



Food and Agriculture
Organization of the
United Nations



International
Plant Protection
Convention



Africa Phytosanitary Programme (APP)
Geospatial Tools
USER GUIDE



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Revision History

Version:	Who:	What:	When:
0.1	USDA APHIS PPQ	Draft for IPPC review	24-Aug-2023
0.2			

Overview

Purpose

The African Phytosanitary Program (APP) is a White House Initiative supported by the United States Department of Agriculture (USDA) Animal & Plant Health Inspection Service (APHIS) International Services (IS) and Plant Protection and Quarantine (PPQ) management teams to produce geospatial products and provide training support on a pilot initiative. PPQ staff will facilitate a technology transfer to Food and Agriculture Organization of the United Nations (FAO) staff in Rome, Italy and a train the trainer workshop in Cairo, Egypt.

Scope

Pathogens

- Banana bunchy top virus (BBTV)
- *Candidatus Liberibacter asiaticus* (Citrus greening)
- *Fusarium oxysporum f. sp. cubense tropical race 4*
- *Ralstonia spp.*
- *Xylella fastidiosa*

Insects

- *Bactrocera spp.* (Fruit Flies)
- *Thaumatotibia leucotreta* (False Codling Moth)
- *Spodoptera frugiperda* (Fall Armyworm)
- *Diastocera trifasciata* (Stem Girdler)
- *Rhynchophorus ferrugineus* (Red Palm Weevil)

Contributors

African Union

Egypt Ministry of Agriculture and Land Reclamation

Esri

Food and Agriculture Organization of the United Nations (FAO)

United Nations International Computing Centre (UNICC)

United States Department of Agriculture (USDA) Animal & Plant Health Inspection Service (APHIS) Plant Protection & Quarantine (PPQ)

Mobile Data Collection

Data collection for the Africa Phytosanitary Programme makes use of a combination of two mobile data collection applications – ArcGIS Field Maps and ArcGIS Survey123. The user begins in ArcGIS Field Maps to use the mapping function and enter a Site Name. Then, using the link in the data form, the user is automatically transferred into ArcGIS Survey123 to complete a data form.

ArcGIS Field Maps mobile application

Required equipment: Mobile device (iOS or Android) and Wi-Fi connection

Install

ArcGIS Field Maps is available through the App Store for both Android and iOS devices for free. Search by name (ArcGIS Field Maps) and select install or “get”.

Locate “ArcGIS Field Maps” from the list. (Figure 1)

Select by tapping the ArcGIS Field Maps icon from the list and select “Install” to install.



Figure 1. ArcGIS Field Maps application icon

Sign In

Requires Wi-Fi connection and an approved user account in the ArcGIS Online environment.

You will need to sign into ArcGIS Online to locate maps shared with your user account. Once signed in, ArcGIS Field Maps will retain your sign in for offline data collection.

Locate the ArcGIS Field Maps application icon and tap to open it. (Figure 1 above)

At the time of writing, this product was in a development phase. Further guidance on URL and access can be found here: IPPC@fao.org

ArcGIS Field Maps presents sign-in options: “Sign in with ArcGIS Online” or “Sign in with ArcGIS Enterprise”. (Figure 2)



Figure 2. ArcGIS Field Maps sign in options

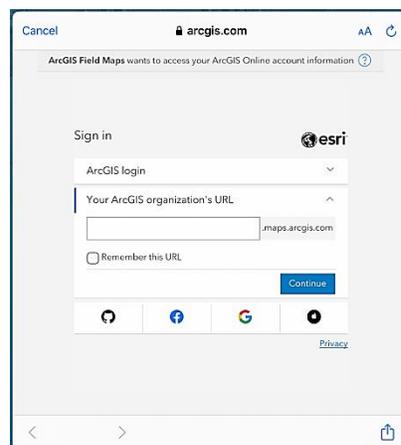


Figure 3. ArcGIS Online login

Locate Map

Once signed in to ArcGIS Online, a “Maps” landing page similar to Figure 4 should appear.

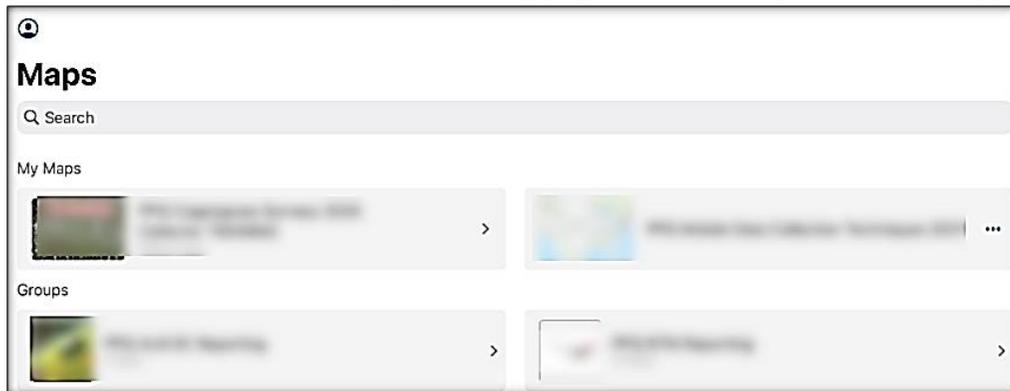


Figure 4. Sample Maps landing page

If you were previously collecting data in a map, Field Maps holds this sign in unless you sign out and will open into that previous map. You will have to tap the back button on the top left of your screen to return to the map landing page view, if desired.

“My Maps” lists maps you have created. There is unlikely to be anything listed for field data collectors.

The “Groups” section indicates groups to which your account has been given membership. This means that maps shared to those groups are available for your use in field data collection.

The Search bar at the top of the Maps page can be used to quickly locate a map by typing part or all of its title.

Profile Menu

The profile icon  in the upper left corner contains additional settings. The yellow box in Figure 5 shows that a user is signed in.

To see more, tap, hold, and pull your finger tip up on the screen to scroll.

Be sure that Auto-Sync (Figure 5) is NOT enabled.

