SENSORS & SOFTWARE
from RADIODETECTION

SPX TECHNOLOGIES

Using PointMan® Mapping Software with LMX™ GPR Systems

GPR field interpretations, added to the GPR data by touching the DVL screen, can be sent to the PointMan mapping app running on a nearby device using Bluetooth® wireless technology.



Mapping integration is available when the LMX200™ or LMX150™ GPR system has an external GNSS/GPS connected and enabled. See the LMX operations manual for details on setting up an external GNSS/GPS.

This document contains the following sections:

1. **Setting up the LMX GPR to output Interpretations to PointMan**
2. **Connecting the PointMan app to the LMX GPR System**
3. **Sending LMX GPR interpretations to PointMan**
4. **Brief Overview of LMX GPR interpretations in PointMan**

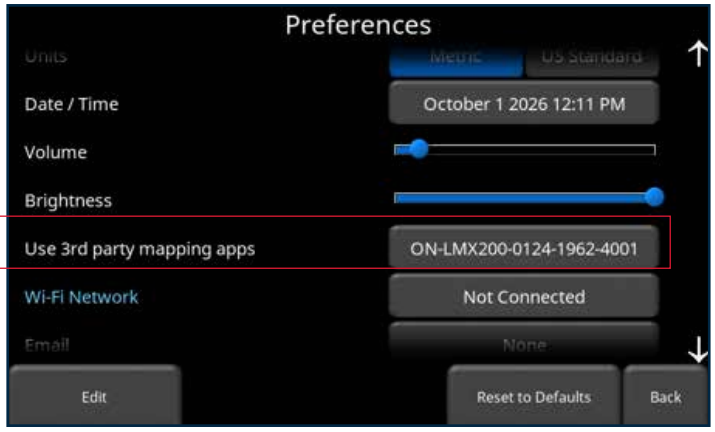
Optional Settings

5. **Customizing the PointMan GPR Dictionary**
6. **Editing GPS to see Cross-hairs in PointMan**
7. **Adding your RTK Correction Details to PointMan**

1. Setting up the LMX DVL to output Interpretations to PointMan

In the LMX menu, select **Tools > Preferences**.

Turn **Use 3rd Party Mapping Apps** to ON and note the serial number of the LMX system displayed on the button in the format LMXAAA-XXXX-XXXX-XXXX. The LMX serial number is required when setting up the PointMan app in the next section.



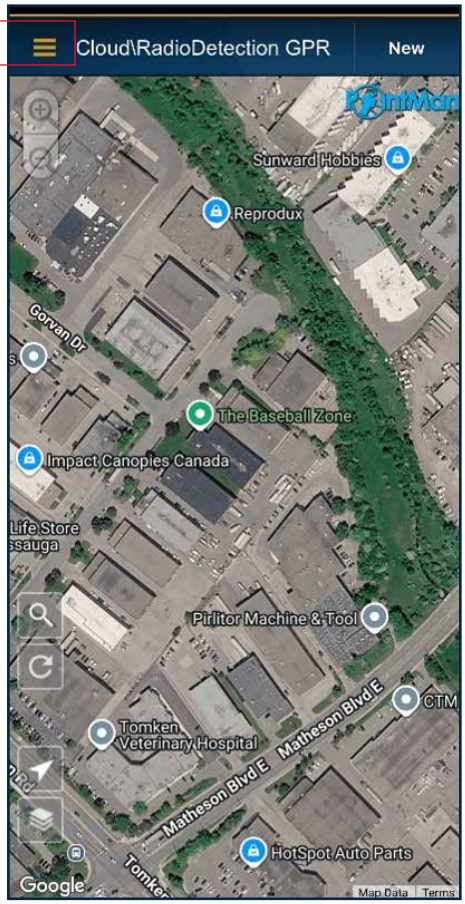


Download the PointMan™ app to a cell phone or tablet through either the Apple Store® or Google Play™ Store.

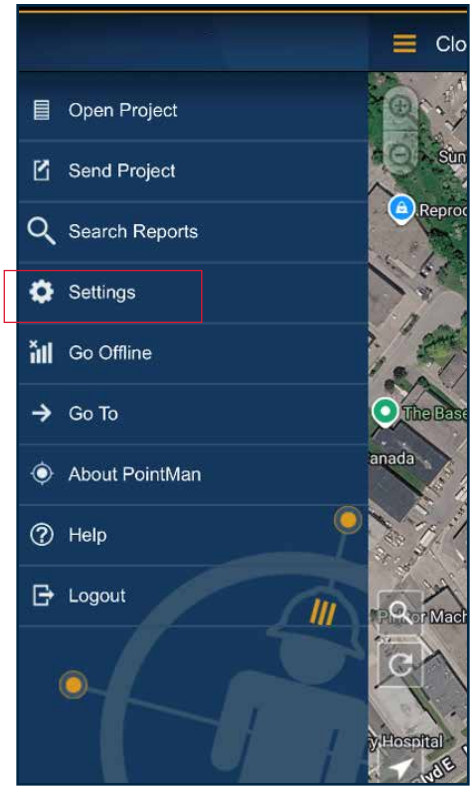
2 Connecting the PointMan app to the LMX GPR System

With the LMX GPR system close by and powered on, open the PointMan app on your Smartphone or tablet.

