



Cariboo Consolidated Roads

Field Manual for Road Verification and GPS Data Collection

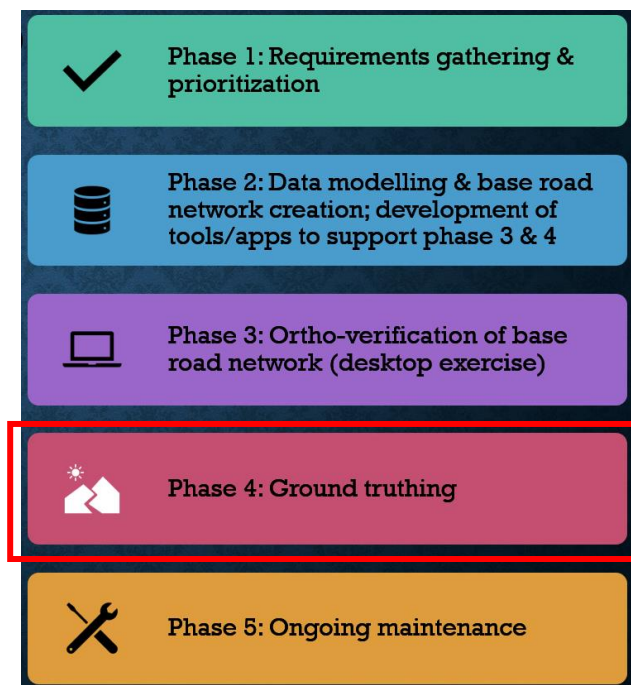
*THIS DOCUMENT IS INTENDED FOR FIELD DATA COLLECTION
USING ESRI ARCGIS FIELD MAPS.*

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Introduction

The Cariboo Consolidated Roads (CCR) project is an ongoing effort to create a single, reliable, and up-to-date road dataset for the Cariboo Region that meets the business needs of Cariboo Region staff and supports collaborative decision-making. The project started in 2019 with the gathering of spatial information remotely and is now on to the ground truthing stage. This manual will walk the field data collector through the process of verifying road existence, updating road attributes and capturing new roads currently not present in the data set. The data collection process uses the ArcGIS Field Maps application to validate roads that need to be verified in the field. These data will then be used for mapping and incorporated into a number of key initiatives in the region. We are currently in *Phase 4: Ground truthing* in the graphic below.



Downloading and Using the App



IOS Devices



Android Devices

ArcGIS Field Maps the Mobile App

The ArcGIS Field Maps application is an easy-to-use mobile app that allows you to access your maps, collect data, track your location, and annotate your maps, all in one app on your mobile device. The Cariboo Consolidated Roads project will be using the mapping functionality in this application to collect updated data on roads in the Cariboo Region.

To download the app, use your tablet/phone/iPad app store to search for 'Field Maps' then download the application with the information or scan the QR code above for your specific device.

Logging in and Using Credentials

Upon opening ArcGIS Field Maps, the sign-in screen will appear. Please select "Sign In with ArcGIS Online" as shown below.



Enter the credentials as shown below. This account provides 'Editing' permissions so the individual logged in will be able to create and edit the data. This can be used by all government employees, First Nations, and contracted staff members. However, **DO NOT** share to the public.

Username: PX.FLNR.CAR.RDS

Password: CarRoads1

Warning: Before heading out to the field, ensure you have connected to WIFI and have logged in using the above credentials to ensure you are able to access the offline maps in the field. You will not be able to capture data without doing so. Further to this, you will be unable to sign out of the application and log back in without WIFI access, so switching between accounts on one mobile device is not possible in the field.

Internal BC Government staff will be required to use their **IDIR** in the application as part of the verification process. Before external parties can begin verifying roads, they will be required to request a **username** from our administrators. The username is an 8-digit code that is used for tracking edits to the data. Please send an email to CaribooGeospatialServices@gov.bc.ca if you do not have or know your organization username and we will reply with the ID needed.

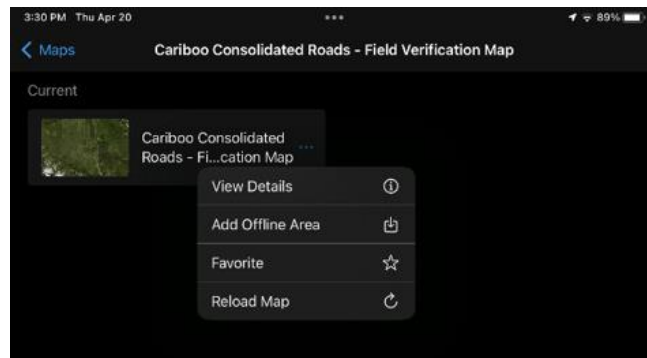
Prepare for Offline Data Collection

Because the vast majority of road features are outside of cellular coverage, you are required to download an offline map before heading into the field that will store the map and all of your attribute and spatial edits. Follow the steps below to download the offline map.

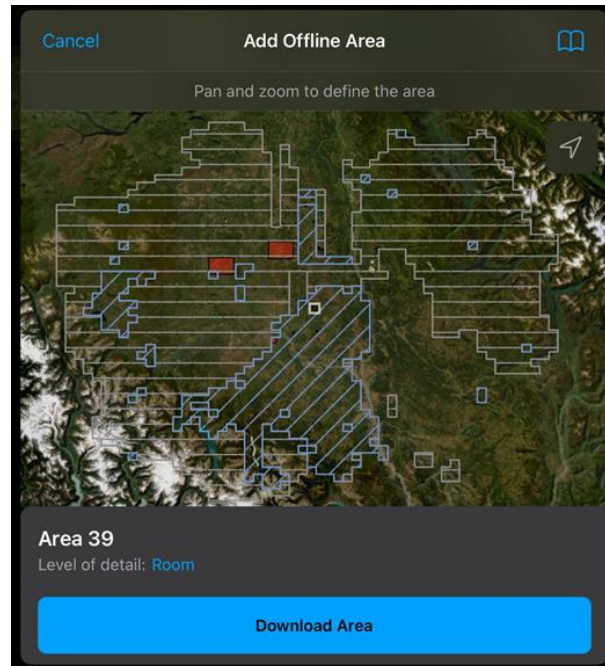
Before beginning, please ensure Auto-Sync is enabled on the device to ensure data is uploaded at regular intervals. See section 'Uploading and Reviewing' below for further details.

Download offline map areas:

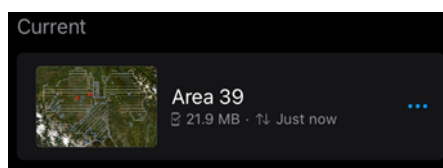
1. On the main Field Maps menu, click the 'Cariboo Consolidated Roads' group under 'Groups'.
2. Open the 'Cariboo Consolidated Roads – Field Verification Map' map
3. Click the ellipses (...) next to the map name and click 'Add Offline Area'. This will open a new window for selecting the extent and level of detail of the offline map.



4. Navigate to the area you will be verifying and collecting road data. There are two layers that you should be cognizant of when selecting an offline area for download; Areas Available for Verification, symbolized by grey or blue hatched polygons, and Checked Out Areas from field staff, symbolized by red boxes. The areas within the blue hatch contain both editable roads and roads that 'Require Verification'. The areas within the grey hatch only contain editable roads without any roads that 'Require Verification'. All other areas should be avoided as they do not contain any editable road features. In order to avoid data conflicts with other staff, please avoid downloading any offline area that is within the Checked Out Areas (red boxes) polygons.



