The Ultimate Flight Planning Software

FlightPlanner User Guide

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Revision history:

Version	Author	Date	Changes
1.00	P. Dare	July 2015	Initial version
1.1	P. Dare	Jan 2018	New features added
1.2	P. Dare	Jul 2020	New features added

ALL USERS MUST READ THE SAFETY NOTICES AT THE END OF THIS DOCUMENT BEFORE USING ANY PRODUCTS PROVIDED BY SPATIAL SCIENTIFIC PTY. LTD. (OWNERS OF THE AEROSCIENTIFIC BRAND).

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Background

Step-by-Step Guide

This document will guide the user through how to install and use all three versions of FlightPlanner.

Although FlightPlanner is very simple to use, some understanding of aerial image acquisition is required. However, if you have purchased this software, or even if you're running the trial version, it is very likely that you already have some knowledge of aerial imaging.

In this guide, we will try to describe every single feature of the software, but as we're adding new features all the time, sometimes it is hard to keep up! Please let us know if we've missed something.

A complete understanding of how the software works will be gained by experimenting with different flight plans and using all the features. We encourage you to experiment as much as possible.

Please refer to Pages 9 and 10 to identify the features available to the version used.

About FlightPlanner

FlightPlanner is a powerful application for creating accurate airborne digital image acquisition flight plans. It comes in three different versions: Classic, Pro and Ultimate.

If you regularly undertake airborne image acquisition, either in manned aircraft or UAVs, you will be well aware of the need to create a flight plan. You have to know where to place the flight lines, so you can get the exact ground resolution (GSD) that you require, and just the right amount of overlap between neighbouring lines.

FlightPlanner will create flight lines over an area of interest defined by a polygon, or a path, based on imaging parameters specified by the user. The resulting flight plan, which is created automatically by the software, can be manually edited to create the desired result.

FlightPlanner is specifically designed to make the planning process quick and easy. You can vary all the imaging parameters to get the perfect flight plan. All the calculations are done fully automatically, meaning flight plans can be created in seconds. The interactive graphical environment is user-friendly and extremely easy to use. Trial versions need to be online, and once a license is used after a purchase, it is suggested to work online, unless you are using your own maps.

IMPORTANT NOTE:

All references and plan calculations to *height* mean *height above ground*, unless described as above sea level.

It is the responsibility of the person planning the mission that this convention is followed.

For example, a flight plan showing an altitude of 2000 feet and flying over land that has an elevation of 2500 feet above sea level, requires flying at an indicated flight level of 4500 feet.

FlightPlanner Versions

FlightPlanner Classic has all the basic functionality that a user could require: either import or draw a polygon and then create flight lines and camera trigger points based on user-defined imaging parameters. Results are output in multiple formats.

FlightPlanner Pro gives many extra features, including linear (path) flight plans, free draw mode and use of terrain models to create even more accurate flight plans. Importantly, users can import a background map to help with the planning process.

FlightPlanner Ultimate adds even more features to our award-winning software. Creating flight plans with flight lines of varying heights and importing unlimited numbers of background maps are just two important features.

Features	FlightPlanner Classic	FlightPlanner Pro	FlightPlanner Ultimate
Import .KML polygons	✓	✓	✓
Draw polygons on streamed background maps	✓	✓	✓
Database of dozens of DSLR and other cameras	✓	✓	✓
Add new cameras to the database	✓	✓	✓
Create parallel flight lines with cross lines	✓	✓	✓
Export in multiple formats (.KML, ForeFlight)	✓	✓	✓
Full support for the Aviatrix FMS	✓	✓	✓
Adjust planned flying height	✓	✓	✓
Calculate Mission Time	✓	✓	✓
Path flight line mode		✓	✓
Free draw mode		✓	✓
Selected entity information		✓	✓
Use terrain height when flight planning (DTM)		✓	✓
Import .KML for view only		✓	✓
Import static background maps		Limited to 1 map at a time	Unlimited
Vary trigger point heights		✓	✓
Create flight lines of different heights			✓
Import ESRI shape files and ASCII text files			✓
Import TopoFlight and Track'Air files			✓
Export flight line heights for Aviatrix Pro			✓

Features	FlightPlanner Classic	FlightPlanner Pro	FlightPlanner Ultimate
Infill flight lines			✓
Export flight plan into multiple heights of .fpl files			✓

… and many more features coming.

Updates and Upgrades

From time to time, AeroScientific will produce updates and upgrades to its product range. An update is a new version of the software with bug fixes, improvements and minor new features. An upgrade is a completely new release of the software which incorporates significant changes.

Updates are free, whereas upgrading will incur a fee. However, there is no obligation to upgrade if you are happy with the current version of the software. Download links for updates, and upgrades will automatically be sent to every registered user. Please make sure your contact details are up to date so that you will be able to continue to receive upgrades.

To install an update, it is wise to uninstall the current version first, before installing the new version. However, for upgrades, there is no need to uninstall the current version.

Any current valid licence code will also be valid for all updated versions of the same software. Upgrades, however, will require a new licence code, which can be purchased after the end of the trial period.

System Requirements

FlightPlanner will work on most versions of Windows.

FlightPlanner will not work on Mac OS (including iPhone and iPad). In the future we may look at supporting Mac OS, but currently we don't have any plans to do so.

Likewise, in the future we may also consider an Android version, but that's also not currently on our to-do list.

It is recommended that you have a keyboard and three-button mouse; FlightPlanner has not been optimized for use on touch-screen devices.

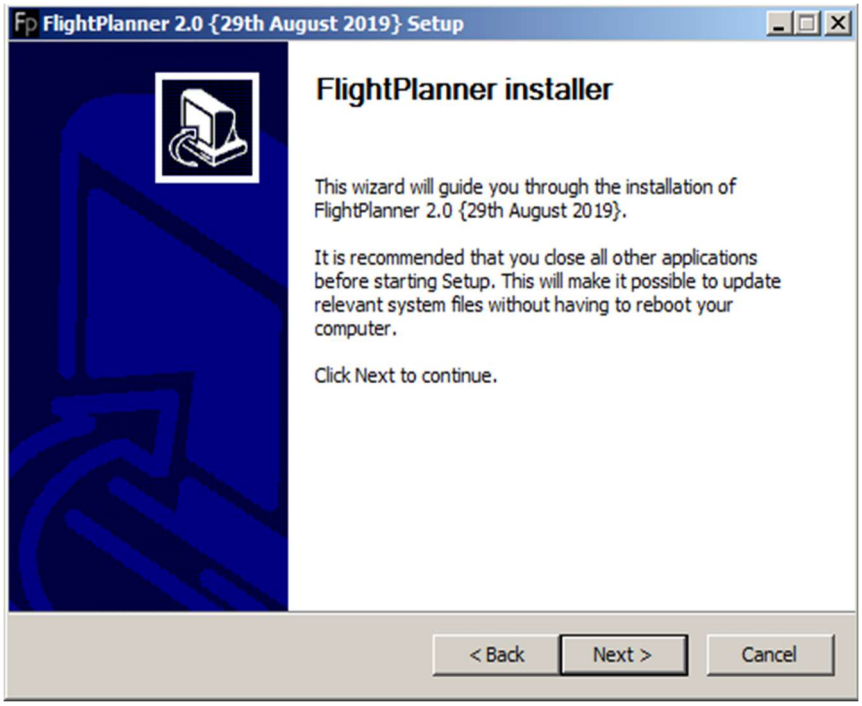
Software Installation

FlightPlanner software has been designed and thoroughly tested by AeroScientific to operate with devices running Microsoft Windows operating systems.

Note that the purchase of a licence is only valid for one computer – the licence cannot be moved between computers. If you want to use FlightPlanner on a second computer, you will have to purchase a second licence.

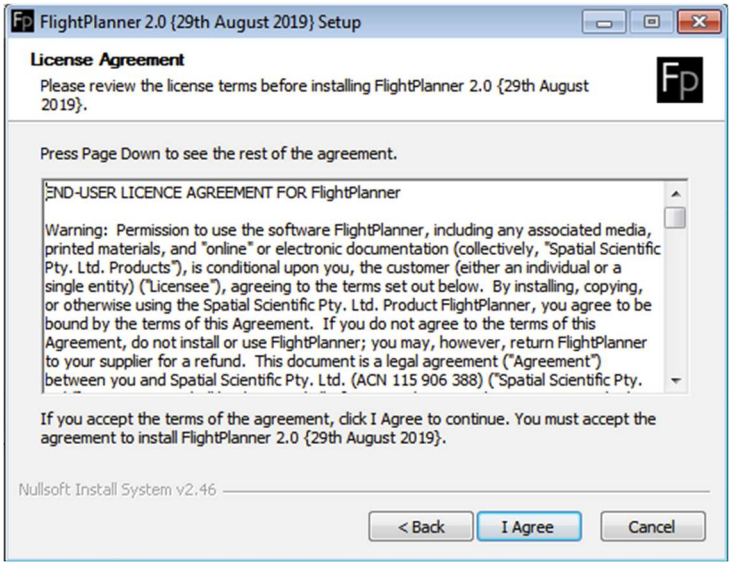
1. Prior to the installation window appearing, some users may see a security window appear. In order to begin the installation process for FlightPlanner, the user must ALLOW the software to make changes to their device. These changes are required for the installation process.

   Double click the file marked "FlightPlanner_[DATE]_Setup_x64" to initiate the installation procedure. This should bring up the installation window, as shown below. This window will guide the user through the installation process required for FlightPlanner. Press NEXT to continue.



NOTE: *You may need to run the installation file as an* ***Administrator*** *to install this software. You can do this by right-clicking on the .exe file and click "Run as Administrator." If you can't see this option, or can't "Run as Administrator in any way, please refer to* Insufficient Privileges in Troubleshooting and Issues at the bottom of this document.

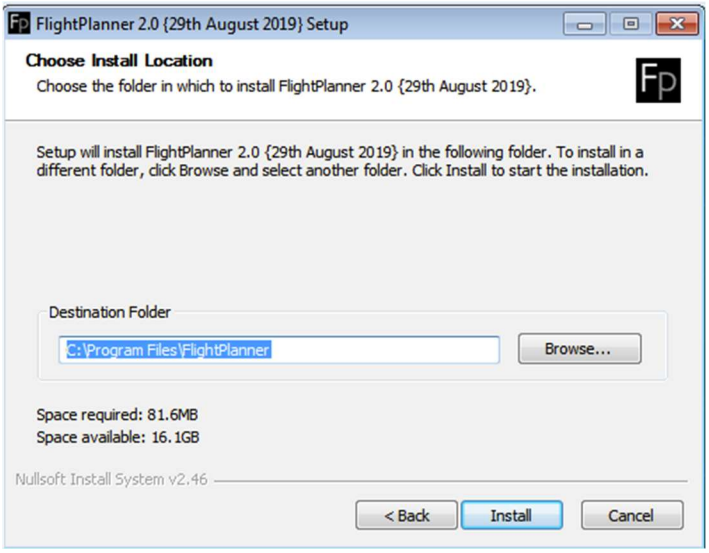
2. The next window is the licensing agreement. The user must select I AGREE to proceed with the installation.



3. The next window allows the user to select the folder for installation. The default for most users will be the C drive, as shown.

   The space available in the installation folder must exceed the space required for the FlightPlanner programme.

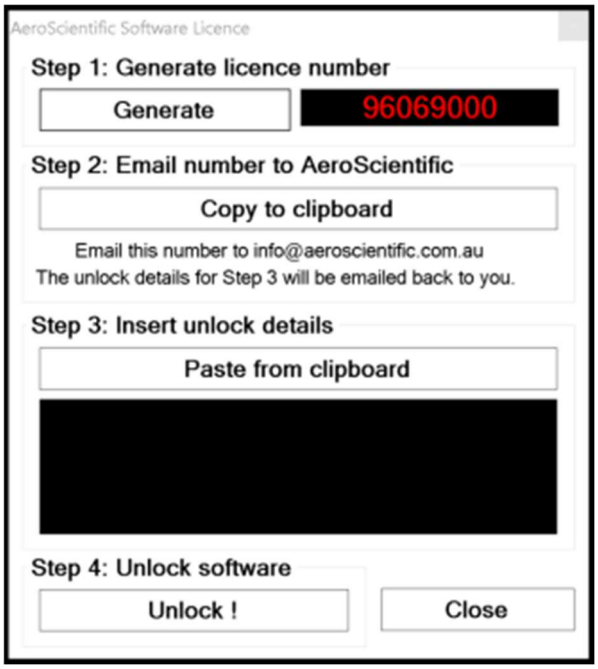
   Other folders may be selected by the user via the BROWSE option. Once the correct folder has been located, proceed by selecting INSTALL.



This will bring up a window with a progress bar. While the installation is underway the user will not be able to close this window.

Once you've successfully installed the software, you'll need to unlock the software.

Unlocking the Software



1. Click the "Generate licence" button.
2. Copy the 8-digit licence number and send it to us at: info@aerosci.info. The user may utilise the 'Copy to clipboard' option for ease of use when copying and pasting the licence number to our email.
3. We'll send you an unlock code.
4. Paste the unlock code into the black box provided.
5. Click "Unlock!".
6. A dialogue window will confirm that the software has been successfully unlocked.

Restart the program, online.

NOTE: If you're on a trial version, you'll have FlightPlanner Pro version for 30 days, unless Ultimate is requested.

Installation — Troubleshooting and Issues

Cancel Option

Selecting CANCEL at any point of the installation in the FlightPlanner Setup window will cause the window to close and installation progress to be lost. To resume installation after selecting CANCEL the user must launch the file marked "FlightPlanner_[DATE]_Setup_x64" again.

Insufficient Privileges

To install FlightPlanner and its component software, the user must have sufficient privileges to make changes to their device. If, during any part of the installation procedure, a message window appears saying the user has insufficient privileges to make changes to their device, the installation for FlightPlanner cannot proceed. The user must receive administrator privileges from the device's administrator to continue the installation procedure. Once these privileges have been granted, it is recommended that the installation be started again from the first screen.

Older Devices and Operating Systems

Older devices may be incompatible with FlightPlanner if they are running 32-bit operating systems (OS). FlightPlanner has been compiled for 64-bit computers only. This means that it is ONLY compatible with devices running 64-bit OS and NOT compatible with devices running 32-bit OS. It is NOT possible to install FlightPlanner on a 32-bit system. To identify if a device is running a 32-bit OS, see Microsoft Support.

Installation Failure

If the software fails to install or the user is presented with an 'Installation Failure' message, close all windows and reboot the device. If this issue is persistent after rebooting the device several times, contact technical support through the AeroScientific website, support page.

Slow Installation Progress

If the user finds that the installation is progressing at a very slow rate, there are steps that can be taken to speed up the process. Firstly, check that no windows

related to the installation are open and requiring action. If there are no other installation windows open and the installation is still progressing at a very slow rate, close any other non-essential windows open on the device. Installation procedures require access to a large amount of the device's RAM (Random Access Memory) and can progress much more slowly when other programmes are open and accessing the device's RAM.

OS Settings and System Problems

It is possible that OS or system settings on the user's device may conflict with the FlightPlanner installation procedure. To determine if this is the case, boot the device in Safe Mode (on a Windows device this is done by holding the F8 key as the system boots) and run the installation procedure again. If the installation works while the device is in Safe Mode, it is recommended the user review their system settings. Safe mode disables non-essential processes the device runs when it boots, running the installation while the device is in Safe Mode helps to isolate possible problems.

Firewall Conflict

Firewalls installed on the user's device may attempt to block parts of the FlightPlanner installation procedure. Most commonly the firewall will bring up a window asking the user whether to proceed with the installation. The user must select the YES or 'Proceed with Installation' option when this window appears. To check whether the firewall is blocking the software from running, check the firewall settings and list of blocked programmes.

Latest Software Version

Before contacting an AeroScientific technician, it is recommended that the user ensure they are running the latest version of FlightPlanner on their device. FlightPlanner is updated regularly to fix software issues and maintain compatibility with the latest camera and aerial survey systems as well as with devices. It is important for the user to keep their software updated to maintain this compatibility. A link to the latest version of FlightPlanner can be requested on the 'Support' section of the AeroScientific website.

Basic Operation and Import Functions

Flight Planning Workflow Overview

1. Define the area of interest to be imaged by creating a polygon or path.

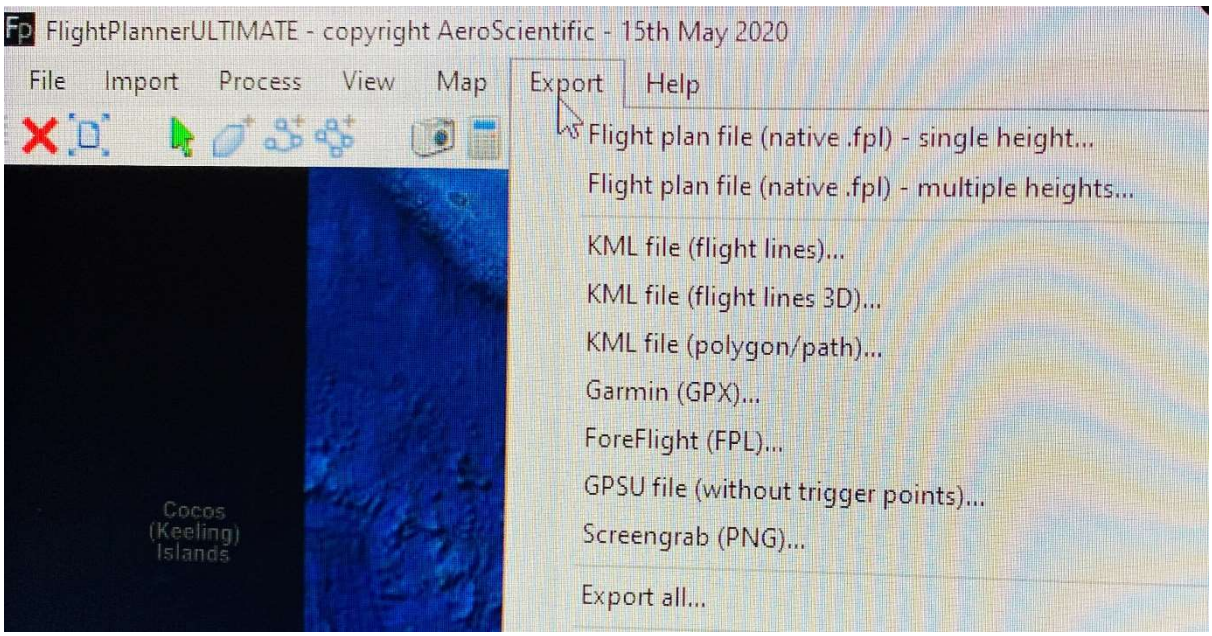
2. The polygon/path can be created in FlightPlanner itself, or it can be imported. Different versions of FlightPlanner have different import options.

3. Specify the camera and imaging parameters. FlightPlanner contains a database of dozens of cameras, or the user can add their own camera to the database.

4. Generate the initial flight plan.

5. Manually modify the generated flight plan if needed, to better meet the project requirements. For example, you may need to alter flight run directions to avoid restricted airspace when turning.

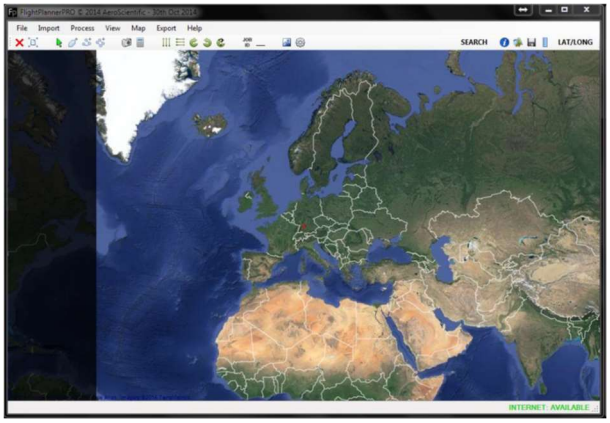
6. Export the flight plan and associated data.



Starting FlightPlanner: Online/Offline Mode

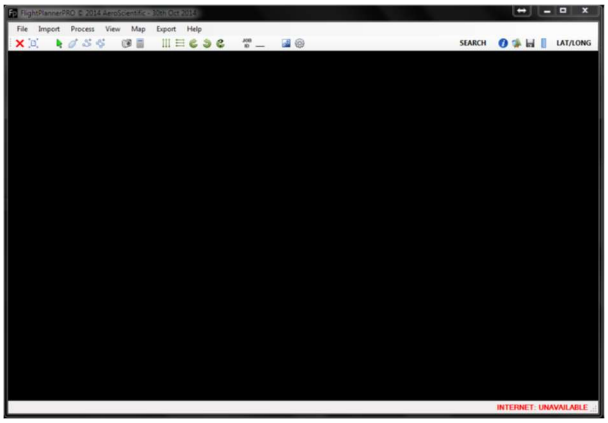
When FlightPlanner is started, it will operate in one of two modes: Online Mode or Offline Mode, depending on whether there is an internet connection. If the computer is connected to the internet, then by default FlightPlanner will start in online mode. If no internet connection is detected, then offline mode is automatically activated.

Online mode



In online mode, live maps are streamed over the internet. The user can pan/zoom the map to the location where the flight plan is required. It is then possible to draw the polygon or path for the area of interest and create the flight plan.

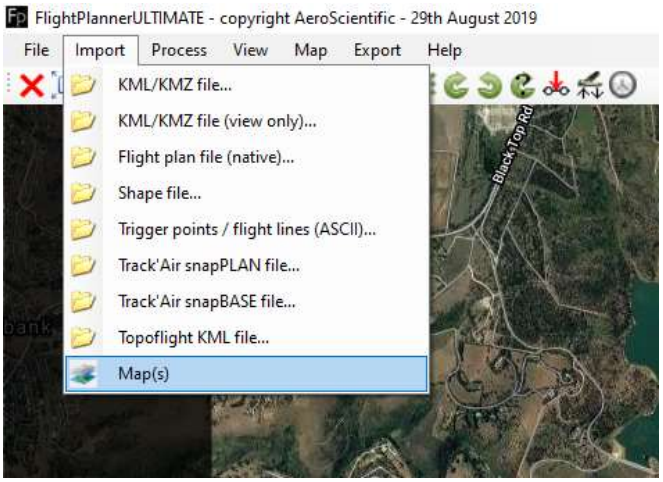
Offline mode



In offline mode, the live maps are not available. The user can either import the polygon/path (e.g. as a .KML file), or load a background map, and use that to define where the polygon/path should be drawn.

