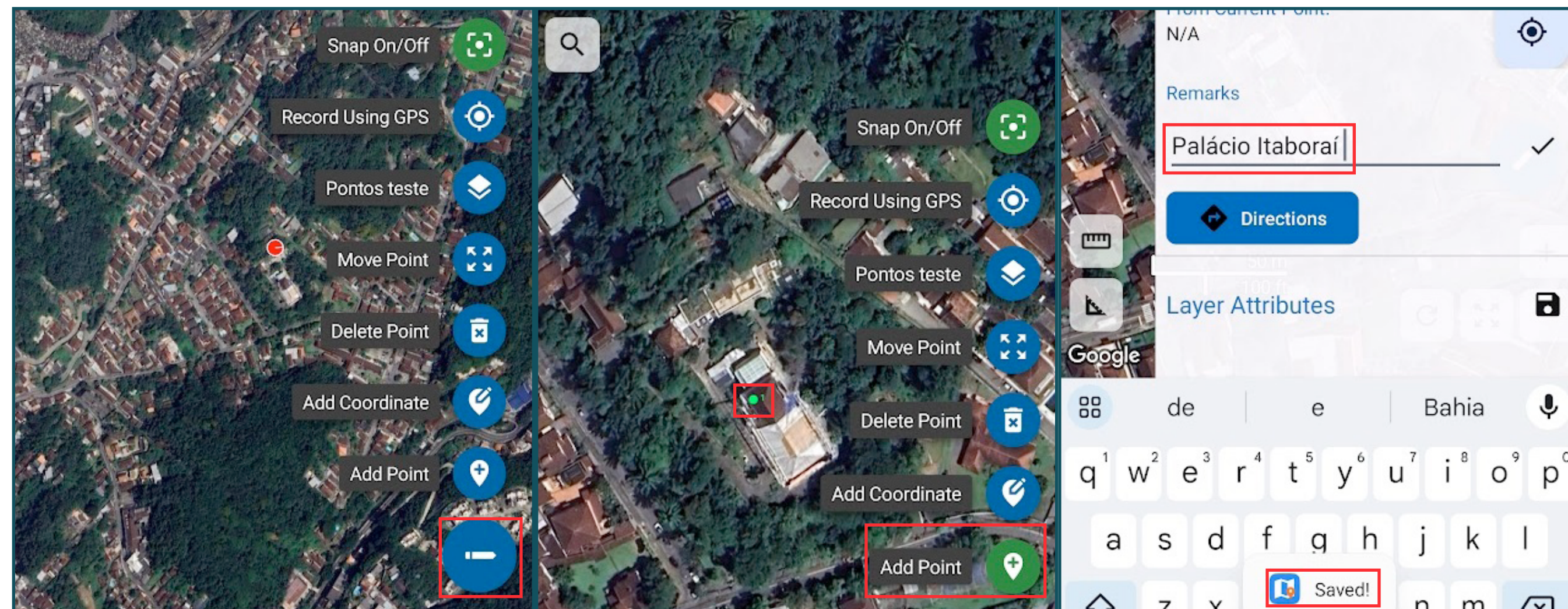


Figure 15: Adding Points to the Map (Fonte: Aviyaan Tech, c2025)

The other way to create a point is automatically, using the GPS location itself. This feature is very important for areas where there is no cellular signal. As stated earlier, this application makes it possible to use it when there is no internet available. To do this, he uses the location of his own cell phone. Click on the pen icon again and choose the "record using GPS" option. It is possible to enter the identification of the point, you do not need to close the information window. The function of creating points using GPS already has its own information window. Go to the "remarks" box and type in the name of the point you just created. At the end, click on the icon that is a marker with a cross to save the point. Notice that the message "point recorded" will appear. To check if it has really been saved, close the information window and click on the created point.

