



# Exercise 4

## Creating Tile Packages (TPKs) from GTAC Image Services for Mobile Use

### Introduction

With mobile data collection becoming the norm, there is a need for people to have maps and imagery on their mobile devices as they head out into the field. The GTAC Image Services, as well as other ArcGIS Servers, provide a wealth of imagery, maps, and other data that you can use while performing your field work. Using tools available in ArcGIS Pro, this guide will walk you through the steps to create Tile Packages (.tpk) that can be used in conjunction with Collector on your mobile device.

### Prerequisites

- ArcGIS Pro on your desktop.
- Write access to a drive with sufficient space for the Tile Package (typically around several GB depending on the size of your AOI).
- The image service must have a cache (see part A for how to check).





# Contents

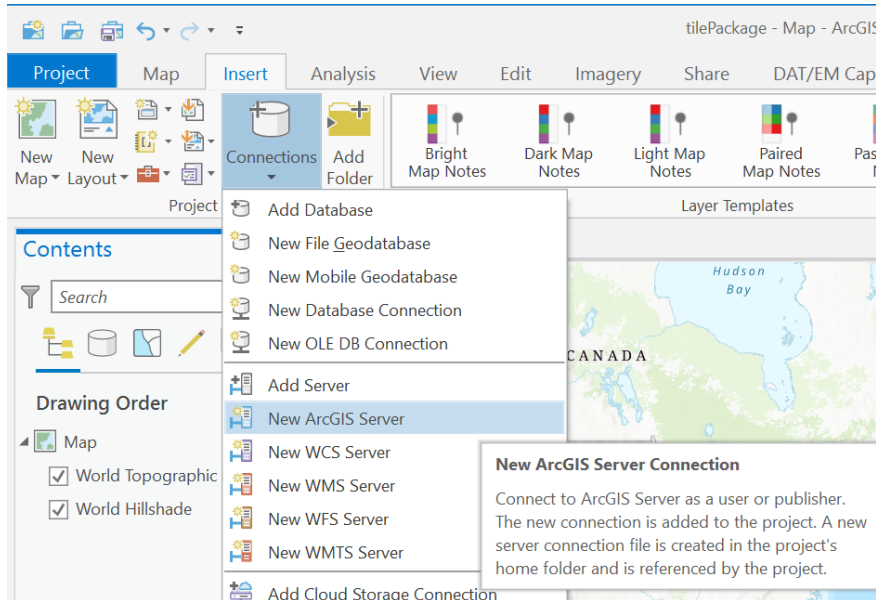
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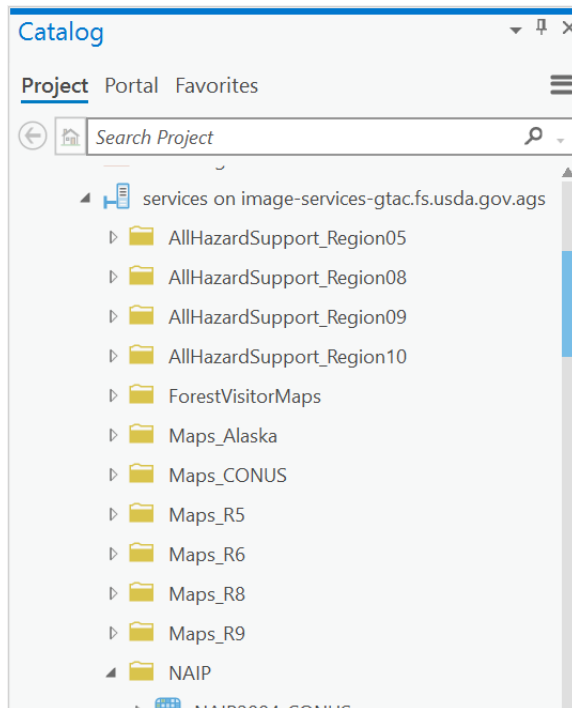
## A. Add an image service and verify it has cache tiles

A base requirement for creating a tile package using the method contained in this guide is that the original service has a cache. This section will describe how to ensure the service includes cache tiles.