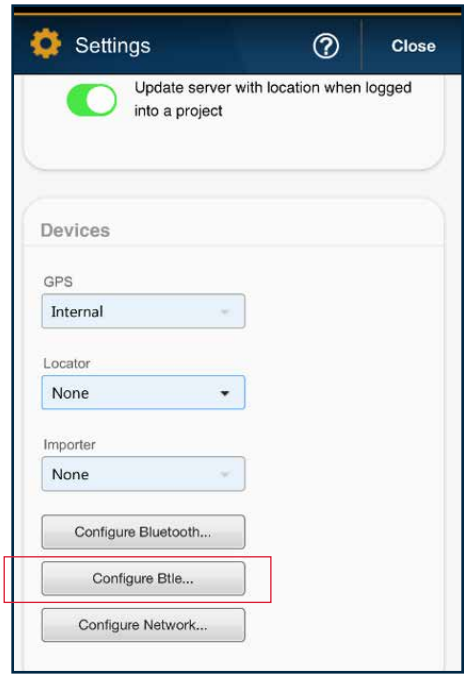
Select the menu (hamburger icon) from the top left:



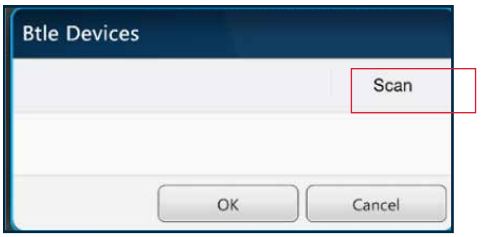
Select **Settings**:



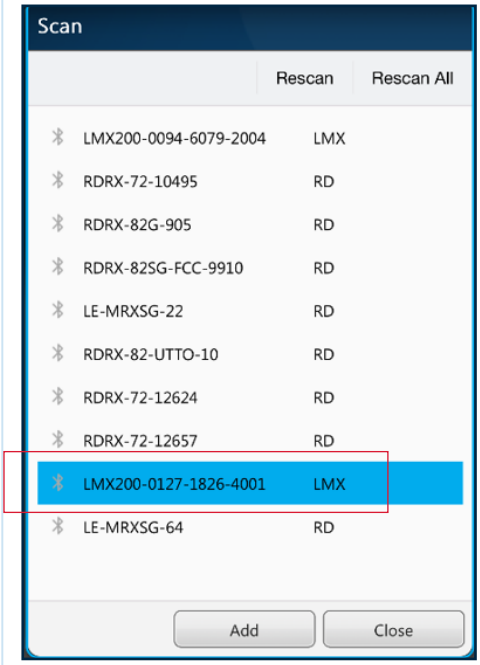
Select **Configure Btle**:



Select **Scan**:

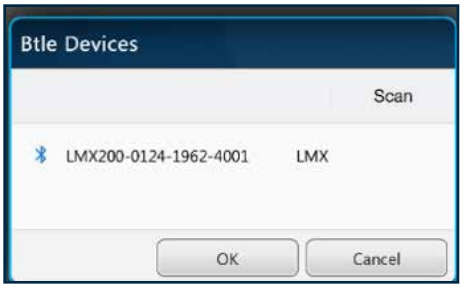


PointMan will scan the area for devices. Select the LMX device that matches the serial number listed on the **LMX Preferences** screen in the previous section.



Select **Add**.

When the LMX has been added, the **Btle Devices** screen should look like this:

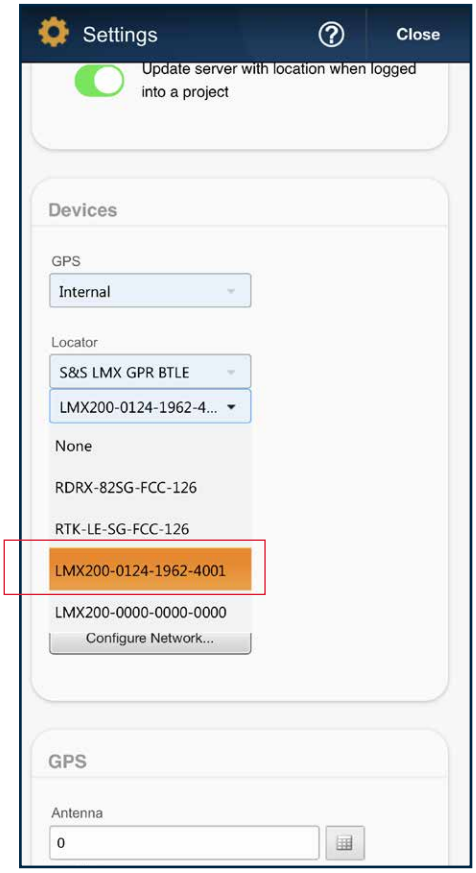


Press **OK**.

In **Locator dropdown menu** select **S&S LMX GPR BTLE** from the dropdown list.



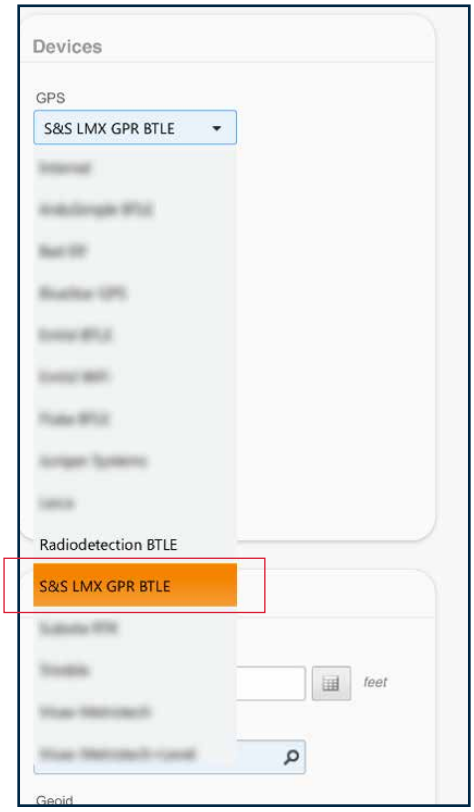
Select the correct LMX device from the **second** Locator dropdown.



