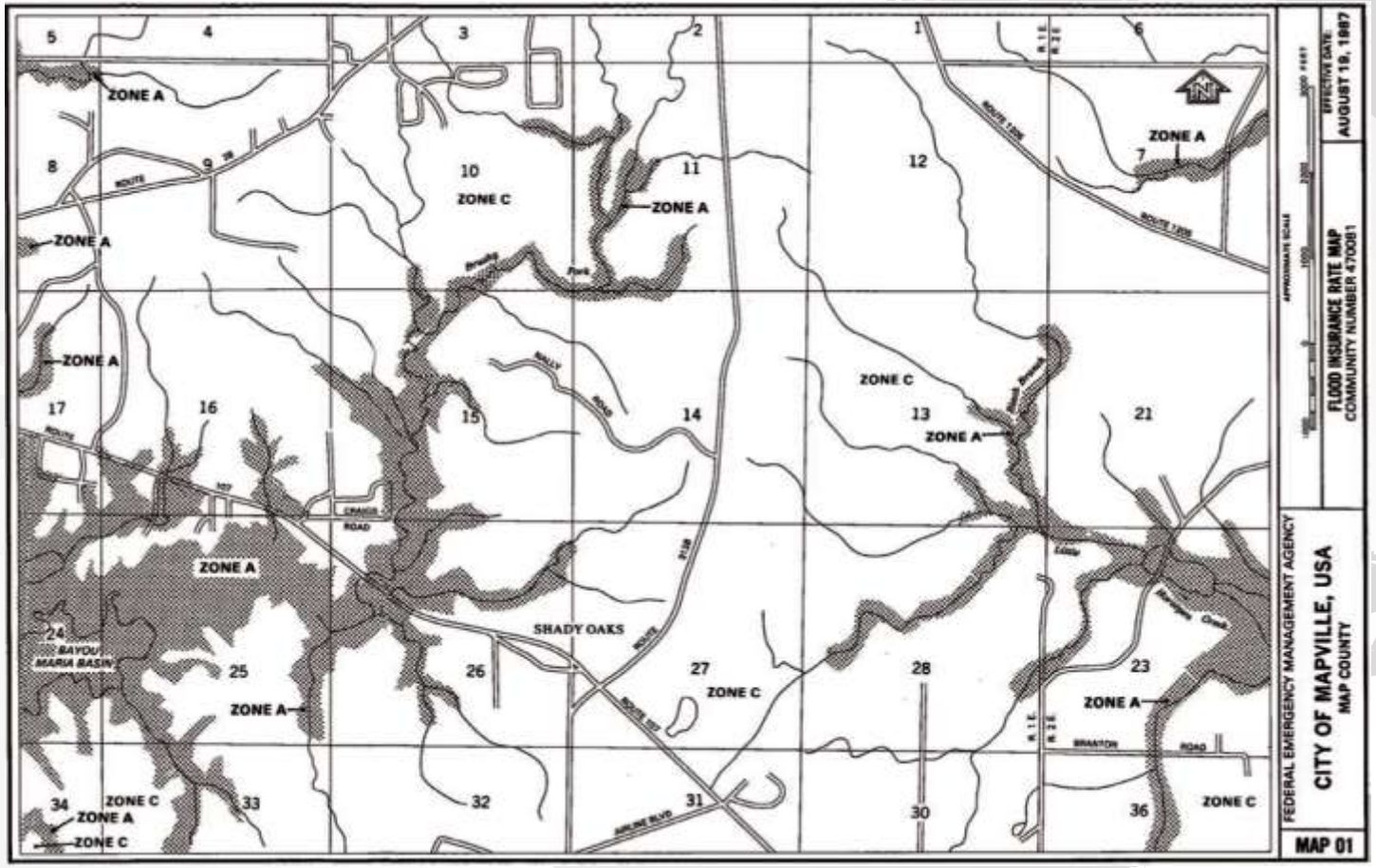


UNNUMBERED A ZONES

History of Unnumbered A Zones

In the beginning we had to guess….

We had a lack of resources

Even now sometimes we have to guess….. But WHY???

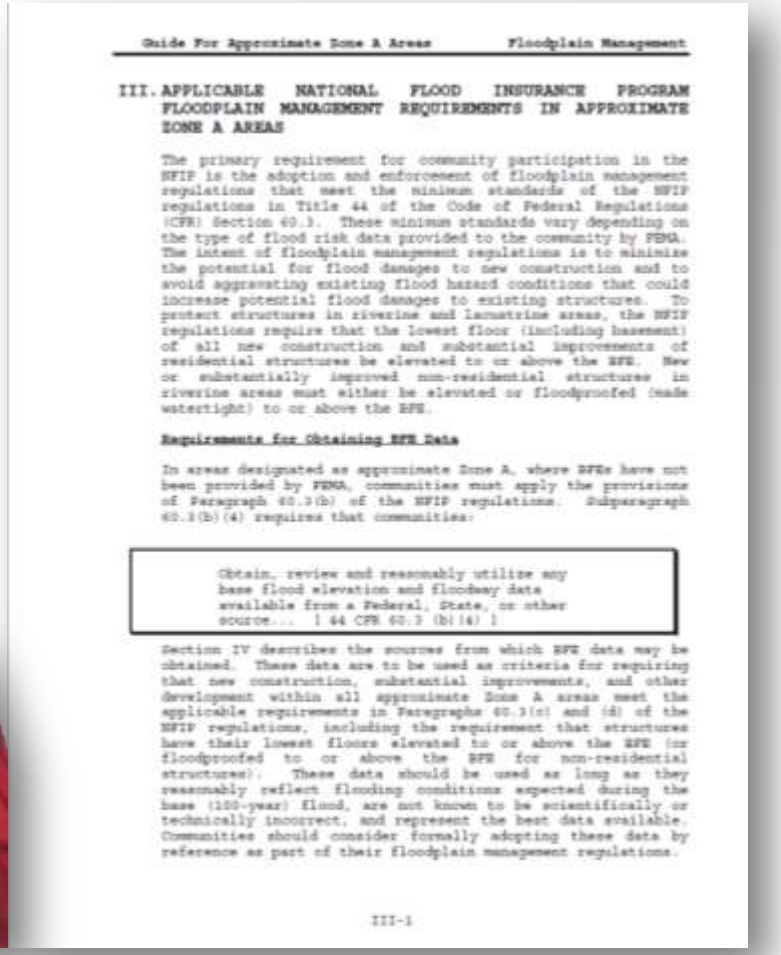
Because detailed floodplain studies are expensive, really expensive.

Many rural areas were estimated using approximate techniques.

The bad news

Even without an established Base Flood Elevation it is still necessary to ensure that development is reasonably safe from flood damage.

And what is reasonable safe from flood damage exactly???



Guide For Approximate Zone A Areas — Floodplain Management

III. APPLICABLE NATIONAL FLOOD INSURANCE PROGRAM FLOODPLAIN MANAGEMENT REQUIREMENTS IN APPROXIMATE ZONE A AREAS

The primary requirement for community participation in the NFIP is the adoption and enforcement of floodplain management regulations that meet the minimum standards of the NFIP regulations in Title 44 of the Code of Federal Regulations (CFR) Section 60.3. These minimum standards vary depending on the type of flood risk data provided to the community by FEMA. The intent of floodplain management regulations is to minimize the potential for flood damages to new construction and to avoid aggravating existing flood hazard conditions that could increase potential flood damages to existing structures. To protect structures in riverine and lacustrine areas, the NFIP regulations require that the lowest floor (including basement) of all new construction and substantial improvements of residential structures be elevated to or above the BFE. New or substantially improved non-residential structures in riverine areas must either be elevated or floodproofed (made watertight) to or above the BFE.

Requirements for Obtaining BFE Data

In areas designated as approximate Zone A, where BFEs have not been provided by FEMA, communities must apply the provisions of Paragraph 60.3(b) of the NFIP regulations. Subparagraph 60.3(b)(4) requires that communities:

> Obtain, review and reasonably utilize any base flood elevation and floodway data available from a Federal, State, or other source... [44 CFR 60.3 (b)(4)]

Section IV describes the sources from which BFE data may be obtained. These data are to be used as criteria for requiring that new construction, substantial improvements, and other development within all approximate Zone A areas meet the applicable requirements in Paragraphs 60.3(c) and (d) of the NFIP regulations, including the requirement that structures have their lowest floors elevated to or above the BFE (or floodproofed to or above the BFE for non-residential structures). These data should be used as long as they reasonably reflect flooding conditions expected during the base (100-year) flood, are not known to be scientifically or technically incorrect, and represent the best data available. Communities should consider formally adopting these data by reference as part of their floodplain management regulations.

III-1

Great so how do I establish a base flood elevation??

There are multiple options, you just have to figure out what works for the particular case.

- FEMA Publication 265
  - Simplified Methods
    - Contour Interpolation
    - Data Extrapolation
  - Detailed Method
    - Topography
    - Hydrology
    - Hydraulics
- Letter of Map Amendment


FEDERAL EMERGENCY MANAGEMENT AGENCY FEMA 265/JULY 1995

MANAGING FLOODPLAIN DEVELOPMENT

IN

APPROXIMATE ZONE A AREAS

A GUIDE FOR OBTAINING AND DEVELOPING
BASE (100-YEAR) FLOOD ELEVATIONS

APRIL 1995

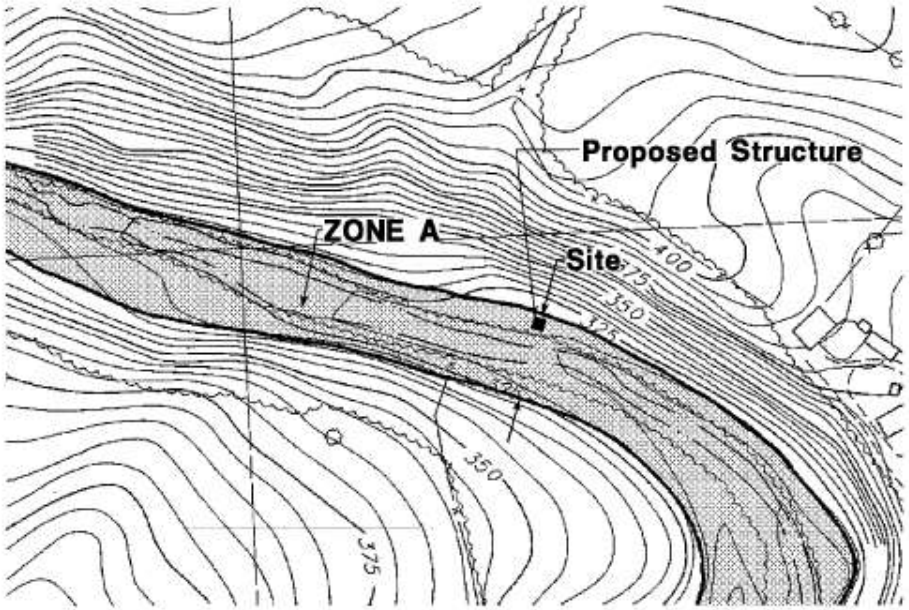
Contour Interpolation

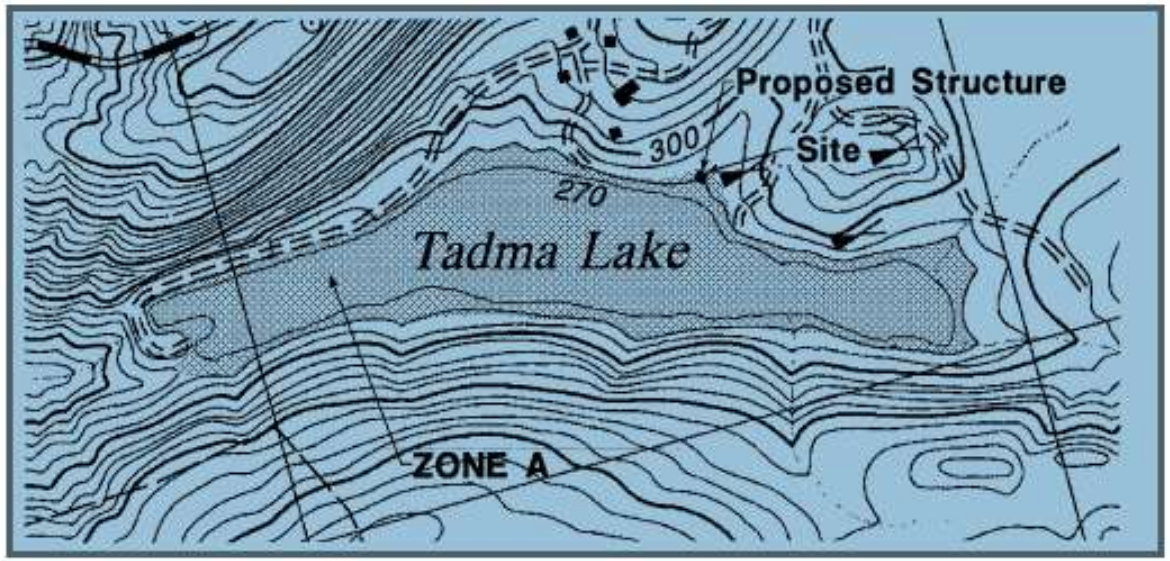
- Obtain a topographic map
- Scale the FIRM or topographic map so the two are at the same scale
- Superimpose the approximate A zone floodplain boundary from the FIRM onto the topographic map
- Determine if this method is within the acceptable accuracy limits.
- If the method is acceptable then determine the Base Flood Elevation.