To sign out, scroll down and tap “Sign Out”. (Figure 6)

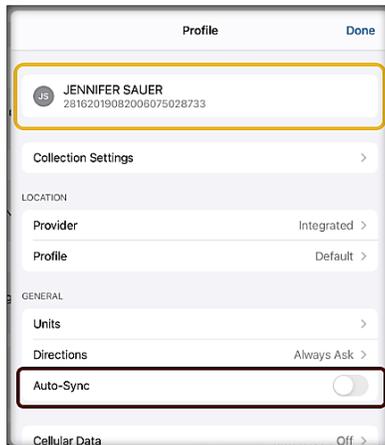


Figure 5. Top half of the Profile menu

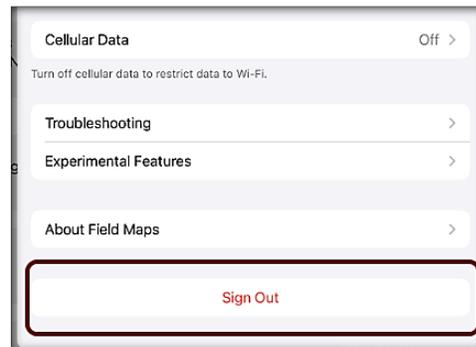


Figure 6. Bottom half of Profile menu

Download a Map Area (offline use)

Map download requires Wi-Fi connection.

The application is specifically designed to operate in disconnected mode. An area of interest is downloaded to your device while connected to a Wi-Fi network. Then the device is disconnected from the internet and field data collection is performed. Once a reliable network connection is regained, the data is synchronized with the online map. See a diagram view in Figure 7.

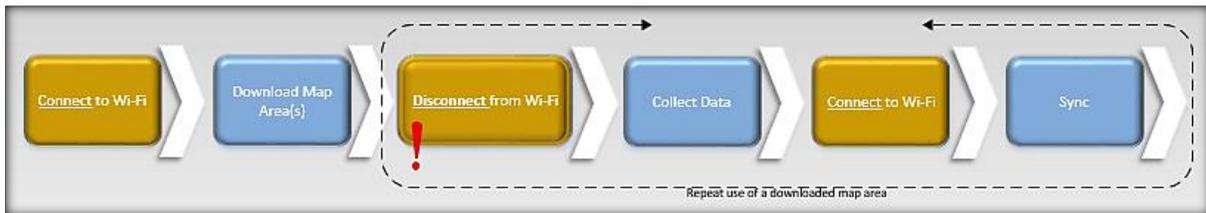


Figure 7. Disconnected Workflow Diagram

Steps to downloading a map area:

1. From the Maps landing page, locate the map needed.
2. If you have not downloaded a map, the map card contains an overflow menu represented by three blue dots. Tap the three blue dots to reveal the overflow menu. See the arrow in Figure 8.



Figure 8. View of map card within a group

3. Next tap “Add Offline Area”. (Figure 9)

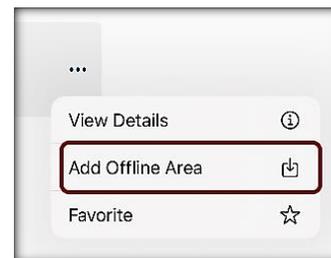


Figure 9. Overflow menu

The Add Offline Area defaults to the set map extent and basemap type. A name is assigned automatically (Area 1, etc.) which can be changed once the map successfully downloads. The Level of detail starts at the highest level of detail: Room. This is nearly always too much detail. (Figure 10)

4. Change level of detail

Tap the blue word “Room” and choose the level sufficient for the survey needs. This is usually “Streets” or “Neighborhood”.

5. Center on location needed

Tap the grey airplane at the top right corner of the map to center on your current GPS location.

OR

Use two fingers to zoom in or out. Tap, hold, and drag to center the map as you wish.

Wait for the map to display completely.

6. Tap “Download Area”

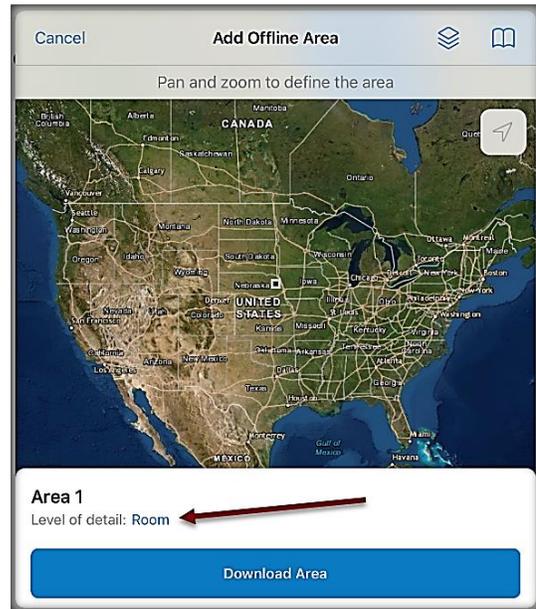


Figure 10. Add Offline Area

The new offline map card is created with a progress message – “Downloading” and a blue progress circle updating the status of the download. (Figure 11)

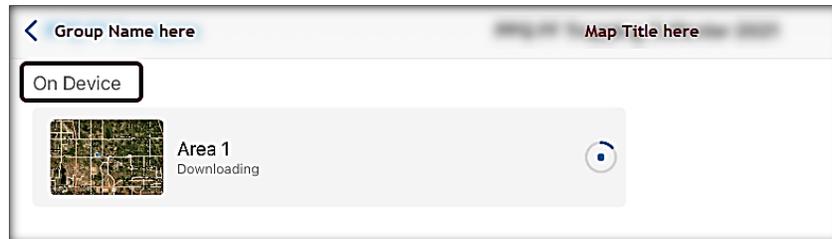


Figure 11. Map area download in progress

Once the download is complete, the progress messaging updates to indicate the size of the download and when it was downloaded to the device. The progress bar circle changes to an overflow menu. (Figure 12)

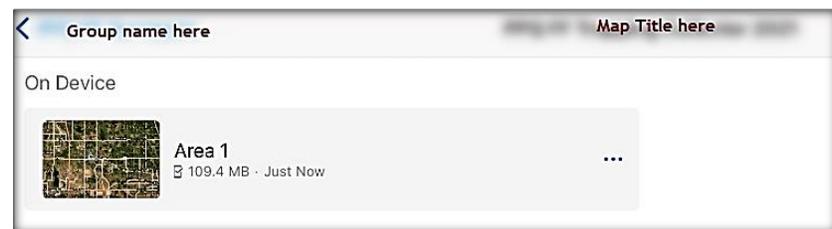


Figure 12. Map area download complete

Open and review the area that has downloaded. If needed, start again to be sure the downloaded area meet the survey need.

It is highly recommended that you rename downloaded map areas. Use the naming convention established by your supervisor.

To rename a map area, tap the overflow menu on the map area card, tap “Rename” and type in a new name. (Figure 13)



Figure 13. Downloaded map area overflow menu

Never assume you are prepared for offline data collection. **ALWAYS** perform a few tests in the application before you go.

