Prepared by/for:
Modeling, Mapping, and Consequences

Appendix 4.1.8

National Levee Database Setup

FY2023 MMC Levee Breach Studies

March 2022

Date	Principal Author	Comments
11/19/2019	MMC	Initial Draft
03/05/2020	MMC	Technical Edit

National Levee Database Setup for Modeling, Mapping, and Consequences Production Center Levee Breach Studies

1. OBTAIN A COPY OF THE NATIONAL LEVEE DATABASE FOR THE USACE DISTRICT THE STUDY TAKES PLACE IN.

Contact the Modeling, Mapping, and Consequences Production Center (MMC) Levee Mapping team (Adrian Christopher and Nate Dougherty) to get the latest published copy from the National Levee Database (NLD) website.

2. SETUP A WORKING GEODATABASE.

In ArcCatalog, create a personal or file geodatabase and name it using the common name of the levee system.

3. EXPORT AND REVIEW NLD DATA.

a. Open ArcMap and set the Data Frame properties so the projection is set to the USA_Contiguous_Albers_Equal_Area_Conic_USGS_version projection shown in Figure 1-1.

Note

Ensure the horizontal units are set to Foot_US.

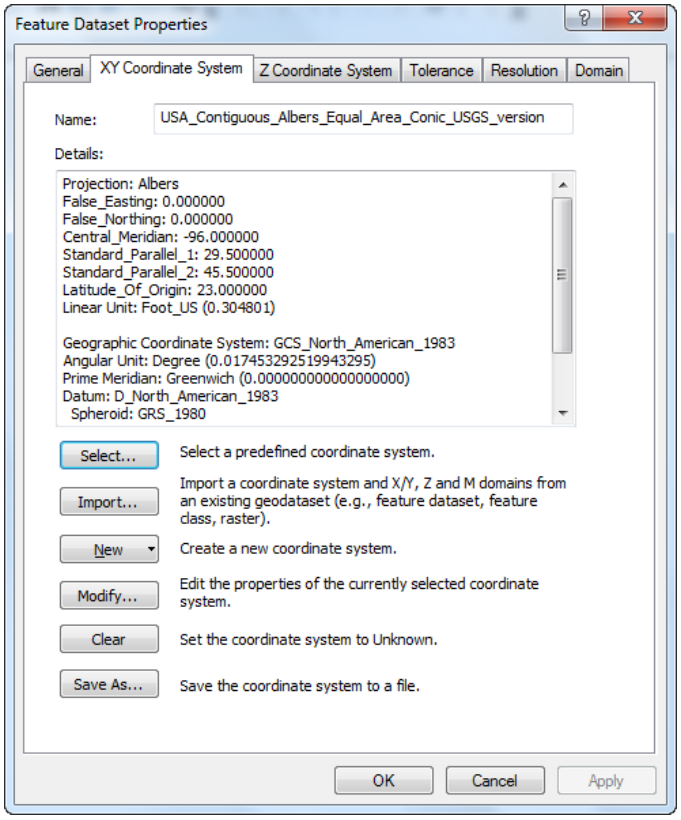

Figure 1-1. Modeling, Mapping, and Consequences Production Center Coordinate System

b. In ArcMap, load the levee_system_alignment_line and system_route feature classes from the NLD from Step 1.

c. Select the features from the study levee system.

d. Export the selected features from each feature class to the working geodatabase created in Step 2. Ensure the data is being exported in the same coordinate the system as the data frame.

Note

If the system_route feature class is not found in the NLD, jump to Section 7. If it is in the NLD, continue to Step 3.e.

e. Use the Feature Vertices to Points tool found in ArcToolbox to change the lines into points. Do this for each of the two feature classes created in Step 3.d. and export the points to the working geodatabase.

