2023

Training Exercises & Class Demo 1-5

ORWA BLM

01/01/2023

Table of Contents

Training Demo 1: Build an S1 Generic Feature Service in AGOL

Goal

To create a generic new feature service in ArcGIS Online as a potential sync able replacement option for S1 Ad Hoc data workflows (replace S1 Waypoints, Tracklogs & Geotagged photos).

Demo Overview

The S1 Mobile Mapper App has an option that always allows field users to collect some basic information about a feature they find in the field using the S1 Ad-hoc (always on device) options. These are: S1 Waypoints, S1 Tracklogs, S1 GeoTagged photos, and S1 Sketches.

One downside to Ad-hoc data options is that **since they are not a feature service, they do not sync back to anywhere via the sync data button in S1 Mobile Mapper.** They must be manually shared from the device, copied to a file location, brought into ArcGIS desktop software like ArcMap, or ArcPro, and converted into a GIS feature class, and then shared in whatever way the user chooses.

One potential way around using Ad-hoc data is to create a **generic feature layer service** to capture this sort of randomly found information in the field. Once it is created it can be shared with all or some field users as appropriate, and then they are able to sync this data back to ArcGIS Online (AGOL) as needed to share the information they have collected. Once synced it is available to all users with access to the groups it is shared with.

ArcGIS Online (AGOL) is a collaborative web GIS that allows you to use, create, and share maps, scenes, apps, layers, analytics, and data. You get access to content in ArcGIS Living Atlas of the World, ArcGIS apps, and cloud infrastructure, where you can add items; publish web layers; and create maps, apps, and scenes (3D data).

Assumptions:

Student has provided their organizational account during the class registration process and knows their credentials and how to log into their AGOL organization.

Access Agency AGOL Organization:

- BLM Go to: https://blm-egis.maps.arcgis.com/home/index.html.
    - Sign in with SAML account & BLM enterprise option (uses passthrough authentication with smart card “no password”).
    - Sign into ArcGIS option; (uses a username and password authentication).
- Geoplatform users go to: https://geoplatform.maps.arcgis.com/
    - Sign into DOI Login.gov option.
- User has a sufficient role in the organization to **publish content**.
- BLM: minimum “Publisher role”.
- **Only for use on mobile devices**: “BLM_Mobile_Editor” role.

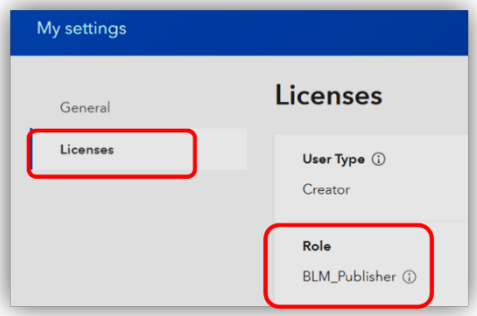
Verify your Role in the Organization

The role will determine what tools and actions you can take in ArcGIS Online (AGOL) when it comes to creating and publishing data. The roles for publishing content for BLM and FS are listed above.

a. Sign-in to AGOL (www.arcgis.com) with your SAML account & BLM enterprise option (uses passthrough authentication with smart card "no password").

b. On the AGOL Organization (BLM or FS) **Overview** page; click on your sign-in username and email in the upper right-hand corner, above the blue bar. **Select My settings.**

c. On the left side bar, select Licenses. To complete this Demo 1 tutorial, you will need to have the minimum roles described in the ***Assumptions*** above (BLM_Publisher Role), otherwise the create tools will not be available to you.



User License and Role listed in the AGOL Settings

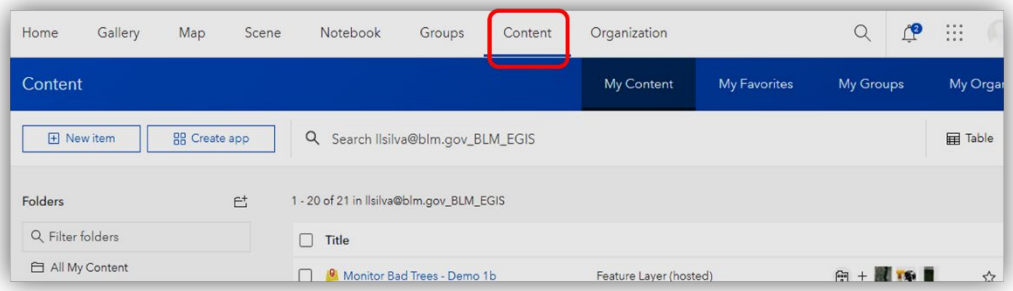
d. On the **My Settings page**, click on the **Groups tab** above the blue banner. The Groups page will list the groups you are a member of within the BLM (or FS) Organization. You may have the BLM OR SO S1 Mobile Mapper Training group listed (if you took the S1 Mobile Mapper training 2022).

e. You can also explore the My Organization's Groups, on the blue banner, to see data shared out to the public. **If you do explore**, come back to the **My Groups page** by clicking on the My Groups tab on the blue banner.

Create a New Feature Service in AGOL

We will create and add a new **editable Feature Layer (hosted)** service **item** to a group that you have permissions to use. This new generic editable Feature Layer (hosted) service is for practicing AGOL purposes. You may already have a generic editable Feature Layer setup for your group to use in an offline environment. We will delete our new item at the end of this tutorial since this is just for practice.

a. Click on the **Content tab** above the blue banner. The Content page will list all the items that you have created in your login account. You may not have any created items yet.

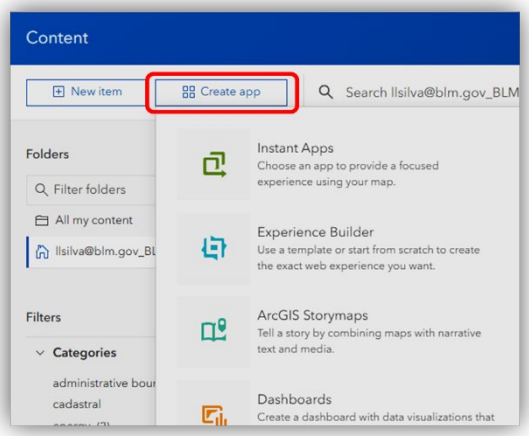


Selecting the Content Tab for Listed Items

b. The **My Content page** will show a list of all content that has been created by you and shared with groups and the BLM Organization (you may not have any Items listed yet if this is your first time

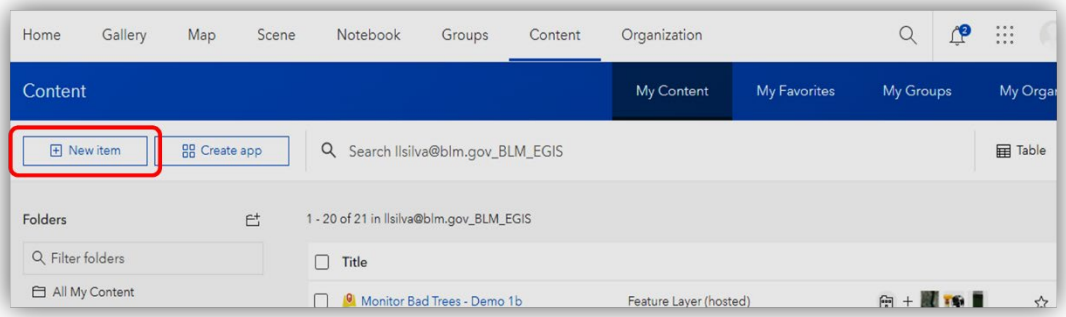
Creating as a Publisher Role or Creator Role in AGOL). The My Content tab on the blue banner will be highlighted also.

c. **Just for viewing**, click on the **Create app button** on the left-hand side to see a list of apps that can be created with your Feature Layer(s) and Web Maps in the future. After viewing the Created Apps list, close it by clicking off the list.



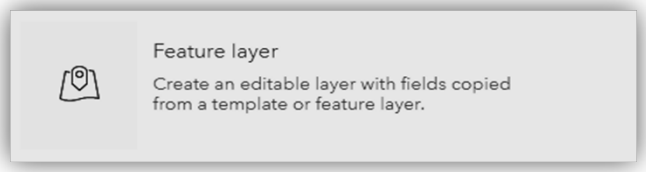
List of Create Apps to choose from in AGOL

d. Select the **[+] New Item button** on the upper left-hand side to start creating a new editable Feature Layer (service).



New Item Create Button

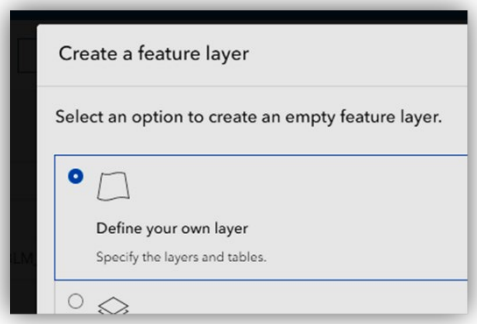
e. Select the **Feature Layer** option.



Selecting the Feature Layer Option

NOTE: *On the **Create a feature layer page**, you could **explore** through the predefined occupation templates to see industry examples, **use a Template**, before selecting **Create a blank layer**. Then click the **Back button** on the bottom left to get back to the **Create a feature layer page.***

f. Select the **Define your own layer** option.

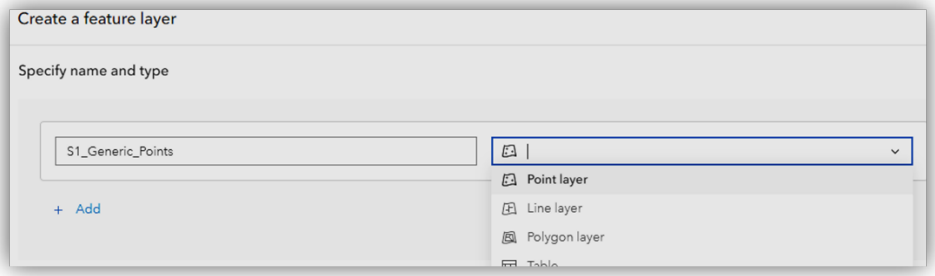


Selecting the Define Your Own Layer Option

g. Then click the **Next** button on the bottom right.

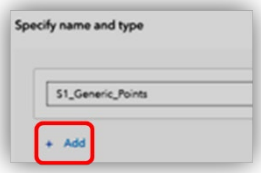
h. In the **Specify name and type** section, click in the **Layer_1 box** and type the new layer name: **S1_Generic_Points**.

i. Then select the **Point layer** from the pulldown list.



Creating a Point Feature Layer Name and Type

j. Next, click the **blue + Add button** to add a new layer line.



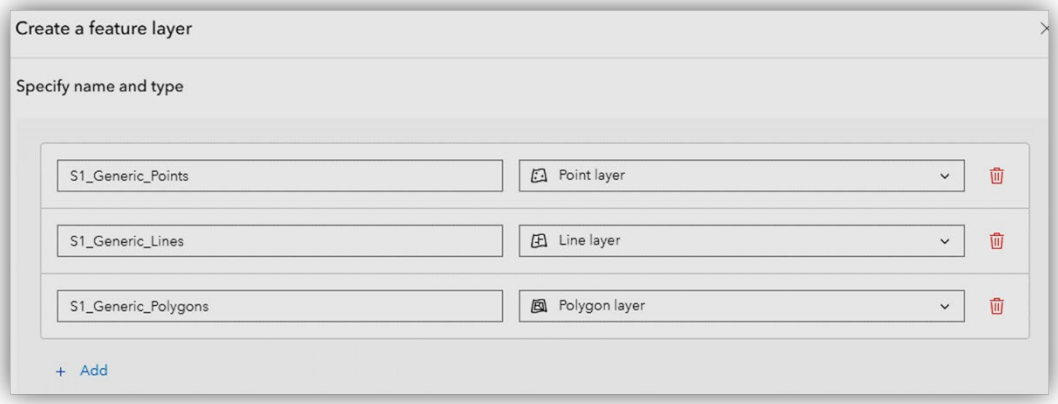
+ Add a New Layer Button

k. For line #2, type **S1_Generic_Lines** in the layer box. Then to the right of it, select **Line layer** from the pull-down list.

l. Click the **+ Add button** for line #3 and type in **S1_Generic_Polygons**. Then to the right of it, select the **Polygon layer** from the pull-down list.

NOTE: *Can add related GPS metadata fields and Z-Value fields to the layers which will add many attribute fields in the attribute tables. For this exercise, we will not add GPS and the Esri Z-Values fields. We will add a field for point z-values manually.*

m. When done adding the three new layer types, it should look like the image below.

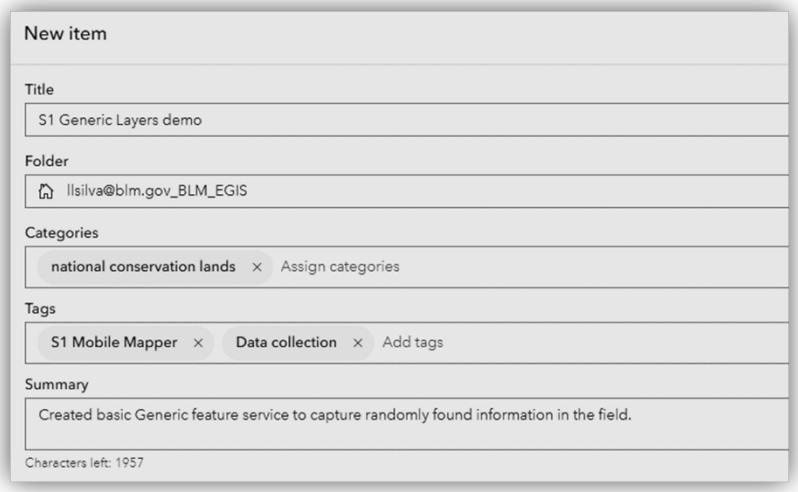


Creating a Point, Line, and Polygon Feature Layer Name and Type

n. Click the **blue Next button** on the bottom right when finished.

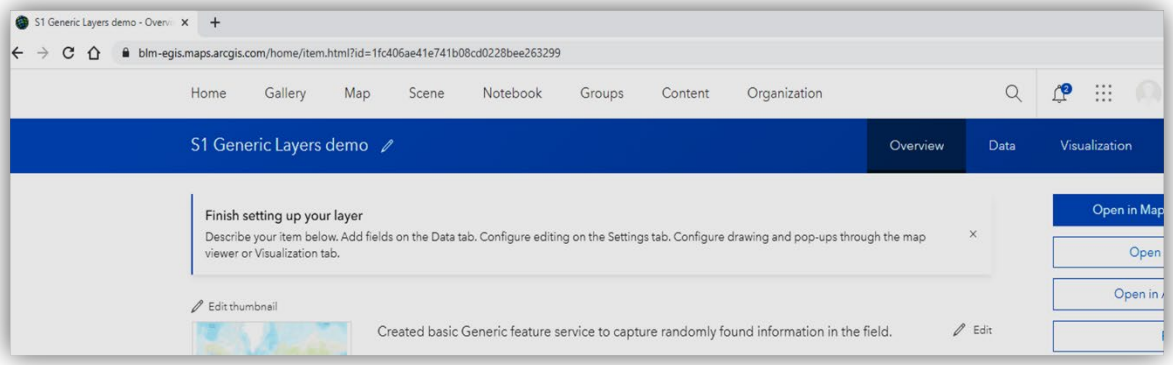
o. Fill in a Title, **S1 Generic Layers demo**, notice what folder it is going in.

p. Assign Categories (search properties), add Tags (search properties), write a summary about the data being collected and why, "Created basic Generic feature service to capture randomly found information in the field.", then click **Save**.



Adding a Name, Tags, and Summary to the Newly Created Item

q. The new feature layer(s) you created will open in an **Overview window** listing info about the new Feature Layer (Service) and listing advice on how to Finish setting up your layer by writing an item description, configure editing, pop-ups, etc.



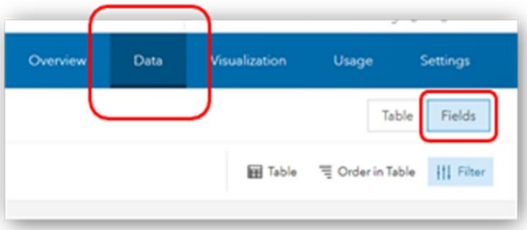
Overview Window of the Newly Created Feature Layer

Building the Feature Layer's Attribute Tables

After creating the new layers, our Point, Line and Polygon layers have an Object ID field (not editable) and a field that will store Photos and Files. The line layer will have an added length field and the polygon layer will have an added length and area field. We want to collect more textual information about the data, so we will add **new fields** and some **attribute domain lists** for each of these three layers.

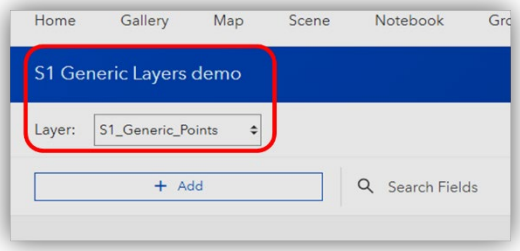
a. Click the **Data** tab on the blue banner, this is where we will set up the attribute table, the tabular data collection fields, for the new feature layer(s).

b. Then, click on the **Fields** button in the upper right-hand corner under the blue banner.



Field View of the Data

c. Just below the blue banner, on the left-hand side is the name of the layer the table is linked to. We will start with the **S1_Generic_Point** layer first.



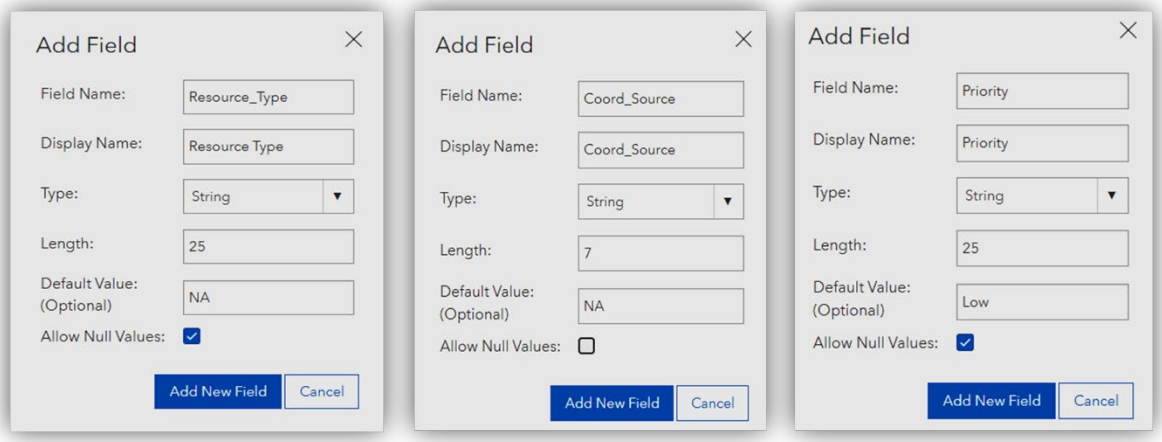
S1 Generic Point Layer Selected for Table View

d. **Click** the **+Add button** below the layer name to add a new field in the table for this layer.

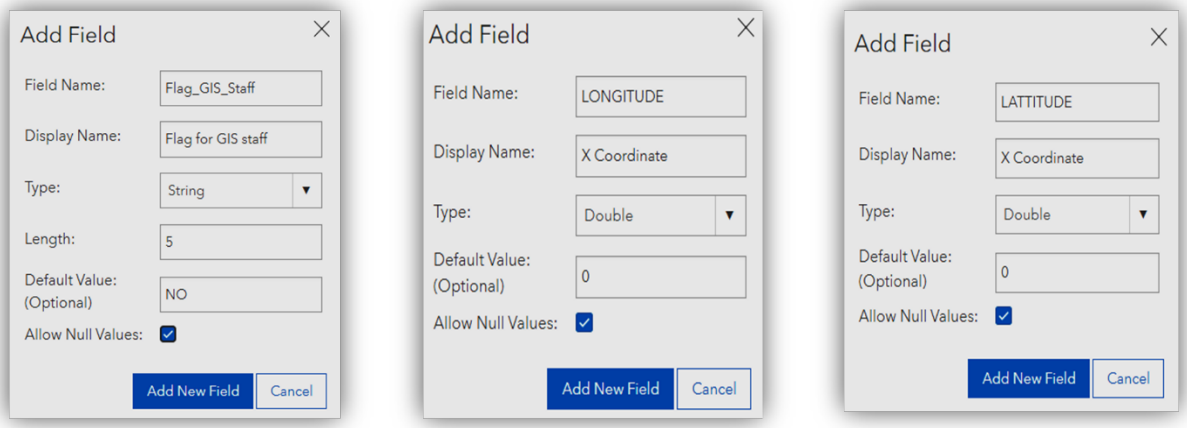
Layer: **S1_Generic_Points**

e. Fill out the form with the inputs listed below in the images for Resource_Type, Coord_Source (S1 auto-pop field), Priority, Flag for GIS staff, LONGITUDE (S1 auto-pop field), and LATTITUDE (S1 auto-pop field).