Follow these steps to be sure of success once you are in the field:

Connect to a strong Wi-Fi or a cellular network.

Perform a sync to load other’s data collections and test your connection/log ins. (Refer to [Sync Data](#) section below)

From the Settings application on your iPad, turn Wi-Fi OFF and Location Services ON.

Collect data

To collect data in ArcGIS Field Maps, tap the plus sign  located in the lower right corner of the downloaded map area.

A data form opens on screen. (Figure 14)

Data fields that are required have a grey asterisk * after their name.

Fields allowing photo attachments, QR code or barcode scans contain the barcode icon  within the data entry box.

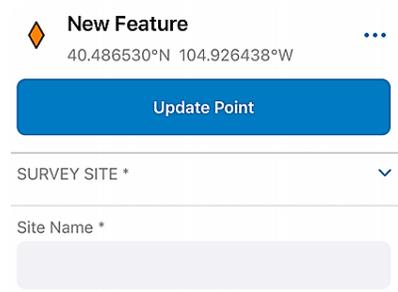


Figure 14. Sample data form

Fields enabled with a dropdown list contain a list icon  within the data entry box.

Related Tables

Depending on the developer's configuration, additional forms, or related tables, may also require data entry. Most typically, the use of a related table records multiple visits to the same site but is also used to record things like samples collected at that site.

The main data form must be completed first, then the user can either continue the data entry needed in the related table. If returning to the site from a previous visit, first select the location symbol from the map to open the main data form and locate the related table to enter new data. The related table icon link  is found within the main data form.

Editing Collected Data

Within ArcGIS Field Maps, edits can be made to the data entered in the main data form and related table entries collected to your downloaded map area.

Main Data Form Edits

1. Tap the location symbol on the map to open the main data form.
2. Tap the edit icon  to open the data form for updates.
3. Make the changes needed and tap **Submit** once complete. This update is seen as a new edit and will not be seen in the hosted map until the data sync is performed.

Related Table Edits

1. Tap the location symbol on the map to open the main data form.
2. Tap the related table icon  or scroll down to tap the related table by name. Then choose the table activity from the list to open the activity form.
3. Tap the edit icon  near the bottom of the related table entry to open the activity form for updates.
4. Make the changes needed and tap **Submit** once complete. This update is seen as a new edit and will not be seen in the hosted map until the data sync is performed.

It is also possible to edit multiple entries at once using the overflow menu's [Edit Multiple](#) tool.

Sync data

Requires Wi-Fi connection.

****Sync your data first thing in the morning AND last thing at night – DAILY!**

This both pushes your data collection out and brings in other edits to your map.

As data is collected, even in disconnected mode, ArcGIS Field Maps tracks these and indicates the need to sync your data with a dot on the outgoing arrow of the sync icon. See Figures 15 and 16 to see the indicator added to the sync icon showing pending edits saved to the device.



Figure 15. Sync icon before data entries



Figure 16. Sync icon after data entries

To perform a data sync, tap the sync icon. A window appears displaying information on edits waiting for sync. Be sure the Auto-Sync button is disabled as seen in Figure 17.

Review the list of edits. Edits from the list may be selected for review and further editing by tapping to open the corresponding data form. For more details on editing in ArcGIS Field Maps, see the [Editing Collected Data](#) section.

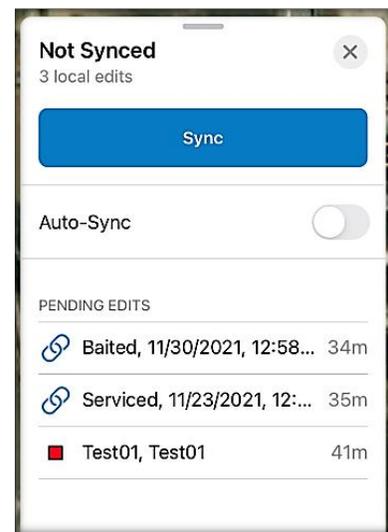


Figure 17. Sample Sync window for review

ArcGIS Survey123 mobile application

Required equipment: Mobile device (iOS or Android) and Wi-Fi connection

Install

ArcGIS Survey123 is available through the App Store for both Android and iOS devices for free. Search by name (ArcGIS Survey123) and select “install” or “get”.

Once installed, the icon will appear on your device. (Figure 18)



Figure 18. ArcGIS Survey123 application

Sign In

Requires Wi-Fi connection and an approved user account in the ArcGIS Online environment.

You will need to sign into ArcGIS Online to locate surveys shared with your user account.

Locate the ArcGIS Survey123 application icon and tap to open it. (Figure 18 above)

ArcGIS Survey123 presents sign-in options: “Sign in with ArcGIS Online” or “Sign in with ArcGIS Enterprise”. Choose “Manage ArcGIS connections”. (Figure 19)



Figure 19. Manage ArcGIS connections

At the time of writing, this product was in a development phase. Further guidance on URL and access can be found here: IPPC@fao.org

Tap “Your ArcGIS organization’s URL” to fill in the box: Enter URL prependage in the open text box and tap “Continue”. (Figure 20)

Then enter your Username and Password (set up with your account access) and tap Sign In. (Figure 21)

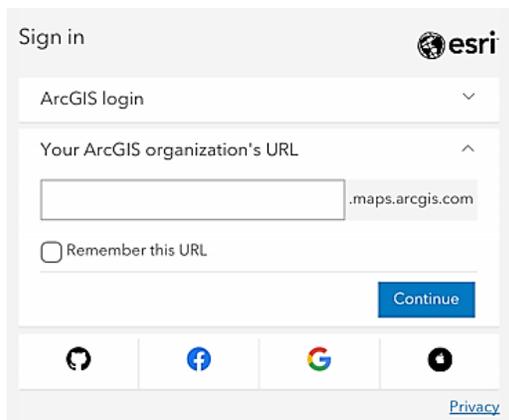


Figure 20. Your ArcGIS organization's URL

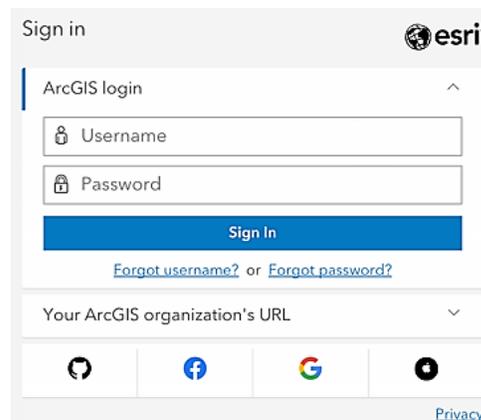


Figure 21. ArcGIS login

Locate your survey and begin field data collection!

