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Mission Planning Guide

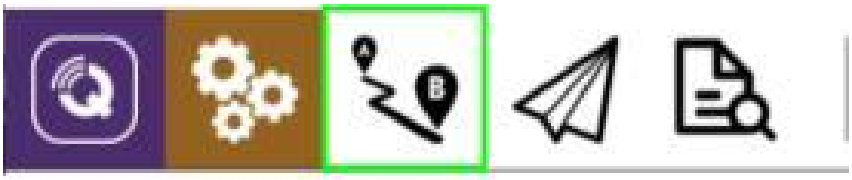
The following instructions are a basic guide to Mission planning in QGC, going over how to create a mission, select mission type, change speed, adjust camera settings and start a mission. Note: This applies to RGB camera payloads, dynamic options for lidar systems are not specified.

Mission Quick Start Guide

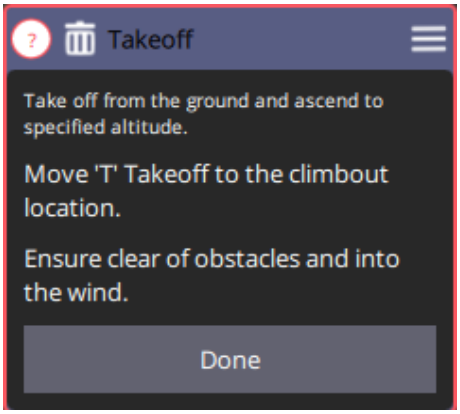
QGC mission planning was originally designed for fixed wing aircraft. As a result, some of the terms and values used do not apply to MultiRotor vehicles.

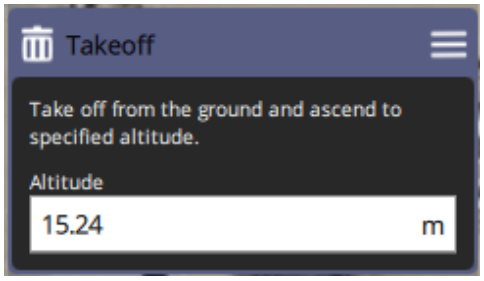
1. Mission planning

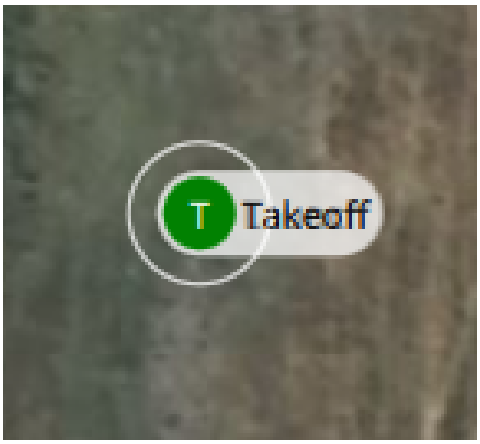
- Open QGroundControl and navigate to the Plan tab indicated by the waypoint symbol on your computer or Herelink Controller and select your desired plan type. For our sample, we used a Survey Plan.



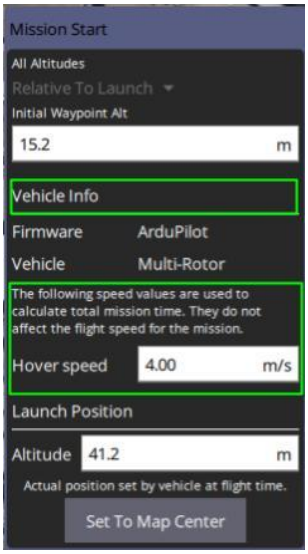
- Start by positioning your Takeoff point to the desired location on the map and click “Done” to bring up the Altitude selection. For our sample, we used 15.24M



