VERSO Wastewater Infrastructure Mapping GIS Workflow

This is the workflow for the mapping of individual towns and their wastewater infrastructure. The workflow may change as you get new datasets to work with from outreaching, or if you will be digitizing features from a scanned/paper map, but the end deliverables will be the same.

Before you begin mapping, check the information we have gathered in the shared spreadsheet and in the stormwater infrastructure mapping project done by the Vermont DEC (sewer lines are in yellow, manholes are the yellow points) to see if we have updated maps for your town. If there are updated maps, you can use those to digitize new features. For help digitizing, we have a digitizing guide on our GitHub. If we do not have updated maps, you can use the existing vermont geodata portal datasets. If that data seems incomplete, inaccurate, or outdated, try outreaching to that town's chief wastewater operator or public works department to try to get an updated map. If you are unable to get an updated map, you can just use the existing data.

End Deliverables:

- GeoJSON files
    - If the town has wastewater infrastructure
        - Town boundary
        - Wastewater Treatment Facilities
        - Sewer Service Area
        - Wastewater Infrastructure Linear Features
        - Wastewater Infrastructure Point Features
    - If the town does not have wastewater infrastructure
        - Town boundary

Download the Data

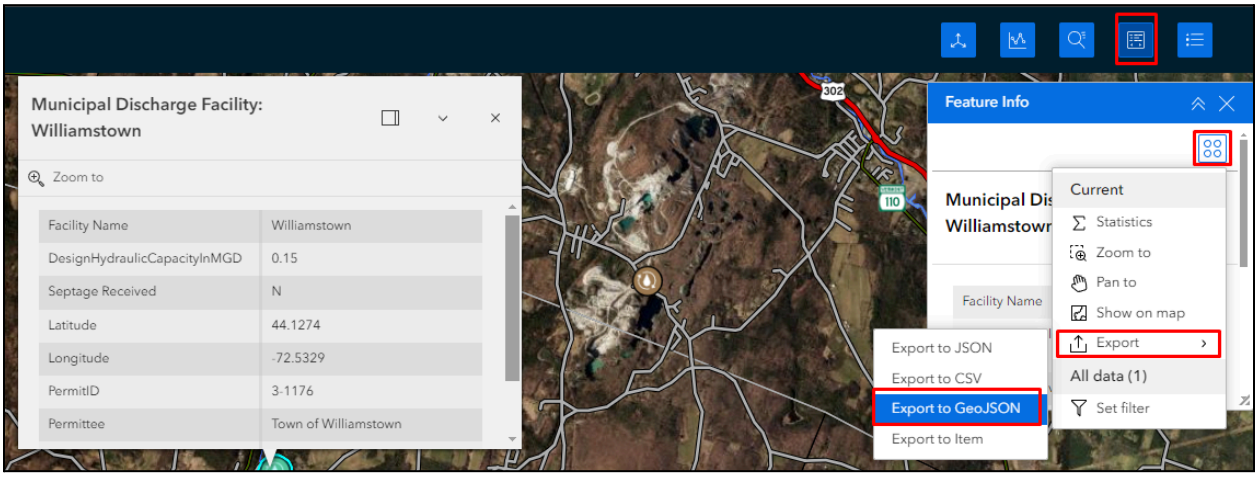
- You can download the existing data from the vermont open geodata portal here on our GitHub - there are files for the statewide wastewater infrastructure linear features, wastewater infrastructure point features, the town boundaries, and the sewer service areas

Create the Project

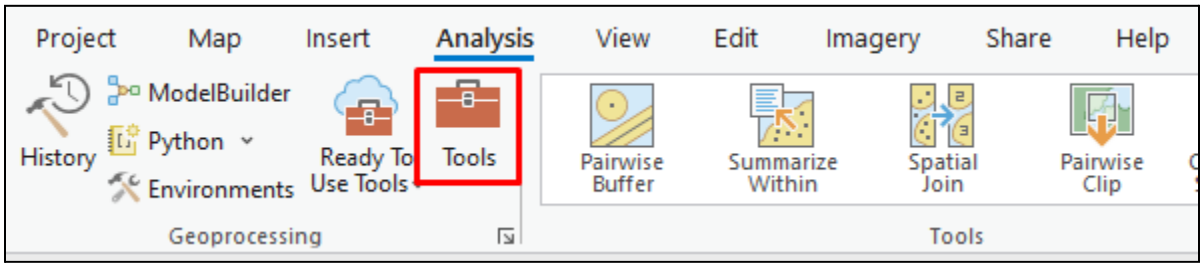
- In ArcGIS Pro, create a new map
- Choose name and location
    - Name the file the town/s you are working on (e.g. KillingtonWIM, TroyAndJayWIM)
    - Check “create a folder for this project”

Import the Data

- For the Wastewater Facilities data, we will be using the data from Vermont ANR’s web map of wastewater facilities and outfall locations
- On the web map, zoom to the town you are working on, and for each wastewater facility in the town (we’re including all facilities - municipal, industrial, and pretreatment), click on the facility
- On the top right, click the **Feature Info** button
- Click the **Icon with Four Circles**
- Then go to **Export** - **GeoJSON**



- Then in ArcGIS, under the **Analysis** tab at the top of the screen go to **Tools**



