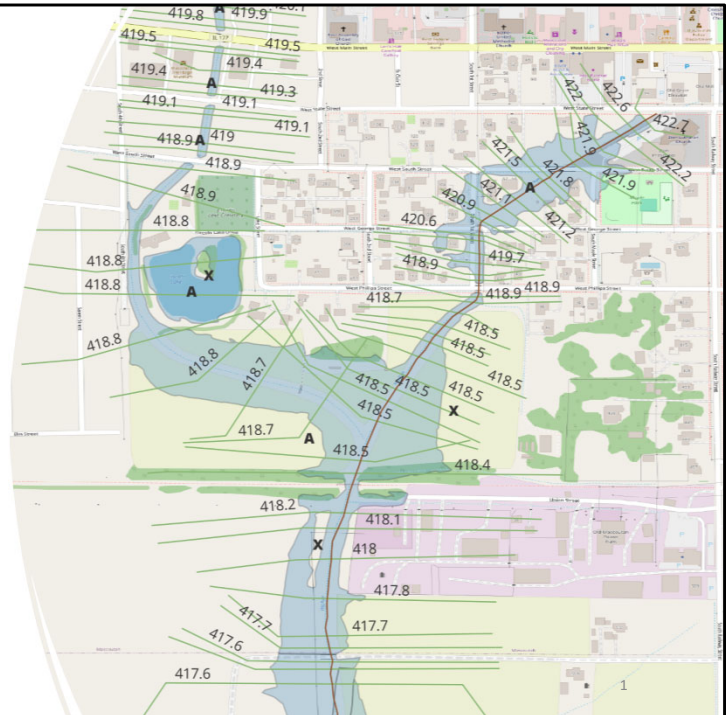


Using Open-Source GIS to Find Regulatory BFEs in Model-Backed A Zones

IAFSM – March 2024

3/9/2024



I am going to show how to pull the data into an opensource GIS for communities and consultants that don't have ArcGIS. I have very little GIS experience. I was helped by Katherine McKenna, a recent college graduate and a new hire at Kane County. Her parents Amy and McKenna are both members of IAFSM and local civil engineers. Katherine taught me how to do this on a Sunday afternoon so I am confident everyone else can easily do this with no GIS experience. Unbeknownst to me ISWS was making a video that is very similar. It will be posted on the IllinoisFloodMaps.org website when complete. We will let everyone know through the state and IAFSM newsletters when available

Goals for
today – Show
you how to:

1. **How to Find Model-backed A Zones**
2. How to download the data from FEMA
3. How to Upload the data into an Open-sourced GIS platform
4. How to see the data, including Zone A BFEs

3/9/2024



Today's goals are list. I will start with showing how to determine if you have the hidden BFEs. Then how to download the data from FEMA, then upload the data into QGIS and finally view the data.

What is a Model-Backed A Zone?

- A Zone A floodplain mapping supported by detailed engineering data, including more accurate topography and some cross-sections
- FEMA is considering these unseen BFEs to be REGULATORY

3/9/2024



The guidelines for the mapping of floodplains establishes standards for modeling to result in a Zone AE, where Base Flood Elevations (BFEs) are shown vs. a Zone A where no elevations are shown.

Historically Zone A floodplains were unstudied, may have been mapped using USGS 10-ft contour maps, digitized from old mapping of a 1964 flood, and often that did not match well with actual terrain. The mapping was improving with better topography and now a new Zone A floodplain mapping may be supported by detailed engineering data, including more accurate topography and cross-sections and is called model-backed.

FEMA is even considering these unseen BFEs to be REGULATORY!

How much
does this
matter?



3/9/2024

4

Here you can see a difference. The mapping on the left is from the 2021 Warren Co maps and on the right of the county line is the 2011 Knox County map. At the county line you can see the model-backed floodplain vs. the original Zone A limits digitized on to the 2011 Knox Co map.

How much does this matter?

Illinois Elevation Finder
<https://maps.dnr.illinois.gov/elev/>

Hillshade Relief

3/9/2024



Now you can see how the mapping compares to the Hillshade Relief Layer on the state's Elevation Finder map. The mapping is far more accurate.

Where are Model Backed A Zones in IL?

- Some streams on the effective mapping for Ford and Warren counties
- Some streams on the preliminary mapping in Madison, Monroe, and St. Clair counties
- Some LOMRs in Zone As

3/9/2024



How to confirm if a Zone A is Model-Backed?

- Use FEMA's Coordinated Needs Management Strategy's ([CNMS Viewer](#)) website
- Look at the Valid (green) Riverine Lines to see if the data is available