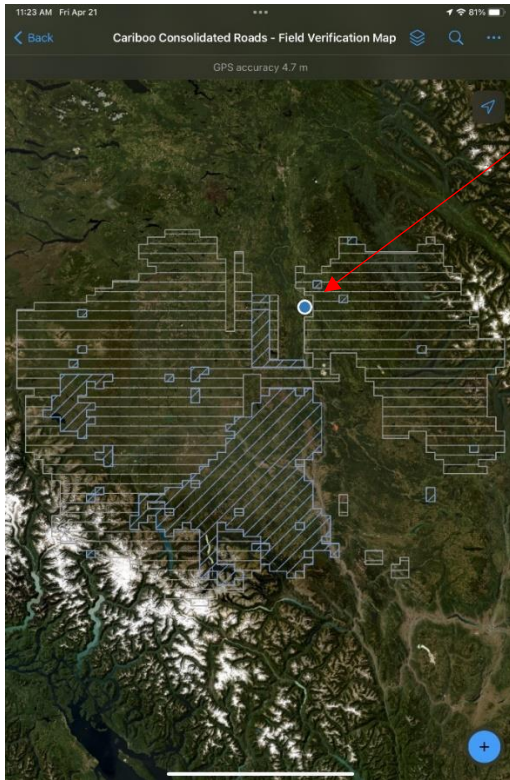
5. You can now set the 'Level of detail' that you will require for the area of data collection. The default is set to 'Room' and contains the highest level of detail and smallest map area. The largest downloadable area is 'Buildings' but contains the lowest level of detail. Keeping the area as small as possible while still having the extent of your working area is most optimal. The larger the area being downloaded the more space it will require on your device and the longer the download time will be.
6. Click 'Download Area' and the map will begin the download process. The progress wheel will spin during the download and then display the file size of the offline area when complete.

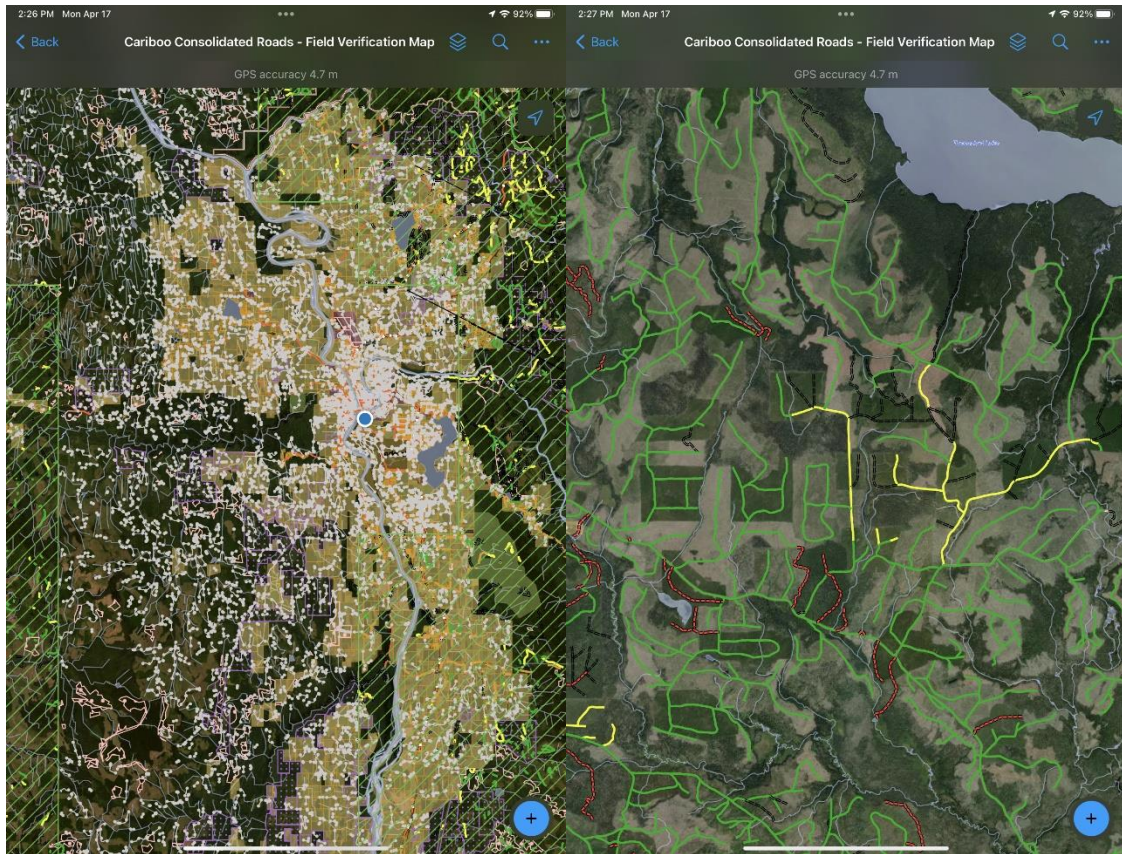


7. When you are in the field and within the extent of the offline area, you can then open the offline area and begin collecting data. Features that are updated or created in the field will sync automatically when connected to WIFI or cell service (with a data plan). To ensure that the sync occurs, ensure that Auto-Sync is enabled. See section 'Uploading and Reviewing Field Data' below for further details.

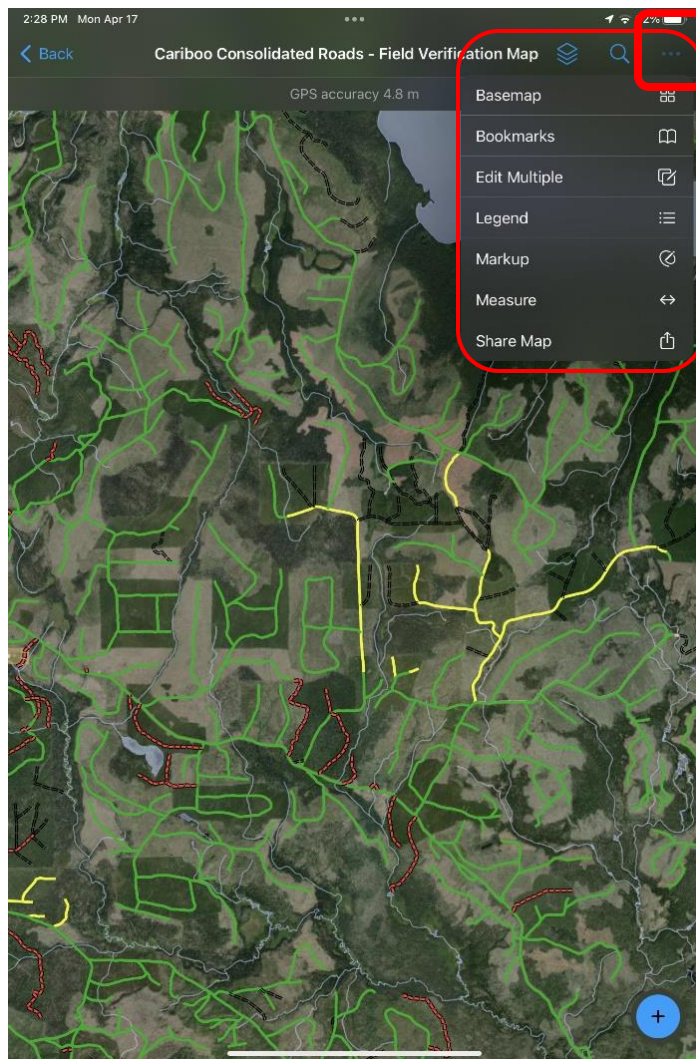
Navigating ArcGIS Field Maps

The map will automatically take you to your location which is the blue dot below. The blue dot will always be your current location.