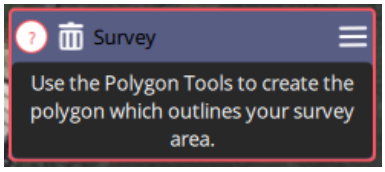


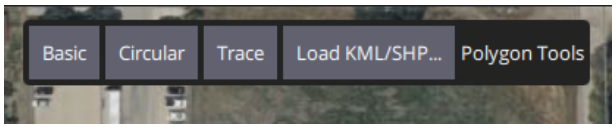


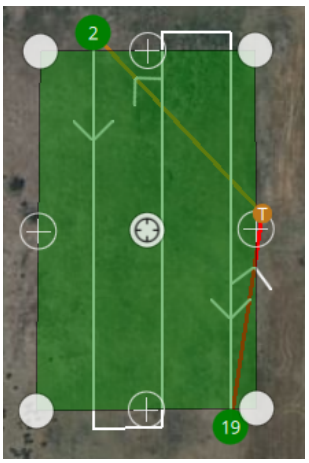
- On the right side of the screen find the Mission Start tab and select it to show the Vehicle Info dropdown. Under the Vehicle Info dropdown, the Hover Speed value is used as an estimate in QGC for the Total Mission Time and Photo Interval time. Our sample is set to 4 m/s. Note: Hover Speed in the Mission Start section is **only used to estimate** the time of the mission and photo intervals. To adjust actual Flight Speed, we will use a waypoint as shown later in the guide. Make sure the two values match to ensure accurate mission settings are achieved.



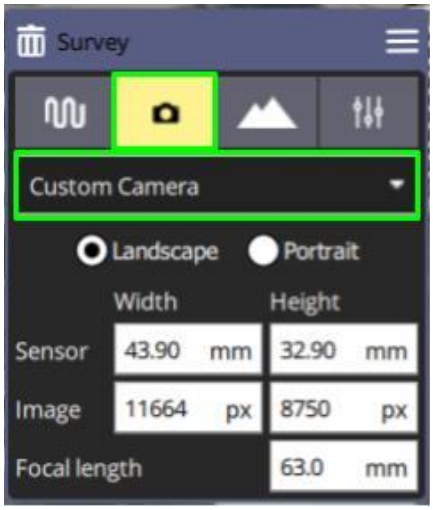
- On the right side of the screen under Takeoff, you will see the Survey tab. Select it to define your mission boundaries. Using the Polygon Tools, create your boundaries on the map. Selecting Basic will bring up a square border box and populate the Survey mission waypoints. Click and drag each corner of the boundaries to outline your mission area. Using the + icons, you can add new points to the boundary or by clicking and holding a white boundary point, you can delete a point by selecting “Remove Vertex”. When you are done the Survey tab will populate more settings.

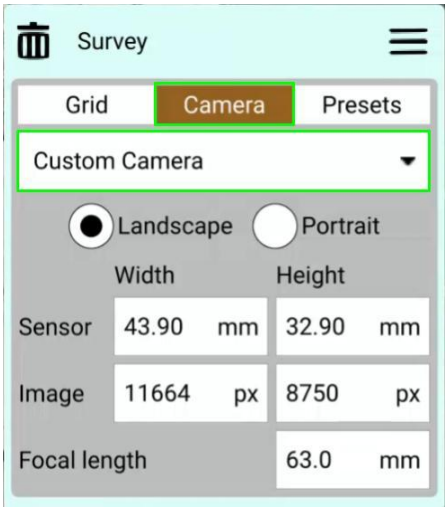




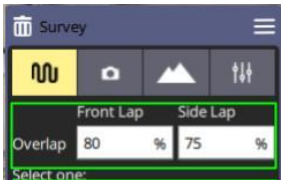


- Select the Camera tab to enter Custom Camera or Manual settings from the dropdown selection. Note: QGC already has several camera presets loaded and available in the software for commonly used cameras. For our example we used the Phase One iXM-100 Camera Specifications which are not a QGC preset so we selected Custom Camera from the drop down menu to input our settings. Your camera will likely be different and will need to have its individual settings input in this section.
    - Sensor Width: 43.9mm
    - Sensor Height: 32.9mm- Image Width: 11664 pixels
    - Image Height: 8750 pixels
    - Focal Length: 63mm Note: For the Phase One iXM-100 Camera it is important to calculate using the 35mm equivalent of the lens for QGC to interpret the data correctly.
- Custom Camera will automatically set Trigger Distance and Spacing based on the Sensor Height, Sensor Width, Image Height, and Image Width settings. Manual will allow you to manually determine Trigger Distance and Spacing without the need to enter camera specific settings.