3/9/2024

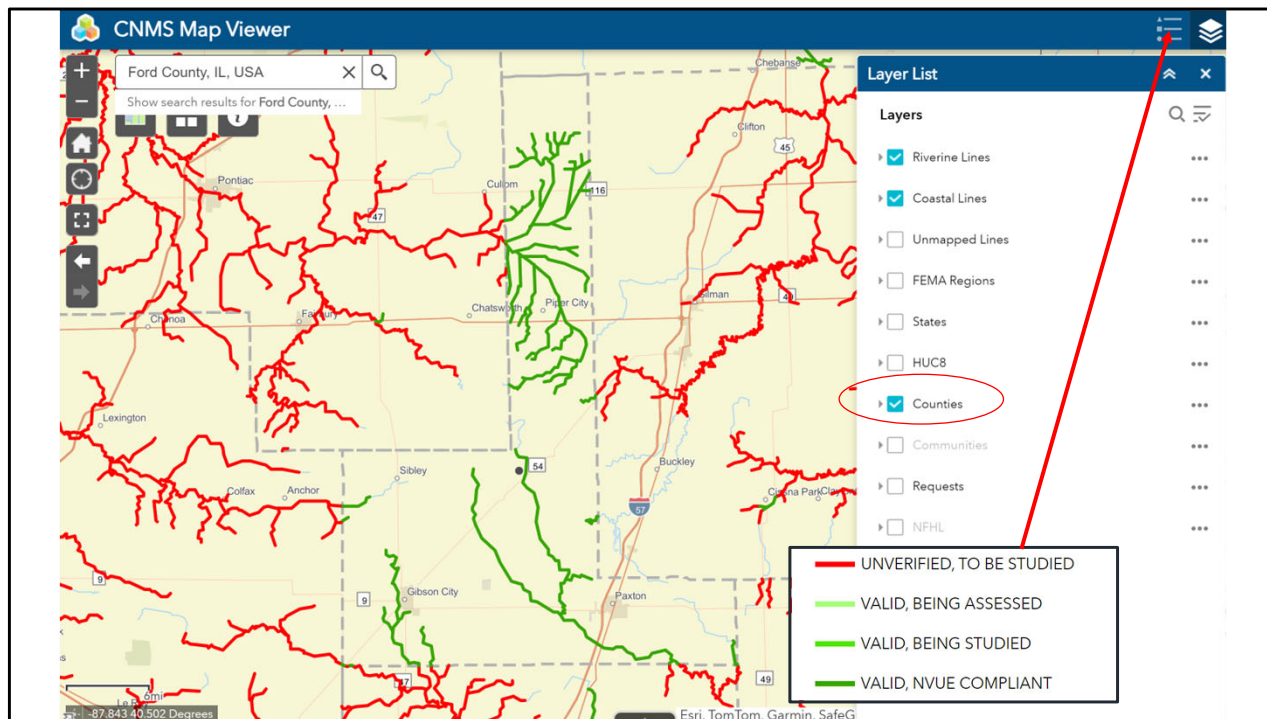


7

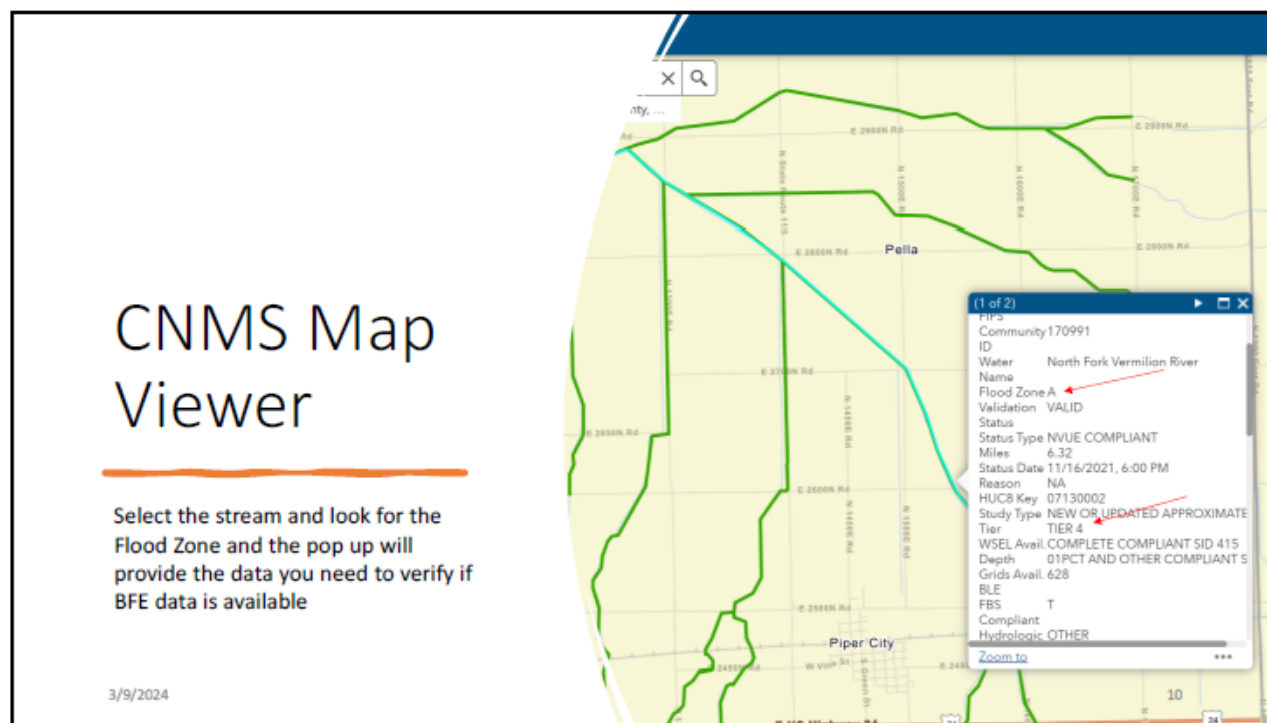
CNMS Map Viewer

The screenshot shows the CNMS Map Viewer interface. At the top, there's a search bar with the text "Find address or place" and a search icon. Below the search bar, there's a "Riverine NVUE Miles" panel with a list of tasks: "Modernized and Paper Inventory Miles by FEMA Region", "Modernized and Paper Inventory Miles by State", "Modernized and Paper Inventory Miles by HUC8", "Modernized and Paper Inventory Miles by County", and "Modernized and Paper Inventory Miles by Community". A "Clear" button is at the bottom of this panel. The main map area shows a map of the United States with various cities and states labeled. On the right side, there's a "Layer List" panel with a search icon and a list of layers: "Riverine Lines" (checked), "Coastal Lines" (checked), "Unmapped Lines" (unchecked), "FEMA Regions" (unchecked), "States" (unchecked), "HUC8" (unchecked), "Counties" (unchecked), "Communities" (unchecked), "Requests" (unchecked), and "NFPL" (unchecked). The date "3/9/2024" is visible in the bottom left corner of the map area, and the number "8" is in the bottom right corner.

The CNMS Viewer tracks the studies on stream across the country. It uses a traditional Arc GIS viewer you should all be familiar with. The viewer will open with Layers panel open. As you scroll in data will be visible.



I have zoomed in on Ford County, they received their first digital FIRM mapping in 2020. You can see the green streams and the adjacent counties have mostly red



Click on a valid studied stream and an info box will pop up showing the Tier. If you scroll down the study and other data will show about the existing floodplain study.

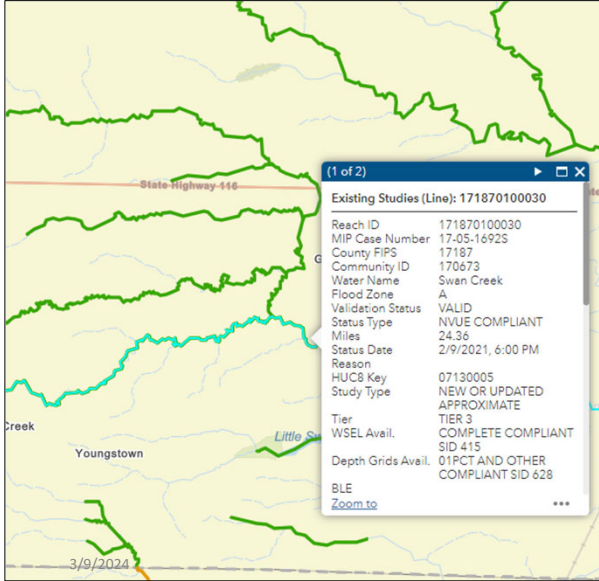
CNMS Map Viewer

Tiers 3, 4 and 5 will have model-backed data available for download if not completed using a 2-D model

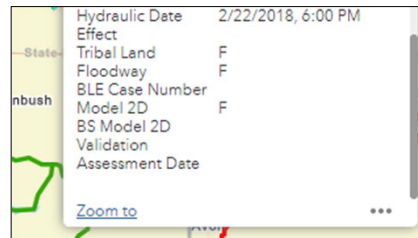
Existing Studies (Line): 171870100048	
Reach ID	171870100048
MIP Case Number	17-05-1692S
County FIPS	17187
Community ID	170673
Water Name	Cedar Fork
Flood Zone	A
Validation Status	VALID
Status Type	NVUE COMPLIANT
Miles	11.24
Status Date	2/9/2021, 6:00 PM
Reason	
HUC8 Key	07130005
Study Type	NEW OR UPDATED APPROXIMATE
Tier	TIER 3
WSEL Avail.	COMPLETE COMPLIANT
SID	415
Depth Grids Avail.	01PCT AND OTHER COMPLIANT SID 628

You are looking for Tiers 3, 4 and 5. You will rarely see this but you should scroll down and see if the stream has a 2-D model. The BFE data for a 2-D modeled stream, which are quite rare in IL may be available in the future but for now it is not available. This is the case in northern Ford County and for the preliminary maps for parts of Madison, Monroe and St. Clair counties.

CNMS Map Viewer



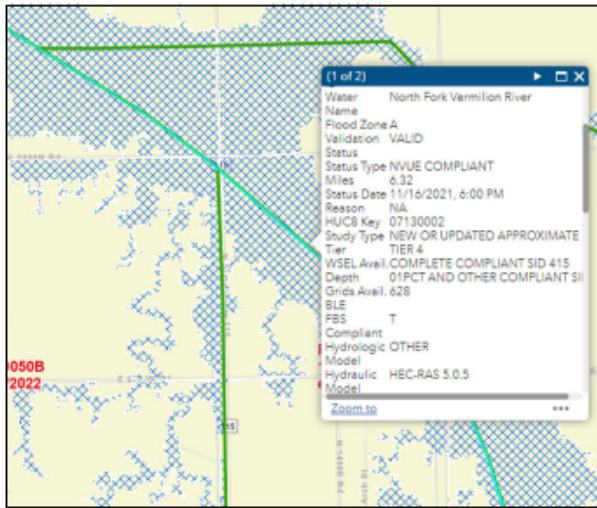
- Swan Creek, Warren Co
- Zone A (Can turn on NFHL Viewer in CNMS)
- Tier 3 Hydrologic Model – Regression
- Hydraulic Model - HEC-RAS 4.1
- 2D Model – False
- **BFE data will show**



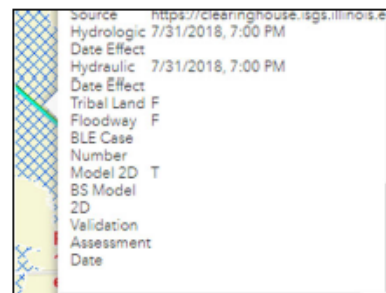
12

Here is an example of the data you will find. This stream is a Tier 3 and the 2D field has an F or False listed so this BFE data will be available.