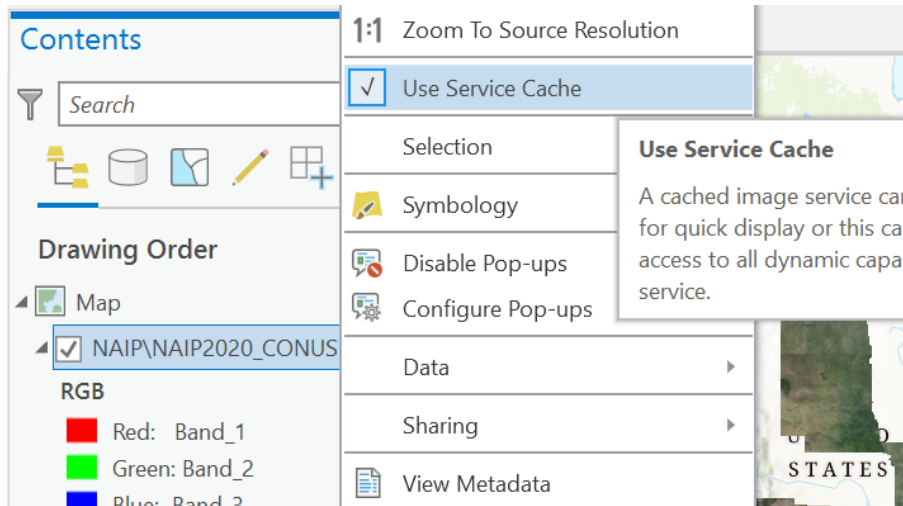
1. On the **Insert** tab (**Project** group) click the **Connections** menu then select **New ArcGIS Server**.



2. In the Add ArcGIS Server Connection window delete everything in the **Server URL** field.
3. Copy and paste the following URL into the Server URL field: <https://image-services-gtac.fs.usda.gov/arcgis/services>
4. In the Catalog expand the service then expand the **NAIP** folder.

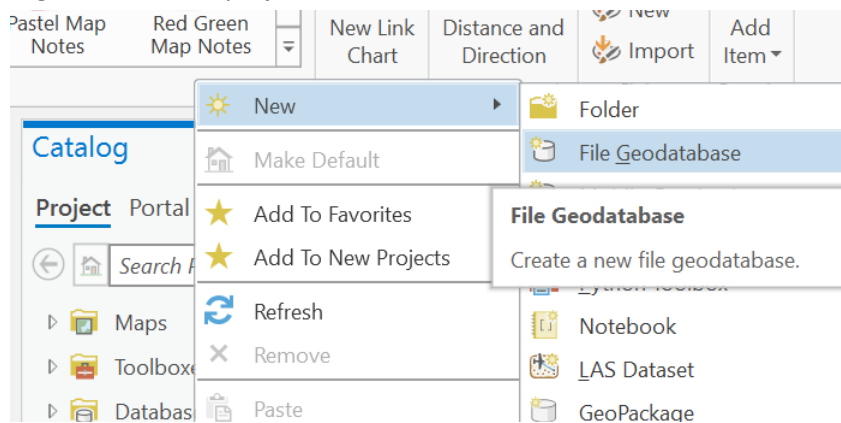


5. Click and drag the **NAIP2020\_CONUS** service layer into the map.
6. In the **Contents** pane right click the **NAIP2020\_CONUS** layer.
  - i. In the contextual menu, if the **Use Service Cache** option is grayed out the service does not have a cache and cannot be used. If you can toggle the Enable Cache View Mode on and off, then the service has a cache and can be used.