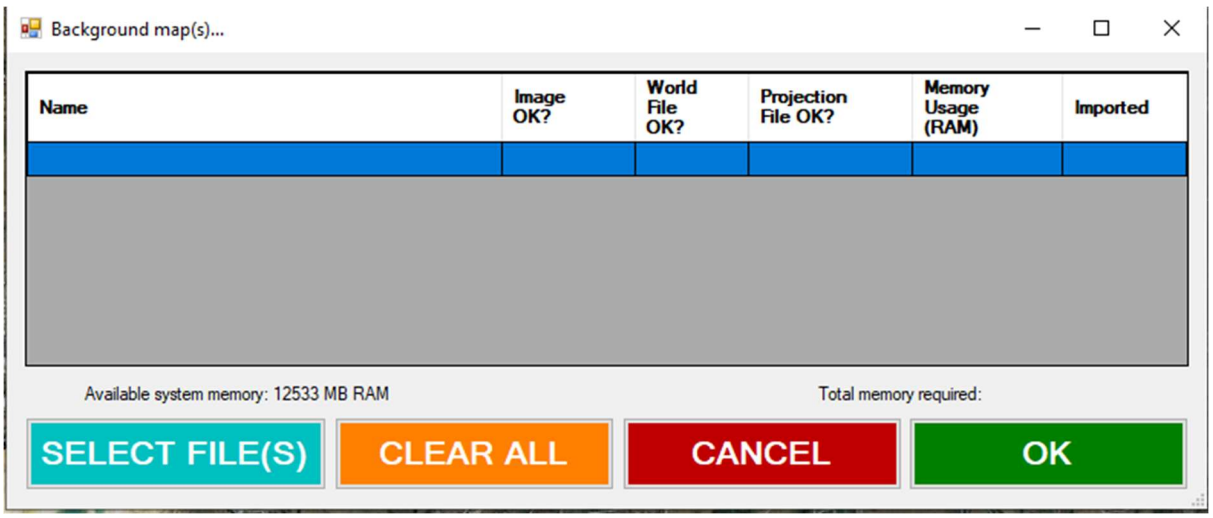
Importing Background Maps

Irrespective of whether FlightPlanner is running in online mode or offline mode, the user can import background maps (one at a time for Pro, and unlimited for Ultimate).



The function for importing background maps can be found under the Import menu:

Clicking this function brings up the import maps dialogue box:



It is important that background maps are formatted correctly. FlightPlanner will check for the correct format, but the user should try to ensure that the correct format is used.

Background maps must have a geographic projection. The ".prj file" should contain the following information:

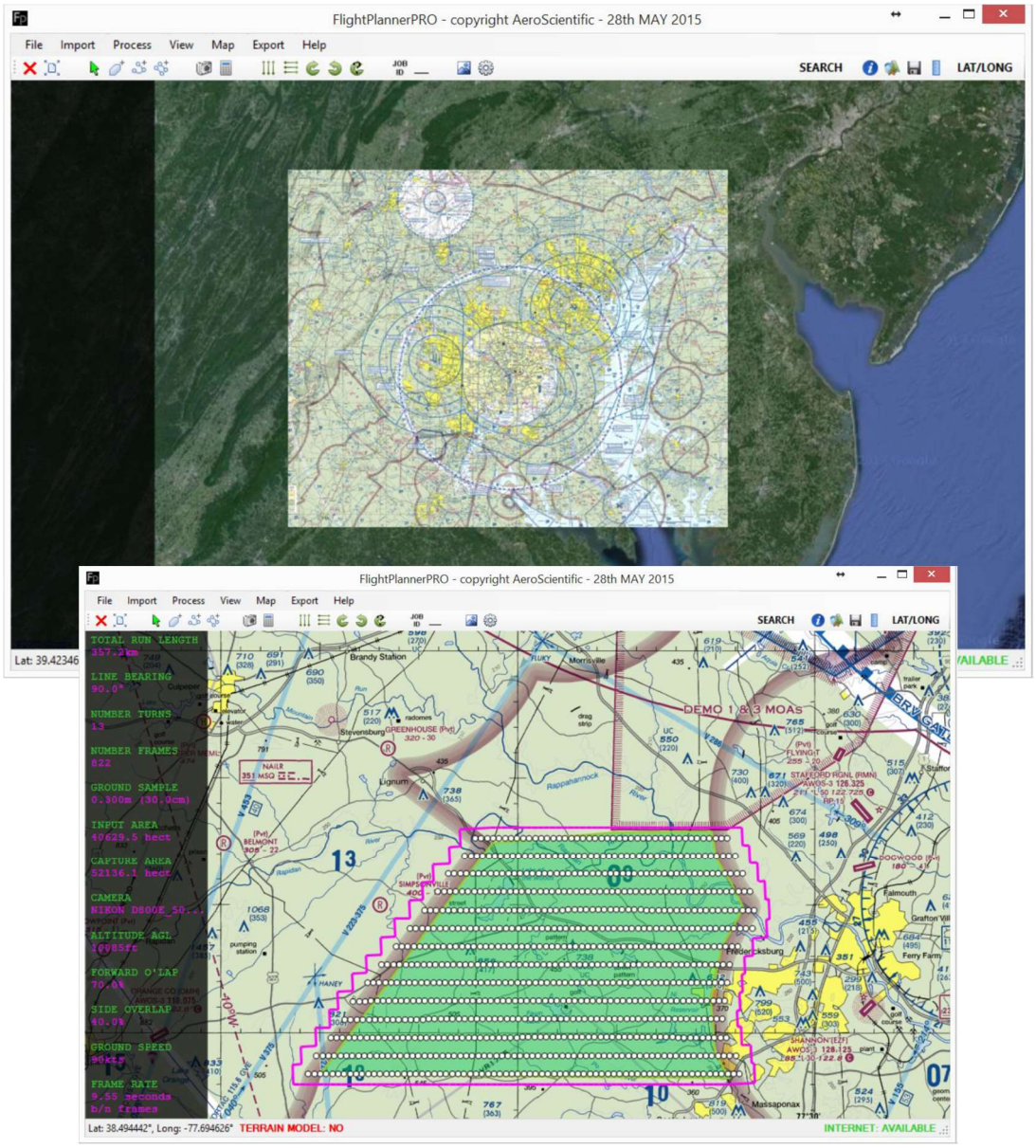
```
GEOGCS["GCS_WGS_1984",DATUM["D_WGS84",SPHEROID["WGS84",6378137,29
8.257223560493]],PRIMEM["Greenwich",0],UNIT["Degree",0.0174532925
19943295]]
```

FlightPlanner Pro or Ultimate only

Background maps must either be .jpg, .tif or .png images. They must have corresponding world files (.jgw, .tfw, .pgw), and obviously the .prj file. Appropriately formatted background maps can be created in any common GIS (geographical information system) software package. Our recommendation is Global Mapper.

The advantages of being able to use background maps are significant:

- FlightPlanner doesn't require an internet connection
- Specialist maps can be imported (airspace maps, topographic maps etc.)
- Maps can even be image mosaics created from previous acquisition flights over the same region



FlightPlanner Pro or Ultimate only

Importing a Polygon or Path

A polygon or path is required to define the area where the flight plan is required.

Polygons/paths can either be drawn in FlightPlanner using the drawing tools, or they can be imported.

Different versions of FlightPlanner allow the import of different file types:

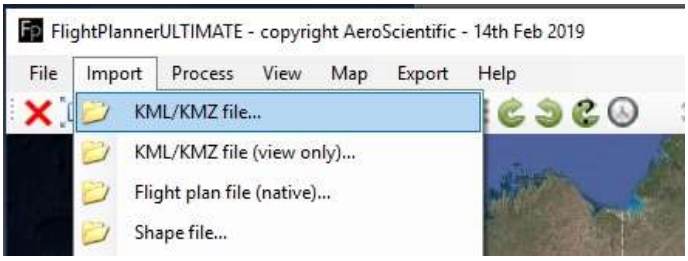
- Classic and Pro: .KML, .KMZ
- Ultimate: .KML, .KMZ, ESRI shape, ASCII, Track'Air, Topoflight

All versions of the software can load FlightPlanner's own proprietary format flight plan files (.fpl).

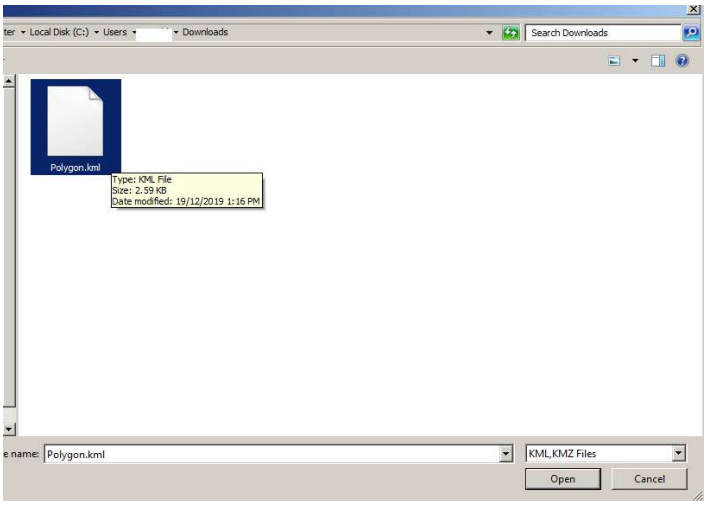
NOTE: Only FlightPlanner Pro and Ultimate have the path tool feature enabled.

Importing a KML/KMZ file

1. After starting FlightPlanner, click Import → "KML/KMZ file…"



2. Browse for the KML/KMZ file you wish to import and click "Open". *Make sure your file is a KML/KMZ for it to appear in the file browser.*



NOTE: Once the KML/KMZ file has successfully been imported, click "Yes" in the pop-up window to begin selecting the camera properties and generate the flight plan.

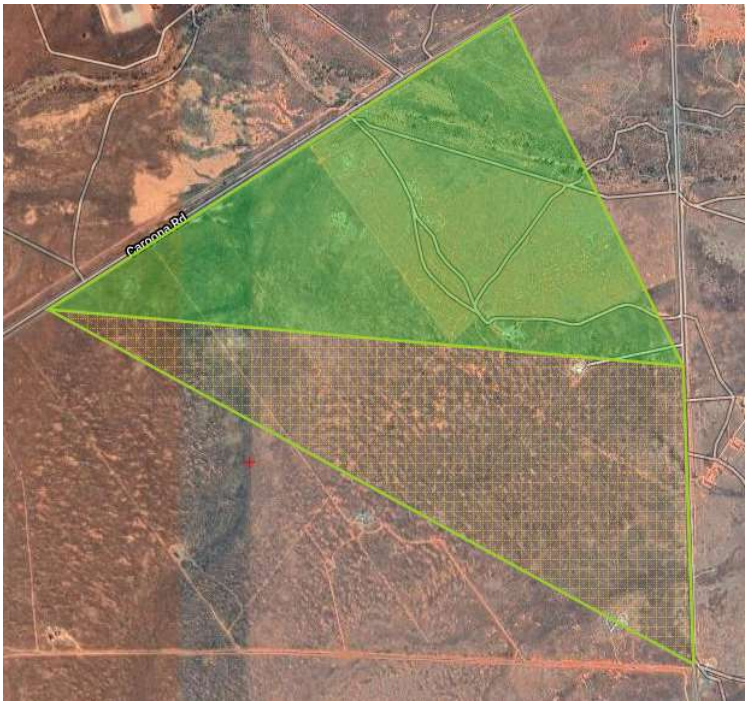
Drawing a Polygon

If a polygon is not imported, the drawing tools in FlightPlanner can be used to draw one.

- Use the polygon drawing tool to manually draw a polygon 

Once the polygon tool is selected it will highlight as green 

After selecting the tool, click on the live map or background map at the points where you would like the vertices. Obviously, the polygon drawing tool can only be used if there is a background map (either live streaming or imported): the background map is required to know where the polygon should be drawn.



To delete the last added point, you can hit the DEL button. Hit ESC or ENTER to finish the polygon drawing process.

Drawing a Path

The path tool is only available in FlightPlanner Pro or Ultimate versions.

1. Click on the path drawing tool on the top left-hand side of the toolbar. It should highlight green once selected.

2. After selecting the tool, click on the live map or background map at the points where you would like the vertices. The drawing tools can only be used if there is a background map (either live streaming or imported). The background map is required to know where the polygon should be drawn.

3. Continue drawing your path on the map. Once you've finished press "Enter" to continue.

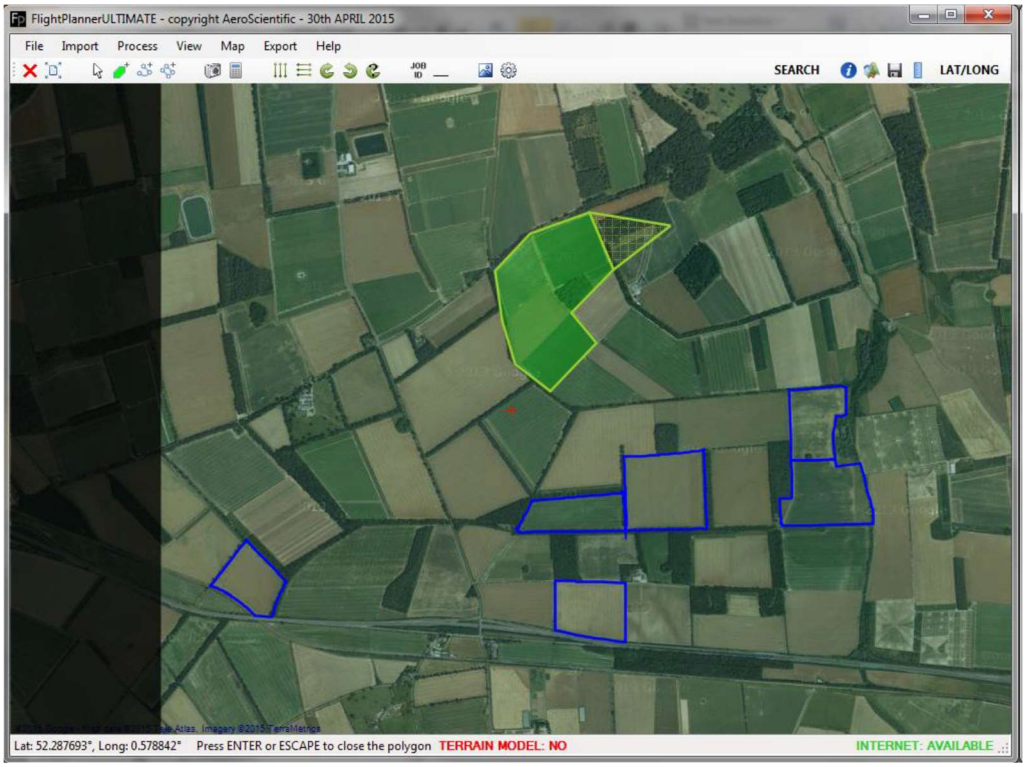
NOTE: To delete the last added point, you can hit the DEL button. Hit ESC or ENTER to finish the polygon drawing process.

FlightPlanner Pro or Ultimate only

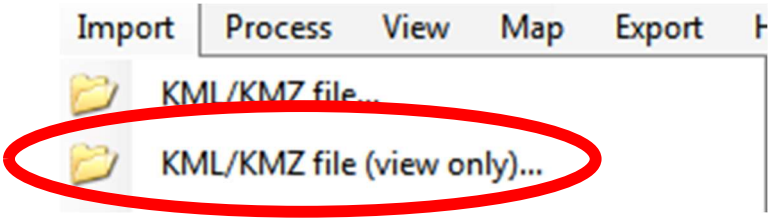
Importing Background Polygons

FlightPlanner Ultimate offers the extra functionality of being able to import background polygons. Background polygons can be very useful when planning where to draw new polygons, and act as a visual guide.

The image shows background polygons (in blue) and a new polygon being drawn (in green).



To import background polygons, click Import, then click ".KML/.KMZ file (view only) …"

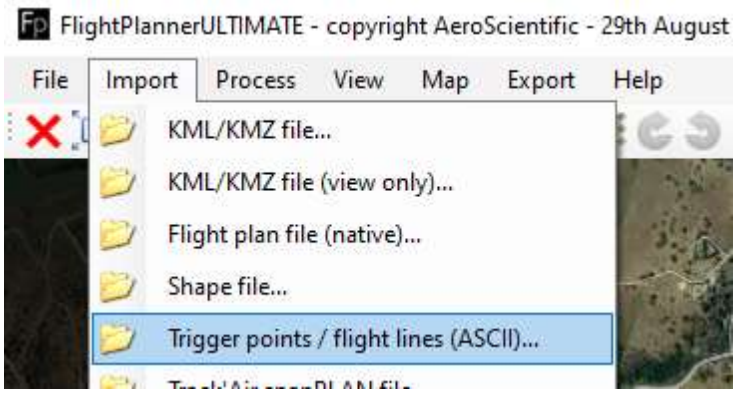


FlightPlanner Pro or Ultimate only

Importing a Text File

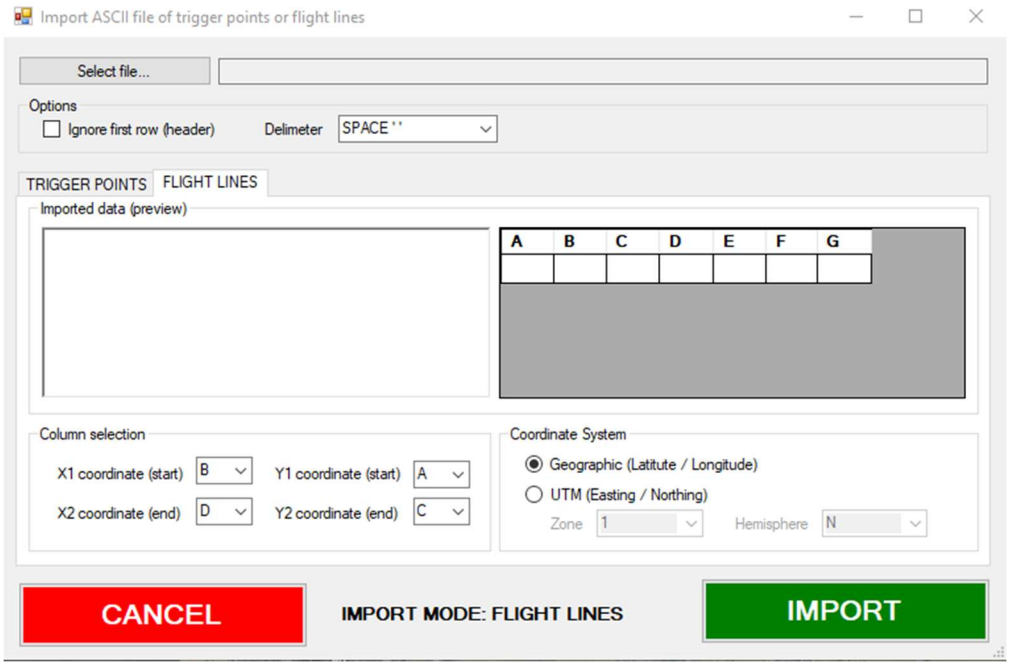
FlightPlanner Pro and Ultimate can import an ASCII text file of start and end-points of flight lines and trigger points from which a flight plan can be created.

You can import a text file by clicking on “Trigger points/flight lines (ASCII)…” inside the “Import” tab.



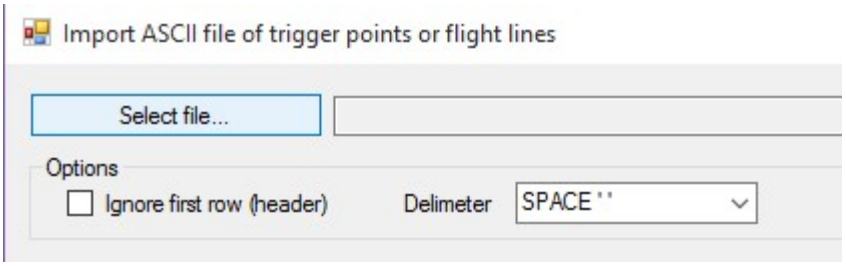
The “wizard” for importing a text file provides flexible functionality. Support exists for both UTM coordinates and geographic, but no other coordinate systems.

Flight Lines:



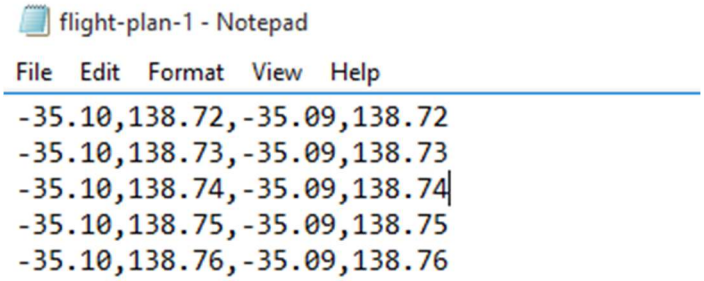
FlightPlanner Pro or Ultimate only

To import an ASCII file, click on “Select file…” on the top of the window.



You’ll be placed on the file browser, where you must select one file either formatted as a .txt, .csv or .asc file.

The correct format for a text file to be successfully imported should look like the following:



Here 5 flight lines are being represented in a geographic coordinate system format (latitude/longitude). The delimiter (symbol to segregate coordinates) is a comma. You can see each flight line needs a latitude start and end coordinate, and longitude start and end coordinate.

For example, the first line:

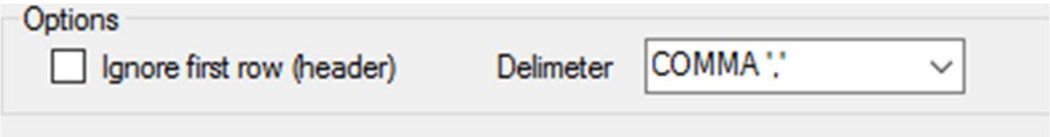
- -35.10,138.72 (represents the start coordinates of the latitude and longitude of the flight line)
- -35.09,138.72 (represents the end coordinate of the latitude and longitude of the flight line)

Once successfully selected the file you will see your imported data in cells. You must ensure each of the numeric values which represent the location of each flight line are divided into cells evenly, (e.g., one cell holds one numeric value). As shown below:

A	B	C	D	E	F	G
-35.10	138.72	-35.09	138.72			
-35.10	138.73	-35.09	138.73			
-35.10	138.74	-35.09	138.74			
-35.10	138.75	-35.09	138.75			
-35.10	138.76	-35.09	138.76			

Each cell represents the latitude or longitude of each flight line imported from the ASCII file.