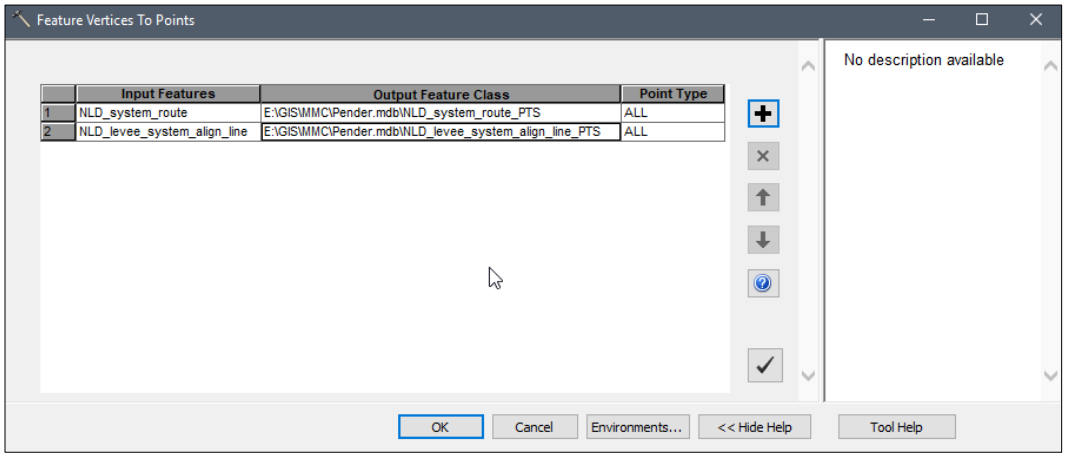

Figure 1-2. Feature Vertices to Points Tool

f. Add elevation information to the point features by running the Add XY Coordinates tool in ArcToolbox.

g. In ArcMap, label each point feature class using the POINT_Z field which was created in Step 3.f.

h. Check along the length of the levee to ensure the points' locations and elevations match.

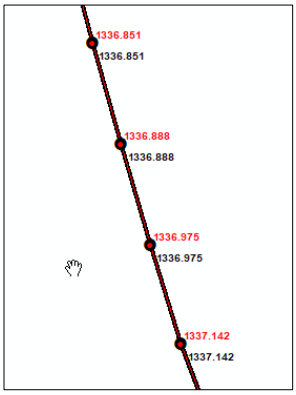

Figure 1-3. Verify Elevations

i. If all of the points match, skip to Step 4.

j. If the points do not match, contact the MMC mapping leads to arrange for further discussion with the district to determine which line is appropriate.

4. SET UP AND EXPORT LINE.

a. Ensure the line runs from upstream to downstream.

Note

If the line is going the wrong direction, utilize the Flip function on the Editor Toolbar to change the orientation (Figure 1-4).

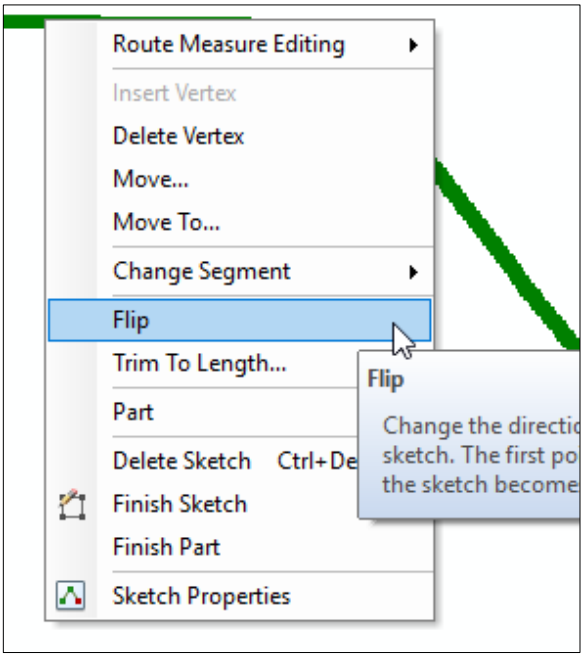

Figure 1-4. Flip Tool

b. Reset M-Values of Line.