- Search for "JSON to Features"
- Under **Input JSON or GeoJSON** select the GeoJSON(s) you just downloaded
- Set the **Geometry Type** to **Point**
- Click run
- You should now see the point data for the wastewater facility(s) on your map
- If there is more than one facility, you will have to merge the data together so it can be in the same layer
    - Under **Tools**, search for "Merge"
    - Under **Input Datasets**, select the wastewater treatment facilities
    - Click Run
    - Now the wastewater facilities should be together in one dataset
- To import the rest of our data, use the **JSON to Features** tool to import the wastewater infrastructure linear features, wastewater infrastructure point features, sewer service areas, and town boundaries that you downloaded from GitHub
    - For the Geometry Type:
        - Wastewater infrastructure linear features - **Polyline**
        - Wastewater infrastructure point features - **Point**
        - Sewer service areas - **Polygon**
        - Town boundaries - **Polygon**

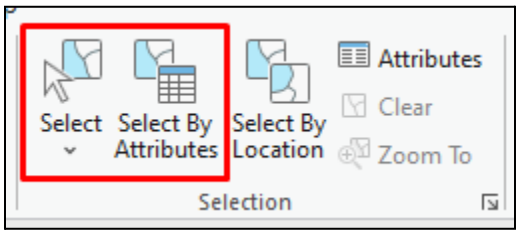
Reproject the Data

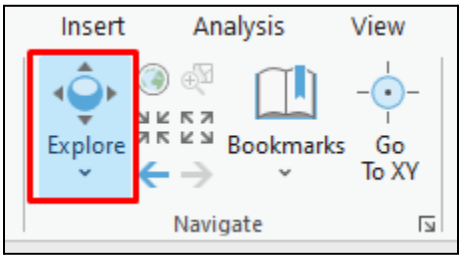
- In the Contents Pane on the left, right click on **Map**, go to **Properties** - **Coordinate Systems**, and search for 32145 (this is the code for the Vermont State Plane projection), click Ok

- Under the Analysis tab at the top of the screen, click on **Tools**
- Search for “project”
- Under **Input Dataset or Feature Class** select the town boundaries file from your geodatabase
- Set the **Output Coordinate System** to 32145
- Click Run
- This is the only data we have to reproject, as the rest of the data is already on the Vermont State Plane coordinate system
    - If any other datasets are not in the Vermont State Plane coordinate system, reproject them

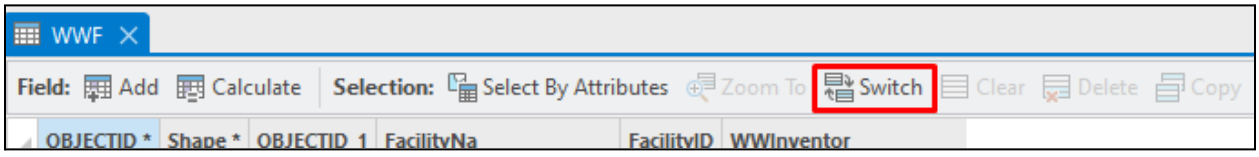
Clip Town Boundary Data to Only the Town You Are Currently Working On

- Zoom in to the town you are currently working on
    - This can be done by clicking **Select by Attributes** under the Map tab, selecting the town boundary layer, and setting the clause to where “NAME” equals the name of the town you are working on. If you’re working on two towns at once, you can add another clause to select the other town as well
- Select the town/s you are working on, either by using **Select by Attributes** mentioned above or by using the **Select** tool and clicking on your town
    - After using the Select tool, click on **Explore** to go back to using your mouse for scrolling





- Open the town boundary layer’s attribute table by right clicking on the layer and selecting **Attribute Table**
- Click **Switch** at the top of the attribute table to select all towns that are not the ones you are working on



- Click **Delete** to delete the unneeded towns
- Now you should be left with just the town boundary of the town/s you are working on

Clip the Rest of the Data - Two Methods

Select by Location

- For each of the remaining datasets (infrastructure point features, infrastructure linear features, and sewer service areas)
- Use the **Select by Location** tool to delete data that is not within the town boundary
- Select the remaining datasets as the Input Features
- Under **Relationship** select **Within**
- Under **Selecting Features** select the town boundary dataset
- Leave everything else as default, and click Ok
- Open the attribute table for each dataset, click **Switch**, and then click **Delete** to delete the data outside the boundary
- Now you should only be left with the data within your town/s

Clip Tool

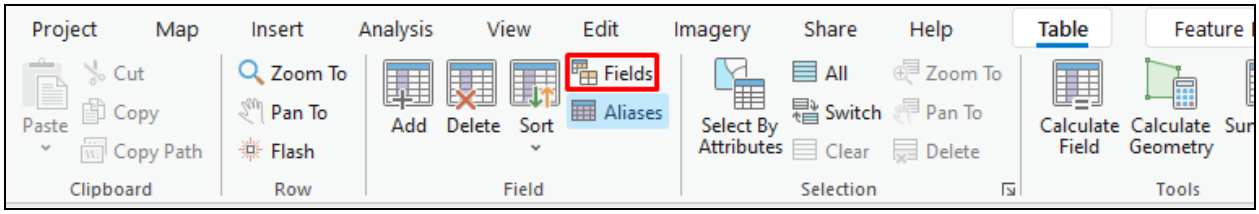
- Under the **Analysis** tab, click on **Tools**
- Search for “clip”
- Under **Input Features or Dataset** select the layer you want to clip
- Under **Clip Features** select the town boundary
- Click Run
- Your data should now be clipped to the town boundary
- Repeat this for each layer you want to clip

Change Symbology (Optional - this will not save to the exported file, but you can do it for your own clarity when working. This is how it will appear in the final map.)