CNMS Map Viewer



- North Fork Vermillion, Ford Co
- Zone A Tier 4
- Hydrologic Model – Other
- Hydraulic Model - HEC-RAS 5.0.2
- 2D Model – True
- **No Data will show**

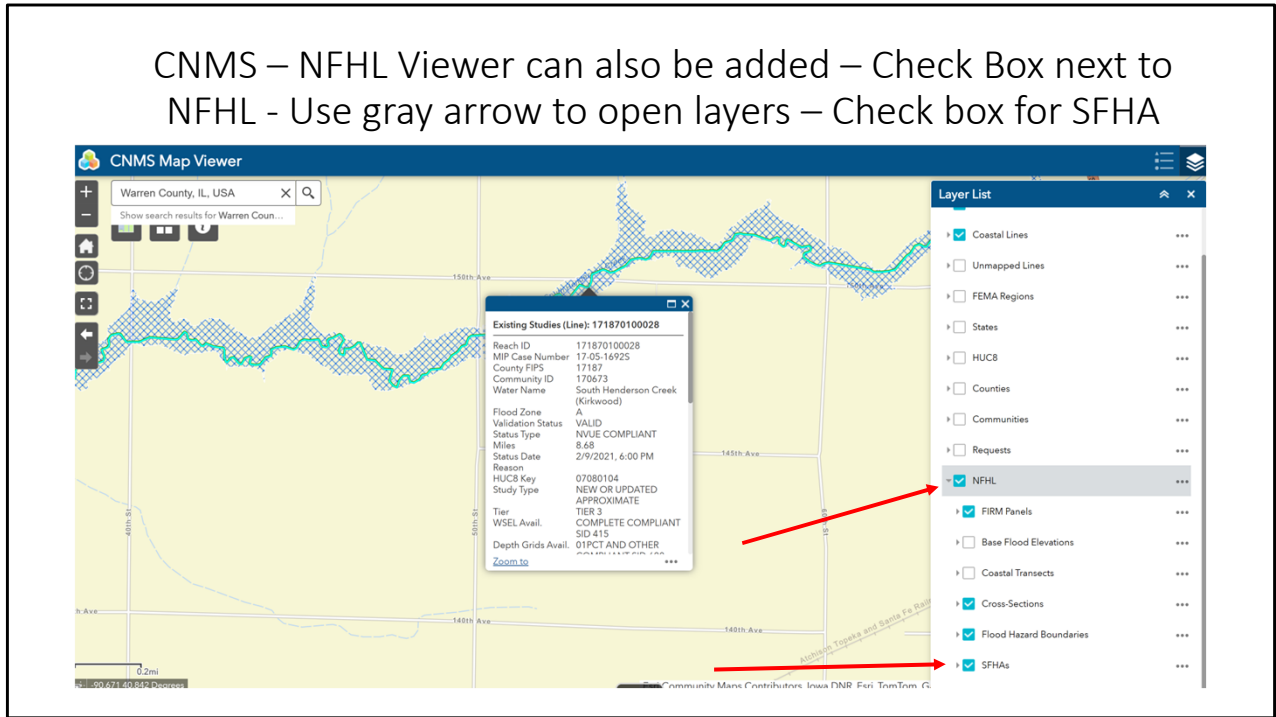


3/9/2024

13

Here is the example from Ford County where the data is Tier 4 but it is from a 2D model and no BFEs will show.

CNMS – NFHL Viewer can also be added – Check Box next to NFHL - Use gray arrow to open layers – Check box for SFHA



NFHL Viewer may be of value.

Goals for today – Show you how to:

1. How to Find Model-backed A Zones
2. How to download the data from FEMA
3. How to Upload the data into an Open-sourced GIS platform
4. How to see the data, including Zone A BFEs

3/10/2024



15

Next will be to download the data

Find Database on FEMA Map Service Center

Can search a jurisdiction name or use drop down menu

FEMA Flood Map Service Center: Search All Products

Choose one of the three search options below and optionally enter a posting date range.

Jurisdiction	Jurisdiction Name	Product ID
State ILLINOIS	Jurisdiction Name or FEMA ID (Ex. Fairfax County-wide or S1059C)	Product ID (Ex. Panel Number, LOMC Case Number)
County ST. CLAIR COUNTY		
Community BELLEVILLE, CITY OF		

> Filter By Posting Date Range (Optional)

Search Clear All Fields

Share This Page

[Home](#) [Download Plugins](#) [About Us](#) [Privacy Policy](#) [EOIA](#) [Office of the Inspector General](#) [Strategic Plan](#) [Whitehouse.gov](#)
[DHS.gov](#) [Ready.gov](#) [USA.gov](#) [DisasterAssistance.gov](#)

OIG HOTLINE
Report Fraud,
Waste & Abuse

Official website of the Department of Homeland Security

3/9/2024

16

Step 2 – Get the data from the FEMA Map Service Center. Easiest is to use the drop-down menus. Grab a community or the Unincorporated county. Do not pick All Jurisdiction option as you may get multiple counties if a city/village straddles the county line.

Find Database on FEMA Map Service Center

Go to Effective Products, choose NFHL Data-County, then the Download icon, and save the file where you can find it

3/9/2024

17

Search Results for **GIBSON CITY, CITY OF**

Click [subscribe](#) to receive email notifications when products are updated.
Click to [download a listing](#) of all products.

If you are a person with a disability, are blind, or have low vision, and need assistance, please contact [a help specialist](#).

Expand All

- Effective Products (8)
 - FIRM Panels (5)
 - FIS Reports (1)
 - LOMC (0)
 - NFHL Data-State (1)
 - NFHL Data-County (1)
- Preliminary Products (0)
- Pending Product (0)
- Historic Products (1)
- Flood Risk Products (2)

Product ID	Latest Study Effective Date	Latest LOMR Effective Date	Size	Download
NFHL_17053C	05/17/2022	N/A	23MB	

[Share This Page.](#)

[Home](#) [Download Plug-ins](#) [About Us](#) [Privacy Policy](#) [EOIA](#) [Office of the Inspector General](#) [Strategic Plan](#) [Whitehouse.gov](#) [DHS.gov](#) [Ready.gov](#) [USA.gov](#) [DisasterAssistance.gov](#)

Under Effective Products or Preliminary Products select the county data download– if you grab the state data the file is huge. This is Ford County.

Preliminary Mapping Database

St. Clair County has preliminary mapping with the Model-Backed data found under Preliminary Products.

3/9/2024

18

BELLEVILLE, CITY OF

> Filter By Posting Date Range (Optional)

Search

Search Results for **BELLEVILLE, CITY OF**

Click [subscribe](#) to receive email notifications when products are updated.
Click to [download a listing](#) of all products.

If you are a person with a disability, are blind, or have low vision, and need assistance, please contact a [help specialist](#).