If all the values are stored in only one cell, you must set the appropriate delimiter to read the imported data properly. For this example, the delimiter being used in the text file is a comma.

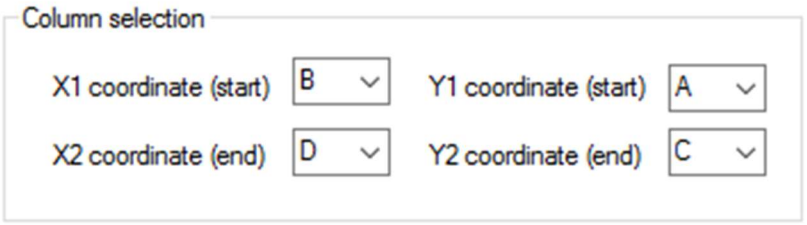


You have the choice to use a delimiter of either a “Space,” “Tab,” or a “Comma.” If you have headers as the first row of data in your ASCII file you can choose to ignore them as well by checking that option.

You must ensure the coordinate system is set correctly. In this case, a geographic coordinate system is being used (latitude/longitude).

FlightPlanner Pro or Ultimate only

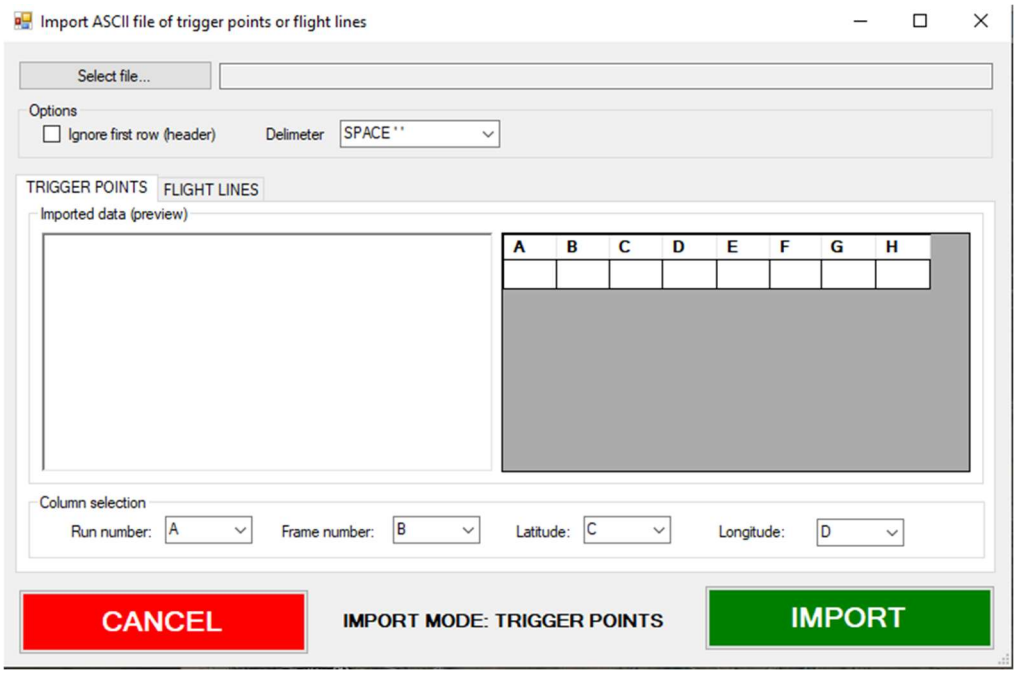
The column selection must also be set correctly according to the data with the imported ASCII file.



In this example, the latitude (Y coordinate) is correctly set Y1 (start of the flight line) to cell A, and the longitude is correctly set X1 to cell B. This is also true for the X2 and Y2 points. If you do not set these columns correctly, your flight lines will most likely be placed in unpredictable locations on the map.

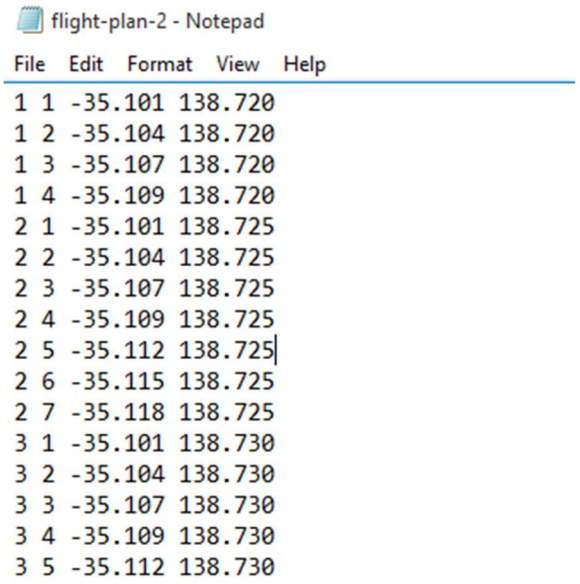
Once you've corrected all these settings click "IMPORT" to begin the importing process. You should receive confirmation that importing has been successfully and be shown the project parameters window. Fill out the correct camera settings, after that, your flight plan will be successfully created.

Trigger Points:



Importing an ASCII file as trigger points is similar to importing flight lines. However, each column of data will have a run number (flight line number), frame number (camera station number), latitude and longitude (the coordinates of the camera station).

The correct format for a text file will look like the following:



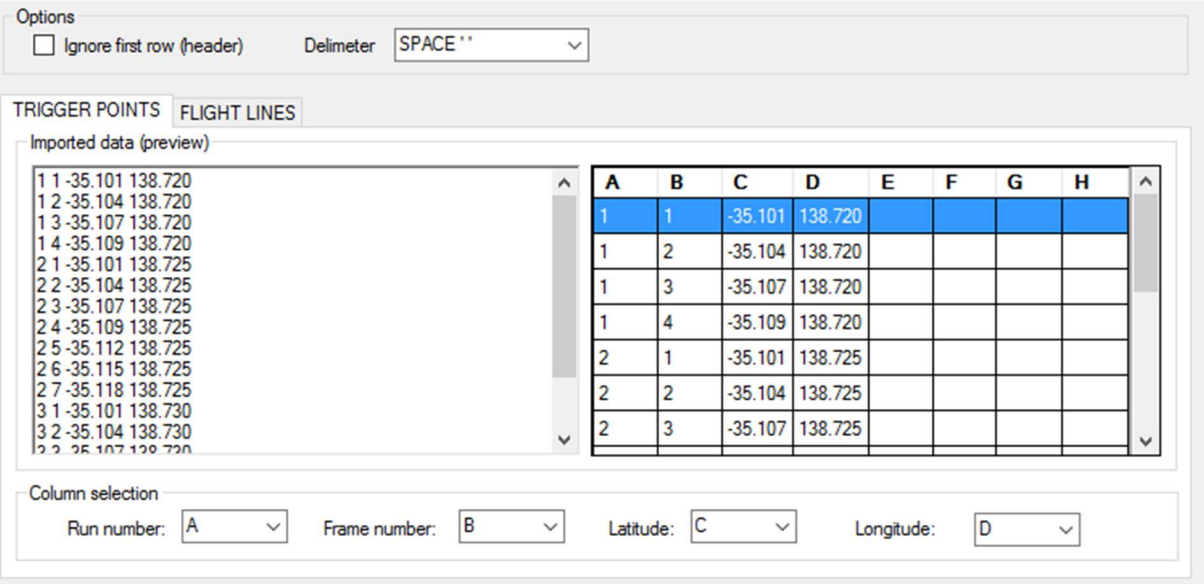
The **run number** is the first digit on each line, while the **frame number** is the second digit on each line represents each camera station along the flight line.

You can see the first flight line has 4 camera stations assigned to it. The second flight line has 7 camera stations, etc.

The latitude and longitude coordinate of each camera station are listed on the right of each of them.

NOTE: The delimiter being used here is a single space.

Once you have selected the file you should be shown the following:

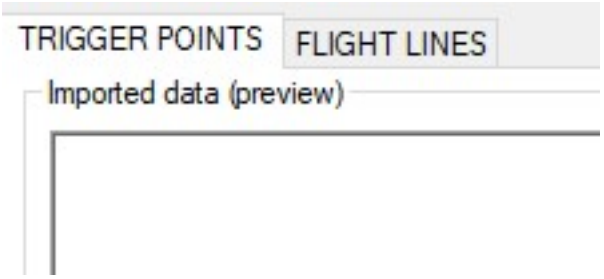


Much like creating flight lines, each numeric value should be placed in one cell each. If not check your delimiter or format of your ASCII file.

The column selection settings must be assigned correctly to each cell.

Once all these settings are correct, you can begin the importing process by clicking “IMPORT.” You should then choose your project parameters and then see your imported flight plan.

To switch between Flight Line and Trigger Points, you must click on their corresponding tabs.



Flight Planning (Polygons)

Creating a Polygon Flight Plan

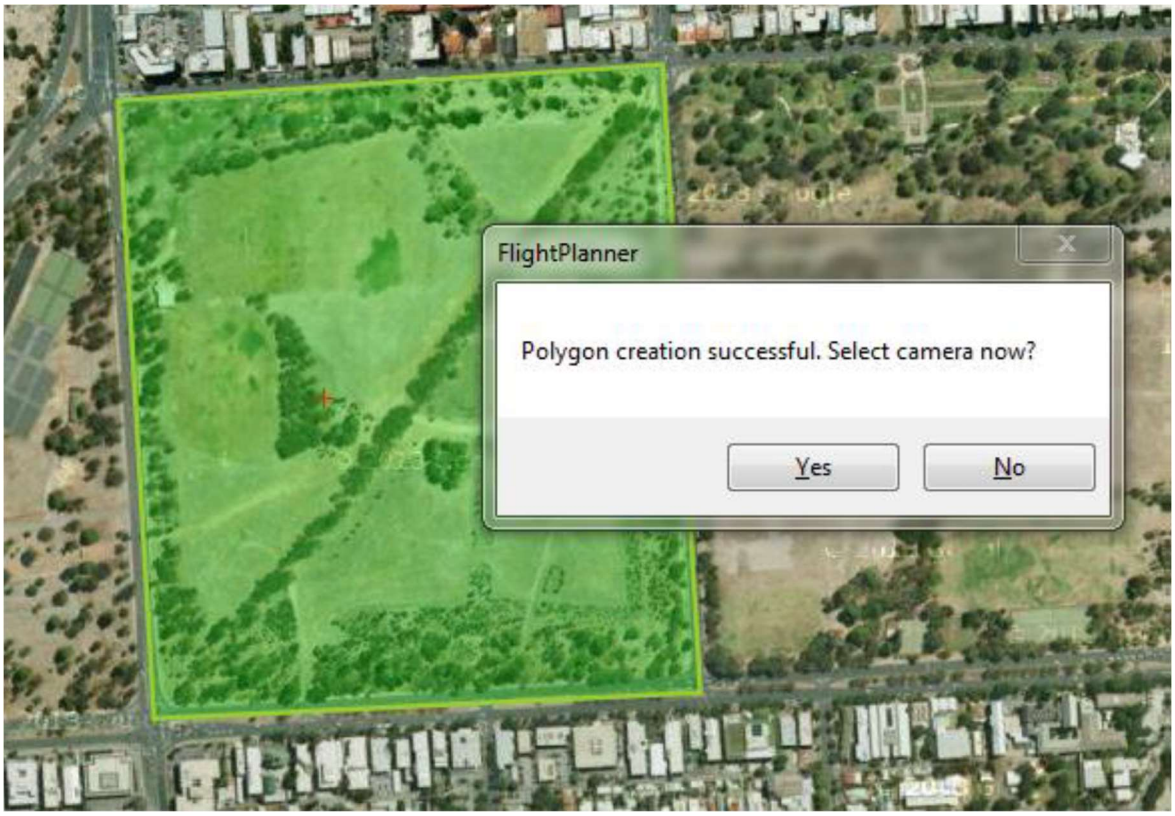
Polygon flight plans are used when image data is required over a wide area. The process for creating polygon flight plans is as follows:

1. Use the drawing tools to draw a polygon or import a polygon directly into FlightPlanner.

2. When the polygon is complete, hit the ENTER or ESC key.

3. When prompted, click “YES” to select the camera.

4. If “NO” is clicked, then the camera dialogue box can be accessed by the camera icon button on the toolbar, or by clicking “Process” tab on the top menu, then “Project Parameters…”

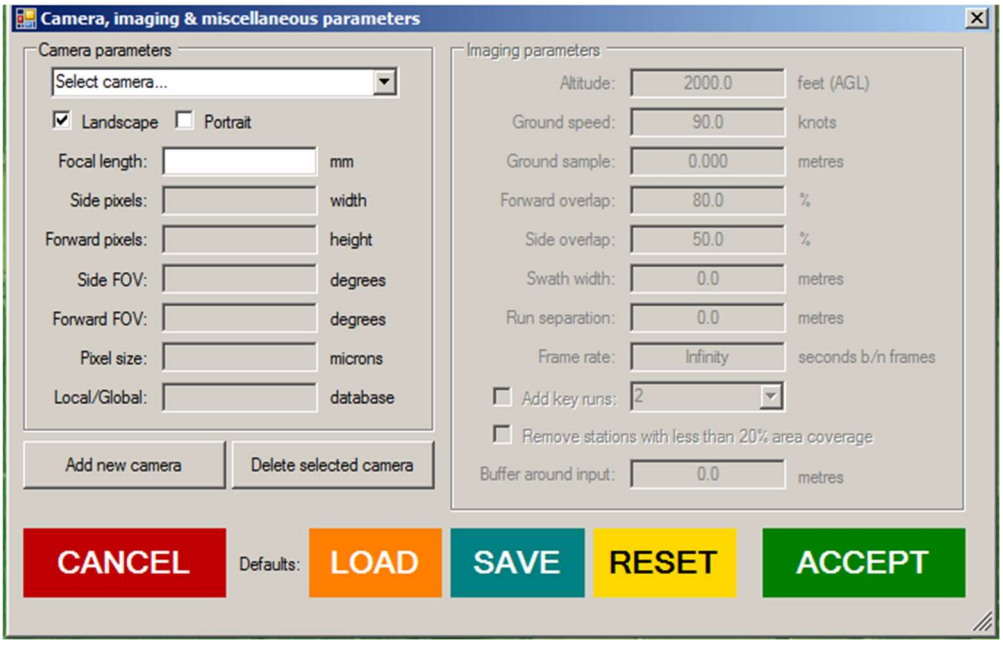


Camera, Imaging & Misc. Parameters (Polygons)

1. Select the camera from the drop-down list, or if the required camera is not listed, click the “Add new camera” button at the bottom of the screen.

2. Choose the appropriate imaging parameters for the project. These should be self-explanatory. (One item that may confuse first time users is the landscape / portrait option: landscape means the long axis of the image is perpendicular to the line of flight, whilst in portrait mode it is parallel to the line of flight.)

3. When the correct parameters have been chosen, click the “Accept” button to create the flight plan.

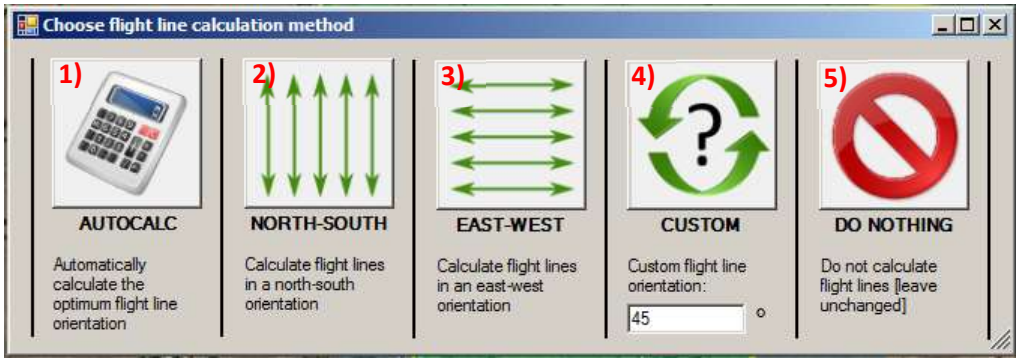


NOTE: *You may add a new camera by clicking the “Add new camera” button.*

Choice of Run Direction (Flight Orientation)

On accepting the project parameters, the method of calculating the flight lines must be chosen.

On the Flight Line Calculation Method window select your flight orientation by left clicking on your desired method. There are multiple orientations to choose from:



1. **Auto-calc** will give the further option of choosing the optimum flight plan: you can either minimise the number of turns, minimise the total length flown, or minimise the number of frames captured.
2. **North-South** orientation will take "a north to south" orientation approach when flying your flight path.
3. **East-West** orientation will take "an east to west" orientation approach when flying your flight path.
4. **Custom** orientation gives you the option to set a specific angle of your orientation. Specifying a custom flight run direction is useful if you plan on operating in strong winds or have air traffic control limitations.
   NOTE: You can place the specific degree of your flight orientation in the input field below "Custom." A 45-degree orientation was entered in this instance above.
5. **Do Nothing** will leave the default flight orientation created when the flight path was first imported or created.

Note that even after the flight plan has been created, these options can be revisited.

You can change the orientation by clicking on the rotation icons on the top menu of FlightPlanner. 

A Typical Polygon Flight Plan

The image on the right shows a typical flight plan. The symbols have the following meanings:

- Yellow lines: flight lines
- Red lines: key runs
- White/red dots: camera stations / trigger points
- Green polygon: area of interest
- Blue polygon: buffer area
- Purple outline: complete area of coverage

Key/Tie Runs

All versions of FlightPlanner give the option of adding key or tie runs to the flight plan (shown in red in the previous image).

Keys runs are aligned perpendicular to the flight lines – they are useful for adding geometric 'strength' to the photography. This is particularly important for mapping projects which require highly accurate results.

In the Project Parameters dialog, you can choose how many Key Runs to add to the block, but you can't choose their location – the algorithm determines the best location automatically.

It is recommended that you add more key runs than are actually required, then manually delete the unwanted key runs.

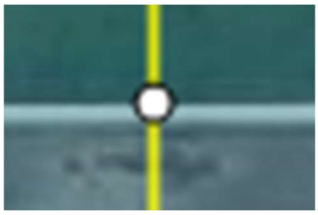
Key runs can be deleted by selecting them with the left mouse button, and then hitting the DELETE key.

Camera Stations/Trigger Points

A camera station/trigger points indicate where your camera will take its shots within your flight plan. These camera stations are the white dots you typically see on a flight plan.

Multiple Camera Stations:

One Camera Station:



Footprints

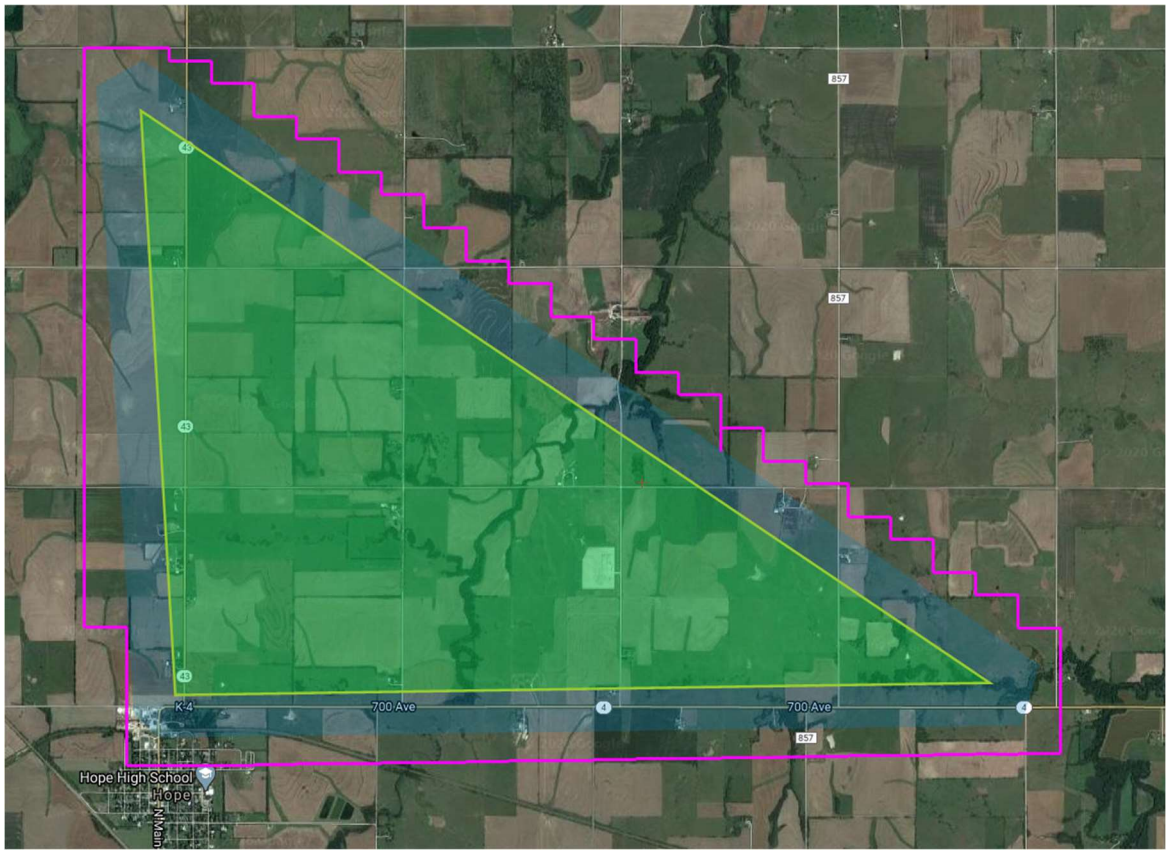
Footprints represent the visual coverage a camera station will have. This is useful to see what camera stations will capture what terrain within your flight plan. Footprints can either be shown as a line footprint or camera footprint.

This is what a typical (camera) footprint will look like.

You can see what terrain will be captured when you pass that camera station in your flight plan.

Capture Boundary

A purple outline around your flight plan shows the overall coverage your camera will capture during your flight. This visual indicator is useful to ensure you don't miss capturing anything important.