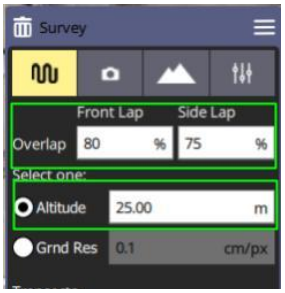




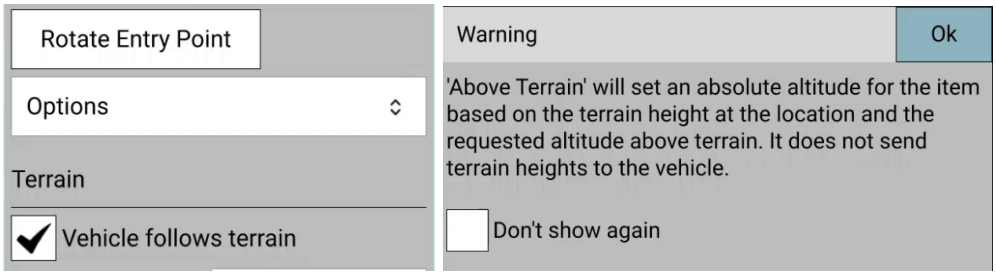
- Return to the Grid tab where you will seeOverlap will set how much the photos overlap when triggered during the mission. Enter the Front and Side Overlap for your mission, our sample uses 80% Front Lap and 75% Side Lap.



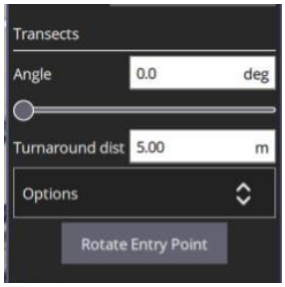
- Selecting Altitude will allow you to enter a height manually or Grnd Res to automatically calculate an altitude to achieve the resolution based on your settings. For our sample, we used Altitude set at 25M.



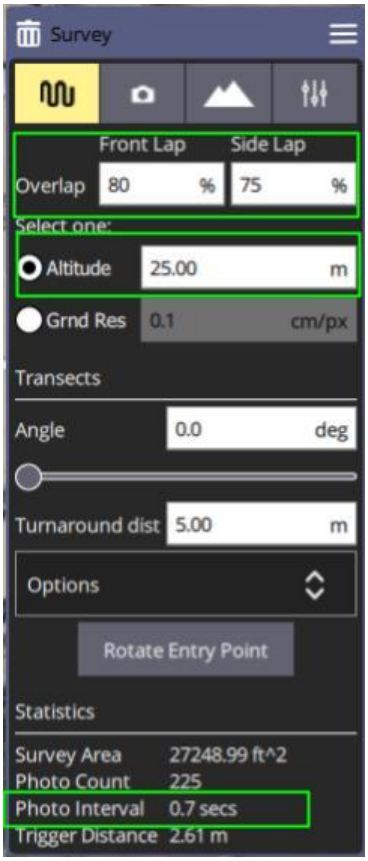
- To enable terrain following, use our QGroundControl Basic Guide to download offline maps and elevation data. With the map data downloaded, you can now use the Terrain Following checkbox located in the Terrain dropdown of the Mission located under the Rotate Entry Point Options.



- The transect angle allows you to adjust the orientation the vehicle will fly through the survey boundaries and turnaround distance adjusts how far beyond the edge of the survey boundaries the vehicle will travel. For our sample, we used 0 deg angle and 5M turnaround.