Expand All

- Effective Products (48)
- Preliminary Products (58)

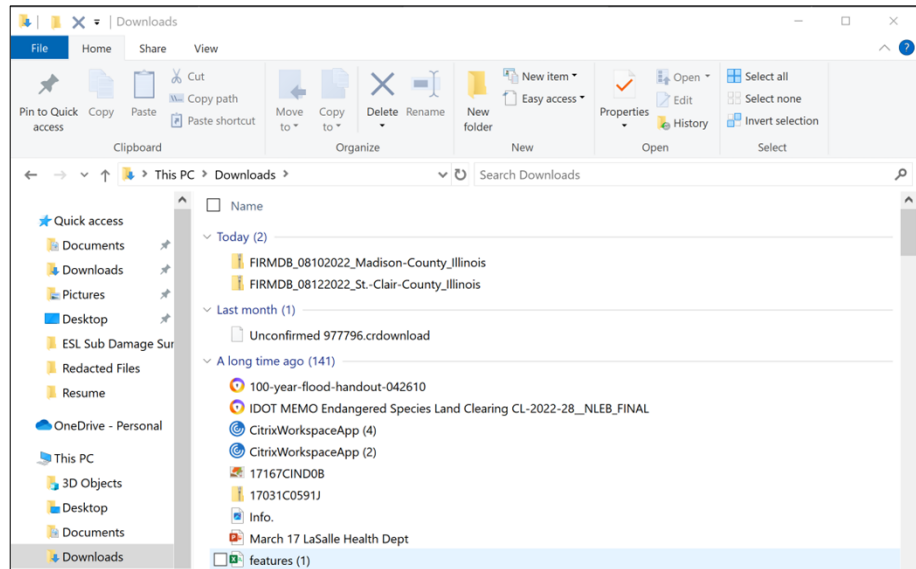
Please note: Preliminary data are for review and guidance purposes only. By viewing preliminary data and maps, the user acknowledges that the information provided is preliminary and subject to change. Preliminary data, including new or revised FIRMs, FIS reports, and FIRM Databases, are not final and are presented on the MSC as the best information available at this time. Additionally, preliminary data cannot be used to rate flood insurance policies or enforce the Federal mandatory purchase requirement. FEMA will remove preliminary data once effective data are available.

- Preliminary FIRM Panels (94)
- Preliminary FIS Reports (3)
- Preliminary FIRM Database (1)

Product ID	Issue Date	Size	Download
17163C_PRELMDB	06/12/2022	1 MB	

- Pending Product (0)
- Historic Products (9)
- Flood Risk Products (5)

Know where to find the files for uploading into QGIS



3/9/2024

19

Once you have downloaded the data, know the file name and location for uploading into the GIS platform.

Goals for today – Show you how to:

1. How to Find Model-backed A Zones
2. How to download the data from FEMA
3. How to Upload the data into an Open-sourced GIS platform
4. How to see the data, including Zone A BFEs

3/10/2024

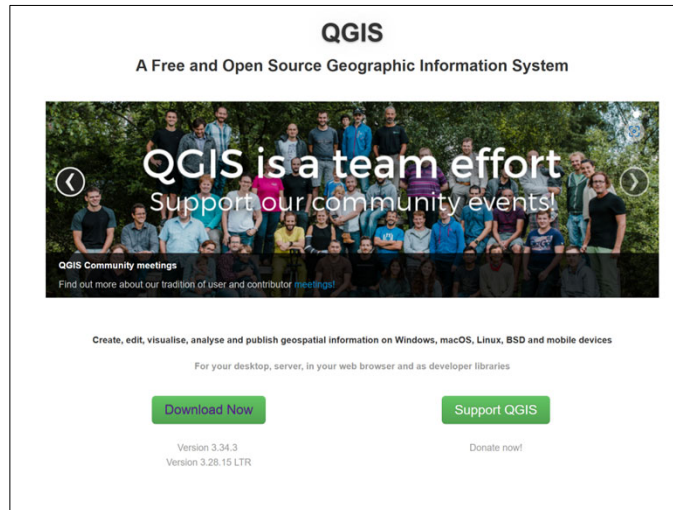


20

Next step – uploading the files

Download Opensource GIS

QGIS used for this example



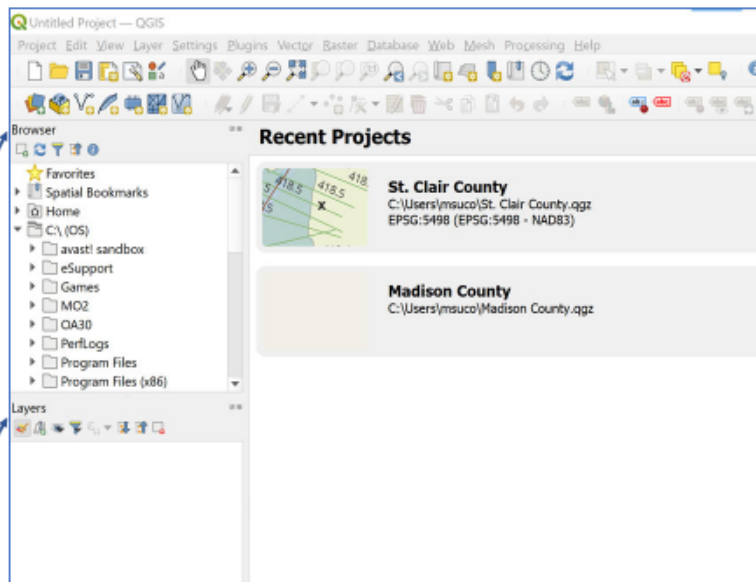
3/9/2024

21

There are other opensource products, but this one seemed to be the most common. If you have ArcGIS available, you can of course use that. If you don't know the steps IDNR does a set of PowerPoint slides like these.

Upload Shapefiles into GIS

You must now upload the shape files into the GIS program. Find them in the Browser by opening the folder and then drag them into the Layers section below.



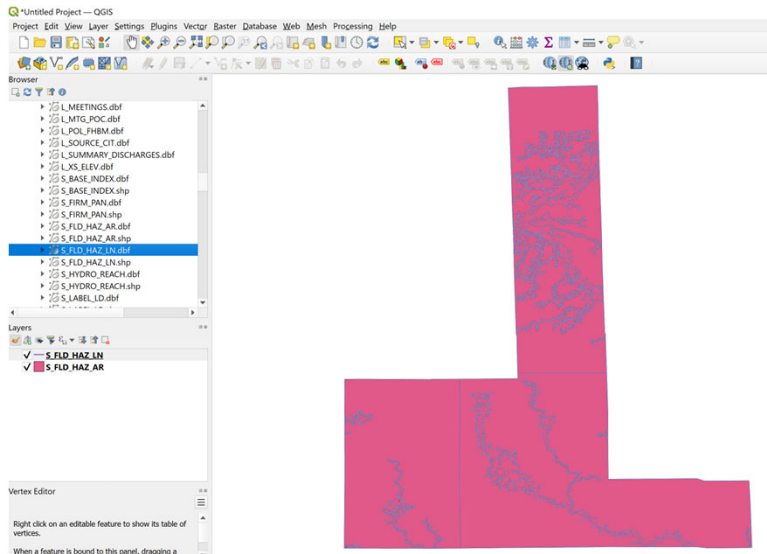
3/9/2024

22

My files are in the Home/Download folder so I just open that folder in QGIS under the browser and drag in the files into the Layers section below.

Uploading Shape Files (.shp)

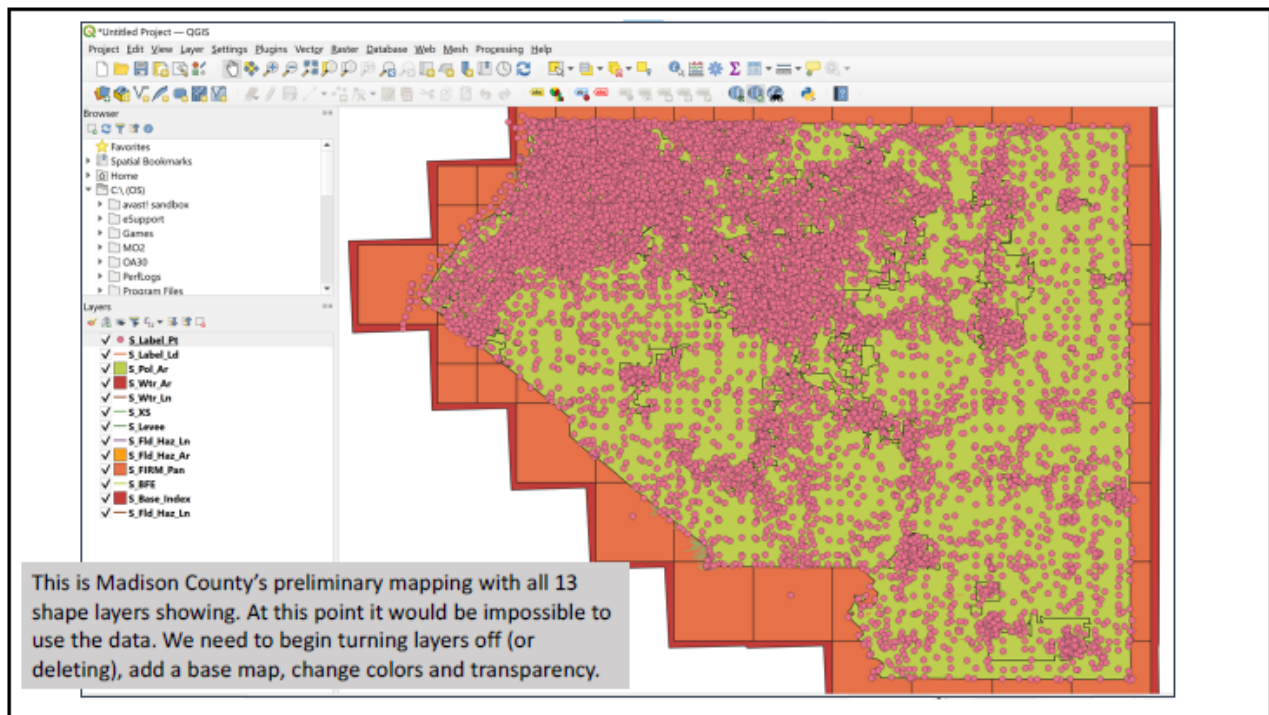
As you move the shape files, the Layers they will begin to appear. You can move all shape files or just the ones you will need.