NOTE: *See about Auto-Populate fields and how they are setup in the S1 Mobile Mapper app options.*



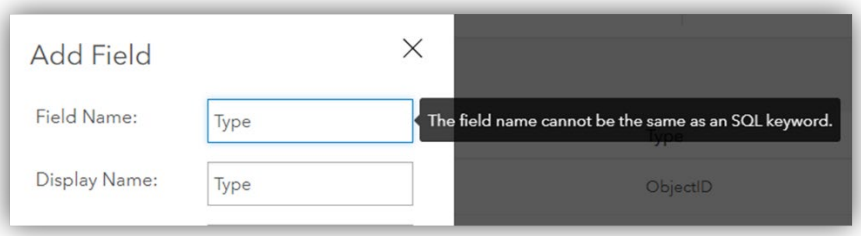
View of Three Added Field Values for the Point Feature



View of Three more Added Field Values for the Point Feature

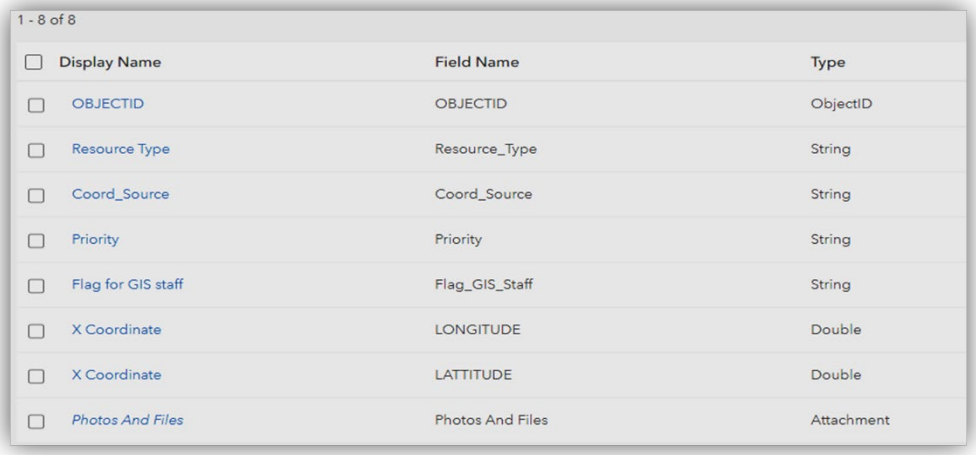
Error Message with Field Names

If you ever get an error message for the **Field Name** (see image below), it is because that field name is a **reserved keyword** used in database tables and cannot be added again. To work around using the same Field Name, add an underscore after the word like **Type_ .** The **Display Name** does not have to follow the database rules. **Also, field names cannot have a space in the name. Display names can.**



Error Message when using a Database Reserved Word

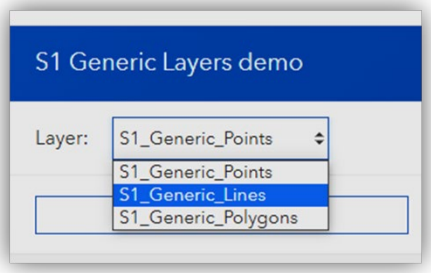
f. This is how the attribute window should look after the field inputs for the point layer. See image below.



New Input Fields for the Point Layer

g. **To set the attribute fields for the line layer and the polygon layer**, go to the Layer pull-down list and select the line layer next and then fill out the form for the new fields.

h. Then select the polygon layer and fill out the form for the polygon fields. It will be up to you to fill out the forms based on what you have learned and what info you may need to collect for a line or polygon.



Selecting the Line Layer for Field Values

i. **When you are finished adding new fields for the line and polygon layers, stay on the fields list page, because we will add domain picklists to the fields next.**

Building Domain List for Attribute Fields

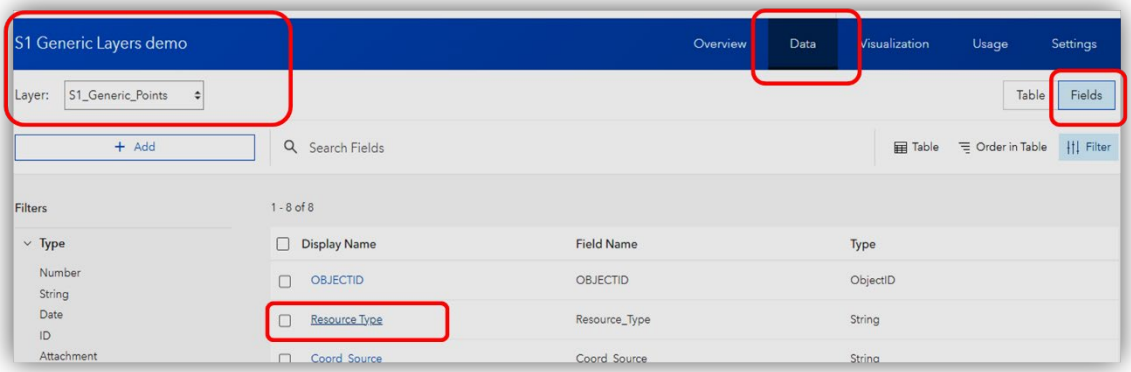
To improve data quality, you can provide editors a list or a range of acceptable values for fields in your hosted feature layers. To prevent editors from typing incorrect values and avoid typos, you could create a **picklist of values** editors can use to populate the field if you have a limited number of possible values.

NOTE: *To get to this next step after closing AGOL; login to AGOL → click on* ***Content*** *at the top → find the* ***S1 Generic Layers demo*** *listed & click on the title name → Click on the* ***Data tab*** *on the blue banner → select the* ***Fields*** *button option (see image below).*

a. On the S1 Generic Layers demo field list page:

- **Data** tab selected.
- **Fields** button selected in blue.
- **Layer:** pulldown list on **S1_Generic_Points** selected.
- Find the field Display Name **Resource_Type** that we added.

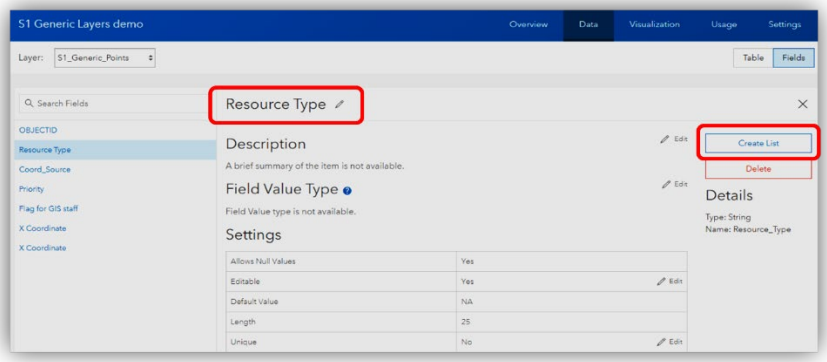
b. Confirm that the S1_Generic_Points is the one listed in the **Layer window**. Click on the Display Name **Resource_Type** in blue text.



Selecting a Point Field Value to Open its properties

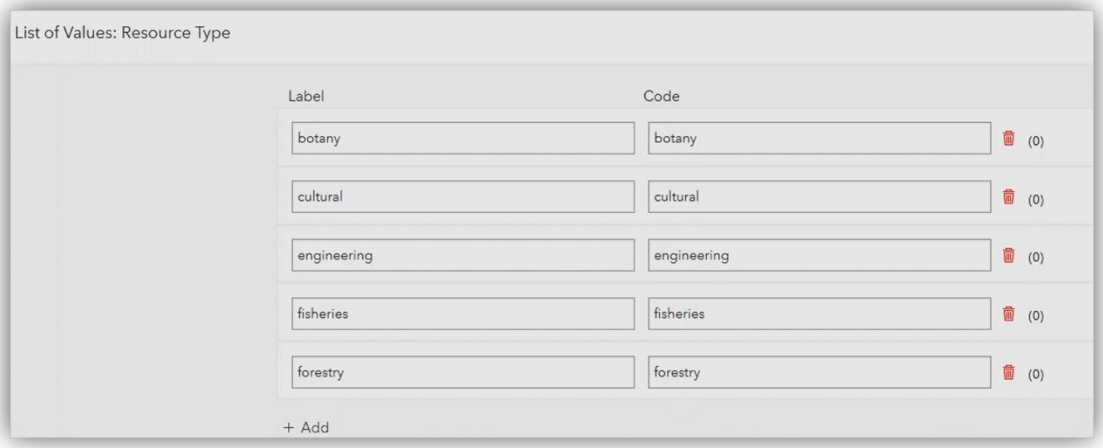
c. Confirm the display field name title is **Resource_Type.** This is a good place to add a short description and make some field property edits.

d. Click on the **Create List** button in blue on the right-hand side. We will add Domain values for our picklist.



Create a List for a Field Value in the Point Layer

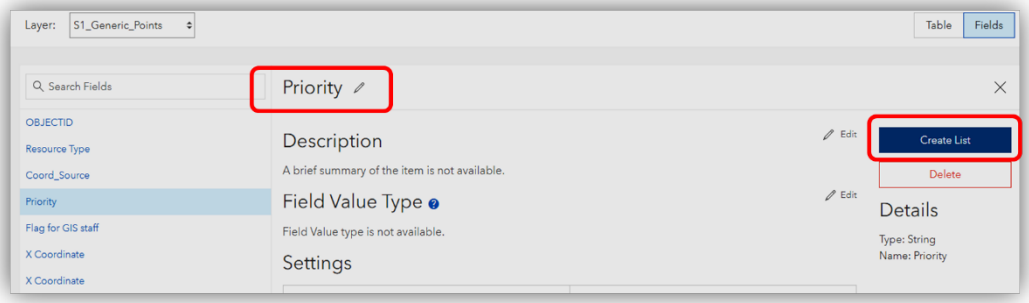
e. Add **Label** name and **Code** like the list below. Since the field type is a String, the code can be a string value too. In this case the Label and the code are the same word: botany, cultural, engineering, fisheries, and forestry. Use the **+Add button** to add a new line.



Picklist Values for the Resource Type Field

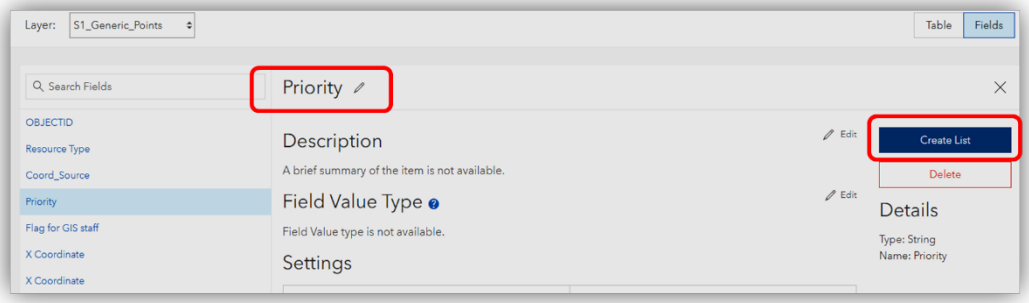
f. When done adding the five new lines, **Click Save** on the bottom right-hand side.

g. Next click on the blue **Priority** field name from the left-hand side column to open its details (also from the Point layer).



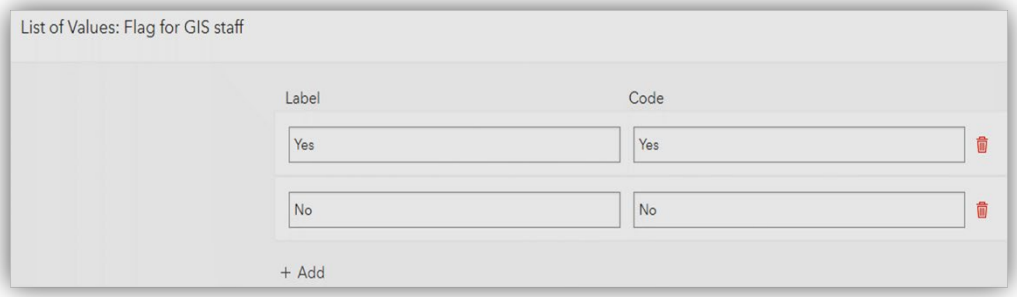
Create List for the Priority Field from the Point Layer

h. Click on **Create List** for the **Priority field** and add three labels and codes: **High, Medium,** and **Low**. This is a string field, so the Label and Code will both be the same. Then click **Save** on the bottom right-hand side.



Create List for the Priority Field from the Point Layer

i. Next, we are going to add one more domain list to **Flag for GIS staff**. Select the field name **Flag for GIS staff** on the left-hand column**.** Click the **Create List** and add **two domain values: Yes** and **No.** Label and code can be the same since this is a string field.



Flag for GIS Staff Field List of Values

j. Then click save. This will bring you back to the field property Details page. Next, we will set the layer settings.

k. Practice adding domains to the line and polygon layers too.

Auto-Populate Fields in S1 Mobile Mapper

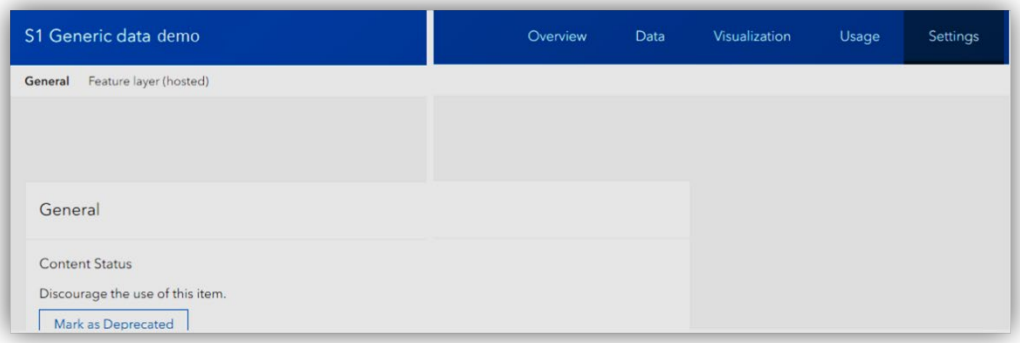
The S1 Mobile Mapper application can **auto-populate** several categories of common feature-level metadata field attributes when data is collected via GPS, including Estimated Accuracy ft/m, Coordinate Source, XY Coordinates, GIS Miles, GIS Acres, Date, and Number of Satellites. With the laser functionality, users can also use the laser to auto-populate fields for Slope distance, Horizontal distance, Vertical distance, Azimuth, Inclination, Height & Percent Slope.

The app supports several default attribute field values in most categories. Users can also add their own attribute fields to each category or further manage the feature-level metadata categories via S1 Options, see **Auto-Populate Features** in the S1 Mobile Mapper User Guide for a full list and more info.

Set the Feature Layer Settings

When done with adding new attribute fields to the tables of the new point, line, and polygon feature layers and then building the domain picklists for some of the fields, we will set the settings for the feature layer (hosted) service.

a. Click on the **Settings** tab on the blue banner (this is from the overview or data page of the S1 Generic data demo layers).



Settings Page for all Layers in the S1 Generic Data Demo Hosted Feature Layer

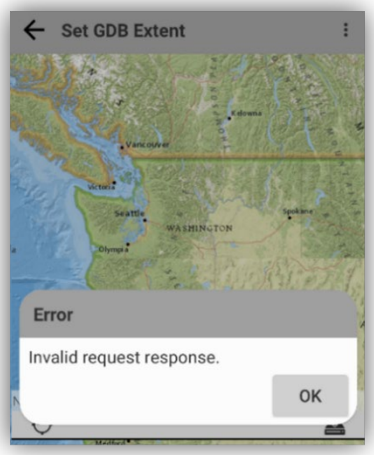
b. Keep all the default settings in the **General section**. Scroll down to the **Feature Layer (Hosted) section.**

c. **Attention! Super Important Settings!** Make sure the "**Enable editing" is checked on** and the most important is to check on the "**Enable Sync (required for offline use and collaboration)**", this is what will help bring data into the mobile app for data collection out in the field offline and allow you to sync your new collected data back into the database with updates.

Enabling Settings for the Hosted S1 Generic Feature Layer

d. Click the blue **Save** button after checking On the Enable Sync option. All other default settings are good for this project.

NOTE: *If the **Enable Sync option is not checked on for a data service**, you will see a **data error** in the S1 Mobile Mapper app (see below). If you see this error in the mobile app, then you must go into AGOL and check the Enable Sync option on to use this data service.*

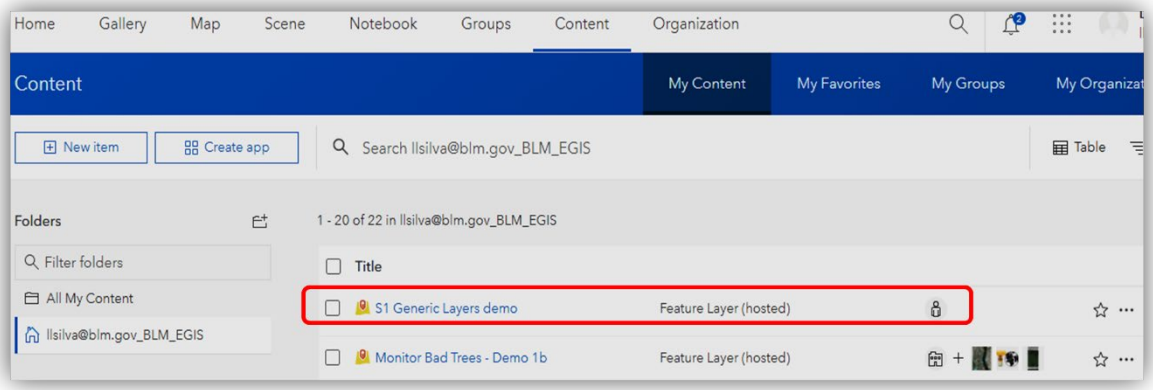


Error Message in the Mobile App if the Enable Sync is not set

Content List and Share with Group

a. Click on the **Content** tab above the blue banner.

b. The **My Content** tab on the blue banner will be highlighted as well on the content page. This page will list your saved content Items. Look for the new Feature layer (Hosted) you just created called S1 Generic Layers demo (or the name you chose to give it).



My Content List View of the Newly Created Hosted Feature Layer

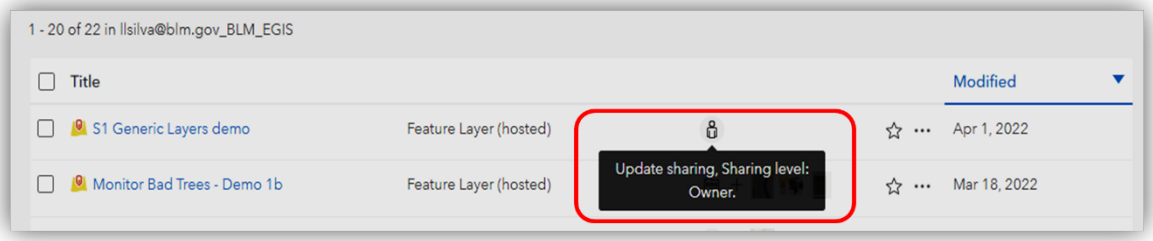
c. If you click on the blue title, **S1 Generic Layers demo**, it will take you to the **Overview** page for that layer.

The Overview page is where you can add a description about the Feature Layer, see details, what layers are in the feature layer and the options to view the data in a map view, etc.

d. Come back to the content list by clicking on the **Content** tab above the blue bar.