- Right click on the layer you are working on in the contents pane and click **Symbology** or click on the icon below the layer name to see the symbology pane
- Change the Town Boundary symbology to **Black Outline (2 pts)**
- Change Sewer Service Area symbology to **10% Simple Hatch** and set the color to **Fir Green**, leave the outline color as black
- Change the Wastewater Infrastructure Linear Features color to **Fir Green** and change the line width to 2 pt
- Change the Wastewater Facilities symbology to **Water Treatment Plant Large**
- Change the Wastewater Infrastructure Point Features color to **Gray 70%**

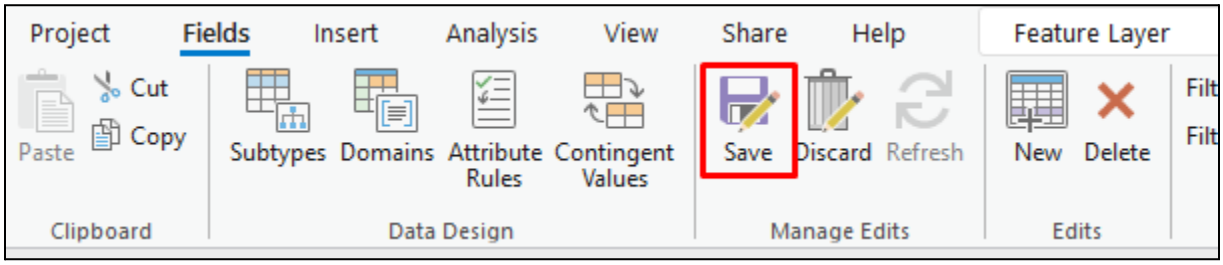
Edit Attribute Tables

- To edit the attribute tables, right click on the layer you are working on and select **Attribute Table**
- To bring up the field editor page, click on the new **Table** ribbon at the top of the screen and click the **Fields** button



- You should now see the field editor page
- For any extra fields that are not listed below, right click them and select **Delete** to remove them
- For the remaining fields, change the **Alias** to the name listed after the hyphen in our list of fields (e.g. System_Name's alias is System Name)
- For any fields you need to add, click the **Click Here to Add a New Field** button at the bottom of the field editor

- Type in the field name and alias, and set the data type to text if it is a text field or double if it is a numerical field
- When you are done editing the fields, hit **Save** under the Fields tab at the top of the screen



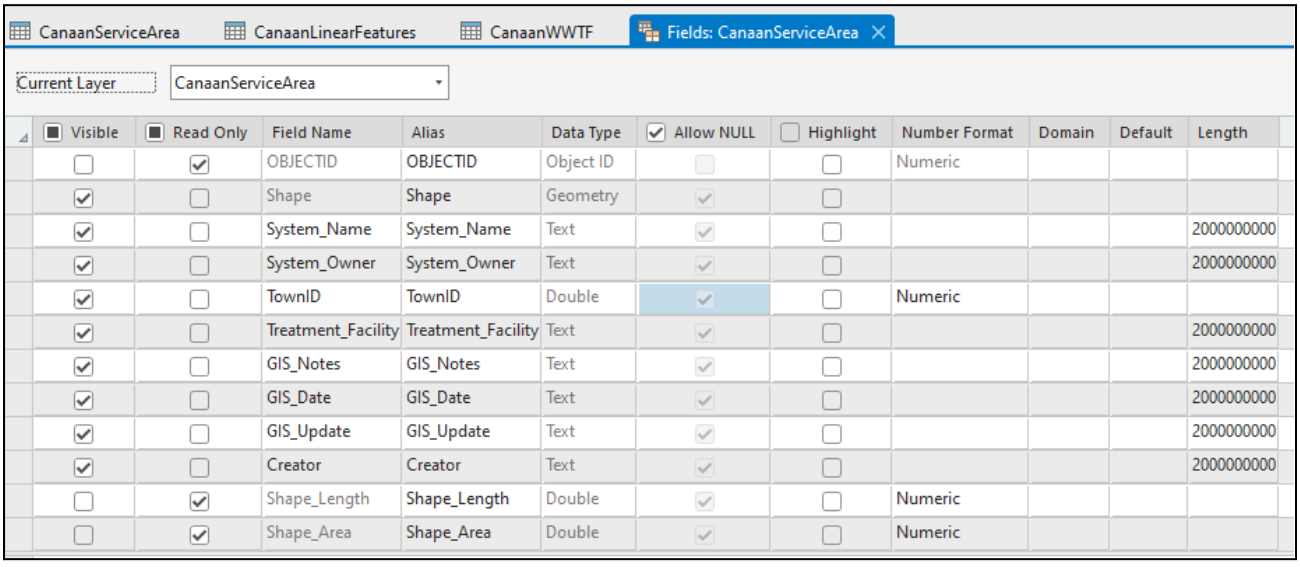
- To edit the contents of a field, you can open up the attribute table and click the cell you want to edit, or you can use the **Calculate Field** tool
- Check that your fields resemble the ones shown below, and remember to toggle objectid, shape_length, and shape_area to not be visible since they are mandatory fields, but we don't want them to show in our final map

Update or correct any empty or incomplete fields if possible.