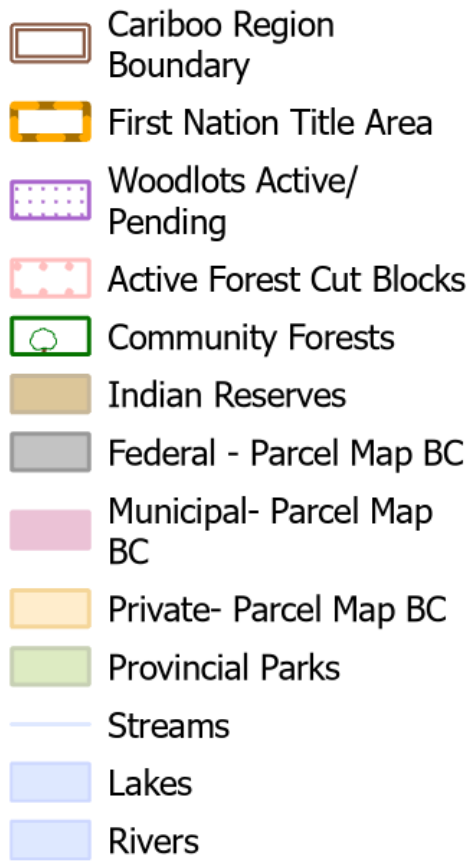
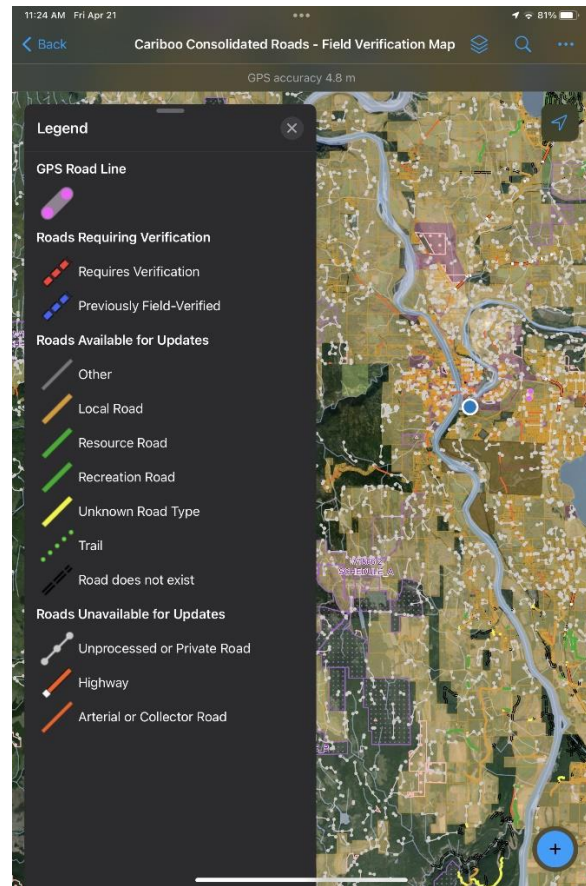




Zooming in will make the features easier to see. Zoom into a closer and move the screen around to see which road features are in need of updating or are possible to capture when out in the field.



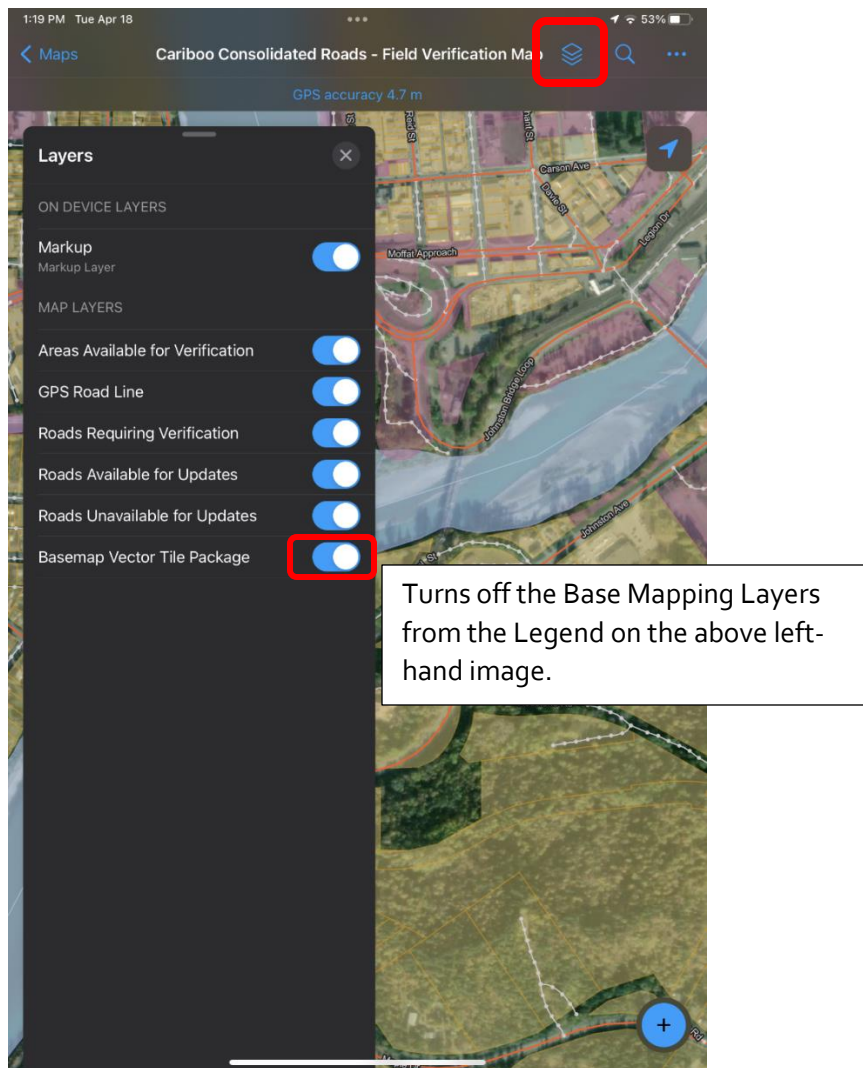
Use the ellipses (...) in the right-hand corner to explore the app and find information.



These are the Legend items that are within the map under the ellipses button in the top left-hand corner.

The Base Map Vector Tile Package Legend seen above on the left is only available to view in this manual. The CCR app will not store this part of the legend, but the features are labeled where possible within the field maps application. The Base Map Vector Tile Package layers on the left are all held within one map layer to optimize offline downloading capability and cannot be toggled on or off individually, but all of the layers can be turned off together, if needed.

The menu legend on the above right-hand image is interactive within the app and items from this can be separately turned off and on and updated. This legend can be accessed from the Legend button within the ellipses menu button on the top right corner of the app.



The available layers can also be accessed from the layers icon in the top right-hand corner to turn on and off layers (highlighted in red square in above image). If any layers are missing on the map, look at this Layers menu to see if any layers have been turned off.