Download Survey

Locate and download surveys by tapping the profile icon in the top right corner of the screen, OR by tapping the "Download Surveys" button at the bottom of the screen. (Figure 22) Either option is acceptable.

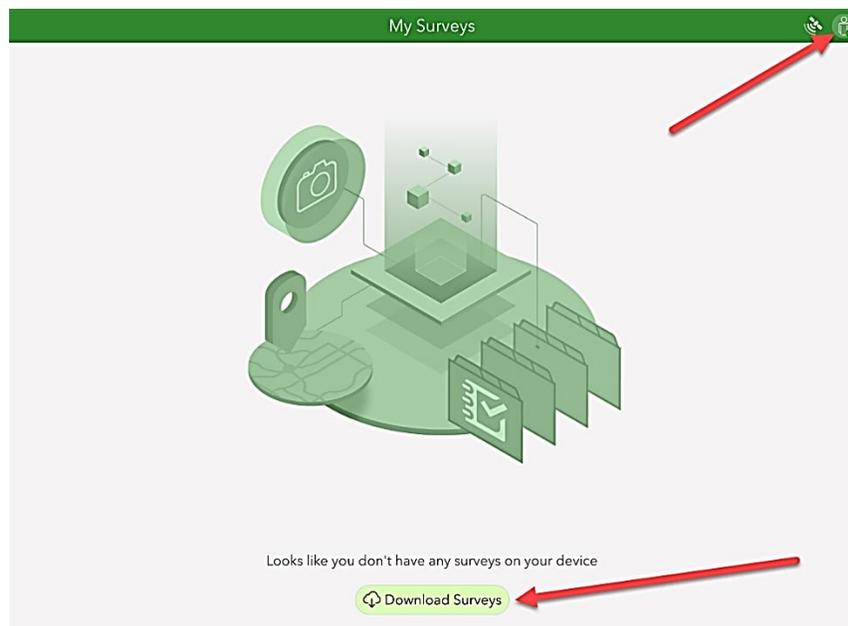


Figure 22. Download Surveys options

All surveys shared with you will be listed for download. Choose the cloud icon to the right of the title and the survey download will start. (Figure 23)

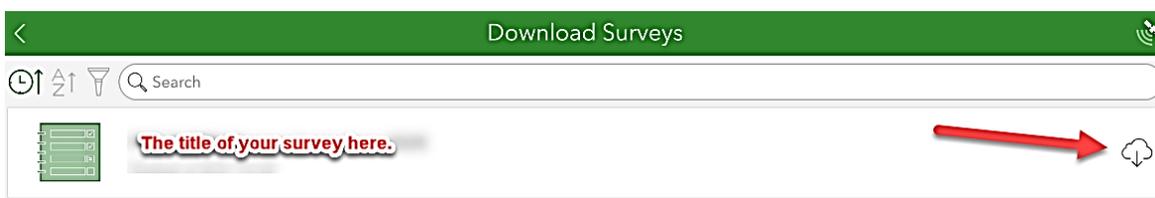


Figure 23. Download - Cloud icon

Once downloaded, click the back arrow at the top left (right if Arabic language) (Figure 22) to return to your list of "My Surveys".

Click the survey icon to open the survey. (Figure 24)

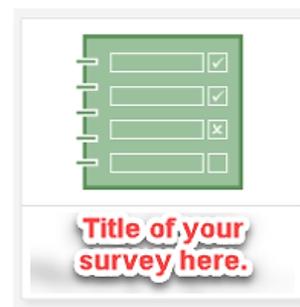


Figure 24. Survey icon

Follow steps to complete a survey as described in the [Complete a Survey](#) section of this document.

Delete Survey (if desired)

You may need to free memory on your device or simply clean out old unused surveys. These can be deleted easily.

Tap the survey icon to open it and then tap the menu at the top right. (Figure 25)



Figure 25. Menu icon

Then select “Delete Survey”. You will be asked to confirm your choice and the survey is deleted. (Figure 26)

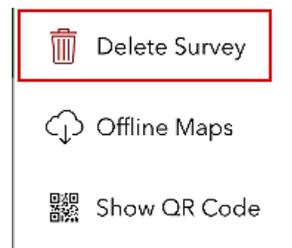


Figure 26. Delete Survey

Change Language

To change the language:

1. Locate and tap the survey icon to open it.
2. Tap Collect to open the form. (Figure 27)

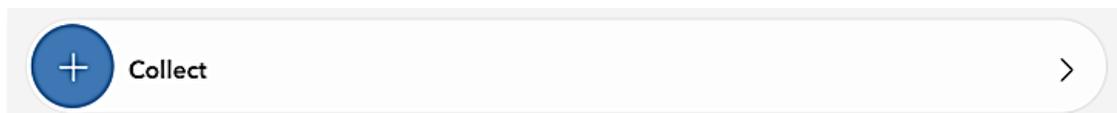


Figure 27. Collect bar

3. Then tap the menu at the top right (Figure 25) and select the language of choice (Figure 28).



Figure 28. Sample language option list

Complete a Survey

Follow directions previously outlined under the [Install](#) section to install ArcGIS Survey123 and [Download Survey](#) to download your survey.

Be Prepared

You will need the following:

1. A mobile device – iOS or Android preferred
2. A fully charged battery or access to a power supply
3. Survey downloaded to the device
4. Wi-Fi OFF on the mobile device
5. GPS enabled (iPad HINT: Settings app > Privacy > Location Services ON)

The Data Form

Open the survey.

To begin a survey, tap or select anywhere on the “Collect” bar. (Figure 29)

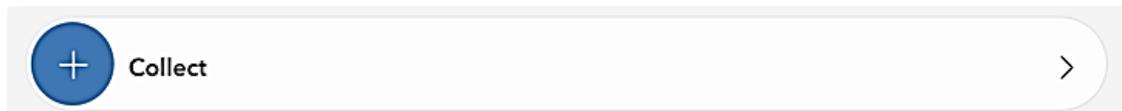


Figure 29. Collect bar

Map

IMPORTANT! Survey123 has a geospatial (mapping) component that requires your confirmation. This map may or may not be enabled in your data form.

The map shows your GPS location (found by your device's internal GPS receiver).

