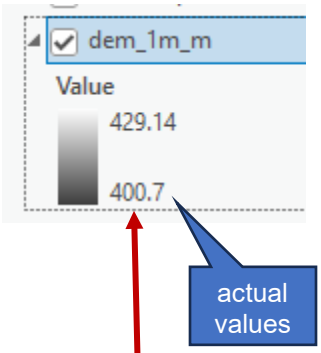
This reference guide covers exporting a LiDAR DEM, Contours, and imagery from ArcGIS Pro for use in Engineering Field Tools. The DEM surface may be used in place of a survey, where allowed, for waterways, terraces, and water and sediment control basins. The Geoprocessing tools shown are standard tools available in ESRI's GIS Pro; other tools and steps may achieve the same results.

Preparing a GIS DEM for EFT

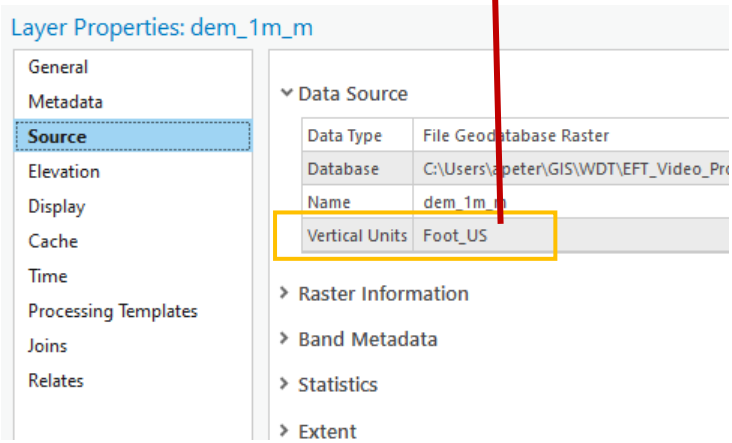
1. Have the DEM loaded into GIS Pro. (This will likely be an area much larger than the conservation practice.) The values (elevation above mean sea level) are most likely in meters (~300-400 m in Minnesota) as shown in this example.



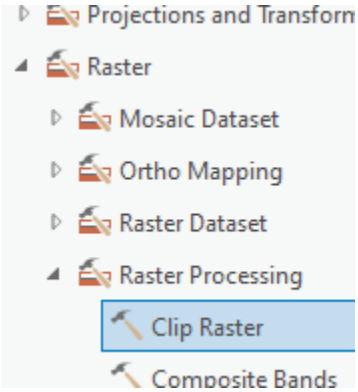
2. Right click on the DEM layer and choose Properties.

   From the Source menu, look at the Vertical Units. If they do not match the actual values of the DEM, you will need to edit the units. The vertical units here (Foot_US) do not match. *We will fix this during the Export Raster step.*

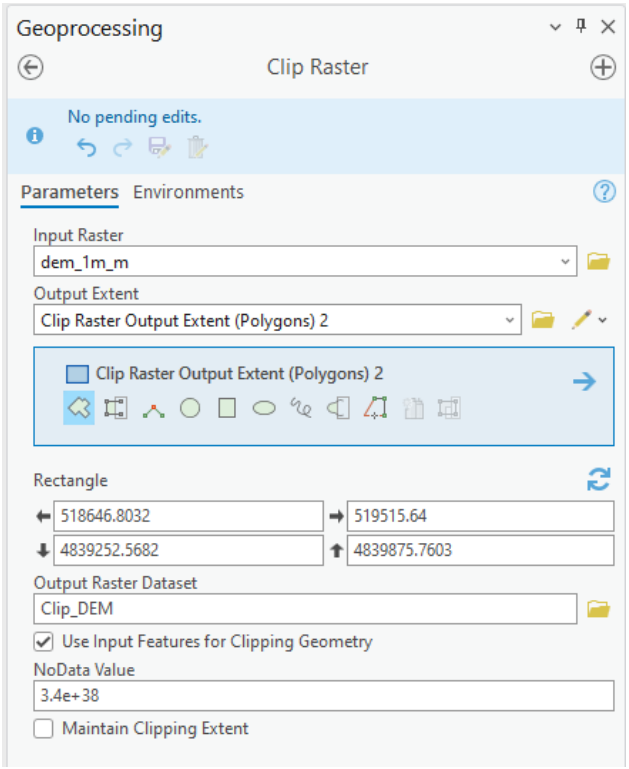
   Note: EFT is expecting horizontal units of meters.