What is an acceptable accuracy limit???

According to FEMA – 265:

½ of one contour interval





Data Extrapolation

If a site is within 500 feet upstream of a stream reach for which a 1% flood profile has been computed by detailed methods, and the floodplain channel bottom slope characteristics are relatively similar to the downstream reaches, data extrapolation may be used to determine the BFE.

- ❖ Must be free of backwater effects from downstream hydraulic structures (Bridges, culverts, etc.)
- ❖ If the 1% flood profile changes just prior to the limit of detailed study, this method should not be used.

- Determine the location of the site on the flood profile for the detailed study steam study.
- Extrapolate the last segment of the 100-year flood profile that has a constant water-surface slope to the location of the site. The BFE at the site **CAN** be obtained directly from the profile.

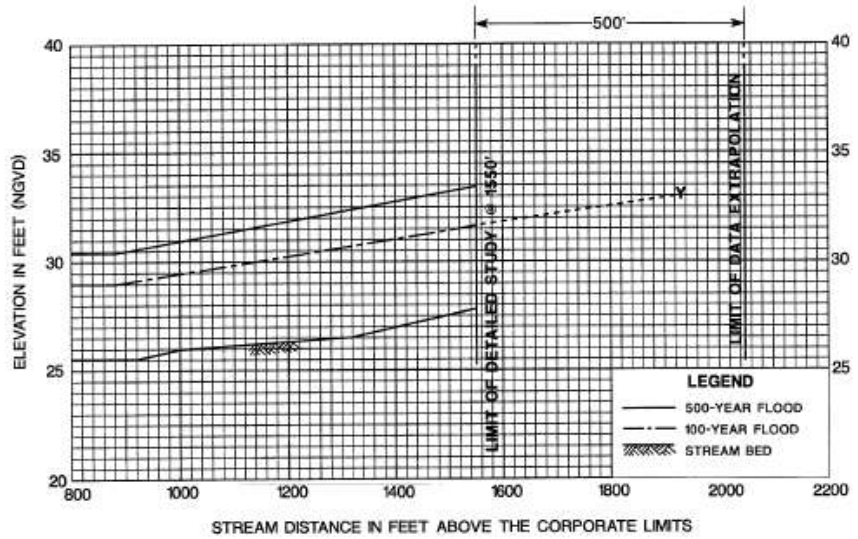


Figure 11 - Data Extrapolation Method - Profile

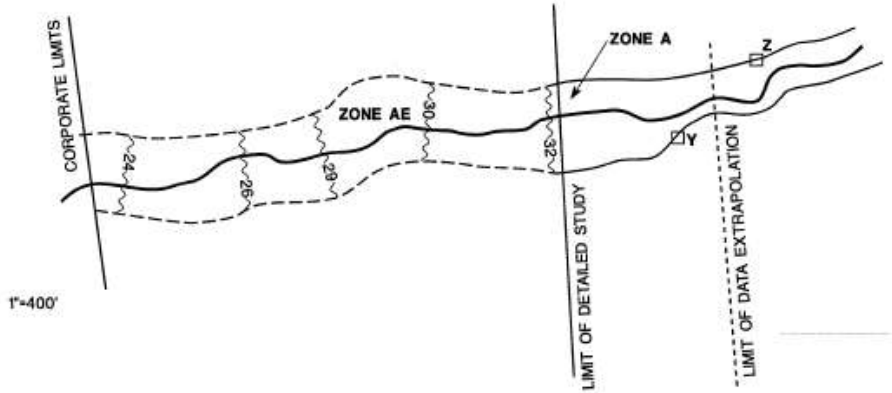


Figure 12 - Data Extrapolation Method - Plan View

-Property Y is approximately 370' upstream of the limit of detailed study (as measured along the streamline). Using the profile below, we can extrapolate the 100-year flood profile to determine that the BFE for property Y is equal to 33'.

-Property Z is approximately 700' upstream of the limit of detailed study (as measured along the streamline), and is therefore beyond the limit of data extrapolation.

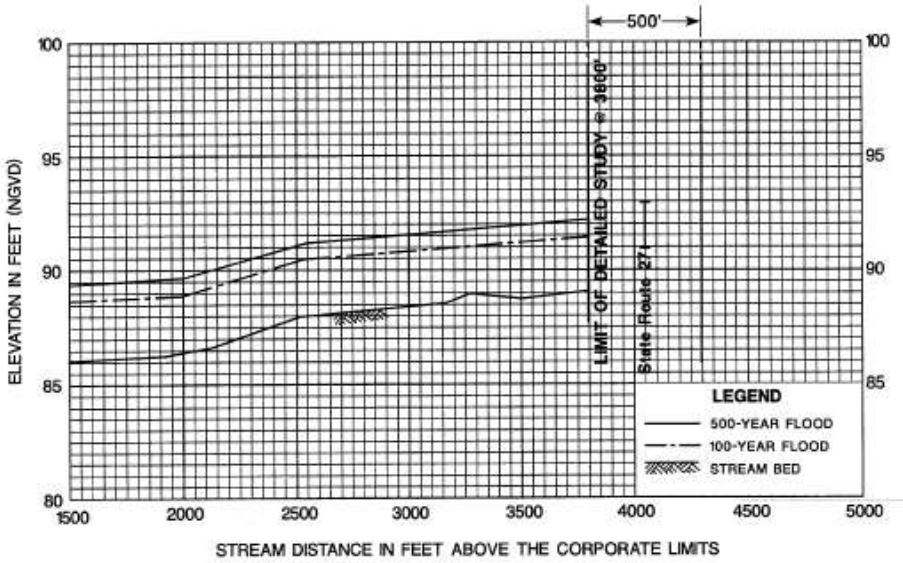


Figure 13 - Data Extrapolation Method - Profile

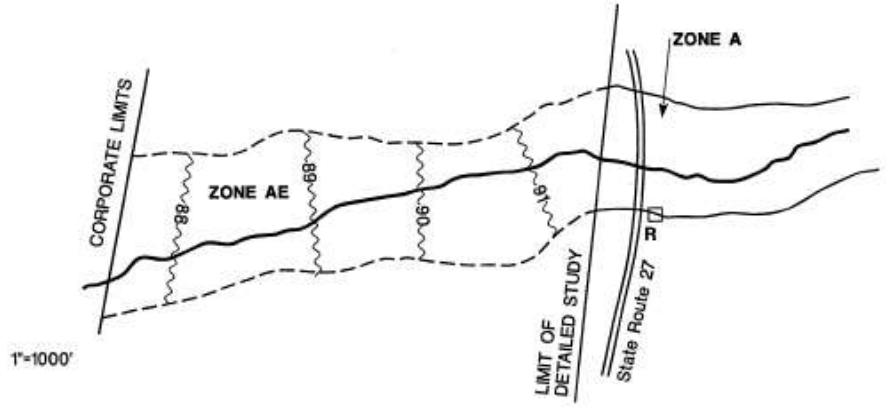


Figure 14 - Data Extrapolation Method - Plan View

-State Route 27 may have an effect on the 100-year water-surface elevations. Therefore, data extrapolation should not be used to obtain a BFE for property R.

Detailed Method

- Topography
- Hydrology
- Hydraulics

Topography

To create cross sections you will need good elevation data. Watch out for datum.

10 foot Contours –BAD
1 foot Contours – Good

How many cross sections?

For one lot technically only one cross section is required, for large parcels of multi-lot subdivisions at least one cross section is required at each end of the parcel or subdivision.

Topography

Proper location of cross sections is imperative

Cross sections:

- Must be perpendicular to the flood path of the 1% flood
- Should be located where changes in channel characteristics, such as slope, shape, and roughness occur
- Should be located at points along a stream where changes in flood discharge occur, such as upstream of tributaries
- A minimum of two cross sections are required to compute a BFE at or near a structure, such as a bridge or culvert.

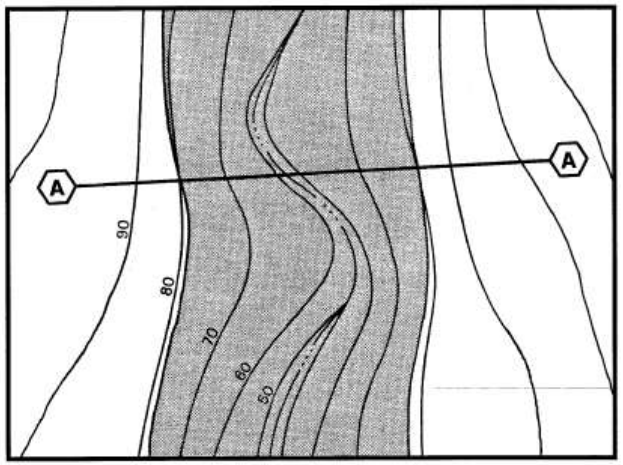


Figure 16 - Cross Section Orientation

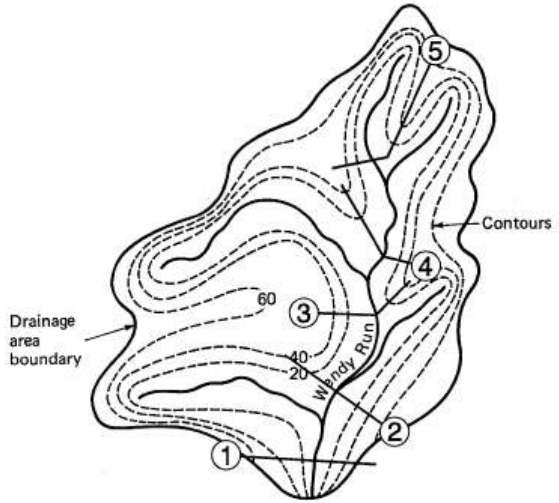
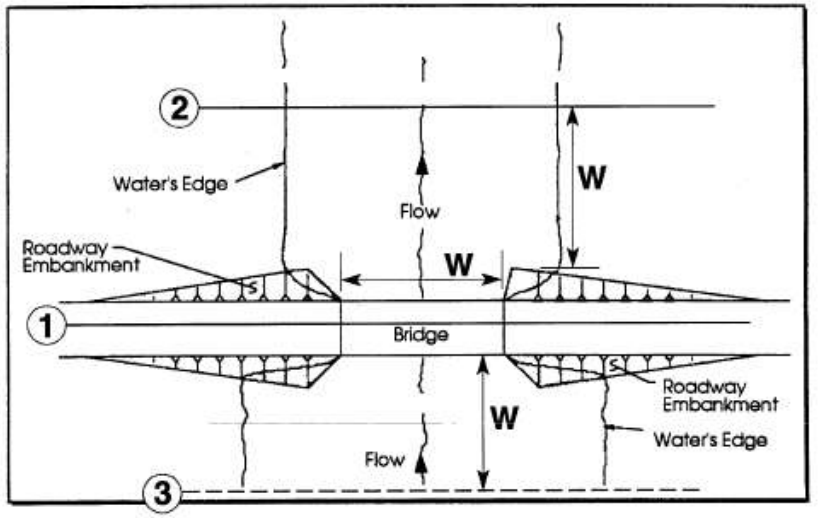
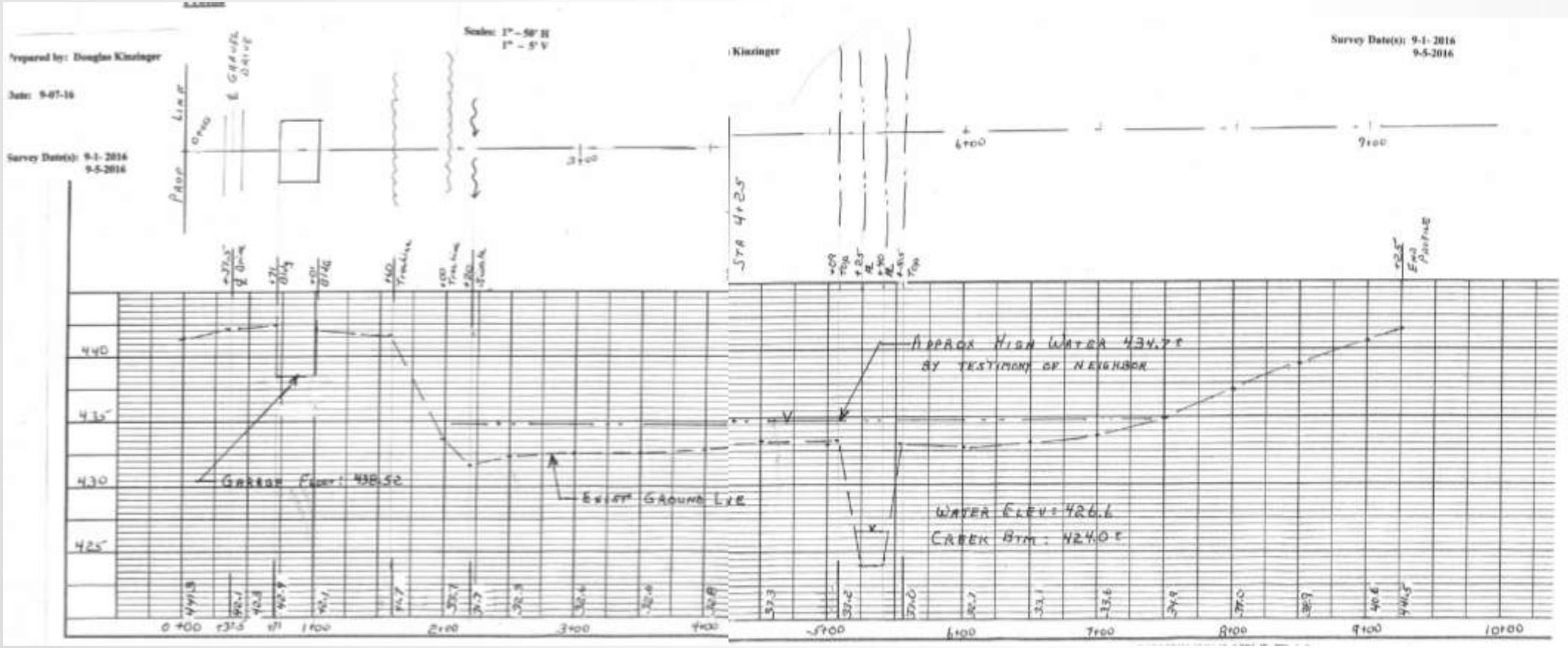


Figure 17 - Locate Cross Sections at Points of Flood Discharge Changes




Prepared by: Douglas Kinzinger
Date: 9-07-16
Survey Date(s): 9-1- 2016
9-5-2016
Scales: 1" = 50' H
1" = 5' V
Kinzinger
Survey Date(s): 9-1- 2016
9-5-2016
Approx High Water 434.7'
By Testimony of Neighbor
Water Elev: 426.6
Creek Btm: 424.0'
Garage Floor: 430.52
Exist. Ground Line

Hydrology

There are a number of methodologies that may be used to develop flood discharges. Each method has its own ease of use and own level of accuracy.

- Discharge-Drainage Area Relationships
- Regression Equations ($Q=K * A^X * B^Y * C^{Z)}$
- NRCS TR-55 "Urban Hydrology for Small Watersheds"
- Rational Formula (Q=C * I * A)
- Other Hydrograph Methods (Stream Stats

Rational Formula (Q=C * I * A)

Q = Discharge (cubic feet per second
C = Runoff coefficient
I = Rainfall intensity (inches per hour)
A = Drainage area (acres)

- Limitations – This method must not be used where the runoff is regulated by the use of dams, detention ponds, canals, and other flow diversions. Also this method is not recommended for drainage areas greater than 200 acres, but can be used with caution for drainage areas up to 640 acres (one square mile).

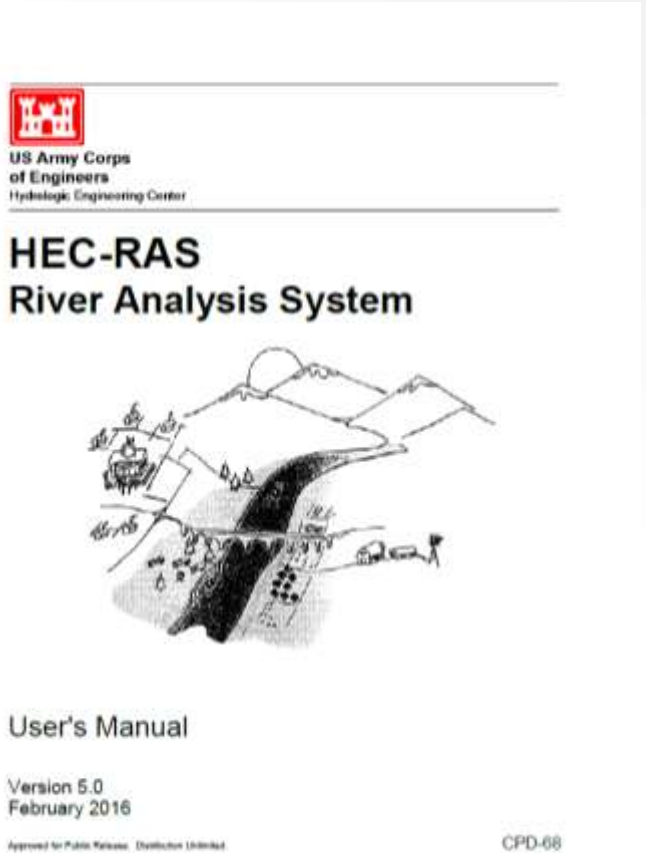
Hydraulics

There are various methods to determine BFE's

- Hand Calculations
- HEC-RAS
- WSP2

What has to be computed?

- Normal Depth
- Critical Depth
- Step-Backwater Analysis
- Hydraulic Structures
  - Weir flow
  - Flow through structure (culverts and bridges)



Letters of Map Amendment

Let FEMA do all the heavy lifting!

FEMA

Federal Emergency Management Agency

LETTER OF MAP AMENDMENT
DETERMINATION DOCUMENT (REMOVAL)

Letters of Map Amendment

For an existing structure hire a surveyor to complete an elevation certificate.

When its close include a cross section (or two)

Make sure the surveyor leaves B9 blank

Submit the required files to FEMA (hazards.fema.gov)

Patiently wait 45-60 days for the results

U.S. DEPARTMENT OF HOMELAND SECURITY
Federal Emergency Management Agency
National Flood Insurance Program

OMB No. 1660-0008
Expiration Date: November 30, 2018

ELEVATION CERTIFICATE

Important: Follow the instructions on pages 1–9.

Copy all pages of the Elevation Certificate and all attachments for (1) community official, (2) insurance agent/company, and (3) building owner.

SECTION A – PROPERTY INFORMATION	FOR INSURANCE COMPANY USE
A1. Building Owner's Name Daniel L & Julie Mongeon	Policy Number:
A2. Building Street Address (including Apt., Unit, Suite, and/or Bldg. No.) or P.O. Route and Box No. 4463 West Park Club Rd	Company NAIC Number:
City Smithton	State Illinois	ZIP Code 62285

A3. Property Description (Lot and Block Numbers, Tax Parcel Number, Legal Description, etc.)
Lot/Sec-15 of West Park Sub as in doc #02401382. Parcel Number: 17-08.0-401-009

A4. Building Use (e.g., Residential, Non-Residential, Addition, Accessory, etc.) Single Family Residence

A5. Latitude/Longitude: Lat. 38° 23' 09.150" N. Long. -089° 50' 23.39" W. Horizontal Datum: ☐ NAD 1927 ☒ NAD 1983

A6. Attach at least 2 photographs of the building if the Certificate is being used to obtain flood insurance.

A7. Building Diagram Number 1A

A8. For a building with a crawlspace or enclosure(s):
a) Square footage of crawlspace or enclosure(s) _____ sq ft
b) Number of permanent flood openings in the crawlspace or enclosure(s) within 1.0 foot above adjacent grade _____
c) Total net area of flood openings in A8.b _____ sq in
d) Engineered flood openings? ☐ Yes ☒ No

A9. For a building with an attached garage:
a) Square footage of attached garage _____ sq ft
b) Number of permanent flood openings in the attached garage within 1.0 foot above adjacent grade _____
c) Total net area of flood openings in A9.b _____ sq in
d) Engineered flood openings? ☐ Yes ☐ No

SECTION B – FLOOD INSURANCE RATE MAP (FIRM) INFORMATION

B1. NFIP Community Name & Community Number	B2. County Name	B3. State
St. Clair County - 170616	St. Clair County	Illinois

B4. Map/Panel Number	B5. Suffix	B6. FIRM Index Date	B7. FIRM Panel Effective/Revised Date	B8. Flood Zone(s)	B9. Base Flood Elevation(s) (Zone AO, use Base Flood Depth)
17163C0020D	D	11/06/2003	11/06/2003	A	

B10. Indicate the source of the Base Flood Elevation (BFE) data or base flood depth entered in Item B9:
☐ FIS Profile ☐ FIRM ☐ Community Determined ☒ Other/Source: Unable to determine

B11. Indicate elevation datum used for BFE in Item B9: ☐ NGVD 1929 ☒ NAVD 1988 ☐ Other/Source: _____

B12. Is the building located in a Coastal Barrier Resources System (CBRS) area or Otherwise Protected Area (OPA)? ☐ Yes ☒ No
Designation Date _____ ☐ CBRS ☐ OPA

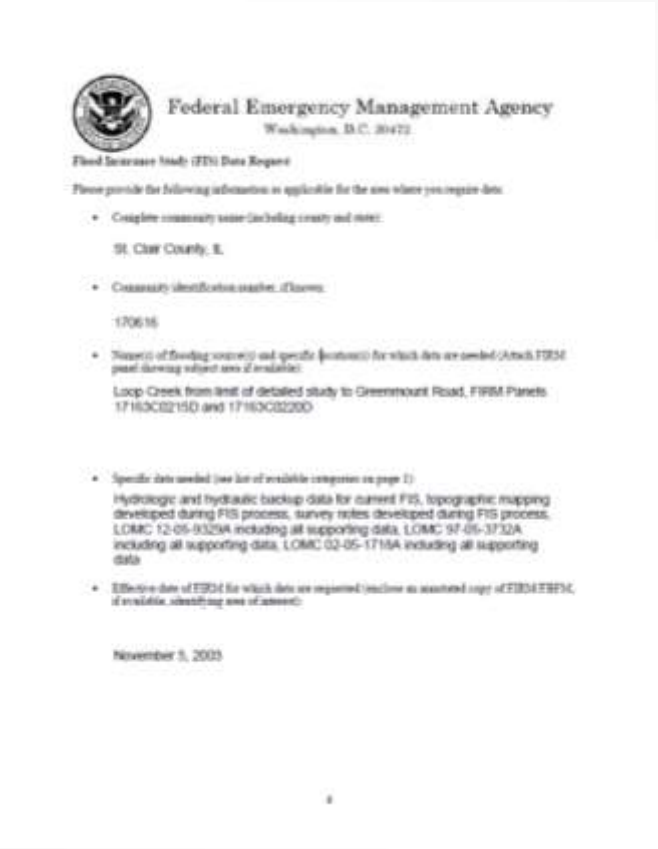
FEMA Form 086-0-33 (7/15) Replaces all previous editions Form Page 1 of 9

Letters of Map Amendment

But wait my LOMA was issued buy FEMA didn't put the BFE on it….

Head back to FEMA….

As a local official you can request FIS data for **FREE!!!!!**



Federal Emergency Management Agency

Washington, D.C. 20472

Flood Insurance Study (FIS) Data Request

Please provide the following information as applicable for the area where you require data.

- Complete community name (including county and state):

  St. Clair County, IL

- Community identification number, if known:

  170616

- Name(s) of flooding source(s) and specific location(s) for which data are needed (Attach FIRM panel showing subject area if available):

  Loop Creek from limit of detailed study to Greenmount Road, FIRM Panels 17163C0215D and 17163C0220D

- Specific data needed (see list of available categories on page 2):

  Hydrologic and hydraulic backup data for current FIS, topographic mapping developed during FIS process, survey notes developed during FIS process, LOMC 12-05-9329A including all supporting data, LOMC 97-05-3732A including all supporting data, LOMC 02-05-1716A including all supporting data

- Effective date of FIS(s) for which data are requested (enclose an annotated copy of FIS(s) FIRM(s), if available, identifying area of interest):

  November 5, 2003

Letters of Map Amendment

Flood Insurance Study Data

Federal Emergency Management Agency

LETTER OF MAP AMENDMENT
DETERMINATION DOCUMENT (REMOVAL)

Determination By: L. Hruska Checked By:

APPROXIMATE WATER SURFACE ELEVATION DETERMINATION

Case No: 16-05-2251A
Community: Village of Swansea, St. Clair County, Illinois
Effective FIRM Panel: 17163C0021D
Property: 107 Clark Circle

SOURCE OF FLOODING: Wolf Branch Tributary

HYDROLOGY: Methodology/Data Sources

- Drainage Area & Discharge from StreamStats

Attachments: A

HYDRAULICS: Methodology/Data Sources

- Length and Height from USGS Quad, BFE from Weir calculations

Attachments: B, C & D

Determination:

1%WSEL: 550.1 feet NGVD 29

LAG: 548.8 feet NGVD 29

Subject LAG is above the computed 1%wsel; therefore, the subject structure can be removed from the SFHA.

NO INCLUDE 1% ELEVATION ON DETERMINATION LETTER

Attachment A2

StreamStats Version 3.0

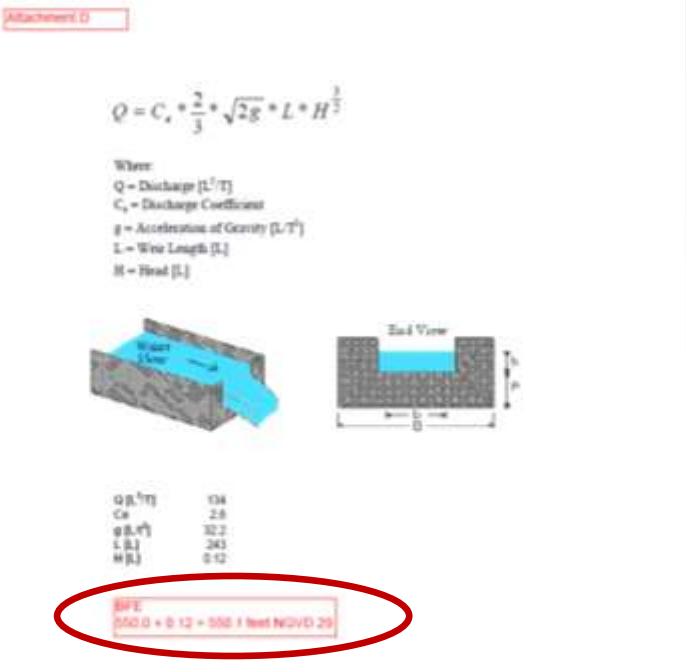
Flow Statistics Ungaged Site Report

Peak Flow Basin Characteristics

Parameter	Value	Regression Equation Valid Range Min	Max
Drainage Area (square miles)	0.04	0.01	9052
Stream Slope 10 and 85 Method (feet per mile)	72.713	0.81	117
Average Soil Permeability (inches per hour)	1.306	0.1	8
Region 5 Indicator (where 1 (dimensionless))	1	1	1

Peak Flow Statistics

Statistic	Value	Unit	Prediction Error (percent)	Equivalent years of record	90 Percent Prediction Interval Min	Max
PK2	22.3	ft3/s	40	2.7	11.8	42.1
PK5	45.2	ft3/s	40	3.2	23.7	86
PK10	63.9	ft3/s	42	3.9	32.8	124
PK25	90.2	ft3/s	44	4.7	44.1	183
PK50	111	ft3/s	47	5.3	54.3	233
PK100	134	ft3/s	49	5.6	63.9	281
PK500	193	ft3/s	55	6.3	87.4	452



Attachment D

$$Q = C_e * \frac{2}{3} * \sqrt{2g} * L * H^{\frac{3}{2}}$$

Where:
Q = Discharge [L^3/T]
C_e = Discharge Coefficient
g = Acceleration of Gravity [L/T^2]
L = Weir Length [L]
H = Head [L]

Q [L^3/T]	134
C_e	2.8
g [L/T^2]	32.2
L [L]	243
H [L]	0.12

BFE
550.0 + 0.12 = 550.1 feet NGVD 29

A first time buyer approaches the Building Department.

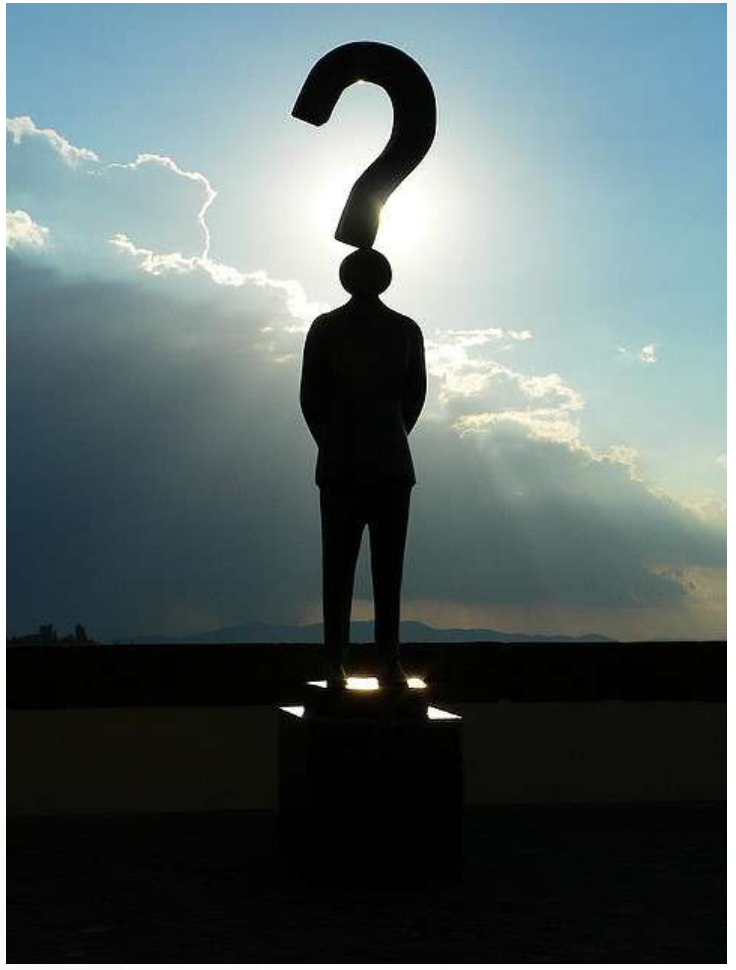
“Can you give us some advice and help us place the foundation.”

I can certainly look at it, however, you may need an engineer.

When reviewing requests for building permits or site plans remember:

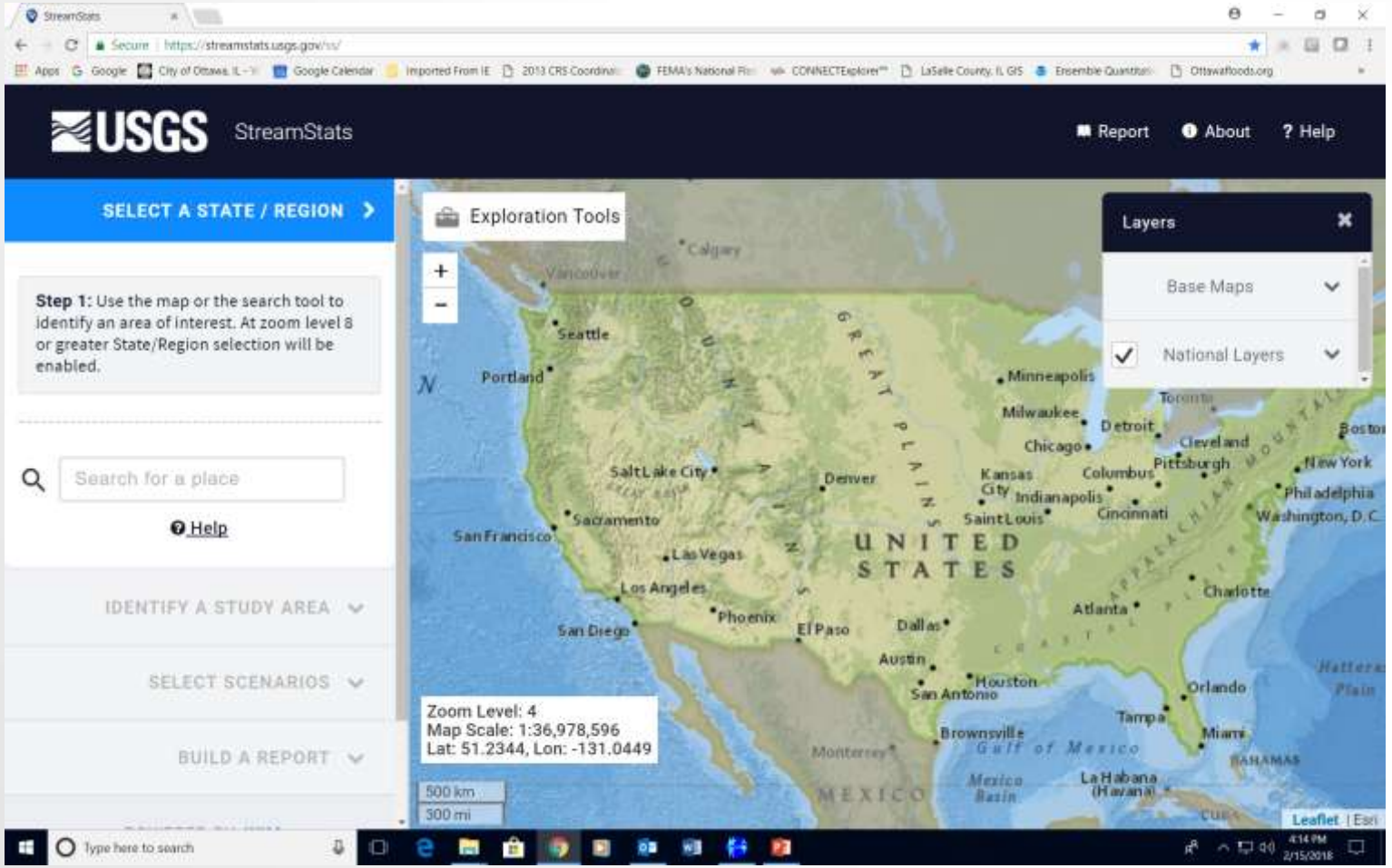
Simply stated, whenever one is developing in an urban area, if the **Watershed** is greater than one square mile (10 square miles for rural) then a Base Flood Elevation must be determined.

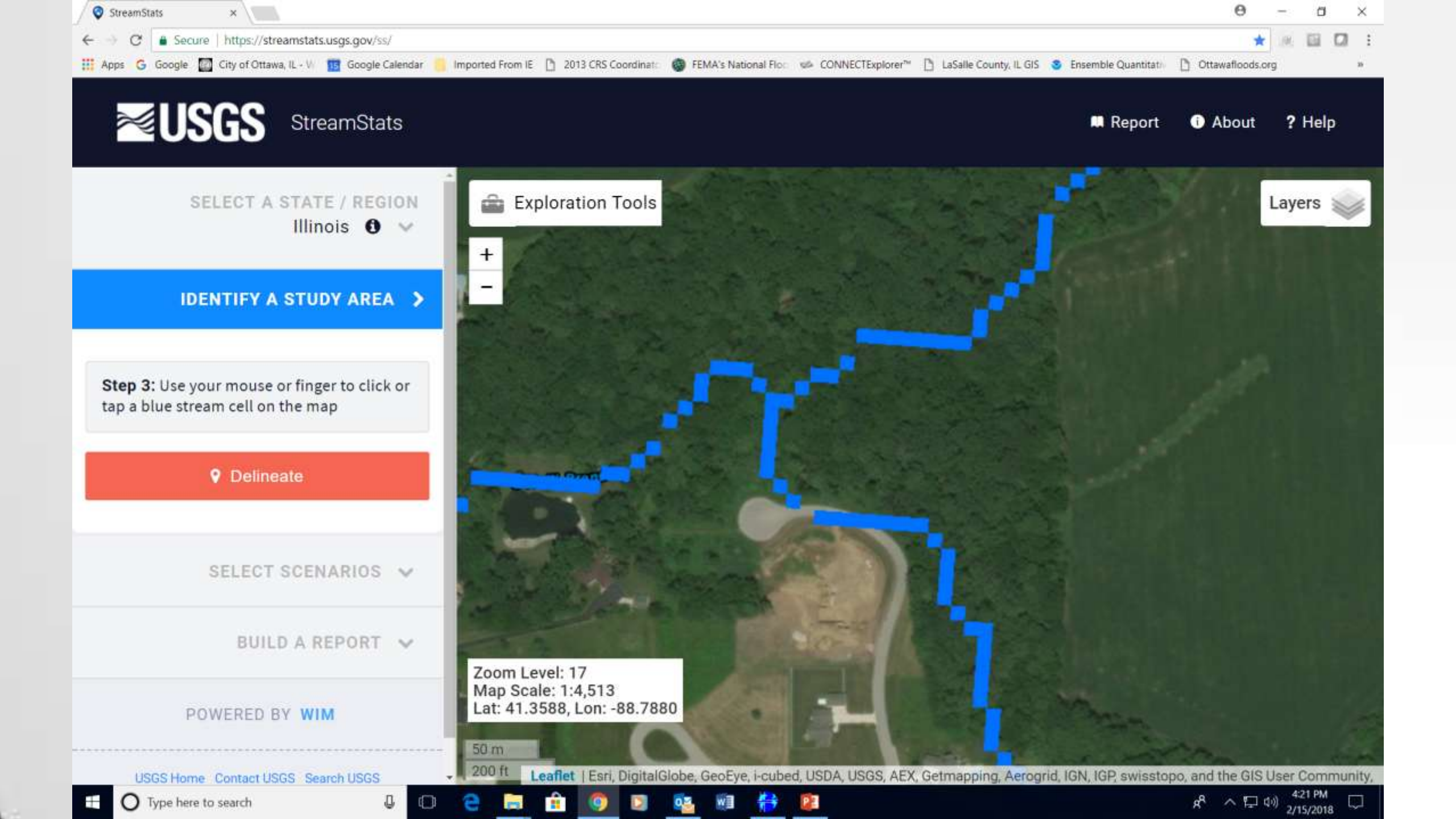
HOW DOES ONE DETERMINE THE **WATERSHED?**

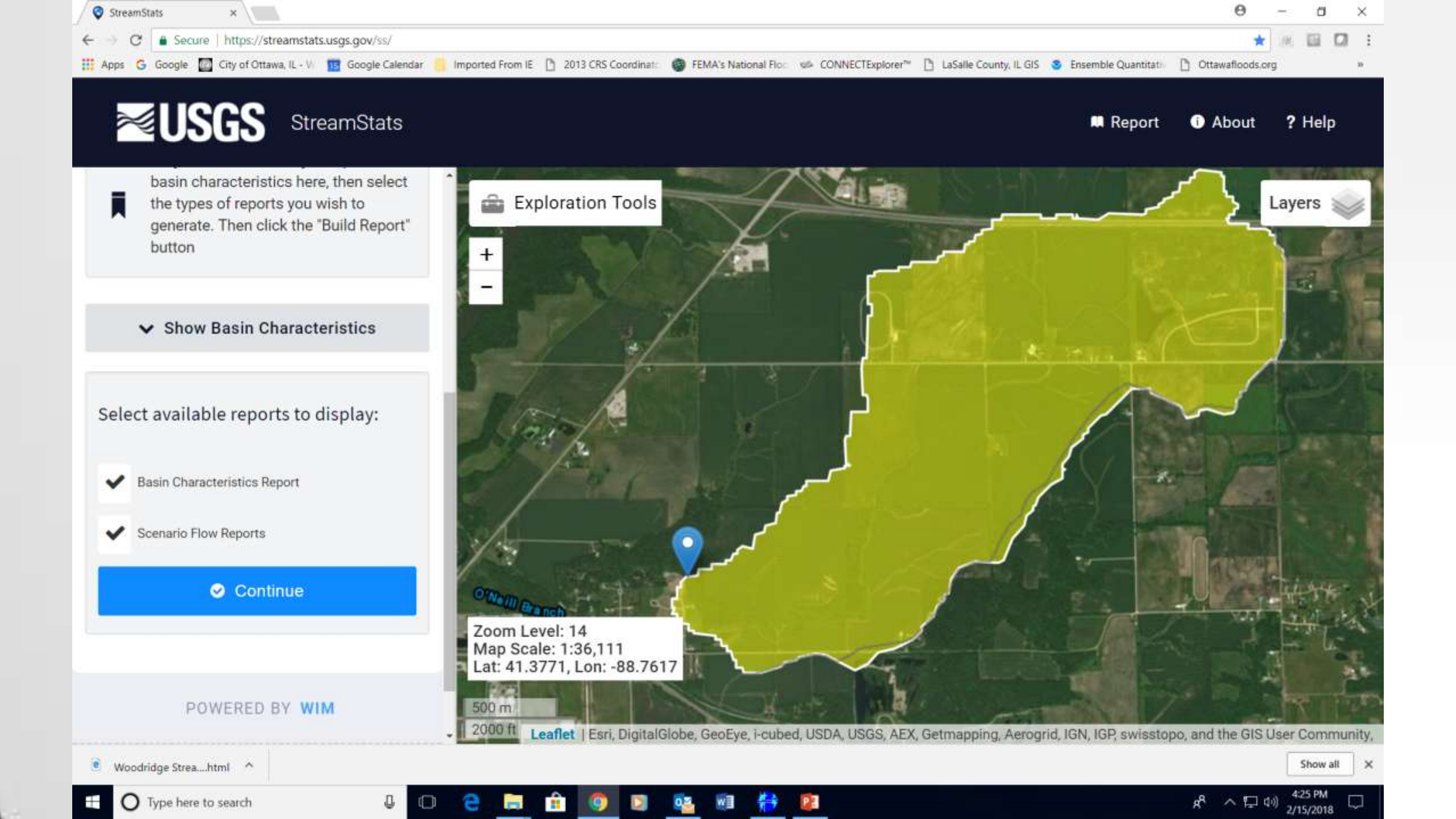


One could hire and engineering firm to do a H & H study. Lots of $$.

Or to get a good idea, turn to US Geological Survey

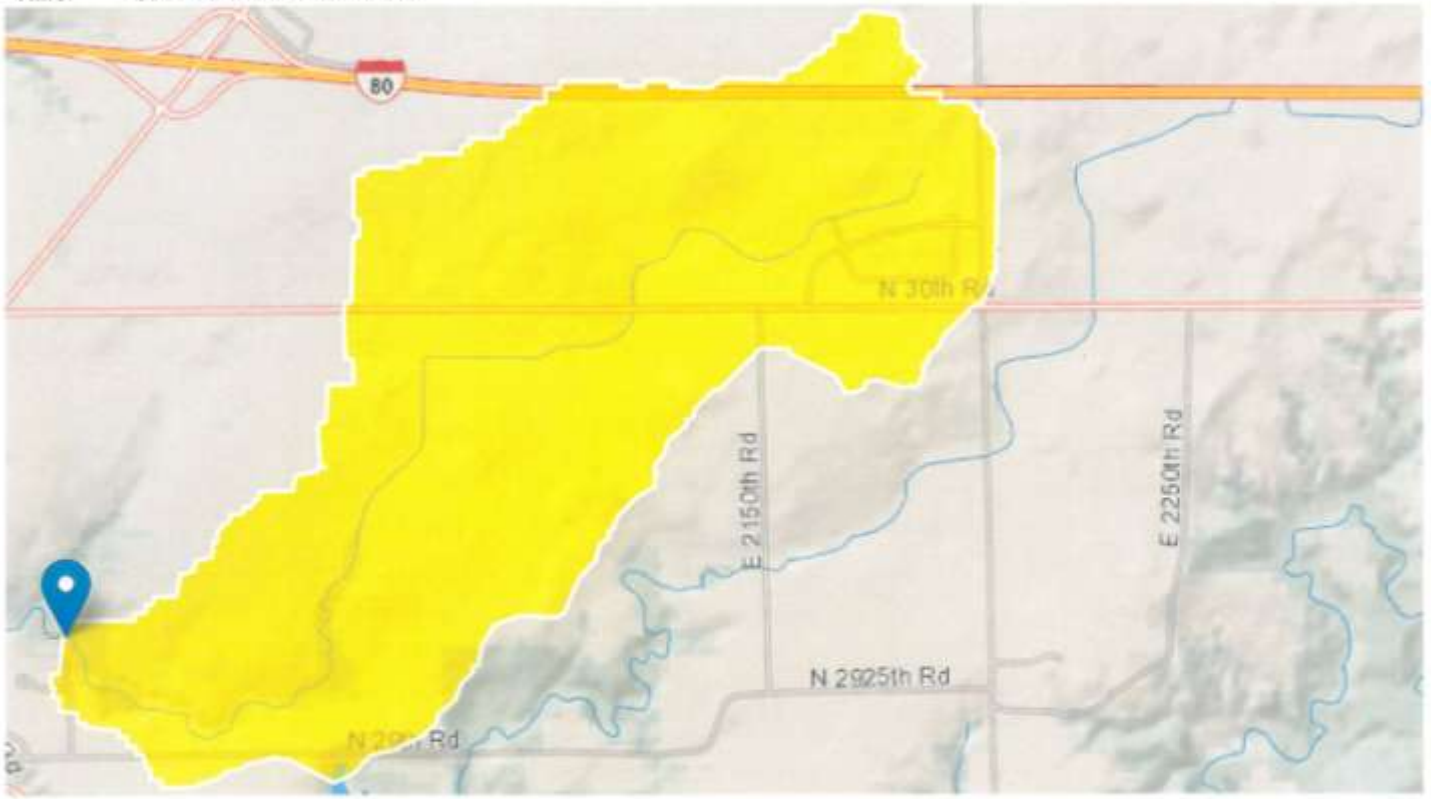



StreamStats
Secure | https://streamstats.usgs.gov/ss/
Apps Google City of Ottawa, IL - W Google Calendar Imported From IE 2013 CRS Coordinat FEMA's National Flo CONNECTExplorer™ LaSalle County, IL GIS Ensemble Quantitati Ottawafloods.org
USGS StreamStats
Report
About
Help
SELECT A STATE / REGION
Illinois
IDENTIFY A STUDY AREA
Step 3: Use your mouse or finger to click or tap a blue stream cell on the map
Delineate
SELECT SCENARIOS
BUILD A REPORT
POWERED BY WIM
USGS Home Contact USGS Search USGS
Exploration Tools
Layers
+
−
Zoom Level: 17
Map Scale: 1:4,513
Lat: 41.3588, Lon: -88.7880
50 m
200 ft
Leaflet | Esri, DigitalGlobe, GeoEye, i-cubed, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community,
Type here to search
4:21 PM
2/15/2018


StreamStats
Secure | https://streamstats.usgs.gov/ss/
Apps Google City of Ottawa, IL - W Google Calendar Imported From IE 2013 CRS Coordinat FEMA's National Flo CONNECTExplorer™ LaSalle County, IL GIS Ensemble Quantitati Ottawafloods.org
USGS StreamStats
Report
About
Help
basin characteristics here, then select the types of reports you wish to generate. Then click the "Build Report" button
Show Basin Characteristics
Select available reports to display:
Basin Characteristics Report
Scenario Flow Reports
Continue
POWERED BY WIM
Exploration Tools
Layers
+
−
O'Neill Branch
Zoom Level: 14
Map Scale: 1:36,111
Lat: 41.3771, Lon: -88.7617
500 m
2000 ft
Leaflet | Esri, DigitalGlobe, GeoEye, i-cubed, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community,
Woodridge Strea....html
Show all
Type here to search
4:25 PM
2/15/2018

Woodridge

Region ID: IL
Workspace ID: IL20180215165309356000
Clicked Point (Latitude, Longitude): 41.35777, -88.78451
Time: 2018-02-15 10:52:03 -0600



Basin Characteristics

Parameter Code	Parameter Description	Value	Unit
DRNAREA	Area that drains to a point on a stream	1.65	square miles
FLC11DVLMH	Fraction of drainage area that is in low to high developed land-use classes 22-24 from NLCD 2011	0.041	decimal fraction

Parameter Code	Parameter Description	Value	Unit
FSSURGDC78	Fraction of land area that is in very poorly drained and unknown likely water drainage classes 7 and 8 from SSURGO	0	decimal fraction
RELRELF	Basin relief divided by basin perimeter	16.53	feet per mi

Peak-Flow Statistics Parameters [Region 2 Peak Rural and Urban 2016 5050]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	1.65	square miles	0.078	1351
FLC11DVLMH	Frac_Lo_Med_Hi_Developed_from_NLCD2011	0.041	decimal fraction	0.0022	0.979
FSSURGDC78	Fraction_SSURGO_Drainage_Classes_7_and_8	0	decimal fraction	0	0.256
RELRELF	Relative Relief	16.53	feet per mi	0.821	37.3

Peak-Flow Statistics Flow Report [Region 2 Peak Rural and Urban 2016 5050]

PII: Prediction Interval-Lower, PIu: Prediction Interval-Upper, SEp: Standard Error of Prediction, SE: Standard Error (other -- see report)

Statistic	Value	Unit	PII	PIu	SEp
Urban 2 Year Peak Flood	124	ft^3/s	58.5	261	46
Urban 5 Year Peak Flood	230	ft^3/s	107	493	47.1
Urban 10 Year Peak Flood	315	ft^3/s	143	695	49.6
Urban 25 Year Peak Flood	436	ft^3/s	188	1010	52.9
Urban 50 Year Peak Flood	535	ft^3/s	221	1300	55.9
Urban 100 Year Peak Flood	642	ft^3/s	253	1630	59.4
Urban 500 Year Peak Flood	916	ft^3/s	327	2560	66.9

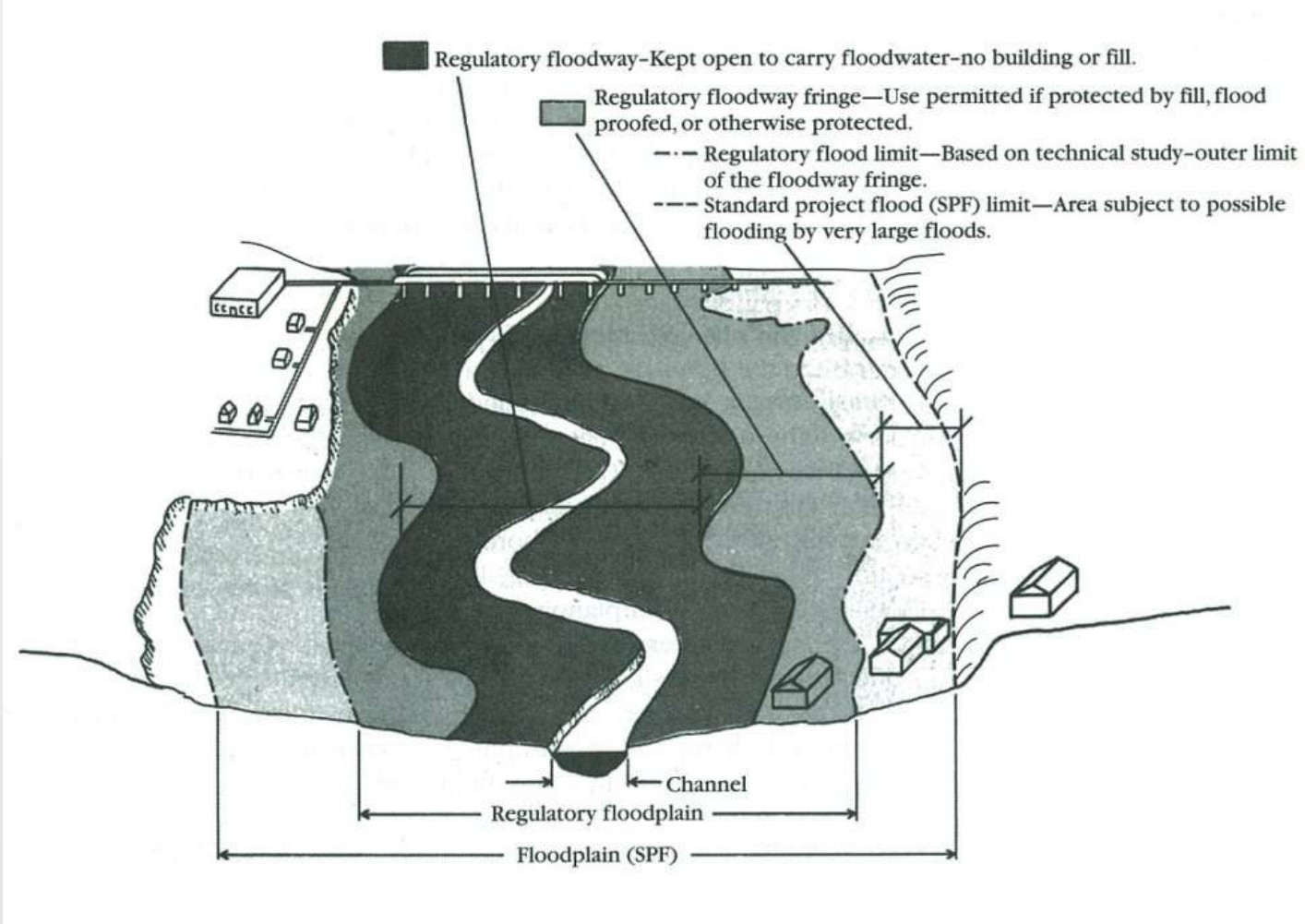
Peak-Flow Statistics Citations

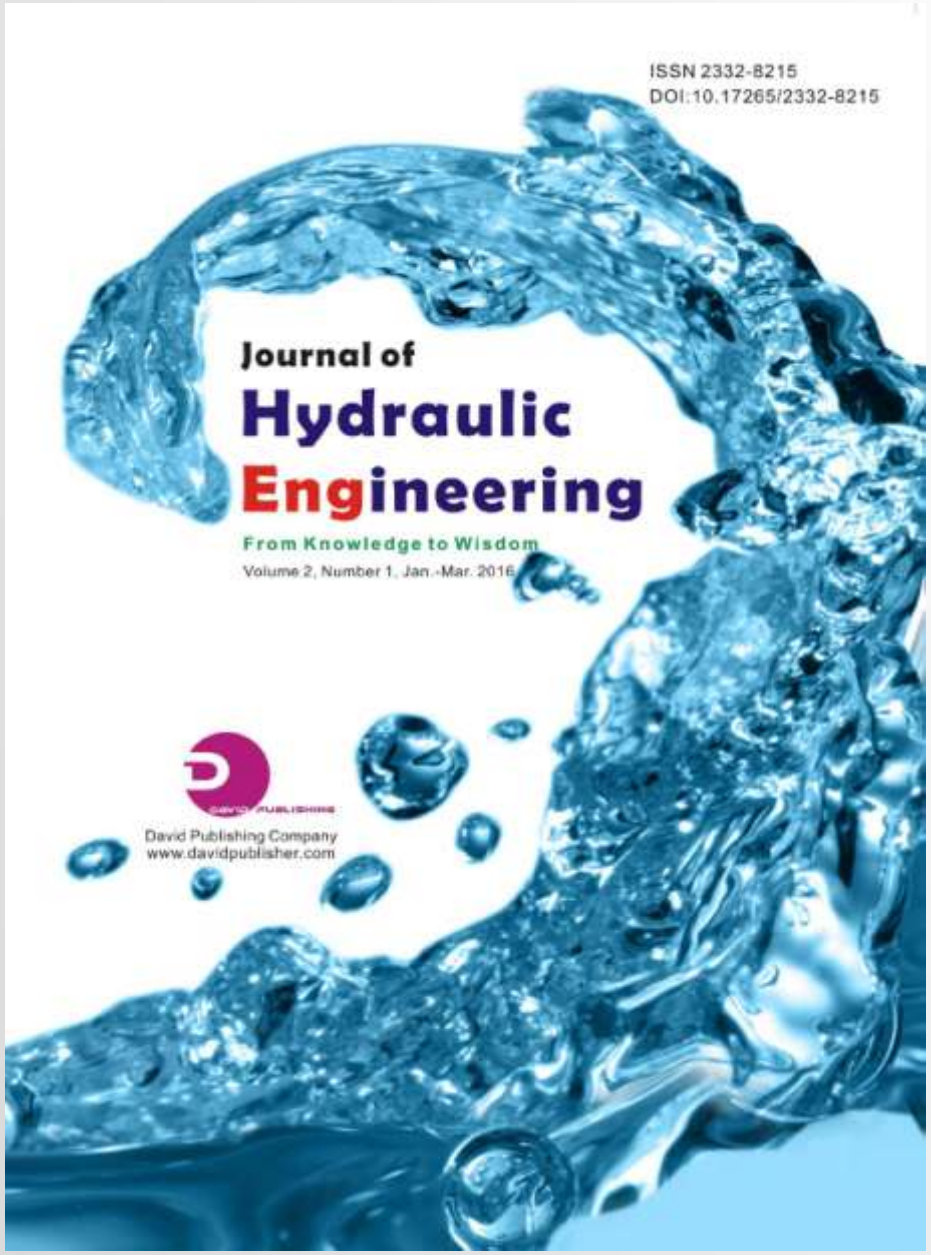
Over, T.M. , Saito, R.J., Veilleux, A.G., Sharpe, J.B., Soong, D.T., and Ishii, A.L.,2016, Estimation of peak discharge quantiles for selected annual exceedance probabilities in northeastern Illinois: U.S. Geological Survey Scientific Investigations Report 2016-5050, 50 p. (http://dx.doi.org/10.3133/sir20165050)

Let's look at peak flows for the 100 year event.

436	ft^3/s	188	1010	52.9
535	ft^3/s	221	1300	55.9
642	ft^3/s	253	1630	59.4

642 Cubic Feet per Second
7.48 Gallons per Cubic Foot
642 x 7.48 = 4802 Gallons per Second
Or
288,120 Gallons per minute!

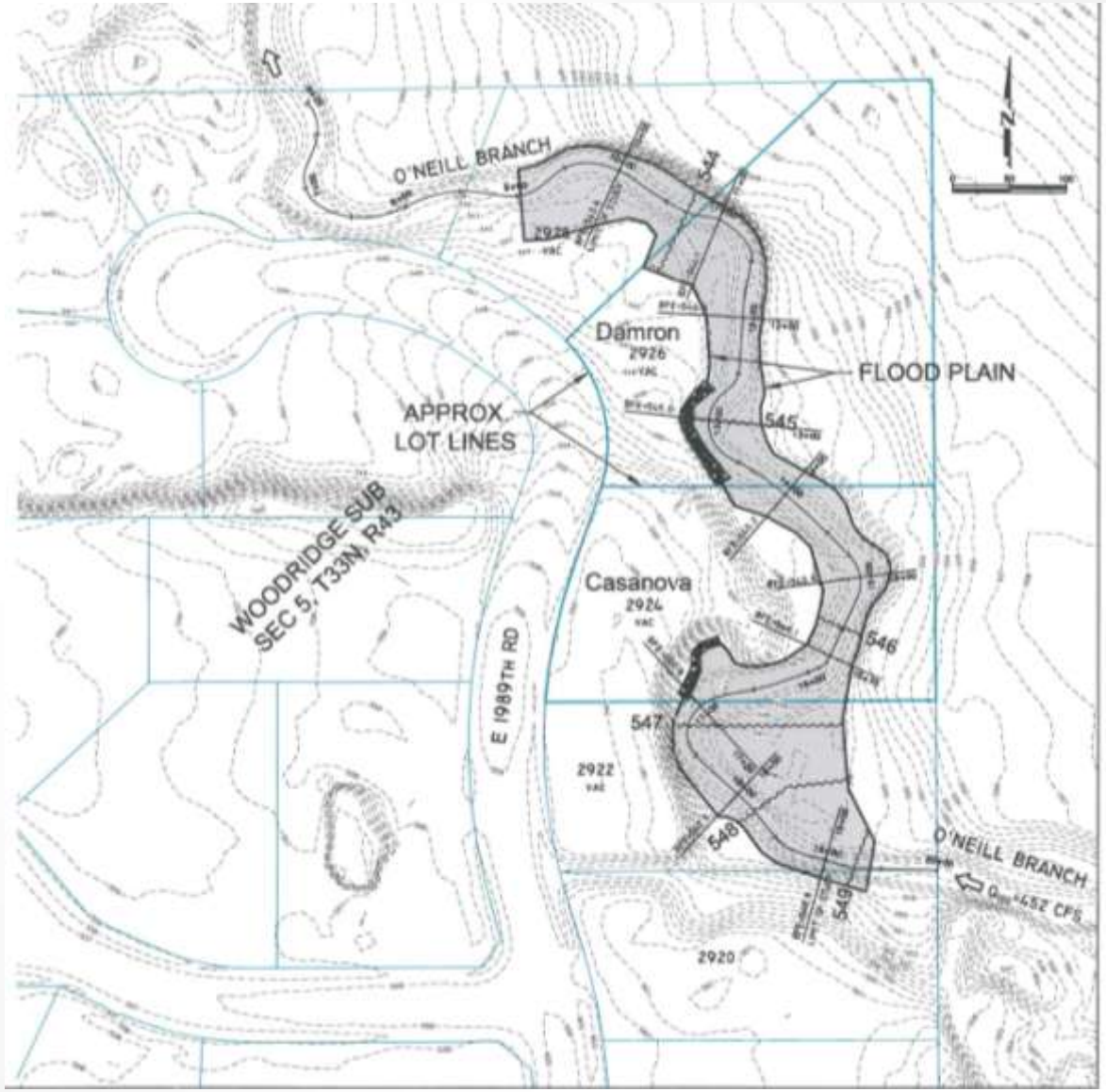


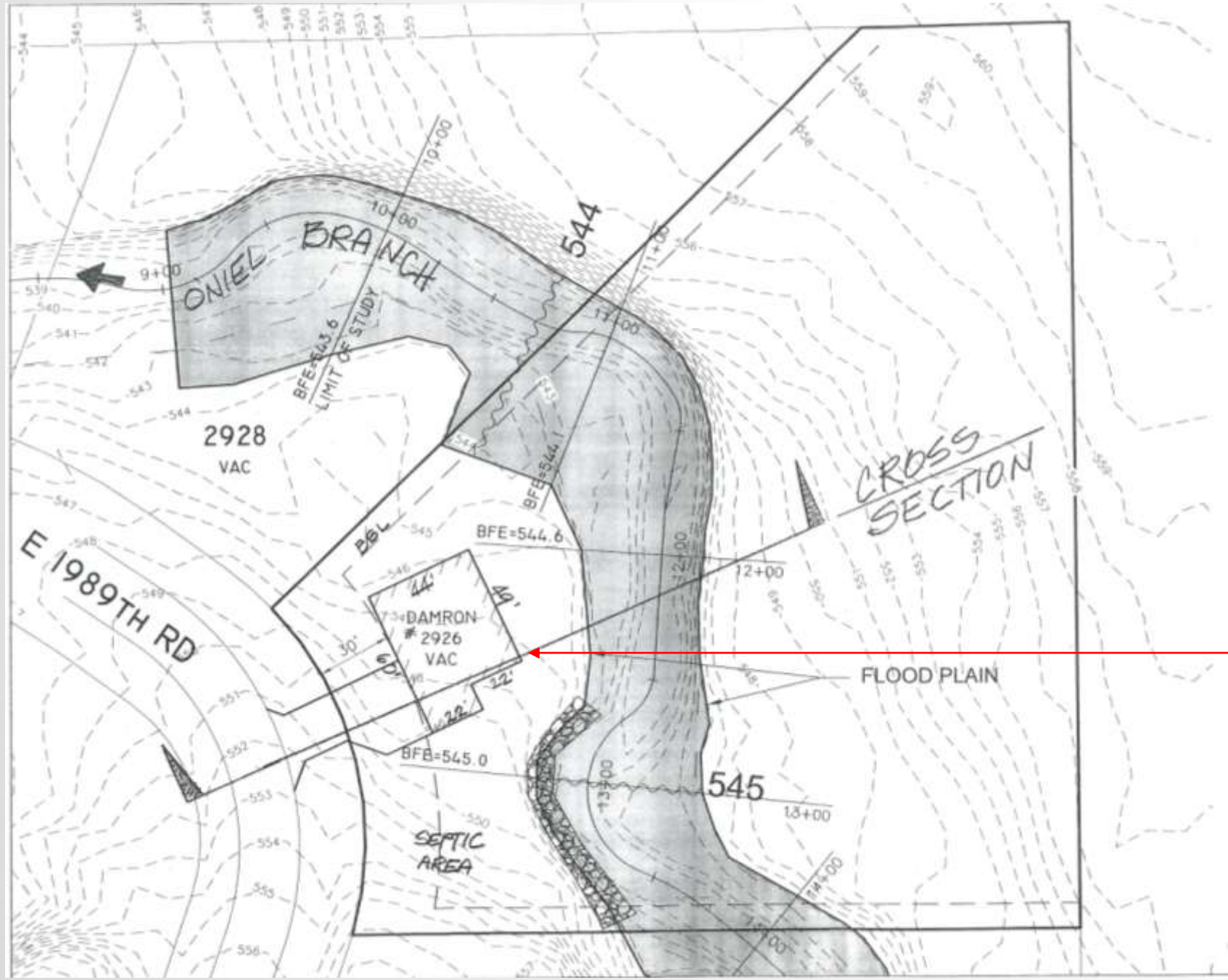


TIME FOR A HYDRAULIC ANALYSIS TO DETERMINE THE BFE

"One of the keys to affordability of this flood study project was the availability of the City's topographic mapping with 1' contour interval.

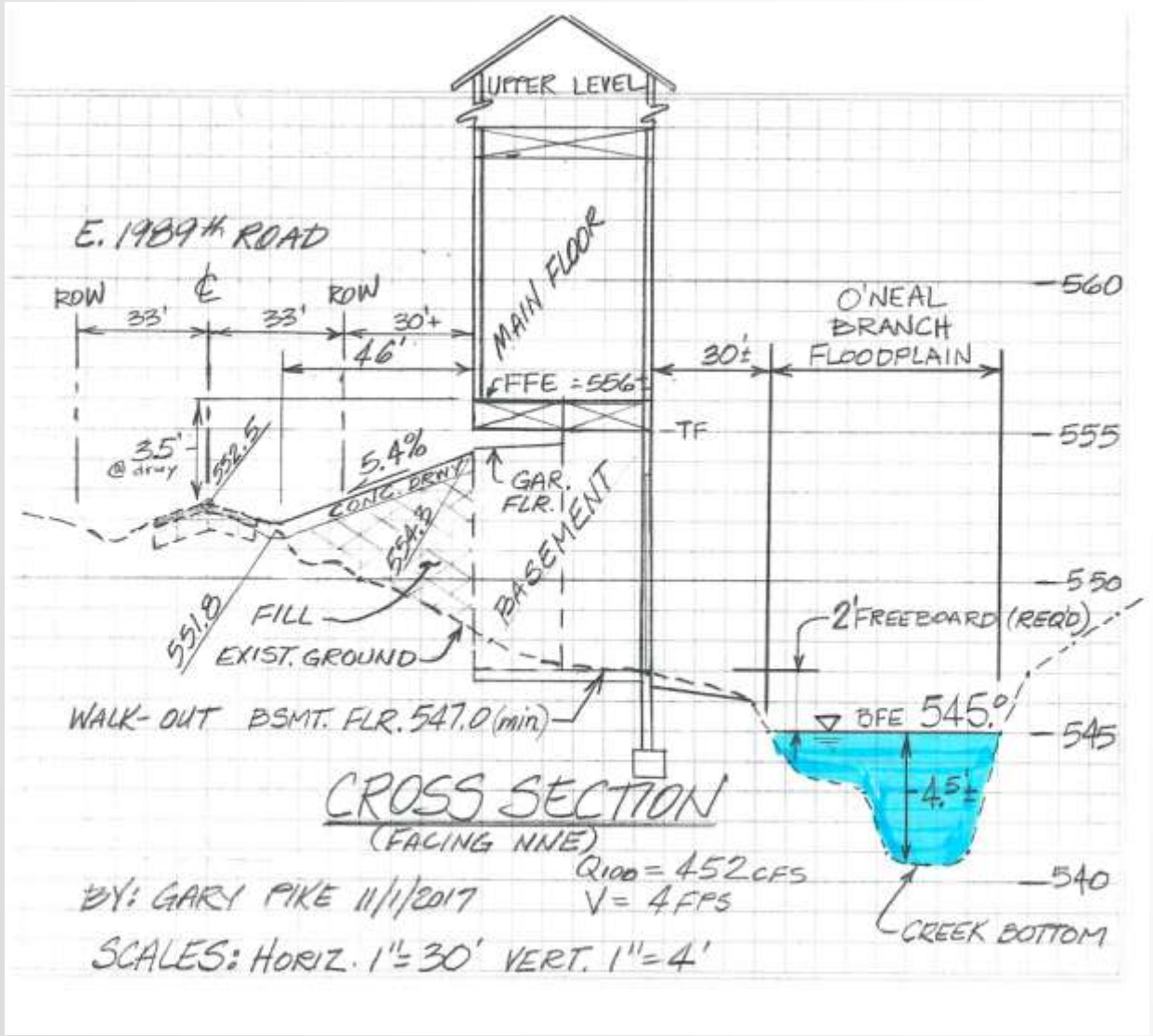
In the absence of such mapping we must perform conventional stream cross section surveys, which can impact the affordability of the flood study." Consulting Engineer



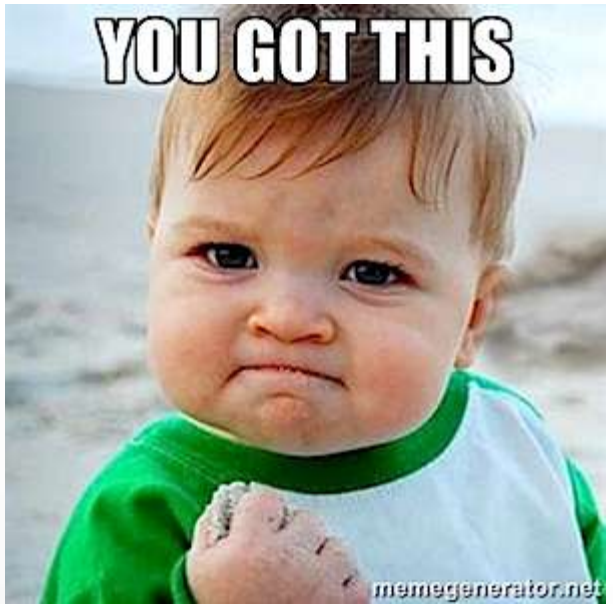


ONCE THE BASE FLOOD ELEVATION HAD BEEN ESTABLISHED, THE REST IS ROUTINE

FOUNDATION LOCATION



1. Provides certainty that the codes are met, i.e., freeboard, compensatory storage, septic placement, etc.
2. An elevation certificate after construction will ensure the building is outside the SFHA.

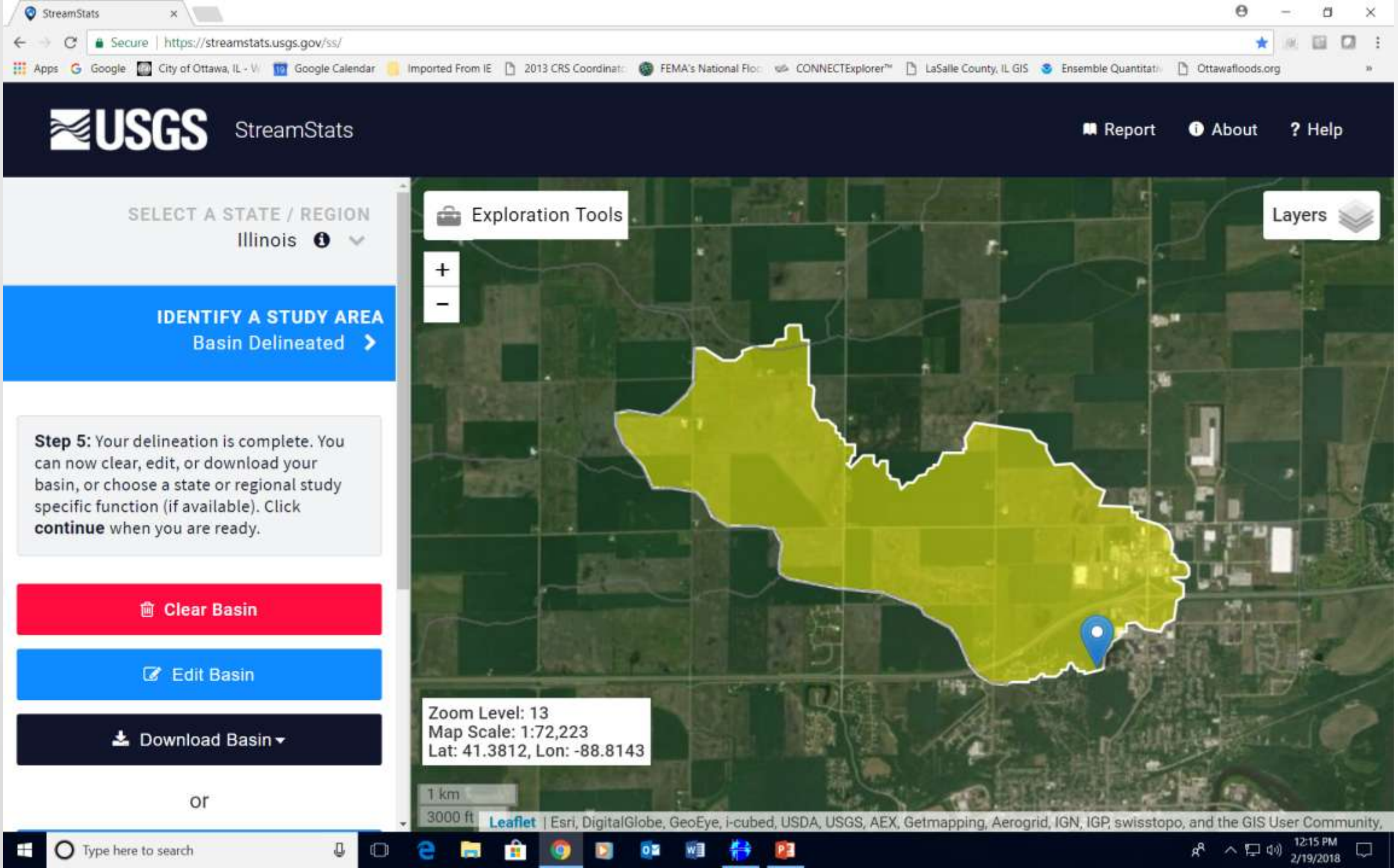


Case # 2

DEER CREEK SUBDIVISION AT THE GOOSE CREEK

1st time home buyer asked for help locating the foundation.

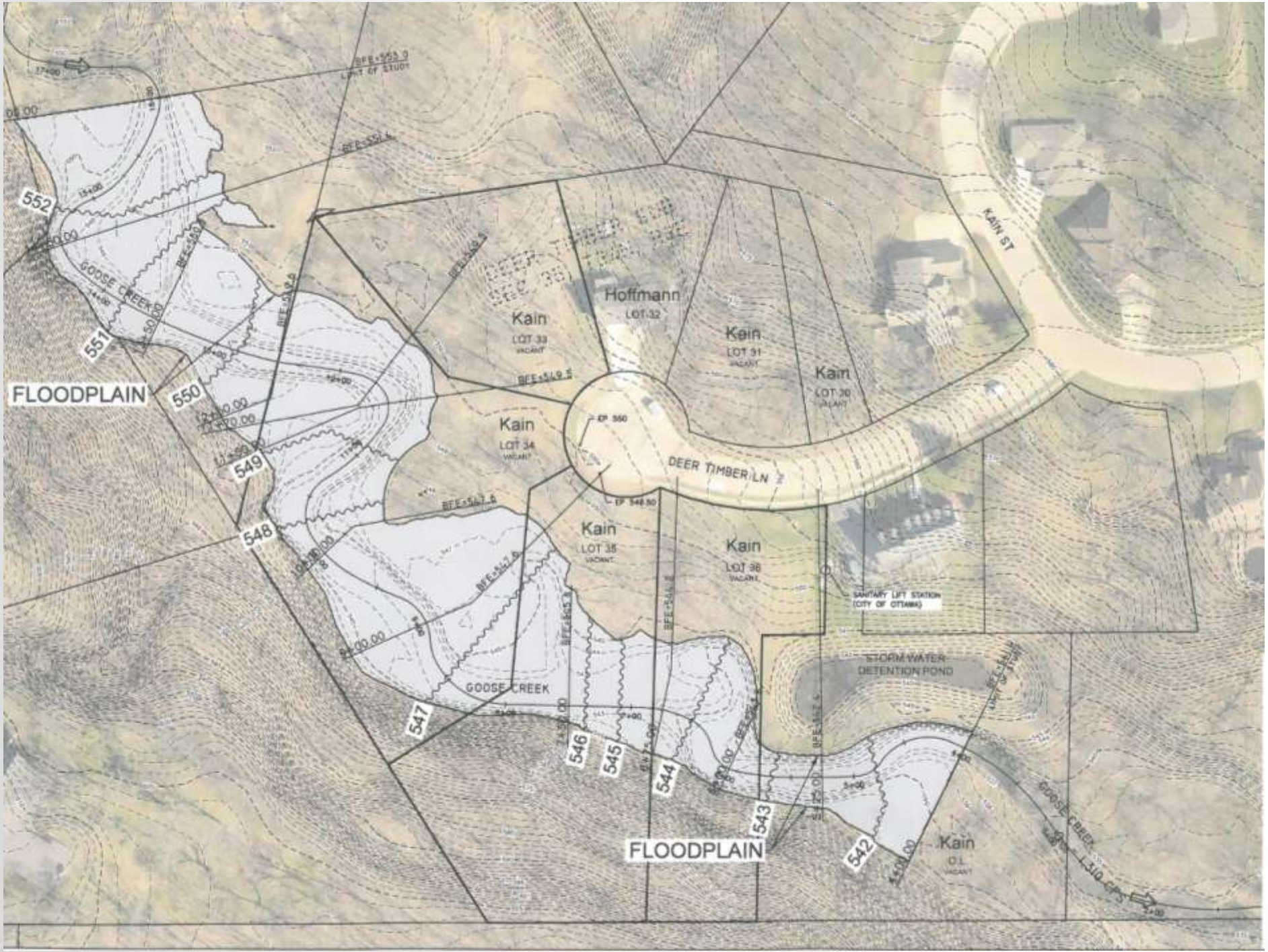
Another area not mapped


StreamStats
Secure | https://streamstats.usgs.gov/ss/
Apps Google City of Ottawa, IL - W Google Calendar Imported From IE 2013 CRS Coordinat FEMA's National Flo CONNECTExplorer™ LaSalle County, IL GIS Ensemble Quantitati Ottawafloods.org
USGS StreamStats
Report
About
Help
SELECT A STATE / REGION
Illinois
IDENTIFY A STUDY AREA
Basin Delineated
Step 5: Your delineation is complete. You can now clear, edit, or download your basin, or choose a state or regional study specific function (if available). Click continue when you are ready.
Clear Basin
Edit Basin
Download Basin
or
Exploration Tools
Layers
+
−
Zoom Level: 13
Map Scale: 1:72,223
Lat: 41.3812, Lon: -88.8143
1 km
3000 ft
Leaflet | Esri, DigitalGlobe, GeoEye, i-cubed, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community,
Type here to search
12:15 PM
2/19/2018

USGS REPORT SHOWS PEAK FLOW FOR THE 1% EVENT IS 1310 CFS

THAT IS ABOUT 587,928 GALLONS PER MINUTE

ONCE AGAIN, ONE FOOT CONTOUR INFORMATION KEEPS THE STUDY AFFORDABLE AND WAS NOT A DEAL BREAKER FOR THE BUYER



At first the developer was upset and reluctant to commit to have the study done.

The buyer was insistent and refused to move further without this information.

The City refused to issue a building permit without this information

The submitted site plan had to be changed as the foundation (walk-out) would have been in the floodplain.

Better information prevents flood damage.