3/9/2024

23

Shapes files begin to appear as they are moved into the Layers section.

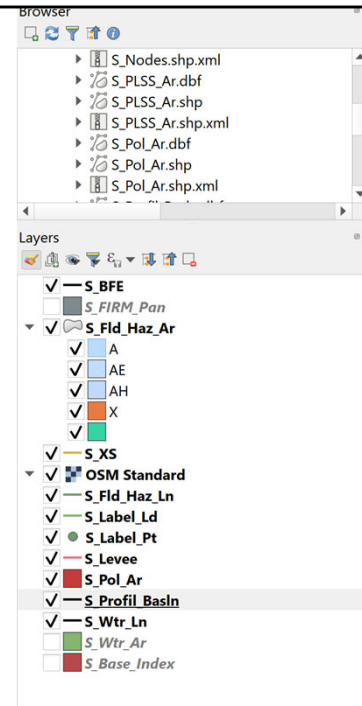


This shows you what 13 layers all on with no adjustments to colors or transparency looks like.

Are all the Shapefiles Needed?

You can download all and just turn them off, but the following are important:

- S_BFE – Base Flood Elev. for an AE, AH, AO, VE is on the map
- S_Profil_Basln – Profile Baseline for Zone AE
- S_Wtr_Ln – Centerline of each waterway, should have the name
- S_XS – Cross-sections
- S_Fld_Haz_Ln – Limits, outside boundaries of each flood hazard area
- S_Fld_Haz_Ar – All the areas including unshaded X
- S_BFE – BFES for Zones AE, AH, etc.
- S_Wtr_Ar – will show lakes or open water



Here is a list of the shape files

Goals for today – Show you how to:

1. How to Find Model-backed A Zones
2. How to download the data from FEMA
3. How to Upload the data into an Open-sourced GIS platform
4. How to see the data, including Zone A BFEs

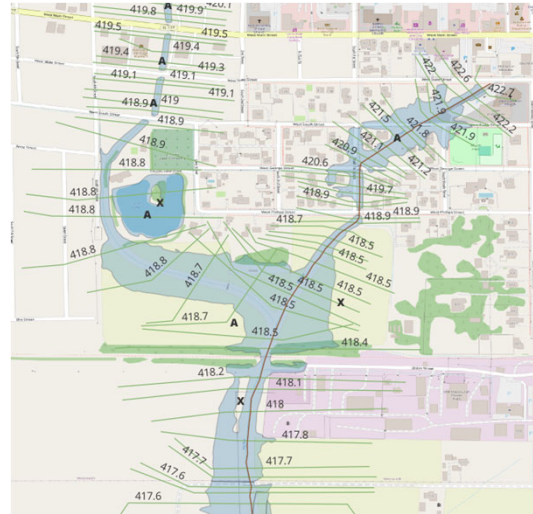
3/10/2024



26

Finally we will view the data.

Comparison – St. Clair County



3/9/2024

27

Here is a comparison in St. Clair County where the Prelim FIRM shows the Zone A and on the left you can see over 50 cross-sections and BFEs are available.

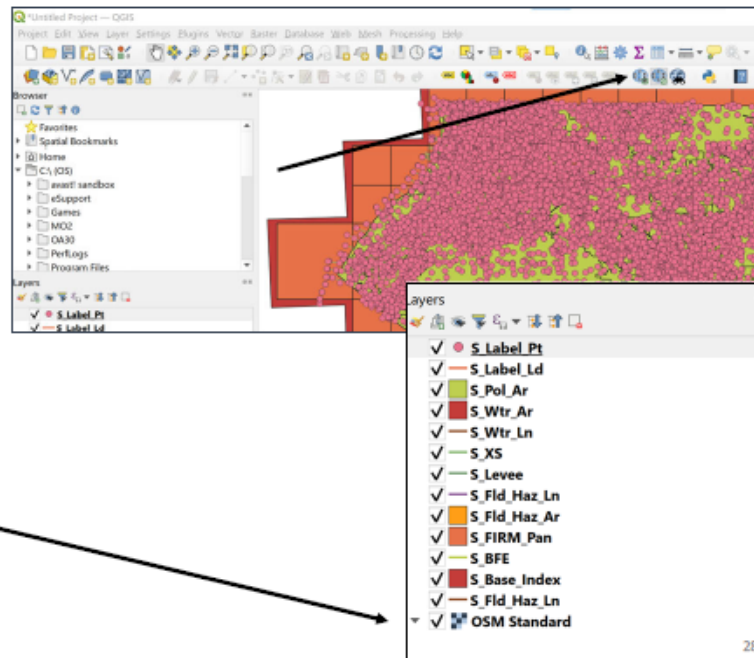
Insert a Basemap of Roads

Before we play with the Layers, we will insert a road map.

Go to First image of a globe

Left click and select OSM Standard or Open Street Map Standard.

It will now show on the Layer List



3/10/2024

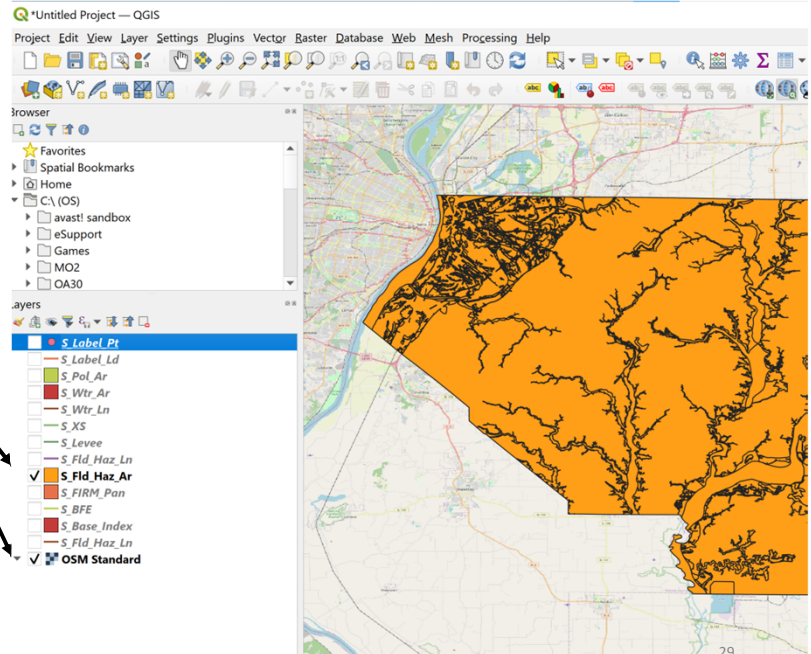
28

Here is how to insert a simple street map directly available from the icons in QGIS. The ISWS video shows you how to download an aerial map layer. Again, their video will eventually be made available.