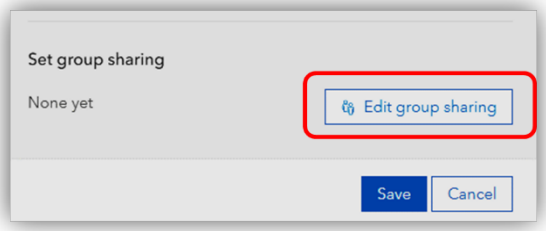
We now need to **add** the Feature Layer (hosted) service **to a group** and **share it** so others in your group can see it and use it to collect data.

e. Click on the **little person Icon** in the same row as your layer title on the **Content list page**.



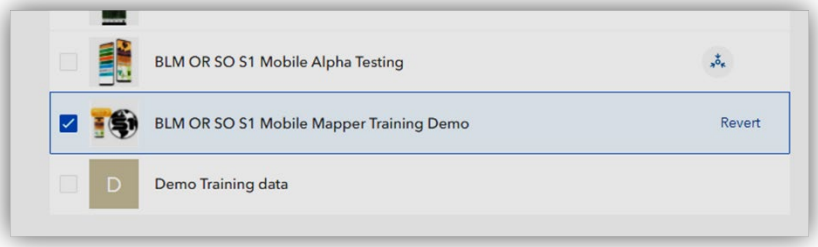
Sharing Icon to set for the Hosted Feature Layer

f. Then click on the **Edit Group Sharing button** under the **Set group sharing section**.



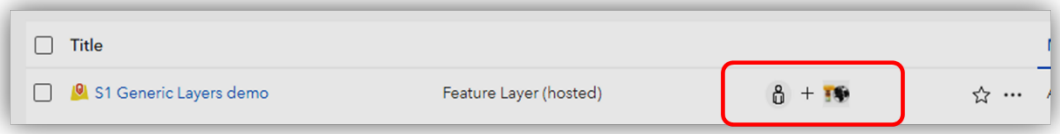
The Set Group Sharing Button

g. Select which group you want to share your new Feature Layer with or select the BLM OR SO S1 Mobile Mapper Training group (if listed), then click **OK,** and **Save**.



Select the Group to Share the Feature Layer

h. Now the layer Icon has changed to show that this feature layer (hosted) service is now shared with a group. (The feature layer could be shared with more than one group if needed).



Icons Show that this Feature Layer is Shared with One Group

At this point, we could **open** the **S1 Mobile Mapper App** and use our new Feature Layer (hosted) service on its own to collect data in the field.

Next, we will view our newly created feature layer (hosted) service that was added (mashed) another hosted service and then saved as a new web map. Web maps, which could include basemaps, sets of data layers, scaled symbols, an extent, configured pop-ups, and external reference layers; can be a single data download to the S1 Mobile Mapper app.

The Map Viewer

The Map Viewer will list the web map layers in a Legend view and show the layer features on a map.

a. In AGOL, click on the **Groups** tab above the blue banner.

b. Find and click on the blue Group title **'BLM OR SO S1 Mobile Mapper Training'** (should have that group listed if you attended the S1 Mobile Mapper Training).

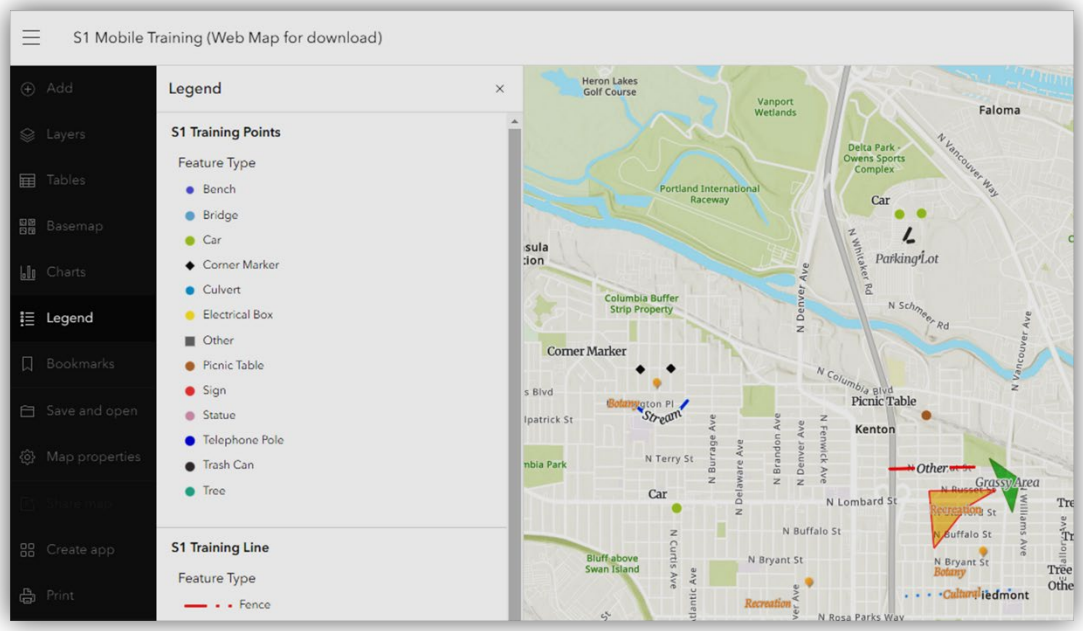
c. Scroll to the bottom of the BLM OR SO S1 Mobile Mapper Training group page to the **Featured group content** Section.

d. Click on the blue title of the **S1 Mobile Training (Web Map for download)** content to open its Overview page.

e. On the right-hand side of the S1 Mobile Training (Web Map for download) Overview page, click to open the **Map Viewer** to view this web map.

Opening the Map Viewer to View the Web Map

f. Viewing the S1 Mobile Training (Web Map for download) web in the Map Viewer, you will see S1 Training Points, S1 Training Lines, S1 Training Polygons layers and their subtypes listed in the Legend.



S1 Mobile Training (Web map for download) in the Map Viewer

g. Scroll down the Legend window to the bottom until you reach the layers called S1 Generic Points, Generic Lines, and S1 Generic Poly. You are seeing the S1 Generic Feature Layer (hosted) Service from the first half of this tutorial added to (meshed with) the S1 Training (hosted) Service to this web map and then saved as a new web map called S1 Mobile Training (Web Map for download).

The **S1 Mobile Training (Web Map for download)** web map was created by opening the **Web Map Viewer**, then using the **"Add" button** to add the S1 Training data (hosted) Feature Layer service and by adding the S1 Generic Layer Demo (hosted) service. The map author set the styles of the map layers (based on type) and then saved everything as a web map called S1 Mobile Training (Web Map for download).

Congratulations! You have completed this section.

Next, we will confirm that the S1 Mobile Training (Web Map for download) web map is listed in the group called **BLM OR S1 Mobile Mapper Training group** in the **S1 Mobile Mapper app** on the mobile device.

Exercise 1: Confirm Login and Training Group Membership

Goals

The intent of this exercise is to confirm that users can login to the S1 Mobile Mapper Application with the right login setup and confirm they are able to get to the training data group.

Expectations

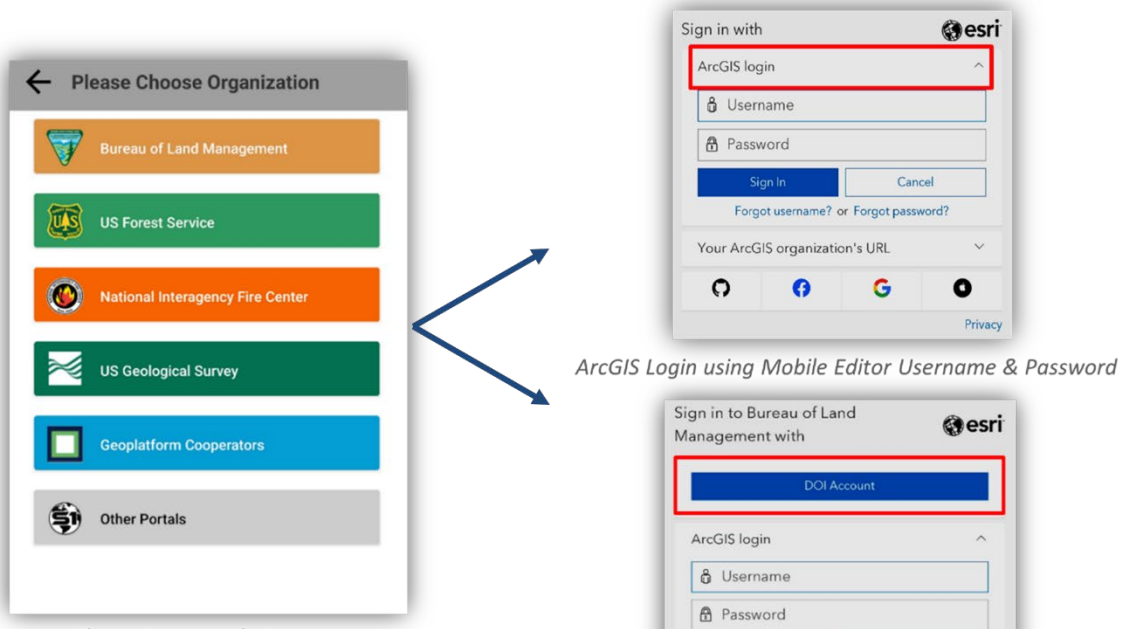
Upon completing this exercise, the user will confirm their login to the S1 Mobile Mapper application and confirm they are a member of the **BLM OR SO S1 Mobile Mapper Training Group** in the S1 Mobile Mapper App.

Login to S1 Mobile Mapper Application

a. Click on the S1 Mobile mapper app on your mobile device.

b. Select the **Organization Login**, then select the BLM Organization (outside of training you may need to sign into another Organization, i.e. Other Portal, US Forest Service, etc.).

c. If signing in with a SAML account, select the DOI Account blue button, otherwise, sign in with the ArcGIS Login credentials that you provided on your registration form. Follow the sign-in steps to get into the app.



Choose Agency on login screen

ArcGIS Login using Mobile Editor Username & Password

SAML Account with ArcGIS Login – DOI Account Button

Member of Training Group

We will now confirm that your user account is an added member to the BLM OR SO S1 Mobile Mapper Training Group in the S1 Mobile Mapper App.

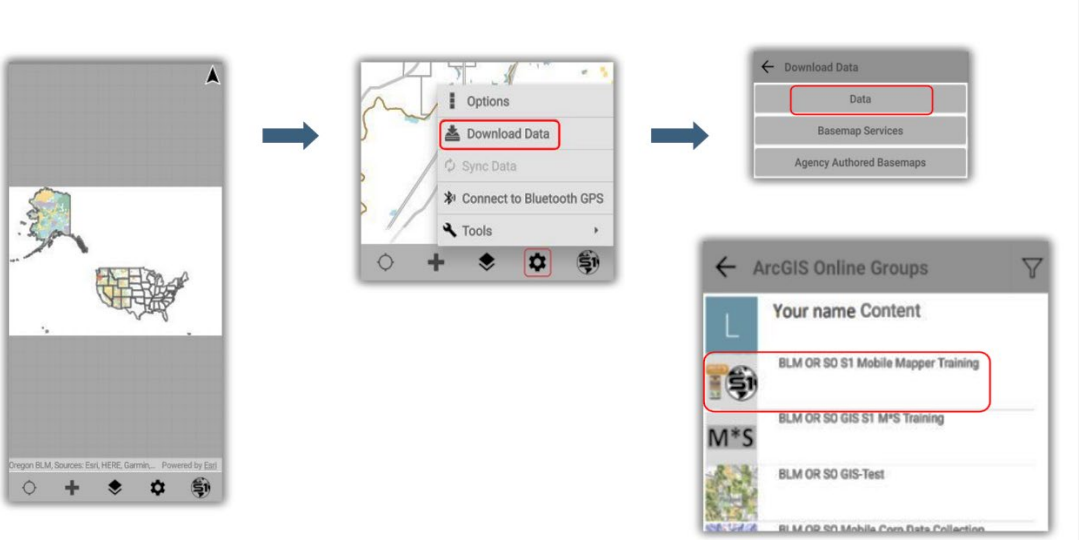
Assumed: You are logged into the S1 Mobile Mapper app.

a. If you see the words "Public Mode" in the top left corner of the screen, you are NOT Logged in. Start the login process over again (listed above).

b. Once logged into the app, go to the S1 Mobile Mapper Application toolbar (bottom of app). Click the **Tools/Options** button (see graphic below).

c. Select the **Download Data** option. Click the Data button.

d. Scroll through your list of ArcGIS Online Groups to find the **BLM OR SO S1 Mobile Mapper Training Group.** Click on it and confirm a list of map data shows. This confirms you are a member of the training group and can download the training data that will be used.



The steps to Downloading Data from a Group in S1 Mobile Mapper App

e. Now close the Select Map Data by clicking on the back arrow in the title bar or the main back arrow, close the ArcGIS Online Groups window too, we will come back to this download again further in the exercise.

The above steps were to confirm that your user login account is a member of the **BLM OR SO S1 Mobile Mapper Training Group**. You will need this membership to run through the rest of the exercises, in or outside of the training class.

NOTE: *If the **BLM OR SO S1 Mobile Mapper Training Group** is not listed, then your user account still needs to be added as a member in ArcGIS Online (AGOL) by the S1 Mobile Mapper Team.*

Exercise 2: Downloading and Managing Basemaps

Goals

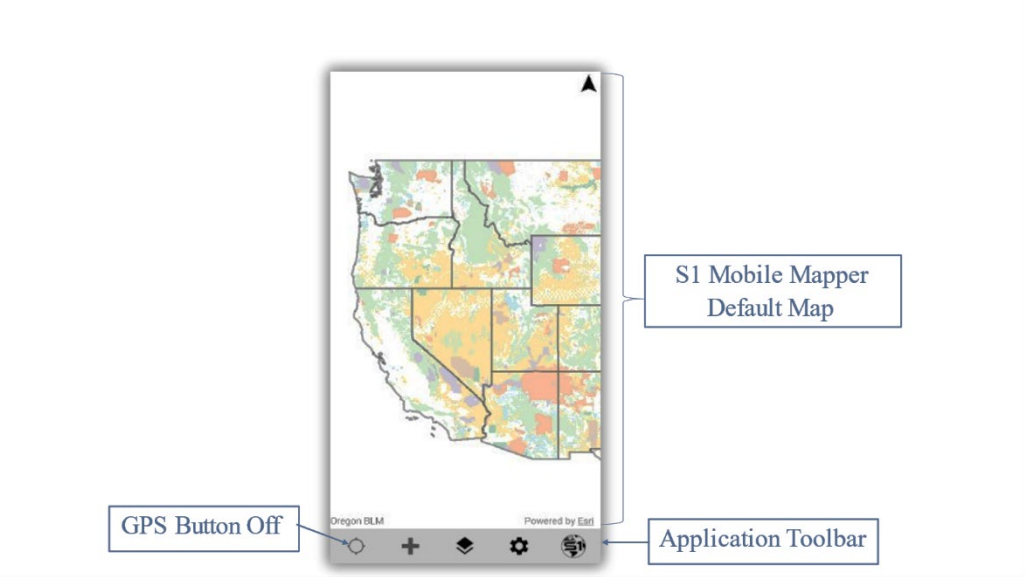
The intent of this exercise is to download different basemaps and demonstrate how to manage multiple basemaps and use the associated basemap tools from the Manage Map Layers page.

Expectations

Upon completing this exercise, the student will be able to manage multiple basemaps in the S1 Mobile Mapper Application and work with the tools associated with managing basemaps.

Default Basemap

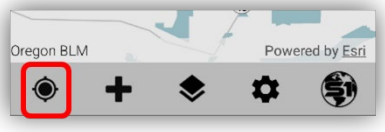
S1 Mobile Mapper has a **Default basemap** that is viewable when you login to the application. The Default basemap helps reference your location when starting out. You can use it for your basemap reference layer when collecting data in the field or overlay the Default basemap with another basemap. The Default basemap can be turned off but cannot be deleted.



Map View of the Default Basemap in S1 Mobile Mapper

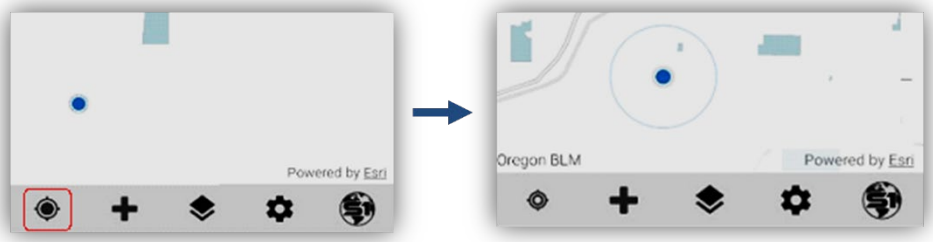
a. When you login to the S1 Mobile Mapper app, the first thing you will see is the S1 Mobile Mapper app's Default Basemap displayed in the Map View. By default, the GPS button will be in Off Mode.

b. Tap the GPS button to turn on your GPS location, if not on already (filled in circle), it's on the Application toolbar. The GPS On mode will zoom the map in to your exact GPS location.



The On/Off GPS Tool Buttons

c. You GPS location will be indicated by a blue dot on the map. Then use the touch screen to zoom-out to display a larger area around your GPS location where you will be doing your data collection (map extent) during the training.



Use the Touch screen to Slightly Zoom out from GPS Location

Download Agency Basemaps

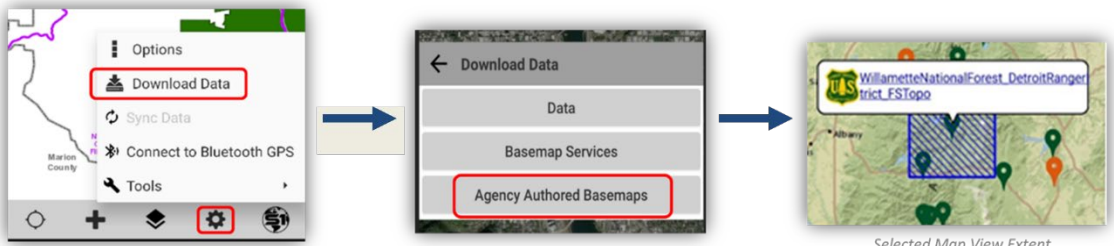
Before we go out in the field, we need to use our internet service to download basemaps and our data. We will start with downloading an **Agency Authored Basemap** tile package and then we will download a couple other basemaps, that may be useful in the field, to get familiar with how basemaps work within the S1 Mobile Mapper app and how to manage them.

a. In the S1 Mobile Mapper app, go to the **Application toolbar** at the bottom of the Map View and click the **Tools/Options button**.

The Tools/Options Button on the Application Toolbar

b. Select the **Download Data** option. Then, select the **Agency Authored Basemaps** option.

c. Look around the map and click on a map pin closest to your GPS point location (try different ones). Find one that has a map extent (blue lines cover extent) that covers your GPS location, either created by the BLM (red pins) or the US Forest Service (green pins).



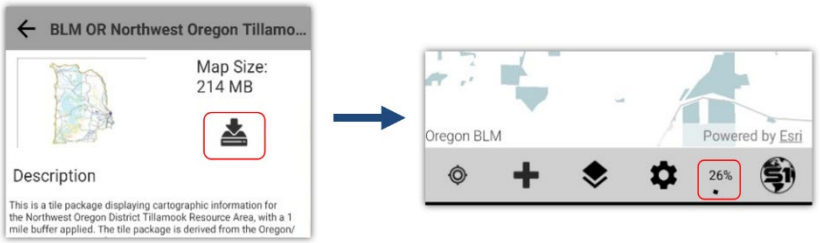
Tools/Options Menu *Download Data Menu* *Selected Map View Extent*

Steps in S1 Mobile Mapper to Download Agency Authored Basemaps

d. Once you have decided which Agency Authored Basemap you want to download, click on the blue Title link in the pop-up window, then a new window will open listing a Description (data type: tile package (.tpk), projection used, etc.), Access and Use Constraints, Map Size, and more, for this basemap.