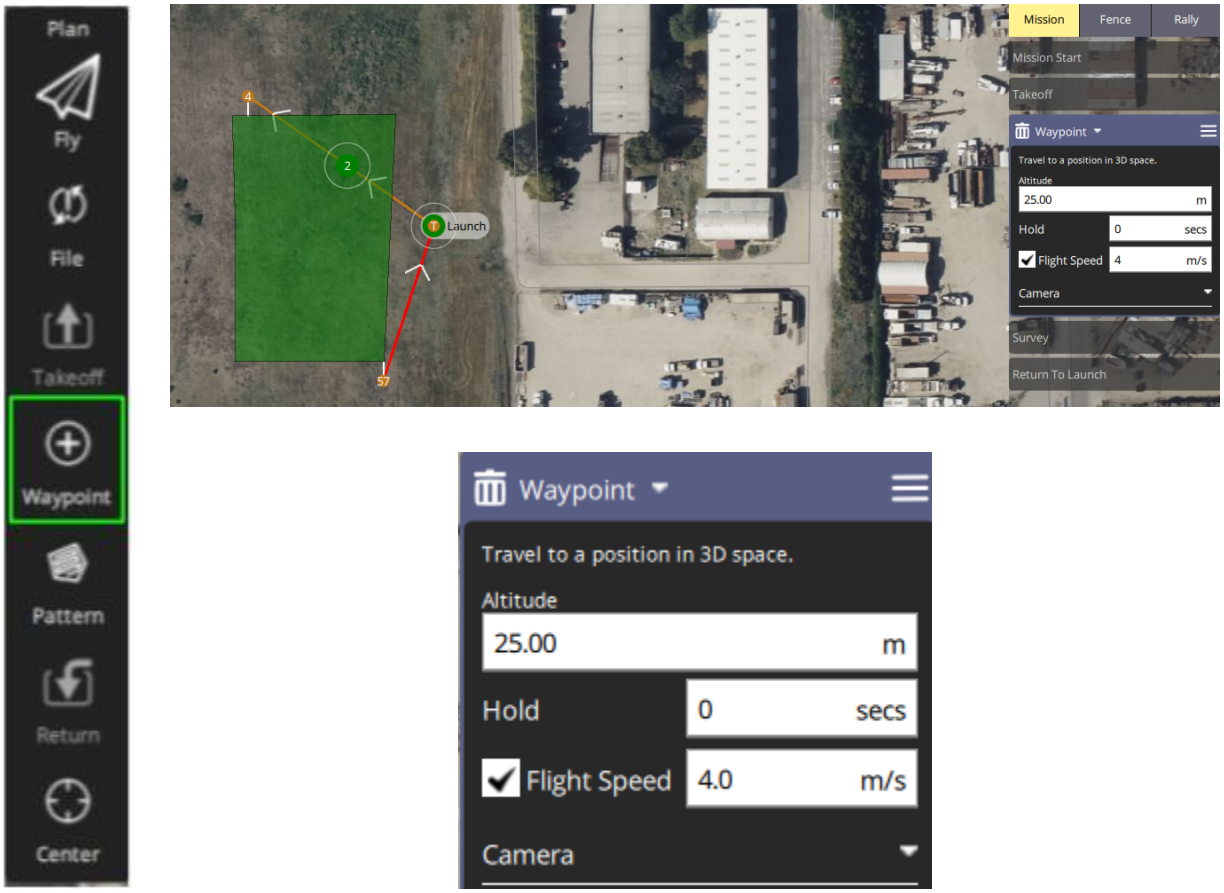
- Reviewing our sample settings, we have QGC outputting a 0.7 second Photo Interval. Note: Keeping the Photo Interval above 0.5 seconds will allow the camera time to keep up with the triggering events sent by QGC during the mission. **If the photo interval is too fast, the camera will stop taking photos**. Make sure the settings and mission speed allow the photo interval to remain above 0.5 seconds



