

## GPS Essentials – Installation Guide and SOP



### 1. Introduction

GPS Essentials is a free application available for Android-based devices with a built-in GNSS receiver.

It is an alternative to dedicated GPS devices (Garmin eTrex for example) when collecting geographic coordinates because it complies with the required minimum specifications:

1. Allows for setting the following specifications:
  - a. Position format: hddd.ddddd
  - b. Map datum: WGS84
  - c. Map Spheroid: WGS84
  - d. Distance and speed: metric
2. Provides coordinate readings with at least 5 decimal digits to reach a level of precision down to the nearest meter.
3. Displays the following information together with the reading:
  - a. Number of received satellite signals
  - b. Accuracy measure

The information presented in this document has been extracted from volume 2.4.2 of the guidance for the collection and use of geospatial data in health<sup>1</sup>.

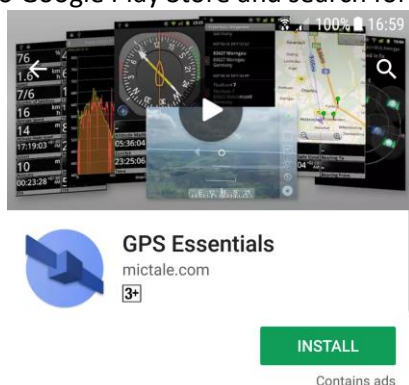
### 2. Installing GPS Essentials

The following minimum device specifications are required to install the GPS Essentials application on your android device:

1. At least Android 4.0
2. More than 512 Mb of RAM

To install GPS Essentials on your device:

1. Go to Google Play Store and search for GPS Essentials.



2. Click on the Install button.

<sup>1</sup> [https://www.healthgeolab.net/DOCUMENTS/Guide\\_HGLC\\_Part2\\_4\\_2.pdf](https://www.healthgeolab.net/DOCUMENTS/Guide_HGLC_Part2_4_2.pdf)

### 3. Standard Operating Procedure (SOP) and Data Collection Form

It is critical to follow defined steps (SOP) for the entire data collection and verification process to effectively collect the geographic coordinates of a specific object in the field (health facility, village,...).

GPS Essentials contains several modules but only two of them are necessary for collecting GNSS-based coordinates following the SOP presented in this document:

1. Settings



Settings

2.

Satellites



Satellites

While the SOP presented here has been designed to collect the geographic coordinates of a health facility, both the SOP and the corresponding data collection form can be adjusted to be applied to other type of objects. Please note that the example used in the SOP corresponds to a health facility in Bangladesh and that the fields number corresponds to those used in the guidance (some fields have been removed for the present exercise).

Generic SOPs including the use of Google Map to check geographic coordinates of the collected point on site are available from the guidance mentioned in the previous section.

The following documents are needed in order to implement the SOP as part of exercise 1:

- Paper version of the data collection form (Annex 1)
- Health facility information from the master list (Slide presented during the training)
- Min/max coordinates for the administrative division in which the health facility is located as follow:

Barangay	Min Latitude	Max Latitude	Min Longitude	Max Longitude
Centro	14.39	14.43	121.02	121.05

#### **SOP to be followed for Exercise 1:**

Please fill the data collection form (Annex 1) as follow once arrived on site of each study site to be survey:

1. Section 1 - Name and code of the health facility as per the master list:

1.1 Write the official name of health facility as per the information provided on the slide in field 1a;

1.2 Write the official code of the study site as per the information provided on the slide in field 1b;

*Example:* The example below illustrates how the information for Ramu Upazila Health Complex (a community health facility in Bangladesh) should be entered for these two fields in the form:

1a. Name of the study site as per the registry (Annex 3)	Ramu Upazila Health Complex
1b Code of the study site as per the registry (Annex 3):	S T S 0 2 3

## 2. Section 2 - Address and location of the health facility:

2.1 Write the street name and number of the study site in field 2a. No other information (such as the name of an administrative division) should appear in this field.

If the study site is located in a place for which there is no street name or/ number then “NA” (standing for “Not Applicable”) should be entered here

*Example:* The figure below illustrates how the information for Ramu Upazila Health Complex is entered in the fields 2a of the form:

2a. Building number and street name	National road 1
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2.3 Use the administrative divisions master list (information provided on the slide) to enter the information for fields 2b to 2f.


Take care to ensure the correct spelling and code are used (including the “0” at the front of the code in some cases).


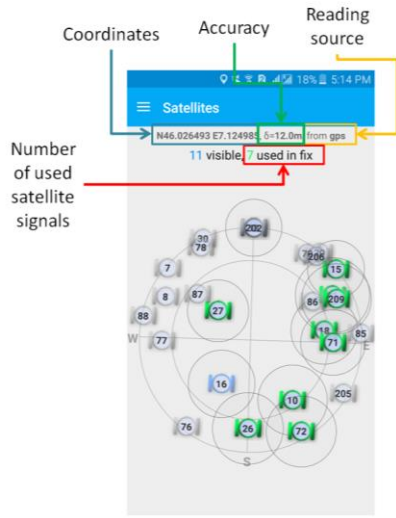
*Example:* The figure below illustrates how the information should be entered for Ramu Upazila Health Complex in these fields:

2c. Name of the Division as per the official registry (Annex 2):	Chittagong
2d. Name of the Zila as per the official registry (Annex 2):	Cox's Bazar
2e. Name of the Upazila as per the official registry (Annex2):	Ramu
2f. Code of the Upazila as per the official registry (Annex 2):	2 0 2 2 6 6

In the case of Cambodia, the official name and code of the operational district as per the operational district master list is then also captured in fields 2g and 2h.