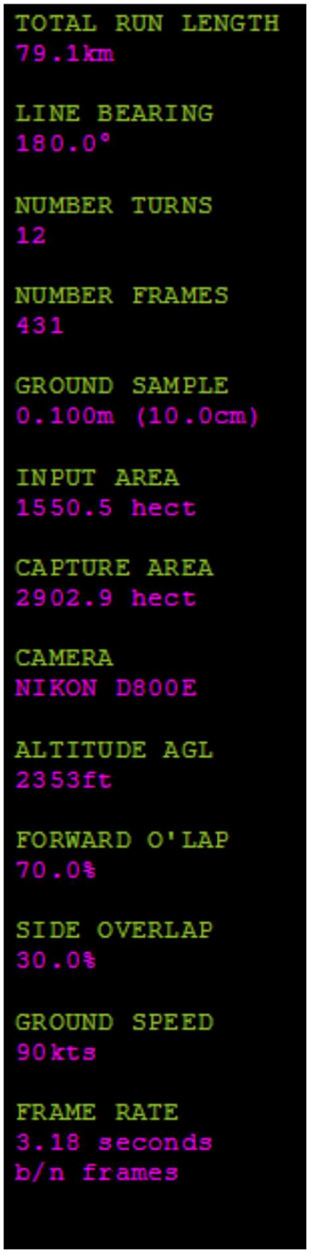
Flight Plan Information

As well as creating the flight plan, FlightPlanner also gives information about the acquisition parameters, such as input area and capture area.

Note that units can be converted from metric to imperial by clicking the settings button on the toolbar or clicking “File” and “Settings” on the menu bar.

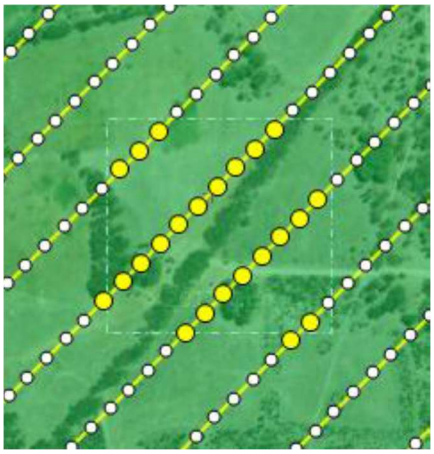
The view can be changed by using the tools under the “View” menu item.

The imaging parameters can be changed by going back to the “Project parameters” dialogue, and changing whichever variables need changing.



Selecting Points or Lines

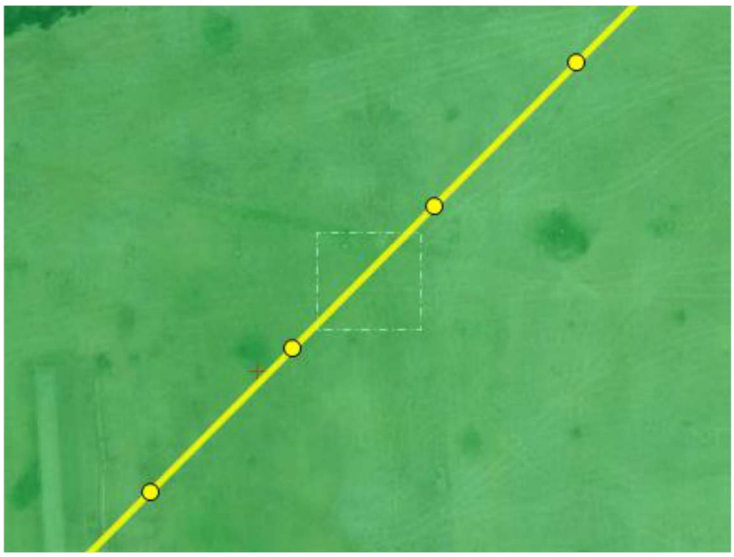
Points and lines may have to be selected so that they can be modified or deleted.



1. To select a single point in a flight plan, just draw a box around that point by holding down the left mouse button and dragging around the point.

2. To select multiple points, simply draw a box around all the points that need to be selected, again by using the left mouse button.

3. To select a whole line, zoom in (using the mouse wheel), and draw a box that intersects the flight line to be selected, but doesn't contain any trigger points. If the box contains trigger points, then they will be selected, and the line will not be selected.



Additional Flight Plan Information

The Pro and Ultimate versions of FlightPlanner will show extra information for entities (lines and camera stations):

If a line is selected (flight line or key run line), the following data is displayed:

- Line number, length and bearing
- Number of camera stations
- Height above ground level (AGL)
- UTM coordinates of the start and end-points
- Max. and min. GSD for the images on that line

NOTE: *You can easily select an entire flight line by selecting only the line, while no trigger points are selected*

If a camera station is selected:

- Line number and camera station number
- Location (UTM coordinates)
- Terrain height, line height and GSD

This extra information is especially useful with flight planning over regions with varying terrain.

FlightPlanner Pro or Ultimate only

Modifying a Polygon Flight Plan

Once a flight plan has been created, it can be modified as follows:

1. Rotate the flight lines clockwise or anti-clockwise (use the buttons on the toolbar 
   ; or use the " , " and " . " keys

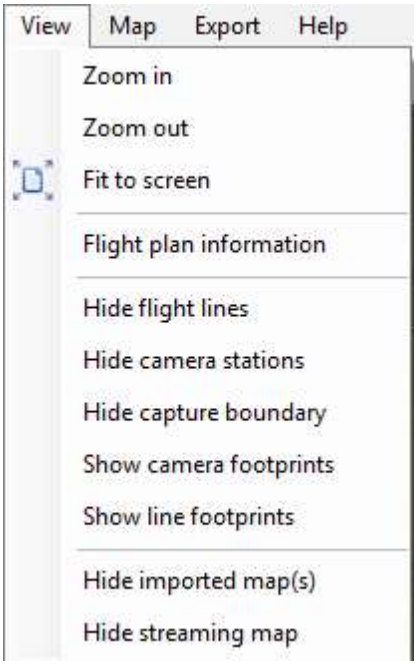
2. Specify a new direction for the flight lines by clicking the button on the toolbar to bring up the "custom rotation" dialogue box. 

3. Reset the lines to North-South, or East-West, again by using the buttons on the toolbar. 

4. Delete individual points or whole lines.

If the whole flight plan is modified (e.g. by rotating the flight line direction) after flight lines or points have been deleted, then the delete function will be undone. Therefore, it is recommended to choose the correct flight line direction before deleting points or lines.

Modify Your Flight Plan View



You can modify your view of the flight plan by hiding or showing certain elements of that flight plan. These can range from hiding/showing flight lines, camera stations, the capture boundary, and footprints.

You can modify the view by hovering over the “View” tab and clicking on the following hide/show options.

The following pictures will show you the visual differences in your flight plan by hiding/showing these certain elements.

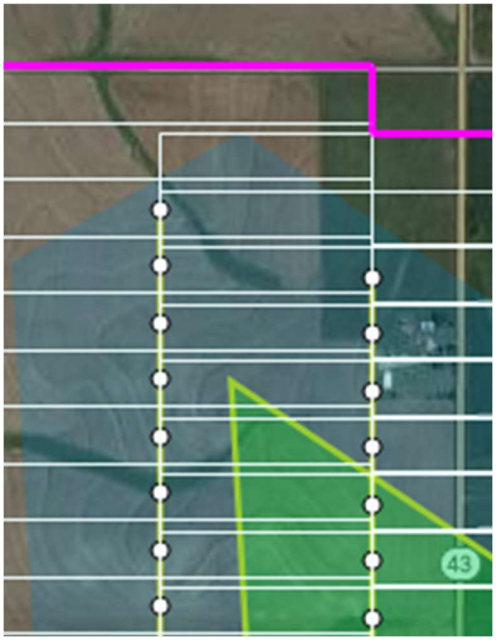
Hide flight lines:

Hide camera stations

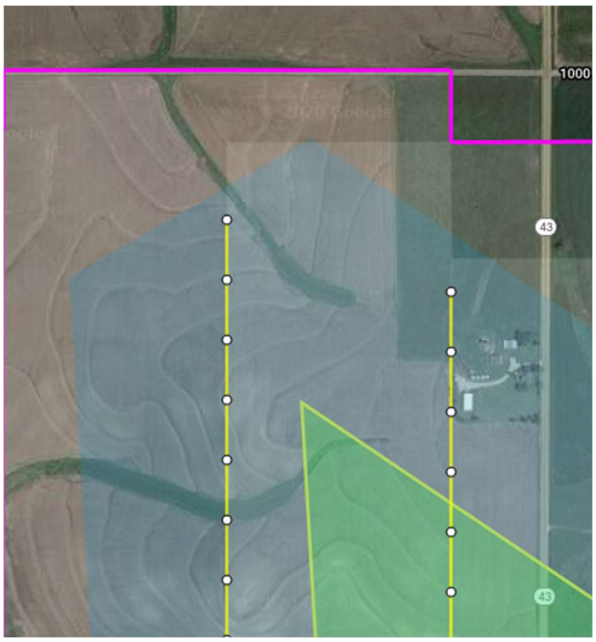
Hide capture boundary (purple outline):

You may either show/hide line footprints, this shows transparent outlines of the footprints. Or show/hide camera footprints, which shows white-boxed outlined of the footprints.

Show camera footprints:



Show line footprints:



NOTE: If you turn on camera footprints it will show many white boxes on your flight plan, which may look confusing at first. However, these footprints simply overlapping each other (for imagery accuracy).

Flight Planning (Paths)

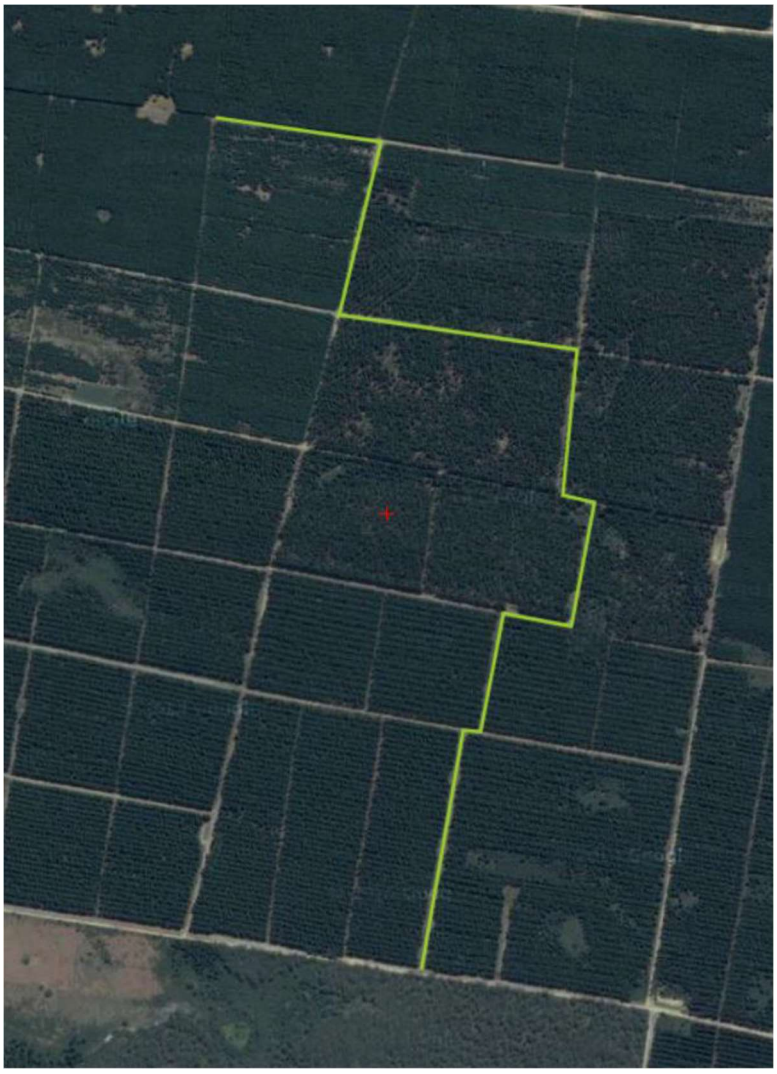
Creating a Path Flight Plan

In addition to polygon flight plans, it is also possible to create poly-linear (or path) flight plans.

Path flight plans are created when a single line of data is required, usually to follow a linear feature such as a road, coastline or border.

1. The path is created by clicking the path drawing tool, and drawing the path, or by importing a path as a .KML/.KMZ file.

2. When the path is complete, the project parameters can be selected.



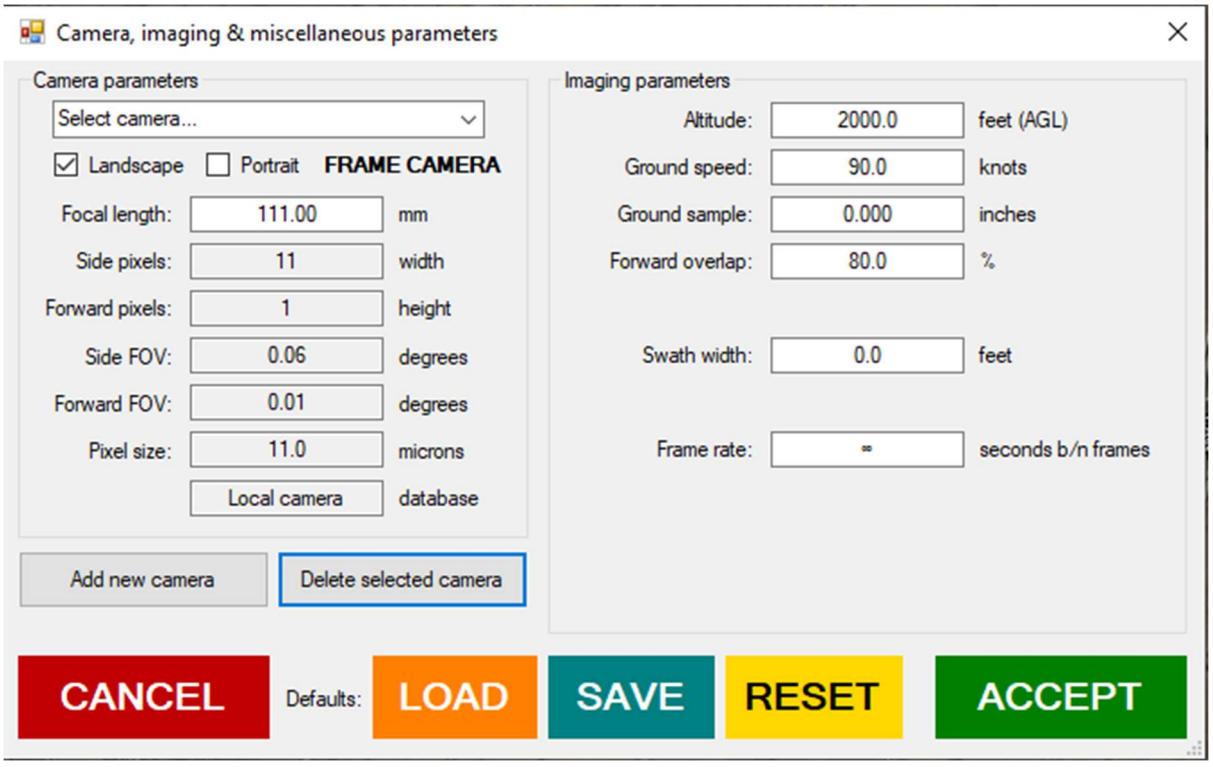
Project Parameters (Paths)

The camera can be chosen from the dropdown list, or if the required camera is not listed, there is an “Add new camera” button at the bottom of the screen.

There are fewer imaging parameters to select when using path mode compared to polygon mode. This is because some of the polygon parameters (side overlap for example) are not relevant to path flight planning.

When the correct parameters have been selected, clicking the “Accept” button will create the flight plan.

Whenever a path flight plan is created, FlightPlanner will indicate the spacing between subsequent camera stations.



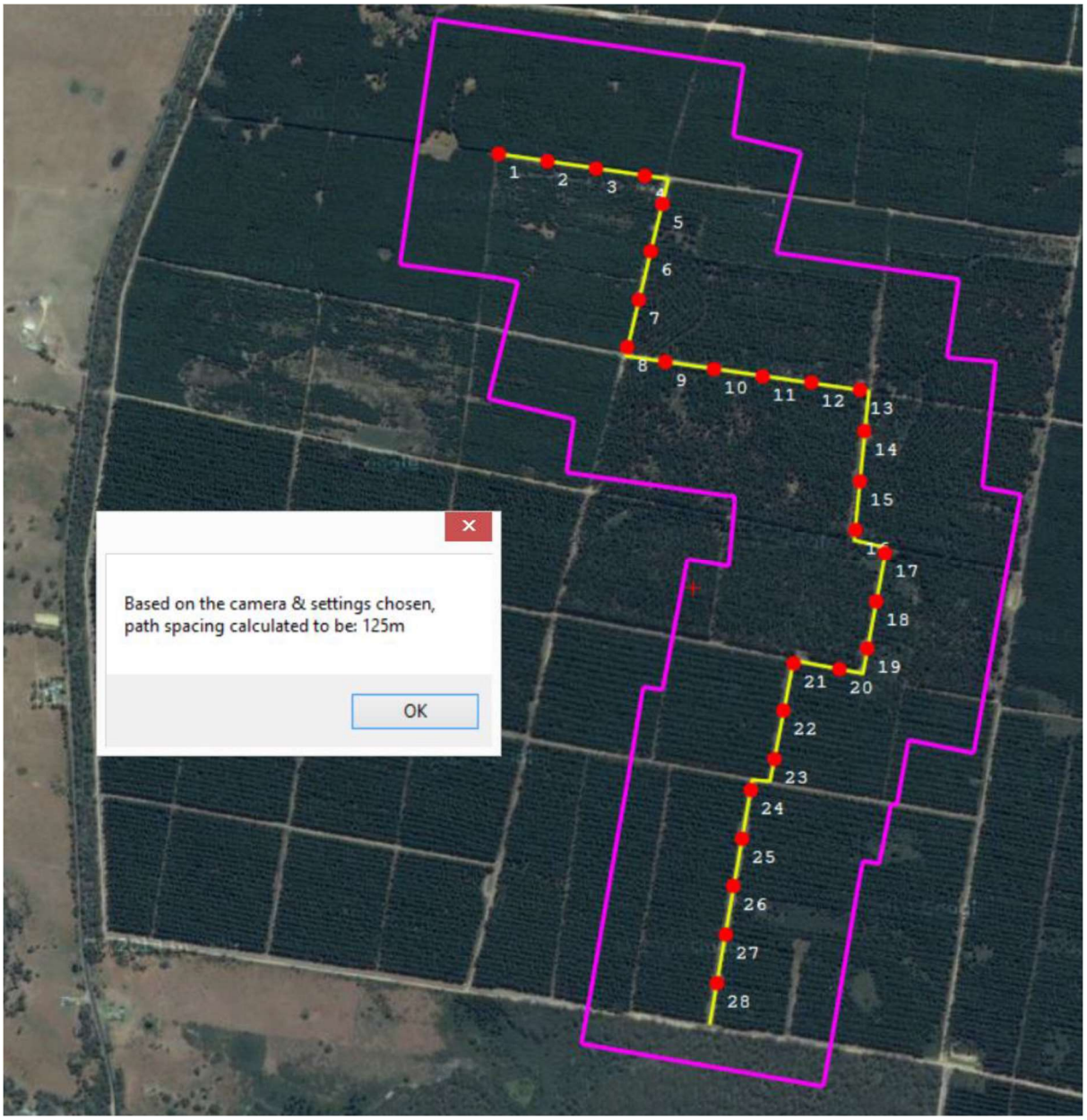
A Typical Path Flight Plan

The camera stations are shown as red dots, numbered sequentially from the start to the end of the path.

The purple boundary shows the complete coverage of the camera footprints.

A path flight plan can be modified by selecting points or line segments to be deleted.

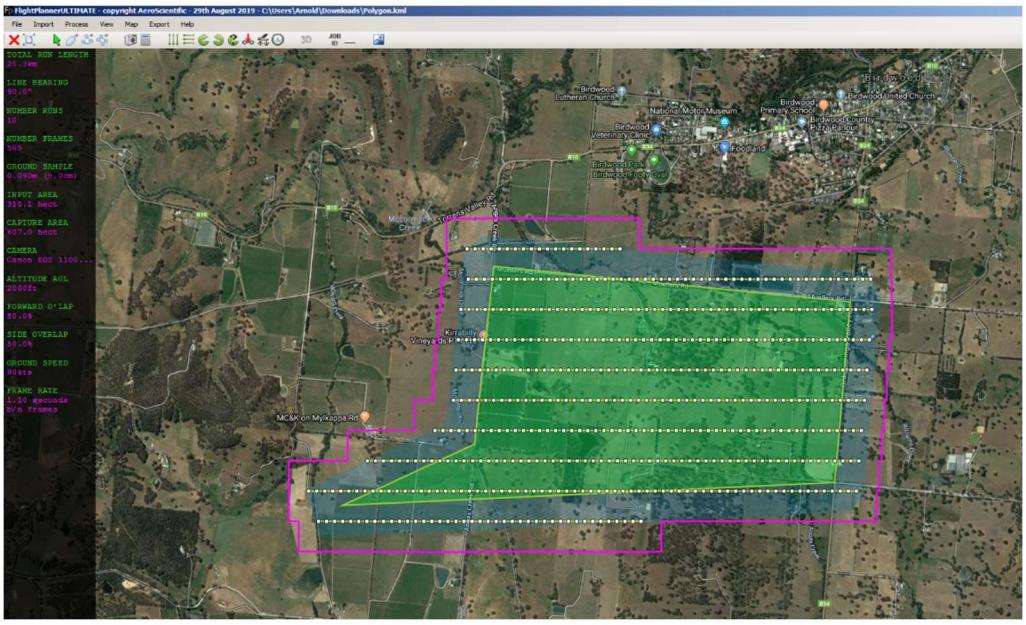
The other tools for modifying polygon flight plans (rotate, North-South lines etc.) cannot be applied to path flight plans.