2. Adjusting Mission Speed Parameters

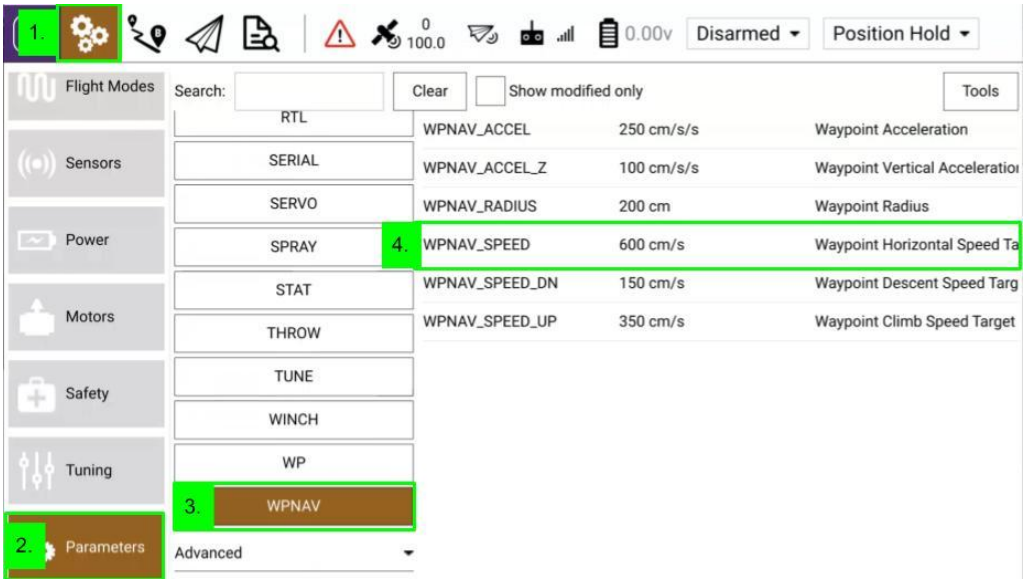
- Adding a waypoint to your mission will allow you to adjust the mission Flight Speed. Each waypoint is numbered in sequence. Select the Takeoff Tab and add a waypoint between Takeoff and Survey by selecting the Waypoint option on the left side of the screen and tapping the map to place a new point between Launch and the first survey waypoint, we will see a #2 added for our new Waypoint. Check the Flight Speed box and enter your desired speed. Checking Flight Speed adds a new action point to the mission plan so we see a #2 for our newly created waypoint and a #4 for our Survey Mission starting point. The #3 action is the change in Flight Speed. For our sample, we used 4.0 m/s. Note: Make sure

the Hover Speed shown in the Mission Start tab matches the adjusted waypoint Flight Speed to ensure accurate mission settings are achieved.



- After a waypoint with the Flight Speed checkbox, the remainder of the mission will proceed at the selected speed. Note: If you cancel and restart your mission from a selected waypoint (battery swap mid-mission, etc), the vehicle will default to the speed set in the WP_NAV_SPEED parameter unless it travels to a waypoint with a Flight Speed box checked. To change the default speed, you will need to change the WP_NAV_SPEED parameter, which will remove the need to create a waypoint to change the speed.
- To change the WP_NAV_SPEED parameter, **with the vehicle powered on**, select the Vehicle Settings icon, scroll down on the left and select the “Parameters” tab, then scroll down again to the “WP” parameters. WP_NAV_SPEED can be changed by selecting the value to the right of the parameter name, and changing the value. The units are in centimeters/second, so you will need to convert the speed you need for your mission. (Ex: 600cm/sec = 6m/s = 13.42mph) Note: Be aware that all vehicle parameters are accessible within the “Parameters” tab, and some, if changed, can create vehicle instability.

