

4C Guidelines for Geodata Collection

Version 1.0



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1 Introduction

To obtain a 4C certificate and to start the audit process, 4C Services requires the provision of explicit geographic coordinates of the producers and service providers of a 4C Unit within the template of the Business Partner Map (BPM). In this context, these Geodata Collection Guidelines, developed by 4C Services, offer instructions for geospatial data collection of coffee plots, emphasizing adherence to the 4C-endorsed coordinate system. The guidelines focus on extracting latitude and longitude data accurately within coffee plot settings, providing specific guidance for plots of land equal to or exceeding four hectares, including the way forward for data transfer to the 4C system.

Georeferenced data from national databases that have been validated by national authorities (e.g., Cadastro Ambiental Rural, Brazil) are accepted.

*Geodata within
4C System*

2 Objectives

The objectives of these guidelines for geodata collection, incorporating GPS coordinates and polygons are:

*Geodata
guidelines*

- a) To guide data collection ensuring that GPS coordinates and polygons are meticulously recorded to accurately pinpoint the location of coffee plots. This precision is vital to confirm that coffee production is not associated with deforested or degraded land
- b) To enable comprehensive documentation of geospatial information for coffee plots
- c) To facilitate the identification of areas at high risk of deforestation through geodata collection
- d) To provide guidelines that are adaptable to various scales of coffee production, accommodating both small plots of lands and larger areas, equal to or exceeding four hectares
- e) To determine the data format that should be delivered to 4C and uploaded in the 4C Portal

The main objective of the geodata collection guidelines is to facilitate compliance with the European Regulation for deforestation-free supply chains (EUDR), ensuring that coffee products meet the deforestation-free criteria, thereby upholding the environmental goals set forth by the regulation.

*Alignment with
EUDR*

3 Geodata Collection

3.1 Required geographic coordinate system for 4C

A geographic coordinate system is a coordinate system that allows a location on the earth to be specified by a set of numbers, letters, or symbols. All

*Geographic
coordinate
system*

coordinate systems and formats have in common that the location is specified by an x and y value.

Decimal degrees are a notation for expressing latitude and longitude geographic coordinates as fractions of degrees. Decimal degrees can be used instead of sexagesimal degrees (degrees, minutes, seconds). As with latitude and longitude, the values are bounded by $+90^{\circ}$ and $+180^{\circ}$, respectively. Positive latitudes are north of the equator, negative latitudes are south of the equator. Positive longitudes are east of the prime meridian and negative longitudes are west of the prime meridian.

Decimal degrees

The Degrees, Minutes, Seconds (DMS) coordinate system is a method of expressing geographic locations using angular measurements of latitude and longitude. Locations are expressed in degrees, minutes, and seconds, with each degree further subdivided into 60 minutes and each minute further subdivided into 60 seconds. This hierarchical system provides a detailed representation of a point on the Earth's surface.

*Degrees,
Minutes,
Seconds (DMS)*

The Degree/Minute (DM) coordinate system is a geographic positioning method that uses angular measurements of latitude and longitude. In this system, locations are expressed in degrees and decimal minutes, where each degree is divided into 60 minutes.

*Degree/Minute
(DM)*

With 4C, coordinates must be provided in decimal degrees, degrees, minutes, and seconds (DMS), or degrees and decimal minutes (DM). In accordance with the EUDR specifications, a minimum of **six decimal digits** is required for coordinates in the decimal degree system using the WGS84 datum (EPSG4326).

4C requirement

3.2 Geodata collection methods

3.2.1 Collecting points

Point Collection: Points are collected to mark specific locations of interest within the coffee plot. Within the context of the EUDR, points can be collected for coffee plots which are smaller than four hectares and must be in the middle of the field.

*Geodata point
collection*

Use Waypoint Feature: Access the GPS unit's waypoint feature to mark and record the exact coordinates of the point. Assign a meaningful name or description to the waypoint.

Data Entry: When collecting points, you record only the geographic coordinates (latitude and longitude) and a name or description for each point. As per requirement, latitude and longitude must be recorded in a decimal degree format with six digits after the period.

Field Procedure: Physically move to the location of interest within the coffee plot.