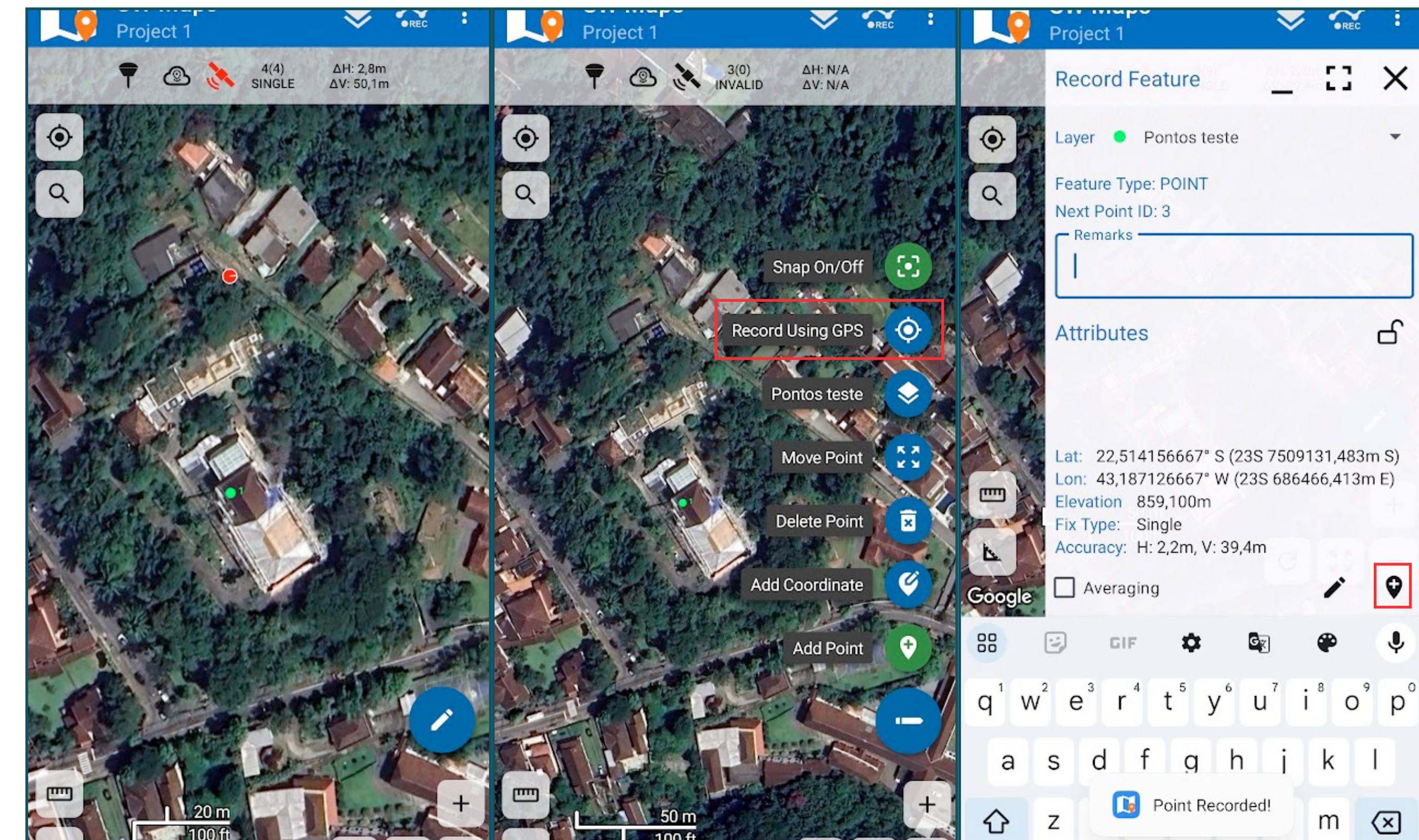


Figure 16: Creating GPS Points (Source: Aviyaan Tech, c2025)



If you want to delete a point, don't click on it. Doing so will open the identification window and, in case you click on the trash, you will delete your entire layer of points, not just the one you want to erase. To do this the right way, click on the pen icon and select the “delete point” option. The icon of the chosen option should turn red. After that, click on the desired point and a message will appear asking if you want to delete it. Click on the “yes” option and the point will be erased. Continue your task of inserting the dots.

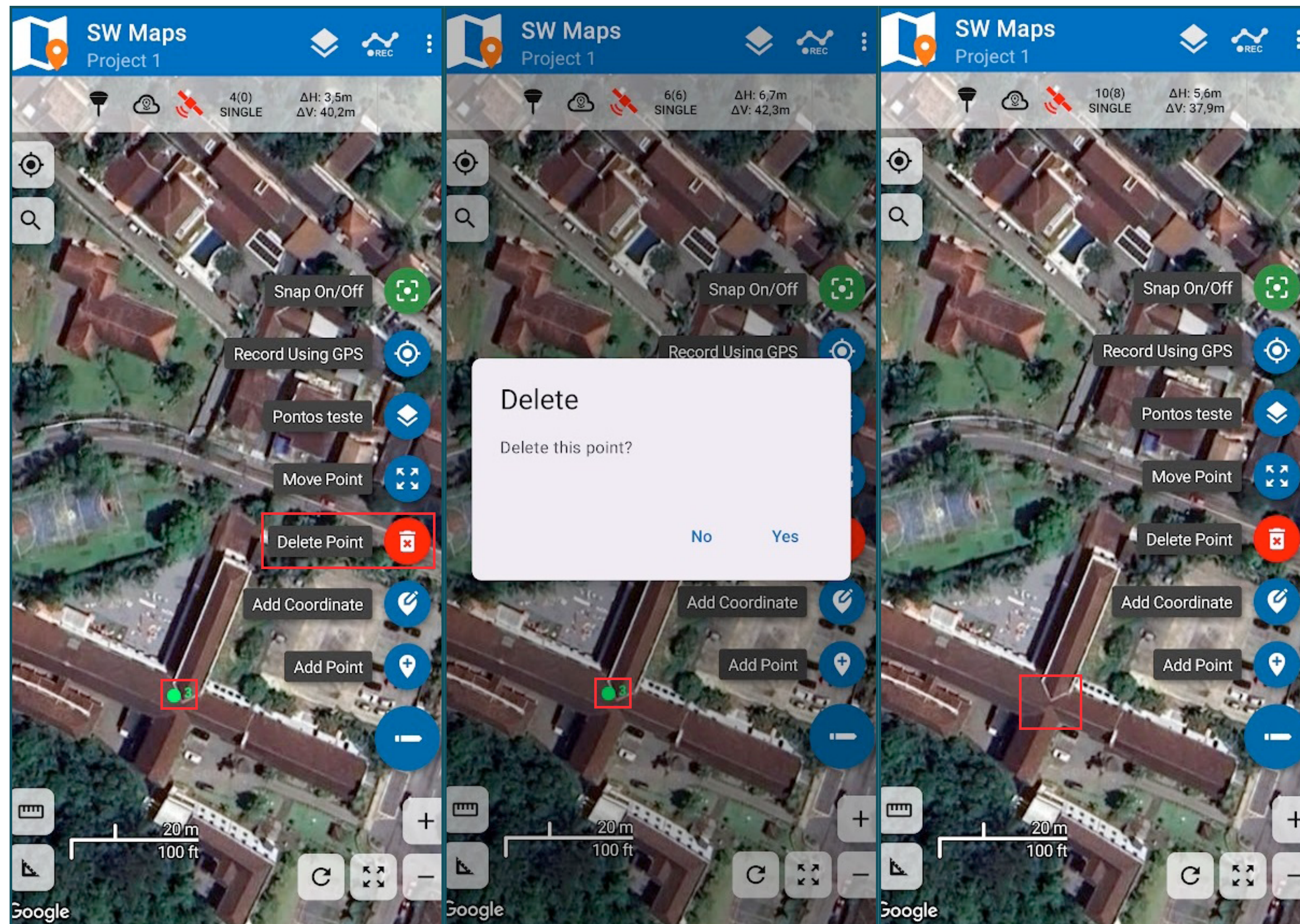


Figure 17: Erasing Points (Source: Aviyaan Tech, c2025)