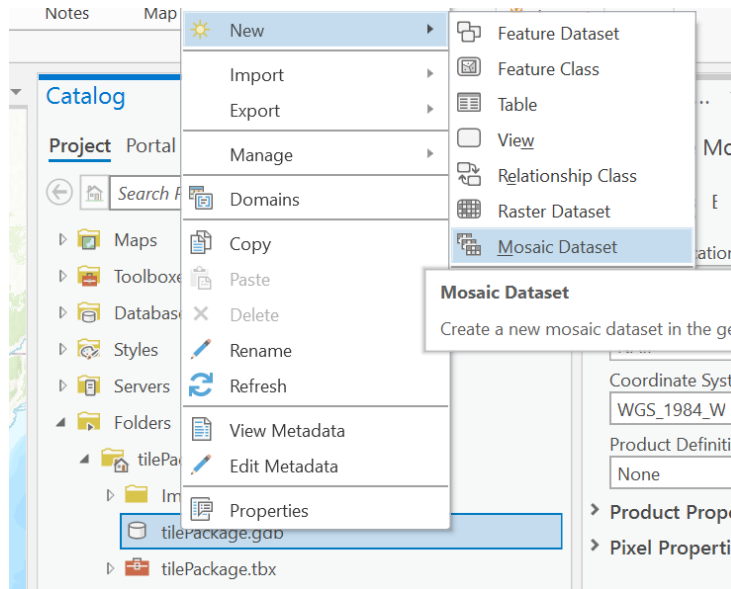


## B. Create a mosaic dataset

1. In the Catalog, navigate to (or create) your project folder.
2. Right-click on the project folder, and select **File Geodatabase**.

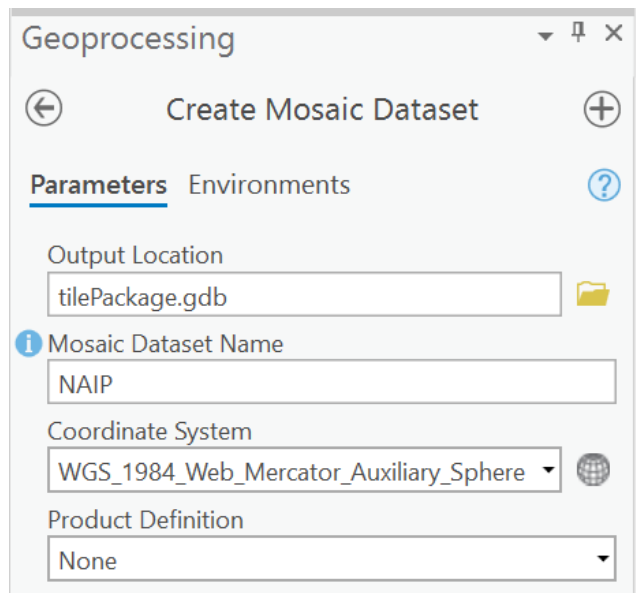


3. Give the geodatabase a relevant name.
4. In the Catalog, *right-click* on the geodatabase and click **Mosaic Dataset**.



5. In the Create Mosaic Dataset tool dialog, type in a name for the **Mosaic Dataset Name** (such as NAIP). This name will also be used by the tools for the name of your tile package.
6. For the Coordinate System, it is recommended that you use the default **WGS 1984 Web Mercator (auxiliary sphere)**, but any coordinate system can be used.

*The Web Mercator (auxiliary sphere) system is recommended for a couple of reasons. Satellite navigation and GPS systems use WGS 1984, and practically all image services and map services are published in this coordinate system. Keeping with Web Mercator will improve the speed at which your tile package is created, as well as its performance on your mobile device.*