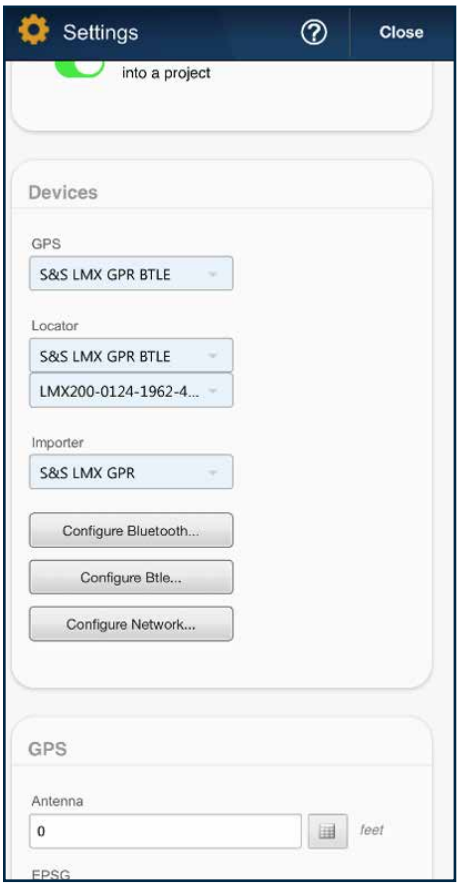
Select **Importer** and select **S&S LMX GPR** from the dropdown list.



Select **GPS**, and from the dropdown list, select **S&S LMX GPR BTLE** from the **GPS** dropdown list:



The **Settings** screen now looks like this:



The LMX GPR system is now ready to use with the PointMan app.

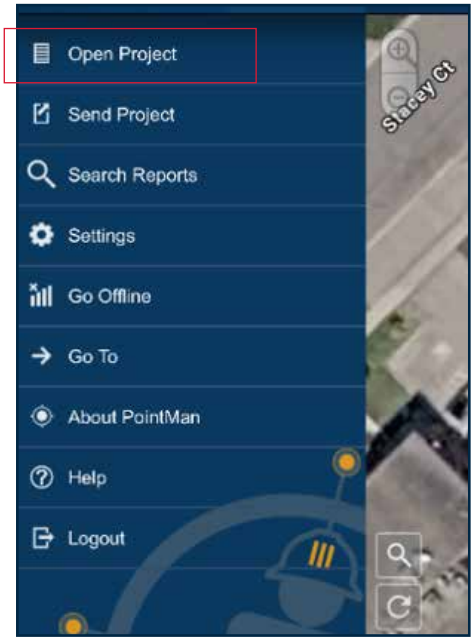
These settings remain saved in your PointMan app until changed, so after entering the LMX details into the PointMan settings, you don't need to do it again – you can start LMX GPR data collection immediately upon opening the PointMan app.

3. Sending LMX GPR interpretations to PointMan

Open the PointMan app on your Smartphone or tablet:



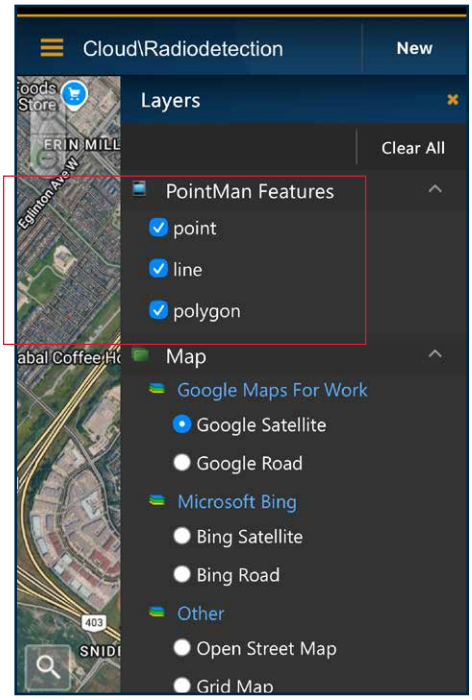
The app may open with the Project already opened (Cloud\Radiodetection GPR in this example). If there is no Project Name, select the menu (hamburger icon) from the top left and select **Open Project** and select the desired **Project Name** from the dropdown list.



Select the **Layers** icon:



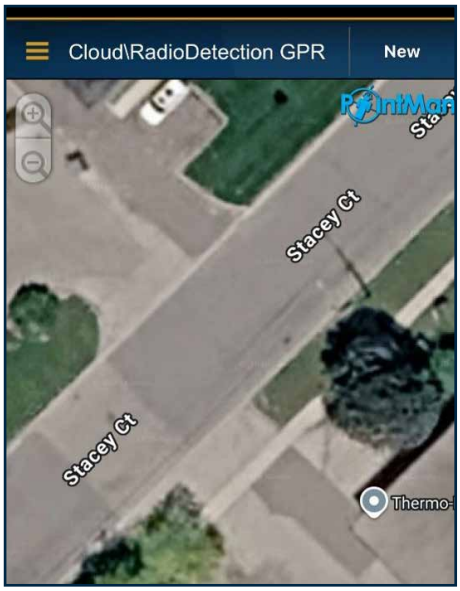
And ensure the **Layer** in the Project is checked so points added are visible on the PointMan map.



In this example, PointMan Features layer has point, line and polyline checked.

In this same menu, set the background Map to the desired background, **Google Satellite**, for example.