### 2.3.2) Inserting lines

To insert another type of drawing feature, such as a line, you'll need to create another layer. To do this, click on the layers icon (two sheets, one on top of the other) at the top right. The layers window will appear. Click on the icon that has a small black square with a white cross to add other layers. Choose the last option from the list, written “drawn feature”. You'll notice that you'll open a window like the first one when you went to create the point layer. You must name this layer, choose the type of feature, which will now be line, define the color and thickness of the line. To insert the lines into your mapping, click the pen icon and check the icon in the list that is the layer icon (one sheet on top of the other). When you click, you will be asked to choose the layer to work on. Click on the line layer you just created. You will need to create the line file within the layer. Once you have selected the line layer, click on the “no feature selected” option. Click on the “add” icon (black square with the white cross) and name the line file you are going to create. Notice that a symbol will appear representing a line connected by dots. Lines are created from points. As you click and generate a point, then continue doing so, you will see that the segments are forming, giving rise to the line. When you think you've finished the line, just click on the pen icon. If you want to make another line, you will need to create another line file and give it another name. To do this, click on the pen icon and go to the layers icon. Select the line layer, click again on the “no feature selected” option and do the same process as before. Notice that with the new line file, the number of points (vertex) to make the segments restarts, after all, it is another line feature (figures 18 and 19).



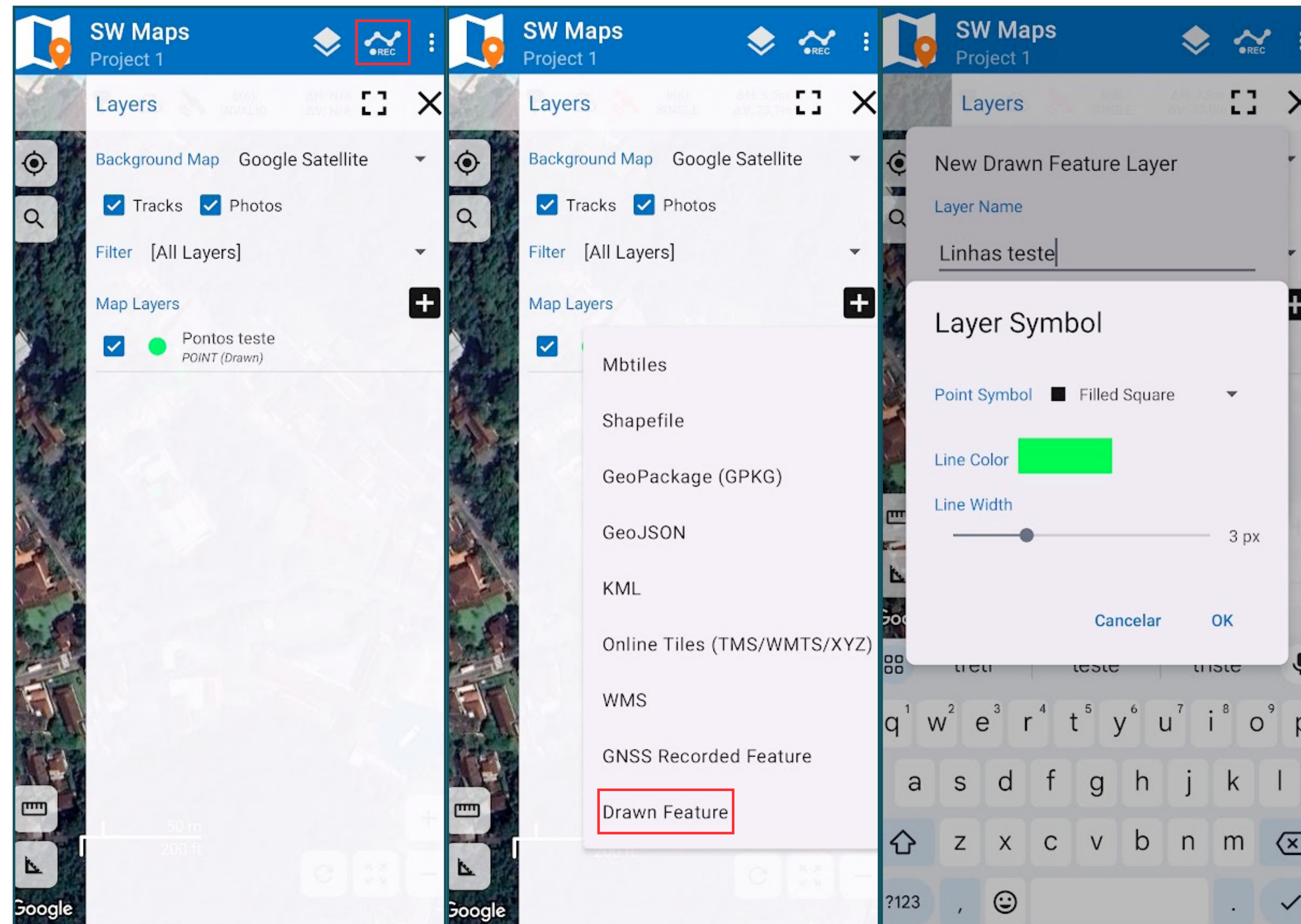


Figure 18: Drawing lines (Source: Aviyaan Tech, c2025)