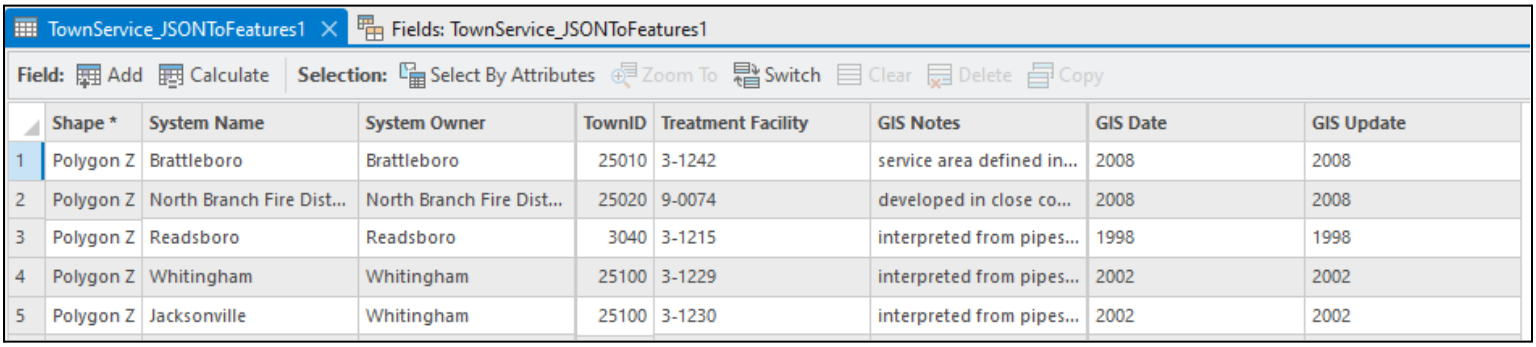
Here are the fields we will be using for each dataset and a short description:

Sewer Service Area

- System_Name - System Name
    - Wastewater system name
- System_Owner - System Owner
    - Wastewater system owner
- TownID - TownID
    - Town identifier
- Treatment_Facility - Treatment Facility
    - Treatment Facility name
- GIS_Notes - GIS Notes
    - Notes about data
- GIS_Date - GIS Date
    - When the GIS data was originally collected
- GIS_Update - GIS Update
    - When the data was last updated
- Creator - Creator
    - Default to VTANR
    - Change to VERSO if you are creating new data



Visible	Read Only	Field Name	Alias	Data Type	Allow NULL	Highlight	Number Format	Domain	Default	Length
☐	☑	OBJECTID	OBJECTID	Object ID		☐	Numeric			
☑	☐	Shape	Shape	Geometry	☑	☐				
☑	☐	System_Name	System_Name	Text	☑	☐				2000000000
☑	☐	System_Owner	System_Owner	Text	☑	☐				2000000000
☑	☐	TownID	TownID	Double	☑	☐	Numeric			
☑	☐	Treatment_Facility	Treatment_Facility	Text	☑	☐				2000000000
☑	☐	GIS_Notes	GIS_Notes	Text	☑	☐				2000000000
☑	☐	GIS_Date	GIS_Date	Text	☑	☐				2000000000
☑	☐	GIS_Update	GIS_Update	Text	☑	☐				2000000000
☑	☐	Creator	Creator	Text	☑	☐				2000000000
☐	☑	Shape_Length	Shape_Length	Double	☑	☐	Numeric			
☐	☑	Shape_Area	Shape_Area	Double	☑	☐	Numeric			



TownService_JSONToFeatures1 | Fields: TownService_JSONToFeatures1

Field: Add Calculate | Selection: Select By Attributes Zoom To Switch Clear Delete Copy

	Shape *	System Name	System Owner	TownID	Treatment Facility	GIS Notes	GIS Date	GIS Update
1	Polygon Z	Brattleboro	Brattleboro	25010	3-1242	service area defined in...	2008	2008
2	Polygon Z	North Branch Fire Dist...	North Branch Fire Dist...	25020	9-0074	developed in close co...	2008	2008
3	Polygon Z	Readsboro	Readsboro	3040	3-1215	interpreted from pipes...	1998	1998
4	Polygon Z	Whitingham	Whitingham	25100	3-1229	interpreted from pipes...	2002	2002
5	Polygon Z	Jacksonville	Whitingham	25100	3-1230	interpreted from pipes...	2002	2002

