

1. Download QGIS for your platform

- Download QGIS here: <https://www.qgis.org/en/site/forusers/download.html#>
QGIS 3.30.3 released 5-26-23 1.1 GBs msi file
- Navigate to your download folder and double click the msi file
- Follow the QGIS Setup Wizard
- Open QGIS Desktop 3.30.3

2. Create a QGIS Project

- Create New Empty Project
- Save project to work folder location, name appropriately

2.1 Add data to your project

- “Project Home” folder in Browser window will show your work files
- Add appropriate shapefiles (.shp) to your workspace by clicking and dragging either into your map panel or layers panel
- Update the symbology by double clicking the layer – update color of fill and boundary
Select “Apply” to see changes made or select “OK” to make changes and exit the properties panel

2.2 Add a basemap

2.2.1 OpenStreetMap

- In Browser panel, expand “XYZ Tiles”
- Add OpenStreetMap by dragging below all other layers
- Note: dragging a layer to the map panel will automatically add it to the top of the list

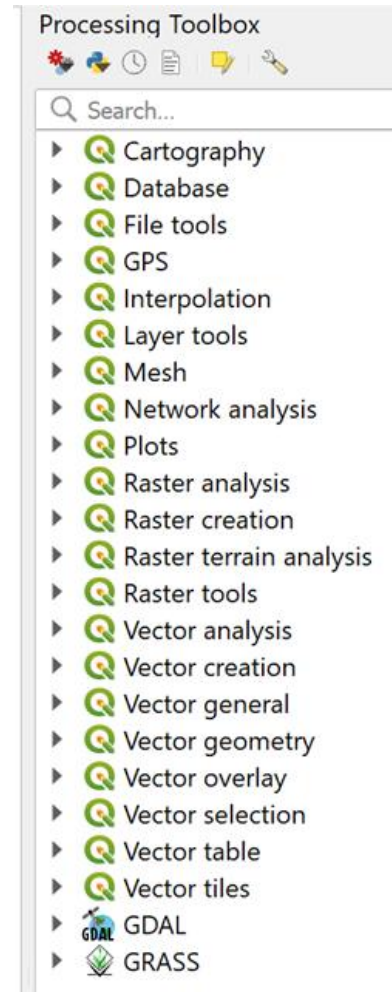
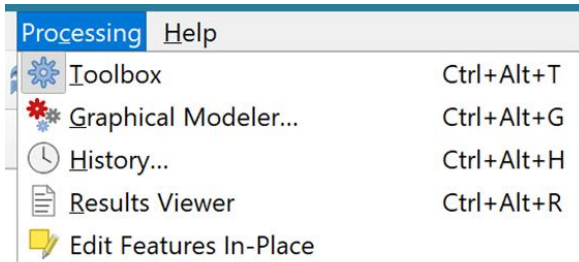
2.2.2 NAIP Imagery Map Service

- Layer > Add Layer > Add WMS/WMTS Layer
- Optional – connect to an online layer by clicking “WMS/WMTS” in Browser panel and selecting New Connection

- Label your new layer and paste the WMS url, then hit OK
Name = NAIP Imagery Map Service
URL = <https://imagery.nationalmap.gov/arcgis/services/USGSNAIPImagery/ImageServer/WMS/Server?request=GetCapabilities&service=WMS>