Mark the Waypoint: When you reach the desired point, use the GPS unit to mark it.

Data export requirement: Export the geolocation data to common formats (such as CSV). Make sure that the file information is linked to the farm's details in the BPM.

3.2.2 Collecting polygons

Polygon Collection: Polygons are collected to outline or enclose specific areas within or around the coffee plot. This could include the coffee plot boundary itself. To meet the requirements of the legislation, all the coffee plots which are equal or bigger than four hectares must have polygons collected.

*Geodata
polygon
collection*

Use Tracklog or Polygon Feature: Some GPS units have a polygon drawing or tracklog feature. This allows you to trace the boundary of the area of interest.

Trace the Boundary: Walk or move along the boundary of the area you want to define as a polygon. Use the GPS unit to continuously record your path.

Data export requirement: Export the collected geolocation data to common formats like KML. Make sure that the file information is linked to the farm's details as stated in the BPM.

3.3 Geodata collection devices

3.3.1 Using GPS Units

The Global Positioning System (GPS) is a satellite-based navigation system that allows users to determine their precise geographic location, as well as their altitude, speed, and direction. GPS works by utilizing a network of satellites in orbit around the Earth. These satellites continuously broadcast signals that are received by GPS receivers or devices on the ground, such as smartphones, car navigation systems, and handheld GPS units.

Use of GPS

By receiving signals from multiple satellites simultaneously, a GPS device can triangulate its exact position on Earth's surface. The more satellites the device can lock onto, the more accurate the positioning becomes.

*Accurate
position*

In general terms, step-by-step instructions for collecting geolocation data using a handheld GPS unit are given below:

COLLECTING GEOLOCATION DATA using a handheld GPS unit

step-by-step guide

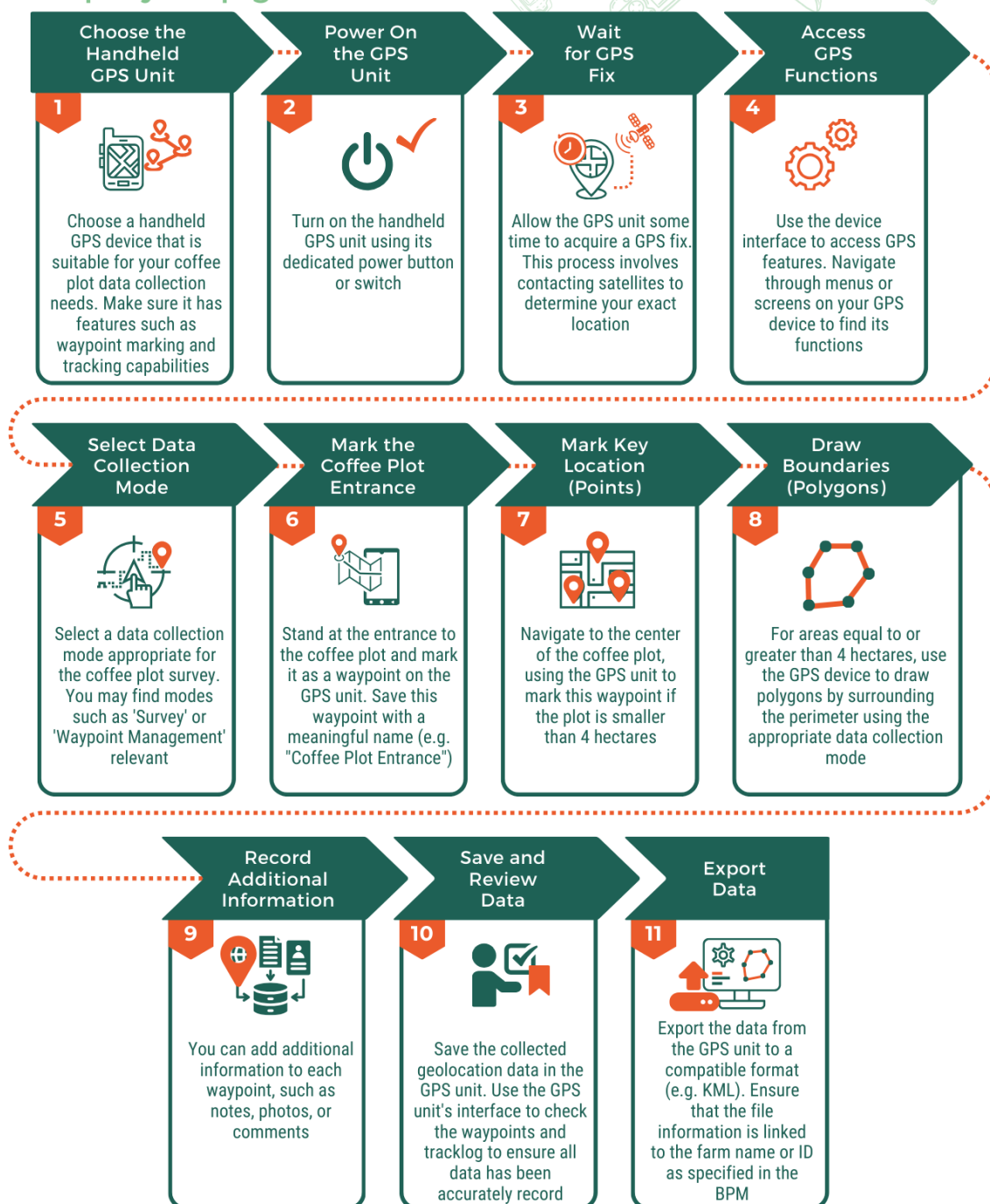


Figure 1: Step-by-step guide for collection of geodata with a handheld GPS unit

3.3.2 Using mobile devices

COLLECTING GEOLOCATION DATA using a mobile device step-by-step guide

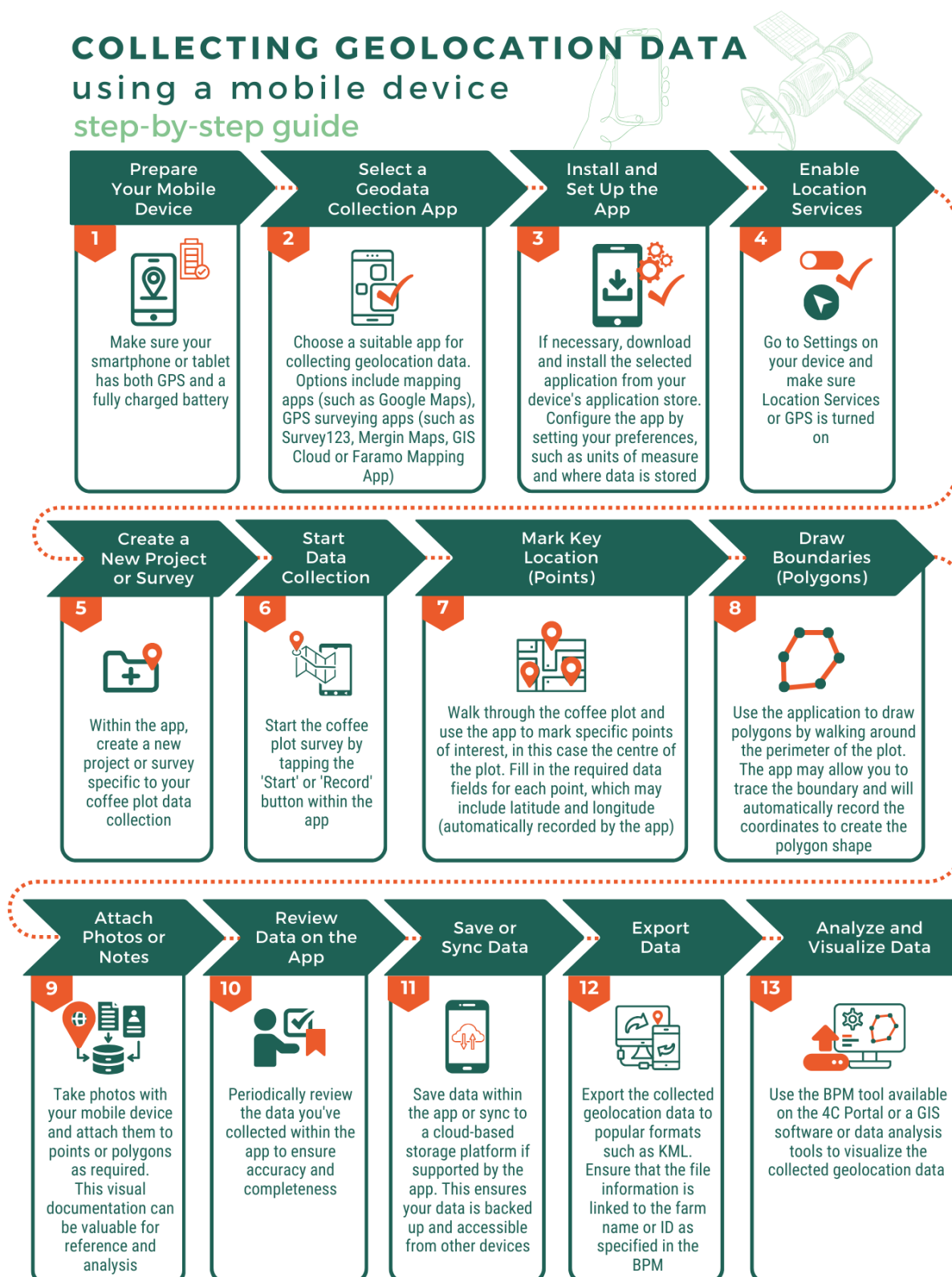


Figure 2: Step-by-step guide for collection of geodata using a mobile device.

3.4 FARAMO Mapping App

Geodata collection, especially for smallholders, can often be a complex, expensive, and time-consuming activity. To support our system users on this task, 4C in partnership with GRAS (Global Risk Assessment Services) offers a tool to collect accurate geodata without technical knowledge in a straightforward way. With the FARAMO (Farmer Risk Assessment and Monitoring) GRAS mapping app, each smallholder's polygons are captured directly in the field using a mobile app on a smart device, without the need for geospatial skills or programming, even when offline. Collected field contours and other ancillary data are uploaded to a secure database and automatically checked for deforestation and protected areas. With the mapping app, GRAS supports efficient and credible smallholder certification processes by enabling the efficient management, analysis, and visualization of smallholder data.

*Collaboration
with GRAS*

Among other features, the FARAMO Mapping App can assist users in collecting geospatial data and contours of smallholder plots (polygons), as well as basic data from the smallholder and other data as needed/requested, such as pictures of the coffee plots. The data will also be uploaded into a database, which will automatically check for overlaps with protected or recently deforested areas.

*FARAMO
Mapping App*

For more information, please visit the GRAS website: <https://www.gras-system.org/gras-platforms/faramo/> and contact GRAS via the contact form.

4 Creating Polygons with Google Earth

4.1 Loading reference GPS Points into Google Earth and creating polygons

If geo-coordinates are available from field collection or BPM, you are able to upload reference GPS points to Google Earth following these steps:

Open Google Earth: Launch the Google Earth application on your computer. If you do not have it installed, you can download it from the official website.

Sign In or Skip Login: You have the option to sign into your Google Account, which allows you to save your projects in the cloud. If you prefer not to sign in, you can still use most of the features.

Import GPS Data: Go to the "File" menu at the top of the Google Earth interface.

Select "Open" or "Import": In the menu, choose "Open" or "Import" depending on your Google Earth version. This action will open a dialog box to locate your GPS data file.

