Planet Imagery GIS Integrations

Mapping of with high resolution satellite imagery

Contents

Purpose

The NSW Imagery Hub provides NSW State Government Agencies and Local Government access to timely remotely sensed satellite imagery across the entirety of NSW. The Spatial Imagery Services Team, Science Division, NSW DCCEEW are responsible for the administration and management of Planet satellite imagery in NSW. For enquiries please email: spatial.imagery@environment.nsw.gov.au

This document details methods available to integrate the Planet Labs satellite imagery into GIS programs. The document has been prepared with all due diligence and care, based on the best available information at the time of publication.
A list of tools and integrations explored includes:

- Planet Explorer: https://www.planet.com/explorer
- Planet Basemap Viewer: https://www.planet.com/basemaps
- Planet ArcGIS Pro Add-in: https://learn.planet.com/download-arcgis-pro-add-in
- Planet QGIS Plugin: https://learn.planet.com/QGIS-Download-Now

- Planet Basemap Web Tile Service Web Page: https://api.planet.com/basemaps/v1/services?api_key={APIKEY}
- Planet Account Page (for API Key): https://www.planet.com/account/#/

We acknowledge and pay our respect to the traditional custodians of the lands and waters of Australia, and all Aboriginal Elders past and present.

ArcGIS Add-in

The Planet ArcGIS Pro add-in provides an ability to view and search the daily 3.7m PlanetScope images and monthly NSW basemaps mosaic web services in the Esri ArcGIS Pro Desktop application. The add-in allows you to login with your account and view Web Map Tile Services (WMTS) as basemaps for your data, or further analysis.

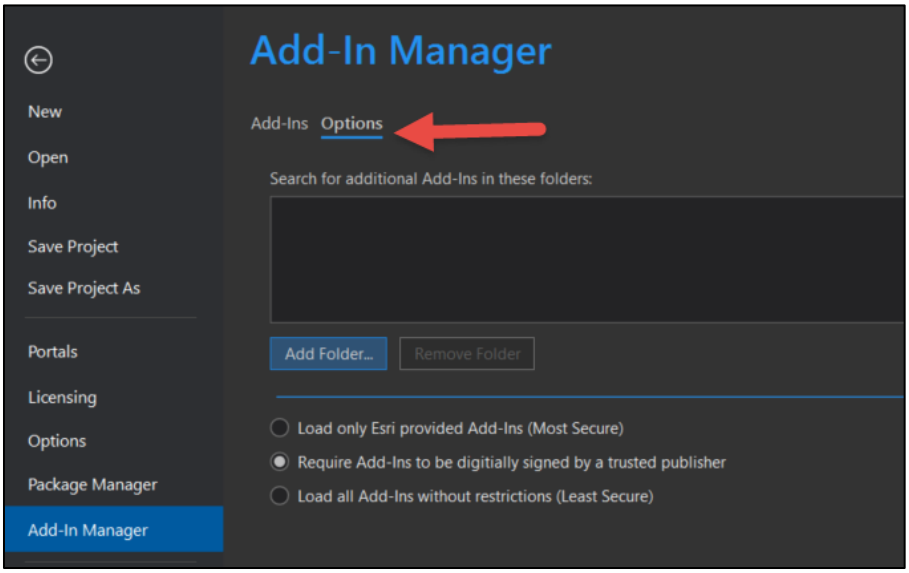
Setup

1. Open ArcGIS Pro. Please note that you will need to have a license for this software.

2. Download the Add-in and install: https://learn.planet.com/download-arcgis-pro-add-in. Please contact your IT team if required for installation.
   Please note the version for installation:
   - ArcGIS Pro 3.0+ for version 3.x of the add-in (the latest version).
   - ArcGIS Pro 2.4.3 - 2.9 for version 2.x of the add-in. Download 2.x. here.

3. Once downloaded, double-click the .esriAddinX file to open and install. When you open ArcGIS Pro, you should now see a Planet Imagery tab available in the toolbar ribbon.

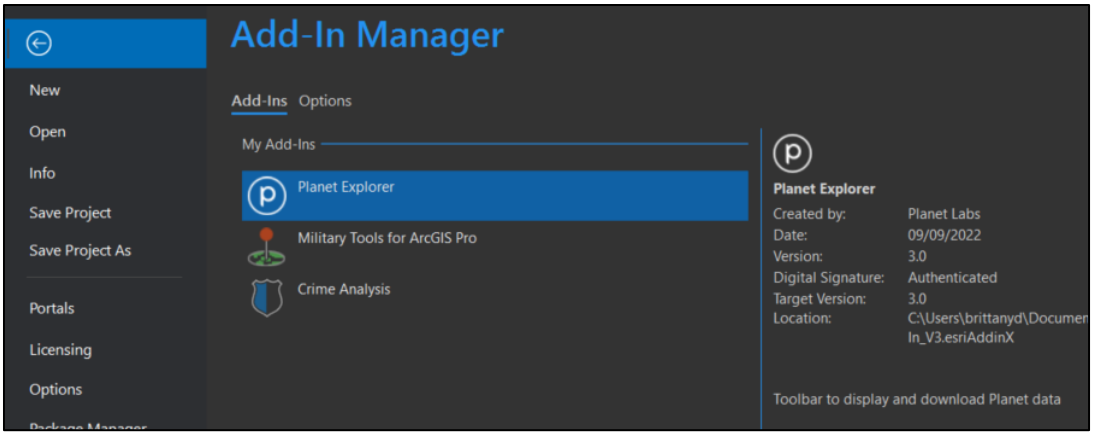
   If the Add-in has not successfully installed, please navigate to the Add-in Manager options (ArcGIS Pro > Project Tab > Add-in Manger > Options). When you have found this, select: *Add folder*. The Add-in is generally installed to: C:\Users\username\Documents\ArcGIS\AddIns\ArcGISPro. Load in this folder.



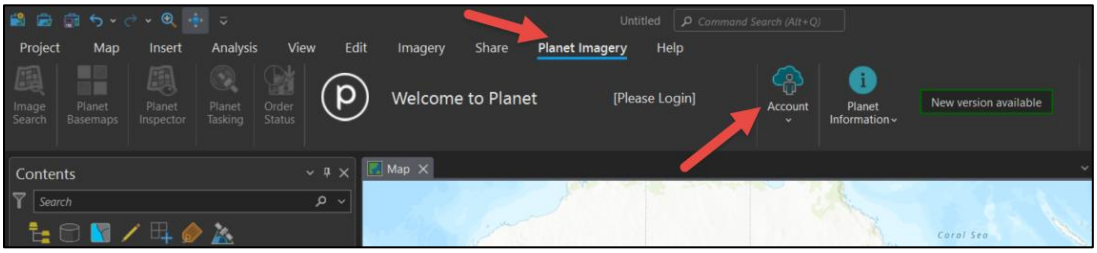
   Additionally, please ensure that either option of “Require Add-Ins to be digitally signed by a trusted provider” or “Load all Add-Ins without restrictions (Least Secure)” is selected, as the Planet add-in is not an official Esri Add-in product.

Note: A restart ArcPro is required to initiate changes.

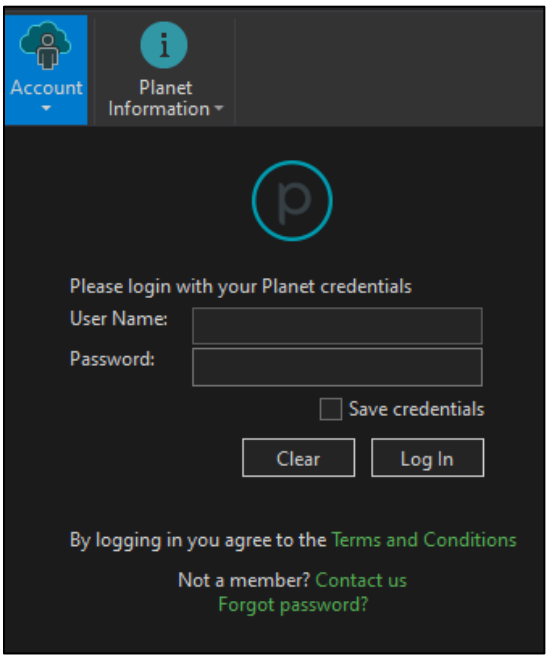
Once successfully installed, the Add-in will be listed in the Add-in Manager with versioning information and a new toolbar will display when in a Map view.