2.3 Add Processing Toolbox

- From top button rows select Processing > Toolbox



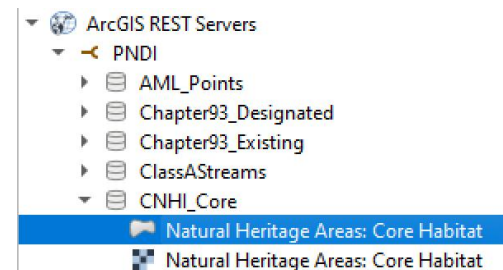
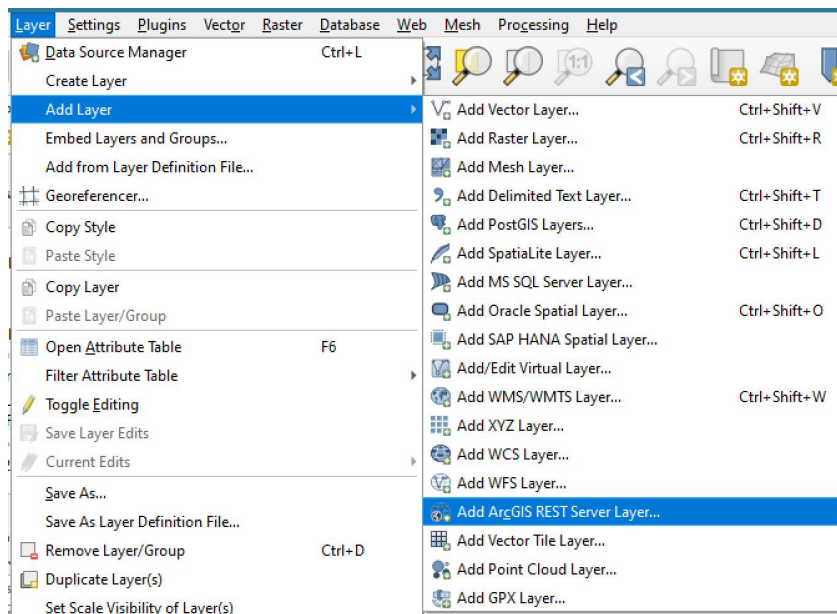
3. Download data

3.1 Add external REST service layer

Natural Heritage Area: Core Habitat ▾

3.1.1 PNDI

- Webpage: <https://conservationexplorer.dcnr.pa.gov/content/map>
- ArcGIS REST Services Directory https://conservationexplorer.dcnr.pa.gov/arcgis/rest/services/PA_Public
- Copy link address for layer(s) to add https://conservationexplorer.dcnr.pa.gov/arcgis/rest/services/PA_Public/CNHI_Core/MapServer
- In QGIS > Layer > Add Layer > Add ArcGIS REST server layer
- New
Name = PNDI
URL = https://conservationexplorer.dcnr.pa.gov/arcgis/rest/services/PA_Public
- Select “OK”, then select “Connect” ... you will see all layers associated with that REST server
- Under the **Browser** pane, scroll down to “ArcGIS REST Servers” and expand
You should see “PNDI”, expand to see associated layers
- Expand until you see a polygon symbol
- Drag and drop selected polygon into the map panel or R-click and select “Add Layer to Project”



Services:

- [Areas_of_Interest](#) (MapServer)
- [Data_Source](#) (MapServer)
- [Historic_Wetlands](#) (MapServer)
- [HUCs](#) (MapServer)
- [Riparian](#) (MapServer)
- [Wetlands_Status](#) (MapServer)
- [Wetlands](#) (MapServer)
- [WetlandsRaster](#) (ImageServer)

3.3 Soils



- Navigate to Web Soil Survey Home
USDA Natural Resources Conservation Service
<https://websoilsurvey.sc.egov.usda.gov/app/>
- Add your boundary shapefile to Import AOI “Area of Interest”
Set AOI
- Navigate to Download Soils Data tab
- Click “Create Download Link”



Download Link

Press **Create Download Link** to create a soils data download package for your Area of Interest.

- Click link under “Download Link” once generated
- Save to appropriate folder and name “Soil”
- Extract Soil data from zipped folder -> Right click and select “Extract All”
- Back in the QGIS Project, this Soil folder should appear under “Project Home” under the Browser panel

- Open folder structure to “spatial” and add “soilmu_a_aoi.shp”

- Select the **Identify features** button

- Click on the map to view the MUSYM, AbB

- Open Soil\wss_aoi\tabular\mapunit.txt replace all “|” with “,” and save as csv

- Add mapunit.csv to layers, view attribute table by hitting F6 once selected

- Next navigate to **Vector general** in the **Processing Toolbox**

- Select **Join attributes by field value**

- Input layer = soilmu_a_aoi Table field = MUSYM

- Input layer 2 = mapunit Table field 2 = field_1

Run

- **Joined layer** is saved in memory, R-click > Export > Save feature as > ESRI

Shapefile > [D:\Projects\Service_Areas\EACs\EAC Mapping Assistance\](#)