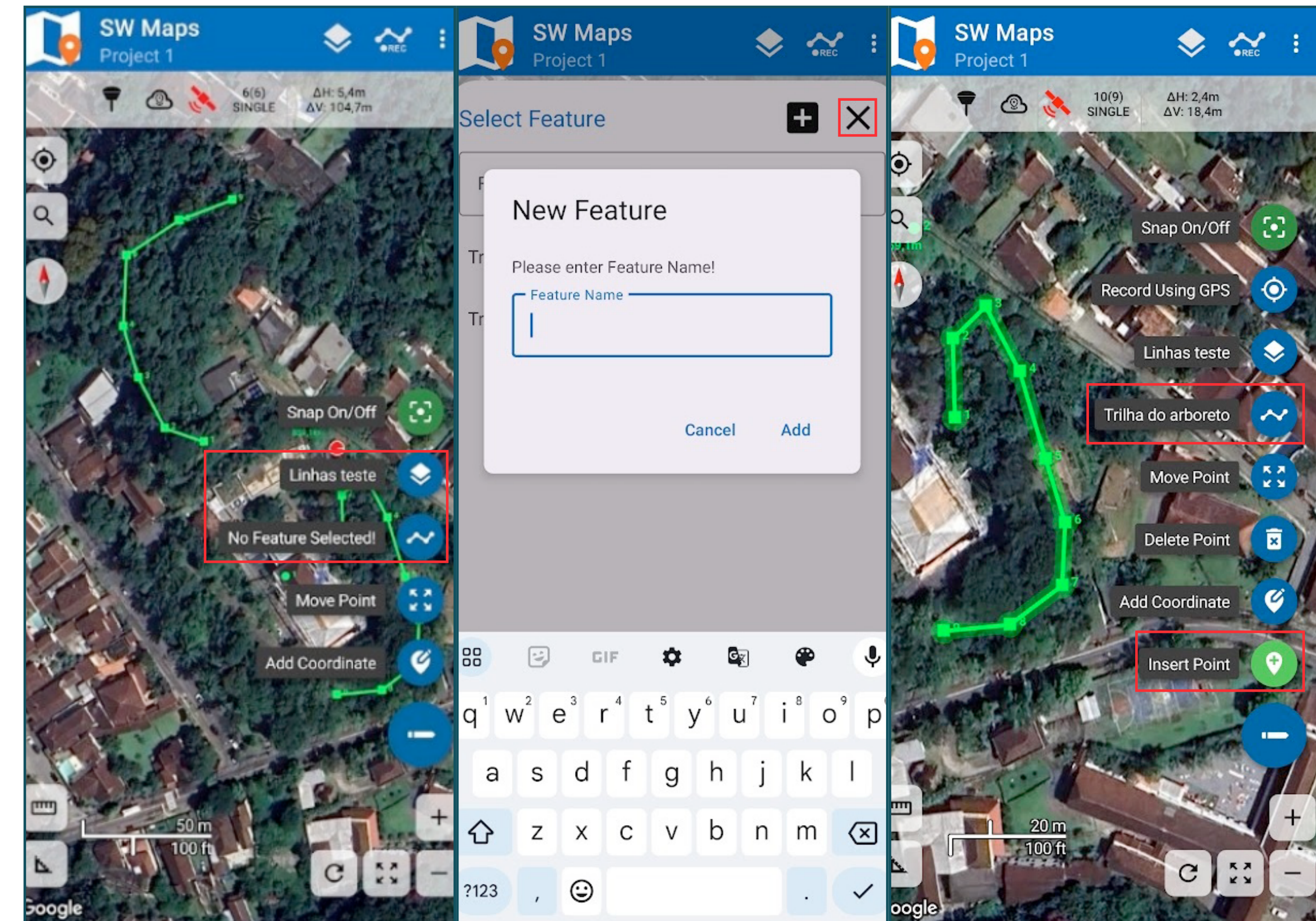


Figure 19: Drawing lines (Source: Aviyaan Tech, c2025)



### 2.3.3) Inserting polygons

To insert polygons, you'll need to recreate a drawing layer, just as you did to create the lines. Repeat the same process as before, only now clicking on “polygon” in the “draw feature” part. Similarly, select the symbology of your polygon. Click on the pen icon and select the layers option. The polygon layer that you created will be there. Now you need to create the files to start mapping with the polygons. Click on the polygon layer in the “select layer” window. Similarly, there are no polygon files and you will need to create. Click on the “no feature selected” option and add a polygon feature, giving it a name. In the same way that lines are constructed through segments that connect points, so are polygons. You will need to click and create the points for the polygon to start forming. We suggest that you enlarge the image so that you can make the boundaries of the polygon in detail. Remembering that if you make a mistake, just click on the “delete point” option and choose the point to be deleted. To build another polygon, just like with lines, you must click on the polygon layer, click on “no feature selected” and create another polygon feature.