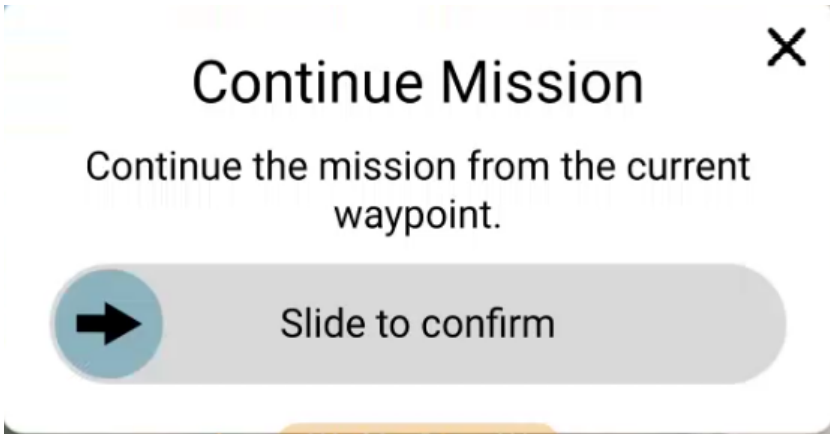
Please take caution when changing parameters, and avoid doing so as much as possible.



3. Starting a mission

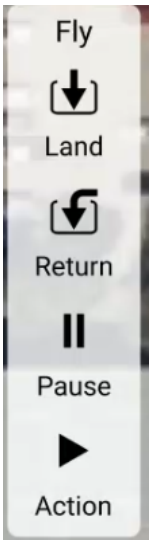
- Using the QGC mission plan screen, below the Fly option select File. There you can create a mission, save a mission for later use, open an existing mission or upload the mission plan to the vehicle. This can be done on a computer using QGC software or using the Herelink controller. When you are comfortable with your mission outline, upload your mission to the vehicle.

- With a Mission uploaded, the vehicle will now show a slider to start or continue the mission. Note: Always conduct a manual pilot takeoff to establish a stable hover, then sliding to continue your mission to ensure safe operation.



4. QGC Action Menu

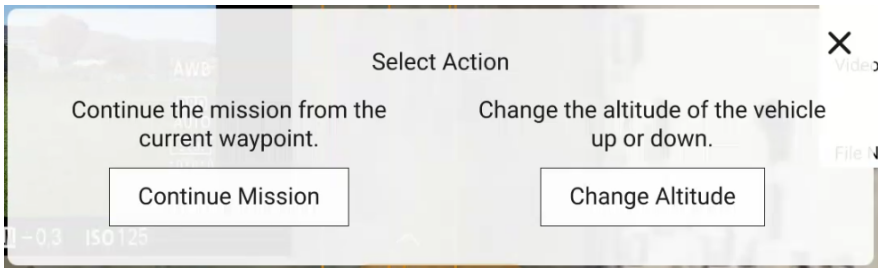
- On the left side of the QGC screen, you will see the Action Menu with Land, Return, Pause or Action options that can be selected to trigger one of the autonomous actions.



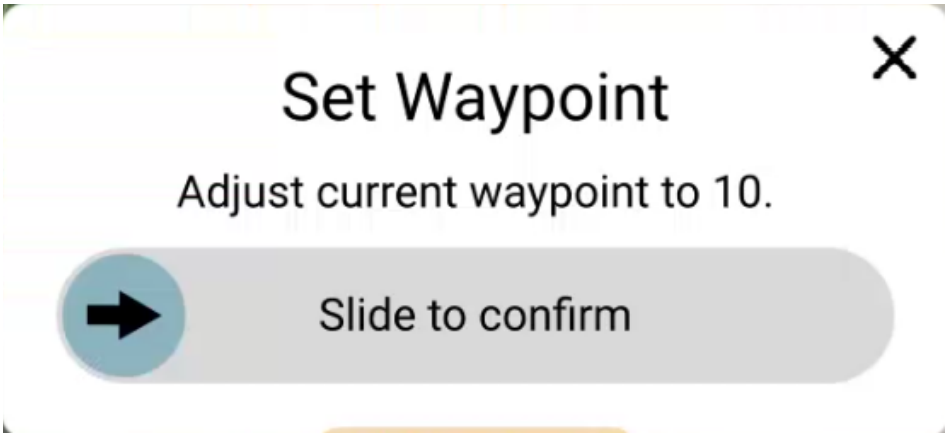
- Land will land the vehicle at its current position.
- Return will initiate a return and the vehicle will land itself at its takeoff location. (Same as pressing the Home button icon on the Herelink Controller)
- Pause will initiate “Brake Mode” where the vehicle will hover at its current position until a new command is given. Note: In “Brake Mode” the vehicle will not respond to manual flight commands and must be switched back to “Loiter” or “Position”