Tap or click on the map to review this location. Be sure this is correct. (Figure 30)

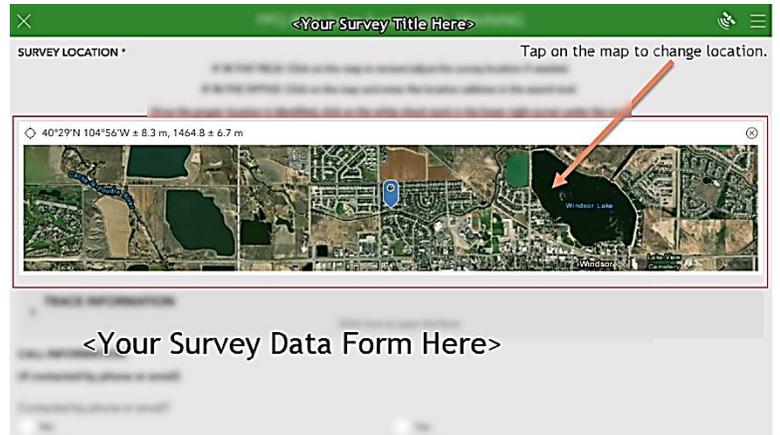


Figure 30. Sample survey data form with map question

If the location does not look correct, this can be updated by either selecting the pinned location on the map OR typing location information into the search bar. Once the location appears correct to you, select the check mark in the lower right corner to confirm and return to the survey form. (Figure 31)

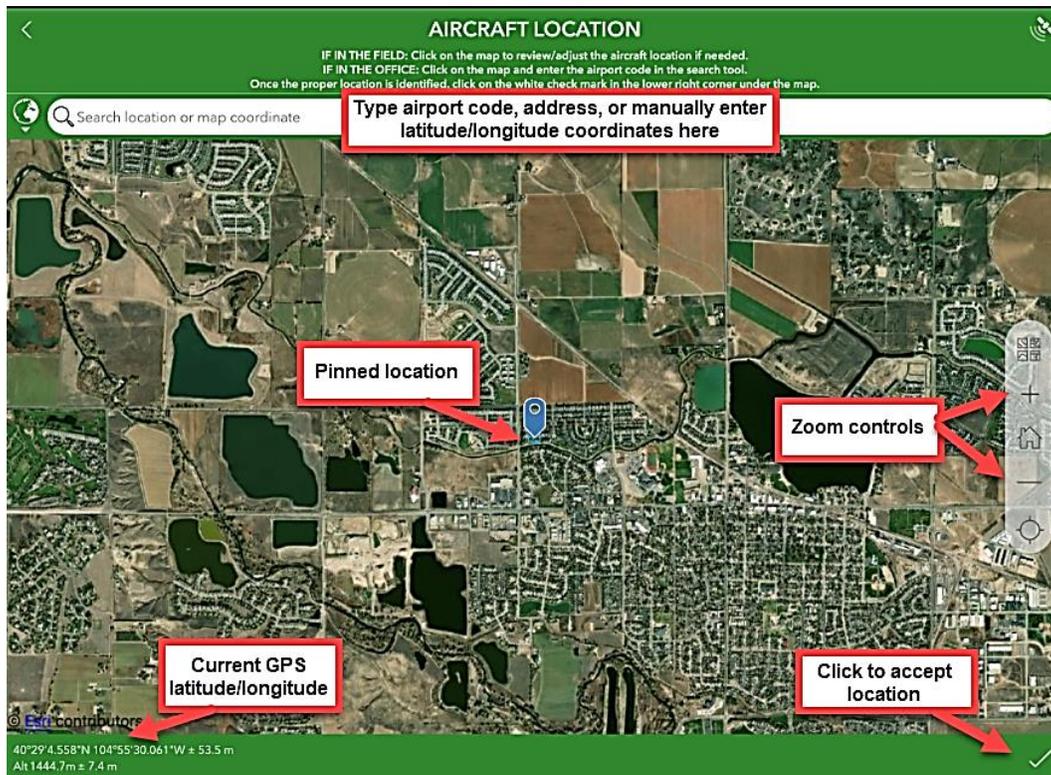
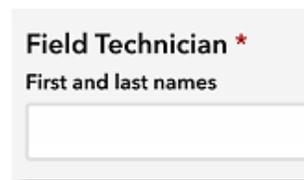


Figure 31. Sample map view after selecting from the data form question

Required Fields

All fields followed by a red asterisk * indicate required fields. These must be completed in order to submit the survey. (Figure 32)



Field Technician *
First and last names

Figure 32. Example required field and hint

Be sure that you understand the input required by reading the “hints”. For instance, Field Technician should be entered as the “First and last names”. (Figure 32)

Repeats or Related Tables

Some surveys are created with related tables which allow the user to repeat a group of questions as many times as needed. For instance, in one location, one or many samples may be collected. First, questions on the location itself appear. Next, a table, or group of questions, on the sample appears. If another sample is collected, the user has the option to add information on another sample.

Usually a hint such as: “Use the + below to add another sample...” is included to help the user along.

The bar at the end of the table (or group of questions) provides the option to delete, toggle through to review multiple entries, add another entry, or complete the survey. (Figure 33)

Once finished with all entries, select the check mark in the lower right corner to complete your survey and proceed to the [Send or Save Completed Surveys](#) section on next page. (Figure 33)

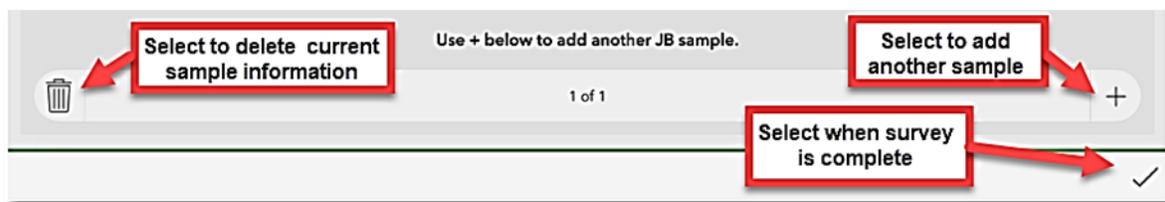


Figure 33. Sample repeating relating table options

Send or Save Completed Surveys

If you have completed the data form and all applicable tables, select the check mark at the bottom right. (Figure 34)

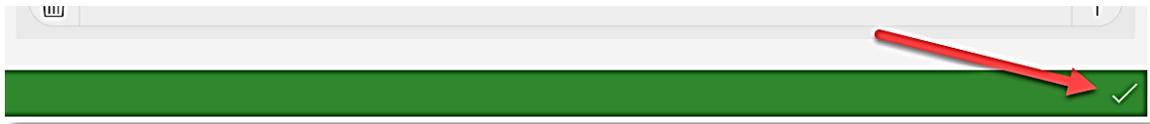


Figure 34. Survey completed checkmark

The “Survey Completed” box that appears next offers a few options (Figure 35):

- *Send now* – If Wi-Fi is connected, choose “Send Now”.
- *Continue this survey* – If the check mark was pressed in error or you realize there is something more to add to the survey, choose this option to return to the survey.
- *Save this survey in the Outbox* – If not connected to Wi-Fi, choose this option and refer to the section on the [Outbox](#). This saves the survey to your device until a Wi-Fi connection is obtained and you are ready to submit the survey to the online database.