GPS Data Collection

There are several layers available for editing in the CCR web map. Collecting and editing the data is facilitated by the use of ArcGIS Smart Form; a form-based interface that is integrated into ArcGIS Field Maps that will assist in acquiring data to our predefined standards.

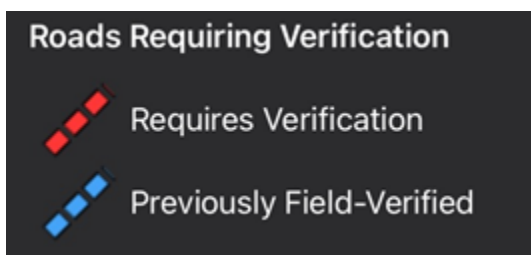
The primary focus is to field verify the roads that 'Require Verification' from the desktop data acquisition and manipulation stage. A secondary focus would be to update the road attributes associated to the existing road features and to capture any roads that are not present in the current dataset through the GPS functionality in the application and mobile device. The steps to capture these data are outlined in the sections below.

A few notes about Smart Forms and data collection:

1. To collect new point and line GPS features, click the '+' button at the bottom right of the map. Select the new feature that you want to collect and begin entering attributes. Further information on collecting GPS features is outlined below.
2. Editing attributes can be done on most existing roads features on the map. This is accomplished by first clicking on the road feature and then tapping the pencil icon or edit button at the bottom of the pop-up menu.
3. Many of the editable attributes amongst the road layers are identical, which makes editing and creating new features a very similar process.
4. Required fields are marked by an asterisk (*). You cannot submit the edit until all required fields have actual data entries.
5. There are several conditionally viewable fields and groups of fields in the smart form, which are dependent on entries of other fields. (Example: when a road type is marked as "Road Does Not Exist", a number of groups and fields are removed from the form as that information is deemed irrelevant. The Smart Form will guide you in the attribute collection of the feature.
6. The attribute fields are grouped so they can be collapsed or expanded as needed.
7. There are several fields that are calculated by the software and are not editable. Please keep the defaults as shown on the screen (Example: date/time fields)
8. Please add any relevant comments in the appropriate fields that you think will be helpful for the GIS staff who will QA/QC the data. Some comments may persist in the data to give clarity and context and may be used beyond the QA/QC process.
9. Click 'Submit' after editing an existing feature or GPS'ing a new feature.

The primary focus for these editable features is to confirm the road type, surface type, and enter any access restriction information. Changing the existing road type from 'Road does not exist' to another road type and editing the existing road type to 'Road does not exist' are important aspects of the data collection process to ensure we have the most-current data available for our road system. The road surface type will give staff better information as to the condition of the road and infer types of road use. The Access Restriction fields will provide road usage information to land managers for planning and managing resources within a given road network.

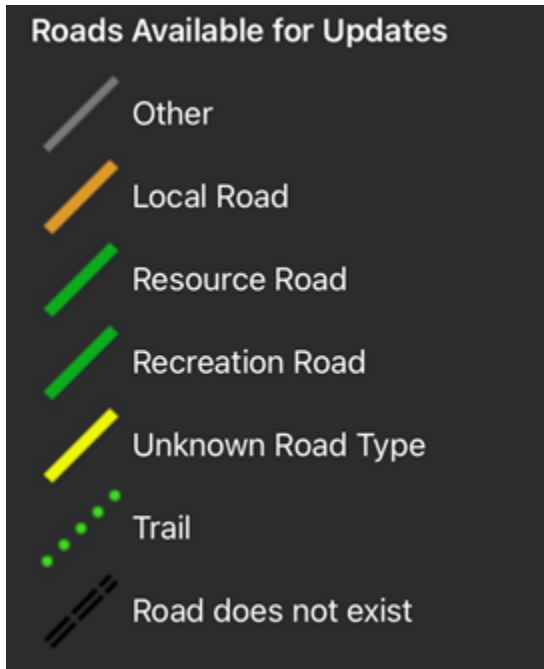
Roads Requiring Verification



Once you are near a road that 'Requires Verification' (bold-red, dashed roads) and are ready to verify its existence, simply click on the road. It will become highlighted in light blue and the pop-up menu will appear and display its attributes. If you have selected the correct road (check by looking at what is highlighted), then the next step is to click the edit button (pencil symbol) in the bottom left corner of the pop-up.

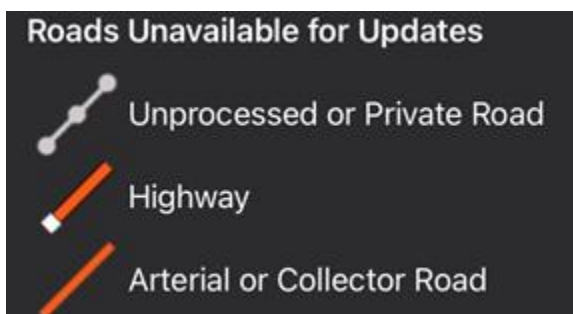
Enter data in all of the relevant fields. After you have verified and/or entered the relevant attributes, click 'Submit' at the top-right of the screen. The feature has now been verified and the symbology will change from a red dashed line (Requires Verification) to a blue dashed line (Previously Field-Verified) and the pop-up menu will reappear. You can once again click the edit button in the pop-up menu post-verification to adjust any of the entered attributes after you have reviewed your entries.

Roads Available for Updates



A large portion of the roads in the Cariboo Consolidated Roads dataset that have gone through the desktop verification exercise are available for confirmation of the current attributes. To review the attributes of a specific road, simply click on the road to review the pop-up menu. If there are attributes that need editing, click the edit button (pencil icon) on the lower left of the pop-up menu and begin editing the attributes.

Roads Unavailable for Updates

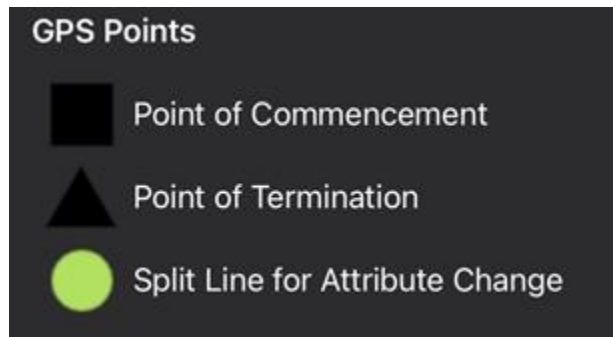


There are a few features that are not available for editing; either due to their road type (Highways and Arterial/Collector Road), they have not gone through the desktop data processing exercise (Unprocessed Roads) or they reside within private land. If you think there is an error in the availability of a specific road feature or group of features, please send an email to CaribooGeospatialServices@gov.bc.ca and detail the issue.

New GPS Features

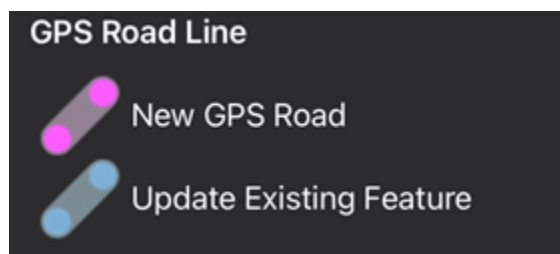
The application has the ability to acquire new road features using the integrated GPS chip in the tablet. To initiate GPS data collection, click the '+' button on the bottom right of the screen. You will now have the option to select the feature type you want to collect. Information on each of the feature types and how to collect these features is noted below.