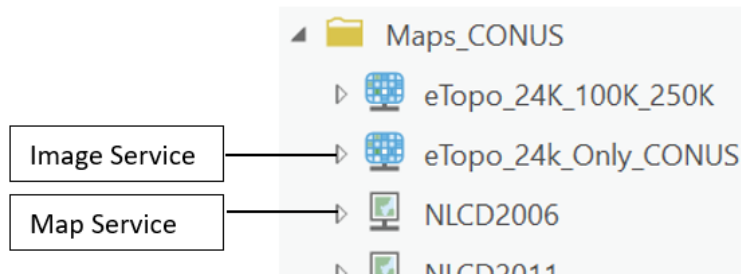


7. Click **Run**.

### C. Add a service to the mosaic dataset

1. In the Catalog, *right-click* on your new mosaic dataset then click **Add Rasters**.
2. In the Add Rasters to Mosaic Dataset dialog use the following parameters:
  - i. For the **Raster Type**, click the drop down and select **Image Service**.

*Most maps on the GTAC Image Services are published as image services, which allows them to have better performance through the use of caches. However, some services, in particular the Forest Visitor Maps, are published as **map services** to take advantage of functionality not available in the image services. Note that some maps (such as the FS TOPO) are published as Image Services! The icons next to the service name indicates which type the service has been published, as shown below:*



3. In the **Input Data** section under **Service**, click on the folder icon.
4. Double-click the **Servers** folder.
5. Double-click on **services on image-services-gtac.fs.usda.gov.ags**
6. Open the **NAIP** folder.
7. Click **NAIP2020\_CONUS** then click **OK**.
8. Expand the **Mosaic Post-processing** section then uncheck the box next to **Update Boundary**.
9. Click on **Run**.

## D. Create an AOI

You can reduce the area your mosaic data set covers to a more manageable size using an AOI (Area of Interest) polygon feature class. Remember that the larger your polygon is, the more disk space you will need to store, and the longer it will take to create, your Tile Package.

1. In the Catalog, right-click your file geodatabase, select **New**, then select **Feature Class**.
2. In the Create Feature Class pane use the following parameters:
  - i. Give it a name such as AOI.
  - ii. Verify the Feature Class type is **Polygon**.
  - iii. Uncheck the box next to **Z Values**.
  - iv. Click **Next** to Page 3 and verify the Spatial Reference is the same as the NAIP mosaic dataset has (WGS 1984 Web Mercator).
  - v. Click **Finish**.
3. On the main ribbon click the **Edit** tab then look in the Features group and click **Create**.
4. In the Create Features pane click the feature class you created then click the polygon digitizing button.

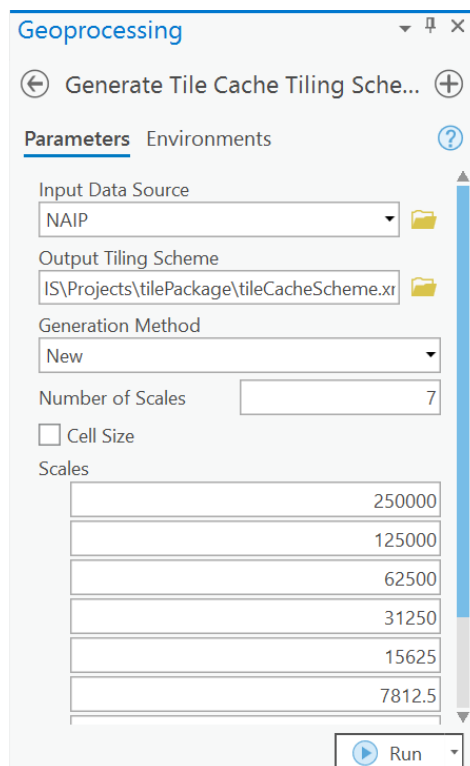
5. Digitize a polygon anywhere you want on the NAIP imagery. You can make it cover just few acres so you can quickly create a tile package in the following steps.

## E. Generate a Cache Tile Scheme (optional)

The default tile cache scheme used by ArcGIS should be sufficient for most users. However, you can setup your own tile scheme to use before creating your tile package. If you are using the Web Mercator (auxiliary sphere) system as recommended for most offline work, you can skip to Part G. If you chose a different coordinate system for your mosaic dataset in Part C and want to use that for your tile package, you will need to complete this section.