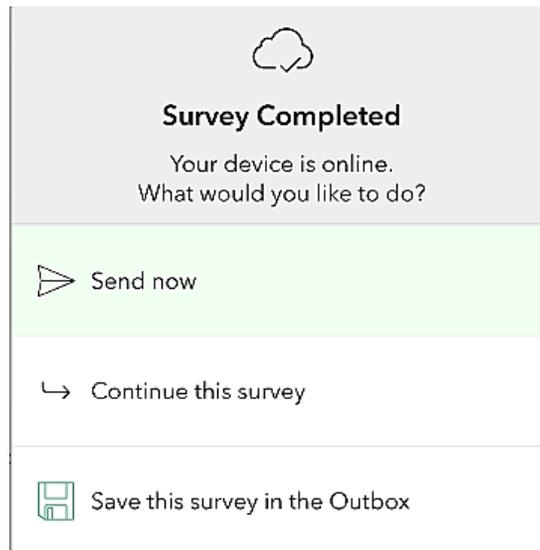


Figure 35. Survey Completed options

Outbox

If you collected data while offline or disconnected from Wi-Fi, your surveys were saved to the Outbox (on your device waiting for upload).

When surveys are being held in the Outbox, it appears just beneath the Collect bar with a number indicating how many surveys are waiting to be submitted. (Figure 36)



Figure 36. Outbox bar

Once you return to a strong Wi-Fi connection, tap the Outbox bar. All collected surveys will be listed and the option to “Send” is located at the bottom right corner. (Figure 37)

The Outbox has three different views listed at the bottom of the screen. In the “List” view, each survey can be reviewed and edited by selection, if desired. To edit a survey, select it and choose “Yes” when asked if you want to “edit this survey”.

You can also choose to view all your surveys in a map view by tapping “Map” along the bottom. When ready, select “Send” (Figure 37) to submit all surveys waiting in the Outbox to the cloud.

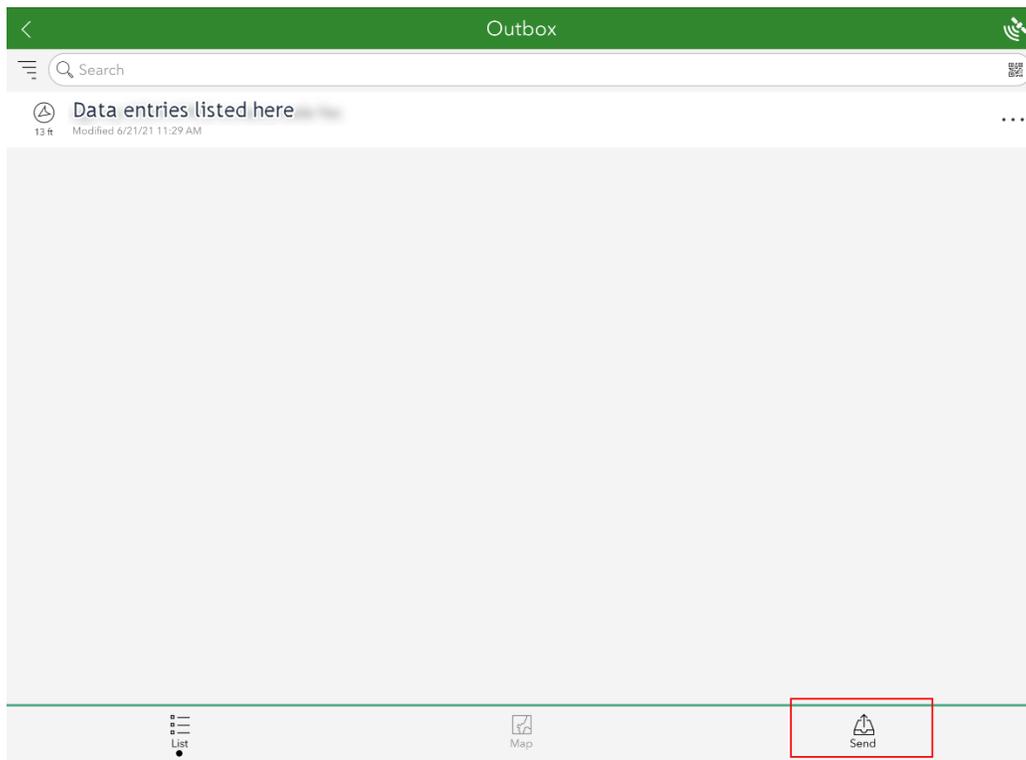


Figure 37. Outbox with surveys saved to send

Sent

Once the survey is sent, you are presented with the option to start another survey (Collect) or review your sent surveys (Sent). (Figure 38)



Figure 38. Collect or Sent menu bars

Selecting the “Sent” bar presents options to view your sent surveys in a list, on a map, or to delete the contents of this folder. The list or map view allow the user to select individual surveys, perform edits, and resend, if desired. (Figure 39)



Figure 39. Sent folder options

Edits may be restricted to the main data form. Repeated related table edits must be edited from the desktop using a web app.

NOTE: Deleting contents from this “Sent” folder will only delete them from the device but not from the database.

IPPC / FAO Hub

Requires Wi-Fi connection and a web browser/computer.