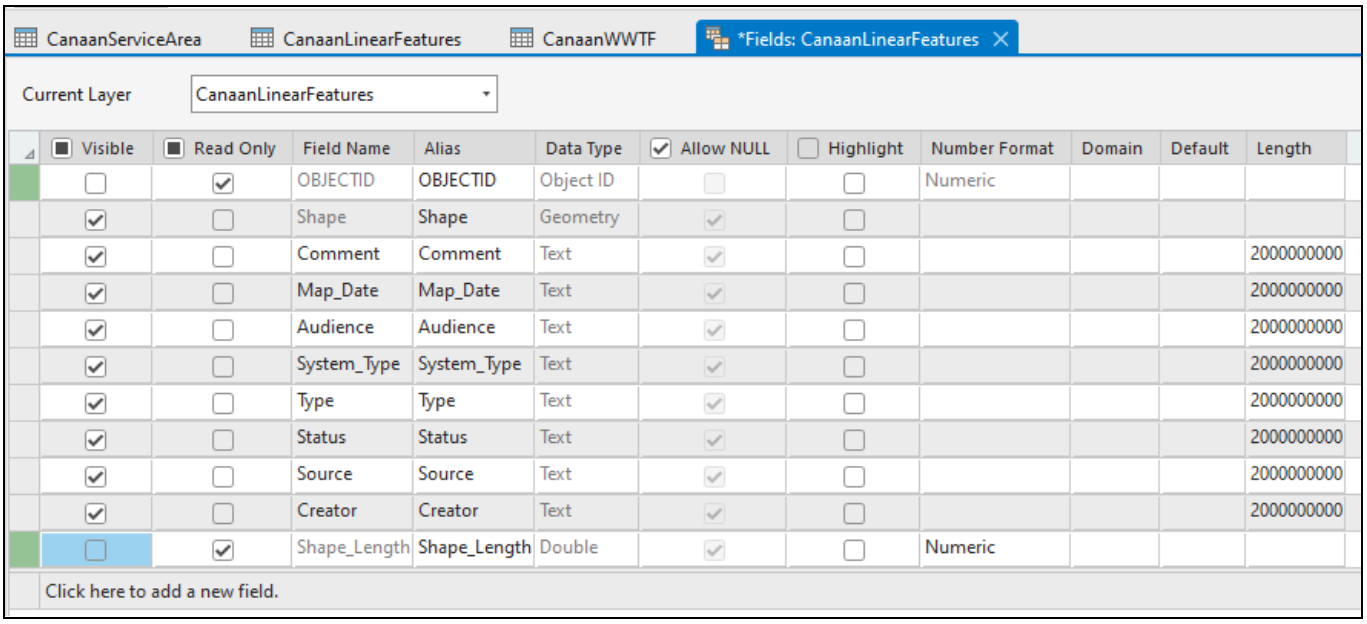
Wastewater Infrastructure (Linear Features)

- Type - Type
  - Stormline, sanitary, combined sewer
- Status - Status
  - Existing, Proposed, Abandoned
- Comment - Comment
  - Comment on the data
- Source - Source
  - where data was obtained from
- MapDate - Map Date
  - Date of map where data originates
- Audience - Audience
  - Public, private
- System Type - System Type
  - Type of water system
- Creator - Creator
  - Default to VTANR
  - Change to VERSO if you are creating new data

StateLinearFea_JSONToFeature

Field: Add Calculate Selection: Select By Attributes Zoom To Switch Clear Delete Copy

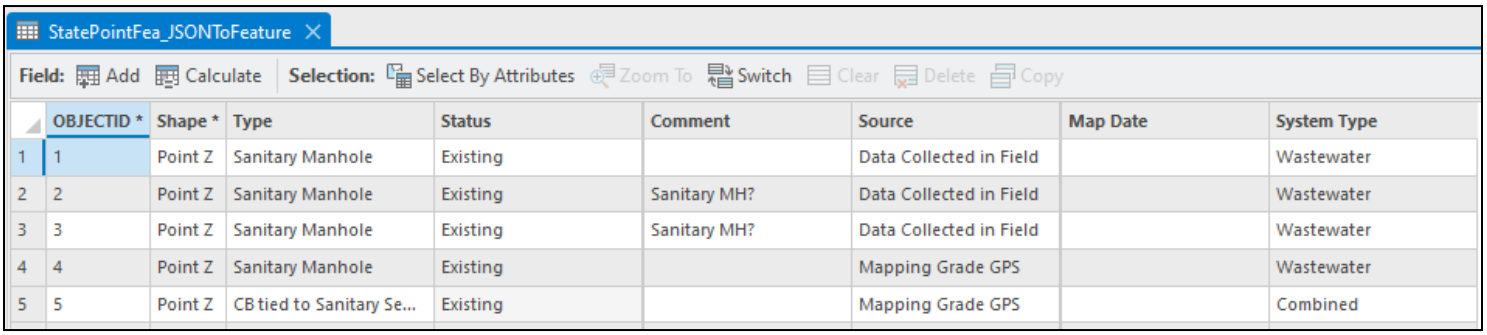
	Shape *	Type	Status	Comment	Source	Map Date	Audience	System Type
1	Polyline Z	Sanitary Line	Existing		Contractor GIS/GPS		Public	Wastewater
2	Polyline Z	Sanitary Line	Existing		Contractor GIS/GPS		Public	Wastewater
3	Polyline Z	Sanitary Line	Existing		Contractor GIS/GPS		Public	Wastewater
4	Polyline Z	Sanitary Line	Existing		Contractor GIS/GPS		Public	Wastewater
5	Polyline Z	Sanitary Line	Existing		Contractor GIS/GPS		Public	Wastewater



Wastewater Infrastructure (Point Features)

- Type - Type
    - Sanitary Manhole, Stormwater Manhole, Combined Sewer Manhole, CSO Outflow
- Status - Status
    - Existing, Proposed, Abandoned
- Comment - Comment
    - Comment on the data
- Source - Source
    - where data was obtained from
- MapDate - Map Date
    - Date of map where data originates