[Bucks_WarringtonTwp\Soil\wss_aoi_2023-06-07_08-36-48\spatial\Soil_joined](#)

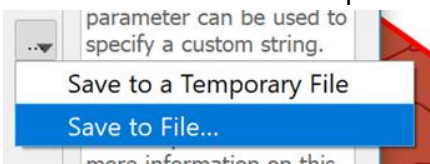
- Or Navigate to **Vector general** in **Processing Toolbox** and select **Save vector features to file**

- Vector features = Joined layer

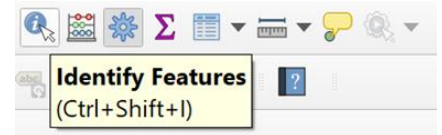
Saved features = [D:/Projects/Service_Areas/EACs/EAC Mapping Assistance/](#)

[Bucks_WarringtonTwp/Soil/wss_aoi_2023-06-07_08-36-48/spatial/Soil_joined.shp](#)

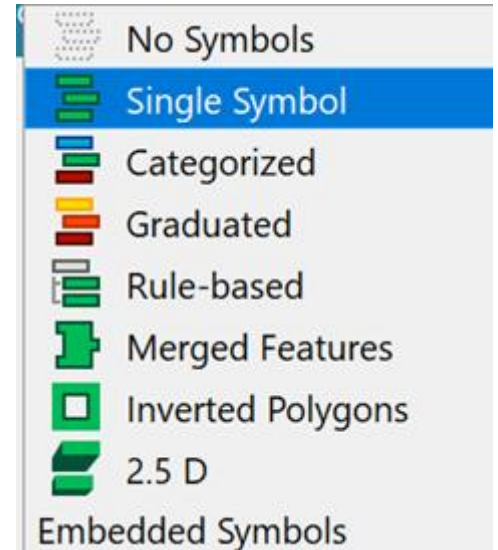
Select **Save to File** in drop-down menu



Add layer to project if not already done so



- Double click “Soil_joined” layer to open the **Layer Properties** window
- Go to **Symbology** > change **Single Symbol** to **Categorized** > Set Value to “Symbol” > Click **Classify** at bottom of panel
Customize colors or choose a Color Ramp
Select **Apply** to preview results before **OK** to close Layer Properties panel
- R-click “Soil_joined” click **Copy layer** R-click **Layers panel** select **Paste Layer/Group**
- Rename layer “Urban”, set symbol to single and gray
- R-click “Urban” layer > **Filter** > "MUSYM" LIKE 'U%'
Note the use of double quotes for a field and single quotes for text
- Follow the same steps to add a “Silt Loam” layer
Filter = "Name" LIKE '%silt loam%'



3.4 Wetlands

- Navigate to the U.S. Fish & Wildlife Service’s Wetlands Data
<https://www.fws.gov/program/national-wetlands-inventory/>
- Select **Wetlands Data** from the side panel on the left
<https://www.fws.gov/program/national-wetlands-inventory/wetlands-data>
- Select **Download Data** from the side panel
<https://www.fws.gov/program/national-wetlands-inventory/data-download>
- Select **Download by HUC8 Watershed**
- Launch the Wetlands Mapper
<https://fwsprimary.wim.usgs.gov/wetlands/apps/wetlands-mapper/>
- Find your Location -> enter a county, city, town, or coordinates



- Select Get Data > By Watershed > Select Watershed (on map)
Click the map to select a watershed from which to extract wetland data.
- *Click the link below to download data for Crosswicks-Neshaminy watershed*
- Save zipped folder in your project folder
- Navigate to your project folder and unzip the file, bring the “Wetlands” shapefile into your data folder
- Add to your Layers panel