At the time of writing, this product was in a development phase. Further guidance on URL and access can be found here: IPPC@fao.org

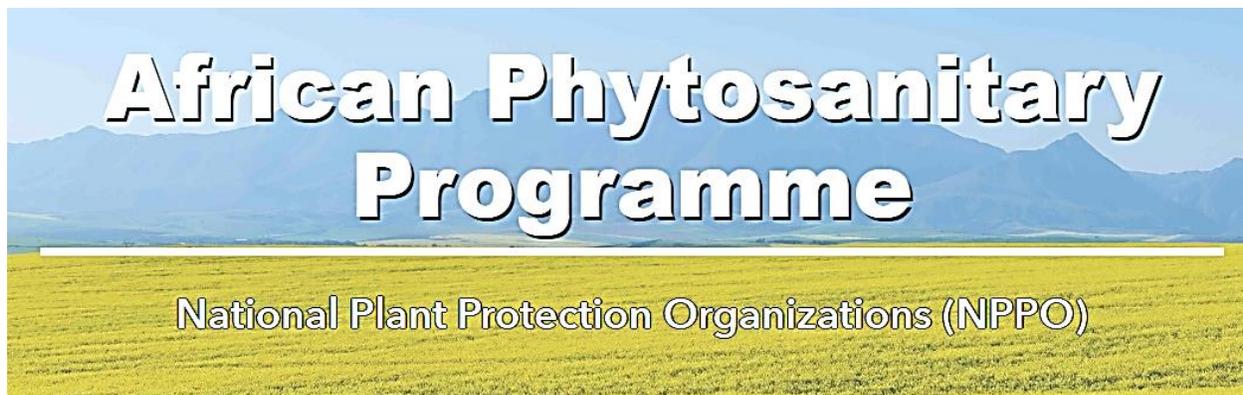


Figure 40. Early prototype sample African Phytosanitary Program Hub

This IPPC / FAO Hub (Figure 40) is the gateway to everything you need to learn about and support the African Phytosanity Project.

Navigate by clicking on icon buttons to access information on corresponding programs, geospatial tools, and training support.

The header displays branding and important links to be emphasized at the top of the page.

The logos at the top function as a home button to bring the user to the main landing page from any page in the hub.

Select a country code from the quick action links or select a country icon to visit a country's home page or scroll down to select a country from the country flags and buttons below.

Each country specific page links directly to applicable web mapping applications.

Additional icons and pages may be created for each Country Web Experiences, standards, and training. (Figure 41)



Figure 41. Sample icon button links

Web Experience

Requires Wi-Fi connection and a web browser/computer.

Users must have elevated access privileges to review and edit data in this tool.

At the time of writing, these products were in a development phase. Further guidance on URL and access can be found here: IPPC@fao.org

NOTE: Screenshots and examples shown are for general training purposes only and may not represent the exact tool you are using.

Field data collectors can edit their own entries using the ArcGIS Survey123 mobile application within the [Sent](#) menu. Those with elevated editing privileges can monitor and edit all surveyed data on a computer within an all-in-one geospatial Web Experience tool. A similar tool has been configured for each participating country and is only viewable with approved privileges assigned within the IPPC portal. See a sample Web Experience tool in Figure 42.

Open a web browser and navigate to the URL provided.

Monitor tab

The Monitor tab features a status dashboard for the country with summary metrics for all surveys completed. The user can explore the map pane and filter data to narrow the display.

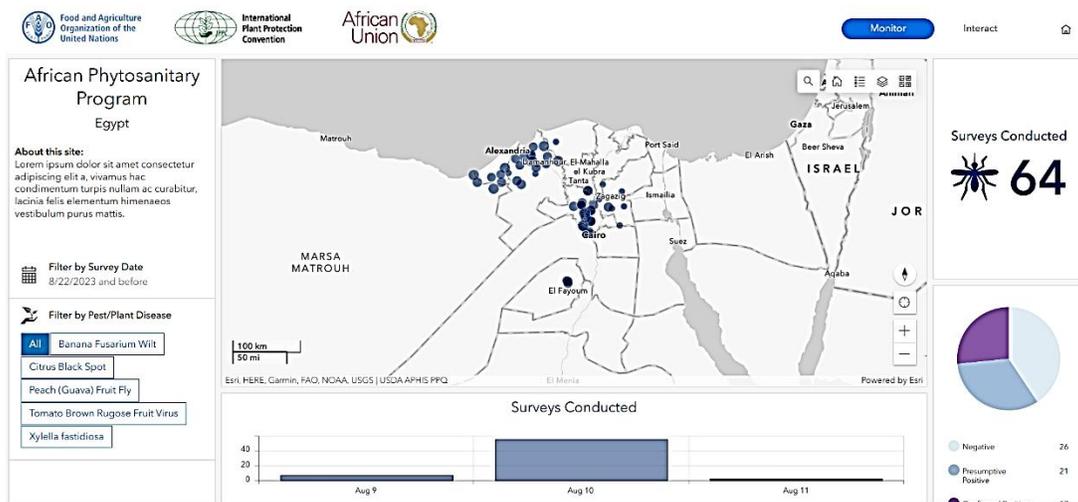


Figure 42. Sample Web Experience tool – Monitor Tab

Customize Your View

Every element on this dashboard is connected and updates when another element is changed. The default view shows all survey information. Changes to other elements are updated in the tally of Surveys Conducted within the metric on the top right corner.

Date filter

The default to shows all surveys completed up to today, enter a date range to see surveys completed between those dates.

(Figure 43)

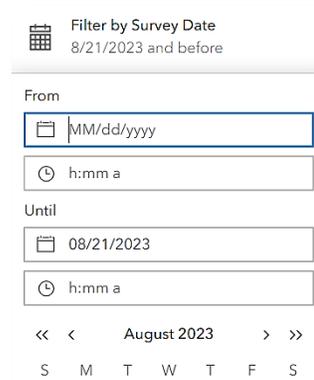


Figure 43. Example filter by survey date

Pest/Plant Disease filter

The user can select one or more pests to display from the Filter by Pest/Plant Disease options. This filter may appear as a dropdown menu or as buttons to select as in Figure 43.

Changes made here prompt updates in the map, the total surveys conducted count, the Surveys Conducted by date bar chart and the Status pie chart.

Surveys Conducted By Date Bar Chart

Select one or more bars to enable/disable on the bar chart to update other elements in the dashboard.

Pest Status Pie Chart

Select one or more slices and toggle on/off on the pie chart to update other elements in the dashboard.

Map Features

Zoom

Users can zoom in and out on the map pane using the mouse roller or the plus and minus icons in the map.

Home  - Selecting the home icon will zoom or pan the map to the original default map extent.

Pop-Up

Features in the map can be selected to reveal a popup that displays the data that was collected in the field for that site.

Search  - The search icon opens an address / location text box. Type in the location of interest, select enter or select the appropriate suggested address, and the map will pan to the entered site.