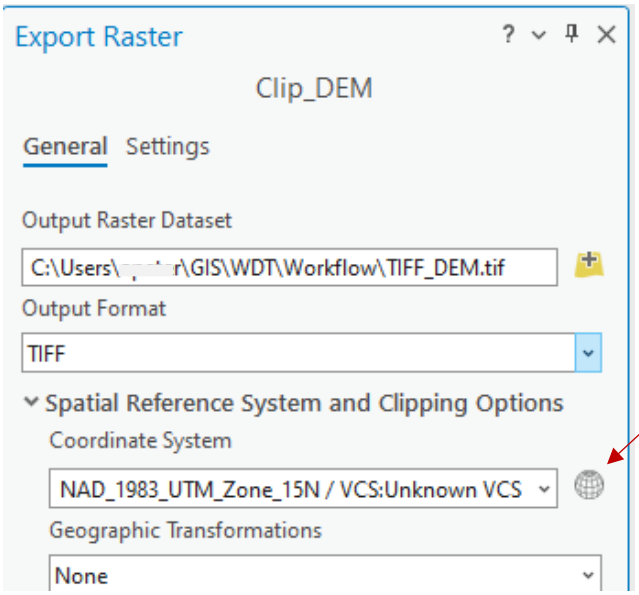
3. Clip the DEM down to the area of interest for the conservation practice. Go to your Geoprocessing Tools. Find and open the **Clip Raster** tool (Data Management Tools) using a search or browsing to it.



4. Fill out the Clip Raster tool as shown:
    a. Choose the DEM from the Input Raster pull-down
    b. For Output Extent, click on the pencil, choose Polygons to open up drawing tools. Choose a polygon or rectangle from the tool options, then draw around your area of interest. This should capture enough area around the footprint of your planned practice.
    c. For Output Raster Dataset, browse to a folder and provide a name (e.g. "Clip_DEM").
    d. Check the "Use Input Features for Clipping Geometry" box.
    e. Click Run. The clipped DEM will appear in your Contents.

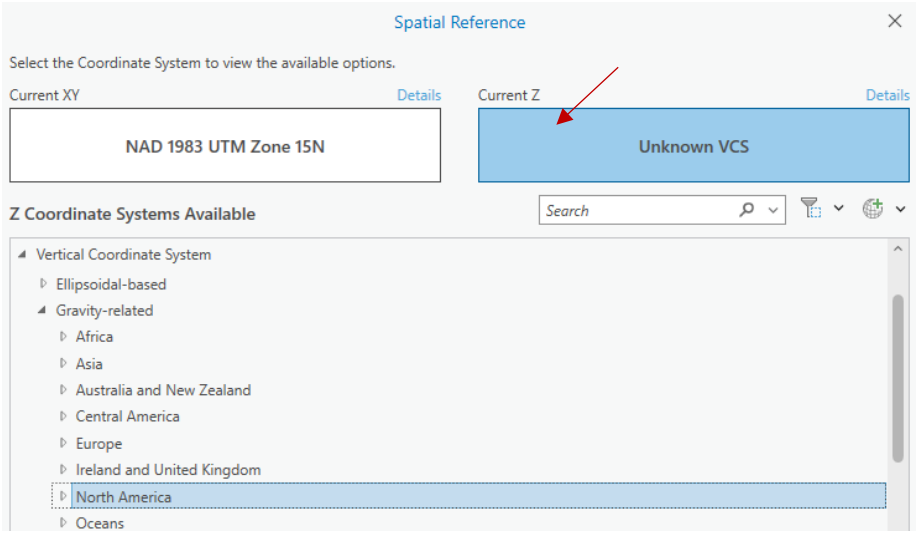


5. Export the clipped DEM to a TIFF for use in EFT. Right click on the clipped DEM layer, choose Data > Export Raster. The Export Raster pane will open.
6. Fill out the Export Raster tool as shown:
    a. Browse and choose an Output Raster Dataset folder and give it a name (e.g. TIFF_DEM).
    b. Choose Output Format "TIFF".



If the vertical units did not match the DEM's values (Step 2), you will need to edit the Coordinate System here. If they matched, skip to the next step.**

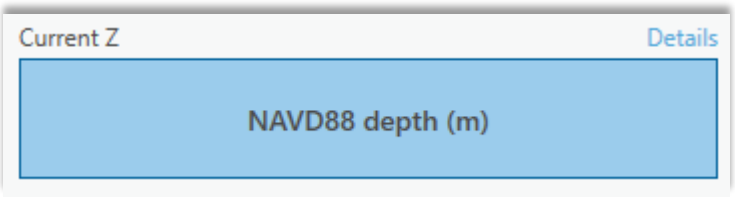
    i. Click on the globe symbol next to the coordinate system.



ii. Click on the Current Z box to modify the vertical units.

iii. The example DEM here was in meters. To assign the units as meters, search for or browse to **NAVD88 height (m).** (Browse: Vertical Coordinate System > Gravity-related > North America.)

iv. Click ok. We have now set the DEM's vertical coordinate units to match the values of the DEM.