Other Features

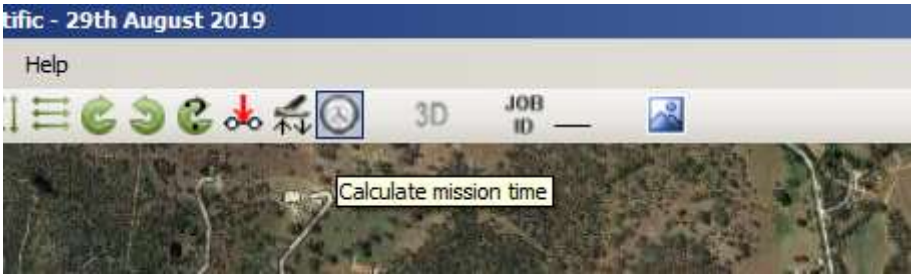
Calculating Mission Time

1. You must first have created your flight plan in FlightPlanner before you can proceed to use the “Calculate Mission Time” tool, similar to what is shown below.

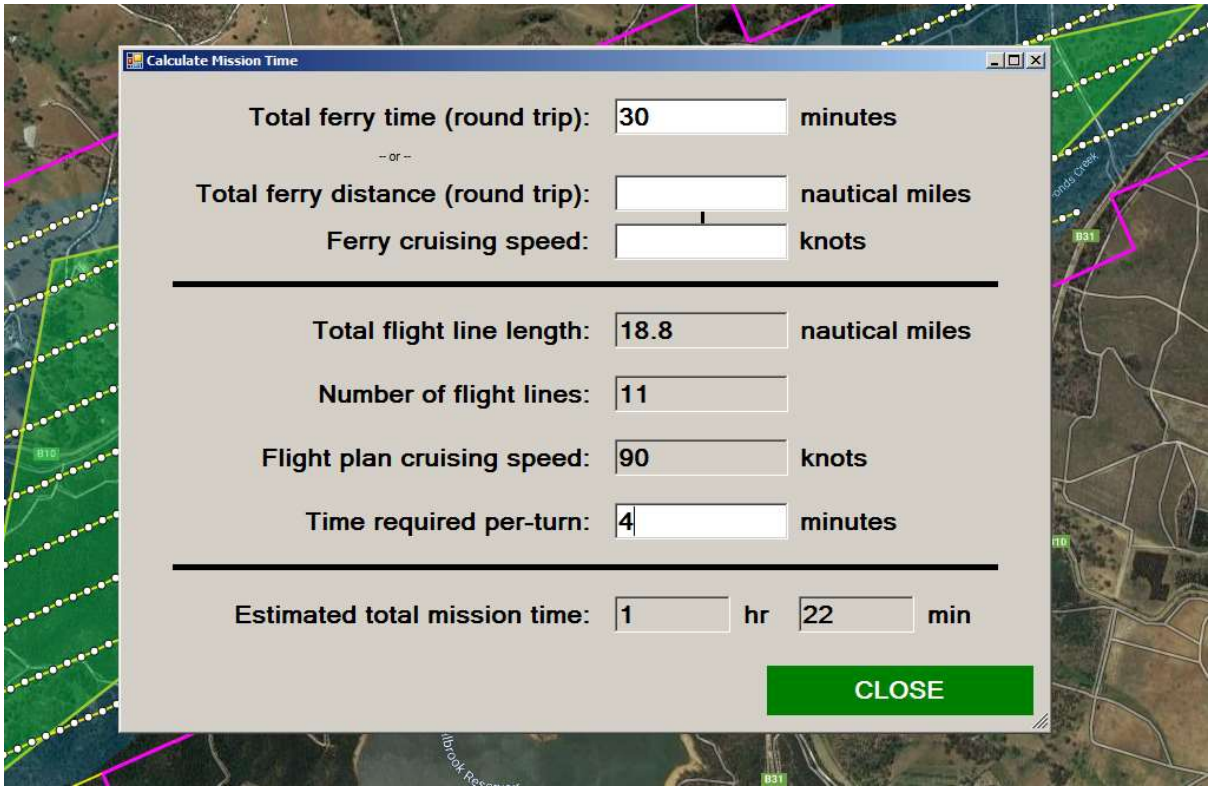


2. Click on the “Calculate Mission Time” tool near the top-left hand side of the window.

This is what the Calculate Mission Time icon should look like 



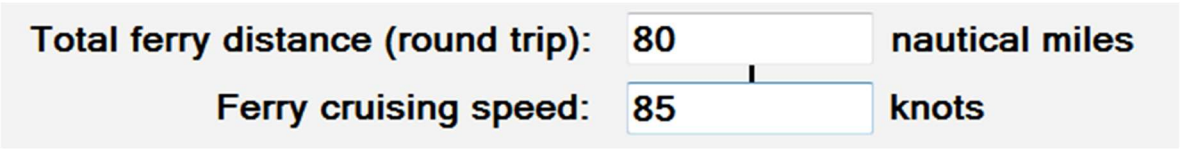
3. Next, you'll be able to calculate the mission time based of several different parameters that you can input into these fields.



There are two methods you can use to calculate the total mission time, as shown in the above image.

- **Total Ferry time**, or

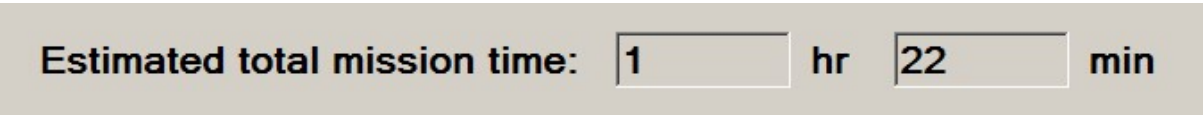
- Total ferry distance in **Nautical Miles** + your ferry cruising speed in **Knots**



NOTE:** If you use the **Total Ferry Time** method, your cruising speed will be set to a default **"90 knots."

4. You must also place the amount of time *(in minutes)* it will take to approximately perform each turn in your flight path.

Now you should be able to see the estimated total mission on the bottom of the window, like so.



Other Fields:

Flight line length: This is the total distance of your flight path measured in nautical miles

Number of flight lines: The number here represents the total number of turns you will need to perform

Flight plan cruising speed: This represents what your aircraft ground speed should be during the mission. It's a helpful indicator when calculating the mission time through **total ferry time** method

Exporting Flight Plan

Once the flight plan has been created (either Polygon or Path) it can be exported using the export function.

The flight plan can be exported in any of the following formats:

- .FPL (Single Height): Flight plan file, for use with FlightPlanner or Aviatrix (AeroScientific's camera control software –see: https://www.aerosci.info/aviatrix/.FPL (Multiple Heights): Exports multiple flight plan files of the same flight plan at varying heights. Additional export options, such as .KML (flight lines), .KML (3D flight lines), .KML (polygon/path) is available.
- Google Earth .KML file of the flight lines
- Google Earth .KML file of the 3D flight lines
- Google Earth .KML file of the polygon/path
- ForeFlight .FPL file, for use with the ForeFlight app (www.foreflight.com)
- .GPSU text file, for use with GPSUtility software (www.gpsu.co.uk, a software package for uploading flight lines to various GPS units)
- .PNG image file: a screen grab of the FlightPlanner screen
- Export all: To export all of these file formats in a single click, select "Export all…". The files will be stored in their own directory

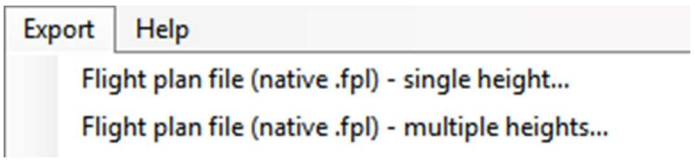
There's more in-depth explanation in the following sections about some of these export options.

Export to Flight Plan File(s)

In FlightPlanner you can export an existing flight plan you've created inside FlightPlanner into its own .fpl file.

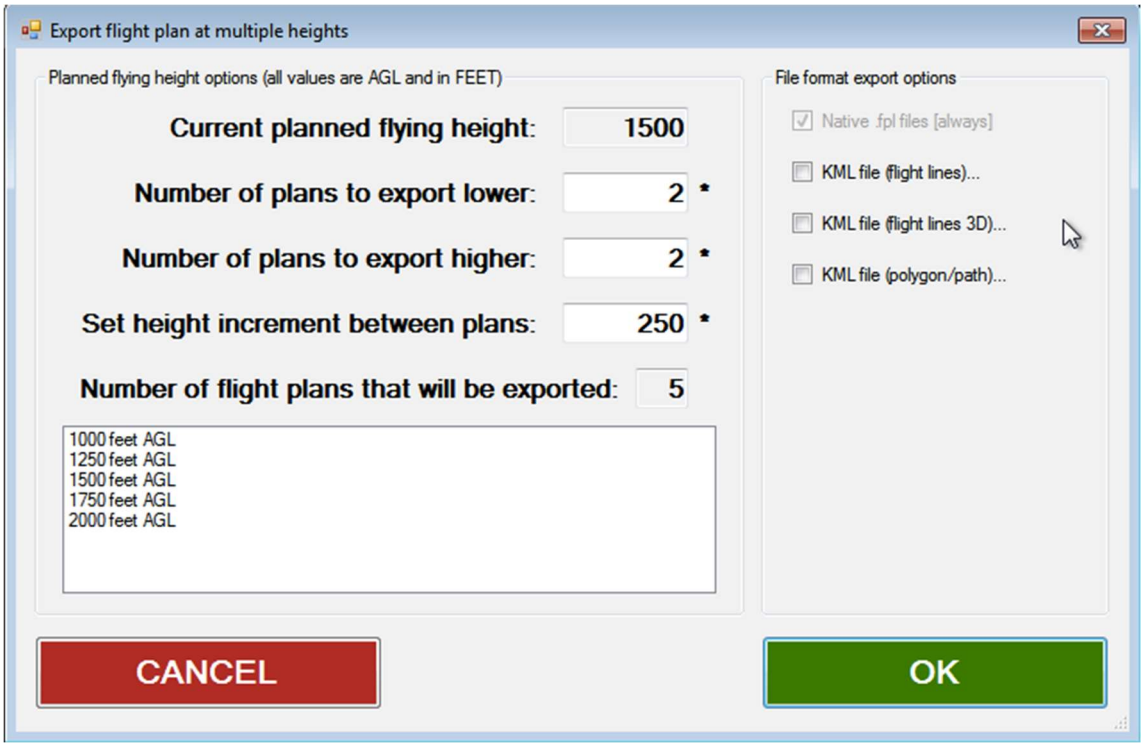
There are two export options for .fpl files under the "export" menu:

- Planned assigned Height
- Multiple Heights , +/- planned height, multiple files



Single Height: This allows you to save your existing flight plan with it default flight attitude assigned to it.

Multiple Heights: This allows you to save your existing flight plan with multiple varying heights. Once you click on this in the menu, a "Export Flight Plan..." window will appear.



FlightPlanner Pro or Ultimate only

There are several fields you are able to set before exporting multiple heights of a flight plan:

Current planned flying height (Read-Only): This is the default flying height generated of the flight plan. This height will be displayed in feet.

Number of plans to export lower: The number of flight plans that will be created which are below the "current planned flying height".

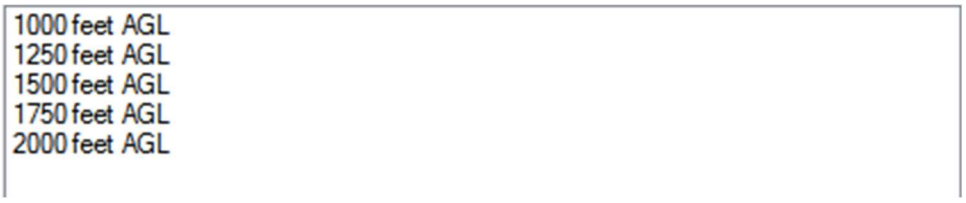
Number of plans to export higher: The number of plans that will be created which are higher the "current planned flying height".

Set height increment between plans: Sets the height of the flight plans to be generated.

In the example, this is set to 250 feet; therefore, every single plan which is created will be generated 250 feet lower or higher than its preceding plan. If the default height is "1500 feet" and there are 2 plans to export which are lower. The plans being generated will be set at 1500, 1250 and 1000 feet.

Number of flight plans that will be exported: The total number of flight plans which will be generated.

You'll be also shown a list of all the plans' height which will be exported.



File format export options: There are multiple formats you can export your flight plan into.

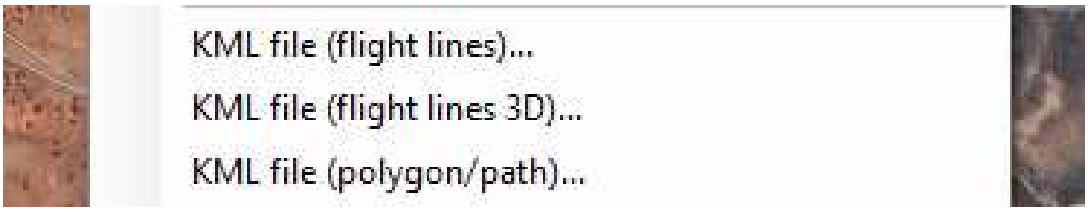
- Native .fpl files
- KML file (flight lines)
- KML file (flight lines 3D)
- KML file (polygon/path) – Read the Export to KML (Google Earth) section for more information

NOTE: *You cannot export in multiple heights, if you create a flight plan using the path tool.*

Bear in mind that any change in flying height, whilst the overlaps and photo positions be correct for that altitude, the resultant GSD will be different.

Export to KML File (Google Earth)

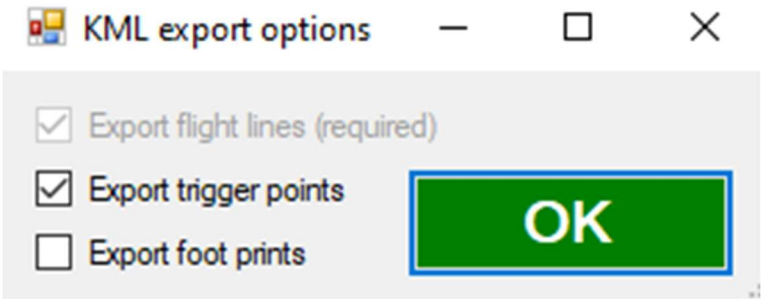
FlightPlanner gives you the option to export into a variety of KML files. This will allow you to view your flight plans inside of Google Earth.



The following are the KML export options you can use:

KML file (flight lines)

An export options window will open if you select this. It will allow you to either export the trigger points and/or footprints of the flight plan. The flight lines are automatically exported by default.



KML file (flight lines 3D)

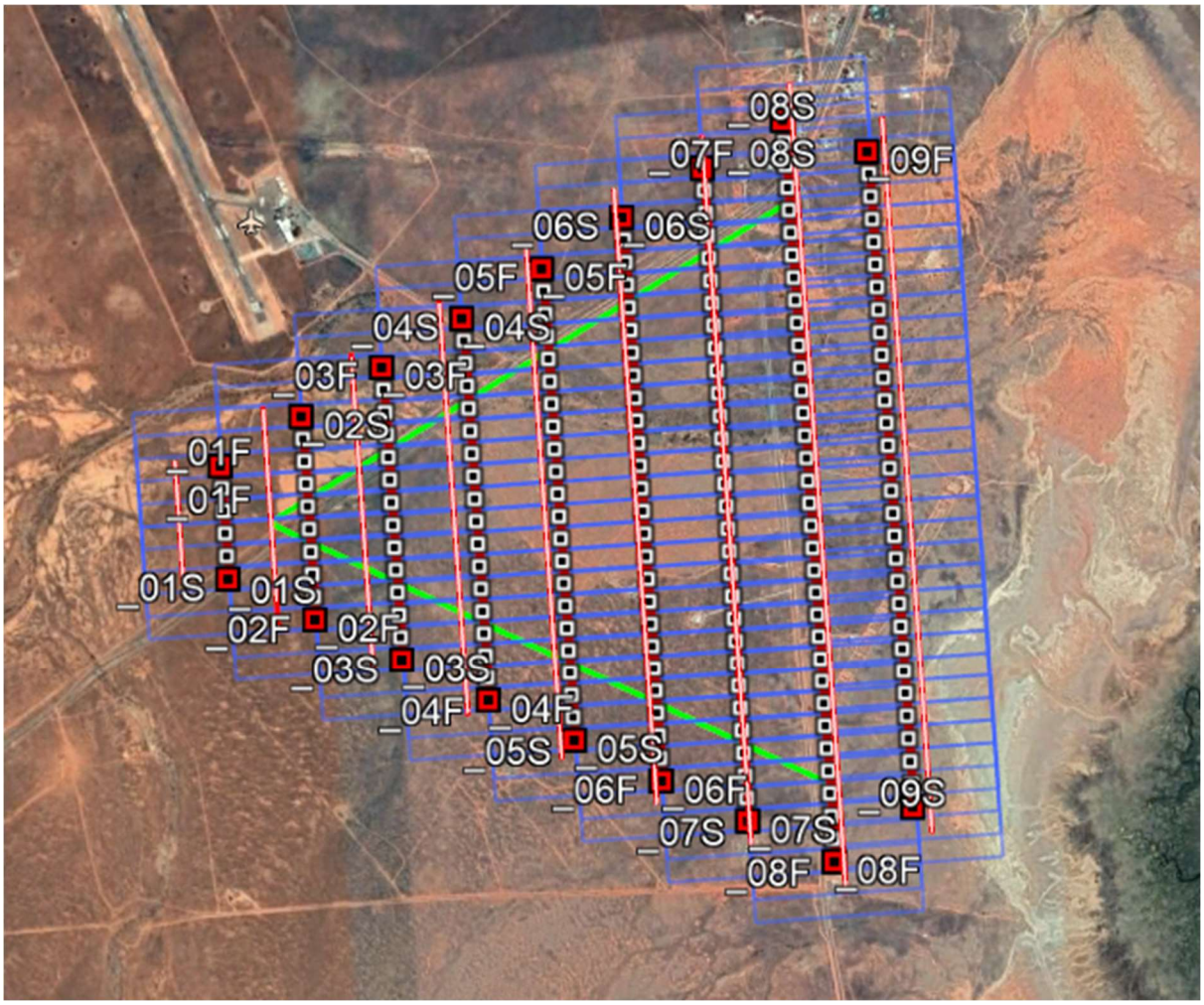
This will only export the 3D flight lines of the flight plan. In Google Earth, you will see white lines to represent these flight lines.

KML file (polygon/path)

This will only export the polygon or path shape of the flight plan. In Google Earth, a green line will represent the polygon or path's shape.

The following lines and shapes represent important information about the flight plan:

- Red line: A flight line
- White line with red outline: 3D flight line (represents its height)
- Black square with white outline: Trigger point
- Black square with red outline: Ending Trigger point
- Green line: Polygon / path of flight plan
- Blue squares: Footprints



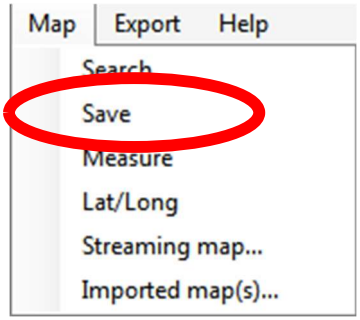
Save Map

The Save function is used for downloading online maps (Google, Bing, etc.) at a specified resolution. Importantly, the downloaded map is georeferenced, so it can be loaded directly into any GIS software.

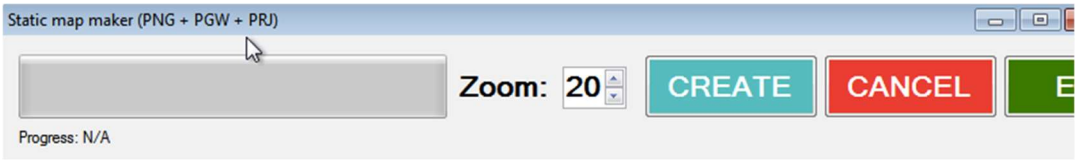
The file format is uncompressed .PNG, with associated world and projection files (.PGW and .PRJ). Before download commences, it is possible to specify the resolution of the data (default is level 17 which uses a pixel size of 1m. Level 18 is 0.5m, and 16 is 2m) the higher the number, the finer the resolution.

To save the currently displayed map, you may either click on save icon on the toolbar 

; or click on the “Map” menu and click the “Save” option



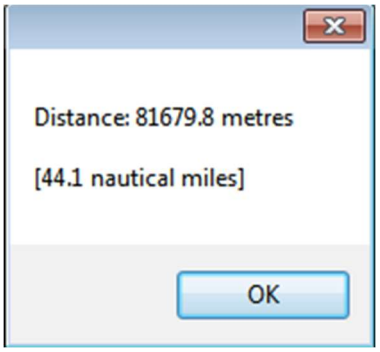
A window will appear showing the zoom level of the map (which you can adjust) and the save progress of the map. The zoom feature determines the resolution of the currently displayed map, with a lower number being a lower resolution while a higher number for a higher resolution.



NOTE: *The zoom number only is valid from 12 to 20.*

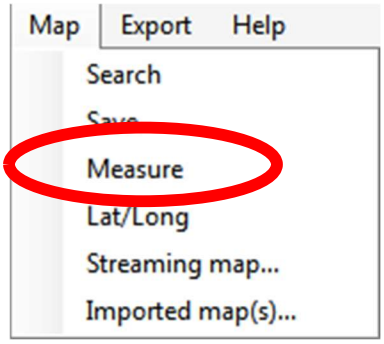
Measurement Tool

The measurement tool calculates the distance between two points in the world map and displays the distance in metres and nautical miles.