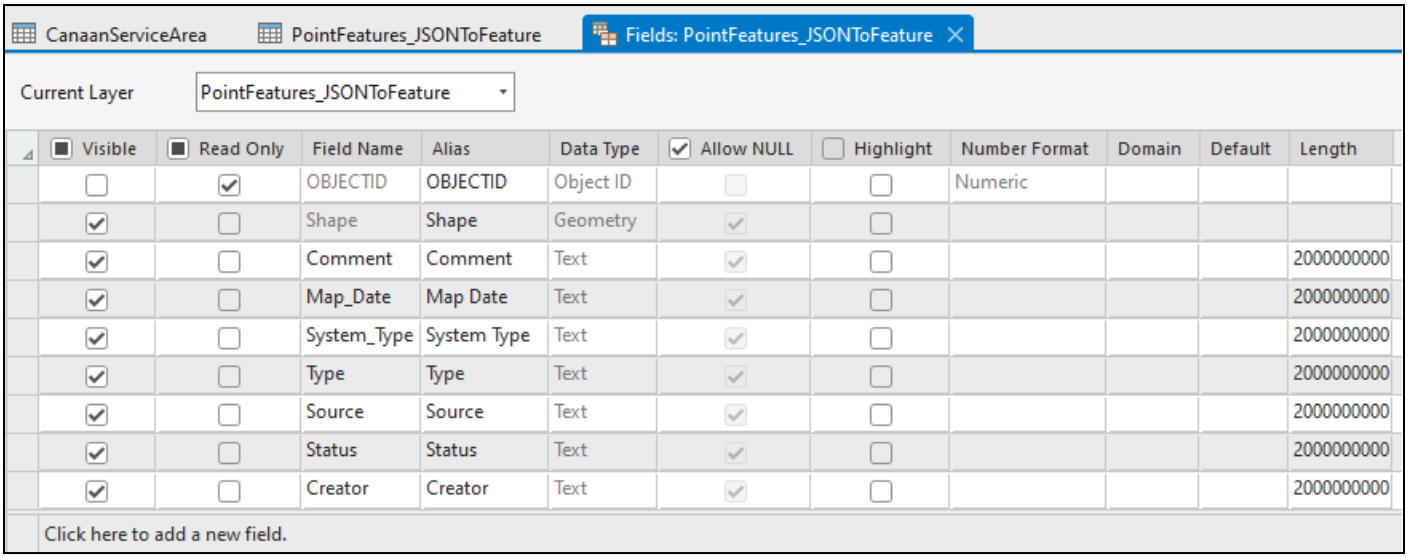
- SystemType - System Type
    - Type of water system
- Creator - Creator
    - Default to VTANR
    - Change to VERSO if you are creating new data



StatePointFea_JSONToFeature

Field: Add Calculate | Selection: Select By Attributes Zoom To Switch Clear Delete Copy

	OBJECTID *	Shape *	Type	Status	Comment	Source	Map Date	System Type
1	1	Point Z	Sanitary Manhole	Existing		Data Collected in Field		Wastewater
2	2	Point Z	Sanitary Manhole	Existing	Sanitary MH?	Data Collected in Field		Wastewater
3	3	Point Z	Sanitary Manhole	Existing	Sanitary MH?	Data Collected in Field		Wastewater
4	4	Point Z	Sanitary Manhole	Existing		Mapping Grade GPS		Wastewater
5	5	Point Z	CB tied to Sanitary Se...	Existing		Mapping Grade GPS		Combined



CanaanServiceArea | PointFeatures_JSONToFeature | Fields: PointFeatures_JSONToFeature