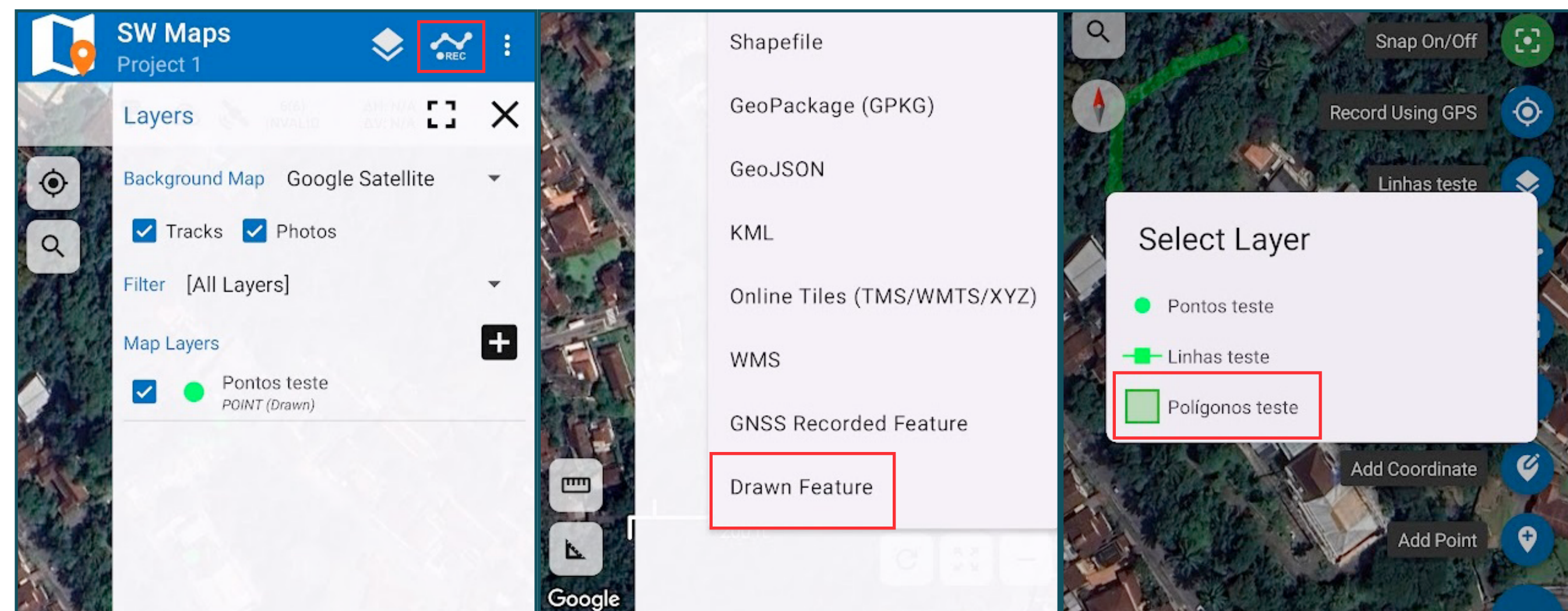


Figure 20.1: Drawing Polygons (Source: Aviyaan Tech, c2025)

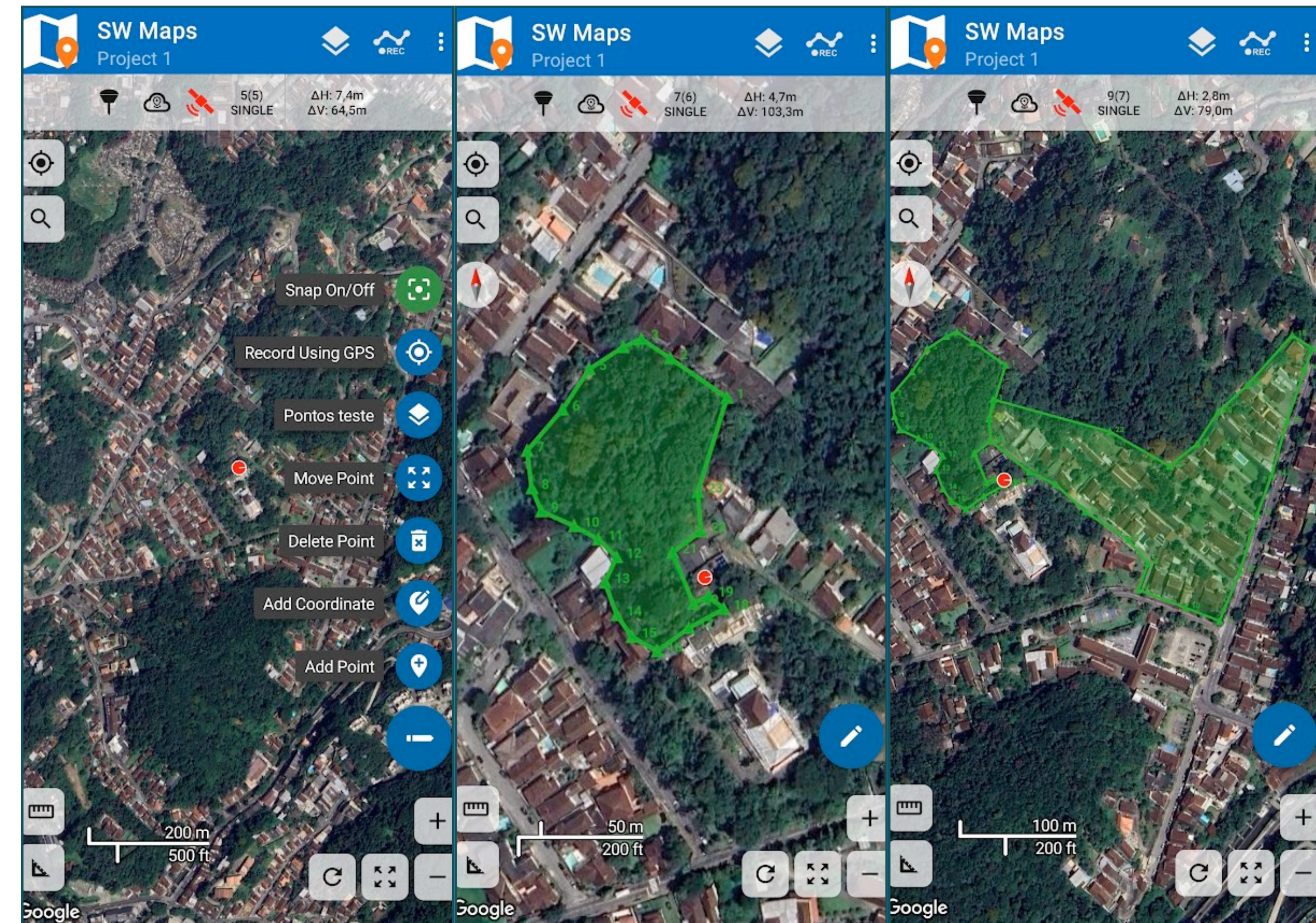


Figure 20.2: Drawing Polygons (Source: Aviyaan Tech, c2025)



### 2.3.4) Using georeferenced photo resource

In SW Maps there is the possibility of making a photographic record of something you consider interesting and this record automatically has a geographic coordinate, locating the photo on the map. To do this, click on the icon that represents a map and a location (upper left corner of the application – figure 21). Scroll down to the “record” part and select the “photo” option. It will open an interface to capture photos, as you normally would with the cell phone camera. Register the photo and confirm. A window will open with information about the registration made, with date, time and geographic coordinates. You can register the reference name for the photo in “remarks”. Click on the icon that represents a “floppy disk” to save and the image will be registered with all the information, including its location.