GPS Points



GPS points are typically collected in conjunction with GPS road lines to provide GIS staff additional context to a newly collected road feature. Before beginning to collect a new linear feature, please collect a '**Point of Commencement**' point to indicate the beginning of the line. Similarly, please collect a '**Point of Termination**' point at the end of each GPS line to indicate the end of the line. The '**Split Line for Attribute Change**' is used in situations where the existing line feature has a change in attributes (road type, surface type, access restriction, etc.) and the line spatial extends beyond where the break in the line would need to occur. This feature informs the GIS staff that a break in the line data needs to occur at that location and they can perform this operation during the QA/QC process. This feature would typically be collected alongside an 'Update Existing Feature' line feature, noted below.

GPS Road Line

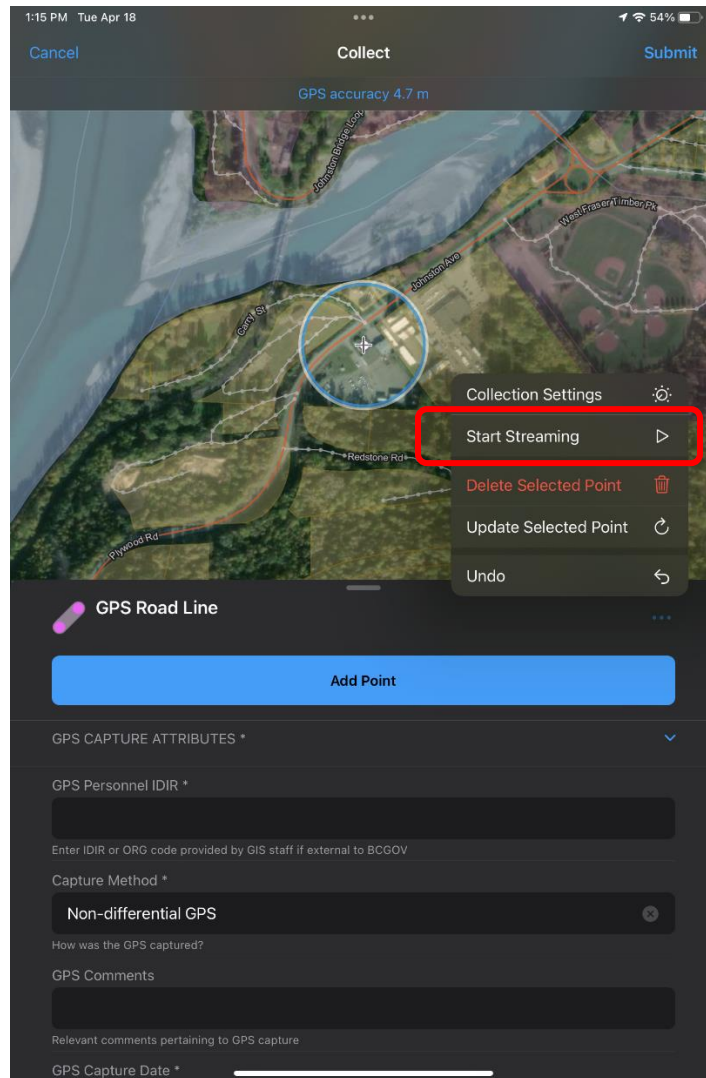


There are two line feature types that can be collected using the application; '**New GPS Road**' and '**Update Existing Feature**'.

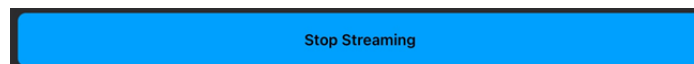
1. **New GPS Road:** Use this option for collecting new road features that do not exist in the current road dataset. Fill out the form with all relevant and required information.
2. **Update Existing Feature:** This feature is used for updating existing line features and contains the same fields as the other editable road features on the map. However, there is an additional field called **Feature Update Type** that communicates to the GIS staff the intent of the new road line; 'Spatial-only' Update, 'Attribute-only' Update, or 'Spatial and Attribute' Update.
 - a. **Spatial-only:** This is used for situations where the existing road line on the map contains correct or newly updated attributes and the intent of the GPS line is to simply update the current line spatial.
 - b. **Attribute-only:** This is used typically in conjunction with a 'Split Line for Attribute Change' point to communicate to the GIS staff that the current road line spatial is correct, but there is a change in attributes along the current line and these new attributes will be stored in the GPS line feature for GIS staff to migrate into a split version of the existing line. The current road line will not be modified; only split from the remainder of the road and the attributes updated.
 - c. **Spatial and Attribute:** The same information in 'Attribute-only' as above, but the road line spatial needs to be updated at the same time as the attribute update. Essentially, this is a combination of edits from the 'Spatial-only' and 'Attribute-only' updates.

Collecting GPS Lines

After clicking the '+' button on the bottom right of the screen and selecting the GPS feature you want to collect, the form is available for editing. Before making edits to the form, click the ellipses (...) on the upper right section of the menu and select **Start Streaming**. This will start tracking the location you are currently at, whether you are in a vehicle or walking the road on foot.



After you have successfully captured the entire road line, be sure to click the large blue button that says **Stop Streaming**. This will successfully create and close the track. You can collect attribute data in the form at any point during or after the streaming process. Once both the GPS line and attribute data have been collected, click 'Submit'.



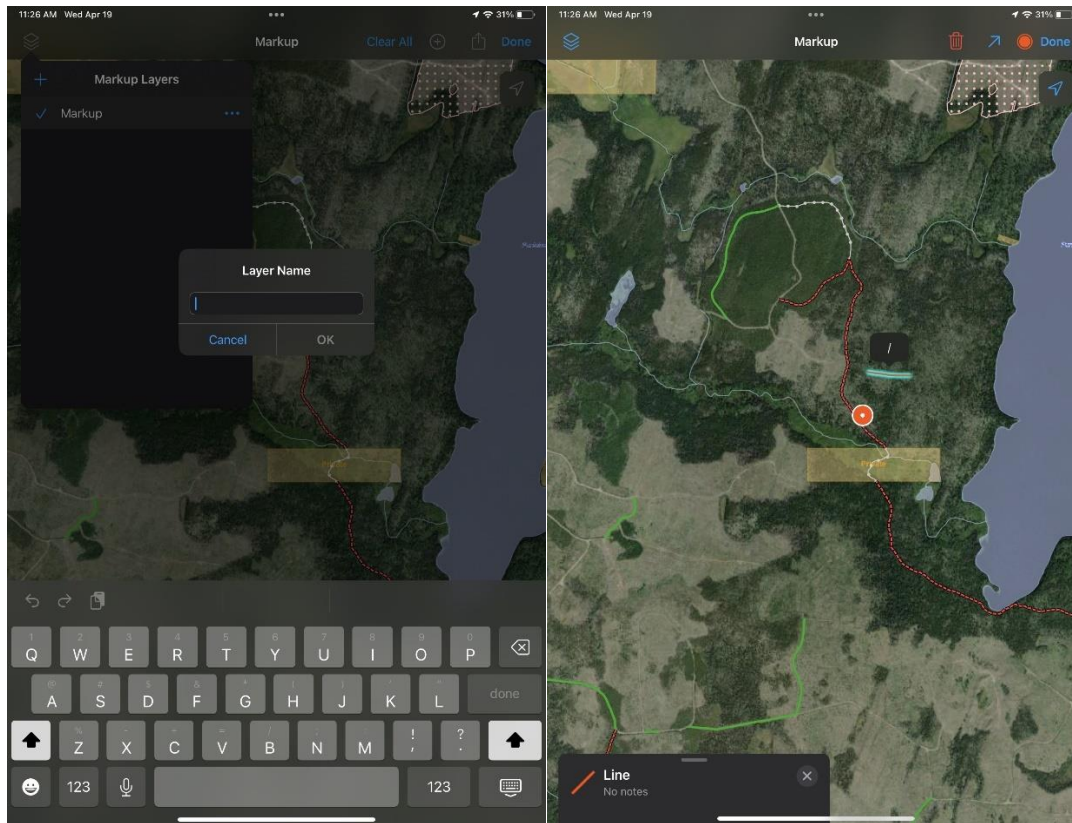
Very important: Remember to Stop Streaming...if you do end up tracking other parts of a drive, please update the comments sections or contact the app admin to edit the information errors captured.