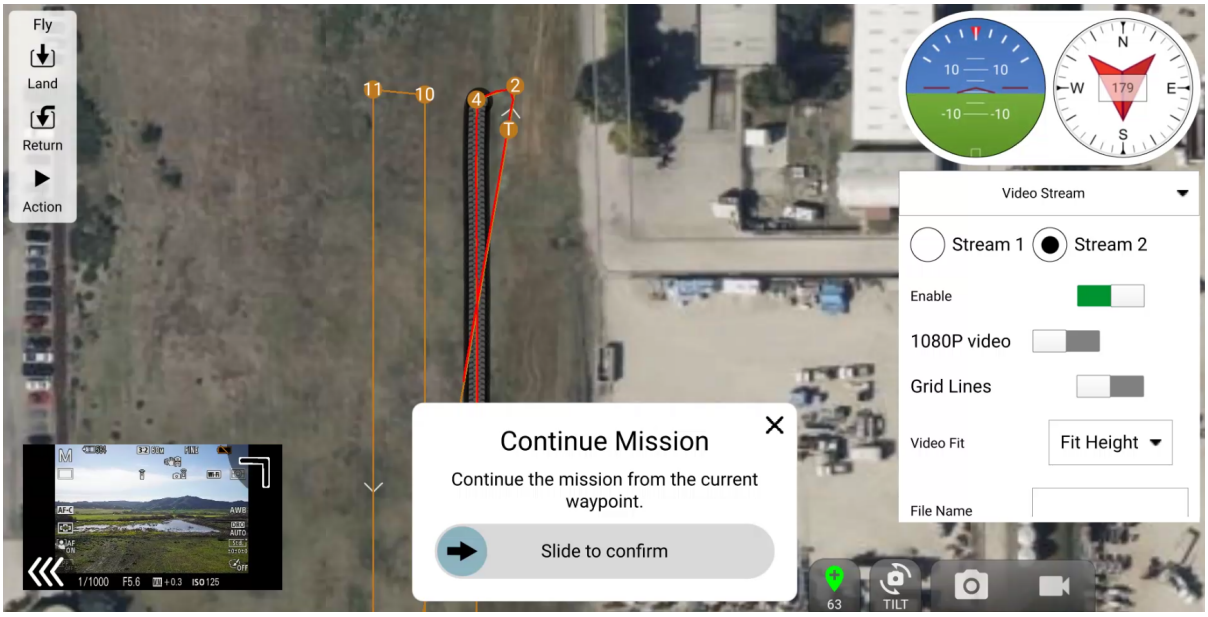
Flight Mode by pressing the A button on the Herelink Controller, or Selecting one of the Action menu options.

- Action will bring up options to select to Continue Mission or Change Altitude.



- To continue from a specified waypoint, click on the desired waypoint via the QGC map to bring up the slider to Adjust current waypoint. Slide to confirm and press the Action button to bring up the Continue Mission slider to resume from the selected waypoint.




Fly
Land
Return
Action
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-10
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S
Video Stream
Stream 1
Stream 2
Enable
1080P video
Grid Lines
Video Fit
Fit Height
File Name
Continue Mission
Continue the mission from the current waypoint.
Slide to confirm
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