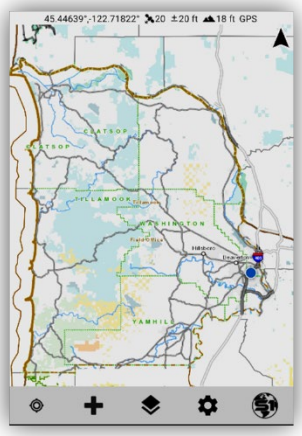
e. Click the **download button** to download and add this basemap to your Map.

f. You will see a **percent spinner** on the Application toolbar indicating the download percentage. If you want **to cancel the download**, just tap on the spinner to activate the cancel download process.



Download Button for the Agency Authored Basemap

g. The newly downloaded Agency Authored Basemap will have a dark yellow boundary line around the area it covers, but it might be blending in with the S1 Default basemap. If a Forest Service pin/Green was chosen, it should be a bit more visible as the symbology is slightly different than the underlying S1 Default basemap. Zoom-in or out to see the basemap boundary line.



Map View of the Downloaded BLM Agency Authored Basemap

Turn Off S1 Default Basemap

To get a better look at the newly added Agency Authored Basemap, we will turn off the S1 Default basemap under it.

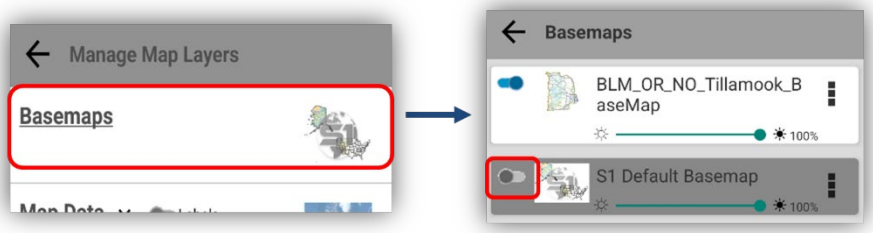
a. Go to the Application toolbar below the map view and click on the **Manage Map Layers** button in the middle.

Manage Map Layers Button on the Application Toolbar

b. The Manage Map Layers page opens. Tap on Basemaps (or the map image icon).

c. The Basemaps page opens to the list of **User downloaded basemap** and the **S1 Default Basemap**.

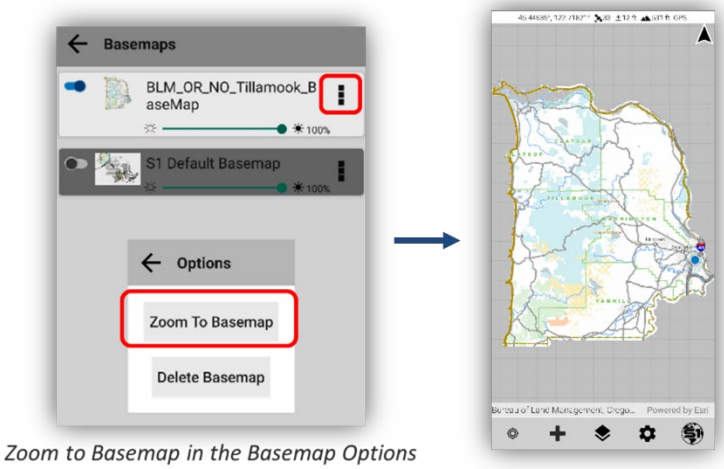
d. Tap the toggle switch on the left-hand side of the **S1 Default Basemap** to turn this basemap layer visibly off in the Map. The basemap title box will turn dark grey when toggled off.



Toggle off the S1 Default Basemap

e. Next, click on the vertical dots next to the new agency basemap you downloaded, this opens the basemap Option. In this example, the downloaded agency basemap is the "BLM OR NO Tillamook Basemap". You have the option to delete this basemap or zoom to the basemap location.

f. In the **Options** pop-up window, select the **Zoom To Basemap.** This will take you back out to the map view and zoomed into the boundary of the basemap. Remember, we toggled off the default basemap that is why we see a grey background.



Zoom to Basemap in the Basemap Options

g. Without the S1 Default basemap visibly on, the background to the Agency Authored Basemap is grey. We will come back to the Manage Map Layers page further in the exercise.

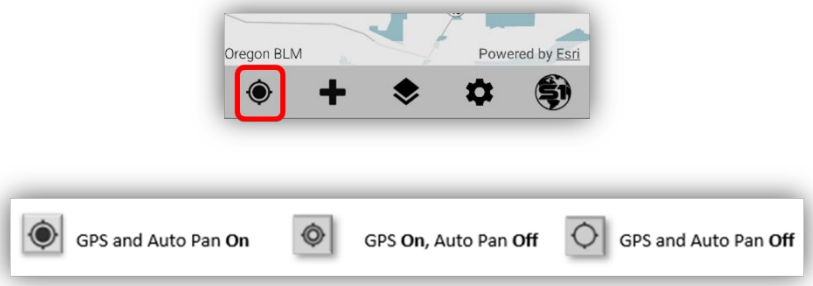
h. Explore the Agency Authored Basemap by zooming in. You will see these basemaps are made up of many detailed layers displaying at different viewing scales (packaged as tiles in a .tpk file). Agency Authored Basemap can be very useful, informative, premade basemaps for use. Agency Authored Basemap cannot be edited (tile package, .tpk) in S1 Mobile Mapper.

Download Basemap Services – BLM or Esri Basemaps

The next option to download is a **Tiled Basemap Service**. These are ESRI and agency created tiled map services that allow the user to choose an extent and a level of detail (LOD) to determine how fine of a resolution you want to see in the basemap. A Higher level of detail means that as you zoom in farther the resolution gets refined up to the level chosen and then begins to lose resolutions if the map view is zoomed in past the level of detail chosen.

The higher the resolution the larger the download file size will be. Make sure to check out the estimated download size before hitting download. The user can adjust transparency to allow overlaying other basemaps as well.

a. With the Agency Authored Basemap still visible, tap the **GPS On button** from the **Application toolbar** to zoom-in to your exact GPS location automatically.



The On/Off GPS Tool Buttons

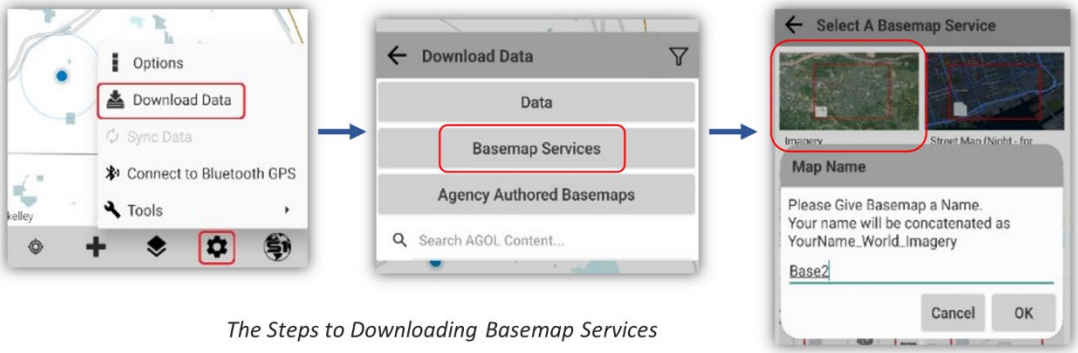
b. Then use the touch screen to zoom-out a little more to display a larger area (smaller scale) in the map view, at least a mile radius around your GPS location.

c. We will now add an **ESRI Imagery basemap.**

d. Go to the **Application toolbar** at the bottom of the map view and **click** the **Tools/Options** button.

e. Select the **Download Data** option and then select the **Basemap Services** option.

f. Click on the **Imagery basemap service** and give the basemap a name; **type Base2**.

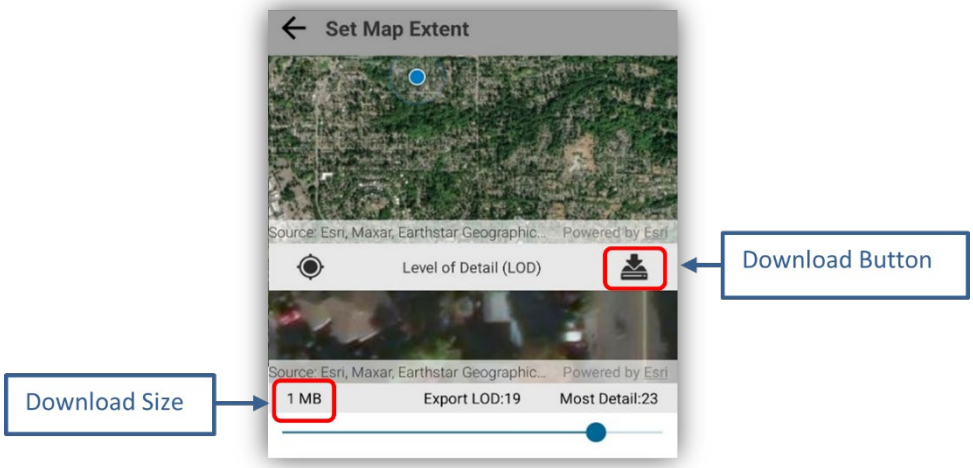


The Steps to Downloading Basemap Services

g. Then click the OK button.

Set the download Map Extent

a. The top part of the screen is the actual map extent (area) that will be downloaded, the bottom screen is to set the Level of Detail (LOD) of the image that will be downloaded.



Setting the Map Extent for Download

b. **Set the extent** you want the imagery to cover (top screen), the area you will be working in when we collect data in our next exercise.

c. Use the slider bar to set the **Level of Detail (LOD)** which is a zoom-in level of detail (bottom screen) and choose a level for the LOD.

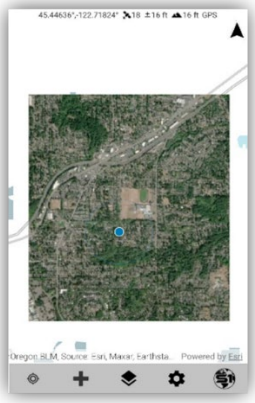
d. Check the size of the download to make sure the file size is not too large. Larger files will take longer to download. A fast download size is around 10MB or less (if your file size is too large, set the extent a little smaller until you get down around 10MB or less).

e. When ready, click the download button.

f. You will see a spinner button rotating on the Application toolbar as the basemap downloads. **If you need to Cancel the download**, then click on the spinner button and it will cancel the download.

Download Spinner Button on the Application Toolbar

g. Zoom-out from the imagery basemap on the touch screen to test its behavior. There may be a scale limitation and cause the basemap to turn off if zoomed out too far (this may change in future development).



Map View of the Imagery Extent

h. After testing the imagery's zoom level limits, zoom-in on the imagery until it fills up the whole map view. You will be working within a small area (most likely within a mile radius) collecting data at your GPS location for the next exercise of Creating New Features in the S1 Mobile Mapper App.

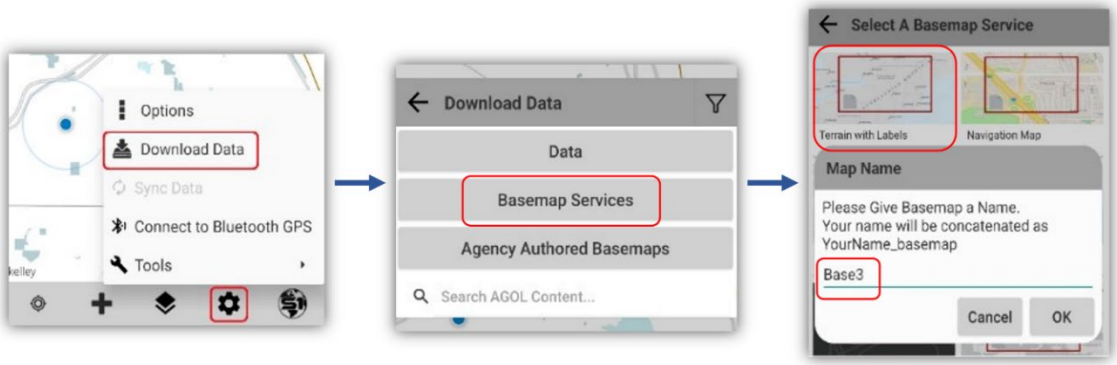
Add Another Basemap Service to the Map View

a. Go to the Application toolbar at the bottom of the map view and then click on the **Tools/Options button**.

b. Select the **Download Data** option and then tap on the **Basemap Services** option.

c. Tap on the basemap named **Terrain with Labels** and name your basemap download; type **Base3**.

d. Click the OK button.



The Steps for Downloading Basemap Services in S1 Mobile Mapper

NOTE: *The **Terrain with Labels** basemap is a **VTPK file**. A Vector Tile Package (.vtpk) is a collection of vector tiles and style resources that are stored on a server. Vector tiles contain vector representations of data across a range of scales. Unlike raster tiles, they can adapt to the resolution of the display device and even be customized for multiple uses.*

e. You may see the white street lines from the **Terrain with Labels basemap** layer overlaying the Imagery basemap layer or you might see just the imagery because it is overlaying the **Terrain with Labels** basemap layer, either way we will manage the basemaps in the order we want them in this next section, Manage Basemap Layers. All depends on the order we downloaded the basemaps.

Terrain with Labels basemap layer overlaying the Imagery basemap layer

Manage Basemap Layers

We can manage basemap layers through the **Manage Map Layers** window and we will have access to useful basemap related tools.

a. Go to the **Application toolbar** below the map view and click on the **Manage Map Layers** button in the middle.

Manage Map Layers Button on the Application Toolbar

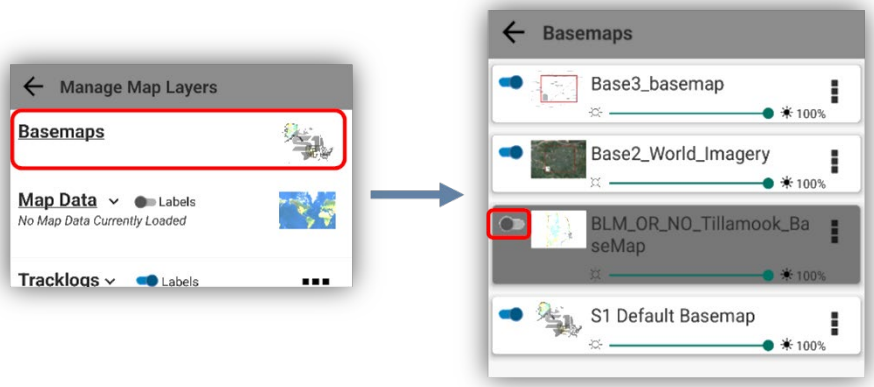
b. The Manage Map Layers page opens. Tap on Basemaps (or the map image icon).

c. The **Basemaps page** opens to the list of three User downloaded basemaps from following this tutorial and the S1 Default basemap: (not necessarily in this order)

1. Base3_basemap of a street layer with labels.
2. Base2_World_Imagery.
3. An Agency Authored Basemap.
4. Plus, the **S1 Default Basemap** that can be turned off but **cannot be delete**.

d. **Toggle off** the **Agency Basemap** (BLM or USFS), we will not need that basemap for this part of the exercise. The Toggle Off mode will change the layer box to dark grey.

e. **Toggle On** the **S1 Default Basemap**.

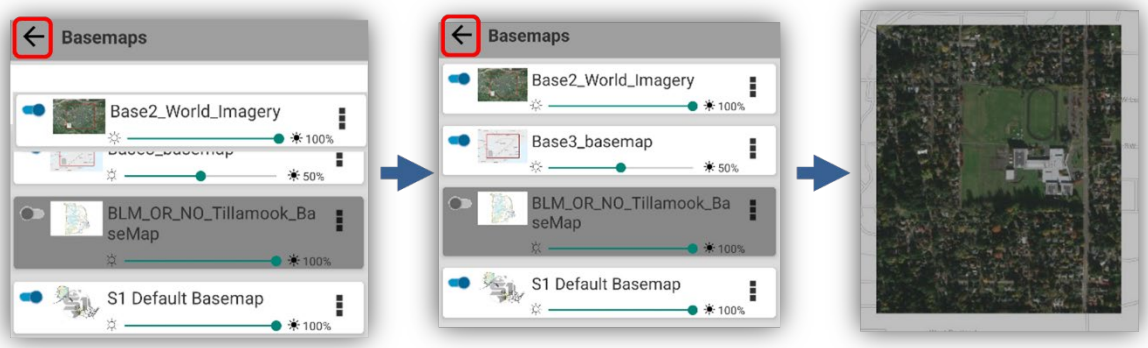


Toggle On/Off Switch for Basemap Layers

Next, we will practice how to rearrange our basemap order.

a. Press and hold the **Base2_World_Imagery**, then slide it to the top of the list. We'll check what that changed next.

b. Click the back arrow next to the Basemap page title at the top and click the back arrow again next to the title Manage Map Layers. We should now be on the map view page.

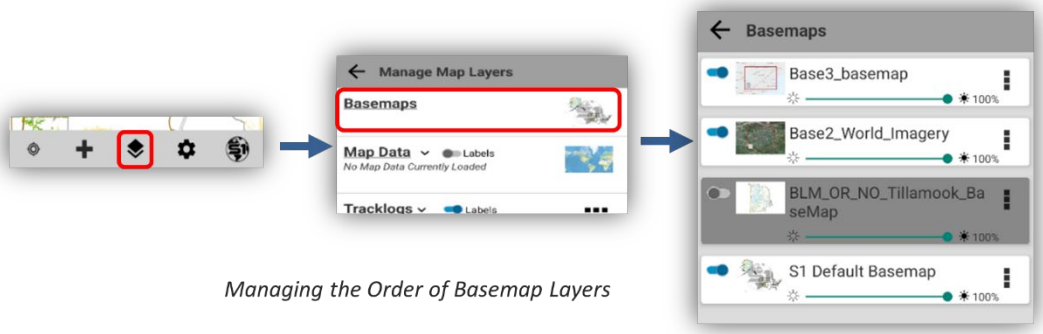


Managing the Order of Basemap Layers

The street layer now looks as if it is off, but really it is not showing because it is drawing under the opaque imagery layer. The layers are drawn in the order we set them in the basemap manage window. We will go back and fix this basemap drawing order (if it needed).

c. Click on the **Manage Map Layers button** on the Application toolbar.

d. Select the Basemaps option.



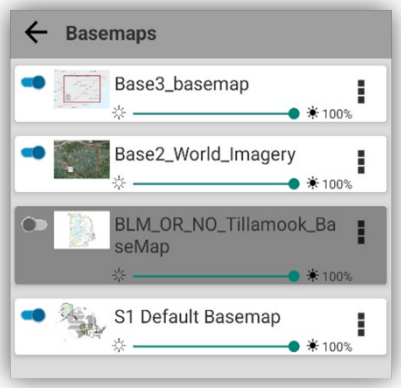
Managing the Order of Basemap Layers

e. Click on Basemaps and Press and hold on the basemap layer you want to move up or down on the list. Move the Base3_basemap back to the top of the list.

f. Rearrange the Basemap layers so that they are listed in the order below:

1. Base3_basemap (streets) listed on top.
2. Base2_World_Imagery below the Base3 and above the Default basemap.
3. S1 Default Basemap on the bottom of the list.

Like the image below, this will be the order the basemaps will draw in the map view too.



Manage Basemap Layers Window

g. Go back to the Map view window and confirm the **Terrain with Labels basemap** (Base3-streets) Layer is drawing on top of the Imagery layer.

Basemap tools

We will change the transparency of one of our basemap layers so we can see the image under it.

a. Click the Manage Map Layers button on the Application toolbar and then click Basemaps.

b. On the Basemap window tap or slide the **Transparency slider bar** to 50% for the Base3_Basemap. We are changing the transparency of the street lines, so they are not so opaque and covering up some of the imagery below it. This will give the street layer a 50% transparency level.

Now let's delete a basemap we will not need.

c. On the deactivated Agency Basemap, select the **Basemap Options**; the **ellipsis (vertical three dots)** on the right-hand side of the layer box.

