

Guide to Adding State of Minnesota's Lidar Derived Data to Desktop Mapping Applications

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This document outlines how to add Minnesota's spatio-temporal asset catalog (STAC), virtual raster tile (VRT) and ArcGIS Image Service of Minnesota's second-generation lidar derived data to desktop applications.

1. Resources

- Second generation Lidar derived data can be found on [2nd Generation Lidar Elevation Data for Minnesota: 2021-2024](#). Raster data are offered via:
 - **STAC Catalog:** Contains raster data such as 100k seamless digital elevation model (DEM) COGs (cloud optimized geotiff) and work unit sized COGs of unblended data:
<https://radianteearth.github.io/stac-browser/#/external/g46p-mngeo-stac-app-001-grfmara2ddcmb2d0.centralus-01.azurewebsites.net/?language=en>
 - **Virtual Rasters (VRT):** URLs to VRTs can also be accessed via the STAC catalog above.
 - **Image Services**
- Vector data such as Flight swaths (formerly flight lines) are offered as map services or feature services, please see "Statewide Authoritative Datasets and Derivatives" section of [2nd Generation Lidar Elevation Data for Minnesota: 2021-2024](#) for available datasets.

2. Accessing Resources

- Available data can be accessed via [2nd Generation Lidar Elevation Data for Minnesota: 2021-2024](#), when you click on links associated with your dataset of interest you will be taken to Minnesota Geospatial Commons page related to the dataset.
- You can click on the buttons beside the listed resources (STAC item, VRT or Image Service) to obtain URL of your preferred resource.

3. Browsing STAC Catalog

The Minnesota Geospatial STAC Catalog was created to share 2nd generation Lidar derived rasters in Cloud Optimized GeoTIFF (COG) format or Virtual Rasters.

- Seamless DEM data is organized by 100 kilometer sections [minnesota-100km-sections - Minnesota Geospatial STAC Catalog](#) and a single VRT [minnesota-virtual-raster-tile - Minnesota Geospatial STAC Catalog](#)
- Unblended DEMs delivered by vendors are organized by Lidar Acquisition Blocks (LABs) which are further broken down into work units in some cases.
- You can use the Search or Filter functions in the STAC browser to find your dataset of interest.
- Once you locate your dataset of interest you can use obtain the URL of either COG or VRT for use in your preferred mapping application.
- We encourage users run analysis directly on the resources instead of downloading the data.

4. Adding Rasters from STAC to ArcGIS Pro

4.1. To add the STAC Catalog in ArcGIS Pro you will need to...

- a. Open ArcGIS Pro
- b. Go to the **"Insert"** tab > click on the **"Connections"** icon > scroll down to **"STAC connection"** and a sub menu will appear > click on **"New STAC Connection"**
- c. For **"Connection Name"** type a name of your choice e.g **"MN DEM STAC"** and for **"Connection"** add URL copied from 3 or by clicking **"Source"** in the top right corner of the catalog and copying URL, then click **"OK"**
- d. Use the **"View"** tab > Click on **"Catalog Pane"** > the Catalog Pane will appear > in the **"Project"** tab click on the **"STACs"** folder > then folder will open and you should see **"MN DEM STAC"**
- e. Right click on **"MN DEM STAC"** and select **"Explore STAC"** > you should see the STAC folders
- f. Click on the check box beside your folder of interest then click on **"View Results"** at the bottom of the **"Explore STAC"** dialogue or **"Results"** at the top of the dialogue to see files listed in the folder> select all items manually by clicking the check box, or select all by clicking the check box above the first item and then click on the ADD icon to add the DEMs to the map.

4.2. To add VRTs in ArcGIS Pro you will need to...

- a. Open ArcGIS Pro.
- b. Click on the **"Map"** tab.
- c. Click on the **"Add Data"** icon and scroll down to **"From Path"**.
- d. In the **"Add Data From Path"** pop-up add the URL (copied from MN Geospatial Commons or STAC) of your preferred VRT in the Path box, Service type will appear, leave it as **"Automatic"**, then click **"Add"**.