The Markup Tool

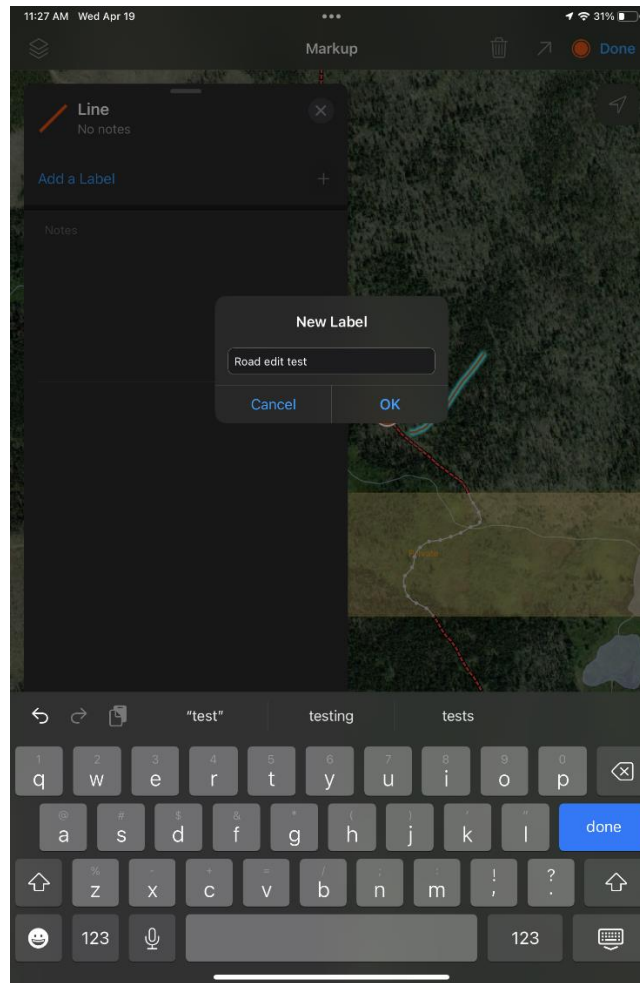
The interactive application will capture data, however in some cases post processing by GIS staff will be needed. Everything will be outlined below.

This tool is great to draw in areas or comments that do not fit in the GPS Road Line data or the Verification Roads layer. However, the markups do put a disproportionate amount of work onto the GIS staff so please use the existing updating roads features wherever possible instead.

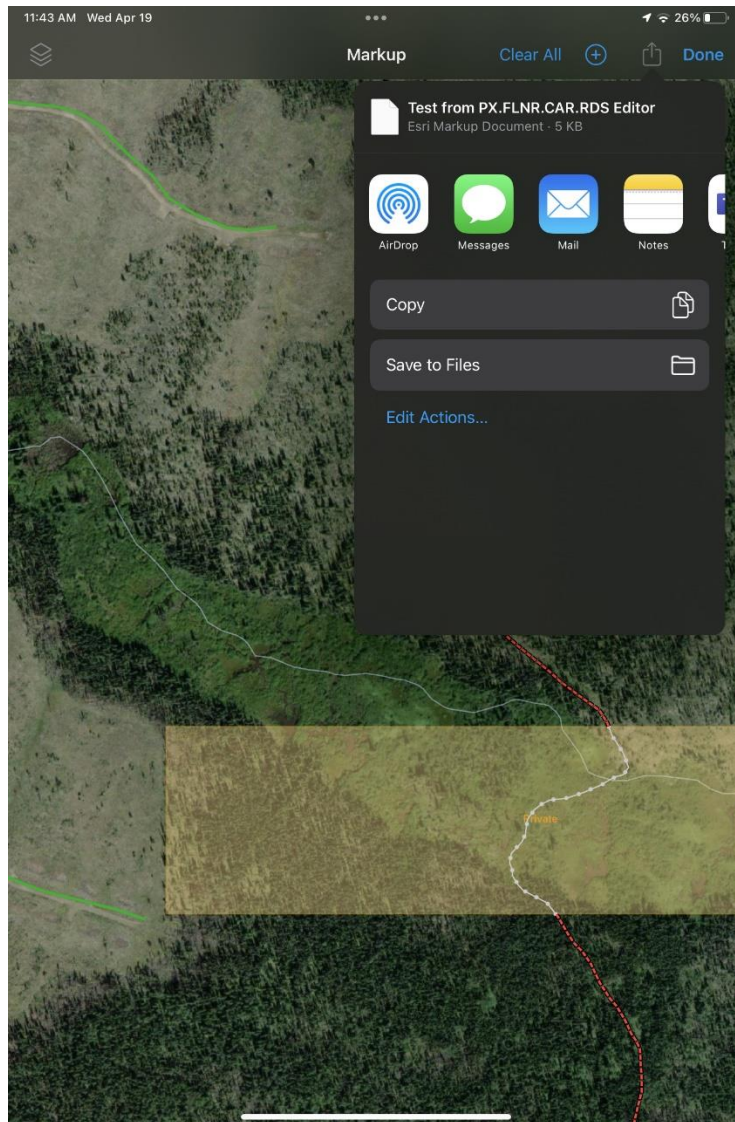
To use the markup tool click on the three dots opening the top right hand menu and select markup. This will open the Markup Layers menu, select the + in the menu to add a layer give it a relevant name.



The top right corner of the screen will have a + symbol which will add a point, and to create a shape or line simply draw with your finger the area you would like to capture. If you need to make a change just be sure the object is highlighted and then click the delete button in the top right corner to remove it.



Once the feature is correct select the line/polygon/ or point so it is highlighted, and then from the menu that appears select Add a Label. Label the feature with a relevant name or comments so the GIS administrators know what the information means.



Created Mark Up's will not auto-sync itself back to the main system. In order to send these features click the above Export button while you are still in Mark Up mode in the top right hand corner then Email the features. Make sure everything you would like to send is selected and email to CaribooGeospatialServices@gov.bc.ca with the subject line 'CCR MarkUp <ORG code or IDIR> <YYYYMMDD>.

Uploading and Reviewing Field Data

Connecting to a network

When connecting your device back to a network as an internal user please use the BCGN that is password protected by IDIR. If this internet is not working only then connect to the Dogwood-NGN.