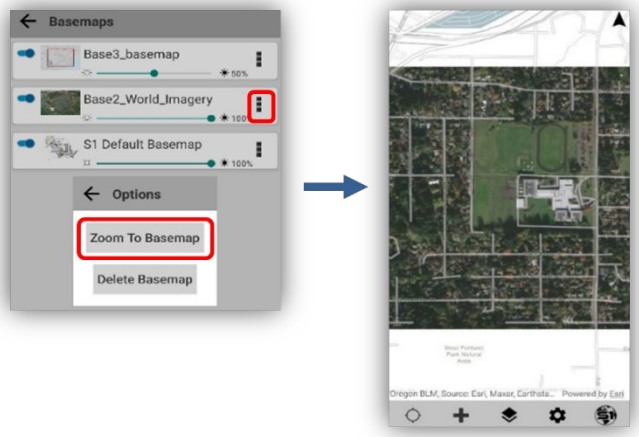
d. Tap on the **Delete Basemap option** to remove this basemap download from the list and from the device. Then, click OK.

Basemap Options List

Now we will use the **Zoom to Basemap** option.

a. Select the Basemap Options; the ellipsis (three dots) on the right-hand side of the Base2 Imagery basemap (Base2_World_Imagery).

b. Tap on the **Zoom to Basemap** option.



Zoom to Basemap Option

The **Zoom to Basemap** button will zoom you to the extent of the basemap layer, in this case it was the Base2 Imagery basemap (**Base2_World_Imagery**) extent.

c. You should now see the full extent of your imagery basemap with the street layer drawing on top at a 50% transparency.

Optional Practice

Try the transparency tool for the imagery basemap layer overlaying the Esri Hillshade basemap or a Topographic basemap with a transparency setting overlaying a Hillshade basemap.

Exercise 3: Download S1 Training Web Map - Data and Basemaps

Goals

To download the S1 Training Web Map data and work with the data managing tools.

Expectations

Students will download the S1 Training Web Map data to the S1 Mobile Mapper Application and learn how to manage the data and work with the map data tools on the Manage Map Layers page. We will be using this map data to collect features in the field offline in Exercise 4.

Download Training Web Map

a. Login into S1 Mobile Mapper (if not already logged in).

b. Click the **Tools/Options** button on the Application toolbar.

c. Select the **Download Data** option from the list.

NOTE: *On the* ***Download Data*** *window there is a* ***Search box*** *to use if you know the name of the web map you are looking for. The web map is called* **BLM S1 Mobile Training**.

d. On the **Download Data** window, tap on the **Data** button.

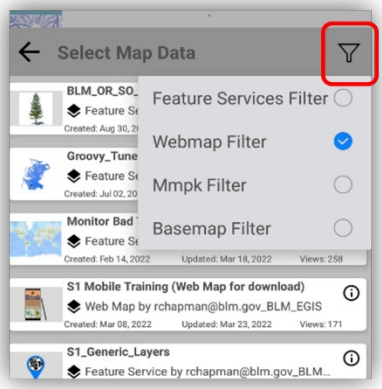
The next page is the **ArcGIS Online (AGOL) Groups** list, this is where all the groups you are a **member of in AGOL** will be listed.

The steps to downloading Web Map Data

e. On the **ArcGIS Online Groups** window, select the group called **BLM OR SO S1 Mobile Mapper Training**.

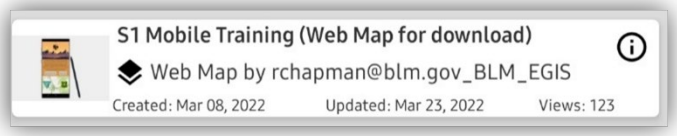
f. Click on the **Filter tool** in the upper right-hand corner.

g. Leave the Web Map Filter "ON" and uncheck all other filters (will reset to all filters "ON" when you download data again).



Filter Tool set to Filter for Web Maps

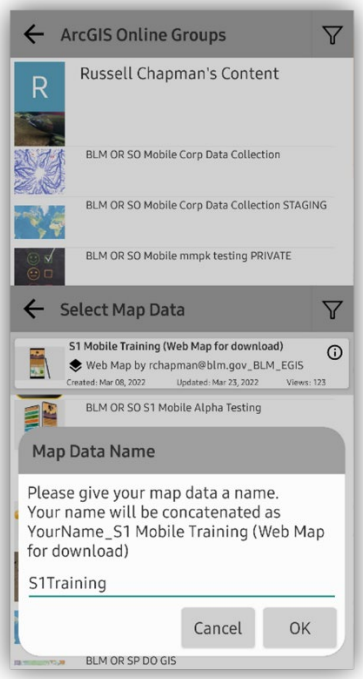
h. Tap on the **Select Map Data** window title at the top to reset the list. You now should only see the web maps listed in this group.



Web Map for download

i. On the Select Map Data window, tap on the web map titled **S1 Mobile Training (Web Map for Download).**

j. Name this copy of the Web Map, S1Training, and click OK.



Adding a Map Data Name

Setup the data collection extent; the area you will be collecting features using the S1 Mobile Mapper app on your device.

a. Activate **GPS On** button to zoom into your location if needed (choose an extent that covers anywhere you might collect data today).

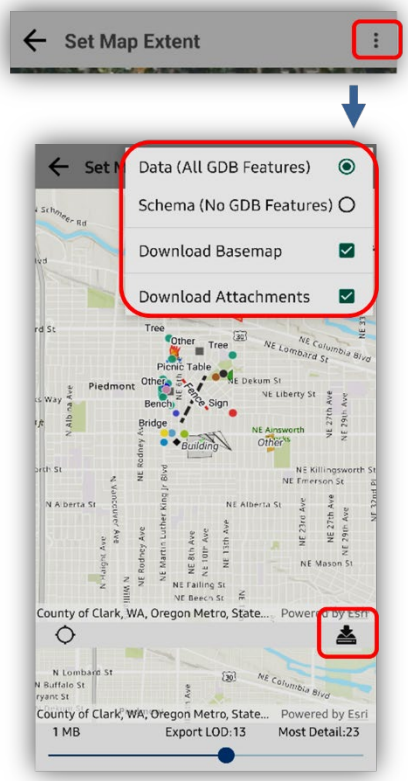
b. Once you have set your collection area extent in the map view, click on the **ellipsis** in the upper right-hand corner to check your **download options**.

c. Click to turn on **Data** and the **Download Basemap** options only, then tap on the screen to close that window (for this exercise Do Not download attachments or you will download all attachments from the classes before you, which could take a long time to download).

NOTE: *Download Option changes will stay the same until you change them again manually. If you are not seeing a basemap downloading with a web map when there should be, this would be the first place to check for options.*

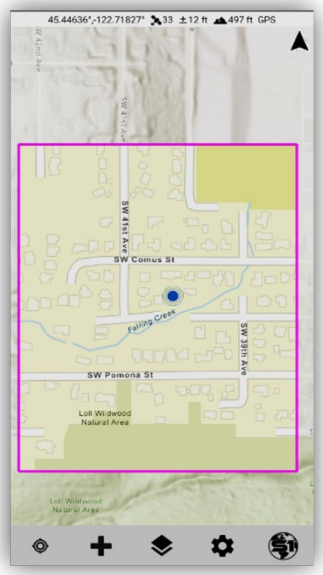
d. Confirm your GPS button is set to ON and you can see your blue dot showing your location. Set your **area extent** in the upper window and set the **Level of Detail (LOD)** in the lower window, and make sure your download size is not too large (best under 10mb).

e. When all is set, click on the download button.



Download Web Map Options

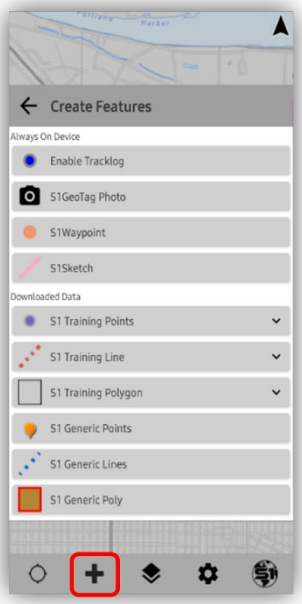
f. Once the web map successfully downloads, you should be back at the main map view showing the newly downloaded extent indicated by a **magenta edit extent box**.



Showing the Map Extent of the Downloaded Web Map Data

g. You should see your GPS blue dot and a topo basemap in your map.

h. Select the **Add Data** button to see the **Create Features** list. Under the Downloaded Data section, you should see the S1 Training points, S1 Training lines, and the S1 Training Polygons. There are S1 Generic points, lines and polygon feature classes added too.



Add Data Button on the Create Features List

At this point, we are now ready to head to the field offline to collect some data and get familiar with the S1 Mobile Mapper data collection workflows.

Basemap Data Types

GeoTIFF *is an image format which contains embedded georeferencing information. The benefit of GeoTiff files is they are very easy and quick to create directly from ArcMap desktop. The downside to GeoTIFF files is that the output is at only one resolution; unlike tile packages that produce scale dependent tiles depending on zoom level. This leads to GeoTIFF files not working well for large areas of detailed information since they do not refine as you zoom in. But for areas that are a couple sq miles or smaller they work very well. GeoTIFF files can be shared to AGOL and downloaded to mobile devices or side-loaded via USB cable and used in S1 Mobile Mapper as a basemap.*

A ***Vector Tile Package (.vtpk)*** *is a collection of vector tiles and style resources that are stored on a server. Vector tiles contain vector representations of data across a range of scales. Unlike raster tiles, they can adapt to the resolution of the display device and even be customized for multiple uses.*

A ***Mobile Map Package (.mmpk)*** *is a standalone file that contains one or more map definitions; basemap layers, data layers, layer content, layer styles, and pop-up definitions. It is created in ArcGIS Pro (only) and the data contained in the MMPK cannot be edited.*

Exercise 4: Create New Features in the S1 Mobile Mapper Application

Goal

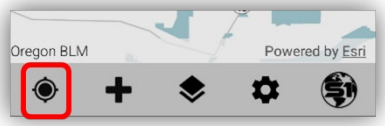
The intent of this exercise is to collect data features with the S1 Mobile Mapper Application. This exercise will provide hands-on experience with the overall application interface, setting options and S1 Mobile Mapper collection tools.

Expectations

Upon completing this exercise, the student will be able to collect points, lines, and polygon features using the create data tool, digitizing, nested feature, off-set feature, GPS Averaging, streaming, build a buffer, and then add attachments and attribute values for the features.

Activate GPS

a. Tap the GPS Icon on the S1 Mobile Mapper Application toolbar to turn on the GPS and activate Auto Pan.



GPS On/Off Button on the Application Toolbar

b. If you pan around on the map, Auto Pan turns off, but GPS remains on. Tapping the GPS icon again will turn Auto Pan back on.

c. Tapping the GPS icon when both GPS and Auto Pan are on will turn GPS and Auto Pan off.

d. Once the **GPS position fix** is obtained, your current location will display on the map from a grey dot to a **blue dot**.

e. When the GPS is turned on, the GPS Status bar appears at the top of the screen, see below:

GPS Status Bar

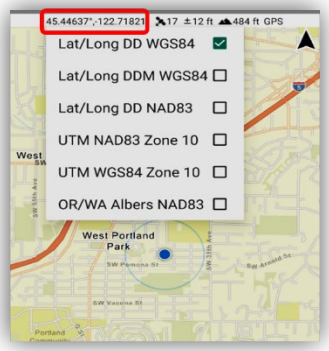
GPS Toggle on Mode

GPS Status Bar Information:

- Current **GPS Location information** (set in Decimal Degrees in this image above).
- = Number of satellites used in **position fix**.
- ± = Estimated accuracy of location (in meters or feet).
- = Estimated elevation of location (in meters or feet).
- **GPS Source/Quality** will be displayed as one of the following:
  - No Fix – No satellite fix.
  - GPS – using mobile device onboard GPS location.
  - DGPS – using Bluetooth GPS receiver location.
  - RTK - using Bluetooth GPS receiver location with *Real-time corrections.*

f. GPS location Coordinates are displayed in World Geodetic System 1984 Decimal Degrees (WGS84 DD) by default. To change the coordinate system displayed, tap the GPS status bar, and select another coordinate system. Alternatively, the coordinate system can also be changed in the **S1 Options**. Also See the Agency User Guide for more information on S1 Mobile Mapper Options.

NOTE: *The coordinate system displayed by the application changes how the XY values are* ***displayed*** *on the* ***GPS Toolbar*** *as well as the XY information displayed in a selected feature information menu.* ***It is only a visual effect in the application****, it does not transform the coordinate system in data storage.*



Coordinate System Menu

g. Estimated Accuracy is displayed to a 68% confidence interval by default. The display value can be changed to a 95% confidence interval in S1 Options. The default accuracy units are displayed in meters, but this can also be changed in S1 Options.

NOTE: *The* Estimated Accuracy *function only affects the display value on the device.* ***All data collected with GPS uses the 95% confidence interval to record data.***

h. For the highest possible location accuracy, set your device's Location setting to GPS only in the mobile device settings. Once GPS is activated, the app will alert if the device is set to any other Android Location setting such as High Accuracy mode.

i. It is possible to connect an external, high accuracy GPS receiver to provide location information to the app instead of using the device's internal GPS. For more information on this topic, see External Bluetooth GPS Receiver Support section of the Agency User Guide.

GPS Tracklog

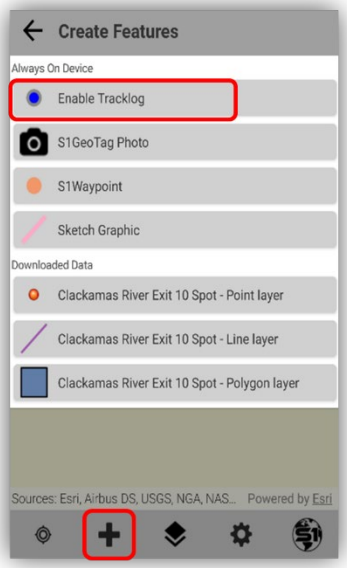
A Tracklog includes a series of points that are logged automatically every **5 meters (only)** traveled. The Tracklog travel is logged continuously in the background for as long as the Tracklog feature is enabled. The same Tracklog can be visually turned on and off as needed, Tracklog labels can be toggled on or off and Tracklogs can be saved and archived to create a new separate Tracklog.

Tracklog positions are stored as JSON files in the coordinate system WGS 1984 Web Mercator Auxiliary Sphere. Tracklog files can be exported and shared as GeoJSON format, a more common format that can be viewed using multiple GIS platforms (as of S1 Mobile Mapper v5.3). **GPS tracklogs are visible at all scales**.

Enabling GPS Tracklog

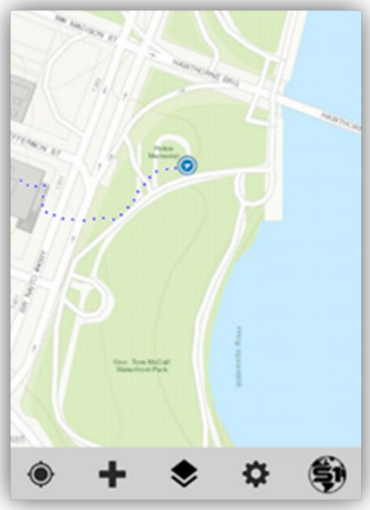
a. To enable GPS Tracklogs, tap the **Create Features** button.

b. Choose **Enable Tracklog** from the list.



Enable Tracklogs on the Create Features Menu

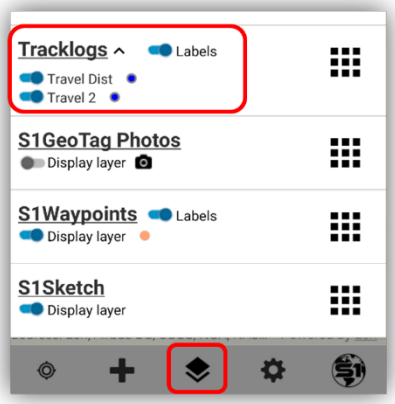
c. The Tracklog will begin logging once the device has a GPS position and will then start displaying on the map as you move. When enabled the tracklog will create a vertex every 5m. This is the default interval, and this setting is not accessible to change. The Tracklog appears as a series of blue dots.



Enabled GPS Tracklog Displays on the Map

d. Visibility of the Tracklog in the map view can be toggled on and off just like S1 Waypoints, S1 GeoTagged photos, and S1 Sketches. Tracklog labels can also be toggled on and off just like Map Data Labels and S1 Waypoints labels.

e. By tapping on the chevron next to the Tracklog name in **Manage Map Layers**, it will list the tracklogs collected and archived. Each with their own toggle on and off switch.



GPS Tracklog Toggle Controls in Manage Map Layers

f. Tap the toggle slider so it is no longer blue to turn off Tracklog visibility in the main map view. If Tracklog is still enabled, it will continue to collect location information even if visibility is toggled off and will show up once Tracklog visibility is turned back on.

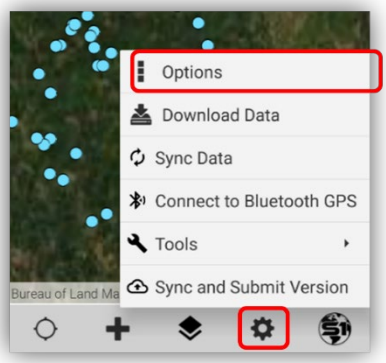
g. To suspend capture of a Tracklog, tap on the **Create Features button** and select **Disable Tracklog**.

More information about Tracklog archiving, sharing, and managing can be found in the **Agency User Guide** posted on the S1 Mobile Mapper website**.**

S1 Application Options

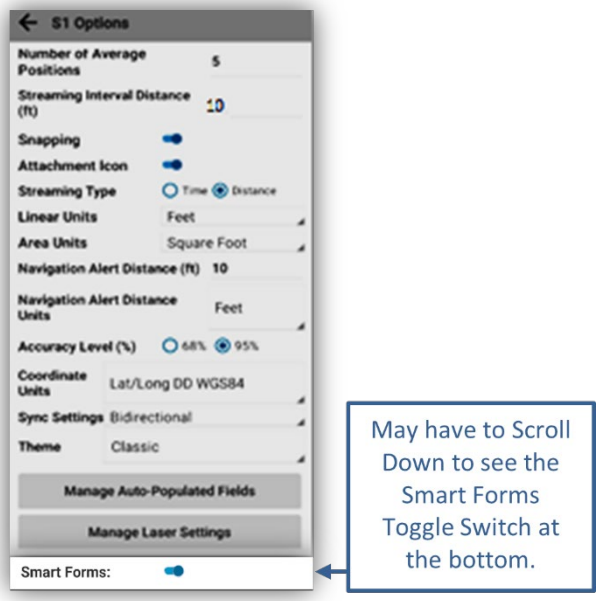
The S1 Options menu allows the user to configure common settings across the application.

a. Tap on **Tools/Options** button on the Application Toolbar and select **Options**.



Tools/Options Button on the Application Toolbar

b. S1 Options setting window below:



S1 Options Setting Window

- **Number of Average Positions**: Sets the default number of GPS positions that are collected to create an averaged point feature or averaged vertex of a line or area feature when using the Average GPS button.

- **Streaming Interval Distance:** The interval at which the application captures GPS vertices while in streaming mode. The value can be set to either the number of seconds or distance traveled depending on the Streaming Type specified.

- **Snapping: Toggle on and off option to snap features. Default snap tolerance is set to 10m. User cannot change this setting.**

- **Attachment Icon:** Toggle on and off visibility of the paperclip icon showing with the features in the map view.

- **Streaming Type:** Specifies the value of the streaming interval as either Time or Distance. **Set** the display units of linear and area measurements throughout the app.

  - **Linear Units:**
    - Distance may be displayed in either kilometers, meters, feet, or miles.
  - **Area Units:**
    - Area may be displayed in acres, square feet, square meters, or hectares.

- **Navigation Alert Distance**: Threshold distance for alerting user that they are approaching a destination target. Units for the alert are set by **Navigation Alert Distance Units** option below.

- **Navigation Alert Distance Units:** The user can set a different unit of measure for navigation alerts than the Linear Units setting (described above).

- **Accuracy Level:** Value displayed for the estimated accuracy on the GPS Position Toolbar. Can display either 68% (default) or 95% confidence interval. While most GPS receivers and data collection software display estimated accuracy statements only to a 50-68% confidence interval,

the National Standard for Spatial Data Accuracy (NSSDA) requirements state reporting of estimated accuracy to a 95% confidence interval. This setting only affects the display value and not the actual estimated accuracy.

- **Coordinate Units**: The coordinate system displayed by the application changes how the XY values are **displayed** on the **GPS Toolbar** as well as the XY information displayed in a **selected feature information menu**. It is only a visual effect in the application.