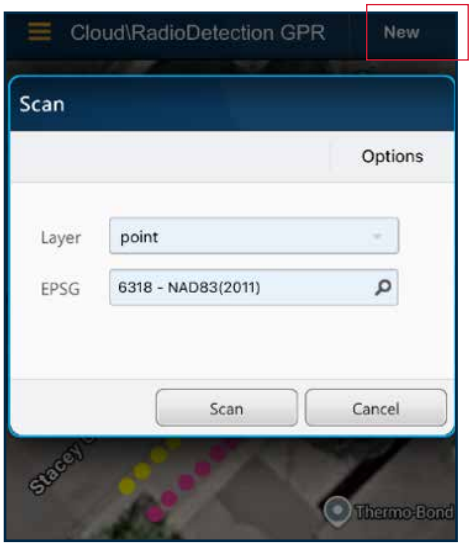
Exit from the Layers menu using the small x to the right of the word “Layers” and return to the PointMan main screen:



With the LMX GPR system close by and powered on, start collecting GPR data with the LMX GPR system in the SplitView™ screen:

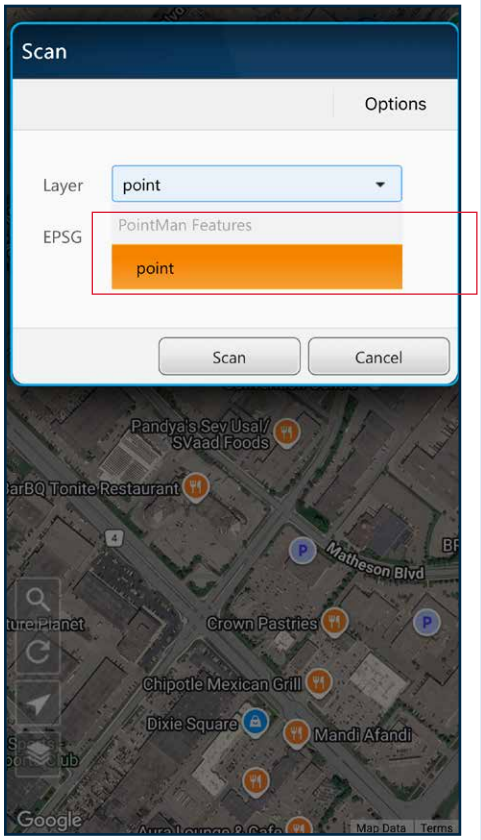


To map a target detected by the LMX GPR, on the PointMan app, select **New**.



Use the dropdown in the **Layer** field to confirm the "point" is for the same Layer, selected in the Layer option earlier.

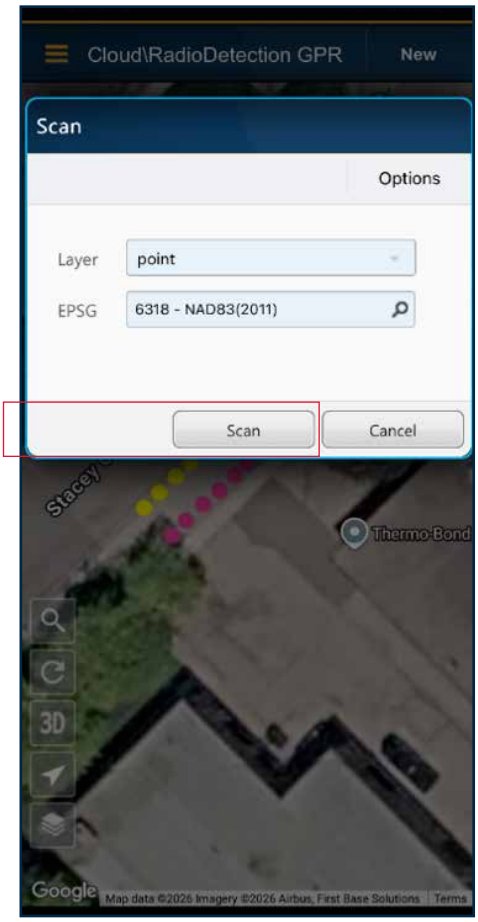
In the example, the PointMan Features layer.



Check the **EPSG** value and ensure it is set to the desired value for the map.

The most commonly used EPSG is **EPSG:4326** (WGS 84), but it may not provide sufficient positional accuracy for your region. Many regions have a specific EPSG, for example for North America, it is EPSG: **6318 (NAD83(2011))** while countries in Eurasia often use a region-specific EPSG based on **EPSG: ETRS89**.

Then press **Scan**.



When the LMX is connected to the PointMan app, you will see the Bluetooth icon on the LMX DVL screen with a green check mark and, once connected, the PointMan screen displays the LMX system serial number.



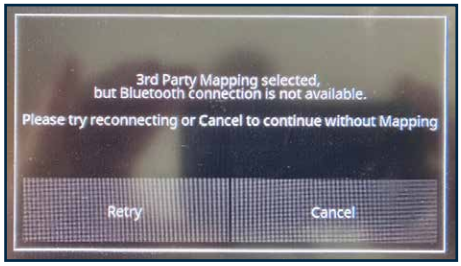
After finding a target of interest in the LMX data, typically a hyperbola, the first step is to conduct a Soil Calibration using the **Soil Cal** menu option on the LineView menu on the LMX DVL. See the **LMX Operations Manual** for details on performing a Soil Cal. An accurate Soil Cal ensures the **Depth** and **Point Elevation** values sent to PointMan are most accurate.

Then, touch the top of the hyperbola on the DVL screen.



Approximately one second after the interpretation appears on the DVL screen in LineView (on the hyperbola) and MapView (at the map position of the hyperbola), the interpretation is transferred to the PointMan app and plotted on the map.There is also an audio tone indicating the data was successfully transferred. Several point attributes are listed in the top right corner of the PointMan screen including the elevation and depth of the interpretation (see above).

If the transfer fails, an error message is written to the DVL screen. You can try to re-establish the Bluetooth connection and then retry sending the interpretation or hit Cancel to stop sending interpretations to PointMan for the rest of the GPR survey line.