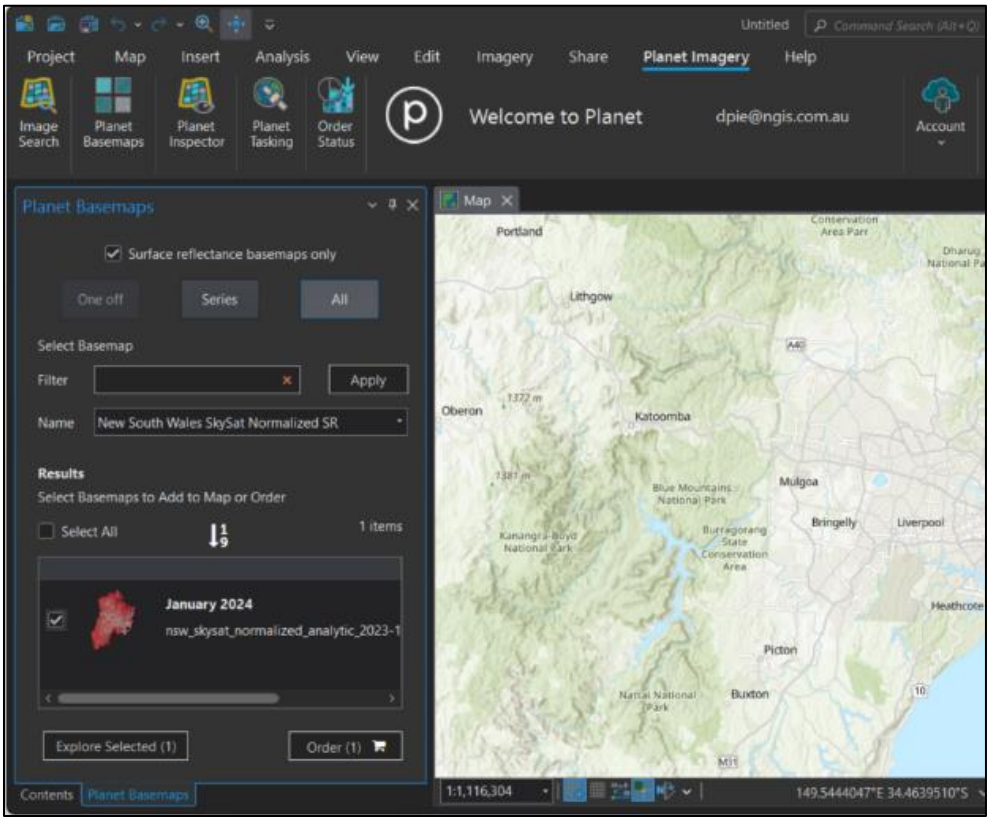
4. Open a Map, and click on the new “Planet Imagery” Add-in tab.



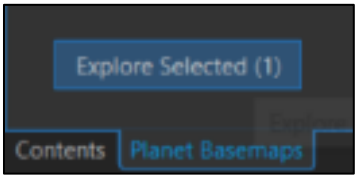
5. Click on Account > Sign in. Sign into your Planet account.



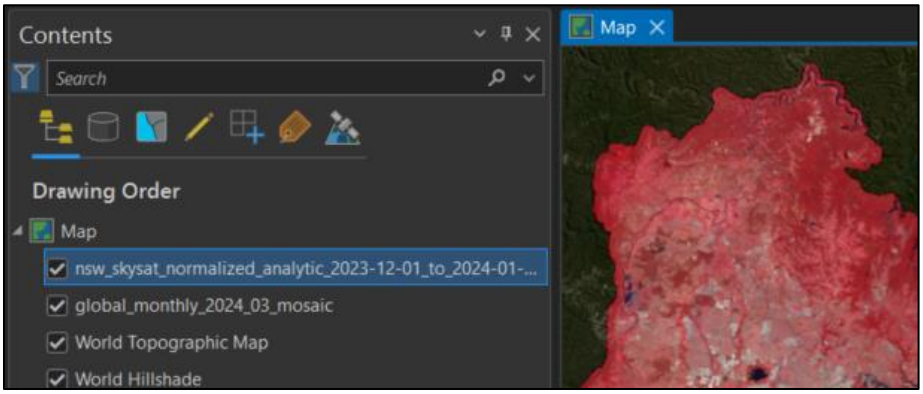
6. Click on the Planet Basemap button on the tab, to launch the side panel.



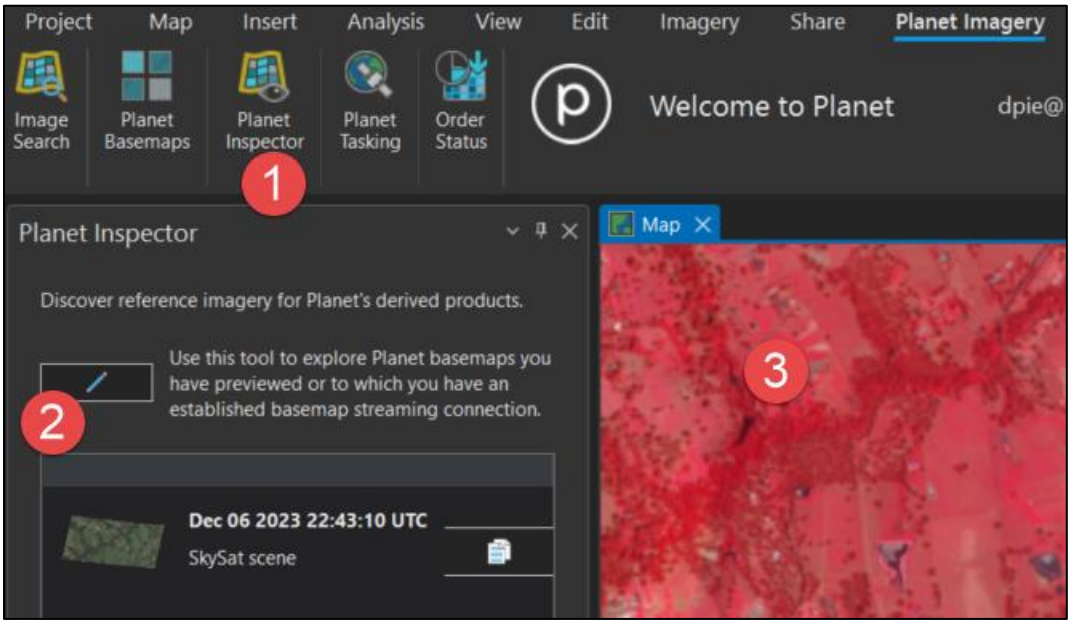
7. Click on the *name* drop down to filter basemaps at the top of the panel. Click on the tick box of Basemap record to select, then click “Explore Selected”.



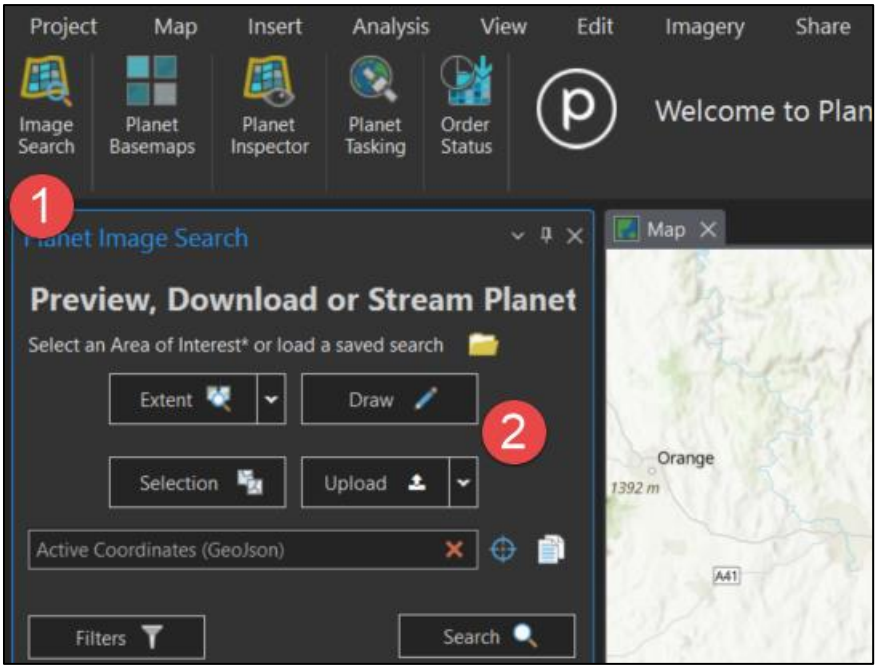
This will load a basemap’s WMTS into the map’s table of contents.