- **Sync Settings**: Allows the user to select whether to use a **Bidirectional** or **Upload Only** sync option**.** If **Bidirectional** is set; all new features and edits on the mobile device will sync up to the feature service and all new edits or features from other users in the user defined edit extent will download to the mobile device. When set to **Upload Only**, only the changes (new features, feature edits or deletes) on the mobile device will sync up to the service, new data from other users in the feature service will *not* be downloaded to the device.

- **Theme:** The theme option allows the user to choose what application theme they wish to enable. There are three themes available: Classic (default), BLM and Forest Service. See the Application Theme section below for more info.

- **Manage Auto-Populated Fields:** The S1 application can auto-populate a variety of categories of feature-level metadata attributes whenever features with the app are created or edited. These categories and attribute fields are managed via this option. For more information on managing feature-level metadata fields, see section on Managing Auto-Populate Field Categories**.**

- **Manage laser settings:** This is where the user manages the settings for collecting information using the TruPulse laser. See the section in this guide for further information on managing the laser settings and capturing data with the laser.

- **Smart Forms:** There is a toggle switch to turn on or off the Smart Form functionality for features that use Smart Forms as their attribute table setting. Smart Forms support the use of basic Arcade Expression operators and profiles like conditional visibility. Smart Forms are created in AGOL.

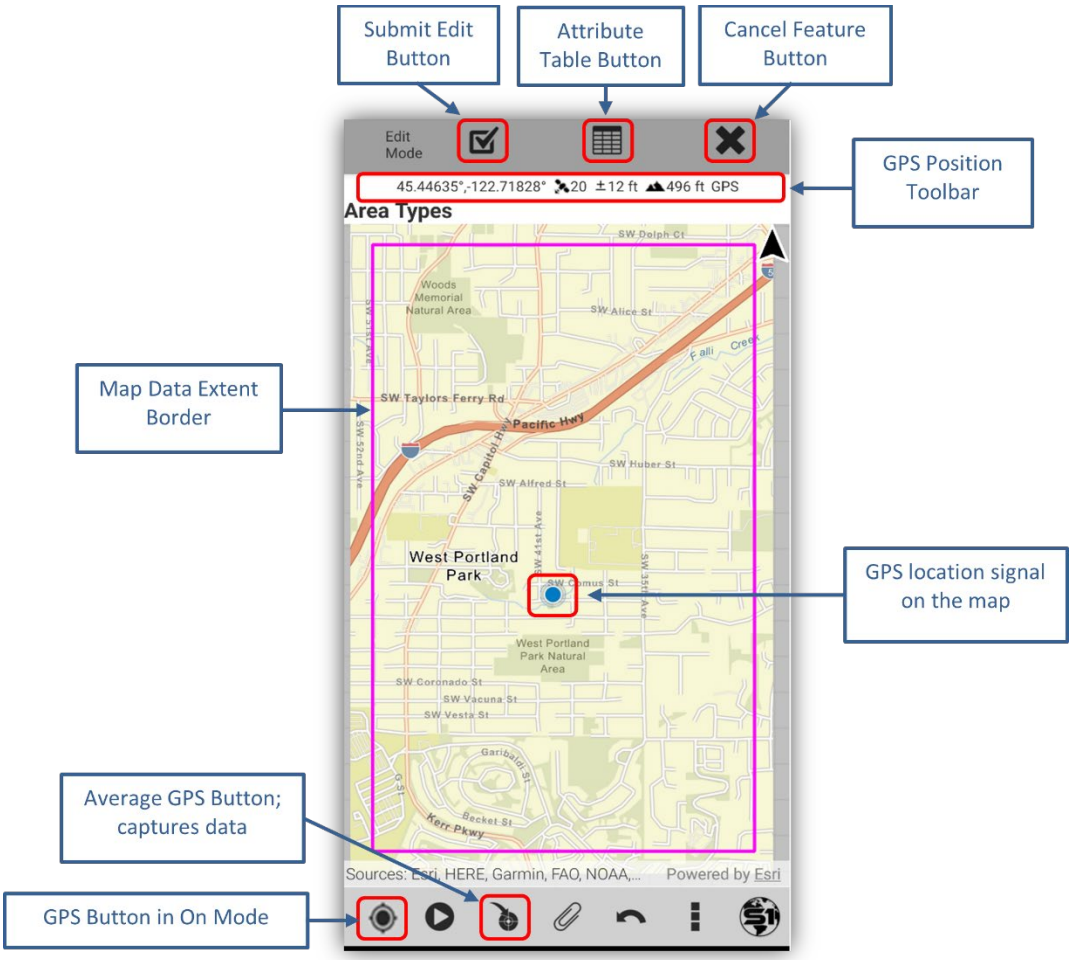
Create Point, Line or Polygon Feature

When collecting a point with GPS, the feature location is captured with GPS Averaging. GPS Averaging consists of taking several GPS position measurements at the same location and averaging the location of all GPS positions collected to minimize positional error associated with the final GPS position.

In locations where GPS accuracy is poor, averaging can improve the spatial quality of the feature being captured. The number of GPS positions collected to achieve the averaged vertex is determined by the number of GPS positions specified in the S1 Application Options menu (listed above).

New Line or Polygon Feature via GPS Averaging

In terms of a line or polygon, you are averaging the location for a single vertex that makes up the final feature. If collecting a line, a minimum of two vertices must be collected, for a polygon a minimum of three vertices must be collected. The number of positions collected to achieve the averaged vertex is determined by the number of positions specified in the S1 Application Options menu.



Create Feature via GPS

a. **Activate GPS** by tapping the GPS button to the **On Mode**.

GPS On/Off Button on the Application Toolbar

b. Wait until a strong GPS position fix is indicated by the **GPS Position toolbar** at the top of the Map view.

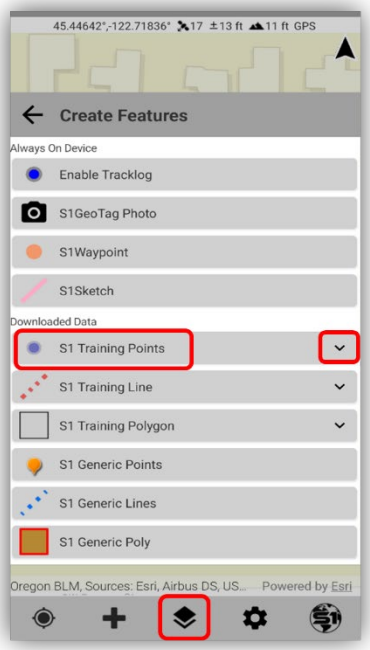
GPS Position Toolbar

c. Tap the **Create Feature button** to list the feature types that are available from the map data.

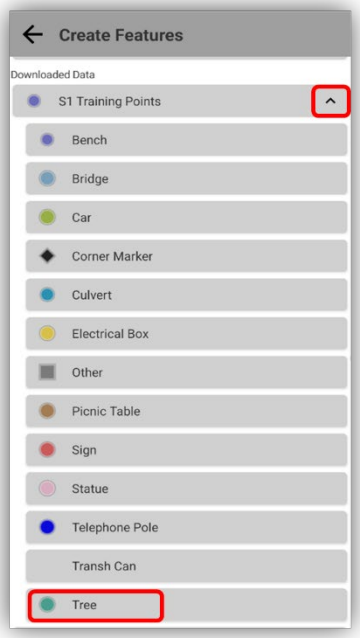
Create Feature Button

d. Choose the feature type to create, listed in the **Downloaded Data** group. The data collection workflow will be dictated by the geometry type of the layer chosen (point, line, or polygon).

e. When a layer has subcategories (subtypes) based on an attribute value, tapping the chevron (⌄) next to the layer's name will display the subcategory list. The layer subtype can be selected as the '**create a new feature**' option.



Create Feature List

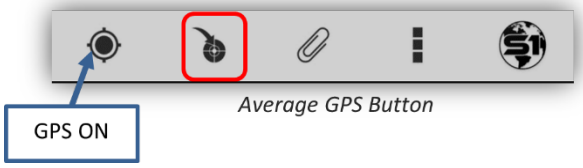


Create Feature List - Point Subtypes List

NOTE: *After selecting a feature type from the* ***Create Feature*** *list, notice that the bottom and top toolbar options change.*

f. Tap on a point feature you want to create.

g. Tap the **Average GPS button** to capture the geometry of the point feature by averaging your GPS position. (If you do not see the Average GPS button, then make sure your GPS is set to ON).



Average GPS Button

h. Averaging status appears at the bottom of the screen in the **Position Capture Status bar**.

Position Capture Status Bar

NOTE: A feature is unable to be saved until all the Averaging GPS Positions have been collected for one point, *though, you can populate the attributes prior to collecting all positions. The number of positions collected is based on the S1 Application Options settings.*

i. You have the option to tap the **Undo Vertex button** to remove the last consecutive vertices added. Works on vertices before they are submitted.

NOTE: *The Undo Vertex button will undo feature geometry only, not attribute values.*

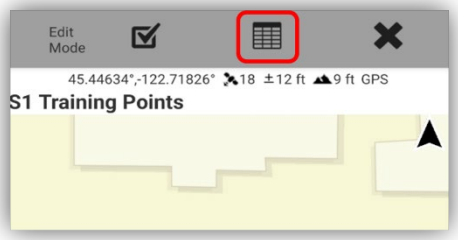
Undo Vertex Button

Add Attachment

a. If you want to add an attachment to the newly created feature, tap the **Add Attachment button** on the bottom toolbar (see Attachments for more information).

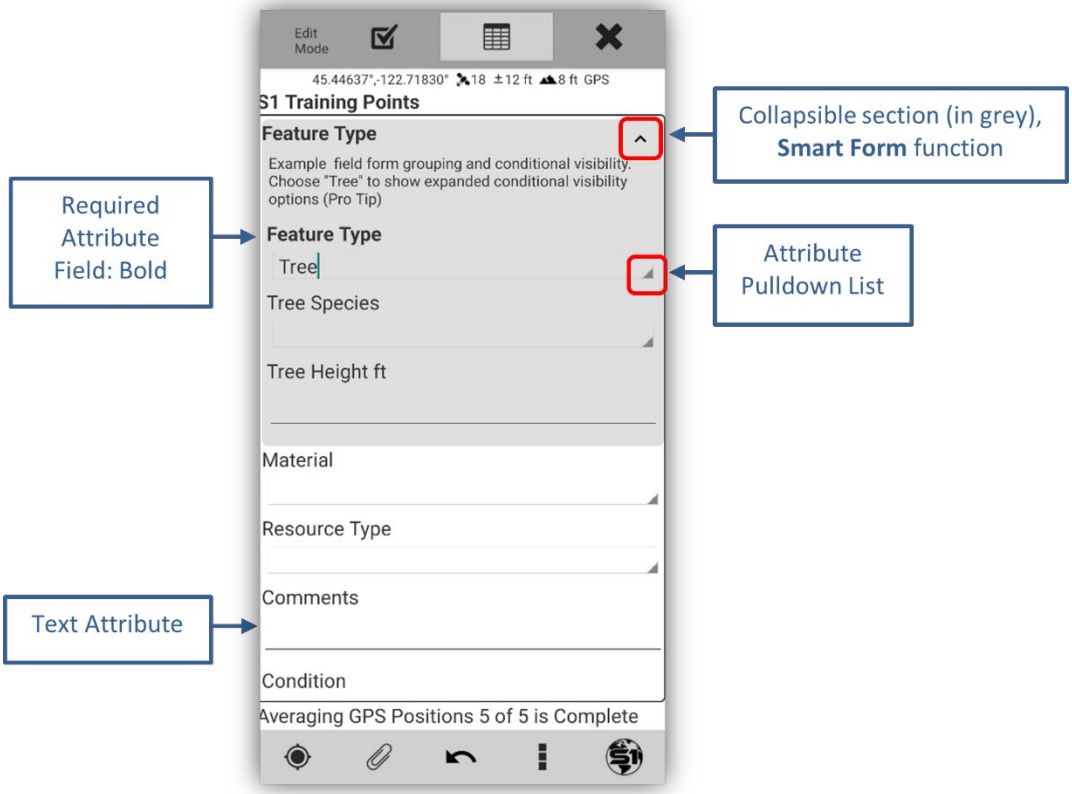
Add Attachment Button

b. Tap the **Attribute View button**, from the **Edit Mode toolbar**, to pull up the feature's associated attribute table for editing. Filling in the attribute values right after creating a new feature is a good workflow to practice (see the Edit Attribute Table in Agency User Guide for more information).



Attribute Table View Button

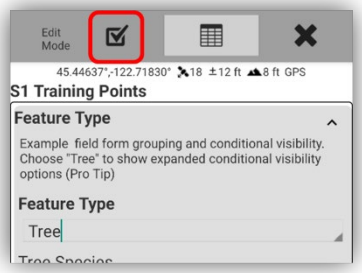
- Attribute field types are set by the **Feature Dataset creator**. There are many attributes value types: short integer, long integer, float, double, text, date, and binary large object (BLOB). Attribute tables also contain predefined fields that hold data on geometry and the object ID.
- Attribute values can be set up as a pulldown list to choose from, a set range of values to add or type in the text or numerical value.
- If an attribute field name is in **Bold**, then it is a required field that will need to be filled out before a feature can be **Synced or Submitted** (see Sync and Submit section).



Attribute Table (Smart Form) View with Required Fields and Pulldown Lists

- **Smart Forms:** In the S1 Options, there is a toggle switch to turn on or off the Smart Form functionality for features that use Smart Forms as their attribute table setting. Smart Forms support the use of basic **Arcade Expression operators** and profiles like conditional visibility. Smart Forms are created in ArcGIS Online (AGOL).

c. When finished with creating a new feature and filling out the feature attributes; tap the **Submit Edit button** on the Edit Mode toolbar to save the geometry and attributes.



Submit Edit Button

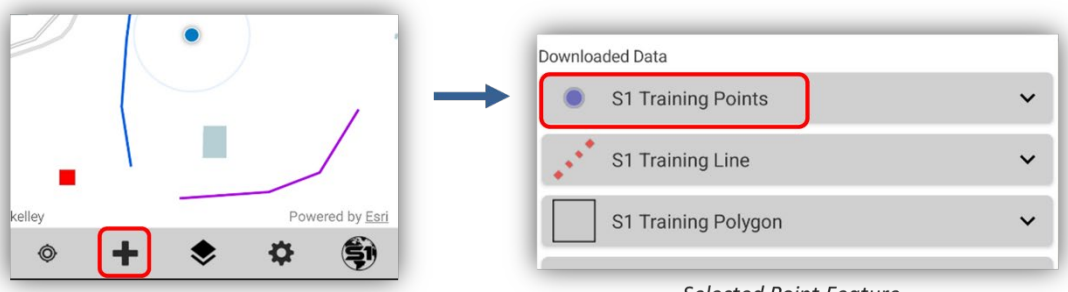
Feature Offset Tool

Feature offsets can be an effective way to capture a point location that you cannot physically reach or if standing near the feature would degrade GPS signal significantly. Offset involves capturing a location either via GPS or via digitizing on screen, then providing the application with a slope distance, direction (azimuth), and inclination from that reference point to the target location.

The measurement values can be obtained using the mobile device's internal sensors (or use a laser rangefinder) or by manual entry by the user. The app will calculate the spatial location of the target feature using the values calculated or provided and will place a point on the map accordingly. **Currently, only point features can utilize the Offset option.**

***Assumptions**: Map Data that contains a point feature is downloaded to the mobile device.*

a. Tap the **Create Features button**, from the Application toolbar, and select a **point feature**.

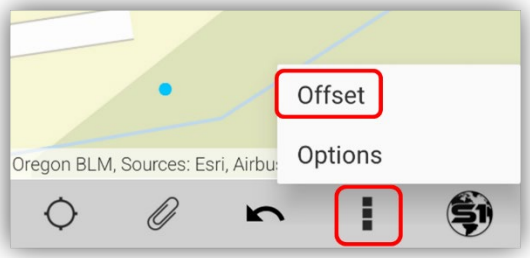


Create Features Button *Selected Point Feature*

b. Create a new point feature on the map view by either GPS Average (GPS on) or by Digitizing (GPS off) a new point.

c. After creating a point feature and **before submitting the feature for saving**, tap the **Edit Options** button on the Edit Toolbar.

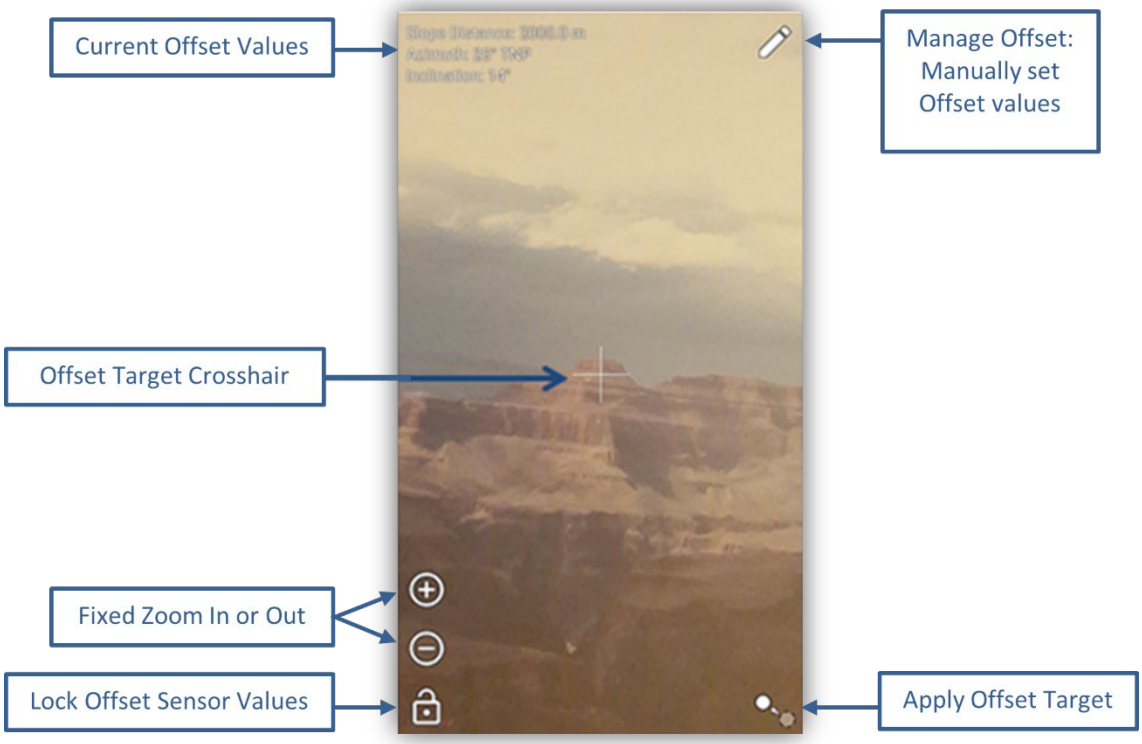
d. Choose the **Offset** option.



Offset Option Tool

e. The **Offset Viewfinder interface** will open with a camera view type interface and a crosshair for lining up with the **Offset target**.

f. Line up the crosshair with the offset feature, fill in the **slope value** (if not using a rangefinder hardware), click on **Lock Offset sensor values**, then click on **Apply Offset Target button**.



Offset Viewfinder Interface

NOTE: *On phones, the* ***Offset Viewfinder interface*** *will fill the entire screen, while on tablets it will appear as a pane to the left of the map.*

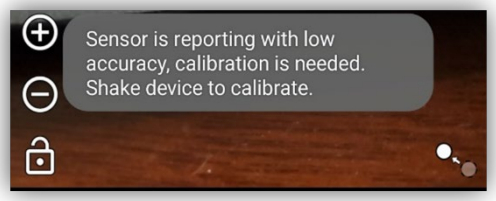
More information about:

- Obtaining Offset Measurements via Hardware Sensors.
- How to Calibrate the Device in the Offset Viewfinder.
- Manually Enter Offset Values.

Can be found in the Agency User Guide posted on the S1 Mobile Mapper website.