If you make a mistake on the DVL screen, you can delete the interpretation (and the point in PointMan) by selecting the same color interpretation and pressing the interpretation on the DVL screen again. It will disappear off the DVL screen and the PointMan map.

Continue to add interpretations of different colors to targets in the LMX GPR LineView image on the DVL:



If a target scrolls off the LineView window on the DVL, use the left and right arrow buttons on the DVL to scroll through the GPR data; the orange portion of the GPR path shown in the MapView window indicates the section of the GPR line plotted in the LineView window on the DVL. For more details, see the LMX200 Operations Manual.

When finished adding all the interpretations to the GPR data, in the PointMan app, press the **Finish** button:

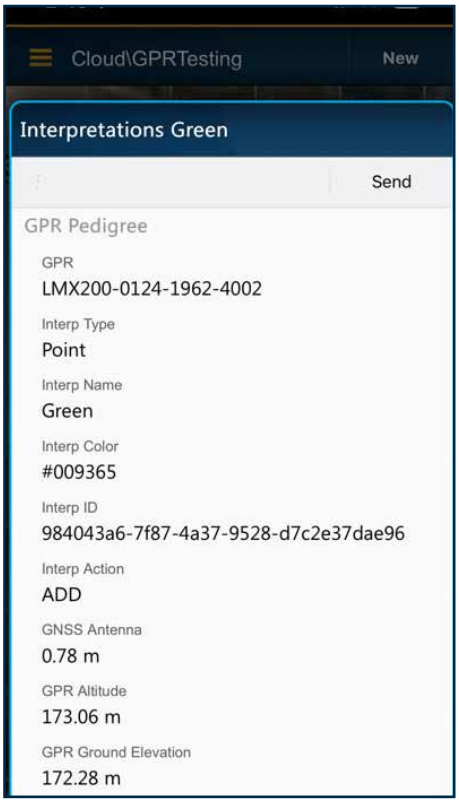


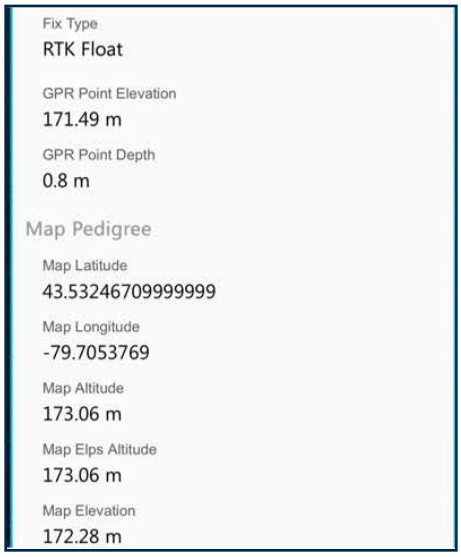
Note that interpretations can be added to the GPR data on the DVL and sent to the PointMan app during data collection and in data review mode, after stopping collection.

Interpretations added in data review while still on site, after the LMX system has been restarted or been moved to another location, can still be transferred to the PointMan app (provided the line or project has not been deleted).

4. Brief Overview of LMX GPR interpretations in PointMan

Each interpretation point added to PointMan is saved with many attributes. These can be displayed in or exported from the PointMan app. The most used attributes for GPR data are listed under GPR Pedigree and Map Pedigree:







Map Altitude is the altitude of the GNSS receiver on the LMX cart.

Map Elevation is the elevation of the ground surface (the height of the GNSS/GPS) above the ground subtracted from the **Map Altitude**.

Altitude and Elevation values vary with the **EPSG** value so ensure it has been entered into the PointMan app.

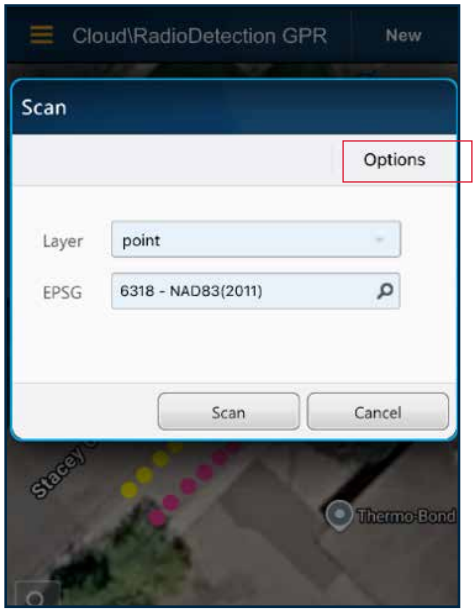
Point Elevation is the elevation of the interpretation added to the GPR LineView screen. This is the **Depth** of the interpretation subtracted from the **Map Elevation** (ground surface).

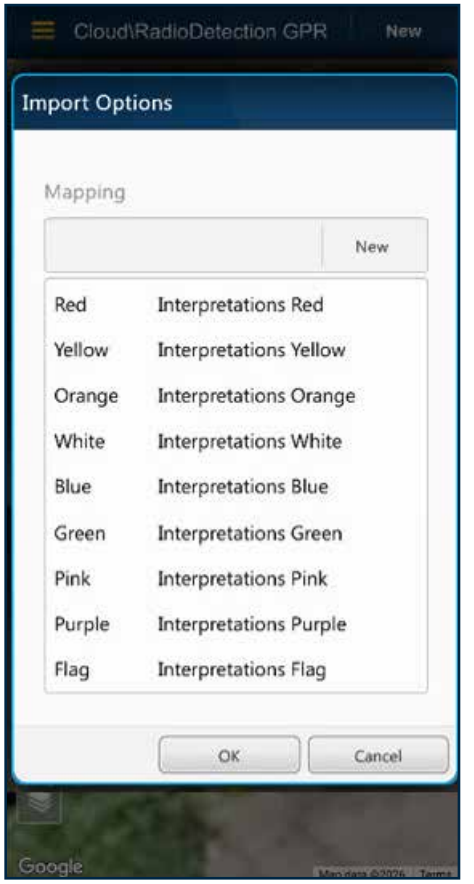
5. Customizing the PointMan GPR Dictionary