8. Use the Basemap Inspector tool to query the date of a pixel in the basemap mosaic.

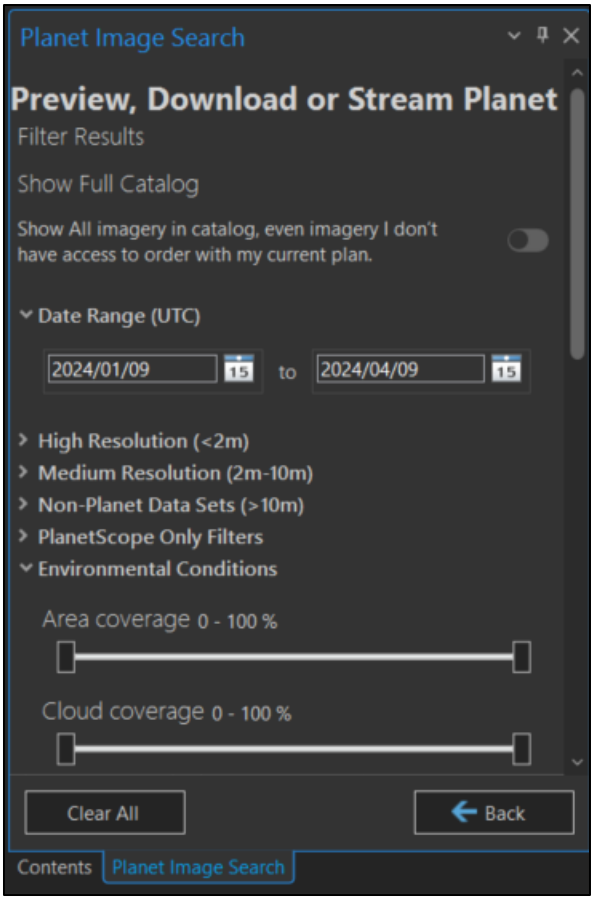


9. Search for individual images using the Image Search panel.

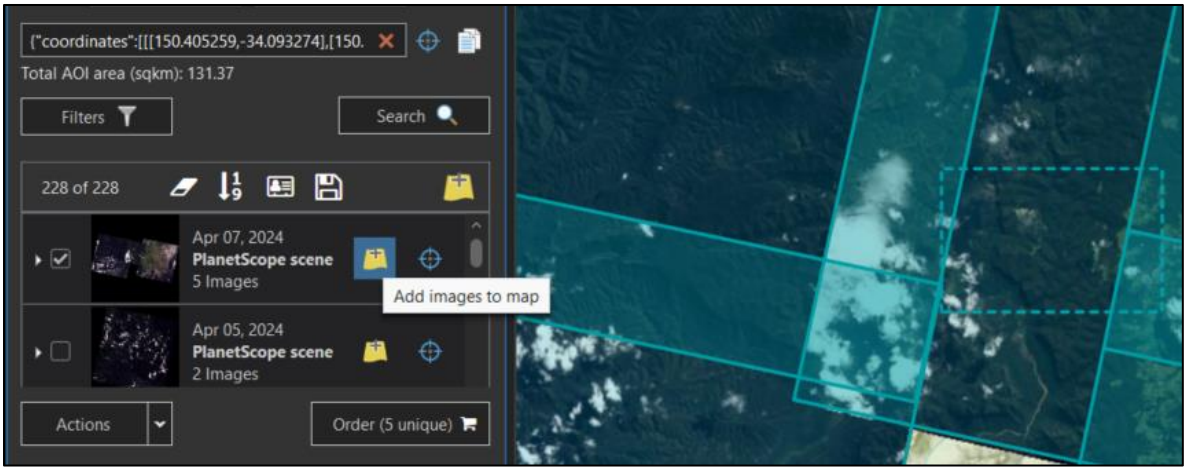


To search for imagery, the only required field is an area of interest (AOI), or alternatively a specific Image ID. On the Planet Imagery Search Panel there are multiple options for selecting an area of interest: e.g., selecting the current map extent, the extent of all active layers in your Pro map, drawing a specific area of interest, using a selected feature to define a polygon AOI, or coordinates.

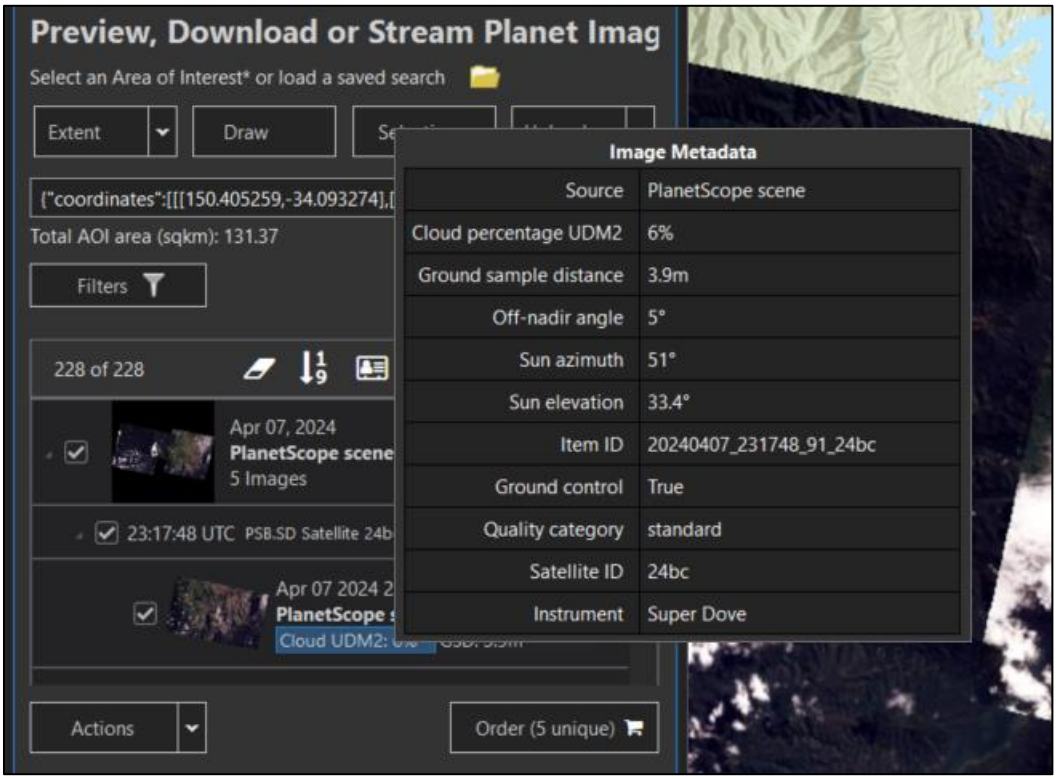
10. Filter your search results. Once an area of interest has been set, you can directly search for Planet imagery within ArcGIS. To further refine your search results, select the “Filters” tab to the left of the “Search” button on the Search Panel. Change a variable and click back to refine the search.



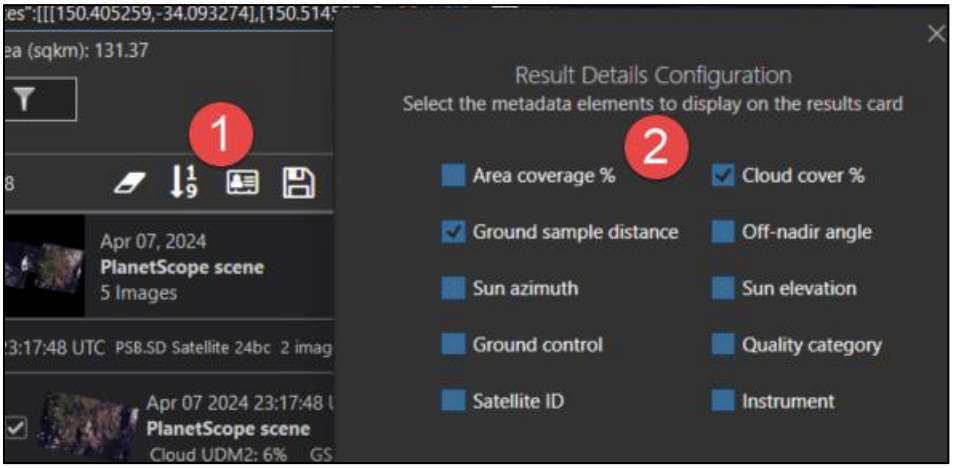
11. Click ‘Search’ to display a list of images and preview thumbnails. Click on the Add images to map button to add into the table of contents.



12. View an item's metadata. Imagery search results are grouped by date and product type. You can explore your search results even further by selecting the drop-down arrows left of each result. This will show each individual image that is included in that set of date and product results. Hover over each image result to see a pop-up window containing the image's full metadata.

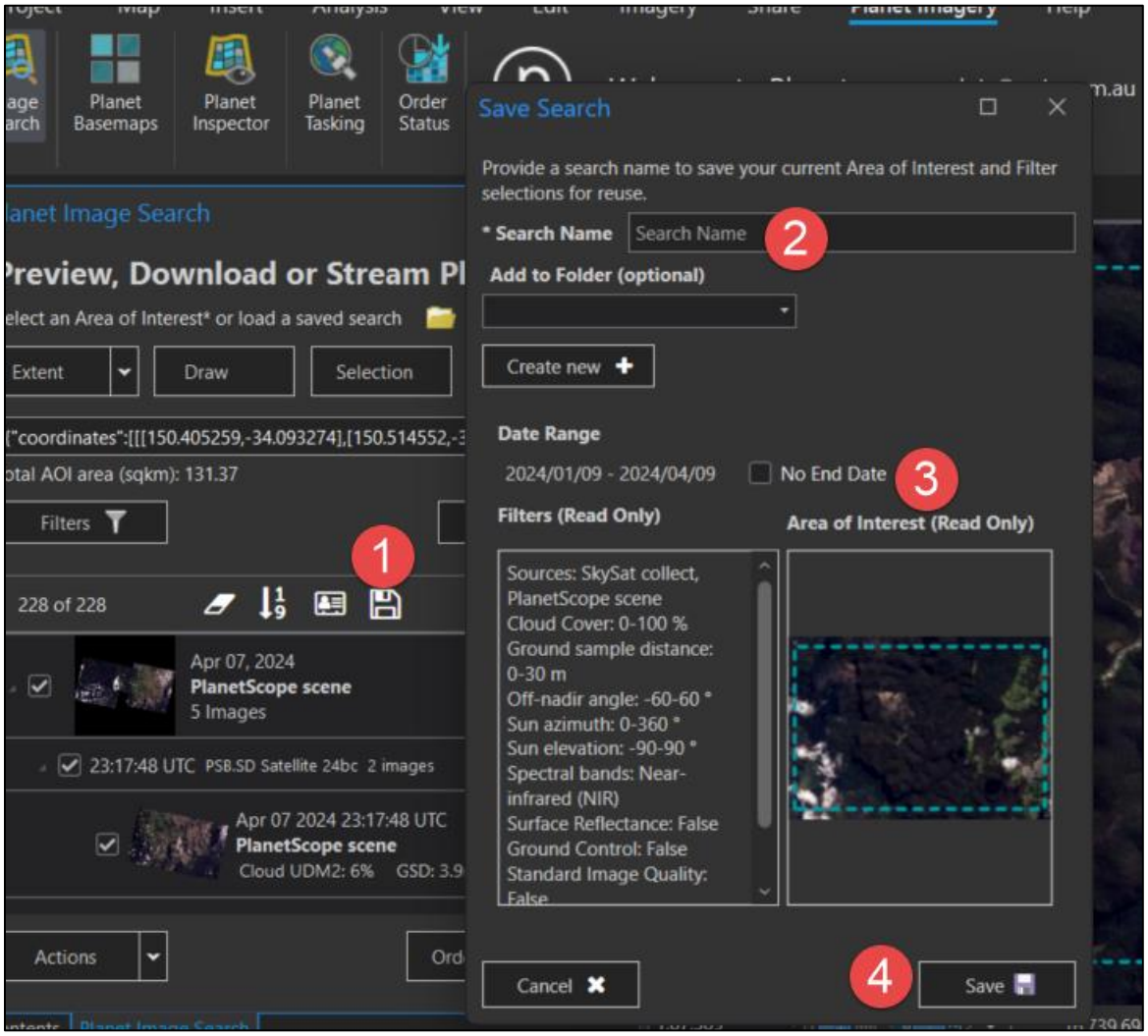


Additionally, by selecting the configure results metadata card above the search results, you can adjust the default metadata fields that are displayed for each individual image so that you can inspect each result in greater detail and display the metadata most important to your curation.