***Continue here to finish the Export Raster tool if you did not need to edit the vertical units.*

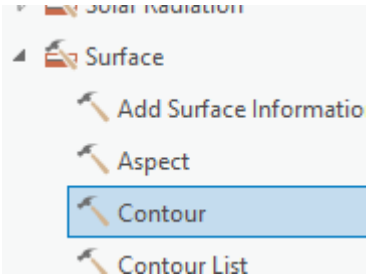
The Cell Sizes of the imported TIFF file need to be 1m x 1m for EFT.

c) Under Raster Properties, change the X and Y cells to 1 if needed.

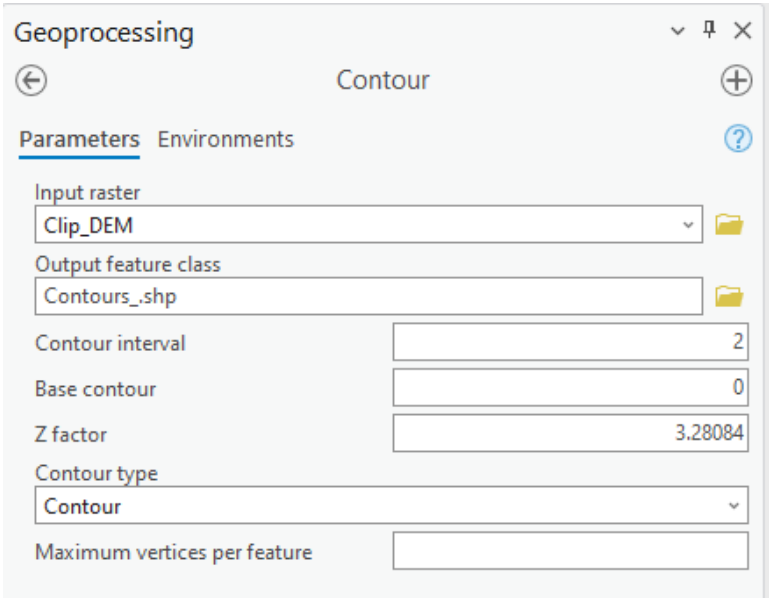
d) Click Export. Your DEM TIFF file is now ready to be imported into EFT.

Create a contours shapefile for EFT

1. Go to your Geoprocessing Tools. Find and open the Contour tool (Spatial Analyst Tools)



2. Fill out the Contour tool as shown:

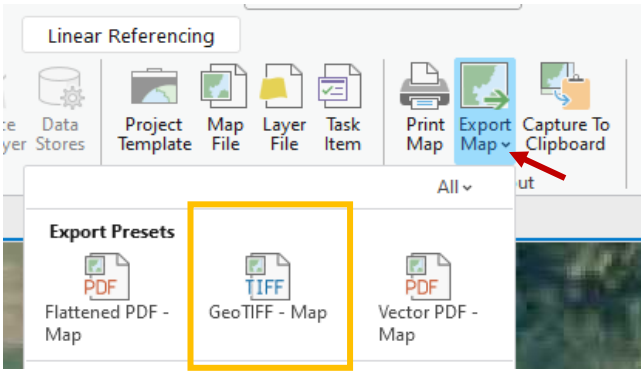


   a) Choose the input raster, either the clipped DEM or the TIFF.
   b) Choose a file location and name in the Output feature class row.
   c) Select a contour interval (e.g. 1', 2', 5' etc.)
   d) Modify the Z factor if your input raster's *values* were in meters. (In this example, both the clipped DEM and TIFF's values were meters.) This converts them to feet for your contours. Use 3.28084.
   e) Click Run. You should now have a contours shapefile, the size of your area of interest, in feet. Turn on the labels to verify the units are correct.