Fix One Layer at a Time

Turn off all layers except S_Fld_HAZ_Ar and the OSM Standard

Right now all of the flood hazard zones A, AE, AO, AH, X, and V are the same color



3/9/2024

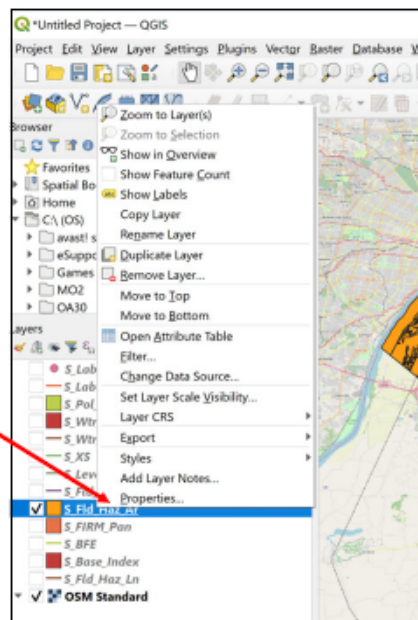
Now for every layer you want to have on you will need to go through them and fix colors, transparency or opaqueness and show any labeling or text available.

Flood Zone Layer - Color Fix

Right Click on S_Fld_Haz_Ar layer

A menu will pop up and choose Properties at the very bottom

Left click on Properties for the next window to fix colors



3/9/2024

30

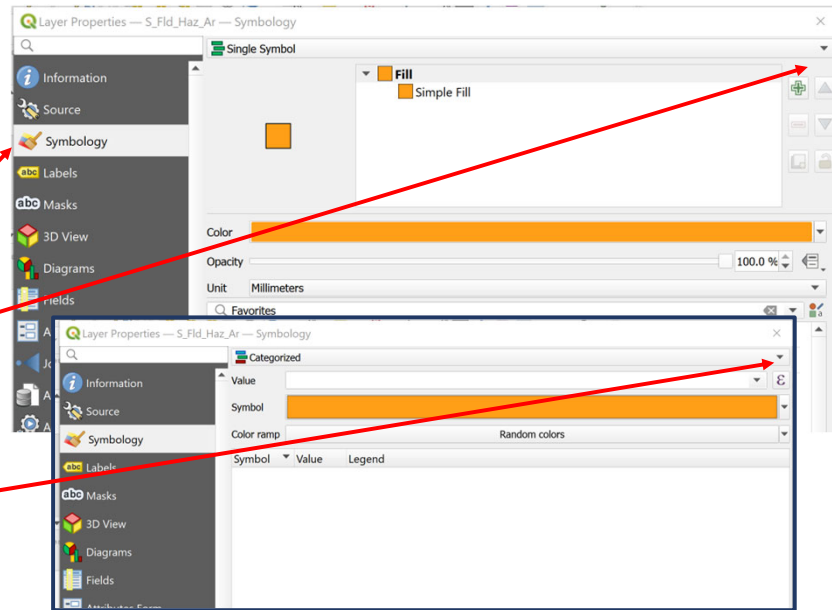
For most of the remaining slides the instructions are listed

Flood Zone Layer – Color Fix

Under Layer Properties choose Symbology

At top Single Symbol must be switched to Categorized. This is unique to the Flood Zone Layer

Using drop down choose Categorized



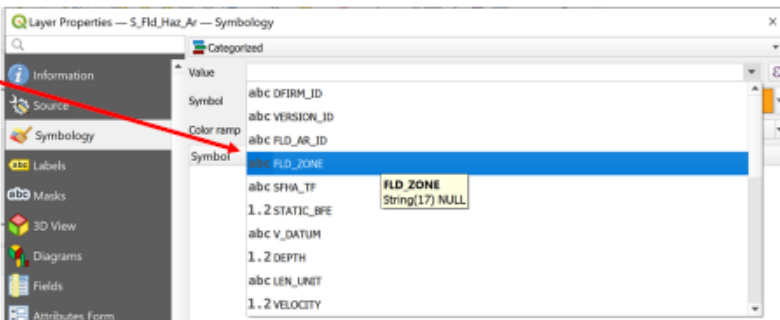
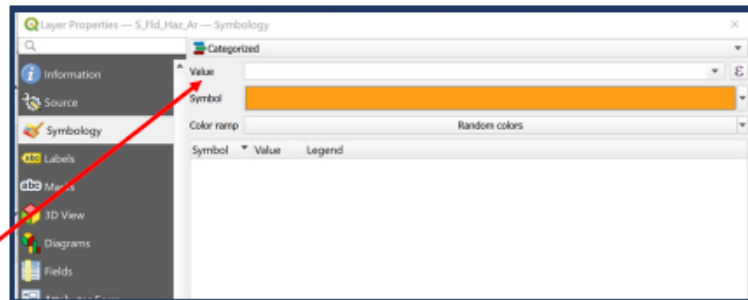
3/10/2024

31

Flood Zone Layer – Color Fix

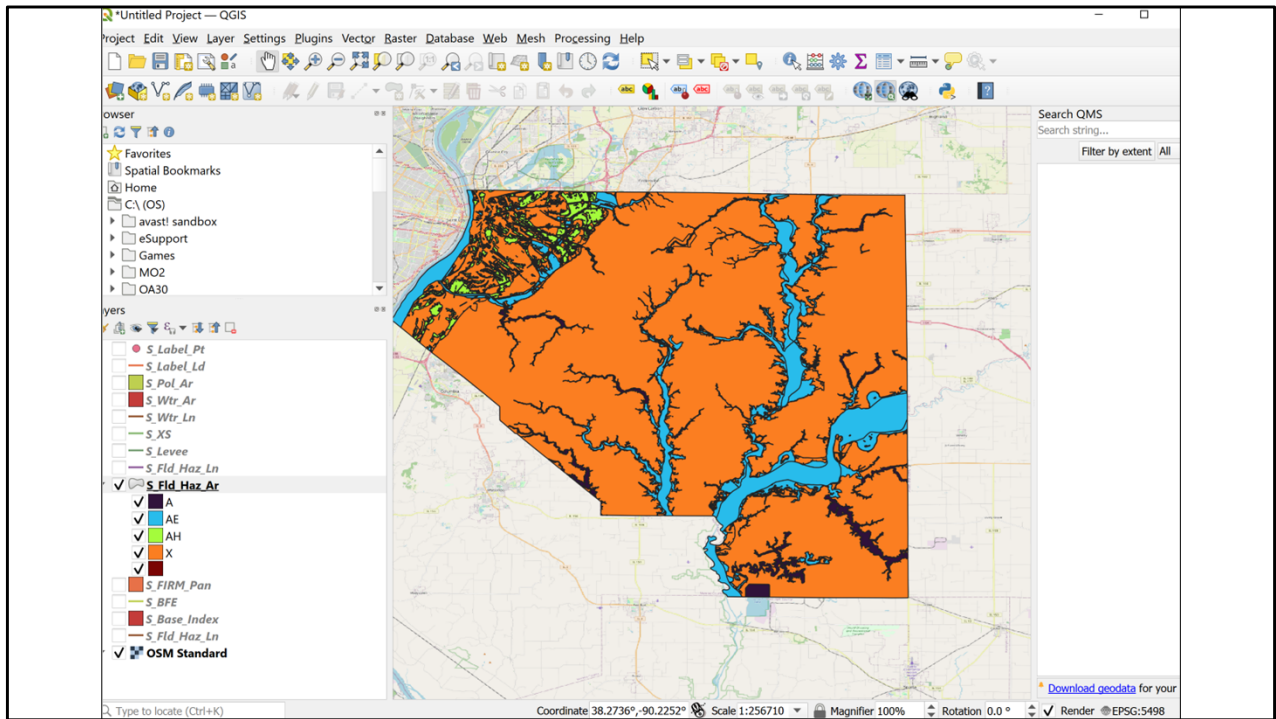
Under Value drop down choose "abc FLD_ZONE"

Because this layer uniquely has multiple layer you will need to do a step to break out all of the A, V, and X zones.