PointMan has a GPR Dictionary for the 7 interpretation colors that the LMX GPR system has available. To see these in PointMan, from the main screen, select **New**:

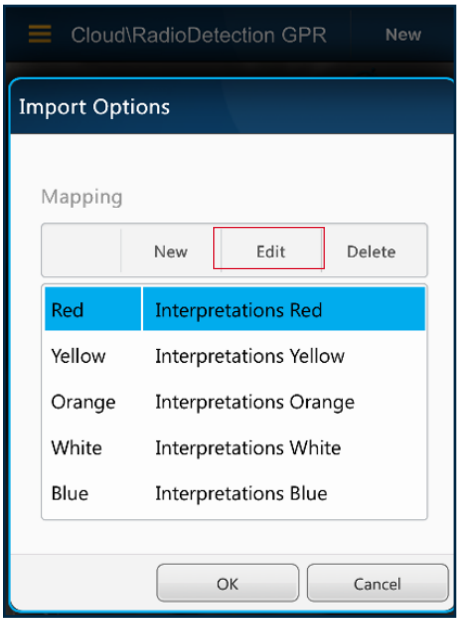


Then **Options**:

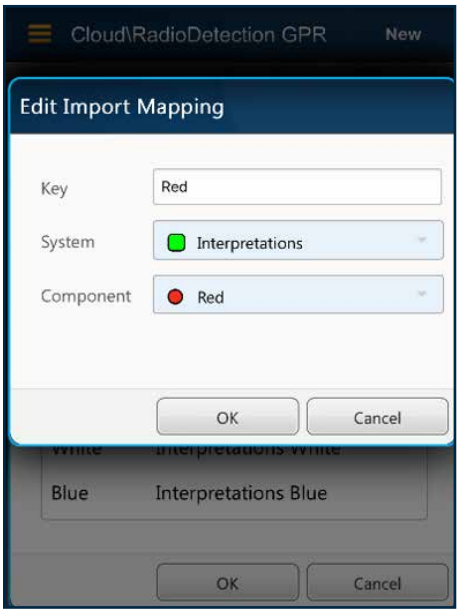




To edit the interpretations, select it and then select **Edit**:



This allows you to change attributes of the interpretation:

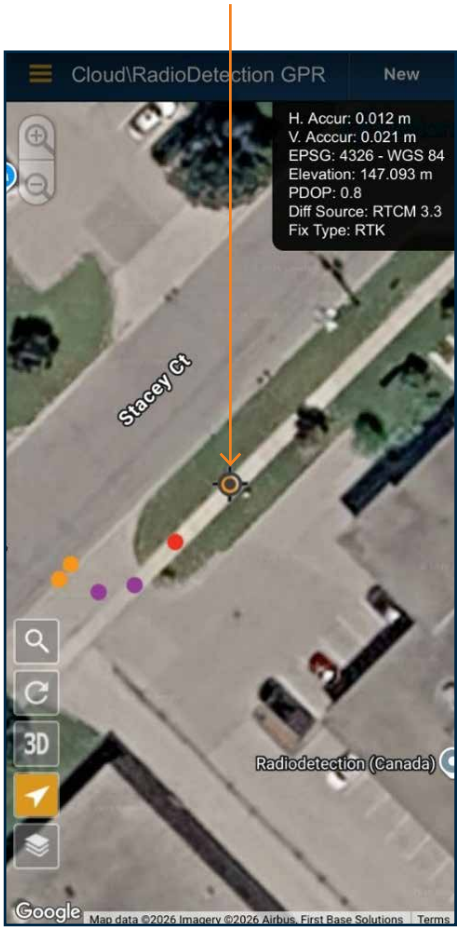


For more information, refer to PointMan training materials available at: https://pointman.com/tech-supprt-and-resources-pointman/

6 Editing GPS to see Cross-hairs in PointMan

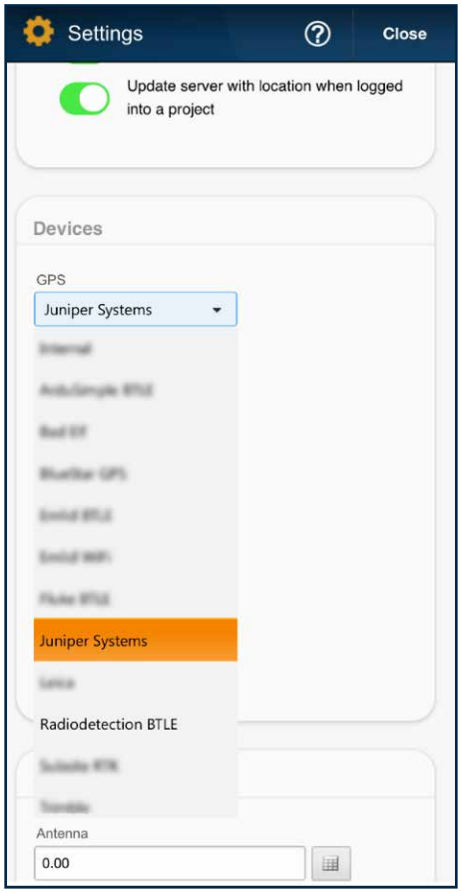
If the PointMan GPS setting is set to the recommended option **S&S LMX GPR BTLE**, the PointMan app uses the GNSS/GPS information from the GPS connected to the LMX. GNSS/GPS position is only sent to PointMan when an interpretation is added to the LMX DVL screen. The result is that you never see the cross-hairs in the PointMan app indicating your current position.