Current Layer: PointFeatures_JSONToFeature

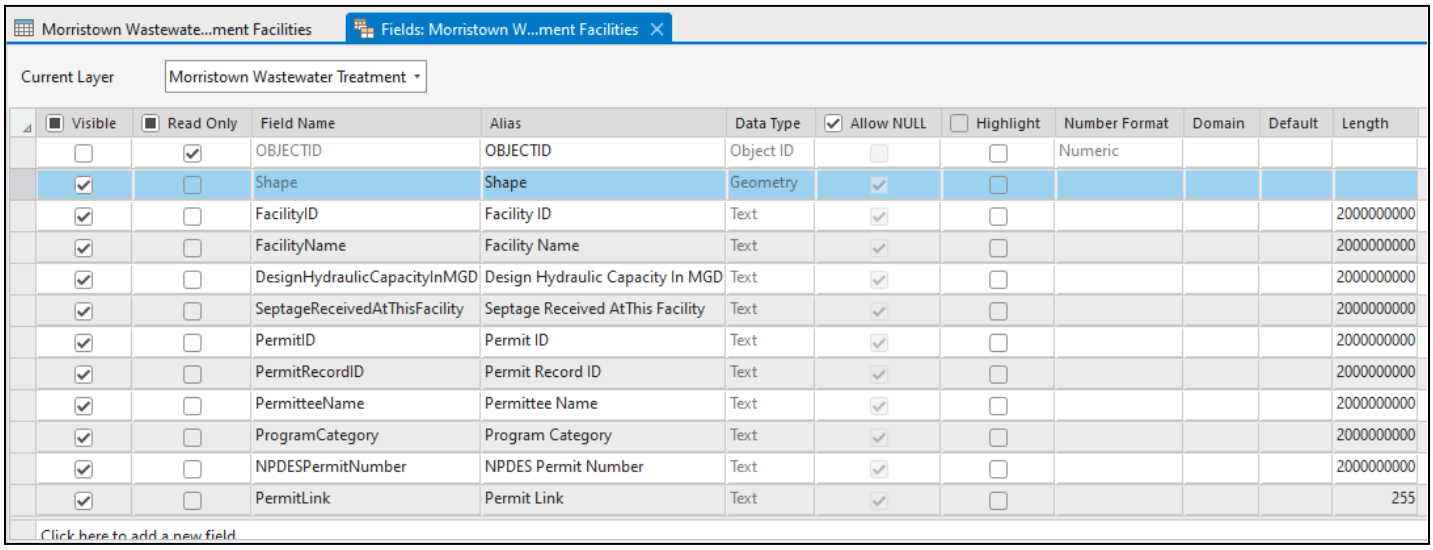
Visible	Read Only	Field Name	Alias	Data Type	Allow NULL	Highlight	Number Format	Domain	Default	Length
☐	☑	OBJECTID	OBJECTID	Object ID	☐	☐	Numeric			
☑	☐	Shape	Shape	Geometry	☑	☐				
☑	☐	Comment	Comment	Text	☑	☐				2000000000
☑	☐	Map_Date	Map Date	Text	☑	☐				2000000000
☑	☐	System_Type	System Type	Text	☑	☐				2000000000
☑	☐	Type	Type	Text	☑	☐				2000000000
☑	☐	Source	Source	Text	☑	☐				2000000000
☑	☐	Status	Status	Text	☑	☐				2000000000
☑	☐	Creator	Creator	Text	☑	☐				2000000000

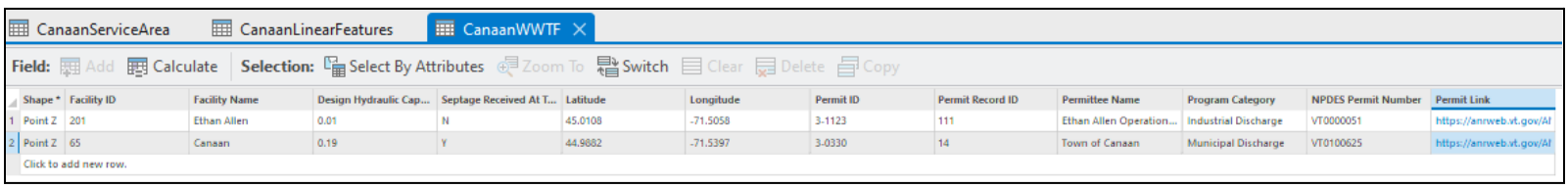
Click here to add a new field.

<u>Wastewater Facilities</u>

- FacilityName - Facility Name
    - Name of facility
- DesignHydraulicCapacityInMGD - Design Hydraulic Capacity In MGD
    - Amount of water the facility can process in a year
- SeptageReceivedAtThisFacility - Septage Received At This Facility

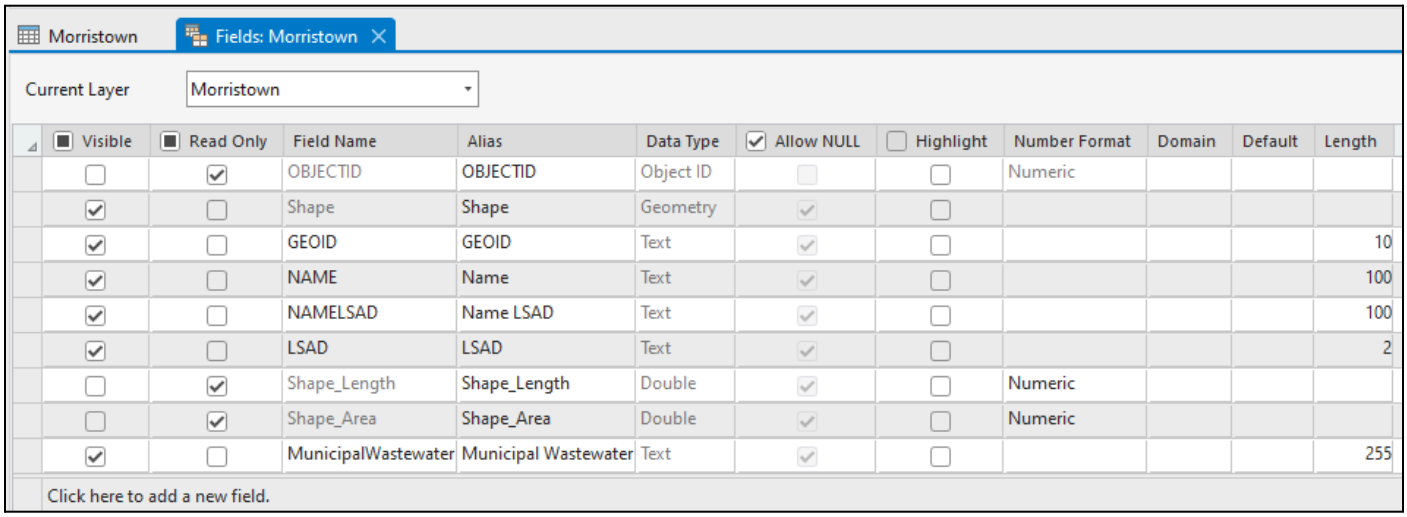
    - Does this facility receive septage?
        - Yes or no
- PermitID - PermitID
- PermitRecordID - Permit Record ID
- PermitteeName - Permittee Name
    - Name of town served
- ProgramCategory - Program Category
    - Municipal, industrial, or pretreatment
- NPDESPermitNumber - NPDES Permit Number
- PermitLink - Permit Link - you will have to add this field
    - Link to permit - find your facility, click on the “PERMIT NUMBER” link on the left, copy the link from that page and add to attribute table
        - If municipal or industrial, can be found here
        - If pretreatment, can be found here