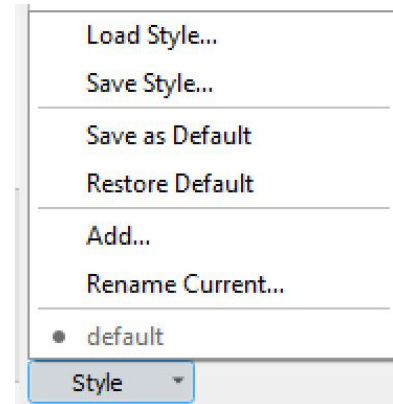
4. Symbology and Geoprocessing

4.1 Symbology

- Either double-click the color patch to the left of a layer name or R-click > Properties > Symbology
- Choose from either Single Symbol, Categorized, Graduated, and more

4.1.1 Save symbology layer

- Within the Symbology window, at the bottom of the page, select **Style**
- **Save Style** to a style folder within your project folder
- Or **Load Style** from a previously saved symbolized layer to the current one



4.2 Clip or Extract from layer using boundary shapefile

- In Processing Toolbox panel, either type in “clip” into search box
- Or open Vector overlay
- Use Clip for shapefiles and Extract/clip by extent for raster files

4.3 Clip Raster by Mask Layer

- Processing Toolbar > GDAL > Raster extraction > Clip raster by mask layer
Alternatively, Clip raster by extent
- Input layer = Raster (Wetlands) Mask layer = Municipal boundary
- Layer exports as a temporary layer held in the system memory
- R-click > Export Layer > Save as > Save Raster Layer as...
- Output mode = Raw data Format = GeoTIFF Uncheck “Create VRT”
- Optional -> Extent > Calculate from > Layer > Boundary layer
- OK

4.4 Filter layer using a definition query

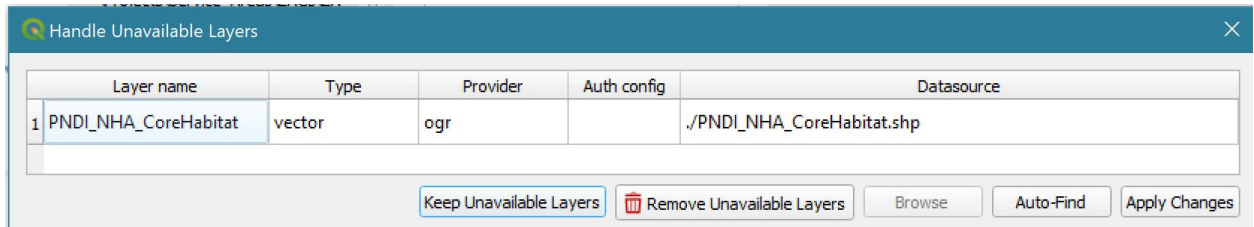
- R-click > **Duplicate Layer** New name will be original layer + “copy”
- Rename layer describing what it shows R-click > Rename Layer
- R-click > **Filter** (F) to open the **Query Builder** window
- Double click a field to add it to the definition query
- “OWN1” = ‘WARRINGTON TWP’
- Use double quotes “ for Fields and single quotes ‘ for values

- You can export this filtered layer as a new shapefile
R-click > Export > Save Feature as >
Save Vector Layer as ... ESRI Shapefile
- Shapefiles will be saved to root directory unless changed

5. Troubleshooting

5.1 Hand Unavailable Layers

- When a layer is unavailable upon opening the project, a window will appear with choices



- You can either:
 - a) Keep Unavailable Layers
 - b) Remove Unavailable Layers
 - c) Select the layer and Browse for the layer's shapefile location
 - d) Auto-Find
- Select "Auto-Find" when the layer is in a subfolder of the project file location
- If found, the **Datasource** link will fill in and turn green

Layer name	Type	Provider	Auth config	Datasource
PNDI_NHA_CoreHabitat	vector	ogr		D:/Projects/Service_Areas/EACs/EAC Mapping Assistance/...

- Select **Apply Changes**
- If a layer becomes broken while the project is open, a red triangle with a red exclamation point will appear. Select this icon next to the broken layer to point to the correct shapefile location on your hard drive