The first few uses of this tool might require trial-and-error to discover the settings that work best for you.

1. In the **Geoprocessing** pane, type **Generate Tile Cache Tiling Scheme** in the search field then open the tool.
2. Use the following parameters for the tool:
  - i. **Input Data Source:** select the **NAIP** mosaic dataset you created in Part B.
  - ii. **Output Tiling Scheme:** click on the folder icon, choose your project folder or other convenient location, then type a suitable file name and click **Save**.
  - iii. In the Number of Scales section, enter **7** (see the figure and notes below).



*For these instructions, we use the default settings. As you use this tool more, you will want to investigate the different options and scale settings.*

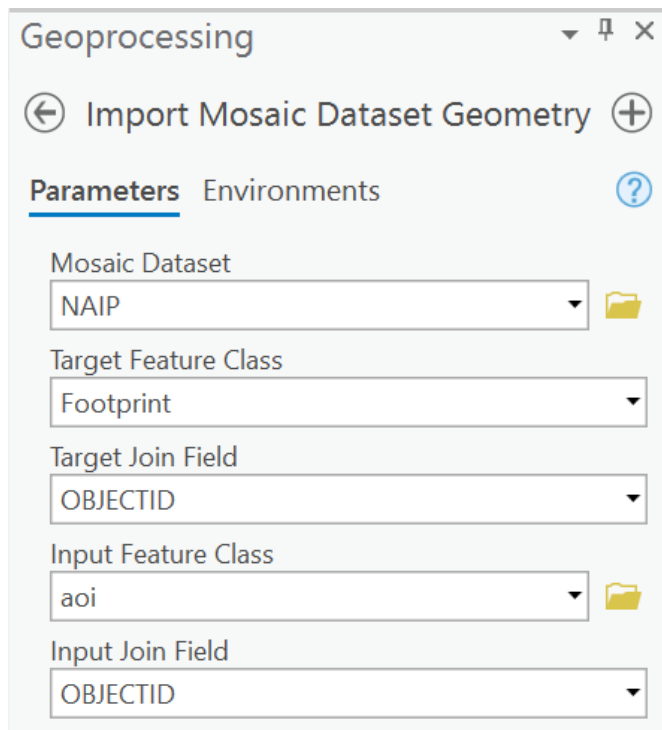
*The more large scale levels you choose, the larger your tile package will be, and longer it will take to create the package. As an example, creating a tile package for a ~350 square kilometer area of 30 cm imagery took about 40 minutes (with a high bandwidth connection) and resulted in a 1.3 GB TPK file. The time required will vary greatly with connection speed.*

3. Click **Run**.

## F. Finish setting up the Mosaic Dataset

In order to create a tile package for only your area of interest and not the entire service, we need to modify parts of your mosaic dataset. For a typical dataset, the footprint layer describes the area covered by each raster it contains, while the boundary is a polygon that encircles the entire area. For our purposes, these will cover identical areas.

1. In the Catalog, *right-click* the **NAIP** mosaic dataset, and select **Modify – Import Footprints or Boundary....**
2. Use the following parameters in the **Import Mosaic Dataset Geometry Tool** pane:
  - i. Mosaic Dataset: **NAIP**.
  - ii. Target Feature Class: **Footprint**.
  - iii. Target Join Field: **OBJECTID**.
  - iv. Input Feature Class: select your AOI feature class.
  - v. Input Join Field: **OBJECTID**.
  - vi. Click **Run**.