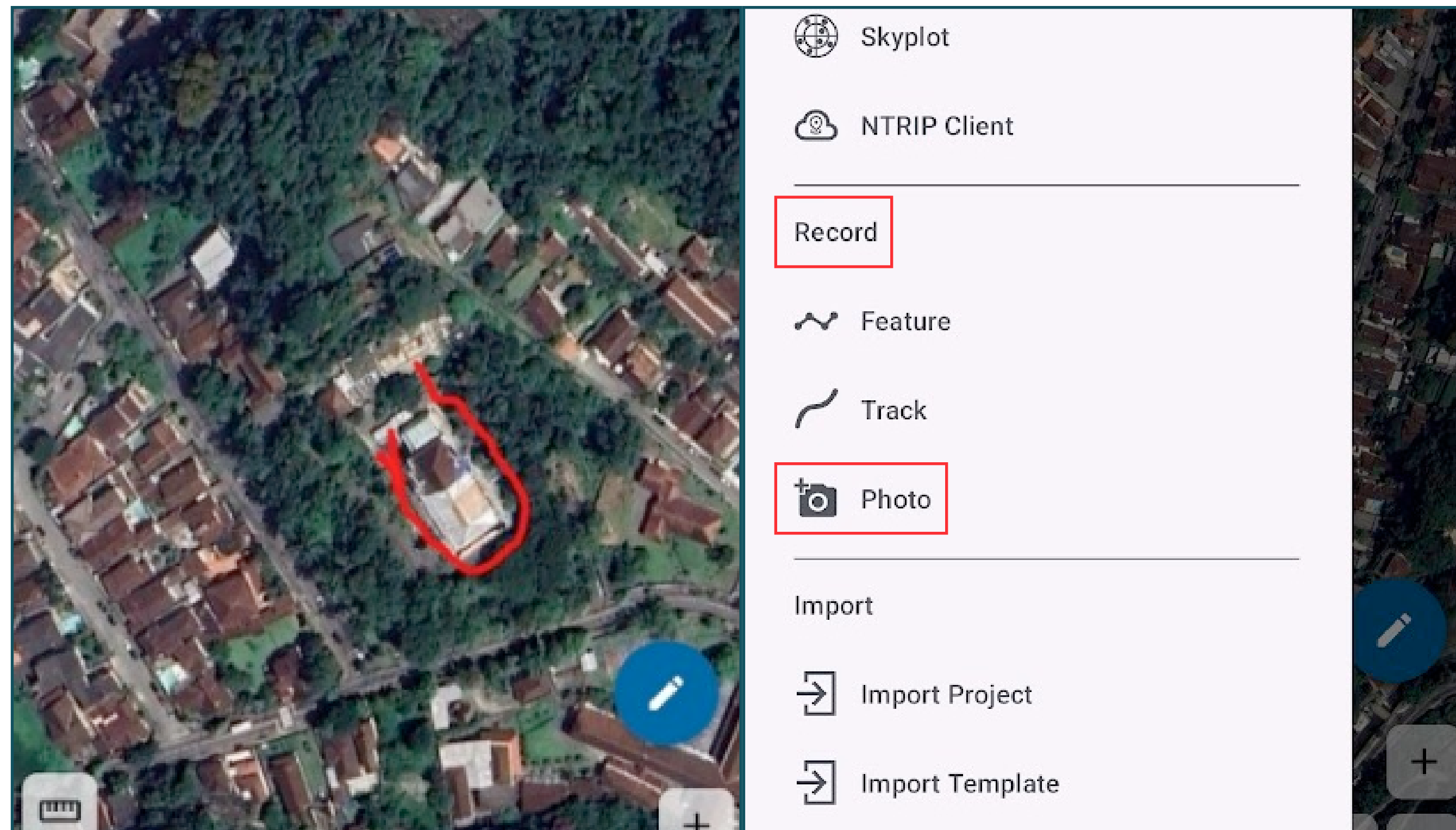


Figure 21.1: Creating Geotagged Photos (Source: Aviyaan Tech, c2025)