13. Save your search.

This preserves you search filters including the AOI, by selecting the save icon above the search results. Give your search a name and specify if you'd like to remove the start or end date. Removing the end-date, for example, ensures your saved search applies to new imagery as it becomes available. Save Searches are portable across the Planet Platform. i.e., Saving a search in ArcGIS will allow you to access that same saved search in Planet Explorer, and vice versa.



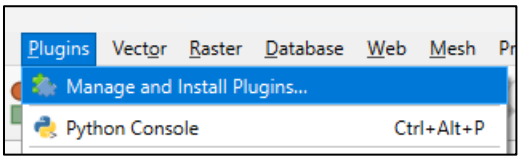
14. For further help, and access to the GeoTIFFs (downloaded imagery) please contact the team: spatial.imagery@environment.com.au

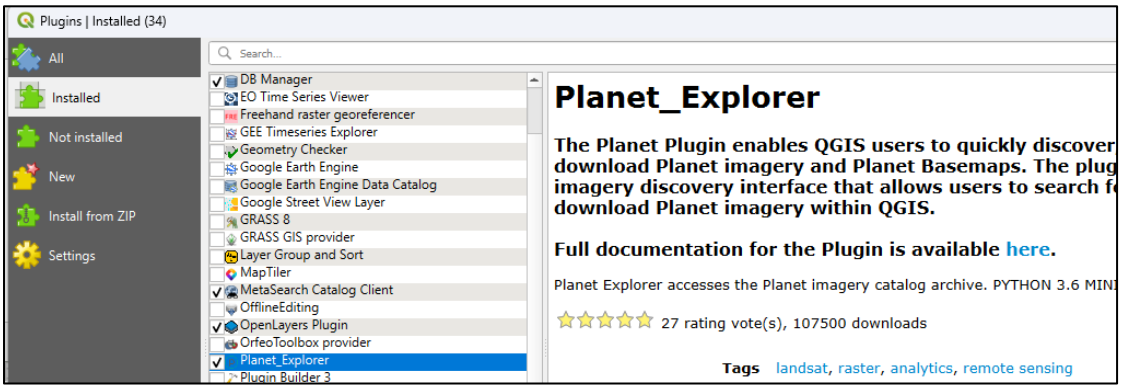
QGIS Plugin

The Planet QGIS Plugin provides an ability to view the PlanetScope scenes and basemaps in a Desktop application.

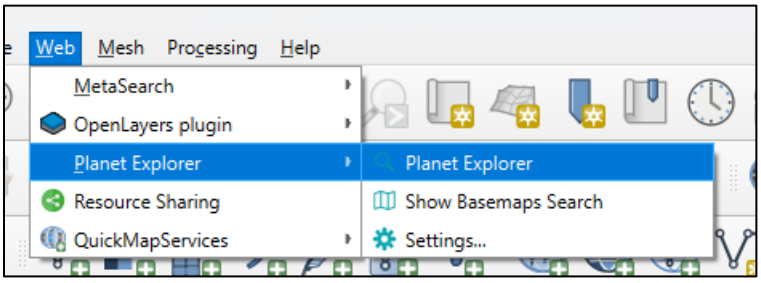
1. Open QGIS. Contact your IT team if required to install the free program.

2. Download the Plugin from the website, and install (if not already installed): https://learn.planet.com/QGIS-Download-Now. Please contact your IT team if required for installation. Launch the Plugin Manager to ensure the Plugin is installed and ticked on for the toolbar to appear.

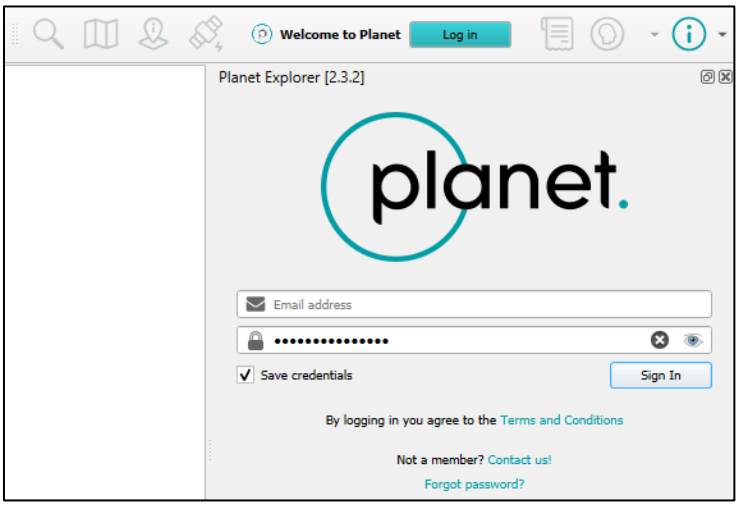




3. Then from the QGIS menu bar, select Web > Planet Explorer > Planet Explorer to load the toolbar.



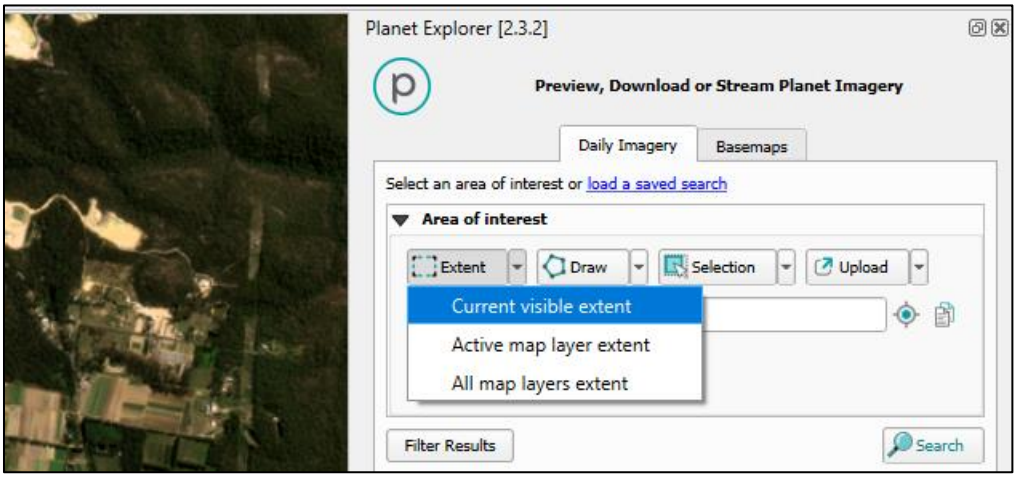
4. Click on Login. Sign into your Planet account.



5. Click on the Basemaps tab. 

6. Select from drop down to find a basemap. Tick the box next to the name and click on 'Explore Selected' to load:

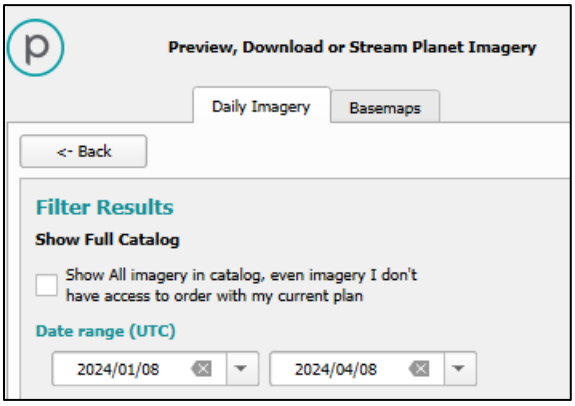
7. Search for PlanetScope imagery scenes under the daily imagery tab.