For both external and internal users downloading will be difficult with weak service or wifi. To make things easier on yourself wait until you can access a fairly stable and strong connection.

Uploading or Syncing Data

The mobile data collected in the field will need to be uploaded or synced to ArcGIS Online in order to complete the process of verifying road data.

When you are working in an area without connectivity, you will store collected information on your device until you are online again. Anytime your device regains connectivity you will be able to upload or sync the information that you have collected.

After you are done working in an offline area or have completed all anticipated edits, it is important to remove your offline area from the mobile device after the sync is complete. This releases any replicas associated to the data in the area and allows others to download the same area for offline use.

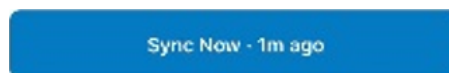
Enabling Auto-Sync

Automatic Sync is the default setting. It is recommended that the auto sync be turned on to ensure the syncing step at the end of the data collection is not forgotten. Even if you have auto sync enabled it is also recommended to ensure your edits have uploaded (see 'Manually Syncing Data' below).

1. In the **Maps** view tap on your Profile button 
2. In the **General** section slide the Auto-sync toggle button to the on position (blue will appear) or to the off position (grey will appear). Please leave mode to **Auto-sync** on.
3. Select **Done**

Manually Syncing data

1. Once you have connectivity, open the offline map area
2. Tap on the **Sync** button  (if a dot is present on the Sync button data is available to Sync)
3. The **Sync** panel will appear
4. A list of edits available (if any) to upload will be shown in the panel
5. Tap on the **Sync Now** button



Alternative manual method:

1. Tap the "Cariboo Consolidated Roads – Field Verification" web map. You will find the "Areas" available to you for offline mapping.
2. Click the ellipses (...) next to the "Area" you want to sync and click "Sync". The progress wheel will spin until the sync is complete.

CCR Hub Site

The data can be reviewed through the '[Cariboo Consolidated Roads – Data Collection & Mapping Hub](#)'. To access a copy of this documentation, click on the overflow icon (hamburger menu) on the top right of the screen above the British Columbia logo. Click on 'Documents' and click 'CCR Field Manual'.

Monthly Update Process

Offline edits that are synced back to the ArcGIS Online Feature Service are immediately accessible in ArcGIS Online for GIS staff to view. However, any edits that are made by GIS staff to our local data sets can only be pushed to the ArcGIS Online Feature Service (and display in the Field Maps application) at a scheduled time due to potential for conflicts and overwrites between the offline areas (checked-out areas) and the locally edited data. The scheduling allows time for field staff to sync their data to ArcGIS Online, remove their offline areas, and for GIS staff to integrate local updates to ArcGIS Online. The schedule of events is noted below:

- The last Wednesday of each month at 4:30pm is the last chance to sync your data in ArcGIS Field Maps to submit your edits. Delete all of your offline areas after you have sync'd your data.

!WARNING! Delete your offline areas at this time to avoid the chance of editing within the post-update offline area. Any edits that occur in the pre-existing offline areas after the Wednesday will be unable to sync back to ArcGIS Online. Follow the steps in Appendix A below to provide your edits !WARNING!

- At approximately 10:00am on the Monday that occurs during the same week as the last Wednesday noted above, GIS staff will send an email reminder of the upcoming Wednesday deadline to all external and internal field staff. A 'last call' email will be sent at approximately 1pm on the Wednesday as well.
- Updates will occur after hours on the Wednesday evening and the application will be available for further offline area downloads and field data collection on the Thursday morning of the same week.

If you are experiencing any issues with the above process, please contact CaribooGeospatialServices@gov.bc.ca with any of your questions or concerns.

Appendices

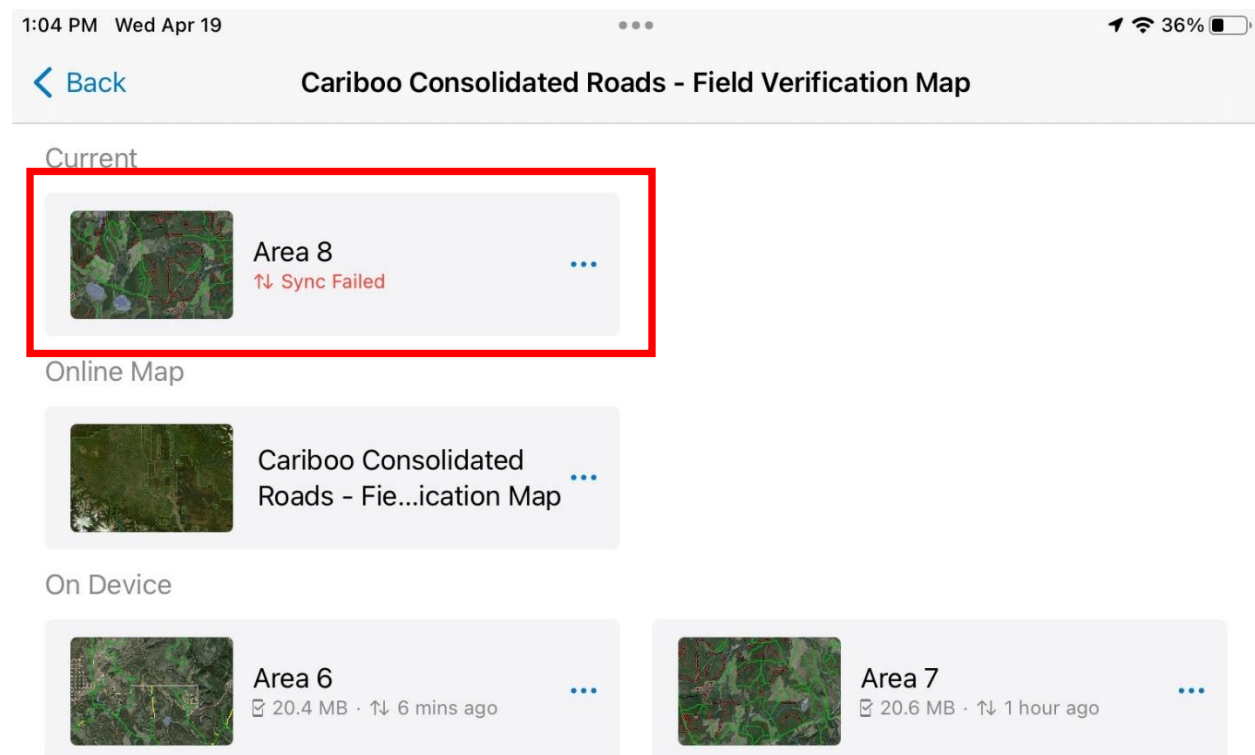
Appendix A: Process for Providing Data After Sync Failed

Sync failures – What to do?

There may come a time when you are unable to sync your offline edits back to the Feature Service in ArcGIS Online. This can happen when you have not synced your edits for a long time and your offline area (replica) becomes disconnected from the Hosted Feature Service in ArcGIS Online. Please follow the steps below to provide the Cariboo Geospatial Services Team the data required to make the edits on your behalf.