If seeing the cross-hairs indicating your current position in the PointMan map is desired, it is possible to connect the PointMan app directly to the LMX GNSS/GPS (option A or B below) or even another nearby GNSS/GPS, such as the GNSS/GPS in the device the PointMan app is running on (Option C below).



A. Juniper Systems® Geode™ GNSS supplied by Radiodetection/Sensors & Software

First, connect the Geode in your phone Bluetooth settings prior to adding it in PointMan. Then on the PointMan **Settings** screen, scroll down to the **GPS** settings and select **Juniper Systems™** from the **GPS** dropdown list:



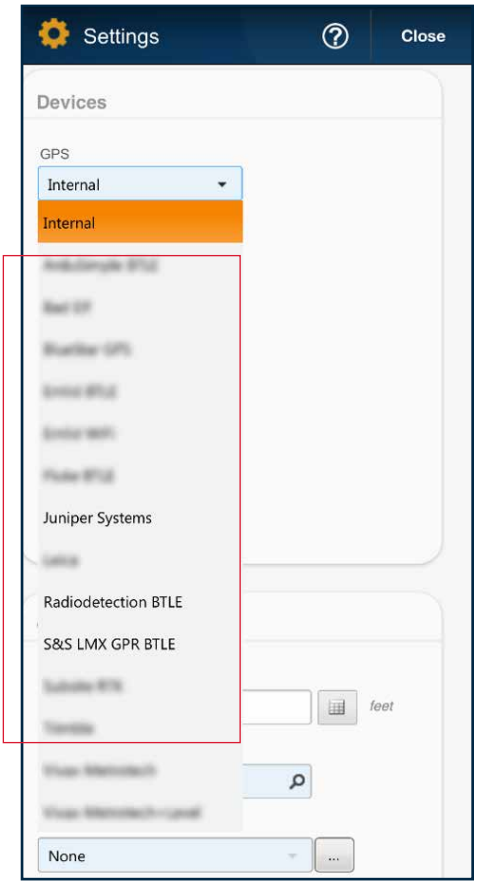
Set the GPS **Antenna** height to 0.00.

The LMX automatically outputs the corrected Ground and Utility Elevations based on the height of GNSS on the standard LMX mount (0.78m/2.56ft) on the LMX cart system, so there is no need to add this information to the **Antenna** field in PointMan.



B. Using an external GNSS/GPS that is not Juniper

On the PointMan Settings screen, scroll down to the GPS settings and from the GPS dropdown list, select the GPS/GNSS you have connected to the LMX GPR system:

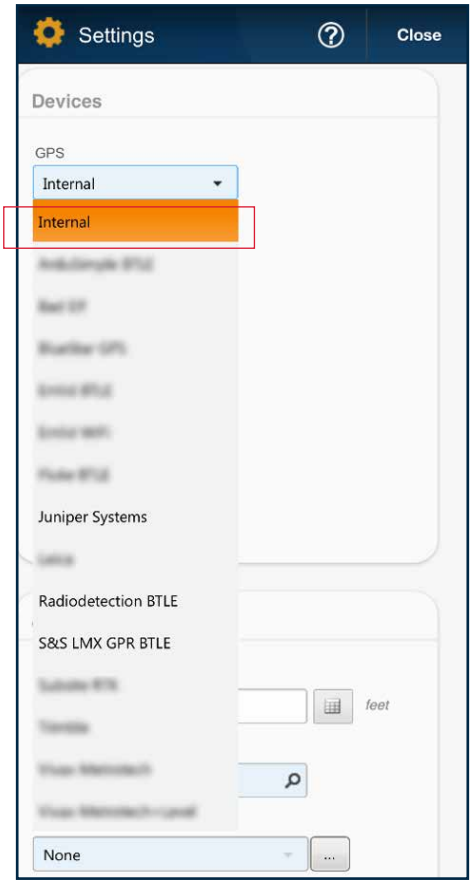


If the manufacturer of your GPS/GNSS is listed, select it. If the manufacturer of your GPS/GNSS is not in the list, contact PointMan for suggestions.

Note that the height of the GNSS/GPS is pre-set for the Sensors & Software GPS mount and Juniper Systems Geode GNSS (0.78m or 2.56 feet). If using another GNSS/GPS at a different height, you will need to enter the height difference in the GPS height field in PointMan (refer to PointMan documentation for details).

C. Using the PointMan app Device

Select **Internal** to use the GNSS/GPS from the device the PointMan app is installed on, for example, a cell phone.



Since the cell phone is not typically coincident to the LMX sensor, you may notice that when in GPS mode, as you move the LMX, the cross-hair will have inaccuracies in position due to the positional accuracy of the device.

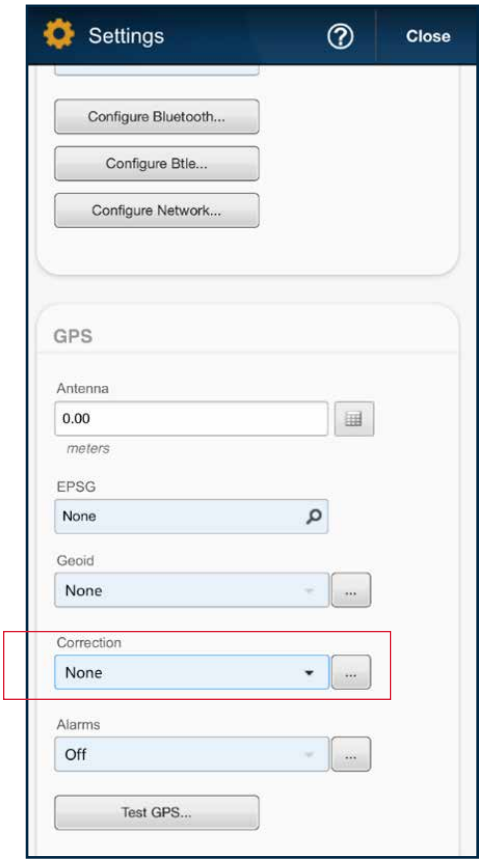
Note: Interpretations added on the LMX and displayed in PointMan use the position from the external GNSS/GPS connected to the LMX system and saved in the GPR data.