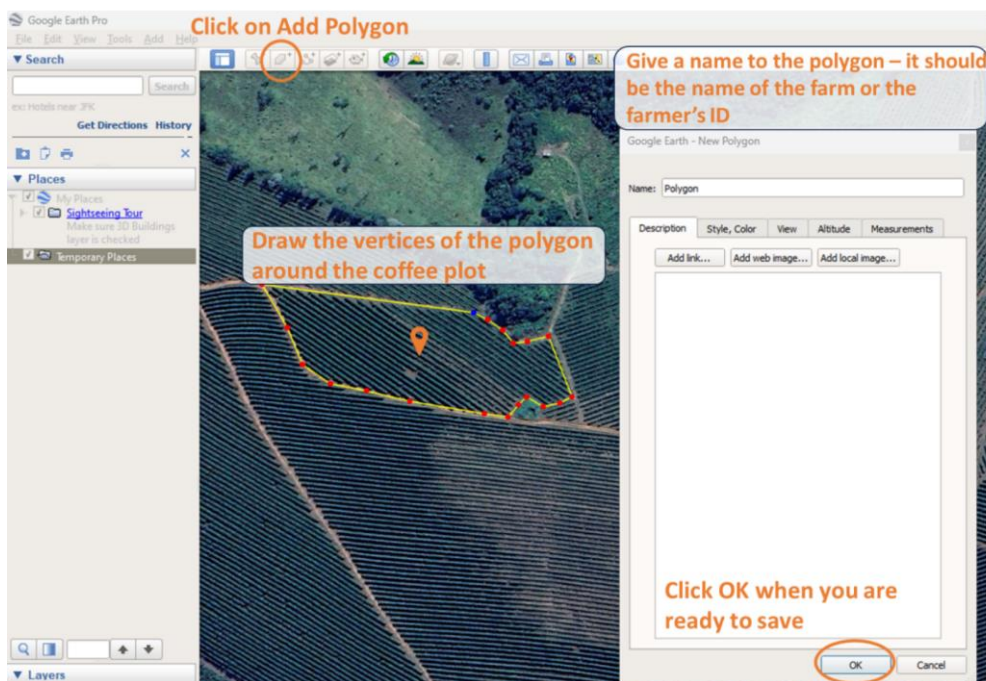
Choose GPS Data File: Navigate to the location of your GPS data file (common formats include KML, or CSV). Select the file and click "Open" or "Import".

Review Data: Google Earth will load the GPS points onto the map. You will see placemarks indicating each point's location.

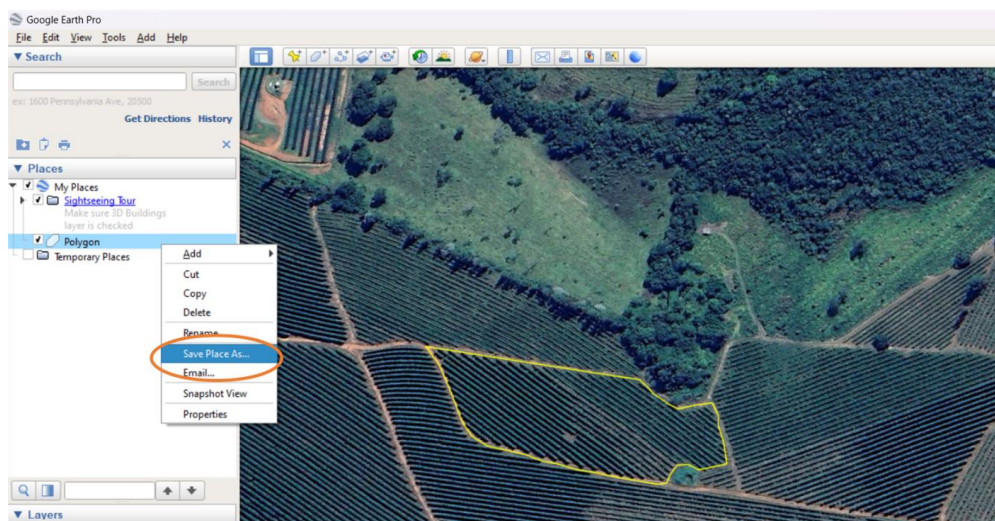
Create a New Polygon: In the menu bar, select the "Add Polygon" option.