****It should be noted that this method of syncing is a last resort solution that should be followed only when truly necessary. Syncing your edits regularly (nightly) is best practice to avoid the necessity of following the below steps****

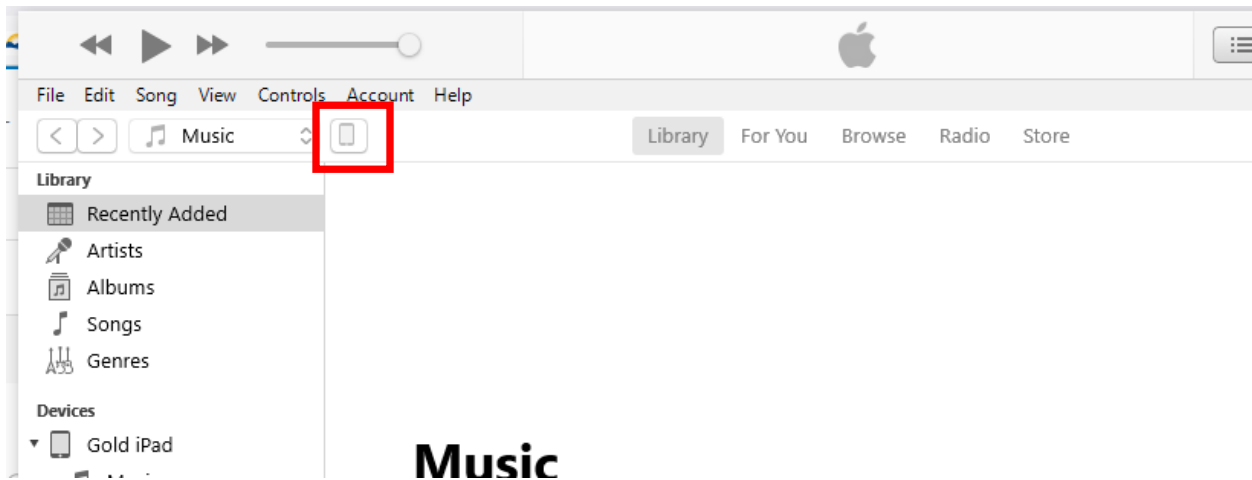
1. Sync all offline 'Areas' that you can do so successfully as per the above documentation. Remove the successfully synced areas from the Field Maps application after they have completed the sync process. This can be done by clicking the ellipses (...) button next to the specific 'Area' and clicking 'Remove Area'. Ensure you only have the 'Areas' that are marked as 'Sync Failed' as below to reduce the number of unnecessary files from being sent.



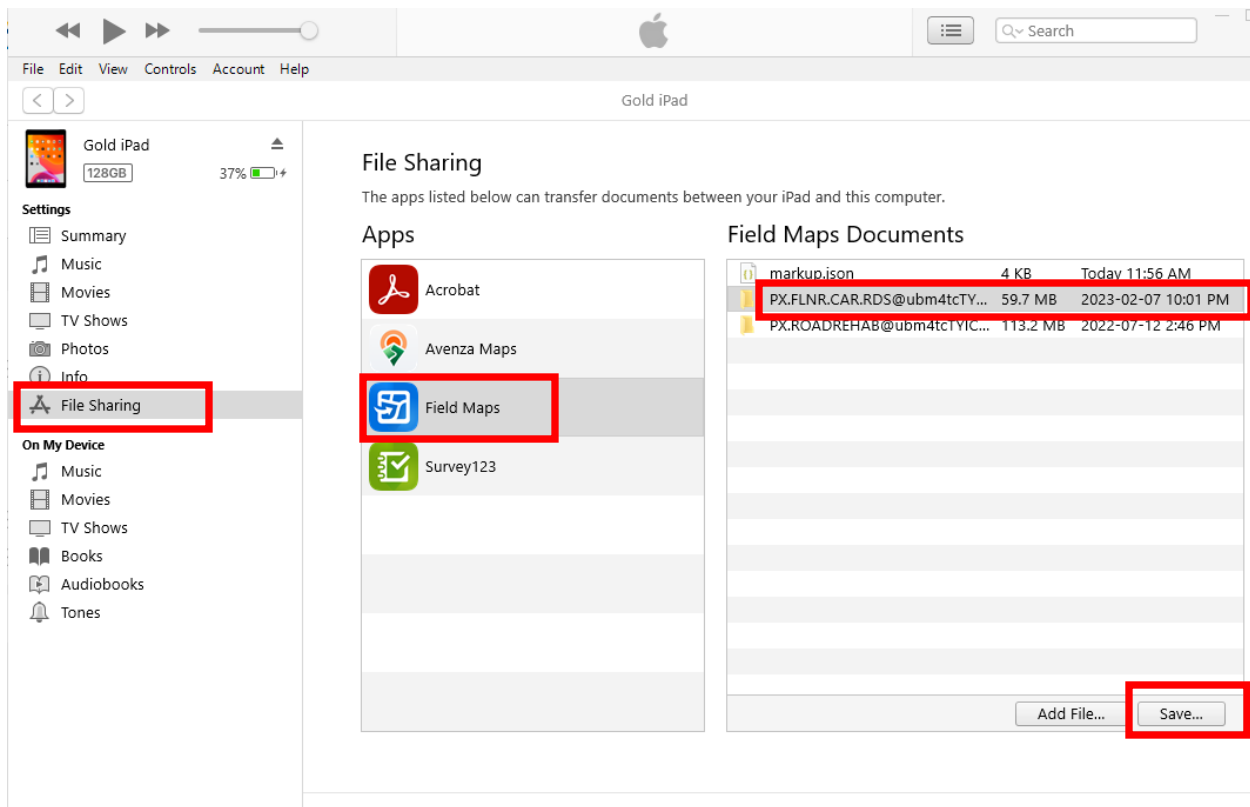
For Apple IOS Devices

2a) Plug the Ipad into a computer that contains Itunes.

3a) Open Itunes and click the button highlighted below.



4a) Click 'File Sharing' on the left-hand menu and click 'Field Maps' under the 'Apps' section. A list of files and folders will appear in the 'Field Maps Documents' section on the right-hand side. Click the folder that is named 'PX.FLNR.CAR.RDS@...' and click the Save button.



5a) Continue to 'All Devices' below to finalize the process.

For Android Devices

2a) Plug the Android device into a computer that contains using USB. Click Allow USB tethering on the android tablet.

3a) The device will show up on the computer as a removable drive.

4a) Navigate to this drive and go to 'This PC\<Android Device >\Phone\Android\data\com.esri.fieldmaps\files'. You should find a folder called PX.FLNR.CAR.RDS@.

5a) Continue to 'All Devices' below to finalize the process.

All Devices

6. Save the folder to an accessible folder on your local PC and note the location. Navigate to the folder using Windows Explorer and open the saved folder. Within that folder, do a search for all mobile geodatabases using the following command: *.geodatabase. A list of .geodatabase files will appear. Select them all, right-click on the selection and click Send to > Compressed (Zipped) Folder. Click 'Yes' when asked to save the zip file on your desktop. Rename the file

'CCR_FailedSync_<ORG code or IDIR>_<YYYYMMDD>.zip'. Send the file to cariboogeospatialservices@gov.bc.ca.

7. Remove the 'Area' from Field Maps and download a new 'Area' if continuing data collection work.
8. Further details provided in Appendix B below, if required.

Appendix B: Further Reading and References

Access Offline Edits for Field Maps on IOS: <https://support.esri.com/en-us/knowledge-base/how-to-access-offline-edits-from-arcgis-field-maps-dire-000026799>

Access Offline Edits for Field Maps on Android: <https://support.esri.com/en-us/knowledge-base/how-to-access-offline-edits-from-arcgis-field-maps-dire-000026798>