The GPS setting remains saved in your PointMan app until changed, so after entering the GNSS/GPS details to the PointMan settings, you don't need to do it again – you can start LMX GPR data collection immediately upon opening the PointMan app.

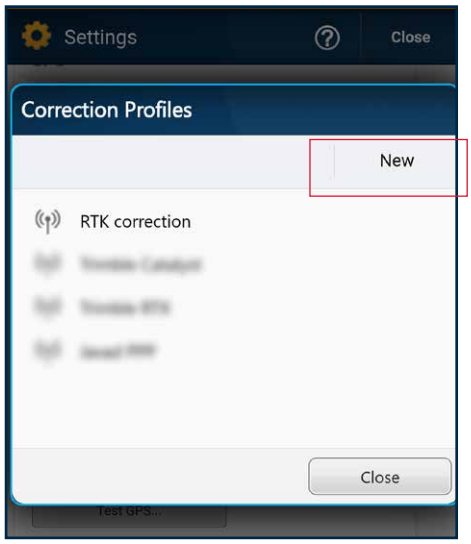
7 Adding your RTK Correction Details to PointMan

If you are using a GNSS/GPS with the LMX GPR system and have an RTK correction service, you can add your RTK correction subscription credentials to the PointMan settings to simplify setting up and using your LMX system.

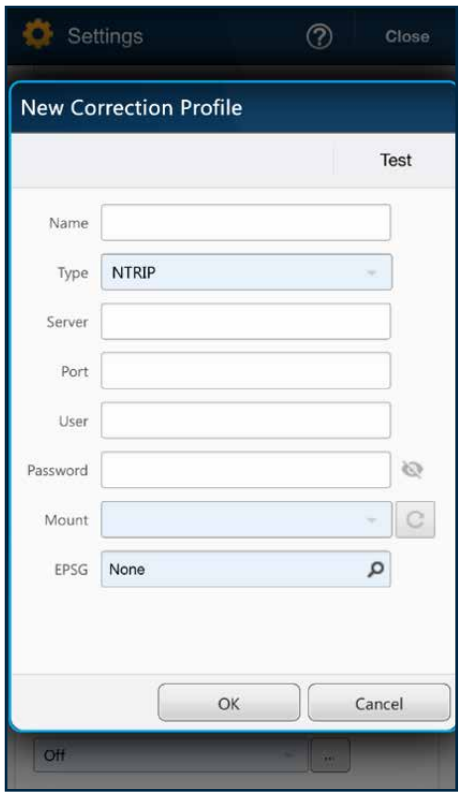
On the PointMan **Settings** screen, scroll down to the GPS section and select the button with three dots (...) on the right of the **Correction** field.



Select **New**:



A **New Correction Profile** opens to name and populate with your RTK license details:



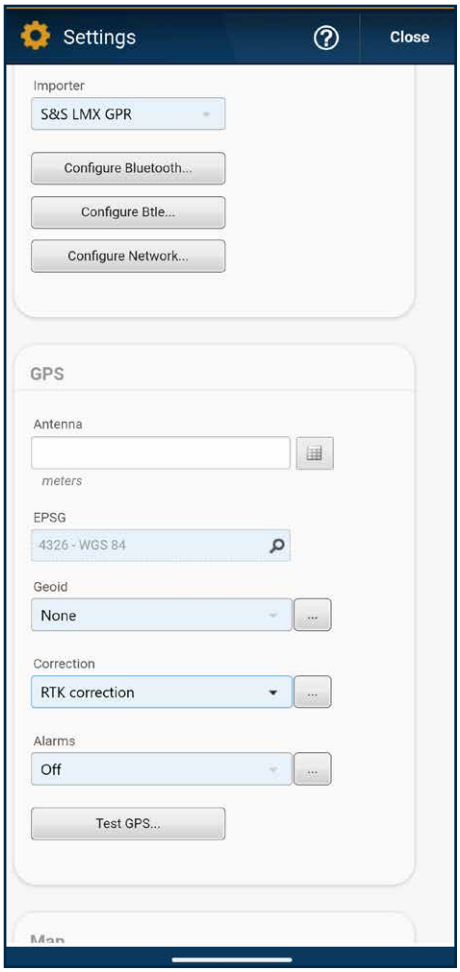
Here is an example:



The most commonly used EPSG is **EPSG:4326** (WGS 84), but it may not be accurate enough for positioning in your region. Many regions have a specific EPSG, for example for North America, it is **EPSG: 6318 (NAD83(2011))** while countries in Eurasia is often use a region-specific EPSG based on EPSG: ETRS89.

The EPSG set in PointMan MUST match the RTK correction service's coordinate reference system. If necessary, contact the RTK correction service.

The **Profile Name** you enter is added to the Correction Profiles list and is displayed in the Correction field, in this example, RTK Correction:



The GPS Correction settings are saved in your PointMan app until changed, so after entering the RTK correction credentials into the PointMan settings, you don't need to do it again – you can start LMX GPR data collection immediately upon opening the PointMan.

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