3/9/2024

32



Right now, every Flood Hazard Zone is a different color.

Flood Zone Layer - Color Fix

To do that you select
Classify and all the Flood
Zones will show.

After making changes you
must always Hit Apply and
then Okay

In the next step we will
change the colors and
transparency

You can make Zone X 100%
transparent or just turn off
the layer

3/9/2024

Symbol	Value	Legend
<input checked="" type="checkbox"/>	A	A
<input checked="" type="checkbox"/>	AE	AE
<input checked="" type="checkbox"/>	AH	AH
<input checked="" type="checkbox"/>	X	X
<input checked="" type="checkbox"/>	all other...	

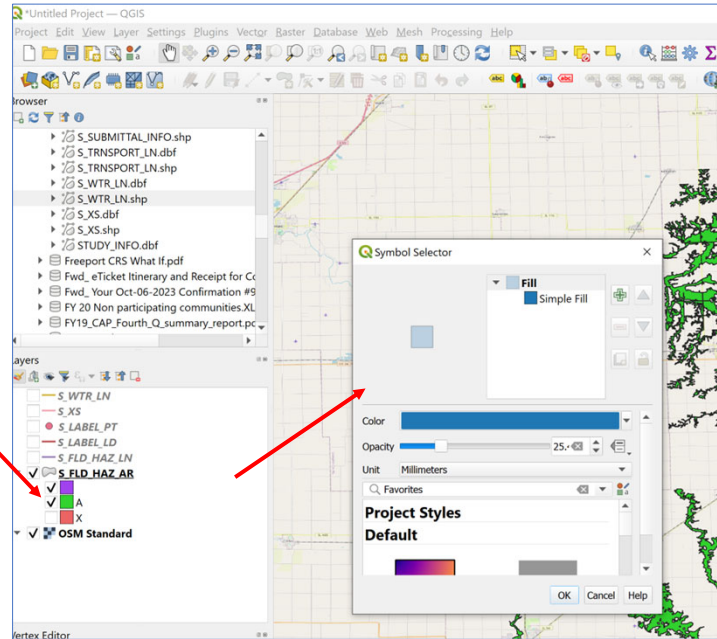
Fix Colors and Transparency

Double Left Click on Zone A

Symbol Selector options for color and transparency opens

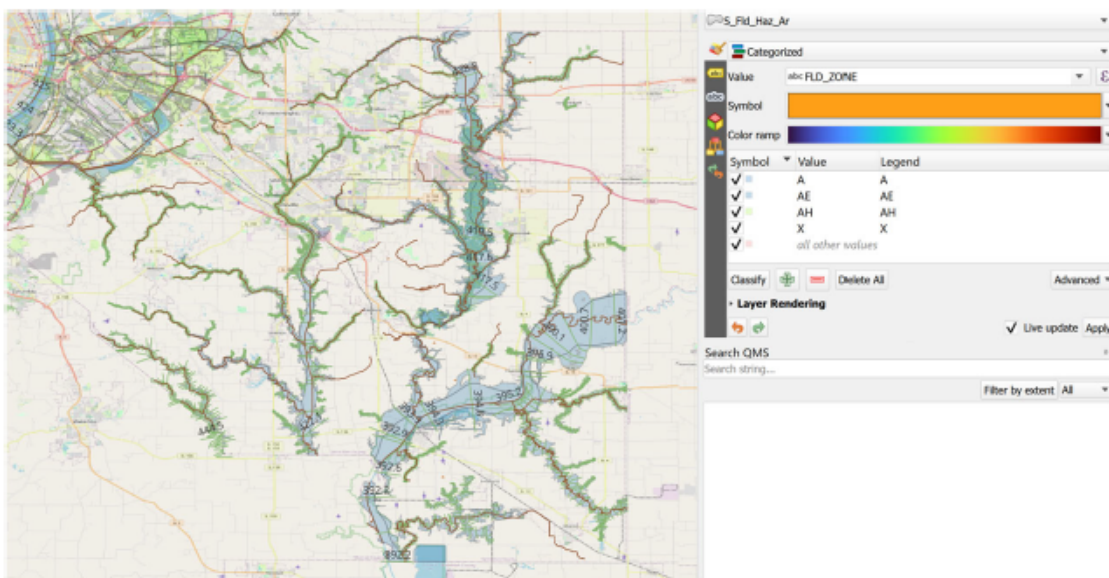
I chose a blue and 25% opacity

Select OK.



To switch you need to pick each flood zone type and select the color of choice

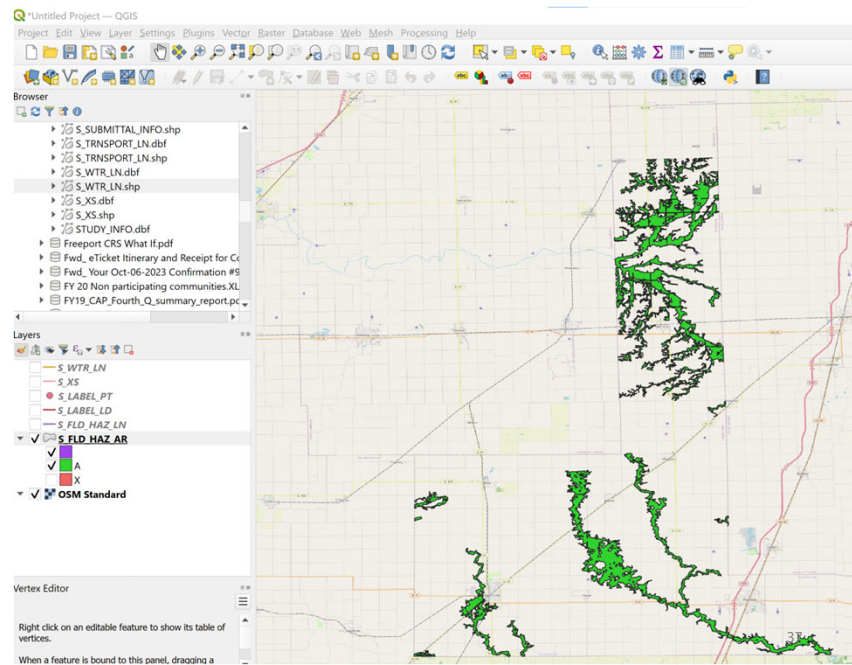
Here all A Zones are Blue and X-Zone is transparent



In this example for Ford Co I turned off the X Layer.

The County only has Zone A so everything is one color green

3/9/2024



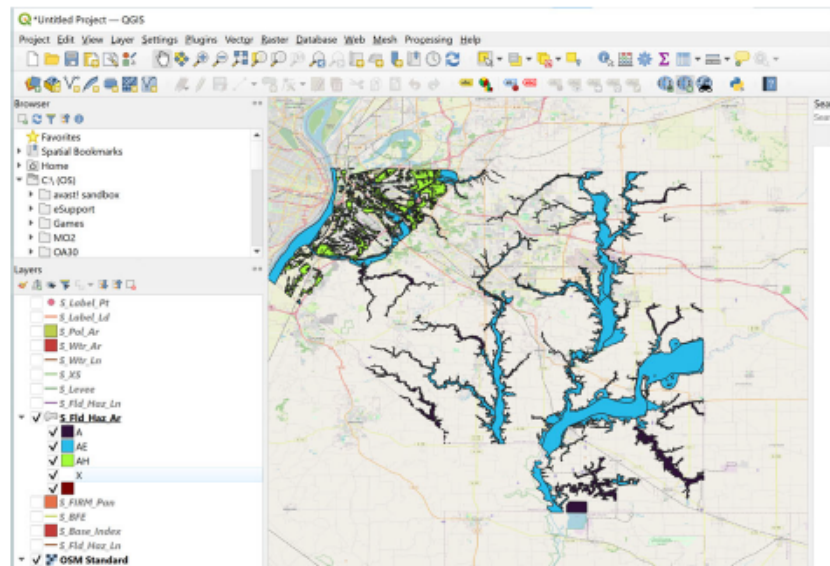
I have no idea what the unlabelled flood zone is that is showing as purple in this example.