You can use this by clicking on this icon on the toolbar 

; or by clicking on the “Map” menu and clicking “Measure”



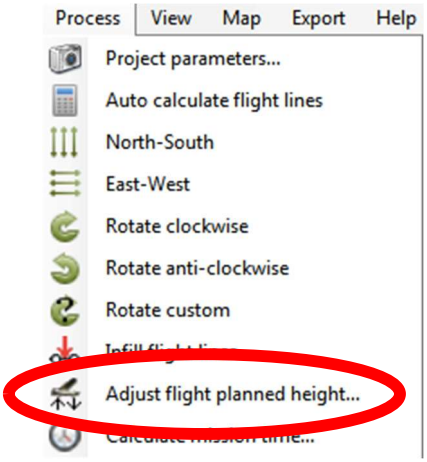
Once the measuring tool is activated, click between two points on the screen to measure the distance between them. Like so:

Adjust Flight Planned Height

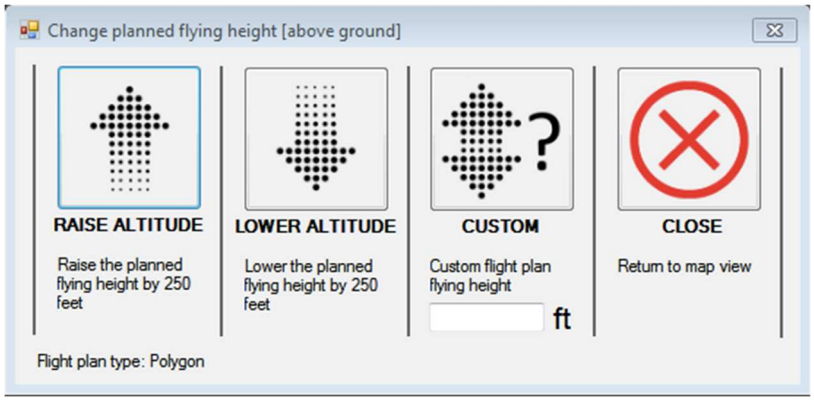
The adjust flight planned height features allows you to change the height of your existing flight plan.

To use this feature, you may either click on the “Adjust planned flying height” icon on the toolbar 

; or click on the “Process” tab and click on “Adjust flight planned height”.



Once the window appears, you can raise or lower the attitude of your flight plan by simply clicking the corresponding button. This will adjust the current attitude height for your flight plan by 250 feet. The flight plan will adjust itself automatically by insert or removing camera stations, flight lines, etc.

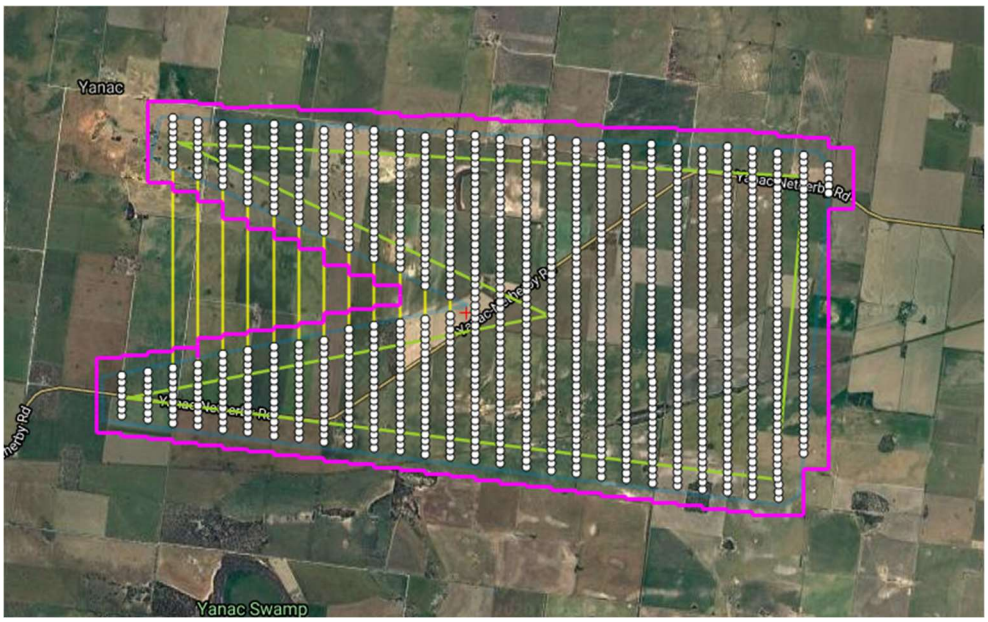


You can set the exact flying attitude of your flight plan by inserting it into the “ft” field under the custom section.

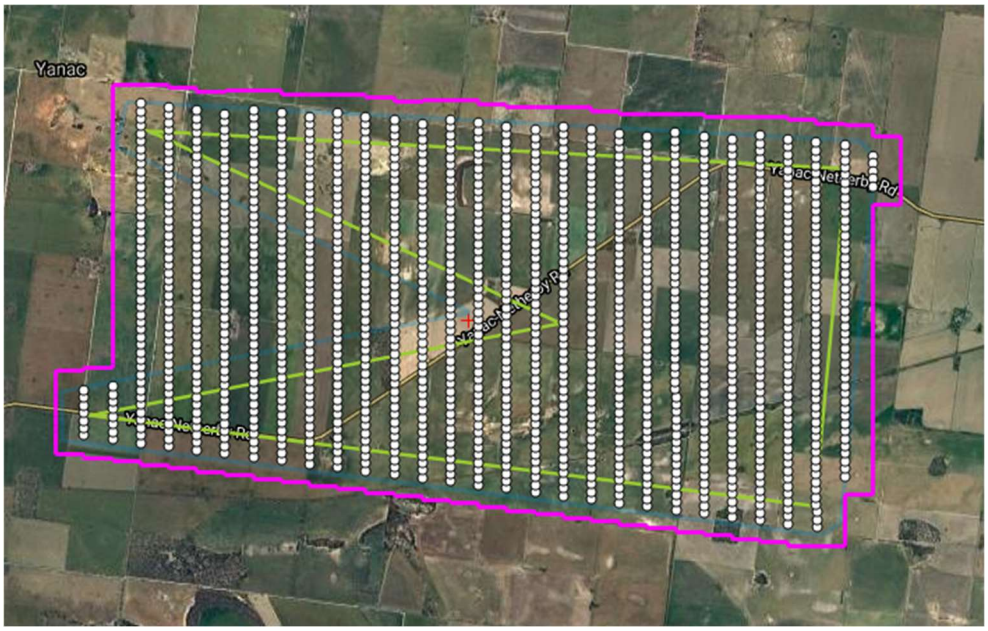
Infill Flight Lines

Using this option will add camera station points along your flight path to areas outside of your polygon area. This feature is available only in FlightPlanner Ultimate.

Before Infill Flight Lines:



After Infill Flight Lines:

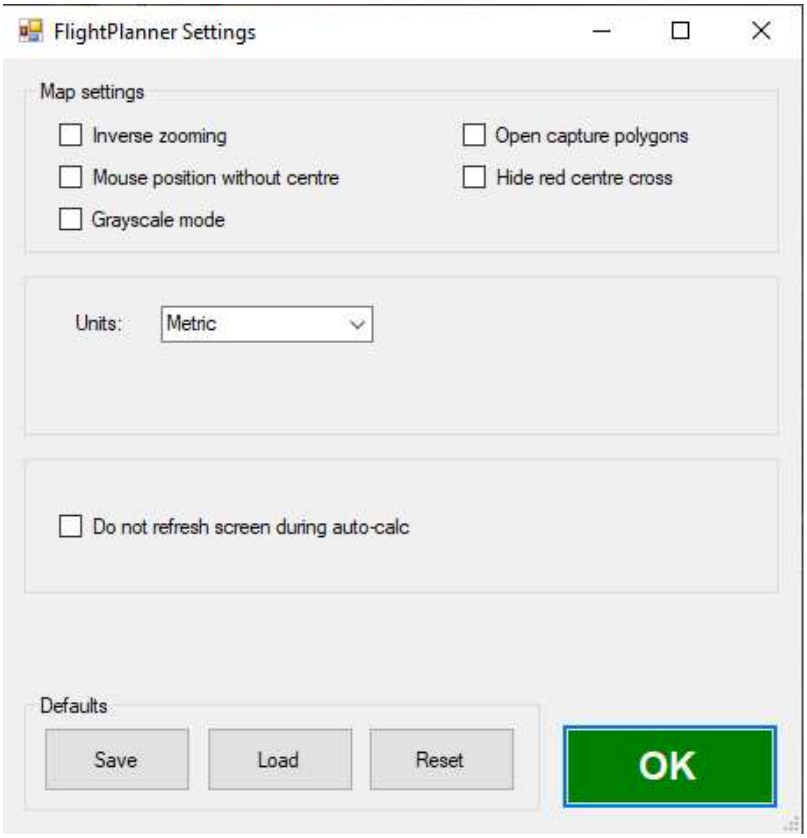


FlightPlanner Ultimate only

You can see in the example above camera station points were added along the flight lines outside of the polygon area. These extra camera points improve the overall image quality of the geography for your other camera shots as well. There is no significant downside to using this feature considering you're going to fly pass these areas regardless during your flight.

FlightPlanner Settings

The FlightPlanner settings window allows you to alter various features of FlightPlanner. You may find these settings in "Settings" options under the "File" menu.



Map Settings:

- Inverse zooming: Reverses your zooming direction when using the mouse-wheel

- Mouse position without centre:
- Grayscale mode: Changes the map being displayed to grayscale
- Open capture polygons:
- Hide red centre cross: Hides the small red cross in the centre of the window
- Units: Changes how FlightPlanner displays its information to either, metric or imperial

You also have the option to ignore screen refreshes while you're calculating an auto-calculated Flight Orientation for a flight plan.

By clicking, "Save," you can save new default settings which may be quickly loaded by clicking the "Load," button.

Using Terrain Models

FlightPlanner Pro and Ultimate support the use of terrain models in flight planning. This offers several advantages:

1. Ensure consistent forward overlap in regions of high terrain by moving camera stations closer to each other on the flight lines.

2. Ensure consistent side overlap in regions of high terrain by moving flight lines closer to each other.

3. Ensure GSD and overlap remain within tolerance by changing the height of flight lines.

As a result of using terrain models when operating in regions of high terrain, the flight plan can always be optimized: GSD and overlap will be close to their specified values, and the number of images acquired will be minimized.

To be compatible with FlightPlanner, the DEM file format must be either .BSQ or .BIL, with geographics style (lat/long) projection, single-band, 16-bit float. Typically an ENVI-type .hdr file will accompany the .BSQ or .BIL file. The maximum supported file size is 1.25GB.

Creating and Exporting a Digital Terrain Model

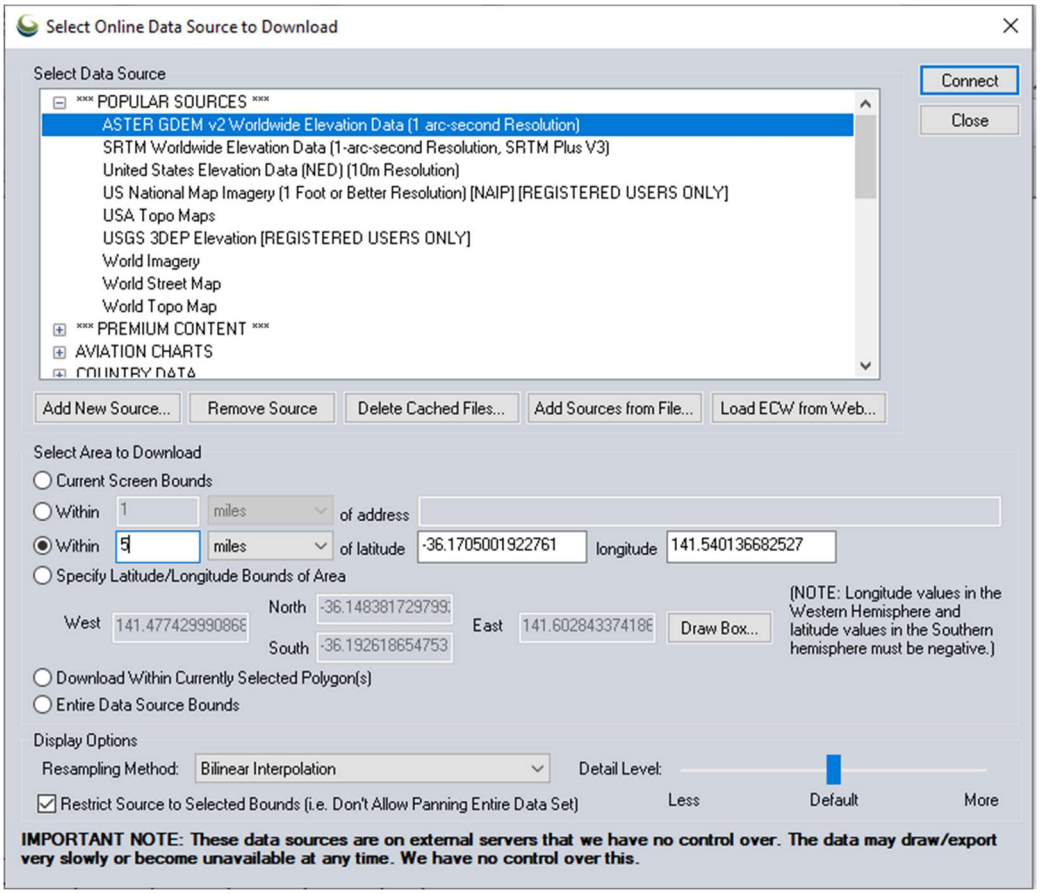
We recommend importing terrain models from the Global Mapper GIS software from Blue Marble Geographics (www.bluemarblegeo.com).

NOTE: *You may trial the Global Mapper software initially, but you will need to buy a license from them after the period ends. You will also need to provide a business email before downloading the software.*

Once you've successfully downloaded the software. The following steps outline how to do this.

1. In Global Mapper, choose "Download Online Imagery/Topo/Terrain Maps…" from the File menu.

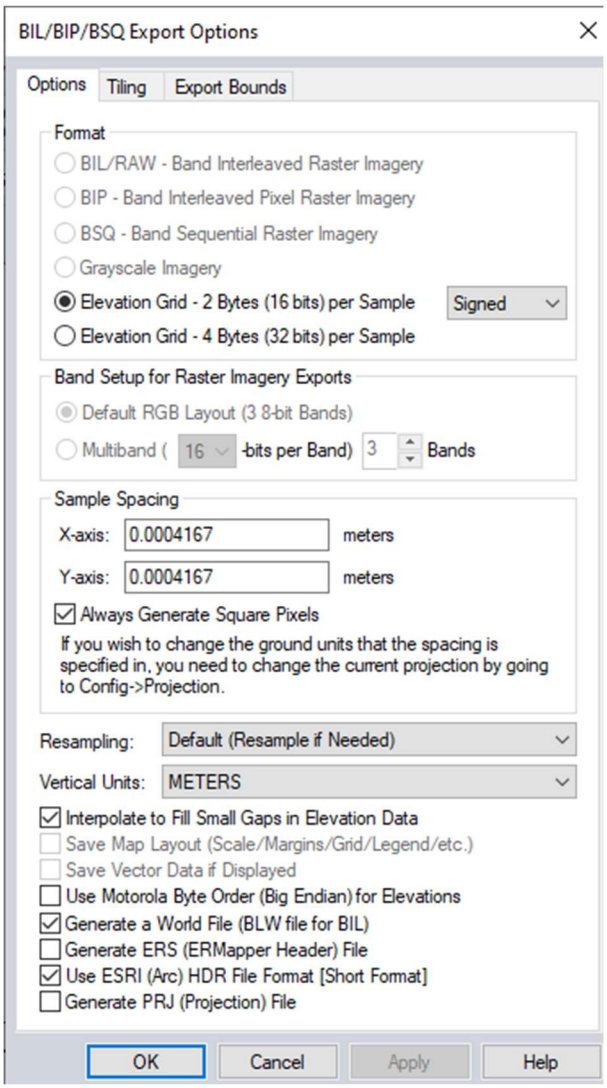
2. Select ASTER GDEM in the list of DTM (Digital Terrain Model) choices. Select the Area to Download in the bottom half of the dialogue and then click, "Connect."



3. Once the DEM has loaded into the view, select “Export” > “Export Elevation Grid Format” from the File menu.

4. Choose .BIL/.BIP/.BSQ format.

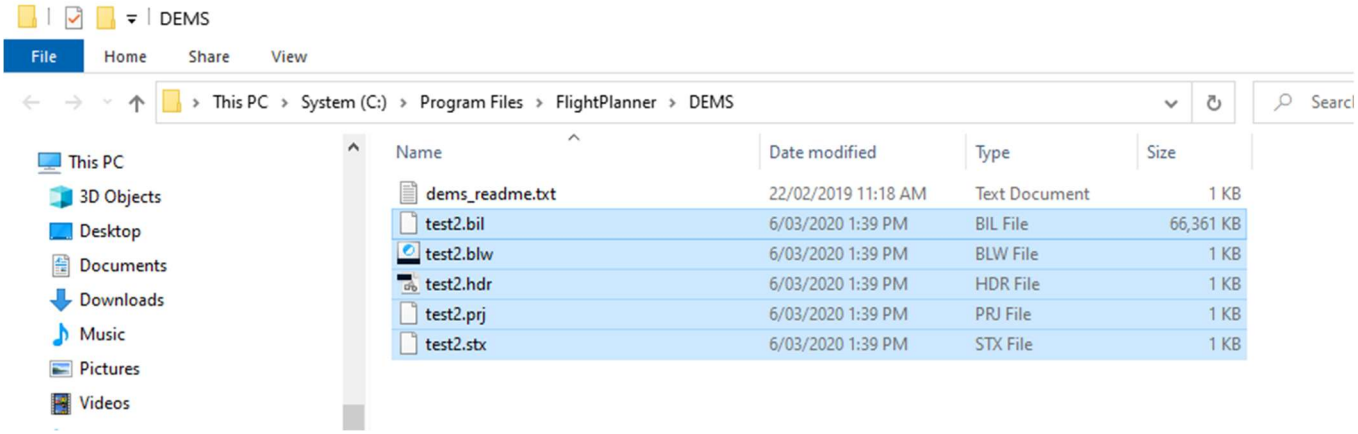
5. Make the Export Options match the image below:
   a. Format: Elevation BIL –2 Bytes (16 bits) per Sample
   b. Sample spacing: 0.0004167 arc degrees for both X & Y
   c. Interpolate to fill small gaps: YES
   d. Generate a world file: YES
   e. Use ESRI HDR file format: YES



FlightPlanner Pro or Ultimate only

6. Give your DTM a sensible name so you can identify it in FlightPlanner later. Note that multiple files will be outputted including the .BIL file itself.

7. Put all these files in a folder called “DEMS”. This folder can reside anywhere on your computer. However, note that some installations of Windows have limitations on where you can store files (e.g. in some cases the C drive cannot be used).



FlightPlanner Pro or Ultimate only

Using a DTM in Flight Planning

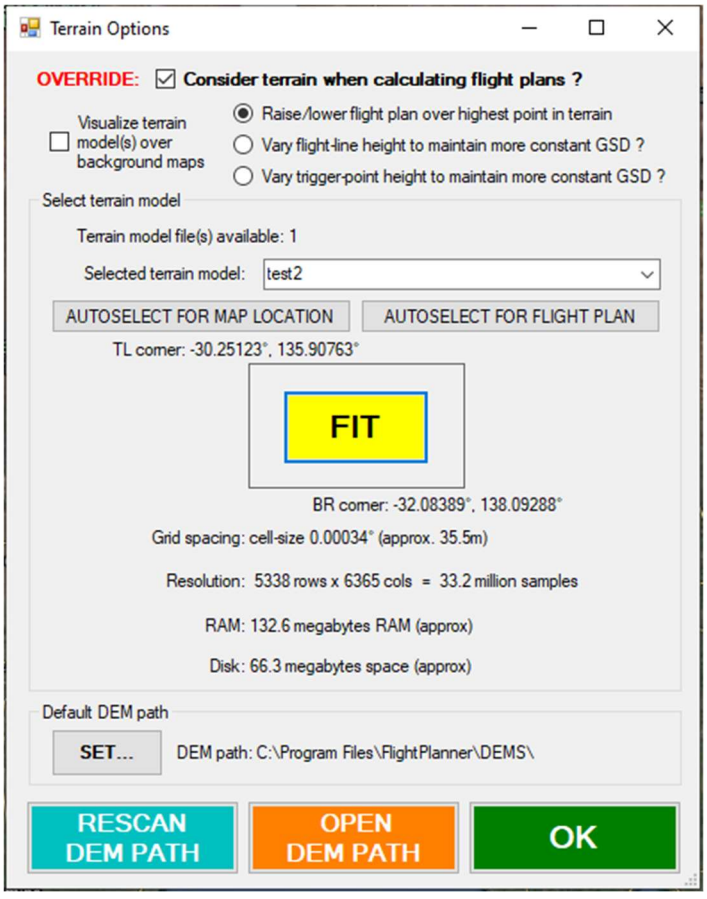
The use of terrain models is controlled through the "Terrain Options" dialogue box (shown below). This can be accessed using the terrain icon on the toolbar. This icon also indicates whether terrain features are turned on or off.

 indicates that terrain features are switched off

 indicates that terrain features are switched on

The terrain model dialogue box allows the user to choose the following options:

- Whether to consider the DTM in planning
- Whether to visualize the terrain model over the top of the streaming maps
- Whether the DTM should be considered when calculating flight plans. The height can be varied by either flight-line, trigger-point, or by a constant highest point over the entire flight plan
- Which terrain model to use
- Auto-select (move your view) to the nearest imported terrain model based off your current camera's location
- Auto-select (move your view) to the nearest imported terrain model based off your flight plan's location
- Fit the terrain model to the screen (using the "FIT" button)
- Set the path where the terrain models are stored. Since not all installations of



FlightPlanner Pro or Ultimate only

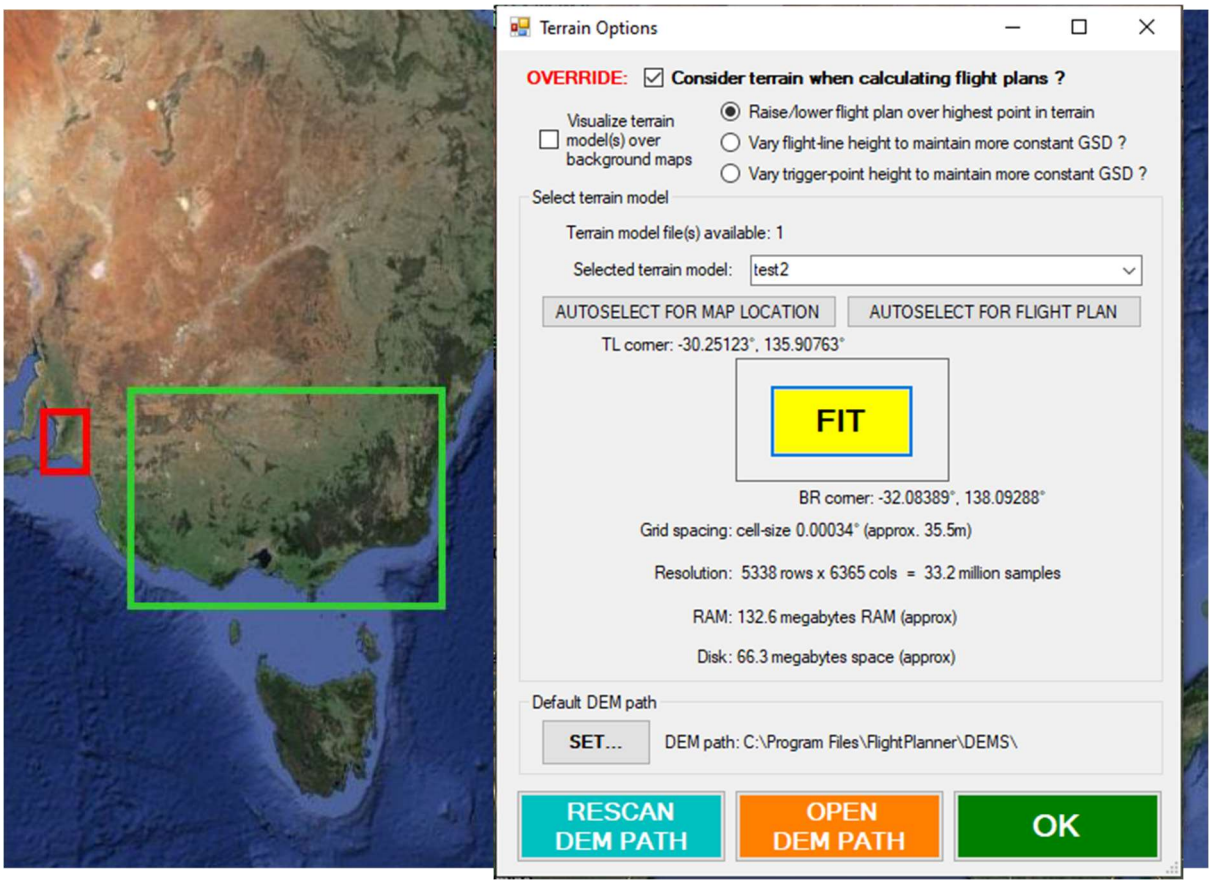
Windows will allow files to be stored in certain locations, the user can choose the default location of where to store the terrain models

- Open or rescan the storage location to detect newly created terrain models

When FlightPlanner Pro/Ultimate is started, any terrain models that have been added to the DEMS folder will be automatically imported. If terrain features have been switched on, the terrain models are indicated by red or green rectangles: the green rectangle is the active terrain model, whilst the red rectangles are non-active terrain models.