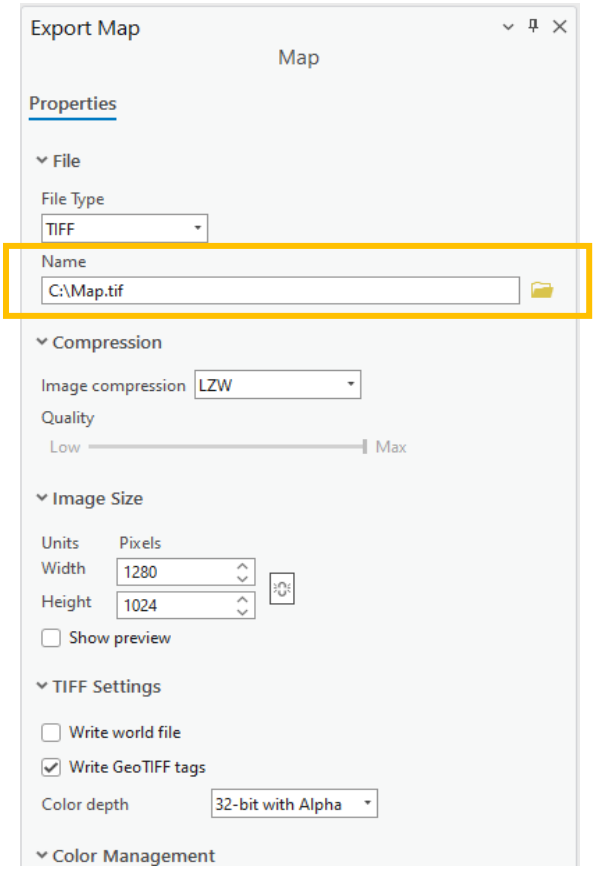
Create Background Image for use in EFT

In Arc GIS Pro

1) Turn on background imagery (and/or any other layers, e.g. soil map units)
2) Zoom into the approximate area you would like to capture.
3) From the Share ribbon, click the Export Map arrow, choose GeoTIFF-Map.



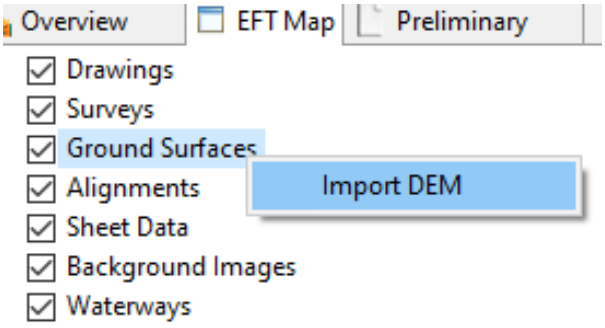
4) An Export Map pane will open. In your map area, zoom and pan to the exact area you want exported; whatever is visible will be in the exported image.
5) In the Export Map pane, choose a file location and name.
6) The "Write GeoTIFF tags" option should be checked under TIFF Settings.
7) Click Export.



The background image is a useful visual tool when completing your design. You are able import multiple images into EFT. So you may want to export more than one aerial image or have different layers turned on.

Importing DEM, Contours, and Imagery into EFT

Create a new survey, terrace, or waterway design in a selected customer/project folder in EFT.



Right click on Ground Surfaces. Choose Import DEM. The window shown below will open.

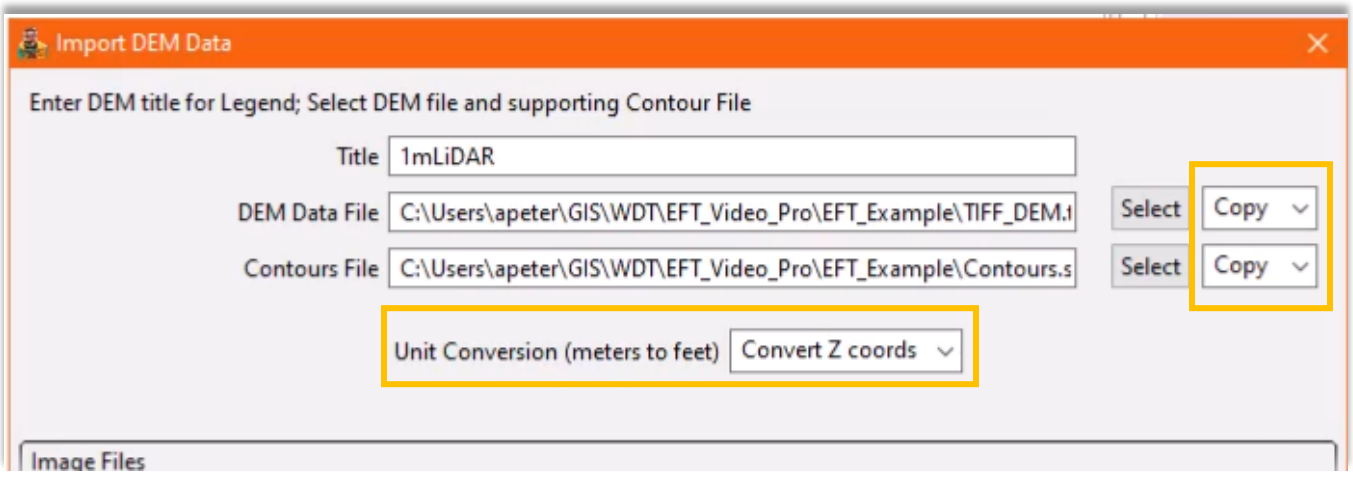
(You may load additional images by right-clicking on Background Images.)