1) Start editing and double-click the feature to expose the vertices.

2) Right-click the selected feature, choose Route Measure Editing, then Drop Measures to clear any M values already on the features (Figure 1-5).

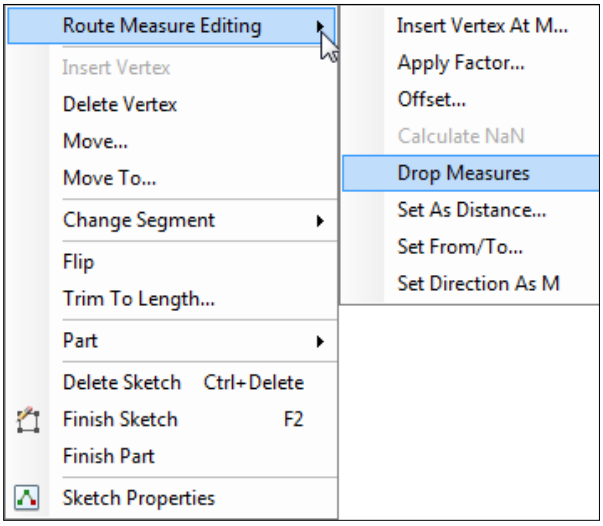

Figure 1-5. Drop M-Values

3) Right-click again and choose Set as Distance to establish M values on the route. When prompted, enter 0 for the starting M value and hit Enter (Figure 1-6).

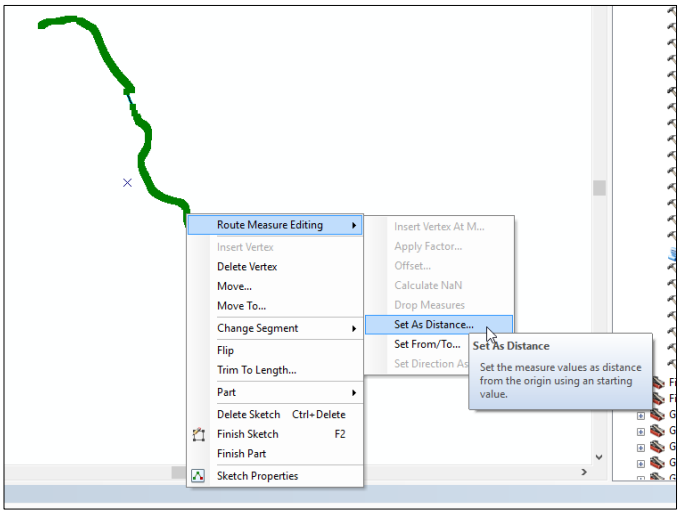

Figure 1-6. Add M-Values as Measure

4) Stop editing.

c. Export the line feature to a shapefile in the working directory. Name the file “SystemName_LoP”.

5. SET UP AND EXPORT POINTS FEATURES AND TABLE.

a. Create a points shapefile.

1) Run the Feature Vertices to Points tool found in ArcToolbox on the shapefile created in Step 4.c. Name the new shapefile “SystemName_LoP_Pts” (Figure 1-7).

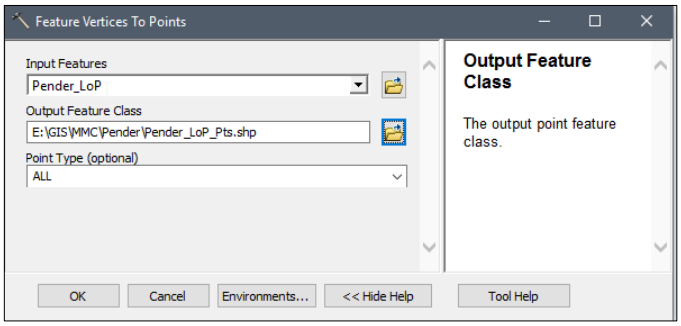

Figure 1-7. Export to Shapefile

b. Add XYZM Coordinates to the points shapefile.

Run the Add XY Coordinates tool in ArcToolbox on the LoP_Pts shapefile created in Step 5.a.1.

c. Export table to CSV.

1) Open the attribute table for the points shapefile.

2) Export the table to a CSV file in the working directory called “SystemName_LoP_Pts_Table.csv” (Figure 1-8).

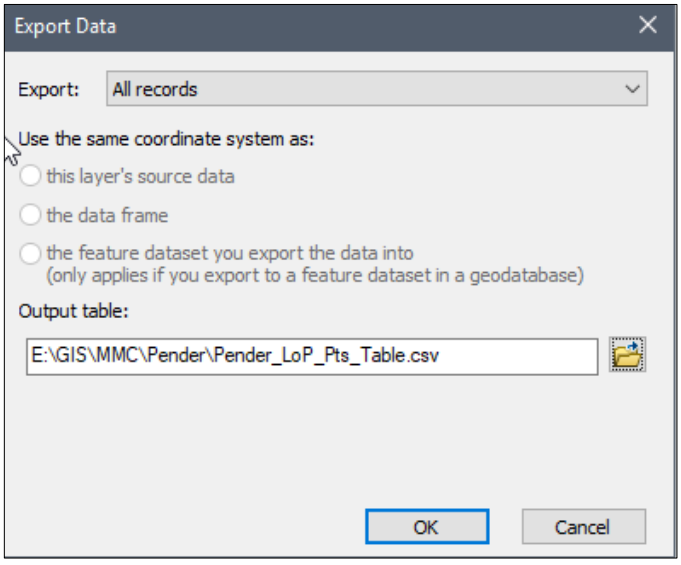

Figure 1-8. Export CSV

6. CONVERT AND EDIT TABLE.

a. Save CSV file To Excel Spreadsheet.

1) In Excel, open the CSV file created in Step 5.c.2.

2) Save the file as an Excel Spreadsheet called “SystemName_LoP_Pts_Table.xlsx”.

b. Delete all fields in the new spreadsheet except FID, Point_X, Point_Y, Point_Z and Point_M (Figure 1-9).

	A	B	C	D	E
1	FID	POINT_X	POINT_Y	POINT_Z	POINT_M
2	0	-195920.7632	6969983.339	1336.845	0
3	1	-195910.8017	6969982.992	1336.86	9.9675
4	2	-195889.7442	6969984.538	1336.882	31.0817
5	3	-195868.1121	6969984.083	1336.858	52.7186
6	4	-195846.4787	6969983.188	1336.966	74.3705
7	5	-195824.6915	6969982.651	1336.799	96.1643
8	6	-195801.1131	6969982.288	1336.947	119.7454

Figure 1-9. Example of Completed Table

c. Save the Excel Spreadsheet and close Excel. The table is now ready to deliver to the MMC Modeling Team. There is no need to continue to Step 7.

7. CREATING A SYSTEM ROUTE LINE IF ONE DOESN’T EXIST IN NLD.

Create a routed line using the system_alignment_line feature class.

a. In ArcMap, start editing.

b. Ensure the lines in the feature class run from upstream to downstream.

Note

If the line is going the wrong direction, utilize the Flip function on the Editor Toolbar to change the orientation (Figure 1-4).

c. Flip ToolCombine the lines

1) Select all of the lines in the feature class.

2) Choose Union from the Editor Menu (Figure 1-10). A new line will be added to the features that contains all of the lines combined.

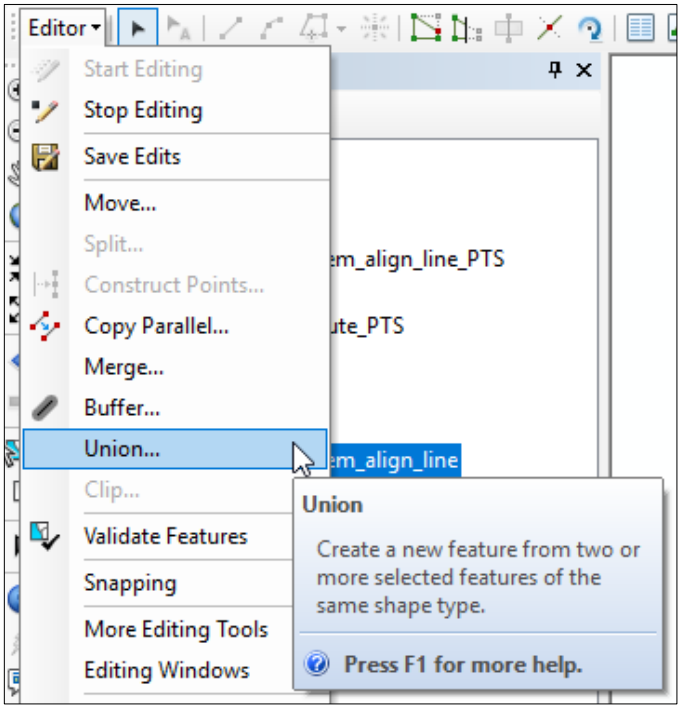

Figure 1-10. Union Features

d. Check the new Line

1) Examine the line to determine if any quality errors exist, for example, a multi-part feature (Figure 1-11).

Incorrect ***Correct***

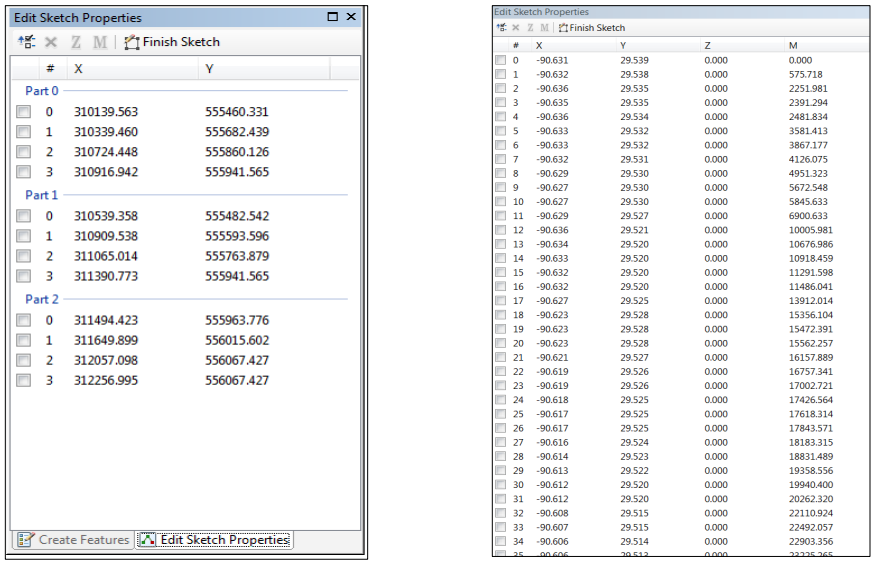

Figure 1-11. Check for Multi-Part Features

- If the sketch properties window shows a break of the line into separate parts, the union process needs redone. This is an indicator that perhaps some of the lines from the feature class did not snap to each other. Examine intersections in the original linework.
- No routes allowed that intersect their own vertices.
- No overlapping individual routes.
- If any of these are observed, delete the created line and union the line again once errors are fixed in the original linework.

2) Once the new line is deemed acceptable, export the single line to a feature class in the working geodatabase called “NLD_system_route”

e. Return to Step 4.

List of Acronyms and Abbreviations

MMC	Modeling, Mapping, and Consequences Production Center
NLD	National Levee Database