4.3. To add Image Service to ArcGIS Pro you will need to...

- a. Open ArcGIS Pro
- b. Click on the **"Map"** tab
- c. Click on the **"Add Data"** icon and scroll down to **"From Path"**
- d. In the **"Add Data From Path"** pop-up add the URL of your preferred Image Service the Path box, Service type will appear, leave it as **"An ArcGIS Server Web Service"**, then click **"Add"**

4.4. To add Vector Data Services to ArcGIS Pro you will need to...

- a. Open ArcGIS Pro
- b. Click on the **"Map"** tab
- c. Click on the **"Add Data"** icon and scroll down to **"From Path"**
- d. In the **"Add Data From Path"** pop-up add the URL of your preferred vector service in the Path box, Service type will appear, leave it as **"An ArcGIS Server Web Service"**, then click **"Add"**

5. Adding Rasters to QGIS

5.1. To add the STAC Catalog in QGIS you will need to...

- a. Open QGIS
- b. Go to the Browser window and find the STAC connection tool > right click on the STAC connector and select “New STAC Connection” > in the pop-up next to “Name” type a name of your choice e.g “**MN DEM STAC**” and add URL copied from 3 or by clicking “Source” and copying URL in the top right corner of the catalog, then click “OK” in the lower right hand side of the pop-up.
- c. Find the STAC Connector in the browser menu and click on the black triangle to the left off the “STAC” tool to see the STAC connections > You should see the newly created item called “MN DEM STAC”, click on the black triangle next to “MN DEM STAC” and three folders (DEM data) should appear
- d. Click on the black triangle beside your collection of interest and DEMs in the folders will appear.
- e. To load a file listed in your folder of interest into the map, click on it and drag it into your “Layer” menu/map content pane, and it should appear. You can also select multiple items and drag into the map content pane to add multiple items to the map at the same time.

5.2. To add the VRT in QGIS you will need to...

- a. Open QGIS
- b. click on “**Layer**” item in the top menu > scroll down to “**Add Layer**” and a sub menu will appear, select “**Add Raster Layer...**”
- c. In the pop-up box under “**Source Type**” select the “**File**” radio button > in the “Source” box next to “Raster dataset(s)” add the URL (copied from MN Geospatial Commons or STAC) of your preferred VRT then click on “**Add**” > you may be prompted to answer if you would like to stream the dataset, select “**Yes**”
- d. Close the Add Raster pop-up and you should see the DEM for Southeastern MN but will be missing the far east corner.

5.3. To add the Image Service in QGIS you will need to...

- a. Open QGIS
- b. Click on “**Layer**” item in the top menu > scroll down to “**Add Layer**” and a sub menu will appear, select “**Add ArcGIS REST Server Layer...**”
- c. In the server connection dialogue click “**New**”, a “**Connection Details**” dialogue will pop up. In that pop up, create a name for your connection in the “**Name**” field,
- d. Add - add the URL (copied from MN Geospatial Commons) of your preferred Image Service in the “**URL**” field and click “**OK**” at the bottom of the dialogue box. The pop up will disappear.
- e. Back in the Server Connections dialogue box, click on “**Connect**”, the connection created will appear in the dialogue, click on the drop-down arrow beside the connection name, click to select/highlight the layer under the connection name and click “**Add**” and close the dialogue box.

5.4. To add Vector Data Services in QGIS you will need to...

- a. Open QGIS
- b. click on **"Layer"** item in the top menu > scroll down to **"Add Layer"** and a sub menu will appear, select **"Add ArcGIS REST Server Layer..."**
- c. In the server connection dialogue click **"New"**, a **"Connection Details"** dialogue will pop up. In that pop up, create a name for your connection in the **"Name"** field,
- d. Add the URL (copied from MN Geospatial Commons) of your preferred vector data service in the **"URL"** field and click **"OK"** at the bottom of the dialogue box. The pop up will disappear.
- e. Back in the Server Connections dialogue box, click on **"Connect"**, the connection created will appear in the dialogue, click on the drop-down arrow beside the connection name, click to select/highlight the layer under the connection name and click **"Add"** and close the dialogue box.