Use the Select button to find the DEM Data file (TIFF), the contours (shp.), and the Image file (GeoTiff). Importing the imagery with this step is optional.

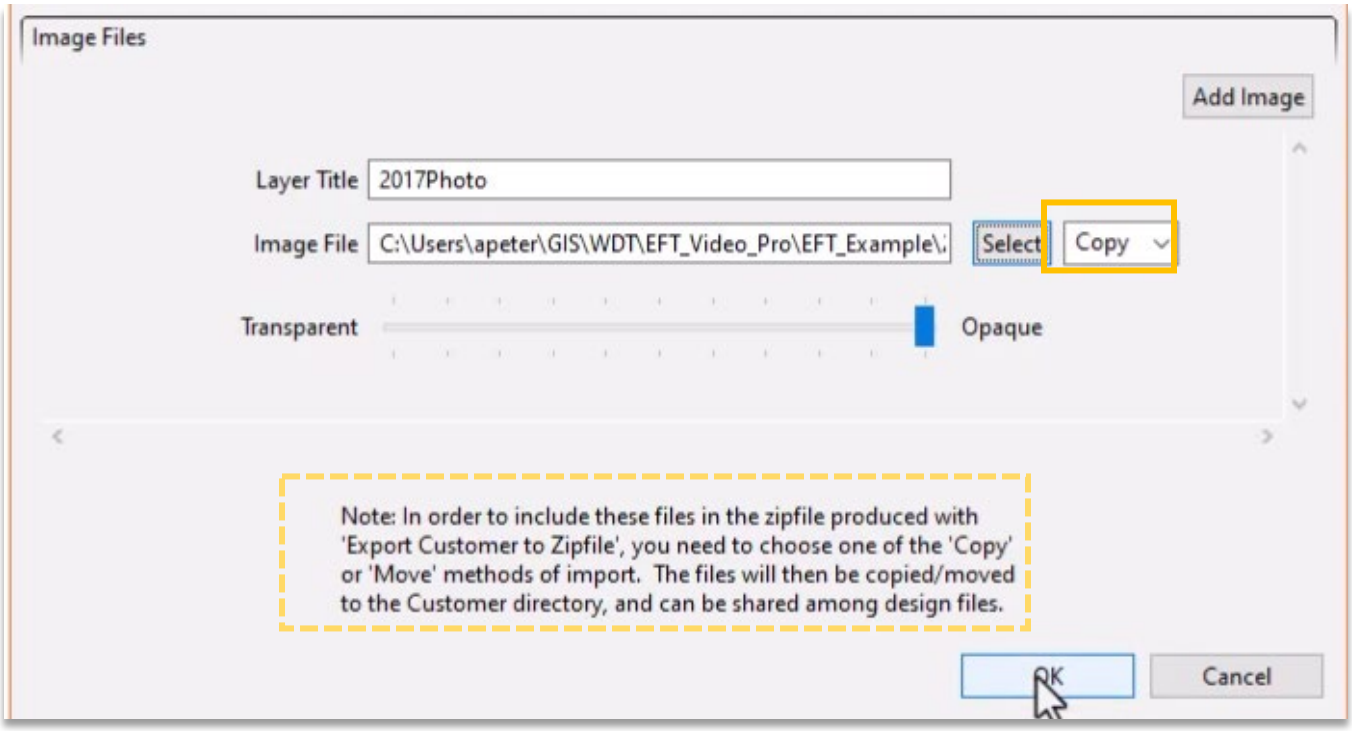
For the far right pull-down options, “Copy” is recommended. This copies the respective file to an EFT-specific customer folder (usually on your c: drive). This will allow you to export the whole project as a zip and include those necessary copied files.

Note, the Unit Conversion is done for the Z units since the example DEM had vertical units of meters.

Top half of screen:



Bottom half of screen:



If the DEM imports correctly, hovering over the DEM (visually, the same as hovering over the contours), should provide a read-out of the elevation. If no elevation is given, an error occurred with the DEM import and must be resolved.