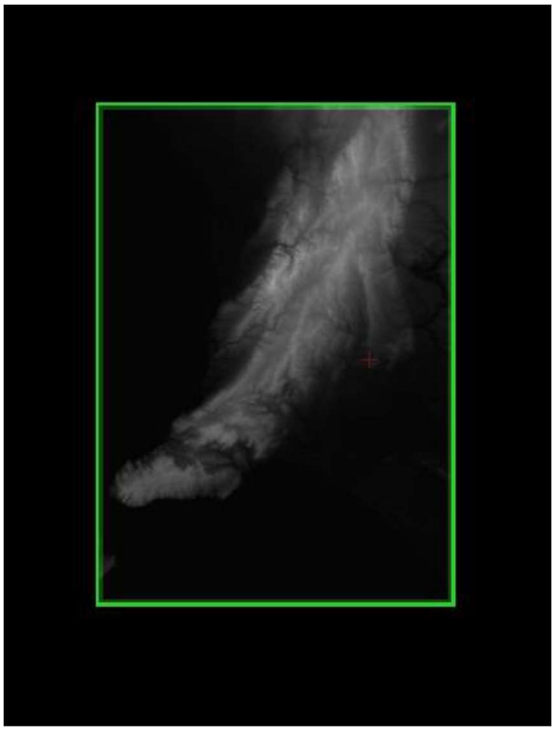
Note that if terrain features have been switched on, then flight planning can only take place within the area covered by the active terrain model (i.e. within the green rectangle).

To flight plan outside of the area covered by the active terrain model, the terrain features must be switched off.

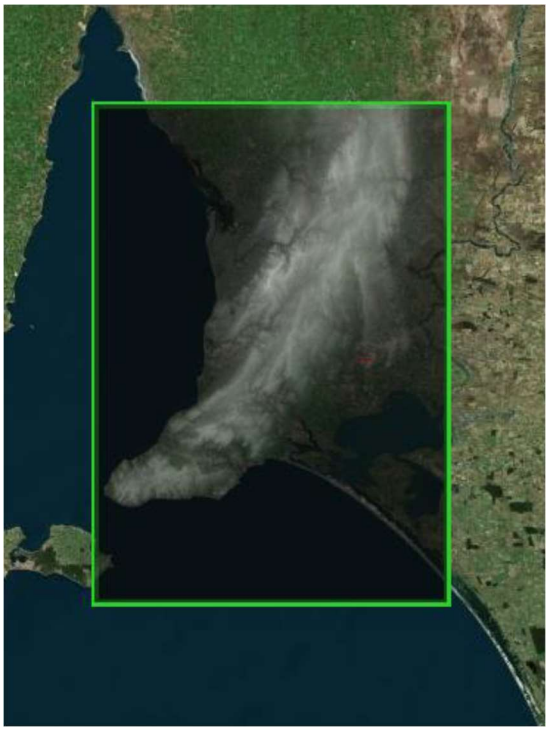


FlightPlanner Pro or Ultimate only

The imported terrain models can be visualised in FlightPlanner as a semi-transparent overlay:



Blank background

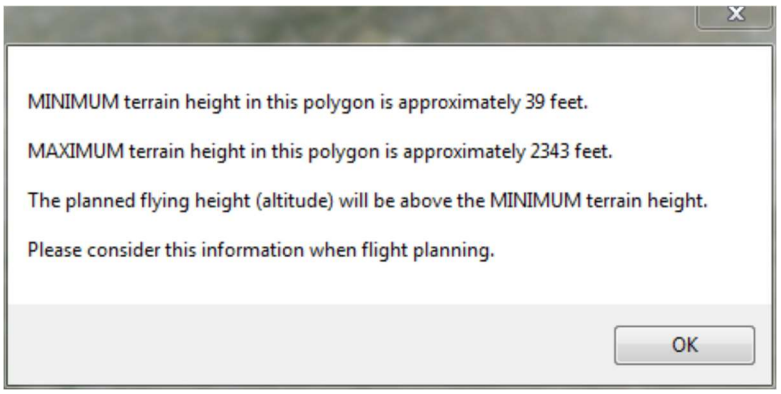


Bing maps background

Care must be taken when using terrain models in flight planning to ensure that sensible numbers are entered into the project parameters dialogue box. For example, if the flying height of the aircraft is below the terrain height in the region of the flight plan, then strange results could occur.

To guard against using incorrect values, there are some automatic warnings. It is recommended that the user be guided by these warnings, to make good decisions about the project parameters.

Although FlightPlanner will warn when strange behaviour could occur, this won't stop FlightPlanner from creating the flight plan.



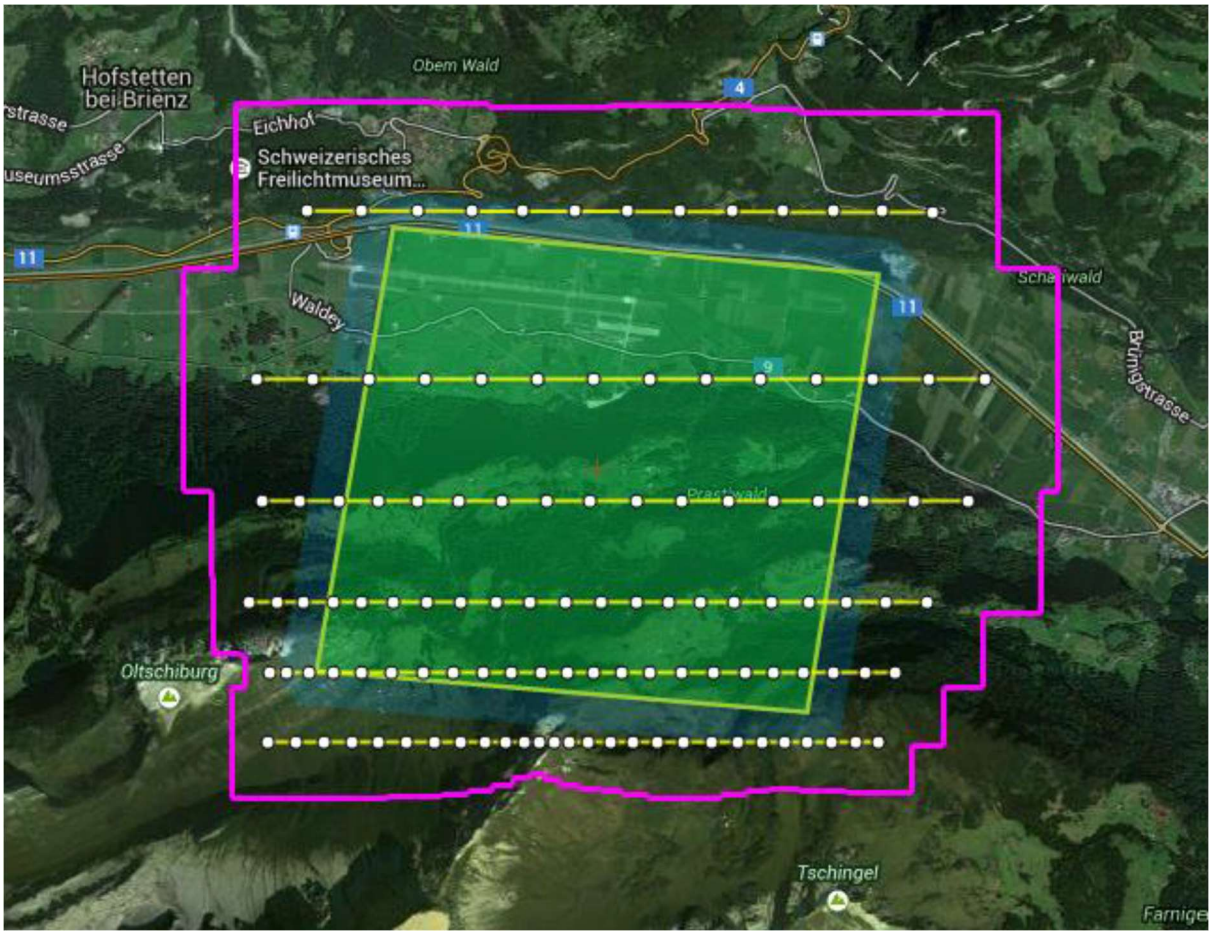
FlightPlanner Pro or Ultimate only

The flight plan below shows how the flight lines have been automatically moved closer together to ensure that side overlap does not drop below the value set in the project parameters (in this case, 40%).

It can also be clearly seen that the trigger points have been automatically moved closer together over high terrain to ensure the forward overlap is not less than 70% (the value set in the project parameters).

Note that the pixel size is associated with the lowest point in the flight plan area. Therefore, the pixel size will never be coarser than the value specified in the project parameters.

Finally, although FlightPlanner Pro/Ultimate can account for varying terrain heights in a single flight plan, in some cases, for the greatest efficiency, it is better to create two flight plans at different heights.



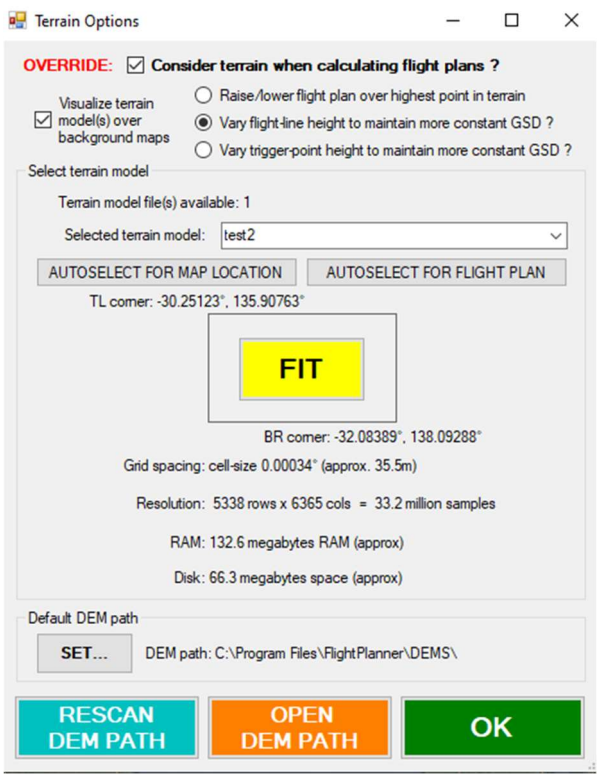
Flight Plans with Lines at Different Heights

FlightPlanner Ultimate gives the user the option of creating a flight plan with lines at different heights. This can lead to more consistent GSD and overlap, and fewer images to cover the same area.

In order to create flight lines of varying heights, the checkbox “Consider terrain when calculating flight plans?” must be clicked. There are 3 different methods you can use:

1. Raise/lower flight plan over the highest point in terrain: Sets the entire flight plan over a constant height which would be the highest terrain point
2. Vary flight-line height to maintain more constant GSD?: Varies the height of flight lines based off the terrain map’s height
3. Vary trigger-point height to maintain more constant GSD: Varies the height of the trigger-points based off the terrain map’s height

To get full benefit from creating a flight plan with lines of varying height, it is recommended that a flight management system is used which can handle flight lines of varying height. Aviatrix Ultimate, our own flight management system can do this really well!



There are good reasons for creating flight plans with flight lines at different heights:

- Reduced number of flight lines
- Fewer frames to capture
- Less variance in the GSD across all the acquired frames
- More consistent forward and side overlap
- Better terrain clearance for the aircraft

FlightPlanner Pro or Ultimate only

The algorithm which determines the height of the flight lines firstly aims to preserve the forward and side overlap, whilst simultaneously ensuring that the GSD does not increase above the maximum value specified by the project parameters.

Note that flight plans with varying flying heights can only be applied to polygon flight plans. Support for path flight plans will be added at a later date.

As an example, a flight plan was created for the same area, but firstly using a fixed flying height, and then secondly a varying flying height.

The varying flying height achieves the following efficiencies:

- Reduced flight distance, from 273km to 216km
- Reduced number of turns from 21 to 16
- Reduced number of frames from 2025 to 1312

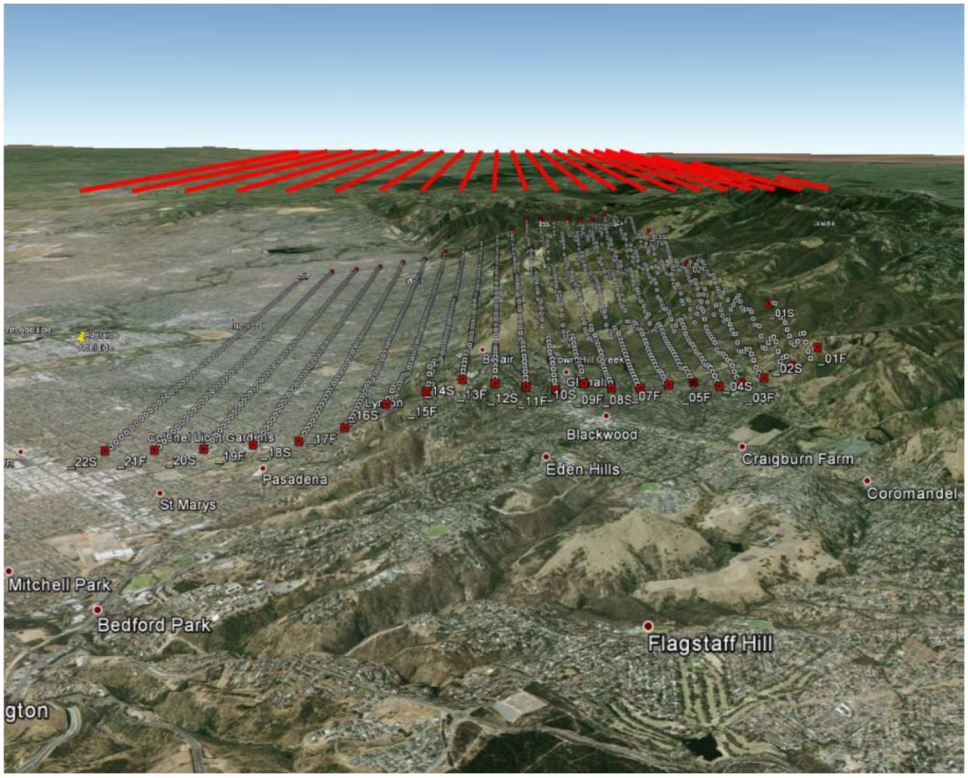
In the varying flying height flight plan, the heights of the lines range from 3081 feet to 3981 feet, as opposed to being fixed at 3023 feet. Over the areas of higher terrain, this gives a much better safety margin.

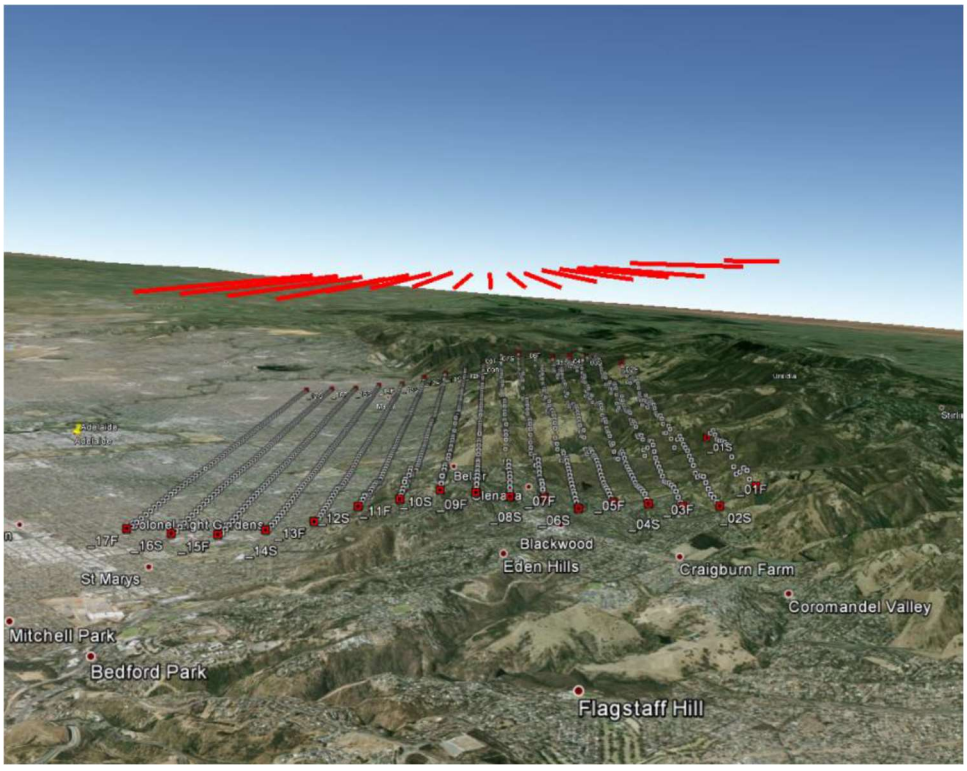
However, be careful where there are very large variations of terrain as you may be flying at levels of unpressurised height, e.g., 10,000 feet or higher and therefore need oxygen, unless in a pressurised cabin. Computers with SSD's , also a must.

TOTAL RUN LENGTH 273.4km	TOTAL RUN LENGTH 216.1km
LINE BEARING 36.5°	LINE BEARING 36.5°
NUMBER TURNS 21	NUMBER TURNS 16
NUMBER FRAMES 2025	NUMBER FRAMES 1312
GROUND SAMPLE 0.127m (12.7cm)	GROUND SAMPLE 0.127m (12.7cm)
INPUT AREA 8053.2 hect	INPUT AREA 8053.2 hect
CAPTURE AREA 10521.6 hect	CAPTURE AREA 10587.3 hect
CAMERA NIKON D800E	CAMERA NIKON D800E
ALTITUDE AGL 3000ft	ALTITUDE AGL 3000ft
FORWARD O'LAP 70.0%	FORWARD O'LAP 70.0%
SIDE OVERLAP 40.0%	SIDE OVERLAP 40.0%
GROUND SPEED 90kts	GROUND SPEED 90kts
FRAME RATE 4.06 seconds b/n frames	FRAME RATE 4.06 seconds b/n frames

FlightPlanner Pro or Ultimate only

Comparison in Google Earth of fixed height flight lines and varying height flight lines:





Free-draw Flight Plans

The free-draw flight planning tools are used when a polygon or path flight plan won't meet the requirements of the project.

The process is started by dropping a single flight line on a map. Next the camera and imaging parameters are chosen. Then the user has the complete freedom in designing the flight plan: replicate lines, lengthen or shorten them, rotate them, move them, delete them. It's the most flexible way of creating a flight plan.

Note that free draw flight plans cannot be used with terrain models. If a terrain model is loaded, the flight planning algorithm will ignore it, and assume that the terrain is a flat surface.

The free-draw tool is useful for creating non-regular flight plans. Flight lines can be placed wherever they are required. They can be modified as follows:

- Lengthened and shortened
- Rotated
- Duplicated and deleted

Free-draw mode is activated using the free-draw tool icon on the toolbar. 

FlightPlanner Pro or Ultimate only

Using the Free-draw Tool

1. Using the free-draw tool is slightly more complicated than the polygon and path planning tools.

2. Open FlightPlanner (Pro or Ultimate) and browse to the location of the flight plan.

3. Click the free-draw tool icon on the toolbar and add the first line of the flight plan. At this point you'll be prompted to select the camera parameters.

4. Either:
   a. Add more lines, making sure the free-draw tool is active (it appears green),  or
   b. Modify the current lines by highlighting them, making sure the select tool is active (it appears green). 