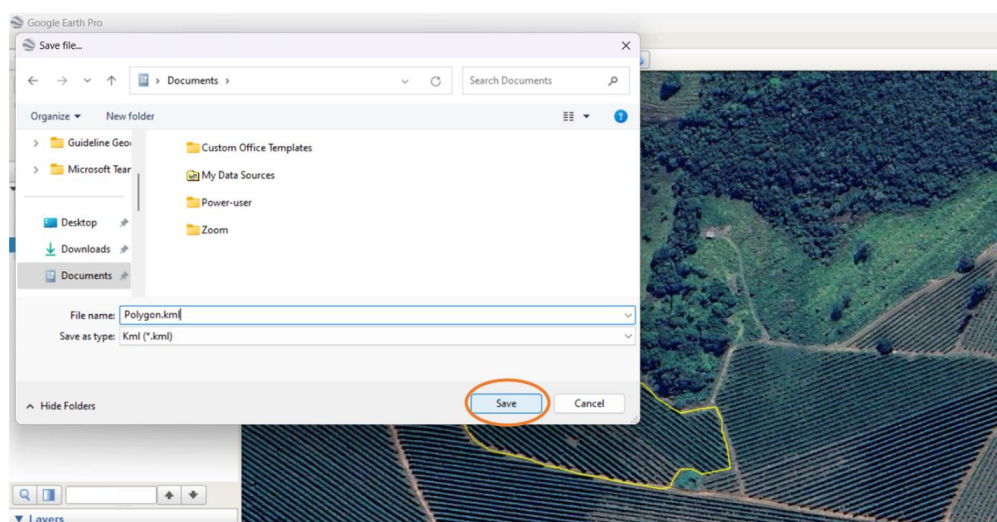
Define the Polygon: Click on the map to create the vertices of your polygon, connecting the points you want to include in the polygon. After selecting the final point, double-click to close the polygon.

Customize and Save the Polygon: You can edit the polygon by changing the name, description, color, or other attributes. Click OK when you are ready to save it.



Exporting the polygon in .kml format: Right click on the polygon you have created and click on Save Place As..., choose a folder to save the polygon and remember to save as type **.kml**. Proceed by clicking on the save button.





5 Creating KML files

Creating KML (Keyhole Markup Language) files is a useful skill for geospatial data management and visualization. In general, KML files are used to represent geographic information and can be opened in applications like Google Earth. Here is a step-by-step guide on how to create KML files:

Decide on the Data You Want to Represent: Determine what geospatial data you want to include in your KML file. Within this guideline context it can be points or polygons.

Choose a Tool or Software: To create a KML file, you can use a variety of software tools. Some popular options include Google Earth (for simple KML creation), dedicated GIS software like QGIS or ArcGIS, or text editors for manual KML coding.

Collect or Prepare the Data: Ensure you have the geographic data you want to include in your KML file. This could be GPS coordinates, shapefiles, or other geospatial data formats.

Create or Convert the Data: Depending on your chosen software, you may need to create or convert your data to KML format. Many GIS software tools can export data directly to KML. In Google Earth, you can create placemarks and polygons manually and save them as KML files.

Editing and Styling: Customize your data by adding descriptions, labels, and styles to your KML features. You can specify colors, line styles, icons, and other visual properties.

Save the KML File: After you have created, converted, and styled your geospatial data, save it as a KML file in your chosen software. Most software will have a "Save As" or "Export" option that allows you to save your work as a KML file.

Verify and Test: Before finalizing your KML file, open it in a KML viewer or Google Earth to ensure that it displays as intended. Check for any errors or inaccuracies.

Upload Your KML File to the 4C Portal: Once your KML file has been created and verified, you can upload it to the 4C Portal. For that, the Managing Entities can choose the Polygon Upload function, select the Managing Entity unit, and select the KML file.

Bulk upload process: Streamline the upload process by consolidating all polygon files into a designated folder. For increased efficiency, compress the folder using a preferred format, such as .zip. This consolidated and compressed file can then be uploaded directly, streamlining the handling and processing of multiple polygons.

Polygon upload

You can upload polygon data about your coffee farmers via the form below.
The polygons will be saved in 4C database connected to

- the Managing Entity (=your company)
- farm name or other farm identifier
- (optional) national ID of the producer.

Any future BPM uploads will *connect* the BP Producer/farms from the BPM to the saved polygons in the 4C database.
All automated analysis will then use polygons instead of the geo coordinates included in the BPM file.

To facilitate this connection, the farm name/identifier has to be **identical** in both datasets.

Please upload the file with polygon information (currently supported datatype: KML).
In the next step, you will need to define which information is treated as the farm name for the purpose of the data loading procedure.

Managing Entity:

KML File No file selected.