Calibrate Device in Offset Viewfinder

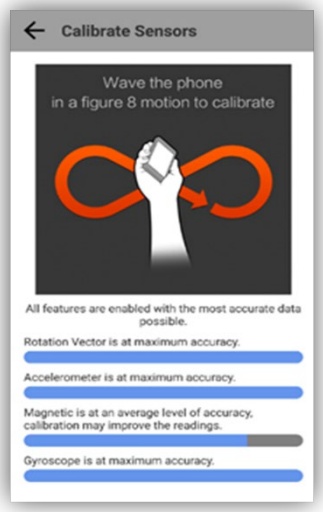
If sensors are providing unreliable measurements or you get a pop-up window message saying, "Sensor is reporting with low accuracy, …", then the device needs to be calibrated.



Sensor Warning to Calibrate Device

a. **Calibrate** the device from the **Offset Viewfinder interface** by shaking the device for several seconds to bring up the **Calibrate Sensors** tool.

b. **To calibrate**, follow the directions as indicated on screen to wave device around until all sensors are fully calibrated and reflecting maximum accuracy.



Calibrate Sensors Tool

To Add a Point via Digitizing

Digitizing is the act of manually drawing the feature on the map rather than using GPS Averaging to collect the location.

a. If GPS is activated, turn off GPS by tapping GPS button on the Application toolbar until off.

GPS Button Off

b. Listed below are the different stages of the GPS button:

GPS On/Off Button on the Application Toolbar

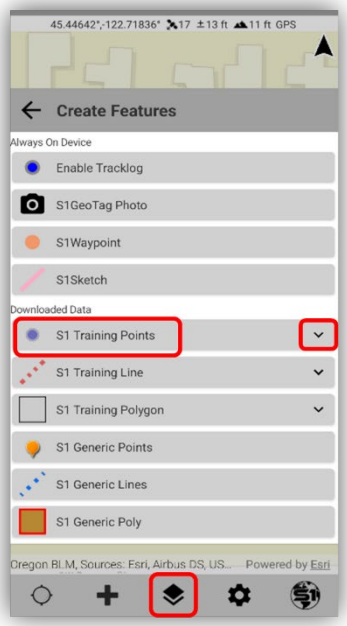
c. Tap the **Create Features button** on the Application toolbar to list the feature types that are available from the map data.

Create Feature Button

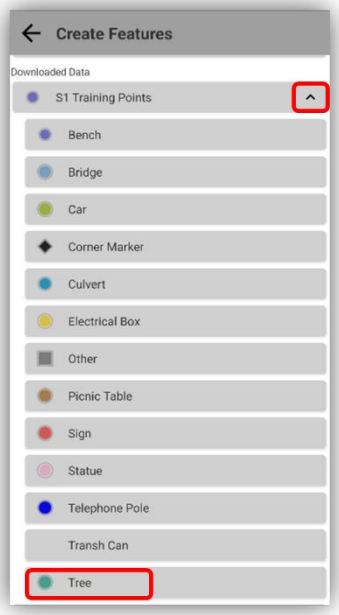
d. Choose the **Point feature** type to create, listed in the **Downloaded Data group**. The data collection workflow will be dictated by the geometry type of the layer chosen (point, line, or polygon).

e. When a layer has subcategories (Subtype) based on an attribute value, tapping the chevron (⌄) next to the layer's name will display the subcategory list. The layer Subtype can be selected as the create a new feature option.

f. Select a Point feature Subtype from the Create Feature list under the Downloaded Data group.



Create Feature List



Create Feature List - Point Subtypes List

g. Tap on the screen at the location where the point geometry is to be created. A Blue Dot will appear on the map for the feature.

New Feature in Edit Mode

NOTE: *After selecting a feature type from the* ***Create Feature*** *list, notice that the bottom and top toolbar options change.*

h. You have the option to tap the **Undo Vertex button** to remove the last consecutive vertices added. Works on vertices before they are submitted.

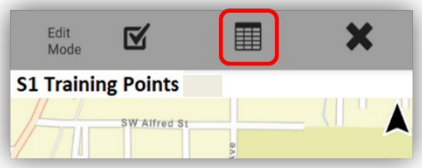
NOTE: *The Undo Vertex button will undo feature geometry only, not attribute values.*

Undo Vertex Button

i. If you want to add an attachment to the newly created feature, tap the **Add Attachment button** on the bottom toolbar (see about Attachments in the Agency User Guide for more info).

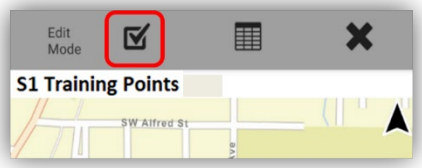
Add Attachment Button

j. Tap the **Attribute View button**, from the **Edit Mode toolbar**, to pull up the feature's associated attribute table for editing. Filling in the attribute values right after creating a new feature is a good workflow to practice (see the Edit Attribute Table section in the Agency User Guide for more information).



Attribute View Button

k. When finished with creating a new feature, filling out the feature attributes and adding attachments, then tap the Submit Edit button on the Edit Mode toolbar to save the geometry, attributes and attachments entered.



Submit Edit Button

Create New Line or Polygon Feature via GPS Averaging

When collecting a single vertex with GPS (one point), the vertex location is captured with GPS Averaging. GPS averaging consists of taking several GPS position measurements at the same location and averaging the location of all GPS positions collected for that vertex to minimize positional error associated with the final GPS position. In locations where GPS accuracy is poor, averaging can improve the spatial quality of the feature captured.

In terms of a line or polygon, you are averaging the location for a single vertex that makes up the final feature. If collecting a line, a minimum of two vertices must be collected, for a polygon a minimum of three vertices must be collected. The number of positions collected to achieve the averaged vertex is determined by the number of positions specified in the S1 Application Options menu.

a. Activate GPS by tapping the **GPS** button to the **On Mode**.

GPS On/Off Button on the Application Toolbar

b. Wait until a strong GPS position fix is indicated by the GPS Position toolbar at the top of the screen.

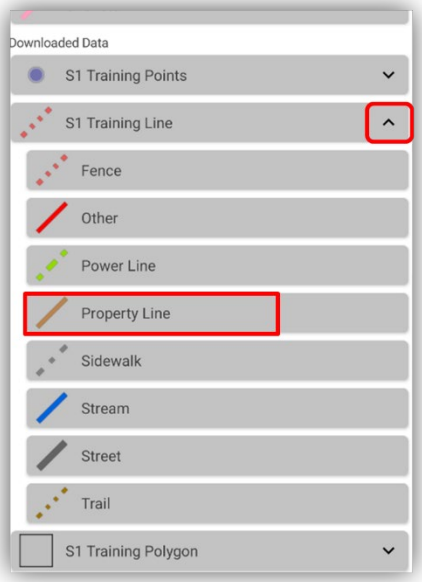
GPS Position Toolbar

c. Tap the **Create Feature button** to list the feature types that are available from the map data.

Create Feature Button

d. Collecting a line or polygon will be the same process, except if you select to create a polygon, then the first and the last vertices will close the area.

e. Choose a Line feature type in the **Downloaded Data group** to create. The data collection workflow will be dictated by the geometry type of the layer chosen (point, line, or polygon).



Map Data Download List

NOTE: *After selecting a feature type from the* ***Create Feature*** *list, notice that the bottom and top toolbar options change.*

f. Stand at the start of the line feature or polygon area that you want to collect. Tap the **Average GPS button** to capture the first vertex.

g. **Averaging status** appears at the bottom of the screen in the **Position Capture Status bar**.

Average GPS Button and the Position Capture Status Bar

h. When averaging is complete for the first vertex, move to the next location where the line vertex will be collected. Tap the **Average Vertex button** to capture another vertex at this location.

i. Repeat moving to the next location and tapping the **Average GPS button** until the feature has been captured.

Second GPS Vertex Captured

NOTE: A feature is unable to be saved until all Averaging GPS Positions for that last vertex has been collected, *though, you can populate the attributes prior to collecting all positions. The number of positions collected is based on S1 Application Options settings.*

j. You have the option to tap the **Undo Vertex button** to remove the last consecutive vertices added. Works on vertices before they are submitted.

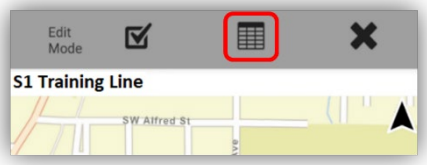
NOTE: *The Undo Vertex button will undo feature geometry only, not attribute values.*

Undo Vertex Button

k. If you want to add an **attachment** to the newly created feature, tap the **Add Attachment button** on the bottom toolbar (see Attachments for more information).

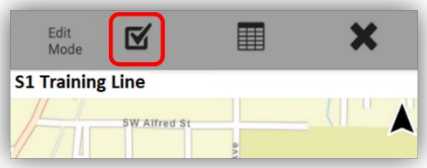
Add Attachment Button

l. Tap the **Attribute View button**, from the **Edit Mode toolbar**, to open the feature's associated attribute table for editing. Filling in the attribute values right after creating a new feature is a good workflow to practice (see the Edit Attribute Table for more information).



Attribute Table View Button

m. When finished with creating a new feature, filling out the feature attributes and adding attachments, then tap the **Submit Edit button** on the **Edit Mode toolbar** to save the geometry, attributes and attachments entered.



Submit Edit Button

GPS Streaming

GPS Streaming is the capture of the geometry of a line or polygon feature by automatically recording GPS positions or vertices based on interval settings (time or distance) specified in S1 Application Options. Once initiated, the application will continue to collect these measurements until GPS streaming is Paused or the feature is Saved.

a. Activate GPS by tapping the GPS button to the On Mode.

GPS On/Off Button on the Application Toolbar

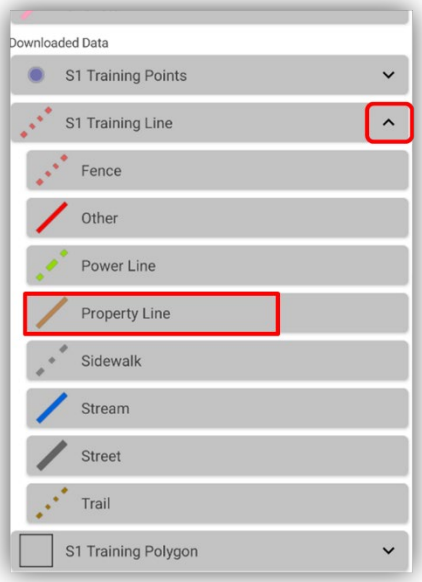
b. Wait until a strong GPS position fix is indicated by the GPS Position toolbar at the top of the screen.

GPS Position Toolbar

c. Tap the Create Feature button to list the feature types that are available from the map data.

Create Feature Button

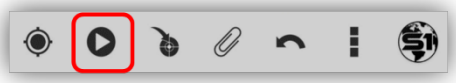
d. Choose a **line or polygon feature type** listed in the **Downloaded Data** group. The data collection workflow will be dictated by the geometry type of the layer chosen (line or polygon).



Map Data Download List

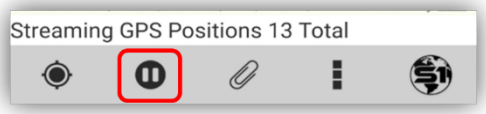
NOTE: *After selecting a feature type from the* ***Create Feature*** *list, notice that the bottom and top toolbar options change.*

e. Stand at the start of the line or polygon feature location. Tap the Begin GPS Streaming button to start recording GPS positions for your feature and start moving.



GPS Streaming Play Button

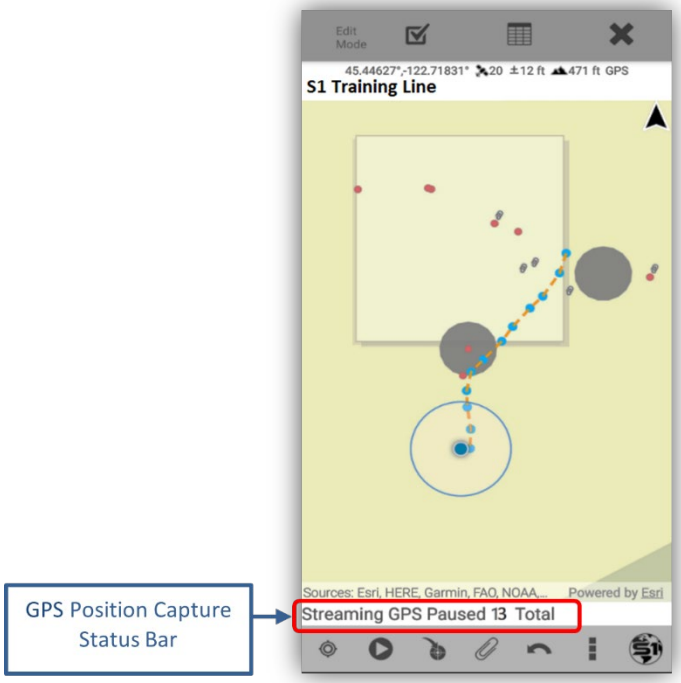
f. To temporarily suspend capturing vertices via streaming, tap the Pause GPS Streaming button.



Pause GPS Streaming Button

g. The total number of GPS positions recorded will be displayed in the **GPS Position Capture Status bar**.

NOTE: *To optimize application performance, do not capture more than 5,000 streaming positions in a continuous streaming session.*



Streaming GPS Line Feature

h. You have the option to tap the Undo Vertex button to remove the last consecutive vertices added. Works on vertices before they are submitted.

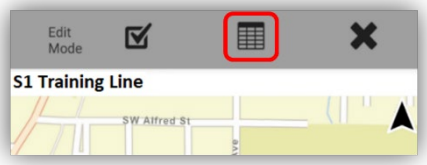
NOTE: *The Undo Vertex button will undo feature geometry only, not attribute values.*

Undo Vertex Button

i. If you want to add an attachment to the newly created feature, tap the **Add Attachment button** on the application toolbar (see Attachments in the Agency User Guide for more information).

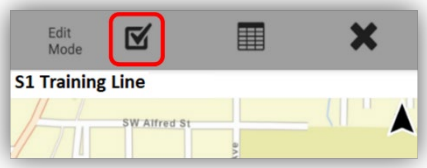
Add Attachment Button

j. Tap the **Attribute View button**, from the **Edit Mode toolbar**, to pull up the feature's associated attribute table for editing. Filling in the attribute values right after creating a new feature is a good workflow to practice (see the Edit Attribute Table in the Agency User Guide for more information).



Attribute Table View Button

k. When finished with creating a new feature, filling out the feature attributes and adding attachments, then tap the Submit Edit button on the Edit Mode toolbar to save the geometry, attributes and attachments entered.



Submit Edit Button

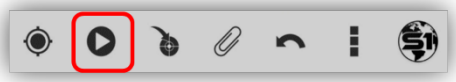
Toggle between Streaming and GPS Averaging

It is possible to toggle data collection methods between GPS Streaming and GPS Averaging when collecting lines or polygons. An example workflow:

a. Tap the **Collect Features** button and select a line or polygon layer.

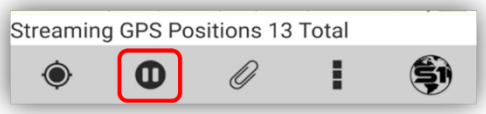
Create Feature Button

b. Start streaming the line or polygon by tapping the **GPS Stream** button.



GPS Streaming Play Button

c. **To switch into GPS Averaging**, tap the Pause GPS Streaming button, move locations to collect the next vertex.

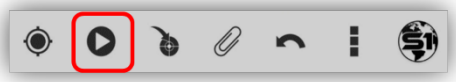


Pause GPS Streaming Button

d. Tap **Average Vertex** button and collect position(s).

Average Vertex Button

e. To return to GPS Streaming, tap the GPS Stream button again.



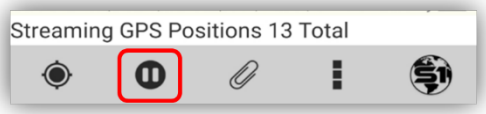
GPS Streaming Play Button

Nesting a Feature while Collecting another Feature

While collecting a line or polygon (area) feature, it may be desirable to nest another feature contained in the map data or an "Always on Device layer" like an S1 Waypoint or an S1 GeoTag Photo. Nesting will pause the data collection of the current feature to allow the capture of another feature type. This way the user does not have to save prematurely. Instead, a user can pause the current feature, capture a different new feature that they have encountered, save that new feature, and then resume the editing of the original feature.

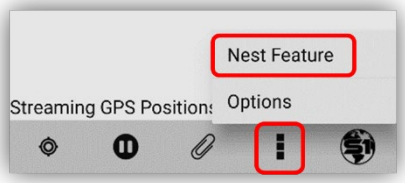
Assumptions: *Map Data that contains a line and/or polygon feature is downloaded to the mobile device.*

a. If using **GPS Stream mode** to capture a line or polygon feature, tap the **Pause GPS Stream** button.



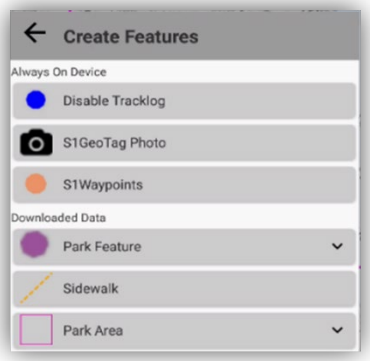
Pause GPS Streaming Button

b. In edit mode (with or without steaming), tap the **Edit Options** button and choose **Nest Feature**.



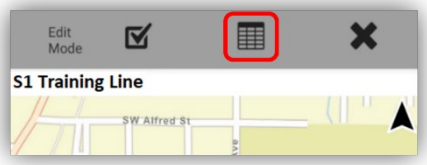
Nest Feature Button from The Edit Options

c. You will be presented with the **Create Features menu**. Select the feature type you would like to **nest**.



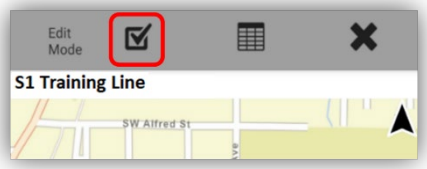
Create Feature List

d. Capture the geometry of the nested feature using GPS or Digitize (turn off GPS to digitize) and populate the **attributes**.



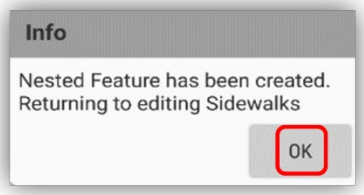
Attribute Table View Button

e. Tap **Submit Edit** button to save the nested feature.



Submit Edit Button

f. A **message box** will appear to notify you that you are **saving the Nested Feature** and returning to editing the previous feature. Tap Ok.



Info Window About Nested Feature Creation

g. Resume capturing the original line or polygon feature by tapping either **GPS Stream** or the **Average Vertex** button.

GPS Stream and the Average Vertex Button

h. Repeat the process as necessary to capture additional "nested" features before saving the geometry and attributes of the original line or polygon feature.

Create New Line/Area Feature via Digitizing

Digitizing is the act of manually drawing the feature on the map view rather than using GPS averaging to collect the location.

a. If GPS is activated, **turn off GPS** by tapping the GPS button.

GPS Off Button

b. Listed below are the different stages of the GPS button:

GPS On/Off Button on the Application Toolbar

c. Tap the **Create Feature button** to list the feature types that are available from the map data.

Create Feature Button

d. Choose the feature type to create, listed in the **Downloaded Data group**. The data collection workflow will be dictated by the geometry type of the layer chosen (point, line, or polygon).

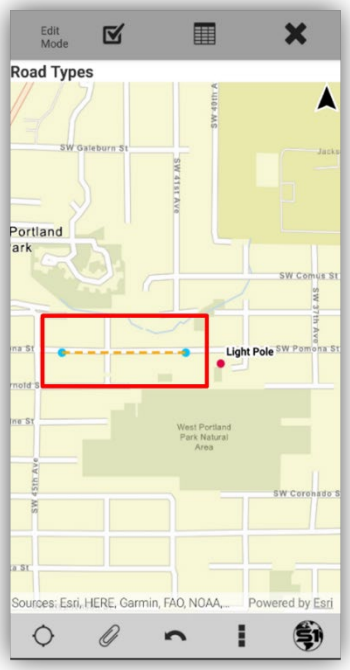
Selected Create Line Feature

NOTE: *After selecting a feature type from the* ***Create Feature*** *list, notice that the bottom and top toolbar options change.*

e. After selecting the feature type, the screen opens to the map view. Tap on the screen at the location where the line or area is to begin, a blue dot will appear.

f. Tap again on the screen to place a second vertex location, a second dot will appear and a line that connects the two vertices.

g. Continue tapping on the screen to create the line or polygon. For polygons, by the third vertex you will see the polygon start to take shape as an area cover.