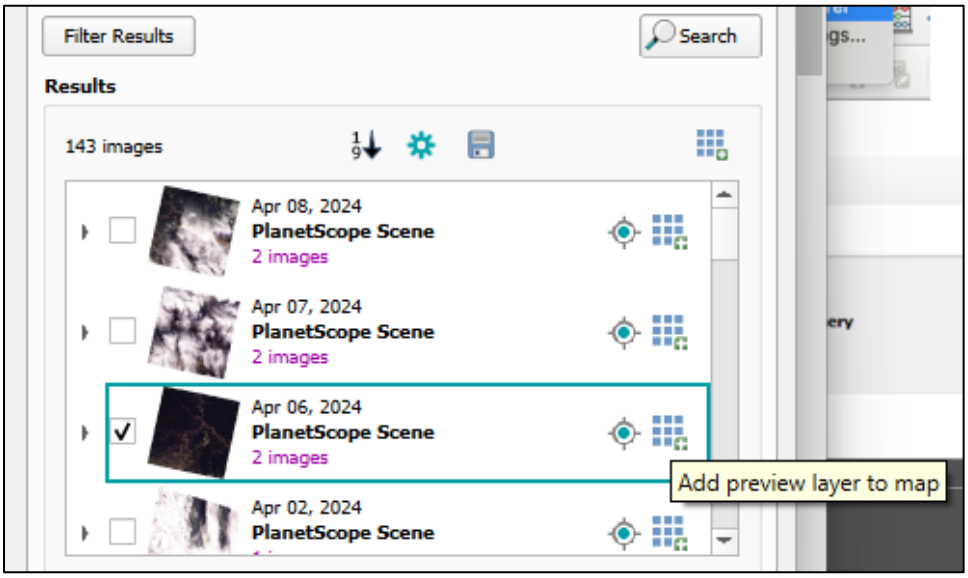

You can also access this panel by selecting the magnifying glass icon from the Planet QGIS Plugin Toolbar. The Imagery Search Panel includes images acquired by PlanetScope and open imagery archives, such as images acquired from Landsat and Sentinel satellites.

To search for imagery, the only required field is an area of interest (AOI) or, alternatively, a specific Image ID. On the Planet Imagery Search Panel, there are multiple options for selecting an AOI. For example, you can select the current map extent or the extent of all active layers in your QGIS map, draw a specific area of interest, or use a selected feature to define a polygon AOI.

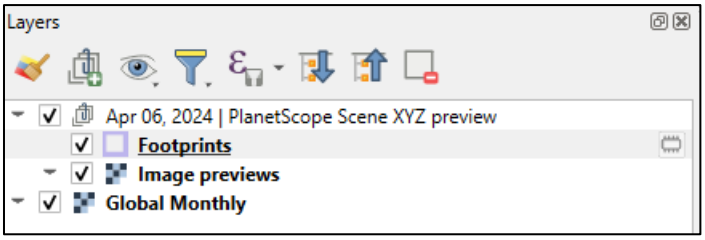
8. Filter results. Once an AOI has been set, you can directly search for Planet imagery within QGIS. To further refine your search results, select the “Filter Results” tab to the left of the “Search” button on the Search Panel. Filter Results is a new panel just for refining your imagery search filters. For example, you can specify a min/max cloud cover threshold, spectral bands, a time of interest, or a specific satellite instrument.



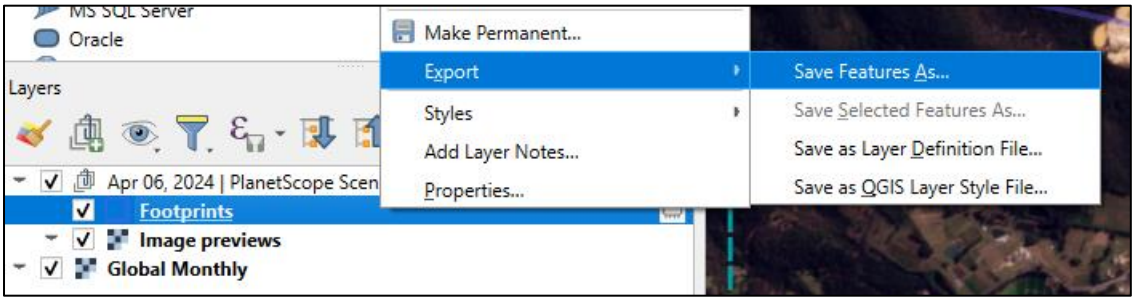
9. Load an image into the map by clicking on the Add preview layer to map button.



This will add the XYZ preview and the image's footprint.



10. Export information, such as the footprints, by right clicking on the item in the Layer list and selecting Export > Save Features As



11. For further help, and access to the GeoTIFFs (downloaded imagery) please contact the team: spatial.imagery@environment.com.au

ArcGIS Online

There are two ways to use Planet imagery in ArcGIS Online (AGOL):

1. Adding Planet Basemaps (WMTS)
2. Adding PlanetScope Individual Scenes (XYZ Tiles)

Requirements:

- Internet access & web browser
- Planet account (for API Key and finding Scene ID)
- ArcGIS Online (AGOL) or ArcGIS Enterprise Portal account
- Ability to edit a URL (MS Word, notepad or notes will be sufficient)

Adding Planet Basemaps (WMTS)

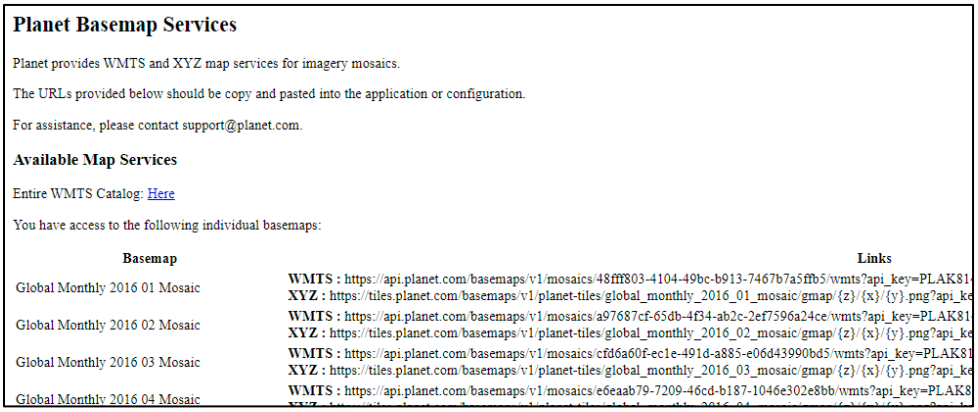
1. **Web service URL format**
   a. We will be using Planet's The Basemap Tile Service, which allows for visualisation of Planet imagery Basemaps in desktop or web mapping applications that support either the XYZ or the WMTS protocols. There are two URLs to use to find the specific Basemap WMTS URLs:
      i. **Basemap WMTS Catalogue Webpage**: https://api.planet.com/basemaps/v1/services?api_key={api-key} Navigate to this page in your browser to view all Basemap WMTS and XYZ available.
      ii. **Basemap WMTS Catalogue Access Request Structure**: https://api.planet.com/basemaps/v1/mosaics/wmts?api_key={api-key} This can be pasted into a Desktop GIS program (e.g., ArcMap or MapInfo) to display the entire WMTS Catalogue available with the current subscription.

2. **API Key**

   a. A valid Planet account is required to authenticate web services by providing a valid api_key as a query parameter. To find your api_key please login to https://www.planet.com/account/ in a new web browser.
   b. Navigate to *My Settings* > Copy API key.

   c. Replace {api-key} in the URL above (step 1 a. i.) with your copied API key. Then paste the URL into a browser.

d. Use the list to find a basemap of your choice. For example:



Planet Basemap Services

Planet provides WMTS and XYZ map services for imagery mosaics.

The URLs provided below should be copy and pasted into the application or configuration.

For assistance, please contact support@planet.com.

Available Map Services

Entire WMTS Catalog: Here

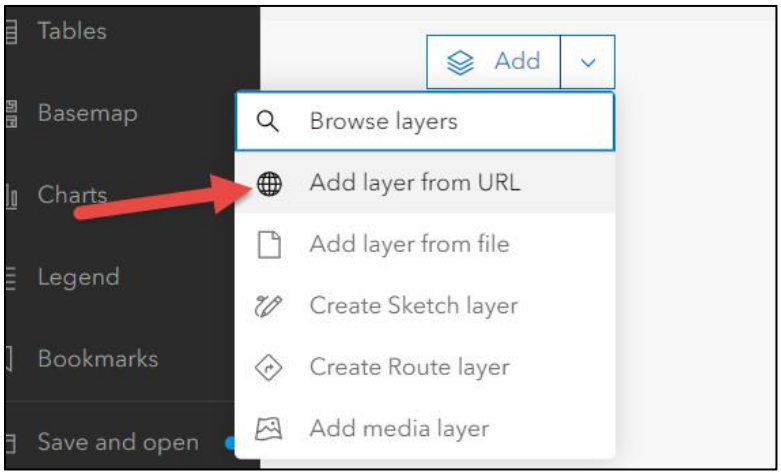
You have access to the following individual basemaps:

Basemap	Links
Global Monthly 2016 01 Mosaic	**WMTS :** https://api.planet.com/basemaps/v1/mosaics/48fff803-4104-49bc-b913-7467b7a5ffb5/wmts?api_key=PLAK81- **XYZ :** https://tiles.planet.com/basemaps/v1/planet-tiles/global_monthly_2016_01_mosaic/gmap/{z}/{x}/{y}.png?api_ke
Global Monthly 2016 02 Mosaic	**WMTS :** https://api.planet.com/basemaps/v1/mosaics/a97687cf-65db-4f34-ab2c-2ef7596a24ce/wmts?api_key=PLAK81 **XYZ :** https://tiles.planet.com/basemaps/v1/planet-tiles/global_monthly_2016_02_mosaic/gmap/{z}/{x}/{y}.png?api_ke
Global Monthly 2016 03 Mosaic	**WMTS :** https://api.planet.com/basemaps/v1/mosaics/cfd6a60f-ec1e-491d-a885-e06d43990bd5/wmts?api_key=PLAK81 **XYZ :** https://tiles.planet.com/basemaps/v1/planet-tiles/global_monthly_2016_03_mosaic/gmap/{z}/{x}/{y}.png?api_ke
Global Monthly 2016 04 Mosaic	**WMTS :** https://api.planet.com/basemaps/v1/mosaics/e6eaab79-7209-46cd-b187-1046e302e8bb/wmts?api_key=PLAK8

Global Monthly 2023 05 Mosaic (global_monthly_2023_05_mosaic), using a fake API Key, would be: https://api.planet.com/basemaps/v1/mosaics/43a480ec-11bd-41bd-af03-987a325a01e6/wmts?api_key=PLAK123456789

3. Add to ArcGIS Online

a. Open ArcGIS Online (http://www.arcgis.com/home/index.html) or ArcGIS Enterprise Portal and login.
b. Open the Map Viewer window. You can use either the New Map Viewer or the Map Viewer Classic.
c. If using the New Map Window, please select Layers., then Add layer from URL.