FlightPlanner Pro or Ultimate only

Free-draw: Replicating Lines

1. A single line has been added to the flight plan, and project parameters have been selected.

2. The single line has been highlighted using the select tool. It can now be used to modify the flight plan.

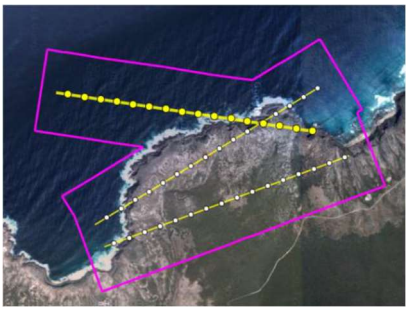
3. Clicking with the left mouse button on the left-hand side of the highlighted line, whilst holding CTRL and SHIFT, the line is replicated to the left.

4. Similarly, clicking with the left mouse button on the right-hand side of the highlighted line, whilst holding CTRL and SHIFT, the line is replicated to the right.

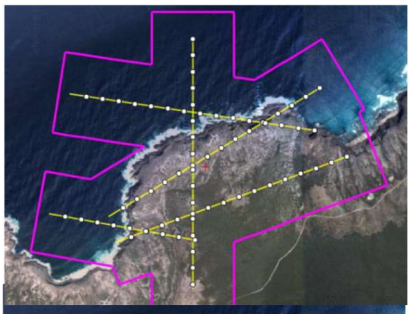
Free-draw: Rotating and Adding

1. One or more lines can be rotated by highlighting those lines, then using the “, “ and “ . ” keys to rotate anti-clockwise and clockwise.

2. Lines can be rotated independently of each other. It’s only the highlighted line or lines that are rotated.

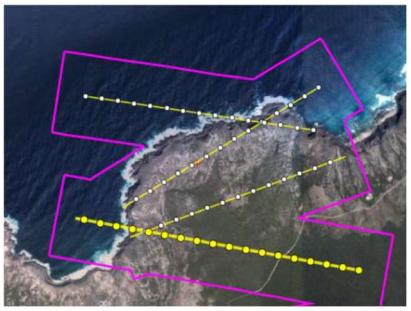


3. By activating the free-draw tool, further lines can be added anywhere in the flight plan.

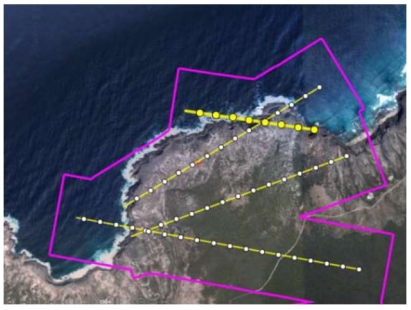


Free-draw: Lengthen, Shorten, Move

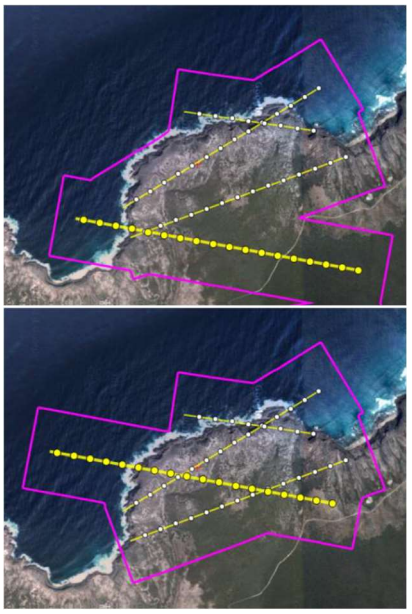
1. One or more selected lines can be lengthened using the “=”, “0” and “]” keys. These keys will lengthen the line at either or both ends.



2. One or more selected lines can be shortened using the “-”, “9” and “[” keys. These keys will shorten the line at either or both ends.



3. One or more selected lines can be moved by holding the SPACEBAR and moving the mouse. Releasing the SPACEBAR will drop the line at the required place.



List of Free-draw Hot Keys

Hot key	Action
CTRL + SHIFT + left mouse button (click to the left of the highlighted line)	Replicate the highlighted line to the left
CTRL + SHIFT + left mouse button (click to the right of the highlighted line)	Replicate the highlighted line to the right
,	Rotate the highlighted line(s) anti-clockwise
.	Rotate the highlighted line(s) clockwise
Left mouse with activated free-draw tool	Add a new line to the flight plan
9	Shorten the line at the left-hand end
0	Lengthen the line at the left-hand end
-	Shorten the line at the right-hand end
=	Lengthen the line at the right-hand end
[	Shorten the line at both ends
]	Lengthen the line at both ends
SPACEBAR and mouse	Move the line to a new position
DELETE	Deletes selected trigger points or flight lines

Help Menu

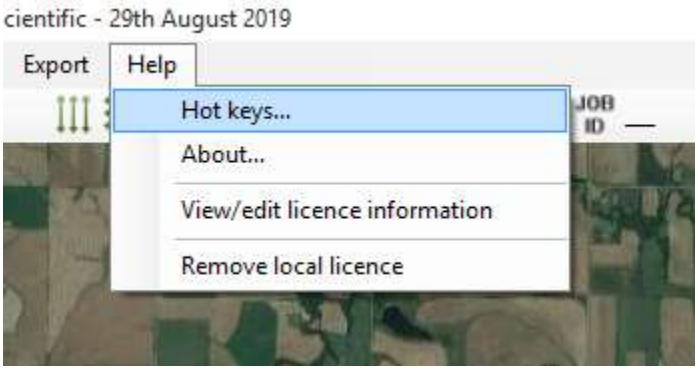
The help menu allows you to edit, remove and show additional information regarding your FlightPlanner version. More specifically:

- Show your FlightPlanner license details
- Show what is your current FlightPlanner version
- View hotkeys for primary functions
- To change your license information
- To remove your local license

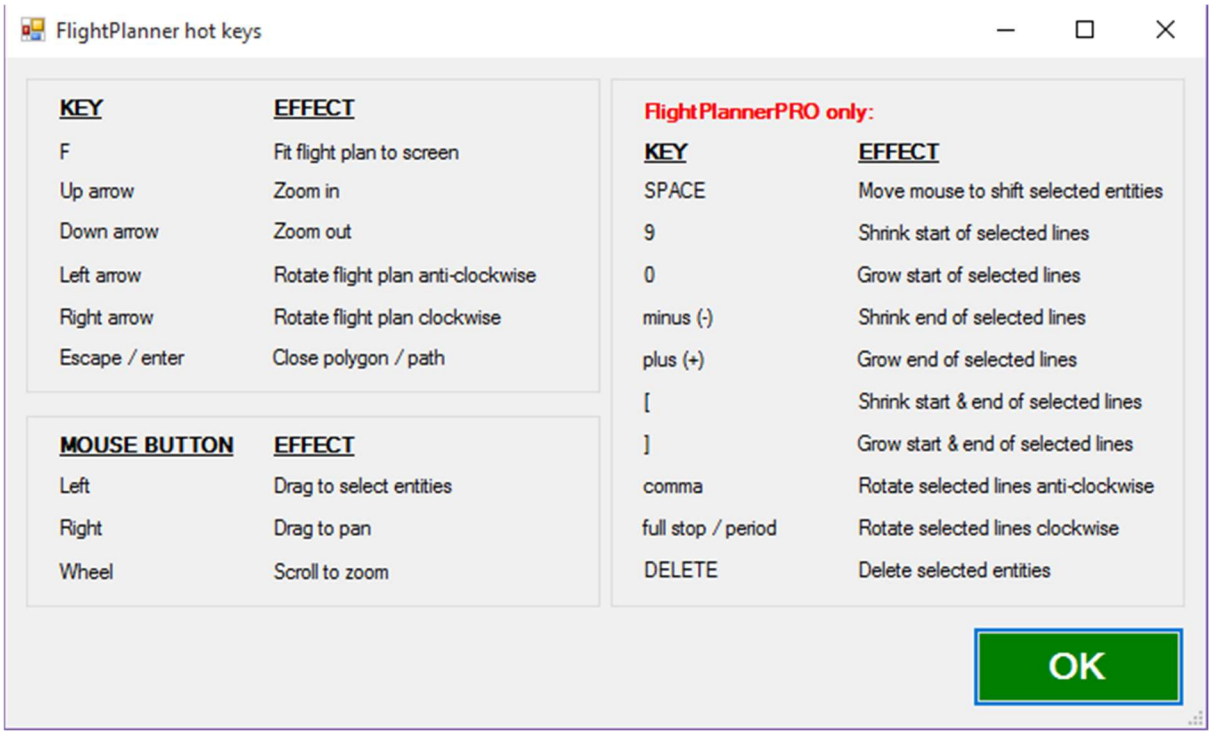
Hotkeys

FlightPlanner uses specific keys you can use to access functions quickly. These can range from zooming in or out, rotating the flight plan's flight lines, grow/shrink selected flight lines, etc.

To view what these hotkeys are, you can hover over the "Menu" tab and click "Hot keys…"



A window will display all the hotkeys and what functions they're assigned to.



About

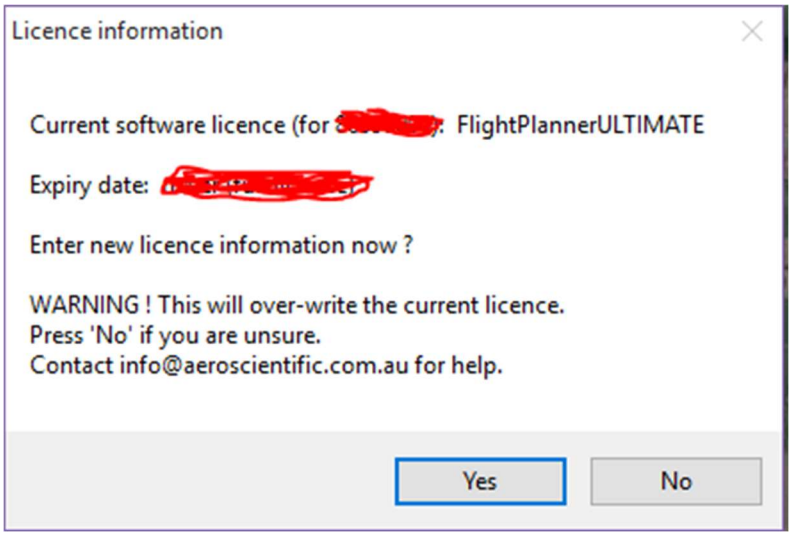
The about window displays what version of FlightPlanner you're currently running when your software was last updated and what your license key is.

To access this hover over the "Help" tab and click on "About"

View/Edit License Information

You can view your license's expiry date and your license key number on this window. You may even overwrite your current license with a new one. You will typically use this only if you're upgrading your FlightPlanner version.

To access this hover over the "Help" tab and click on "View/Edit License Information"



And Finally…

Interfacing with Other Software

FlightPlanner can create files which are compatible with the following software:

- **Aviatrix**, AeroScientific's camera control and flight management system: FlightPlanner has been developed alongside Aviatrix. Together the two applications form a powerful tool for airborne data acquisition. Further details about Aviatrix can be found on the AeroScientific website.

- **ForeFlight**, an iPad application for flight navigation:
  Many pilots in the US use ForeFlight for in-flight navigation. It is possible to load your own flight plans into ForeFlight, if they are in the correct .KML format. FlightPlanner can create appropriately formatted .KML files compatible with ForeFlight (called user_waypoints.kml).
  Check with us to see if your device is compatible.

- **GPSUtility**, an application for uploading data to various GPS units: This application allows users to upload flight plans to some aviation GPS units, such as the Garmin 196 or 296.

Note that functionality for other software may be added on request. Please contact us for details.

Menu Functions

- File menu
  - Clear flight plan: Clear the current flight plan
  - Clear all: Clear the current flight plan, and the polygon/path
  - Clear imported map(s): Clear any imported background maps (Pro and Ultimate only)
  - Settings: Open the Settings dialog
  - Exit: Exit the software

- Import menu
  - .KML/.KMZ file: Import a Google Earth file (either polygon or path)
  - .KML /.KMZ (view only): Import a .KML/.KMZ file for loading in the background (Pro and Ultimate only)
  - Flight Plan Import a flight plan created in FlightPlanner
  - Shape file: Import an ESRI shape file containing polygons (Ultimate only)
  - Trigger Points/Flight Lines (ASCII text file) Import an ASCII text file of flight line start/end-points (Pro and Ultimate only)
  - Track'Air snapPLAN file: Import a Track'Air snapPLAN file (Ultimate only)
  - Track'Air snapBASE file: Import a Track'Air snapBASE file (Ultimate only)
  - Topoflight KML file: Import a .KML file created by the Topoflight software (Ultimate only)
  - Map(s): Import one or more static background maps (Pro and Ultimate only)

- Process menu
  - Project parameters: Open the Project Parameters dialog
  - Auto calculate flight lines: Automatically calculate the most

efficient flight plan

- North-South / East-West: Align the flight plan north to south or east to west
- Rotate (anti-) clockwise: Rotate the flight lines clockwise / anticlockwise
- Rotate custom: Rotate the flight lines to a specified Bearing
- Infill flight lines: Adds camera station points to the flight lines which originally was omitted due to not being inside the polygon area (Ultimate only)
- Adjust flight planned height: Adjust your current flight plan's height in feet
- Calculate mission time: Calculates your flight plan's total mission time

- View menu
  - Zoom in / out: Zoom the display in and out
  - Fit to screen: Fit the flight plan to the screen
  - Flight plan information: Shows the details of the flight plan
  - Hide / show flight lines: Hide or show the calculated flight lines
  - Hide / show camera stations: Hide or show the calculated camera stations
  - Hide / show capture boundary: Hide or show the boundary of complete capture
  - Hide / show camera or line footprints: Hide or show the calculated image footprints
  - Hide / show imported maps: Hide or show the imported background maps
  - Hide / show streaming maps: Hide or show the live streaming maps

- Map menu
  - Search: Find a location based on place name

- Save: Download the currently displayed map. Look at the save map section for more information
- Measure: Measure a distance on the map
- Lat/Long: Find a location based on decimal latitude and longitude
- Streaming map: Opens the Streaming Map selection box
- Imported Map(s): Opens the Imported Map selection box, when imported maps have been added (Pro and Ultimate only)

- Export menu
  - Flight plan file (native) single height: Save a single .fpl file to reopen later in FlightPlanner
  - Flight plan file (native) multiple heights: Saves multiple .fpl files with varying heights to reopen later in FlightPlanner
  - .KML file (flight lines): Save a .KML file of the planned flight Lines
  - .KML file (flight lines 3D): Save a .KML file of the 3D flight lines
  - .KML file (polygon / path): Save a .KML file of the path or polygon
  - ForeFlight .KML file: For use with ForeFlight software
  - .GPSU file (without trigger Points): Save a file for use with GPSUtility software
  - Screengrab (PNG): Save a screengrab of the flight plan
  - Export All: Export all file types

- Help menu
  - Hot keys: Displays a list of keyboard shortcuts
  - About: Displays the current software version
  - Remove local license: Initiates removal of the Local License
  - Remove network license: Initiates removal of the Network License

Toolbar Icons

This section briefs you on the functionality of all the icons on the toolbar.

Clear all:	Clear the current flight plan, and the polygon/path
Fit to screen:	Fit the flight plan to the screen
Select tool:	Selects camera stations or entire flight lines for more information or to modify flight lines
Polygon tool:	Draws a polygon on the map to build a flight plan
Path tool:	Draws a path on the map to build a flight plan
Free draw tool:	Allows you to draw additional flight lines even after your flight plan is calculated
Project parameters:	Open the Project Parameters dialog
Auto calculate flight lines:	Automatically calculate the most efficient flight plan
North-South / East-West:	Align the flight plan north to south or east to west
Rotate (anti-) clockwise:	Rotate the flight lines clockwise / anticlockwise
Rotate custom:	Rotate the flight lines to a specified Bearing
Infill flight lines:	Adds camera station points to the flight lines which originally was omitted due to not being inside the polygon area

 Adjust flight planned height:	Adjust your current flight plan's height in feet
 Calculate mission time:	Calculates your flight plan's total mission time
 Tool Strip Button 3D:	
 Set Job ID:	Adds an ID to the current flight plan
 Terrain Options:	Allows you to set up and import a digital terrain model
 Search:	Find a location based on the place name
 Streaming map:	Opens the Streaming Map selection box
 Imported Map(s):	Opens the Imported Map selection box, when imported maps have been added (Pro and Ultimate only)
 Save:	Download the currently displayed map. Look at the save map section for more information
 Measure:	Measure a distance on the map

Mouse and Keyboard Shortcuts

This is a list of some of the mouse and keyboard shortcuts:

- F key: Fit the flight plan to the screen
- Up arrow: Zoom in
- Down arrow: Zoom out
- Left arrow: Rotate the flight plan anti-clockwise
- Right arrow: Rotate the flight plan clockwise
- Escape / enter: Close the polygon or path
- Left mouse: Click and drag to select either trigger points or whole flight lines
- Right mouse: Click and drag to pan
- Mouse wheel: Zoom in and out

There are also other mouse and keyboard shortcuts used in the free-draw planning mode. Details of these are given in the section “List of free-draw hot keys”.

Acronyms

Acronym	Definition	Description
AGL	Above Ground Level	The height in which the aircraft is above the ground.
ASCII	American Standard Code for Information Interchange	A character encoding standard to exchange information electronically.
DSLR	Digital Single Lens Reflex	Type of digital camera.
DTM	Digital Terrain Model	A 3D Digital Elevation Model (DEM) in which the terrain data has further defined with greater accuracy.
ENVI	Environment for Visualizing Images	Software used to assist image analysis for GIS professionals.
ESRI	Environmental Systems Research Institute	An international supplier of geographical information systems.
FMS	Flight Management System	A fundamental component in modern airline's electronic system, which guides and automates a wide variety of in-flight tasks.
DEM	Digital Elevation Model	A model which 3D CG represents a terrain's surface.
GDEM	Global Digital Elevation Model	A type of digital elevation model (DEM) file type developed by ASTER.
GIS	Geographic Information System	A system designed to gather, manage, store, analyse, manipulate, and present geographic and/or spatial data.

GPS	Global Positioning System	A satellite navigation system used to determine an object's position within the world.
GSD	Ground Sampling Distance	The distance between two adjacent pixels on the ground within a digital photo. For example, each pixel represents 1 meter apart on the ground.
OS	Operating System	A system responsible for managing the computer's hardware, software resources, and provides common computer services.
RAM	Random Access Memory	A type of computer memory that can be accessed and changed in any order, allowing for quick access.
UAV	Unmanned Aerial Vehicle	An aircraft which operates without a human pilot, usually by a ground-based controller.
UTM	Universal Transverse Mercator	A system for assigning coordinates on the surface of the Earth.

Further Help and Support

If you need further help or support, you have the following options:

Email: info@aeroscientific.com.au

Website: www.aeroscientific.com.au

Facebook: www.facebook.com/aeroscientific

Twitter: twitter.com/aeroscientific

LinkedIn: AeroScientific

Please use the support ticket function on our website for technical support

We are currently building a global network of resellers. Please contact us to find out if there is a reseller in your region, or if you are interested in becoming a reseller.

Important Notices

All users must read and fully understand the following notices from Spatial Scientific Pty. Ltd. (“Spatial Scientific”). Please contact us immediately if there is anything that is not understood.

Aviation Safety Notices

It is the responsibility of the end user to make sure that all legal and safety requirements are met when using Spatial Scientific products in an aircraft, or in an aviation related activity. A suitably qualified pilot and/or engineer must be consulted.

The Aviatrix software is designed to assist with aircraft positioning related to aerial survey. It is not certified for aircraft navigation and must not be used for this purpose. None of the data provided by the Aviatrix software (including but not limited to speed, heading, distance, height) are guaranteed to be accurate. All data presented to the operator are indicative only. Aviatrix is a camera control system, not an aircraft navigation system.

It is the responsibility of the pilot-in-command to ensure that the use of the Aviatrix camera control system does not compromise the safety of the aircraft.

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About AeroScientific

AeroScientific is a business unit of Spatial Scientific Pty. Ltd., an Australian-based aerial services company. We develop, build and supply high-end (but cost-effective) software and hardware to aerial photographers and aerial surveyors worldwide.

Our PhD-qualified engineers have developed a range of software tools and hardware solutions to simplify the process of aerial image acquisition. Our software will take care of flight planning, aerial camera control, post-mission analysis and multi-image alignment. All of our products have been fully developed from the ground up by ourselves: we own 100% of the intellectual property.

As aerial surveyors ourselves, with considerable experience in aerial survey operations (topographic, multispectral, thermal and more), we feel that we truly understand the challenges that operators face. We have developed our software to make aerial image acquisition as simple and hassle-free as possible. Having used our own custom-designed technology for many years, we are now pleased to offer our clients this same technology. We've streamlined our own aerial image acquisition process; we'd now like to help others streamline theirs.

We are keen to support everyone in the industry, from new operators who are just beginning, to world-class survey companies that are looking to add new and exciting technology to their operations. Our mission is to make aerial imaging technologies accessible to anyone, through state-of-the-art technology, innovation, leadership and collaborative partnerships.

Clients currently using AeroScientific products include U.S. federal government departments, academic institutions around the world, state government bodies in Australia, and numerous private companies, both large and small.

In 2014, AeroScientific won the Innovation Award at the Professional Aerial Photographers Association annual conference in Las Vegas.

About Spatial Scientific Pty. Ltd.

Spatial Scientific Pty. Ltd. is a geospatial technology company established by Dr. Paul Dare in 2005. Even though Spatial Scientific has never received any external private investment, it has been profitable every year since its beginning, and has grown into a global.

The goal of Spatial Scientific has always been to research, develop and commercialize new airborne imaging solutions, with a focus on using the latest imaging and computer technologies. As a result, Spatial Scientific has managed to create new market opportunities in the field of airborne remote sensing. By exploiting these opportunities, the company has become a leading player in the airborne remote sensing industry, both in Australia and around the world.

Spatial Scientific has followed two parallel business models: acquisition, processing and delivery of airborne remote sensing data (under the brand 'Remote Sensing Australia'); and development and sales of airborne imaging systems to other airborne data providers (under the brand 'AeroScientific'). Although both business models have been successful for many years, Spatial Scientific is currently investing more resources into the AeroScientific brand, with the aim of becoming the global leader of low-cost airborne imaging systems.

Since its founding in 2005, Spatial Scientific has developed a solid background in the use of imaging technologies to generate geospatial intelligence. The company pursues airborne imaging technology that delivers maximum benefit for industry, government and the wider community, and is dedicated to the generation of products, services and outcomes that make a real-world difference, both economically and sustainably.

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