### 3. Section 3 - Geographic coordinates of the infrastructure:

Step	Action
3.1	Once you have arrived at the place to be located, find an open space, turn the GPS option of your android device on and open the GPS Essentials application.
3.2	Go to the "Settings" page through the icon presented on the figure below and fix the settings for the following 3 components as presented in the figures below: <ul style="list-style-type: none"> <li>Units =&gt; Meters (SI)</li> <li>Position datum =&gt; World Geodetic System 1984</li> <li>Position format =&gt; Decimal</li> </ul>
	 Settings
	<div> <p><b>Units</b></p> <p><input type="radio"/> Kilometers, Meters</p> <p><input type="radio"/> Miles, Yards, Feet</p> <p><input type="radio"/> Miles, Feet</p> <p><input type="radio"/> Nautical Miles, Feet</p> <p><input type="radio"/> Nautical Miles, Meters</p> <p><input checked="" type="radio"/> Meters (SI)</p> <p>CANCEL</p> </div> <div> <p><b>Position Format</b></p> <p><input type="radio"/> Degrees, Minutes, Seconds</p> <p><input type="radio"/> Degrees, Minutes, Fractions</p> <p><input checked="" type="radio"/> Decimal</p> <p><input type="radio"/> UTM</p> <p><input type="radio"/> MGRS</p> <p><input type="radio"/> OSGB36</p> <p>CANCEL</p> </div>

		<p><b>Position Datum</b></p> <p><input type="radio"/> YACARE, Uruguay</p> <p><input type="radio"/> ZANDERIJ, Suriname</p> <p><input type="radio"/> KOREAN GEO DATUM 1995, S Korea</p> <p><input type="radio"/> SIRGAS, South America</p> <p><input type="radio"/> EUROPEAN 1950, Mean (7 Param)</p> <p><input type="radio"/> ORDNANCE GB 1936, Mean (7 Para)</p> <p><input type="radio"/> Petroleum Development Oman 1993</p> <p><input checked="" type="radio"/> World Geodetic System 1984</p> <p><input type="radio"/> World Geodetic System 1972</p> <p><input type="radio"/> NORTH AMERICAN 1983, CONUS</p> <p>CANCEL</p>
3.3	Go to the “Main menu” page and click on the “Satellites” Icon presented on the side here.	 <p>Satellites</p>
3.4	Move to the point to be located and stay on the same spot for at least 1 minute (depending on the hardware of your android phone/tablet) to allow for the best reading possible.	
3.5	<p>Make sure the reading is taken by the GPS receiver and not a nearby wifi connection (element in orange on the side figure here) and then wait for GPS essential to take a reading with:</p> <ul style="list-style-type: none"> <li>- At least 4 satellite signals to be used in the fix (element in red in the side)</li> <li>- The accuracy reading to be below 15 meters (green element in the side figure)</li> </ul>	 <p>Coordinates Accuracy Reading source</p> <p>Number of used satellite signals</p>
	<p>In the example shown below, the accuracy is 12 meters with 11 visible satellite and 7 used for the coordinates</p> <div style="border: 1px solid black; padding: 10px; text-align: center;"> <p>N21.444893 E92.100085, δ=12.0m, from gps</p> <p>11 visible, 7 used in fix</p> </div>	