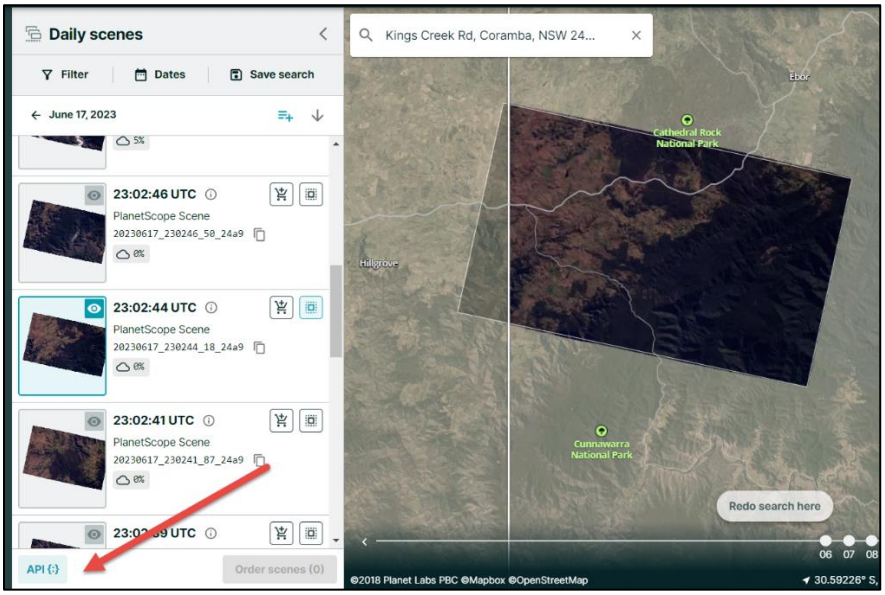


d. Add your Basemap URL copied in Step 2 c.
e. You can also paste the URL into your content page, following instructions here: https://doc.arcgis.com/en/arcgis-online/manage-data/add-files-as-items.htm Once added as items in your content, you can arrange into groups to display as custom basemaps (follow https://www.esri.com/arcgis-blog/products/arcgis-online/mapping/custom-Basemap-gallery/).

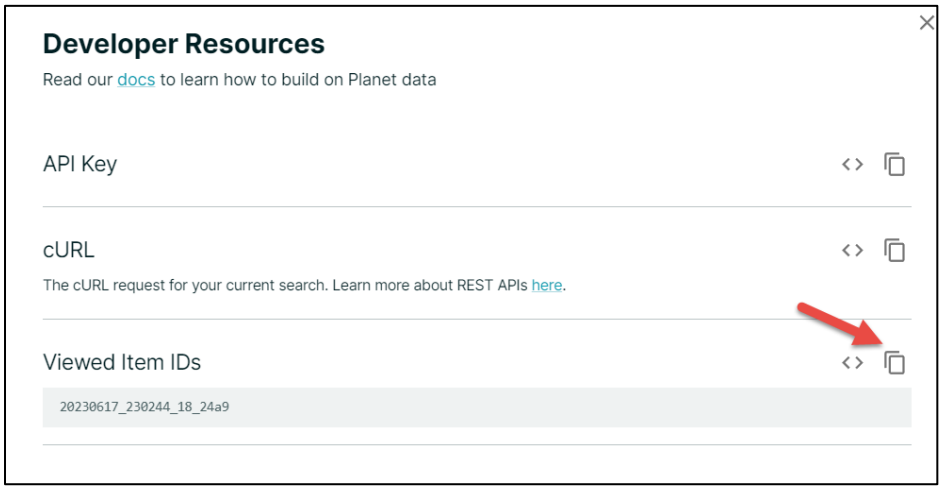
Adding PlanetScope Individual Scenes (XYZ Tiles)

1. **Web service URL format**
   a. We will be using Planet's API Tile Service. Open a Microsoft Word document or notepad and copy or note down the following URL: https://tiles1.planet.com/data/v1/{item_type}/{item_id}/{z}/{x}/{y}.png?api_key={api-key}
2. **API Key**
   a. A valid Planet account is required to authenticate web services by providing a valid api_key as a query parameter. To find your api_key please login to https://www.planet.com/account/ in a new web browser.
   b. Navigate to *My Settings* > Copy API key.

   c. Replace {api-key} in the URL above (step 1) with your copied API key.
3. **Scene ID**
   a. Next find your Scene ID for the image you wish to add into AGOL. You can use Planet Explorer, the ArcGIS Pro Add-in or QGIS Plug-in (if applicable) to find the IDs for the selected imagery items. Today we suggest using Planet Explorer by logging into: https://www.planet.com/explorer/
   b. Search the Explorer interface for a Scene. For more information please see: https://developers.planet.com/docs/apps/explorer/how-to-search-imagery/
   c. Select the image in the window and click on "API".



d. Copy the Selected Scene IDs

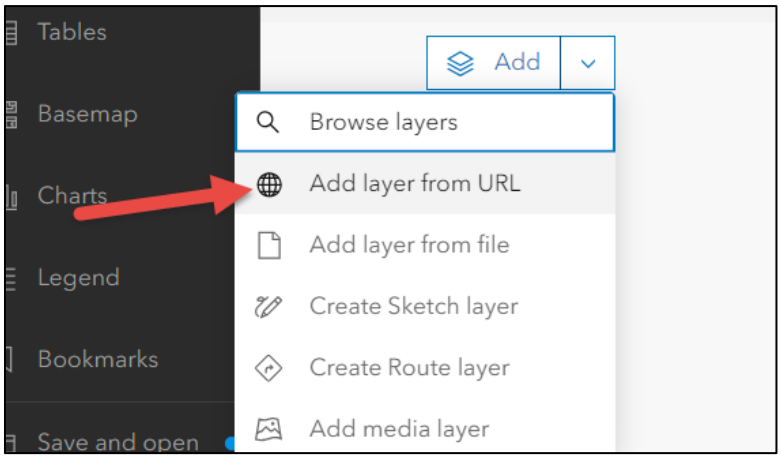


e. Replace {item_id} in the URL above (step 1) with your copied scene ID.
f. Next, update the {item_type} with the item name i.e. “SkySatCollect” for the mosaic, or “SkySatScene” for single items. For PlanetScope use "PSScene".

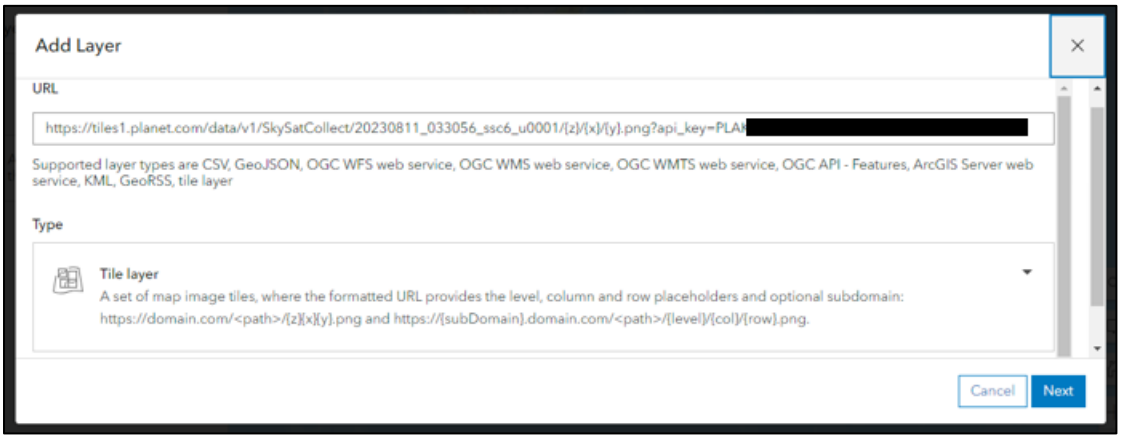
For example:
https://tiles1.planet.com/data/v1/PSScene/20230617_230244_18_24a9/{z}/{x}/{y}.png?api_key={api-key}

4. Add to ArcGIS Online

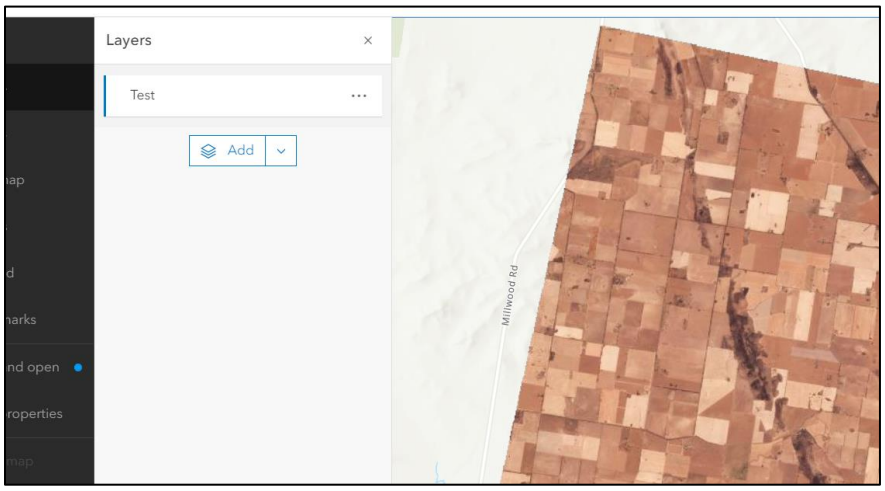
a. Open ArcGIS Online (http://www.arcgis.com/home/index.html) or Portal and login.
b. Open the Map Viewer window. You can use either the New Map Viewer or the Map Viewer Classic.
c. If using the New Map Window, please select Layers., then Add layer from URL.