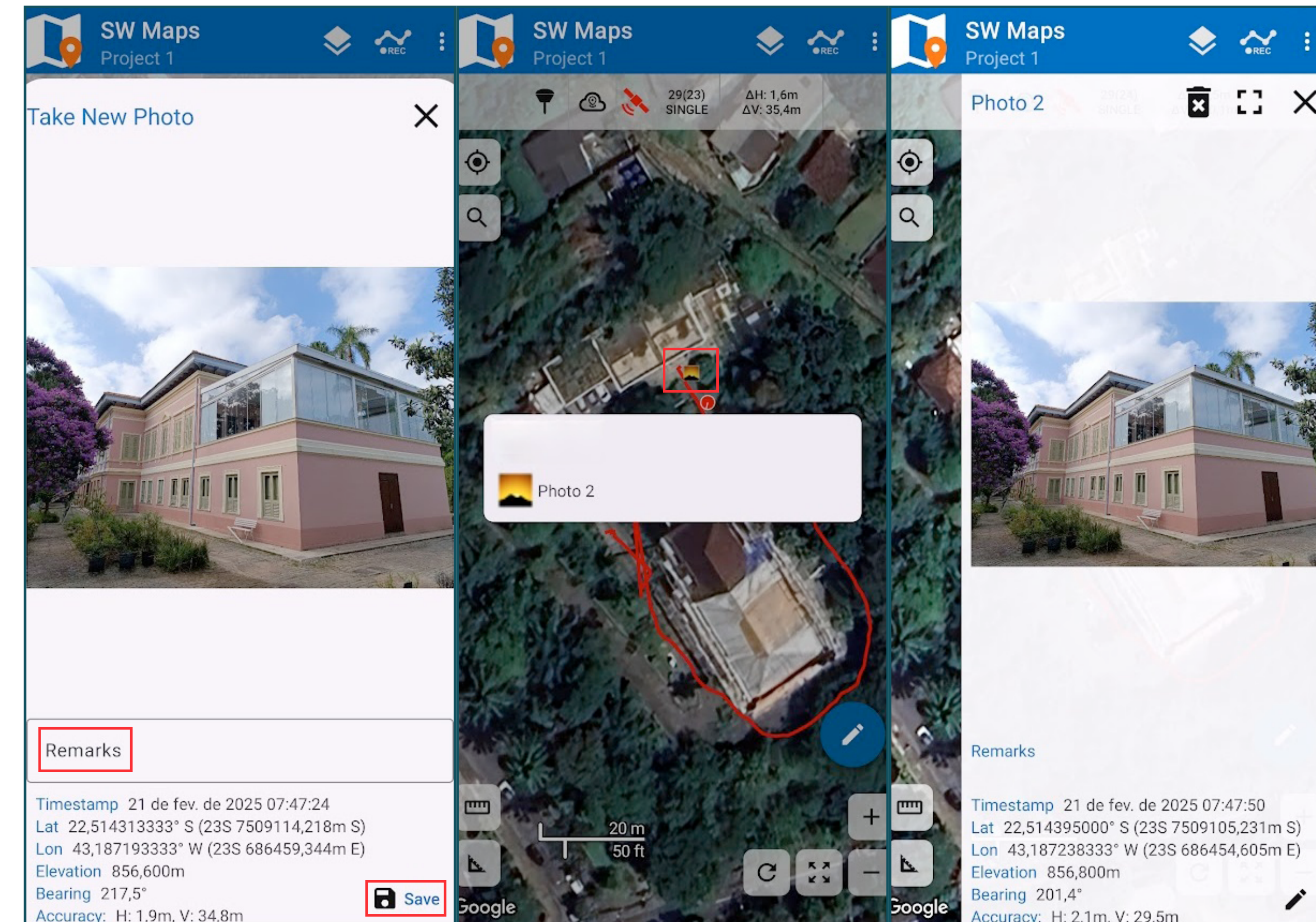


Figure 21.2: Creating Geotagged Photos (Source: Aviyaan Tech, c2025)



### 2.3.5) Using track recording

It is possible to automatically record the route you take in field activities. To do this, click on the icon that represents a map and a location (top left corner of the app, as seen in figure 13) and scroll to the “record” part again. Now, choose the “track” option. Choose a name for the path you want to take and that you want to record. Modify the color of the track line, if desired, and click on the black dot to start recording the feature. You can continue to use the other functions of your device while the app records the route. It will only be finished by clicking on the “black square”, lower right corner. When finished, the application will automatically save the route taken by you.