3.6	<p>Once the accuracy value is below 15 meters with at least 4 satellite signals, temporarily write down:</p> <ul style="list-style-type: none"> <li>- the number of satellite signals and accuracy</li> <li>- the latitude and longitude shown on the screen</li> </ul>																
3.7	<p>Verify that the coordinates are within the Min-Max range of latitude and longitude for the Upazila in which the study site is located using the list of Min-Max Coordinates (Page 2 of this document).</p> <p>In the example used above, Ramu Upazila Health Complex located in Ramu Upazila has latitude: 21.44489° and longitude: 92.10008°. These values are correctly between the Min and Max for this Upazila.</p> <table border="1"> <thead> <tr> <th>Upazila_code</th> <th>Upazila_Name</th> <th>Min Latitude</th> <th>Max Latitude</th> <th>Min Longitude</th> <th>Max Longitude</th> </tr> </thead> <tbody> <tr> <td>22266</td> <td>Ramu</td> <td>21.27760</td> <td>21.61280</td> <td>91.98990</td> <td>92.25740</td> </tr> </tbody> </table> <p>If this is the case, check the "Yes" box in field 3c and go to the next step.</p> <table border="1"> <tr> <td>3c. Coordinates falls within the min/max lat/long values</td> <td> <p>Yes <input checked="" type="checkbox"/></p> <p>No <input type="checkbox"/></p> </td> </tr> </table> <p>If this is not the case, meaning that the coordinates falls outside the ranges:</p> <ul style="list-style-type: none"> <li>- Verify again the units of the device (steps 3.2)</li> <li>- Take a new reading (steps 3.3 to 3.8)</li> </ul> <p>If the coordinates continue to fall outside the ranges:</p> <ul style="list-style-type: none"> <li>- Write "Coordinates fall outside of the range" in field 3h as per the following example and continue the process using the coordinates in question:</li> </ul> <table border="1"> <tr> <td>3h: Comments regarding the GNSS based coordinates</td> <td>Coordinates fall outside the ranges</td> </tr> </table>	Upazila_code	Upazila_Name	Min Latitude	Max Latitude	Min Longitude	Max Longitude	22266	Ramu	21.27760	21.61280	91.98990	92.25740	3c. Coordinates falls within the min/max lat/long values	<p>Yes <input checked="" type="checkbox"/></p> <p>No <input type="checkbox"/></p>	3h: Comments regarding the GNSS based coordinates	Coordinates fall outside the ranges
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22266	Ramu	21.27760	21.61280	91.98990	92.25740												
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3h: Comments regarding the GNSS based coordinates	Coordinates fall outside the ranges																
3.8	<p>Write down the final number of satellites and accuracy measure in fields 3a and 3b as presented here:</p> <table border="1"> <tr> <td>3a. Number of satellite signals received</td> <td>07</td> </tr> <tr> <td>3b. Accuracy</td> <td>12 metres</td> </tr> </table>	3a. Number of satellite signals received	07	3b. Accuracy	12 metres												
3a. Number of satellite signals received	07																
3b. Accuracy	12 metres																
3.9	<p>Write the coordinates with 5 decimal digits in fields 3e and 3f of the form. Then complete field 3g with the location where you took the reading. If option 2 was checked in field 3g, write the details of the location in field 3h as per the example below:</p>																

	<table border="1"> <tr> <td>3e. Latitude (Decimal degrees):</td><td>2 1 . 4 4 4 8 9</td></tr> <tr> <td>3f. Longitude (Decimal degrees):</td><td>0 9 2 . 1 0 0 0 8</td></tr> <tr> <td>3g. Waypoint (Circle one option)</td><td> <p>1 At the location</p> <p><input checked="" type="radio"/> 2 At a nearby location (for example, at the gate, in a park or communal space)</p> </td></tr> <tr> <td>3h: Comments regarding the GNSS based coordinates</td><td>Coordinates collected in a parking lot 50 m away from the study site</td></tr> </table> <p><i>Note: As much as possible, waypoints should be at the location being mapped – “1. At the location”</i></p>	3e. Latitude (Decimal degrees):	2 1 . 4 4 4 8 9	3f. Longitude (Decimal degrees):	0 9 2 . 1 0 0 0 8	3g. Waypoint (Circle one option)	<p>1 At the location</p> <p><input checked="" type="radio"/> 2 At a nearby location (for example, at the gate, in a park or communal space)</p>	3h: Comments regarding the GNSS based coordinates	Coordinates collected in a parking lot 50 m away from the study site
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3h: Comments regarding the GNSS based coordinates	Coordinates collected in a parking lot 50 m away from the study site								
3.10	Write down any other comments you might have about the reading in field 3h (Put "None" if you don't have any)								
3.11	Complete fields 3i to 3k of the form								
3.12	Check back through the form and complete any remaining fields								

## Annex 1 - The data collection form when using GPS Essentials in Exercise 1

### SECTION 1 NAME AND CODE OF THE HEALTH FACILITY AS PER THE MASTER LIST

1a. Name of the health facility as per the master list	
1b Code of the health facility as per the master list:	<input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>

### SECTION 2 ADDRESS AND LOCATION OF THE HEALTH FACILITY

2a. Street name and number	
2b. Name of the Region as per the official master list:	
2c. Name of the Province as per the official master list:	
2d. Name of the Municipality/City as per the official master list:	
2e. Name of the Barangay as per the official master list:	
2f. Barangay code as per the official master list:	<input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>



### SECTION 3 GEOGRAPHIC COORDINATES OF THE HEALTH FACILITY

<b>3a. Number of satellite signals received</b>	<input type="text"/> <input type="text"/>
<b>3b. Accuracy</b>	<input type="text"/> <input type="text"/> . <input type="text"/> metres
<b>3c. Coordinates falls within the min/max lat/long values</b>	Yes <input type="text"/> No <input type="text"/>
<b>3e. Latitude (Decimal degrees):</b>	<input type="text"/> <input type="text"/> . <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>
<b>3f. Longitude (Decimal degrees):</b>	<input type="text"/> <input type="text"/> <input type="text"/> . <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>
<b>3g. Waypoint (Circle one option)</b>	<p>1 At the location</p> <p>2. At a nearby location (for example, at the gate, in a park or communal space)</p>
<b>3h: Comments regarding the GNSS based coordinates</b>	
<b>3i: Data collector name</b>	
<b>3j: Data collection Date (dd/mm/yy)</b>	
<b>3k: Phone brand and model</b>	