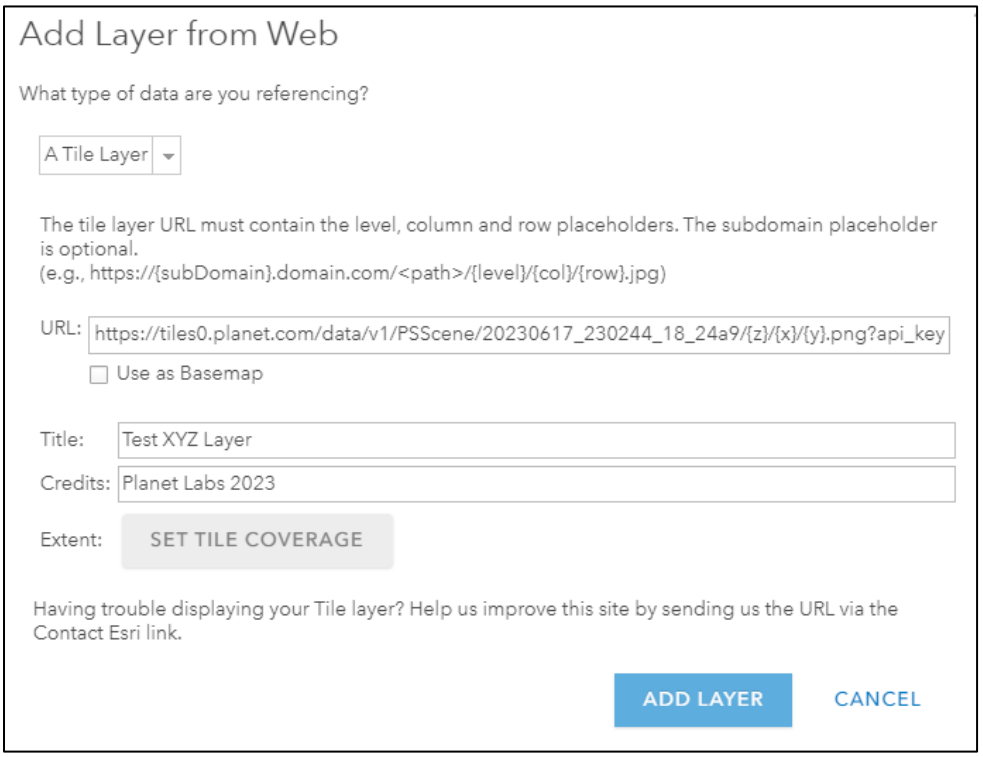
d. Add your newly created URL and select the type as “Tile Layer”.

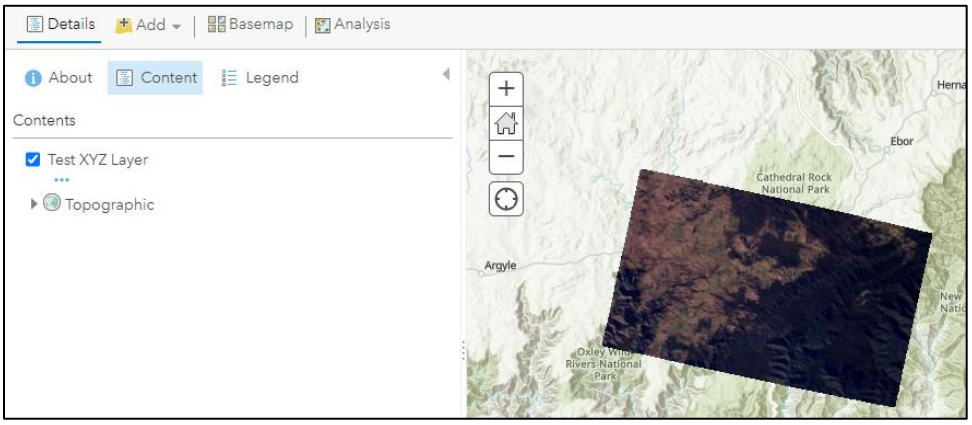


e. Fill in the Name, Attribution, and other options.
f. Once added to the map zoom in to the image.



g. If using the Map Viewer Classic, please select “Add Layer from Web” and then select “A Tile Layer” from the drop down.





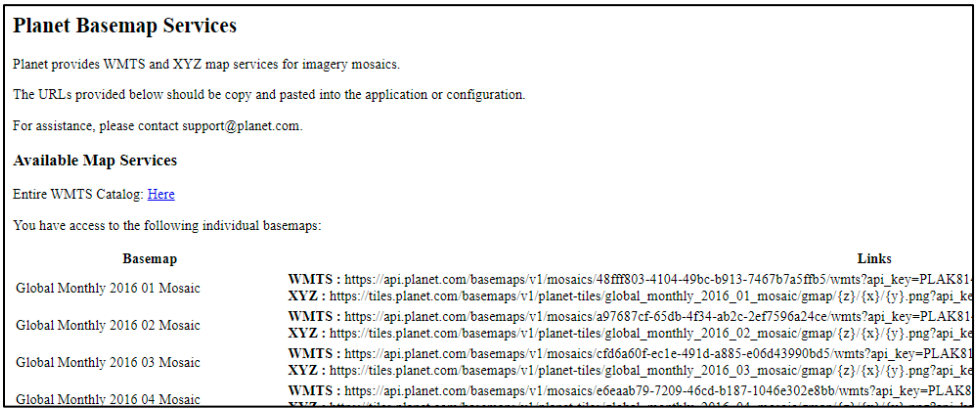
- Please note that Esri has limited functionality for saving XYZ tile layers into the Catalog for sharing with other groups, and requires uses to add XYZ services into maps directly.
- Further information on adding XYZ tile layers can be found here: https://esribelux.com/2021/04/16/xyz-tile-layers-in-arcgis-platform/
- We recommend this Tile Service approach over exporting the service from the Esri ArcGIS Pro Add-in or QGIS Plugin, as those services contain a token that expires. This option above will not expire as there is no token required.

Intramaps

Find API Key

1. Login to https://www.planet.com/account/ in a new web browser with your account.
2. Navigate to My Settings > Copy API key.

3. Open a note pad or text editor and copy the following URL: https://api.planet.com/basemaps/v1/services?api_key={api-key}
4. Replace the {api-key} in the URL with your API Key copied from Step 2. For example it may look like: https://api.planet.com/basemaps/v1/services?api_key=PLAK123456789
5. Navigate to this page in your browser to view all Basemap WMTS and XYZ available.



Planet Basemap Services

Planet provides WMTS and XYZ map services for imagery mosaics.

The URLs provided below should be copy and pasted into the application or configuration.

For assistance, please contact support@planet.com.

Available Map Services

Entire WMTS Catalog: Here

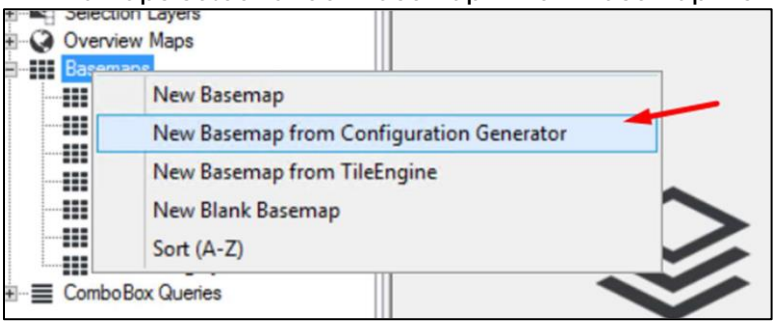
You have access to the following individual basemaps:

Basemap	Links
Global Monthly 2016 01 Mosaic	**WMTS :** https://api.planet.com/basemaps/v1/mosaics/48fff803-4104-49bc-b913-7467b7a5ffb5/wmts?api_key=PLAK81 **XYZ :** https://tiles.planet.com/basemaps/v1/planet-tiles/global_monthly_2016_01_mosaic/gmap/{z}/{x}/{y}.png?api_ke
Global Monthly 2016 02 Mosaic	**WMTS :** https://api.planet.com/basemaps/v1/mosaics/a97687cf-65db-4f34-ab2c-2ef7596a24ce/wmts?api_key=PLAK81 **XYZ :** https://tiles.planet.com/basemaps/v1/planet-tiles/global_monthly_2016_02_mosaic/gmap/{z}/{x}/{y}.png?api_ke
Global Monthly 2016 03 Mosaic	**WMTS :** https://api.planet.com/basemaps/v1/mosaics/cfd6a60f-ec1e-491d-a885-e06d43990bd5/wmts?api_key=PLAK81 **XYZ :** https://tiles.planet.com/basemaps/v1/planet-tiles/global_monthly_2016_03_mosaic/gmap/{z}/{x}/{y}.png?api_ke
Global Monthly 2016 04 Mosaic	**WMTS :** https://api.planet.com/basemaps/v1/mosaics/e6eaab79-7209-46cd-b187-1046e302e8bb/wmts?api_key=PLAK8