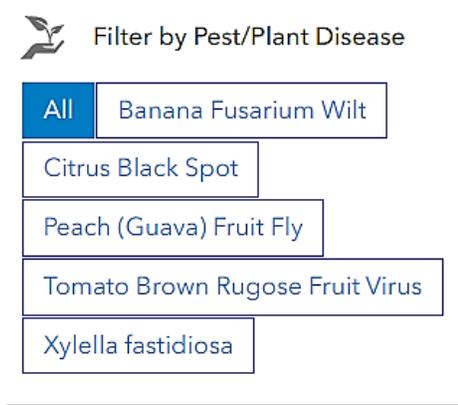


Figure 43. Example Pest/Plant Disease filter

Layer(s)  - Select the layer / legend icon and then expand the group layer to see all layers within the map.

- The open eye  icon means the layer is currently displayed in the map.
- The eye with a slash  means the layer is off and is not displayed in the map.
- The legend tab of the popup will show the user the symbology of all the layers within the map.

Base map  - When the icon is selected, users are presented with other optional base maps.

Interact tab

The Interact tab features an editing WebApp for the country with embedded tools allowing map survey point(s) selection, filtering by relevant attributes and important data fields, editing by selected points or within the full data table, and printing to PDF. The user can explore the map pane in the same ways as the map in the Monitor tab. (Figure 44)

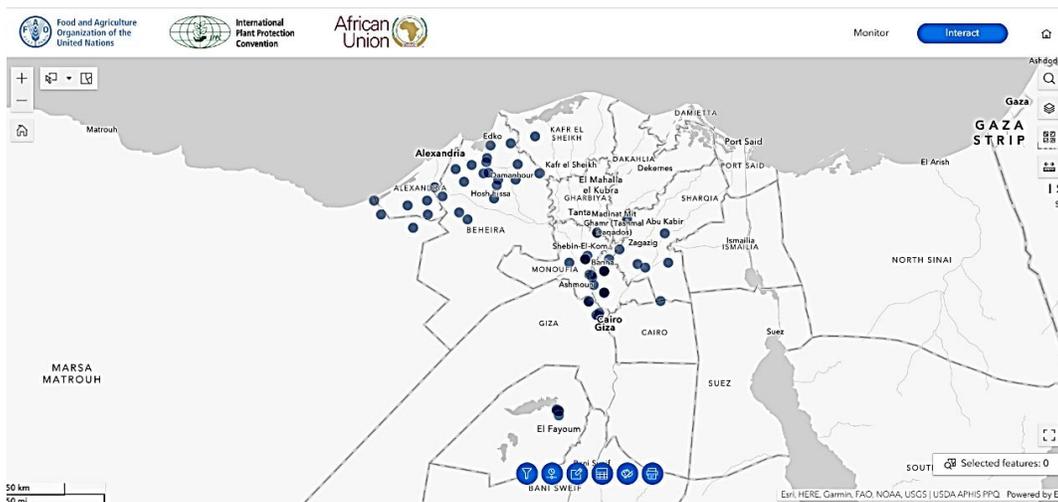


Figure 44. Sample Web Experience - Interact

Map Tools

Select by shape

Toggle this tool on/off, change the type of selection from the choices in the drop down menu, or deselect. To view the button options, hover your mouse for an explanation. (Figure 45)

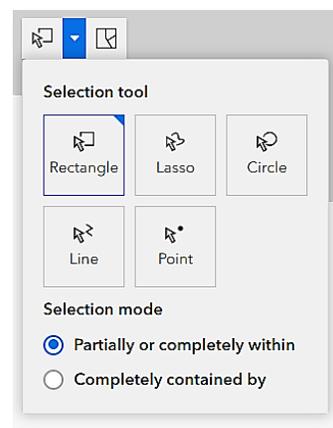


Figure 45. Sample select tool menu

Widget Tools

Hover over the widget tools in the top right corner of the map (Figure 46) to see what they do. Read about their use below.



Figure 46. Sample widget tools

Filter

For both monitoring and editing tasks, it can be helpful to filter the map to show only needed data points.

To filter:

- Tap the filter widget. 
- Within the filter widget menu, activate filter if necessary by tapping the toggle to blue. 
- Apply necessary filters and the map will reflect selected filters.

Edit

Tap the edit widget symbol  on the map to open the editing pane.

- Tap the select icon to activate the widget. The select icon will now be highlighted.
- Select the feature within the map pane that you wish to edit.
- Make necessary edits within the edit widget's popup and select Update.

Caution! The edit widget also has an option to delete features. Be aware that deletion is permanent.

Survey Table Edits

Tap the table widget symbol  on the map to open the editing pane.

- To make this pane larger, drag and expand the bracket in the bottom right corner.
- Selecting a row will highlight the corresponding feature in the map.
- To edit the data within the table, double click the cell to edit and modify as necessary.

Table Widget Data Export

Within the Table widget, you can also export data to a spreadsheet by using this more options icon  and selecting export all > export to csv.

Print Widget

The print widget  allows the user to export maps to jpg or pdf. Simply choose a title for your map and select a template (select A4 for a standard paper size map).

- Go into the advanced settings to customize the map extent, define the author, and include or not include map features like a legend or a north arrow.
- When all settings have been customized to the user's preference, go to the Print result tab of the popup and select your map. The map will open in a new tab where it can be saved to your device.

Map Features

Zoom

Users can zoom in and out on the map pane using the mouse roller or the plus and minus icons in the map.

Home  - Selecting the home icon will zoom or pan the map to the original default map extent.

Pop-Up

Features in the map can be selected to reveal a popup that displays the data that was collected in the field for that site.

Search  - The search icon opens an address / location text box. Type in the location of interest, select enter or select the appropriate suggested address, and the map will pan to the entered site.

Select  - This is activated by selecting it with the mouse. Clicking a second time will deactivate the tool.

- Selected features can be seen in the map and viewed and exported when used in tandem with the [survey table edit](#) widget.
- The upside-down triangle next to the select icon will give advanced options for how the select tool will select features within the map.
- The clear tool  next to the select widget will unselect any selected features.

Layer(s)  - Select the layer / legend icon and then expand the group layer to see all layers within the map.

- The open eye  icon means the layer is currently displayed in the map.
- The eye with a slash  means the layer is off and is not displayed in the map.
- The legend tab of the popup will show the user the symbology of all the layers within the map.

Base map  - When the icon is selected, users are presented with other optional base maps.

Measure  - This tool enables the user to measure both distance and area within the map. This feature is helpful when there is a need to measure distance between two traps or survey locations.

- Click the map once to start the measurement and double click to finish the measurement.
- Within the measurement popup, the unit of measurement can also be changed.

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