Multiple A and V Zones

For maps with A, AE, AH, etc. continue changing colors and transparency.

Notice with a AE Zone there is a BFE shape file in Madison County. This layer is not found in Ford and Warren counties as they only have Zone A with unpublished BFEs

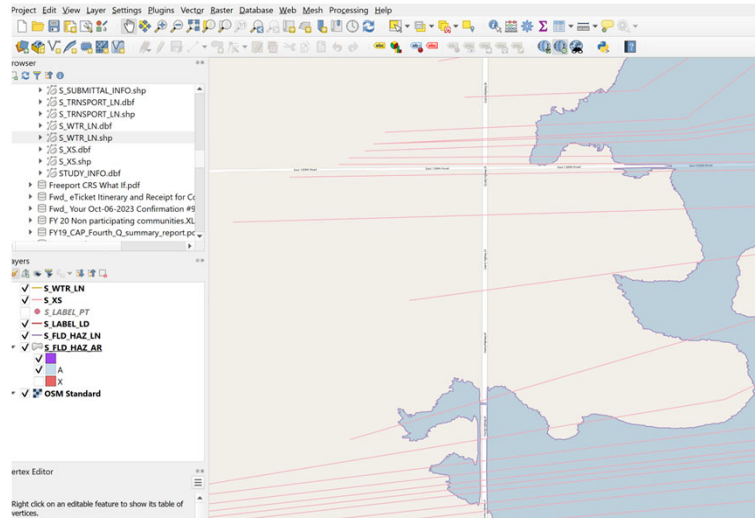
3/9/2024



38

Colors Fixed - Missing BFEs

All Blue with 25% Opacity
so streets are visible.
Cross-sections are pink and
we are missing the BFEs



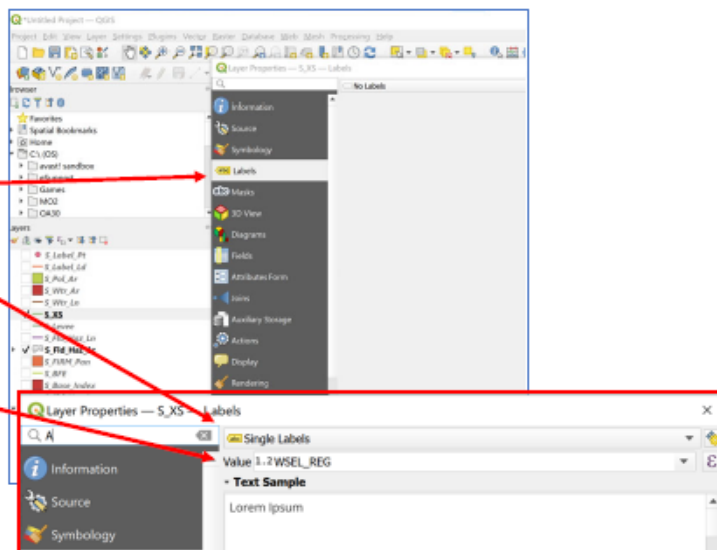
3/9/2024

39

Now I have the Flood Zone A in Blue. Zone X is off. I turned the other Shape file layers on. There is still no text and the cross-sections are in pink.

Add Labels or Text to X-Sections - Water Surface Elevations

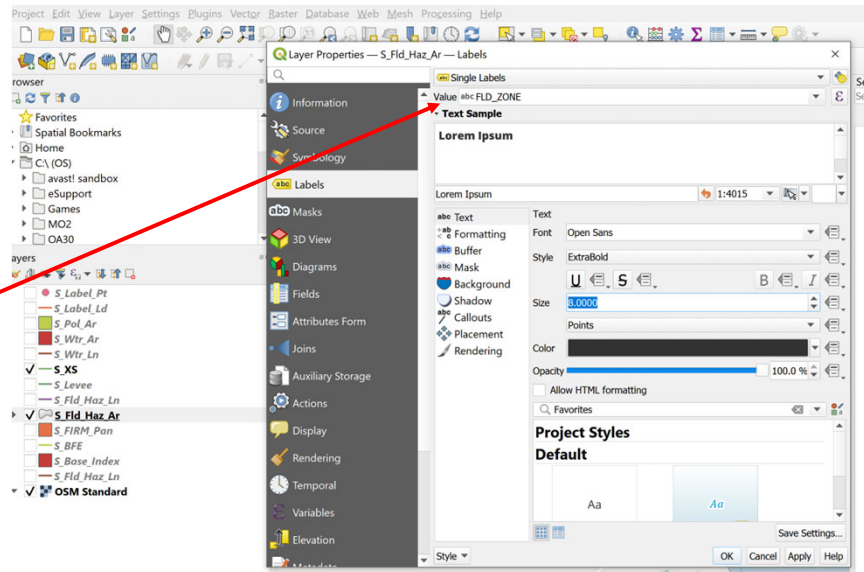
To turn on X-Sections Labels –
Right click on S-XS
Select Properties
Now choose Labels
Switch from No Labels to Single
labels
Now under Value drop down
select WSEL_REG (Regulatory
Water Surface Elevation)
You can change font size and
switch font



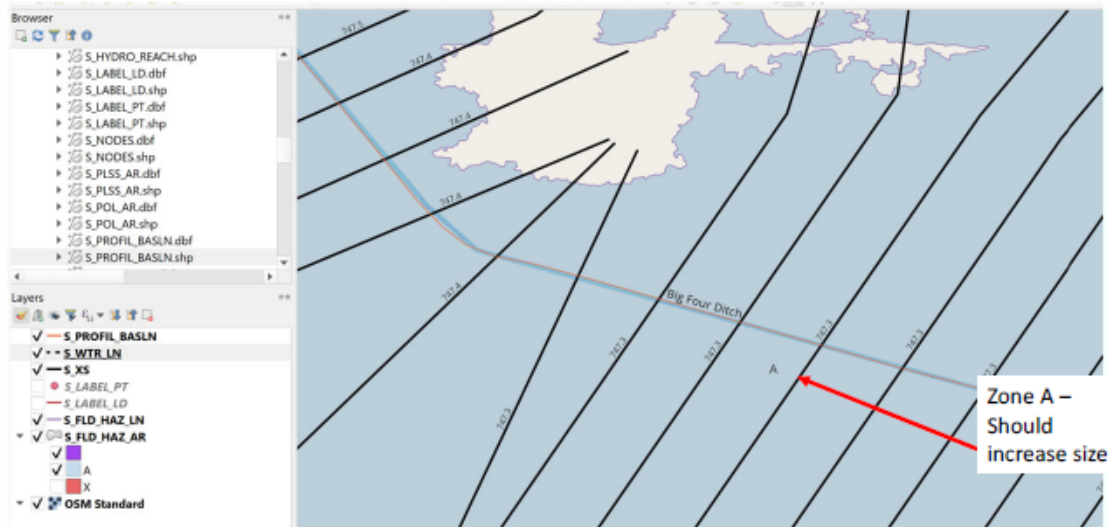
Add Labels to Flood Zones

Same Steps

- Fld_Hazard Area Right click Choose Properties
- Choose Labels
- Switch from No Labels to Single labels
- Under Value Select FLD_ZONE
- Suggest decreasing Font size and chose Extra Bold
- Apply then OK



Added Labels to Flood Zone, Profile Baseline and X-Sections



Now you see the name of the stream, the unpublished BFEs and the Zone A label. Font Sizes can now be increased or better font styles selected. When you have turned on all of the lines I know you will see the floodway line, but I never figured out how to find the floodway cross-hatched layer.

ISWS – Upcoming video will go through these steps



ISWS is deciding where to host this video. A link will eventually be provided in the state and IAFSM newsletters. Much better demo of each layer and a better

Question and Answer Session

Marilyn Sucoe
NE IL Floodplain Program Coordinator
847.608.3181
Marilyn.sucoe@Illinois.gov

Today's rain.
Tomorrow's flood.

GET FLOOD INSURANCE



FEMA