Creating a Line Feature

Creating a Polygon Feature

NOTE: *Lines need a minimum of two vertices to be saved, while polygons need a minimum of three vertices.*

h. You have the option to tap the **Undo Vertex button** to remove the last consecutive vertices added. Works on vertices before they are submitted.

Undo Vertex Button

i. When finished with creating a new feature, filling out the feature **attributes** and adding **attachments,** then tap the **Submit Edit button** on the Edit Mode toolbar to save the geometry, attributes and attachments entered.

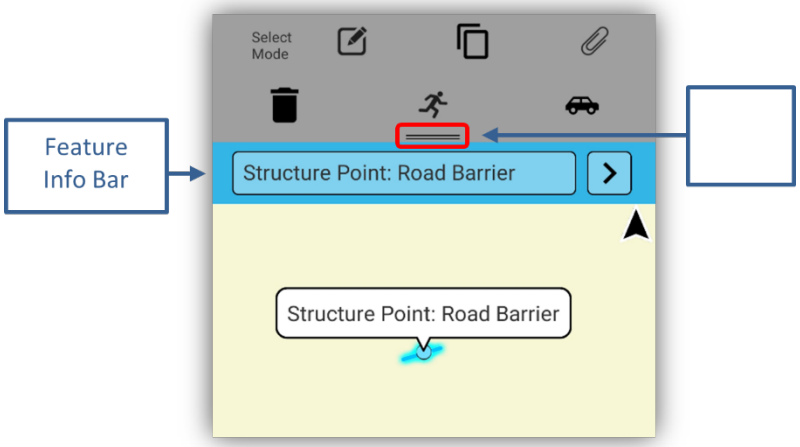
NOTE: *See the Agency User Guide for more information on digitizing and editing features.*

Select Mode Toolbar

The **Select Mode toolbar**, **Feature Info bar** and the **Feature Callout box** in the main map view will appear once a feature in the map view is selected. The toolbar includes a variety of tools, which are contextual, and the toolbar can be expanded and collapsed to reveal more tools. Only tools that are applicable for the selected feature layer will display on the toolbar. If there is more than one row of buttons available, swipe down on the gray toolbar area to expand it.

a. To select a feature in the map, tap on the feature symbol. When selected, it is highlighted in blue in the map.

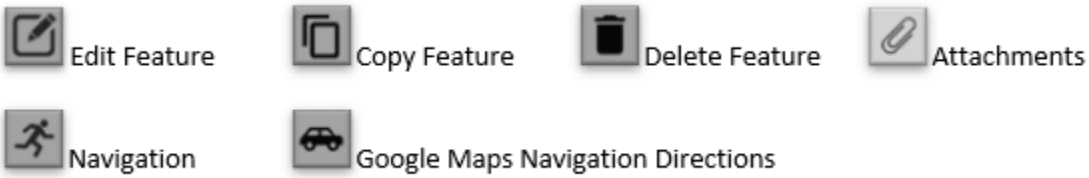
b. Once selected, the **Select Mode toolbar** appears, and a **blue Feature Info bar** will appear listing the name of the selected feature(s).



Selected Feature and Select Mode Toolbar

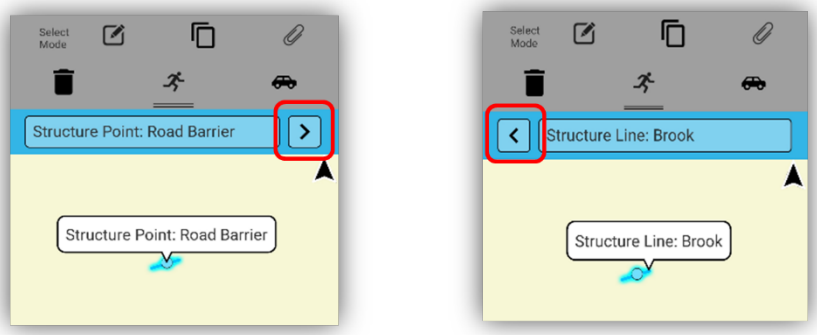
NOTE: *To see all tools on Select Mode Toolbar swipe down as indicated by the double bar.*

c. The following tools are included on the **Select Mode toolbar**, however, the tools that are available (such as Edit Feature) appear depending upon the settings of the given feature layer.



d. **To delete a feature**, select a feature and check that it is the right feature listed in **the blue Feature Info Bar** above the map view. Then tap **Delete Feature** on the **Selection Toolbar**.

e. If multiple features are close in proximity or overlay one another, all will be selected. Tap the **arrow button** on the **blue feature bar** to scroll left or right until the desired feature is displayed.



Select Feature List Arrow

f. If you want to find out the attribute information for a feature, then there are two ways to access the **Feature Info pop-up window**. One is by tapping the feature's name in the **blue Feature Info bar** and the other is to **tap** the **Feature Callout box** in the map view.

NOTE: *The **Feature Callout box** in the map view will also help define which feature is currently selected if the scroll arrows are used on the blue Feature Info bar.*

g. The **Feature Info Pop-up window** provides two possible views. The default view that pops up first, honors the pop-up settings defined in the web map. Most web map pop-up settings should work in the app other than links to connected content in a disconnected environment.

See the *Agency User Guide* for more information on the **Edit Mode Toolbar and editing features**.

Buffer Geometry

The Buffer Geometry tool allows the user to select an existing feature; point, line or polygon, and buffer that feature by a distance they choose. The user can define what this buffer distance is in feet, miles, meters, or kilometers. To build a buffer feature, **the data must have a polygon layer to add the new buffer feature too.**

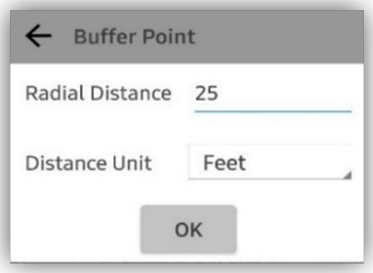
Buffer Geometry via Selected Feature

a. Using the **selected feature option** for buffering a point, line, or polygon, first **select the feature**. Once the desired feature is selected in the map, tap the **Tools/Option** button on the Application toolbar.

b. Select **Tools**, then select the **Buffer Geometry** tool.

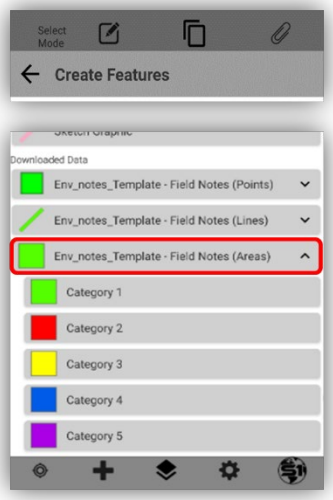
Buffer Geometry Tool

c. Once **Buffer Geometry** is selected, the user is presented with a pop-up to define the distance to buffer the feature by.



Buffer Point Distance and Units

d. Tap OK once the **Radial Distance** and **Units** have been entered and then **Create Features menu** for the currently loaded map data layers will pop-up. **This is where is needs you to select a polygon layer to store your new buffer feature in.**



Create Features Menu

e. Tap the feature edit template you would like to create the new buffered polygon in (can only choose polygon features to create new buffers) and proceed just as you would for creating a new feature normally.

f. Fill out the attributes in the **attributes table**, make any geometry modification that may be needed. At this point the vertices of the new feature are all shown in blue and can be selected and modified either by digitizing or using GPS location prior to saving the new feature.

g. Once the attributes are filled out and the user is satisfied with the geometry of the buffer, tap the **Submit button** to save the new feature.

NOTE: *See Agency User Guide for the* ***Buffer PG – GPS Tool*** *that buffers the current GPS point location using a polygon feature selection.*

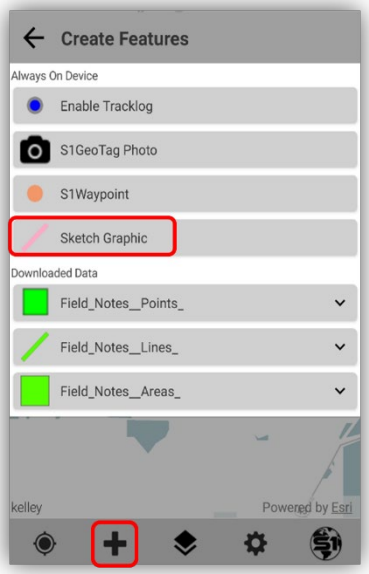
S1 Sketch

The S1 Sketch layer can create mark-ups on the map view. Sketches are drawn with a finger, or tablet stylus, by selecting the **Sketch graphic from Create Features** and then drawing on the map. Sketches are the topmost layer; they will draw on top of basemaps and feature layers. A Sketch can be saved, deleted, loaded, and shared.

NOTE: *Once the finger, or tablet stylus, has lifted from the mobile screen while sketching, that sketch is complete. To create more sketches, tap the* ***Create Features*** *button again to create another sketch.*

Creating an S1 Sketch

a. To **enable S1 Sketch**, tap the **Create Features** button. Choose **Sketch Graphic** from the list.

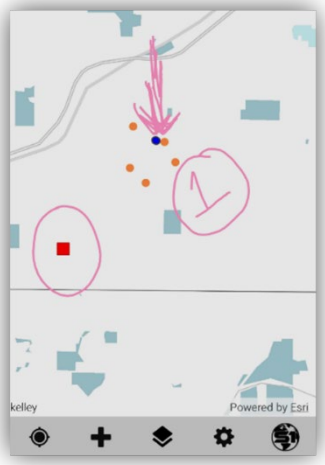


Selecting Sketch Graphic

b. Hold finger down, or tablet stylus, on the map screen to draw a sketch. Once the finger has lifted, the sketch is complete for that part.

c. If the screen starts to move, the sketch has ended. You can add to your sketch by tapping the Sketch graphic again from the Create Features list.

d. The S1 Sketch will draw as a light pink salmon color only. There are no other color options for the S1 Sketch currently. Below is an example of four added Sketches drawn over the map layers:



Four S1 Sketches Drawn Over Map Layers

NOTE: *See the Agency User Guide for more information on Managing and sharing S1 Sketches.*

Navigation Capabilities

When the GPS has a position fix, users can set a navigation target at a designated location in the map or from a selected feature. While in navigation mode, the application provides updated distance, direction and bearing information to the user (depending on device capabilities) and alerts the user when arriving near target destination.

Navigate to a Map Location

a. Do a "**long tap"** on the map to set a **Navigation Target** (GPS will automatically activate if it is not already enabled).

b. A Blue Icon is placed at the location of the **Navigation Target**.

Location Icon

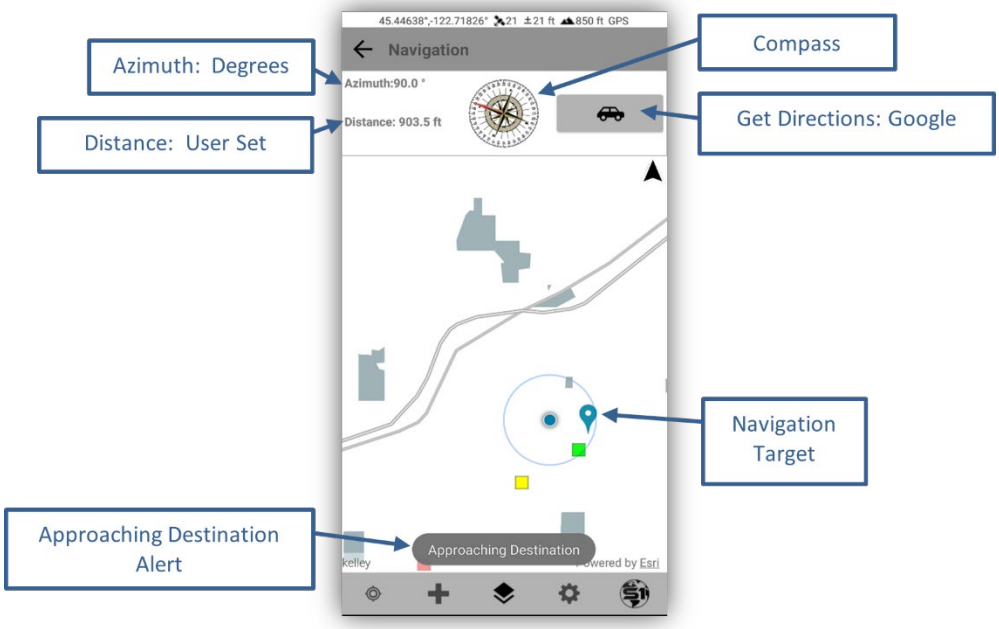
c. The **Navigation Pane** displays at the top of the map. This pane provides the **Distance and Azimuth** (reference direction) to the Navigation Target and a **Compass Rosette** with an arrow pointing to the Navigation Target (if the device hardware supports the compass).

- The Azimuth (reference direction) to the target is displayed in degrees.
- The Distance value to the target is displayed in user defined units that were setup in the S1 Options settings under **Navigation Alert Distance and Navigation Alert Distance Units**.

d. **Distance and Azimuth** values change as the GPS position moves in relation to the Navigation Target.

- Distance value decreases when moving towards the target.
- Distance value increases when moving away from the target.
- Azimuth degree value changes as the GPS position moves.

e. The application displays a message pop-up at the bottom of the screen as the user approaches the navigation target. As the user reaches the alert threshold, the device will also ring or vibrate.



Navigation Target Tools

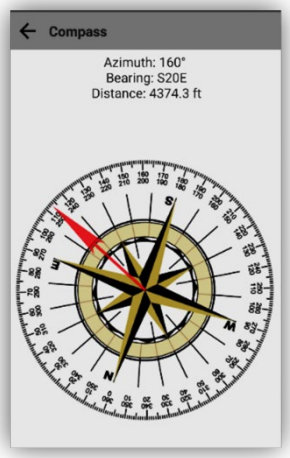
f. **Tap** the **Back Button** to clear the Navigation Target.

g. Long tap on the map to set a different Navigation Target.

h. To view a **full screen compass** while navigating, tap the **Compass Rosette** on the Navigation Pane. A full screen window with the compass will appear.

i. The **red arrow** points toward the direction of the navigation target relative to the orientation of the device.

j. Tap the Back Button to return to the map view.



Navigation Target Compass

Navigate to a Selected Map Feature

Features on the map that can be selected and navigated to, include: A Point, Line, Polygon (area), S1 Tracklog, S1 Waypoint or an S1 GeoTag Photo.

a. Tap on an existing feature in the map. The selected feature will highlight in Blue, and the **Select Mode Toolbar** will appear.

b. Tap the **Navigate button (running person icon)** at the top of the screen.

Navigate Button for a Selected Feature

- **For a Point, S1 Waypoint or S1 GeoTag Photo** – A blue pushpin will appear on top of the point. The **Navigation Pane** will appear at the top of the map view displaying the **Azimuth,** reference direction in degrees, and **Distance** to the selected feature.
- **For a Line or Tracklog Feature** – A blue pushpin will appear at the starting vertex of the line. The **Navigation Pane** will appear at the top of the map view displaying the **Azimuth,** reference direction in degrees, and **Distance** to the selected feature.

Navigating to Location of a Line Feature

c. Tap the Back Button to clear the Navigation Target.

NOTE: *See the Agency User Guide for more information on* ***Navigation*** *and* ***Getting Direction.***

Exercise 5: Sync Collected Data and Interacting with Data in AGOL

Goals:

To sync collected data with the web map stored in AGOL.

Expectations:

The intent of this exercise is after features have been collected or modified, data will be synced back to the server when the device has a network connectivity. The sync Bidirectional setting will upload data from our device and download any new data.

Review Student data Collection – as a group.

- Any Data Collection questions?

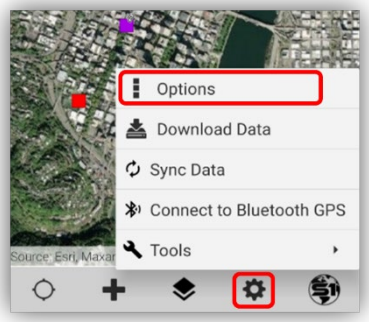
Sync Data Edits to Server

After features have been collected or modified, data should be synced back to the server when the device has a network connectivity. Synchronization requires either a 4G or a WIFI connection; 3G or slower connections cannot support synchronization. It is strongly advised syncing to occur on a reliable WIFI connection whenever possible.

Syncing Data Settings

a. Prior to syncing data, review the sync settings in the S1 Options menu. The Options menu has a setting that allows **Sync to be Bidirectional or Upload Only**. The Bidirectional setting will upload data from your device and download any new data within the geodatabase extent from other users. Upload Only will only sync the data on the device; no data will be downloaded from other users.

b. **By default**, the Sync settings is set to **Bidirectional**. To change the **Sync setting**, tap the Tools/Options button on the Application toolbar in the S1 Mobile Mapper, then tap **Options**.



S1 Options Button

c. Select the dropdown arrow next to **Sync Settings**, and set to preferred sync type, **Bidirectional or Upload Only**.

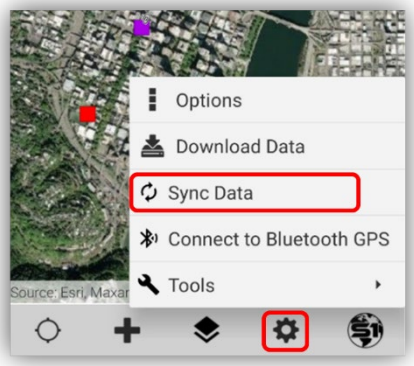
d. **Select Upload Only for this exercise**, this will save upload time while working in this exercise (remember this will need to be changed back when you want to update your sync data with data collected in the field later).

Sync Settings Options

e. Changes to S1 options are automatically saved once selected, tap the back arrow to go back to the main map view.

Sync Data and Attachments to Server

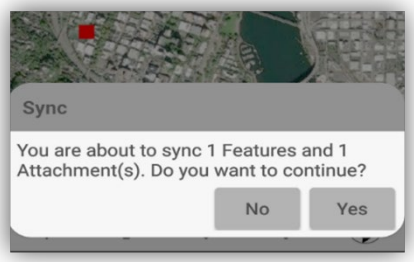
a. **To initiate Sync**, tap the Tools/Options button. Tap **Sync Data.**



Sync Data on the Tools/Options Menu

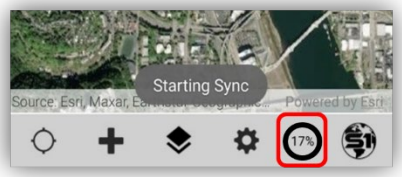
b. The duration of the sync process will be determined by network connectivity and the number of records that are being synchronized.

c. To confirm your Sync, a message window will pop up to tell you how many Features and Attachments are about to be Synced and ask if you want to continue.



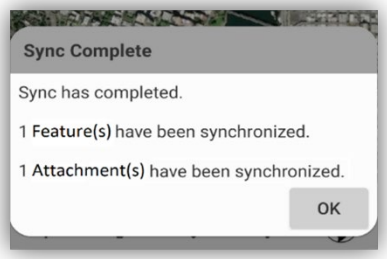
Confirm Sync Data Message

d. A message will appear at the bottom of the map letting you know the sync has started. While the synchronization process is underway, a **Progress Indicator** will display on the toolbar.



Starting Sync with Progress Indicator Percent

e. When the Sync is complete, the progress spinner will disappear, and a message box appears indicating the number of Features and Attachments synchronized. Tap OK to return to the map view.



Sync Complete Message

We can all see the training class data that was synced back to the web map by logging in to AGOL with our ArcGIS Mobile Editor Account and viewing the **S1 Mobile Training (Web Map for download).**

Congratulations, you have completed the S1 Mobile Mapper Training!

For more information on the S1 Mobile Mapper application, visit:
https://www.blm.gov/services/mobile-gis/s1mobile

To submit application bugs or app enhancement requests, use the online form at the location below:

https://forms.office.com/g/zmPkst3rjZ

S1 Mobile Mapper Application

U.S. Department of the Interior, Bureau of Land Management, Oregon/Washington State Office, Information Resource Management