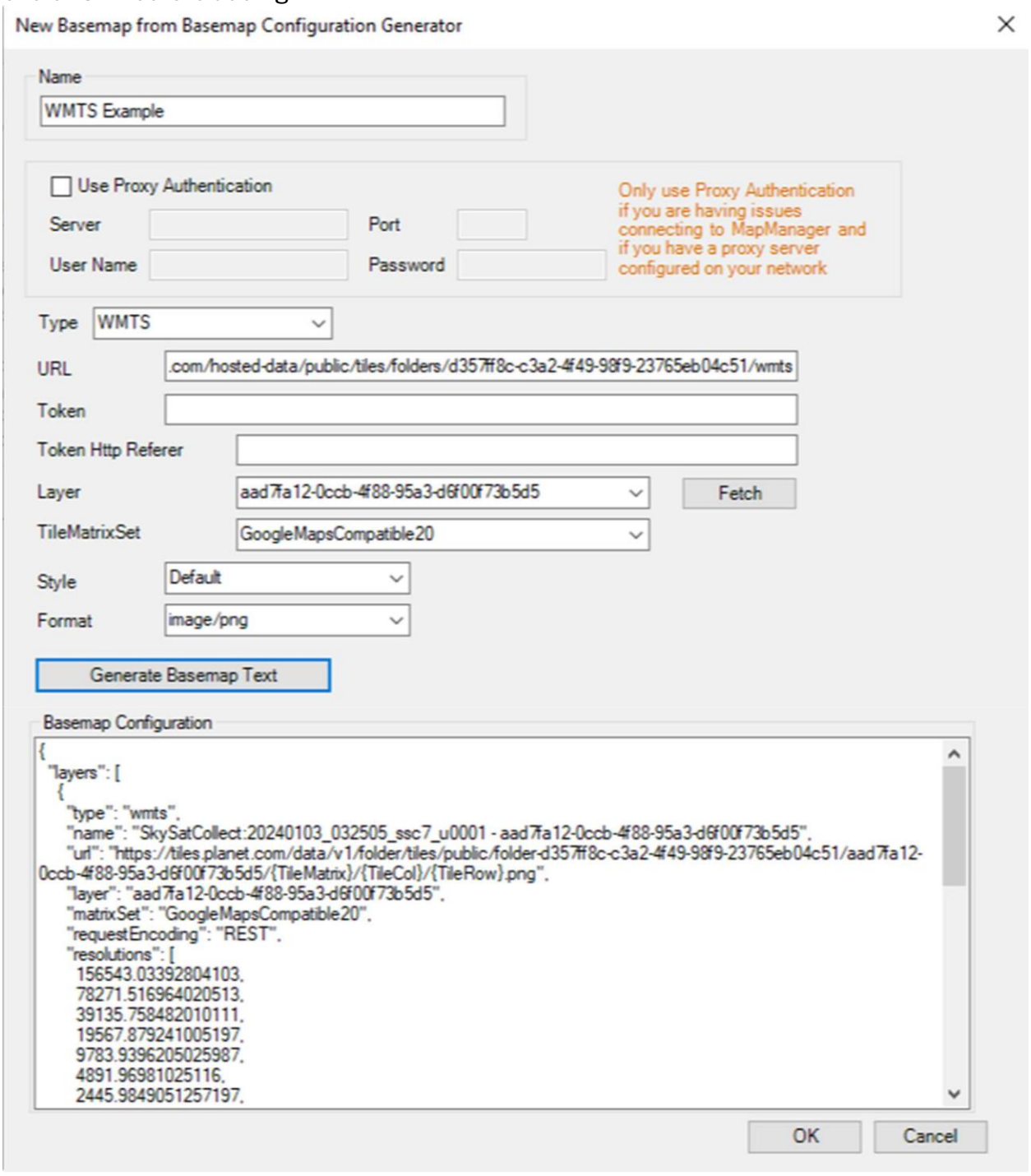
6. Copy the WMTS or XYZ you wish to add into Intramaps. To view what the basemaps look like first, go to https://www.planet.com/explorer.

Adding Planet Basemaps (WMTS)

1. In Intramaps select under Basemap > New Basemap from Configuration Generator



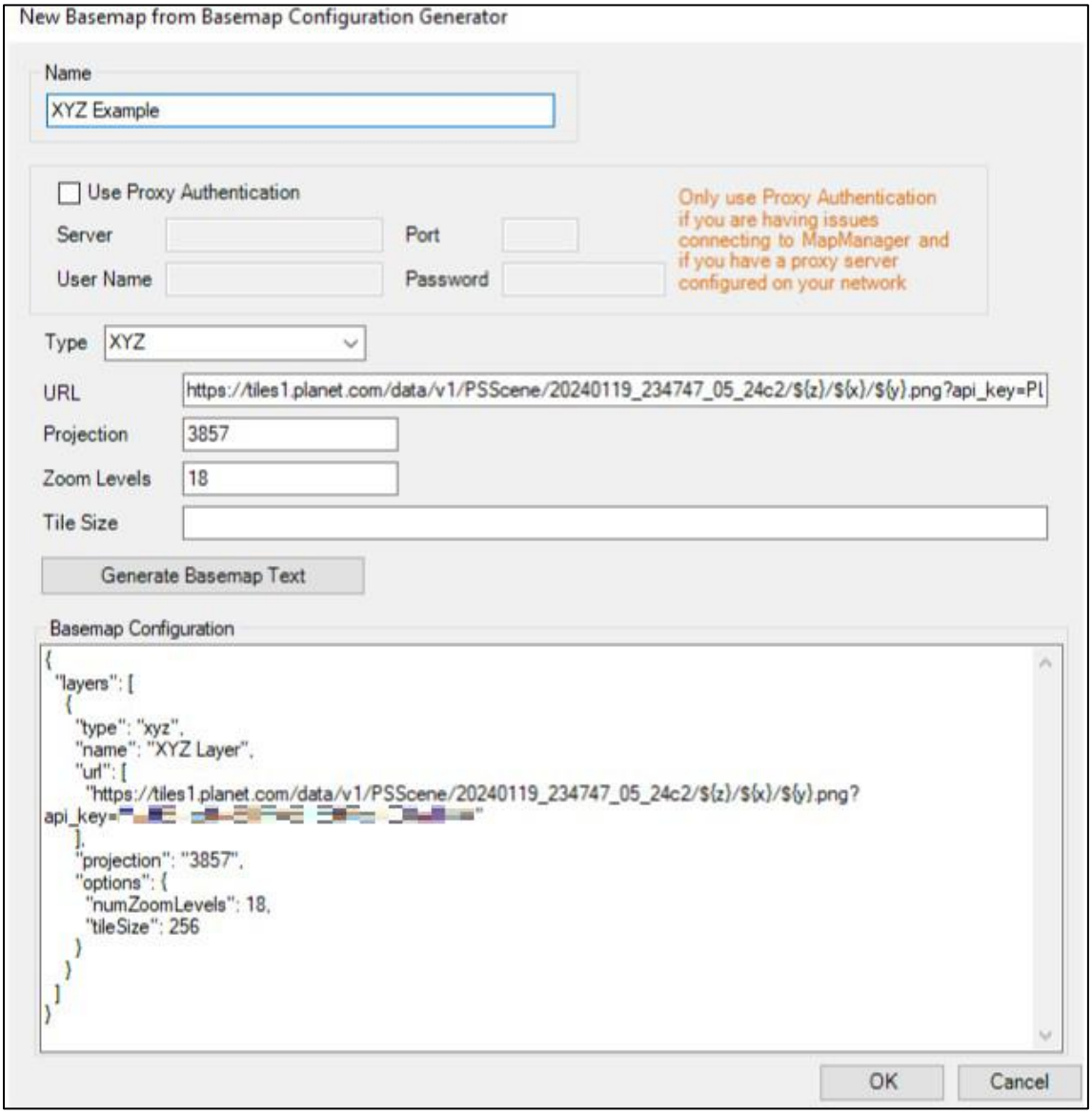
2. **Add**: For WMTS you can simply add the URL to the URL field and click “Fetch” to generate the basemap details then “Generate Basemap Test”. Please note that if you have copied a WMTS URL with a “?group” at the end, please remove/drop off end of URL before adding.



3. Click OK to add.

Adding PlanetScope Individual Scenes (XYZ Tiles)

1. **Reformat URL**: Setting up the XYZ basemap using the provided URLs requires a little tweaking, for example this is an example URL provided: https://tiles1.planet.com/data/v1/PSScene/20240119_234747_05_24c2/{z}/{x}/{y}.png?api_key={api key}. In order for Intramaps to correctly display the basemap, this requires the URL to be edited to include a '$' in front of each z, x and y in brackets. This results in the following URL instead: https://tiles1.planet.com/data/v1/PSScene/20240119_234747_05_24c2/${z}/${x}/${y}.png?api_key={api key}
2. **Add**: Follow the same instructions as the WMTS above. Paste the reformatted URL into the Basemap Configuration Generator, then select generate the basemap text. However, this doesn't assign a projection, and assigns default zoom levels and tile sizes. We recommend loading the XYZ into a program such as QGIS first to check these details.



3. Final result: