Floodways and Non-Encroachment Areas

The Brunswick County Flood Damage Prevention Ordinance is the adopted North Carolina State Model Ordinance. The Model Ordinance was developed in compliance with Federal Code 44 CFR for floodplain management. Brunswick County Flood Damage Prevention Ordinance regulates development in the Special Flood Hazard Areas (SFHAs) in the County. Strict requirements are in place to regulate development in Floodways and Non-Encroachment Areas (NEAs). Recently, there has been some confusion and omissions regarding Non-Encroachment Areas (NEAs). ***NEAs are treated the same as a floodway.*** Below is the Brunswick County Flood Damage Prevention Ordinance regarding Floodways and NEAs;

***7.1.2*-Definitions**

"Non-Encroachment Area (NEA)" means the channel of a river or other watercourse, including the area above a bridge or culvert when applicable, and the adjacent land areas that must be reserved in order to discharge the base flood without cumulatively increasing the water surface elevation more than one (1) foot as designated in the Flood Insurance Study report."

***7.1.5* F. Floodways and Non-Encroachment Areas**

Areas designated as floodways or non-encroachment areas are located within the Special Flood Hazard Areas established in Article 7.1.3, Section B. The floodways and non-encroachment areas are extremely hazardous areas due to the velocity of floodwaters that have erosion potential and carry debris and potential projectiles. The following provisions, in addition to standards outlined in Article 7.1.5, Sections A and B, shall apply to all development within such areas:

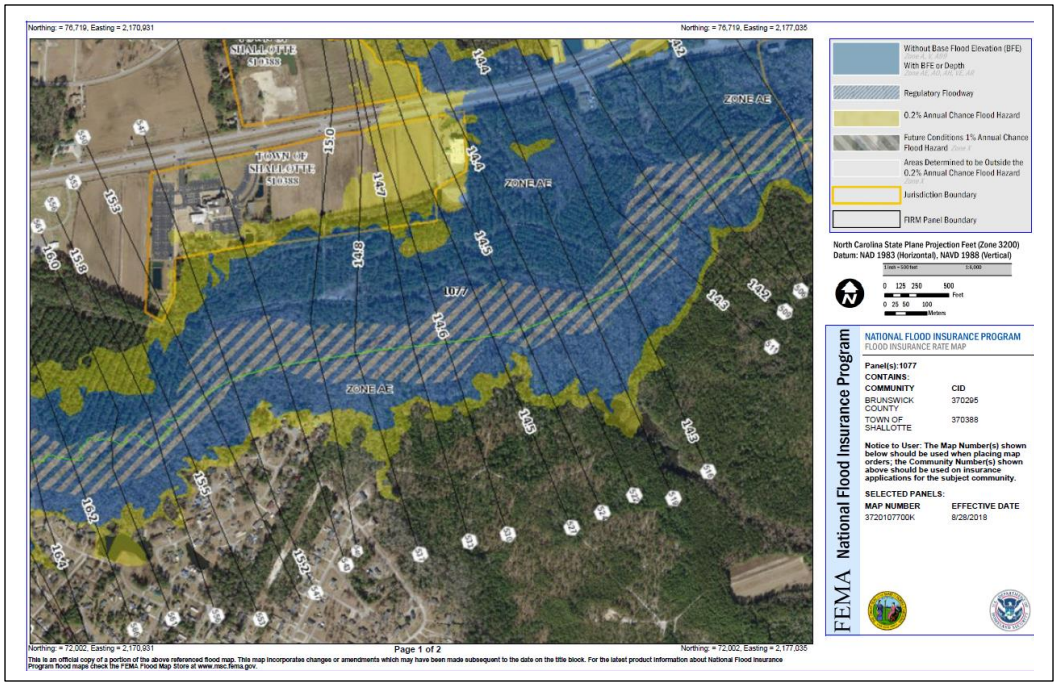
(1) No encroachments, including fill, new construction, substantial improvements and other developments shall be permitted unless:
   (a) It is demonstrated that the proposed encroachment would not result in any increase in the flood levels during the occurrence of the base flood discharge, based on hydrologic and hydraulic analyses performed in accordance with standard engineering practice and presented to the Floodplain Administrator prior to issuance of floodplain development permit; or
   (b) A Conditional Letter of Map Revision (CLOMR) has been approved by FEMA. A Letter of Map Revision (LOMR) must also be obtained within six months of completion of the proposed encroachment.

(2) If Article 7.1.5, Section F(1) is satisfied, all development shall comply with all applicable flood hazard reduction provisions of this ordinance.

(3) Manufactured homes may be permitted provided the following provisions are met:
   (a) The anchoring and the elevation standards of Article 7.1.5, Section B(3); and
   (b) The encroachment standards of Article 7.1.5, Section F(1).

While floodways are easily identifiable on the Flood Insurance Rate Maps (FIRMs), the Non-Encroachment Areas (NEAs) are not. The floodway is identified by the blue/white striped area on the FIRM as illustrated in the FIRMette below in illustration #1.

Illustration #1-Floodway



NEAs are located in areas of riverine flooding along rivers, streams and other watercourses where base flood elevations have been established, but where floodways have not been identified. 44 CFR 63.3(c)(10) does not apply along lakes, bays and estuaries, and the ocean coast. Currently, on the North Carolina Flood Risk Information System (FRIS), the non-encroachment area layer is non-functional thus determining the non-encroachment area will require cross referencing the Flood Insurance Rate Map (FIRM) and the Flood Insurance Study (FIS).

Below, in illustration #2, is a demonstrated area on the Shingletree Swamp that indicates there may be a non-encroachment area. The Shingletree Swamp has black lines (Cross Sections) at intervals across the watercourse. Each line will be assigned a number that is referenced in the Flood Insurance Study (FIS). The numbered cross-sections in the illustration are from #194 to #175. (To see the cross-section numbers, a FIRMette or FIRM panel will need to be downloaded into a PDF- FRIS displays the elevation of the cross-section, but does not display the cross-section numbers) Referencing the cross section numbers in the Flood Insurance Study (FIS) is demonstrated in Illustration #4.

A copy of the Flood Insurance Study (FIS) is available through FRIS (Illustration #3), the FEMA Map Service Center or the Brunswick County Flood Resources Link page. (The links are below)

Brunswick County Flood Resources Link-Flood Insurance Study

FEMA Map Service Center-Search Page

Illustration #2-Cross Sections

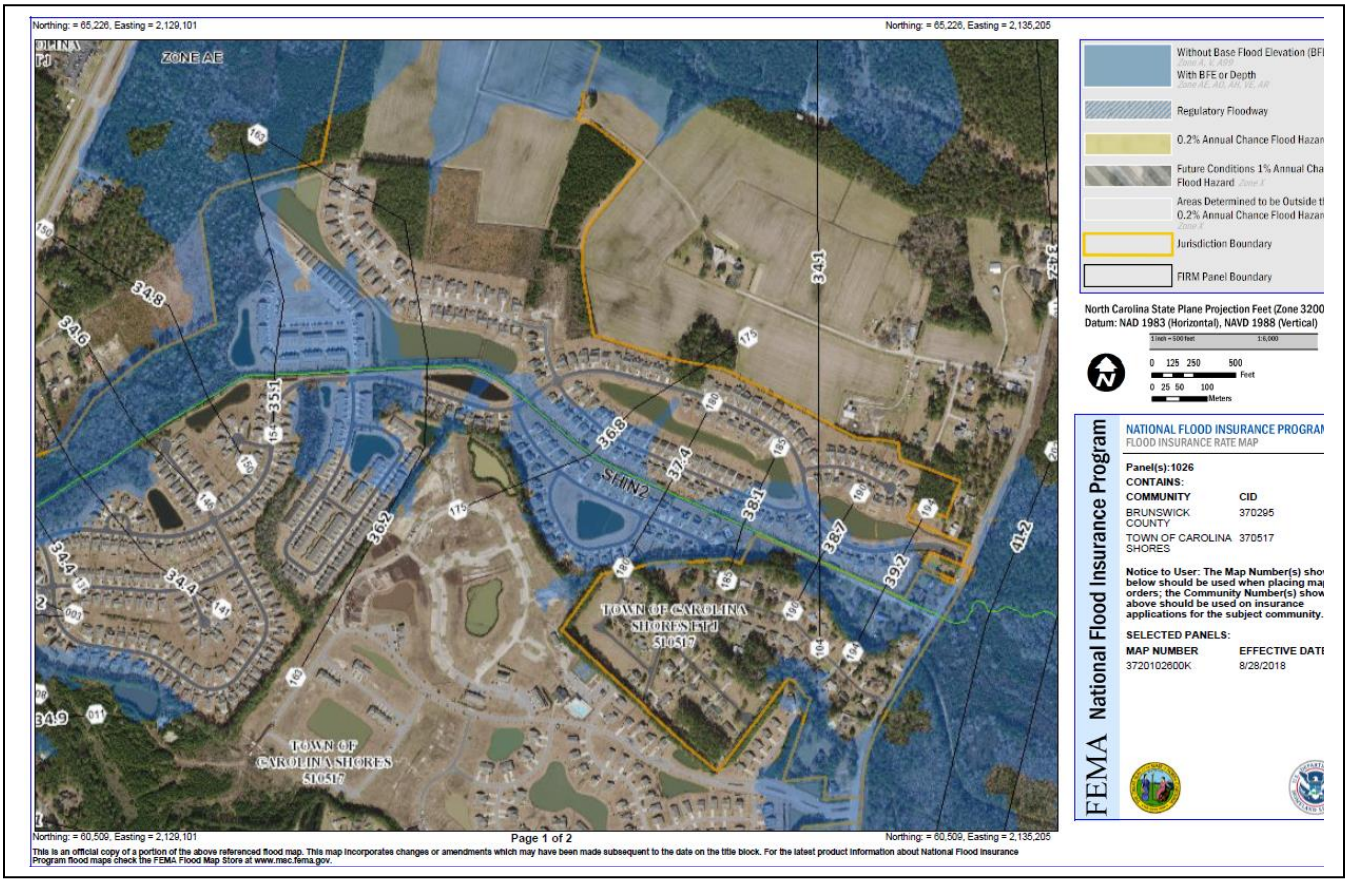


Illustration #3-FRIS-FIS Reports

Able to locate the Flood Insurance Study data from FRIS

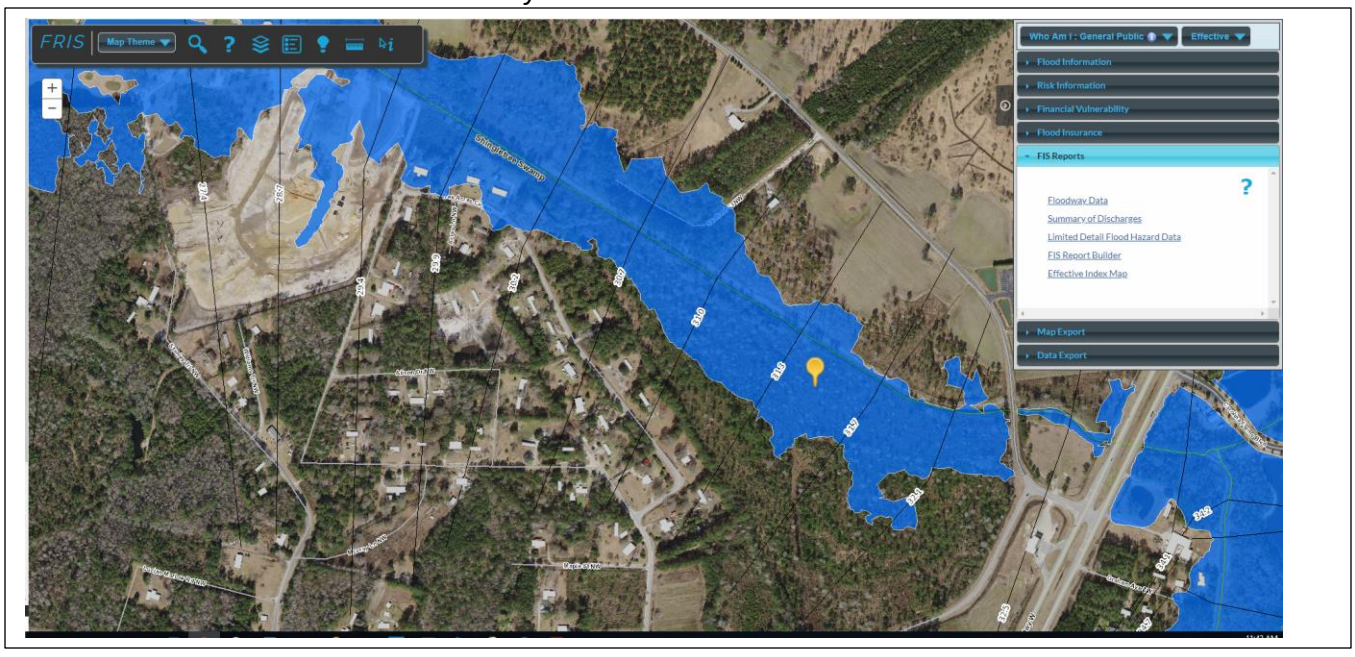


Illustration #4-Flood Insurance Study

Table 17 - Limited Detailed Flood Hazard Data

Cross Section	Stream Station	Flood Discharge (cfs)	1% Annual Chance Water-Surface Elevation (feet NAVD 88)	Non-Encroachment Width (feet) Left/Right from Stream Centerline
Shingletree Swamp				
141	14109.0	553.0	34.4	95.1 / 124.9
146	14558.0	553.0	34.6	9.5 / 191.1
150	15000.0	553.0	34.8	9.5 / 128.3
154	15431.0	553.0	35.1	9.3 / 79.0
159	15852.0	553.0	35.3	17.7 / 38.8
159	15895.0	553.0	36.0	75.0 / 17.8
159	15945.0	553.0	36.0	75.0 / 17.8
163	16346.0	507.0	36.2	9.5 / 170.0
170	16953.0	507.0	36.3	67.0 / 115.0
170	16997.0	507.0	36.4	100.0 / 99.0
170	17040.0	507.0	36.4	100.0 / 99.0
175	17500.0	507.0	36.8	70.0 / 50.0
180	18000.0	507.0	37.4	65.0 / 9.5
185	18500.0	507.0	38.1	52.1 / 13.0
190	19000.0	507.0	38.7	9.5 / 30.6
194	19423.0	507.0	39.2	35.0 / 43.3
197	19745.0	507.0	39.4	50.0 / 68.0
198	19781.0	507.0	41.2	100.0 / 68.0

The non-encroachment width is measured left and right from the centerline of the stream (watercourse). Determining left and right from stream centerline is looking down stream. Looking down stream can be determined by comparing the base flood elevations at the cross sections. The direction which the base flood elevation decreases is “looking down stream”.

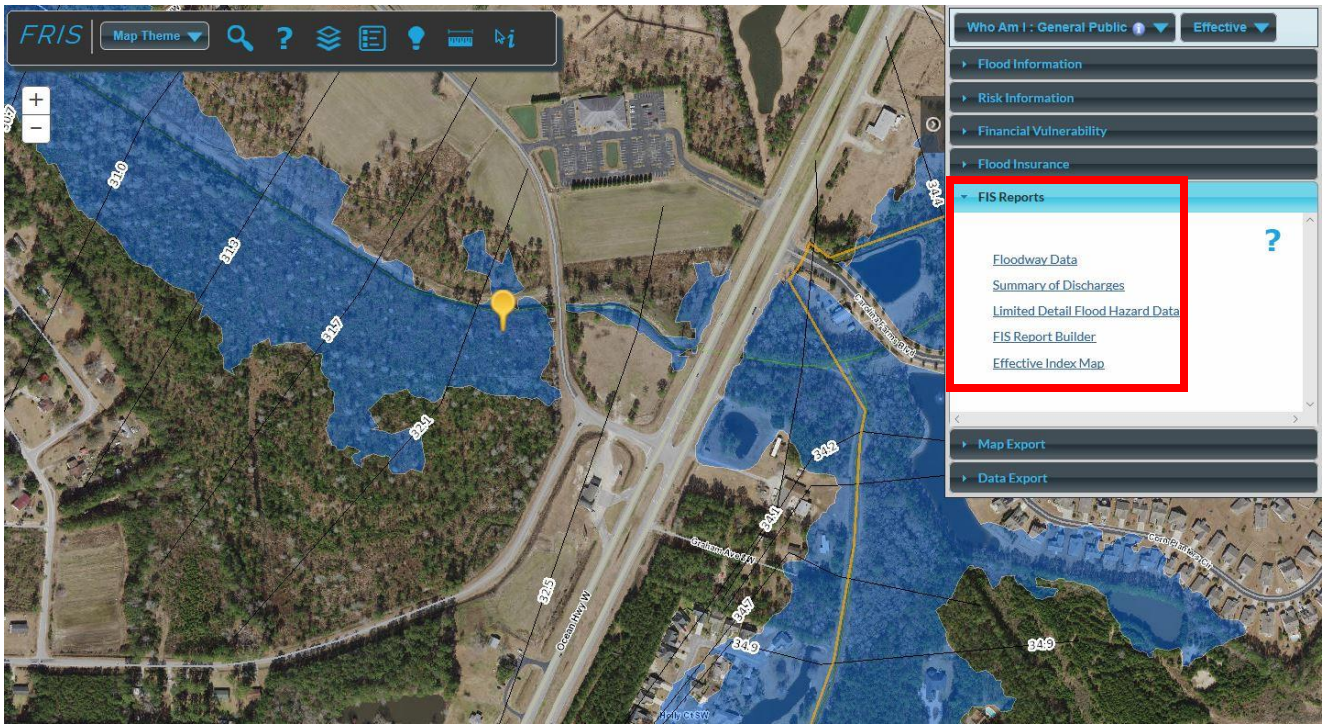
Map the distances from the centerline to establish the total non-encroachment area. The distances referenced in the table are at the point where the cross section crosses the watercourse. To determine the distance in an area between cross sections, interpolation will be required. The non-encroachment area generally will not encompass the entire Special Flood Hazard Area (SFHA) mapped on the FIRM.

Below is an excerpt from a publication from North Carolina Floodplain Mapping, a division of NCEM. The informational document can be viewed at https://flood.nc.gov or by following the link provided below.

https://flood.nc.gov/NCFLOOD_BUCKET/FAQS/QuickGuideTopic/19_Limited_Detailed_Studies.pdf
Identifying Non-Encroachment Areas w/ FRIS

For consistency the FRIS demonstration area will also be the Shingletree Swamp as shown in Illustration #5 below.

Illustration #5 – Shingletree Swamp on FRIS



In the illustration above, you are able to identify the cross sections (black lines w/ elevations) along the Shingletree Swamp watercourse. To obtain the non-encroachment widths on either side of the water course you will need to reference the Limited Detail Flood Hazard Data by clicking the FIS Report tab on the right side of the web page as shown in Illustration #5. Then click on the Limited Detail Flood Hazard Data tab to access the data table and non-encroachment widths for the Shingletree Swamp as shown in Illustration #6 on the next page.

In order to allow the program to populate the data table, you may need to zoom out to a view that shows a couple cross-sections. There are a couple ways to identify which cross section is nearest the proposed development. For this example, we will use the cross section nearest the yellow pin which is Cross Section 119 and Elevation 32.1 feet NAVD 88. To make sure you are utilizing the correct non-encroachment data, you can identify the corresponding elevation from the cross section in the table or you can click on the eyeglass to the left of the cross-section number. This action will minimize the data table and highlight that cross section as shown below in Illustration #7 on the next page.

Referring back to Illustration #6, find Cross Section 119 for the non-encroachment widths of 110.0/13.6. To apply the NEA, looking downstream, measure 110 feet to the left from the centerline of the watercourse for the left NEA and measure 13.6 feet to the right from the centerline of the watercourse for the right side NEA. In this example, it appears that the Shingletree Swamp is flowing northwest. This is determined by following the decrease in elevations.

Illustration #6 – Limited Flood Hazard Data Table

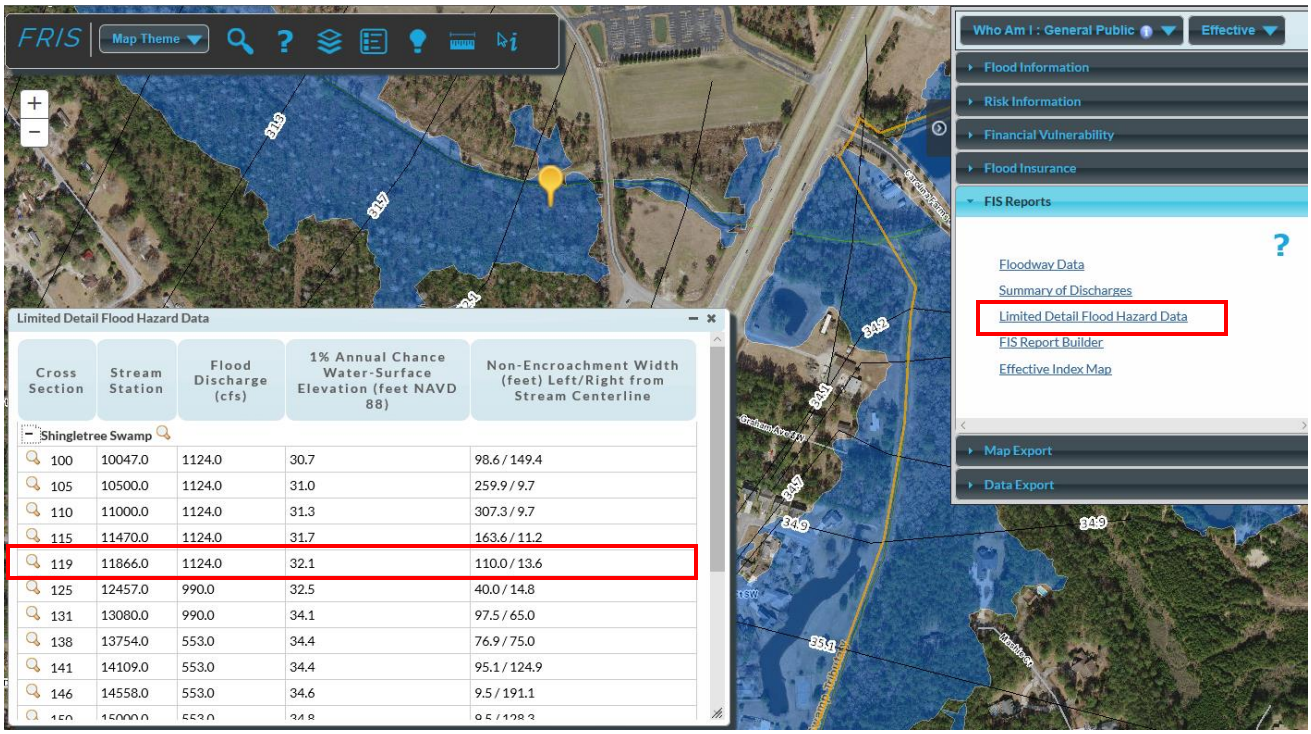
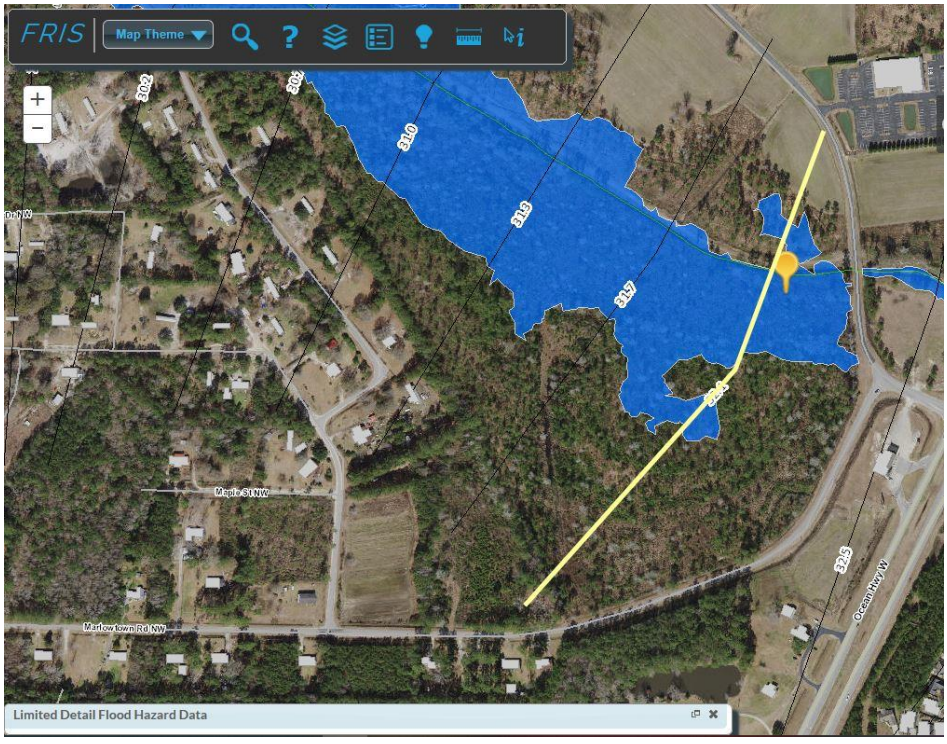


Illustration #7 – Minimized Data Table W/ Highlighted Cross Section



For additional information, contact your local floodplain administrator for guidance.

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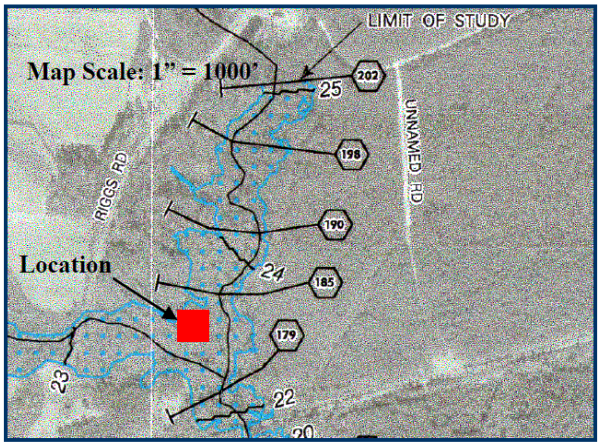
What Methods should be used to determine the Non-Encroachment Area Along Streams Studied by Limited Detailed Methods?

Non-encroachment widths at cross sections are listed in the Limited Detailed Flood Hazard Data table in the FIS Report. For locations between cross sections, there are two straightforward methods that can be used to determine the non-encroachment area and the widths that bound this area.



The simpler method involves comparing the non-encroachment widths at the cross sections located upstream and downstream from the location of interest. The larger of the two are then used to determine the non-encroachment area for any location between the two cross sections. Method 1 may result in a conservative estimate of the non-encroachment area, particularly if there is a large difference in non-encroachment widths at the two cross sections, and/or if the location of interest is close to the cross section with the smaller width. If the width of the floodplain at the location of interest is narrower than the non-encroachment width determined by this method, then the SFHA should be the non-encroachment area (i.e., no encroachment should be permitted within the boundaries of the limited detailed SFHA at the location of interest). The table on the next page is based on Method 1.

Method 1

Non-Encroachment Width (in feet) from the Mapped Center of the Stream		
	Left	Right
From 179 to 185	60'	80'
From 185 to 190	60'	200'
From 190 to 198	115'	200'
From 198 to 202	120'	50'

Therefore, if using Method 1, the community should generally prohibit development in the vicinity of the property location (i.e., between cross section 179 and 185 on the right side of Berry Creek looking downstream) 80' from the mapped center of the stream.

A more rigorous and possibly less conservative method of determining a non-encroachment width and the non-encroachment area between cross sections is to linearly interpolate the non-encroachment boundary based on the data provided in the Limited Detailed Flood Hazard Data table in the FIS report. Method 2 is shown below.

Method 2

Step 1: Determine variables A, B, C, and D

A=Distance between cross-section stations = Upstream cross-section – downstream cross-section
A=18,499′ – 17,857′
A=642′

B=Non-encroachment width difference between cross-sections (upstream – downstream)
B=80-60′
B=20′

C=Distance along stream centerline from downstream cross-section to site location
C=0.50″ x 1000′ per inch (map scale)
C=500′

Step 2: Calculate non-encroachment difference (D)

D=B x (C / A)
D=20′ x (500′ / 642′)
D=16′

Note that in cases where the downstream width is greater than the upstream width, D will be a negative number.

Step 3: Calculate non-encroachment width at the site (W)

W=D+downstream width
W=16′ + 60′
W=76′