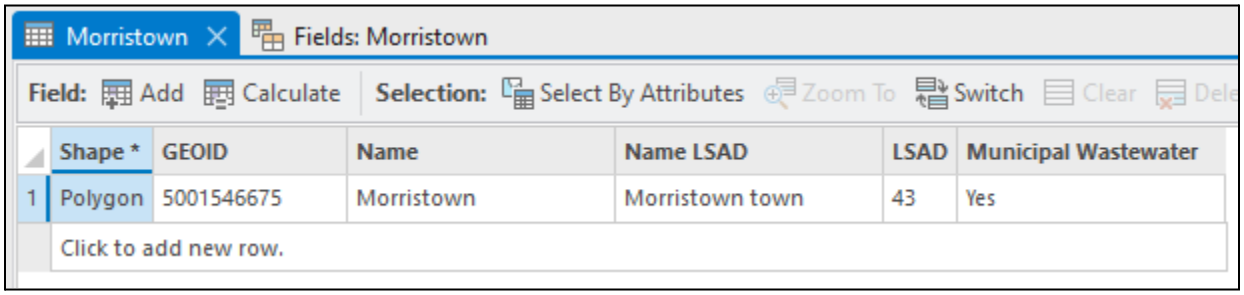
Town Boundary

- GEOID - GEOID
- NAME - Name
    - Name of town
- NAMELSAD - Name LSAD
- LSAD - LSAD
- MunicipalWastewater - Municipal Wastewater - you will have to add this field
    - Does the town have a municipal wastewater system?
        - Yes, No, or In Progress (in progress means there is no current system, but they are in the process of implementing one)



Visible	Read Only	Field Name	Alias	Data Type	Allow NULL	Highlight	Number Format	Domain	Default	Length
☐	☑	OBJECTID	OBJECTID	Object ID		☐	Numeric			
☑	☐	Shape	Shape	Geometry	☑	☐				
☑	☐	GEOID	GEOID	Text	☑	☐				10
☑	☐	NAME	Name	Text	☑	☐				100
☑	☐	NAMELSAD	Name LSAD	Text	☑	☐				100
☑	☐	LSAD	LSAD	Text	☑	☐				2
☐	☑	Shape_Length	Shape_Length	Double	☑	☐	Numeric			
☐	☑	Shape_Area	Shape_Area	Double	☑	☐	Numeric			
☑	☐	MunicipalWastewater	Municipal Wastewater	Text	☑	☐				255

Click here to add a new field.



	Shape *	GEOID	Name	Name LSAD	LSAD	Municipal Wastewater
1	Polygon	5001546675	Morristown	Morristown town	43	Yes

Click to add new row.

Export the Data

- Click on **Analysis** and go to **Tools**
- Search for “features to json”
- Under **Input Features** select each layer one by one and set the **Output JSON** name to
    - For the Wastewater Treatment Facilities layer - “TownWWTF”
    - For the Service Area layer - “TownServiceArea”
    - For Infrastructure Point Features - “TownPointFeatures”
    - For Infrastructure Linear Features - “TownLinearFeatures”
    - For Town Boundary - “TownBorder”
    - (This should be at the end of the file path. Also change “Town” to the name of the town/s you are working on.)
- Check the **Output to GeoJSON** box
- Check the **Project to WGS_1984** box
- Check the **Use Field Aliases** box
- Click run
- This will have to be repeated for each layer. At the end you should have 5 GeoJSON files that you can then upload to GitHub
- If your town does not have any wastewater infrastructure, you should only have the town boundary file to export
- Or if your town is missing any of the datasets, you may have have fewer GeoJSONs
- Upload your files to **GitHub** and in the **Map Completion Progress** tab of the shared spreadsheet, mark your town as complete and put any notes in the notes column

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You don't have to worry about this now, but this is a general outline of the steps we'll be using when we finish mapping the individual towns and combine them into a statewide map to then be uploaded as a web map.

Things to Do in Complete State Map

- Import all GeoJSONs
    - Json to feature tool
- Set map to Vermont State Plane
- Project all feature classes to Vermont State Plane
- Merge border data
    - Delete the old single borders
- Merge point data
    - Delete the old single data
- Merge linear data
    - Delete old single linear data
- Merge WWTF data
    - Delete old single WWTF data
- Merge service area data
    - Delete old single service area data
- Add soil layer
    - Edit attribute table
    - Edit symbology
- Change symbology
- Share as a web map
    - Make sure to set default zoom properly