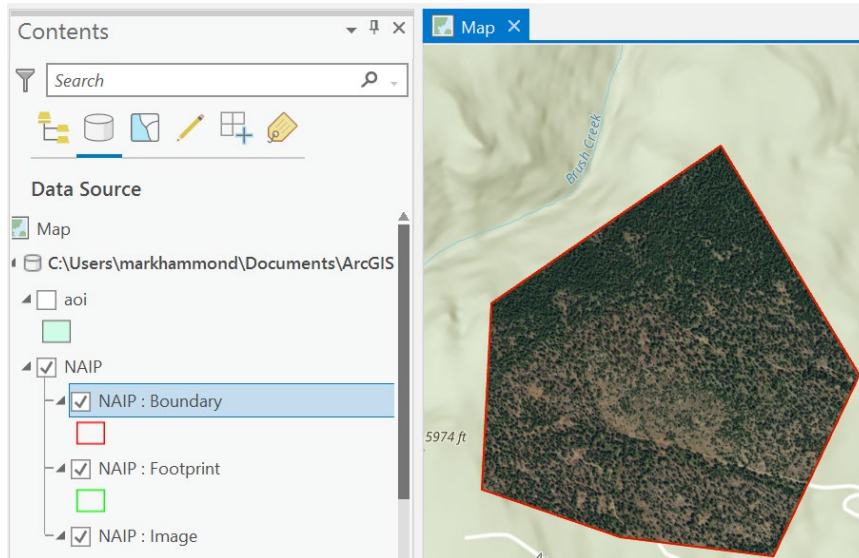




3. Run the tool again using the same steps except use **Boundary** for the **Target Feature Class**.

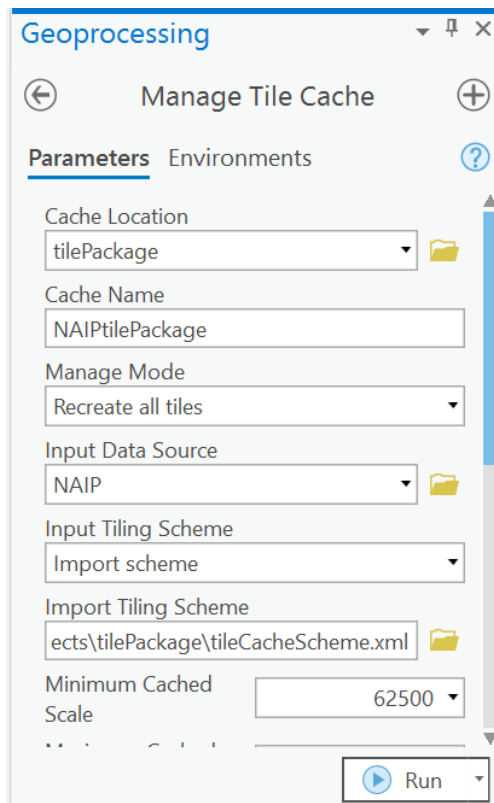
*We have found that the Boundary may not always import using these steps. If this occurs right click the Mosaic Dataset then click **Modify** then **Build Boundary**. In the Build Boundary dialog accept the defaults then click **OK**.*

4. Your Mosaic Dataset should now show only the area within your polygon. You may need to remove your Mosaic Dataset from the map, and then re-add it for it to appear correctly.



## G. Create your Tile Package

1. In the Geoprocessing window search for **Mange Tile Cache** then open the tool and use the following parameters:
  - i. **Cache Location:** select the same folder where the NAIP mosaic dataset is.
  - ii. **Cache Name:** select an appropriate name.
  - iii. **Input Data Source:** the **NAIP** mosaic dataset.
2. If you created your own tiling scheme:
  - i. **Input Tiling Scheme:** choose **Import scheme**.
  - ii. **Import Tiling Scheme:** navigate to and select the XML file that you created.
3. Leave all other fields as the preset default. Notice the **Maximum Cached Scale** has a 1.03 meter pixel size. This is important for displaying NAIP because it was collected at 1 meter resolution.
4. Click **Run**.



*The time required to build the tile package depends on your area of interest, number of tiles, scales, and connection speed. It could take several minutes to several days.*

5. When the package has finished building, examine it in the map.
6. Copy the package to your mobile device and check that it works in Collector or other mobile device app.