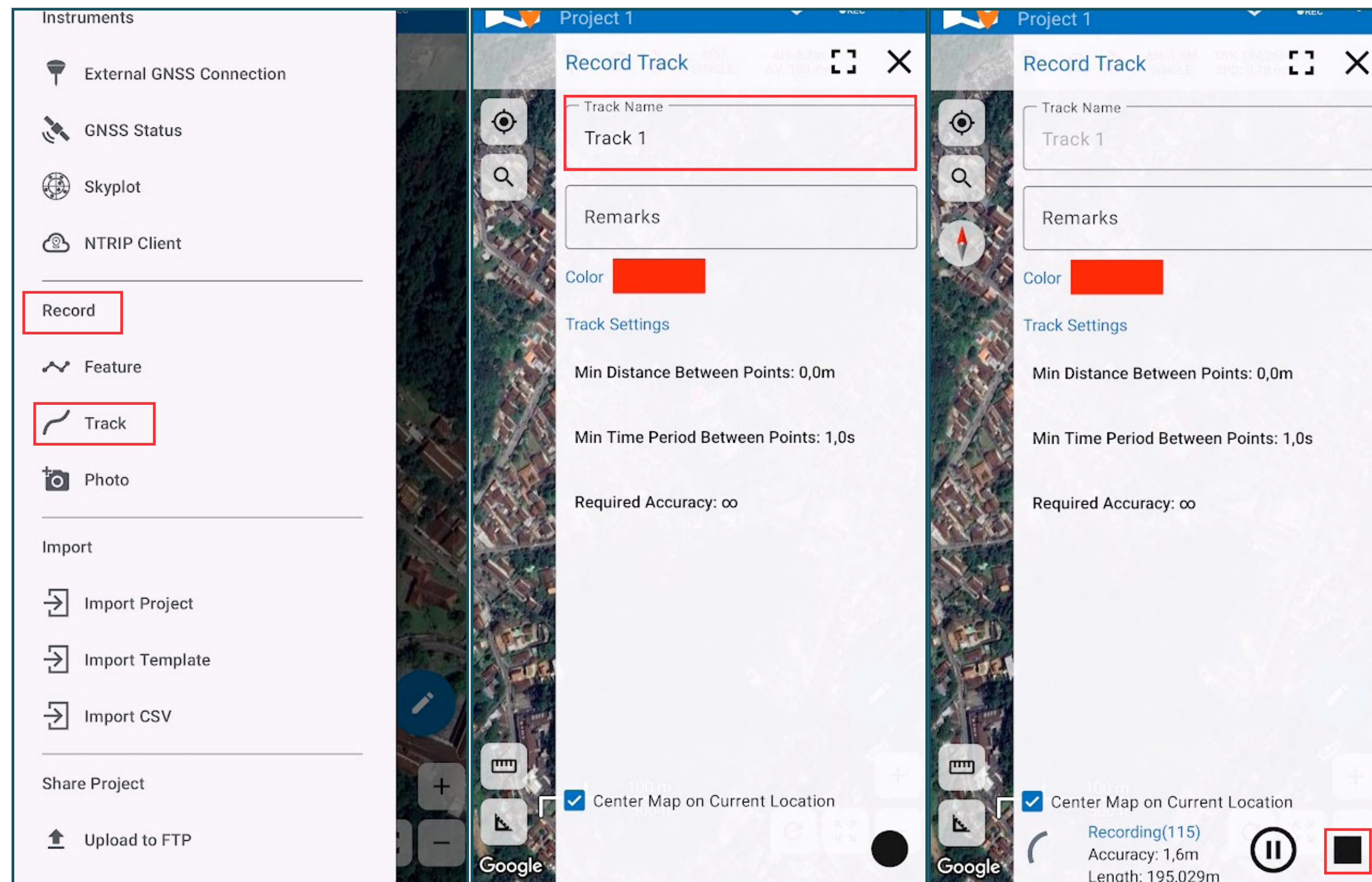


Figure 22: Automatically Recording a Track (Source: Aviyaan Tech, c2025)

### 2.3.6) Exporting the data for sharing

Once you have used all the resources available with the SW Maps application for your field mapping, it will be necessary to share this data with a professional who supports you in the analyses, or even so that you can do it in a data analysis program. To do this, go to the icon that represents a map and a location (upper left corner, as seen in figure 13), scroll to the “share project” function and click on the “share project” option. The “share” options window will appear. Select the “KMZ” option. A “Share KML” information window will appear. Give the file you want to share a name, keep all data export options checked, as well as the format option in “KMZ”. After that, click on share (bottom right). Once this is done, notice that a window will appear with options for sending the file. You can send it by whatsapp, email, Google Drive, etc. Select an option and submit.

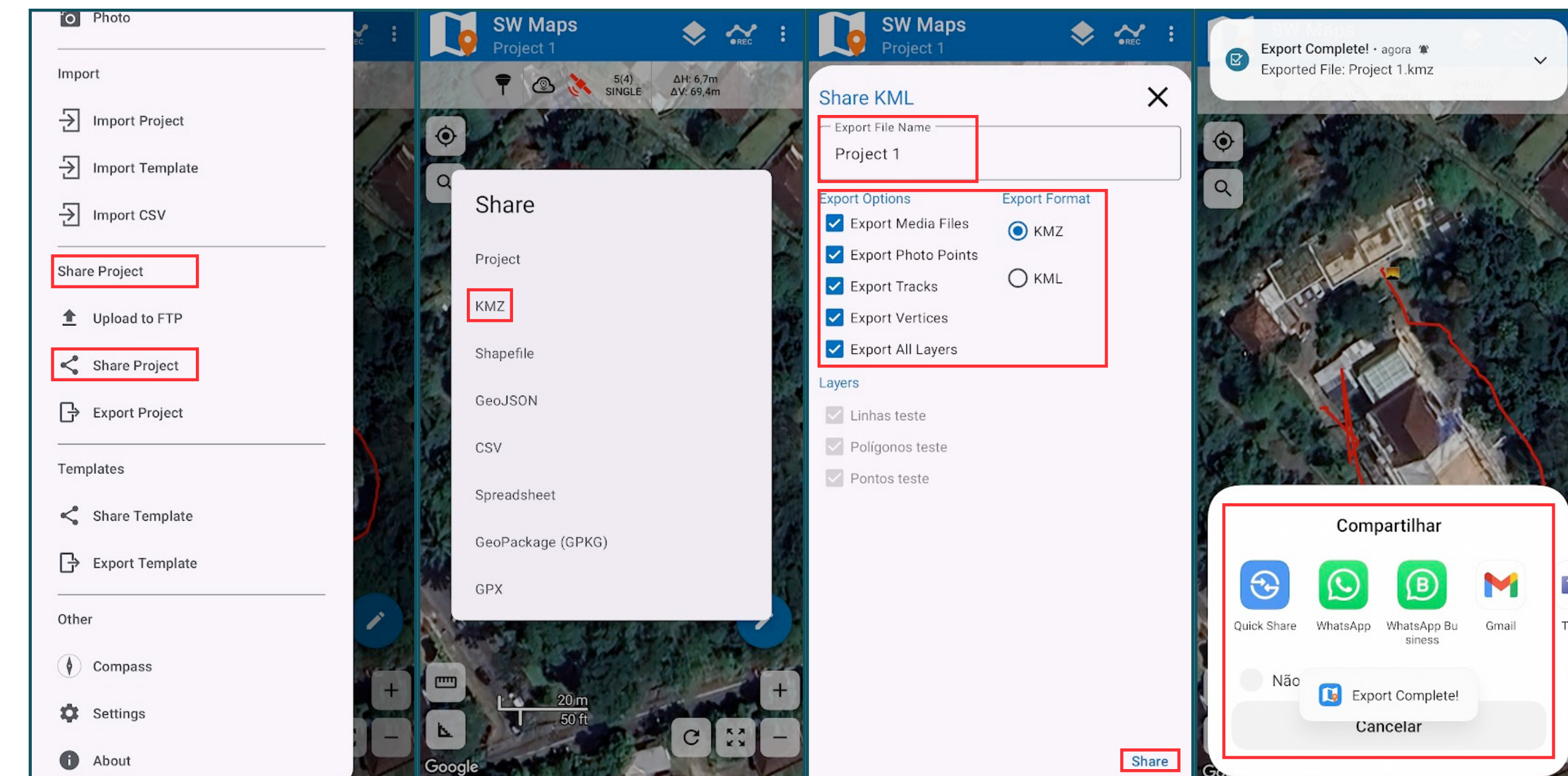


Figure 23: Sharing the produced map (Source: Aviyaan Tech, c2025)



REFERENCES:

GOOGLE. **Google Earth**. [Mountain View]: Google, c2025.

AVIYAAN TECH. **SW Maps**. Kathmandu Nepal: Aviyaan Tech, c2025.

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