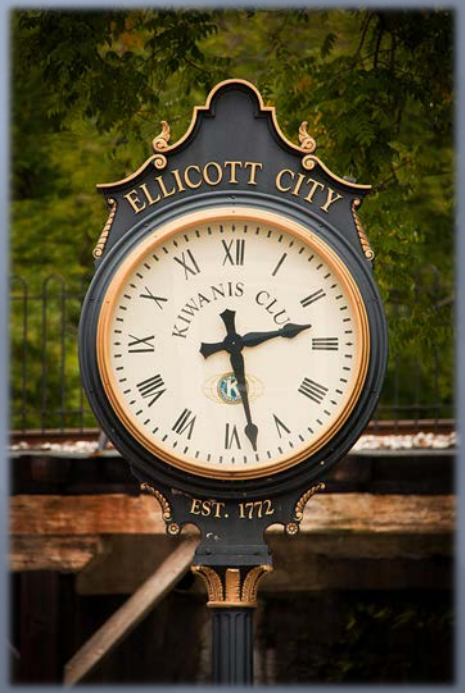
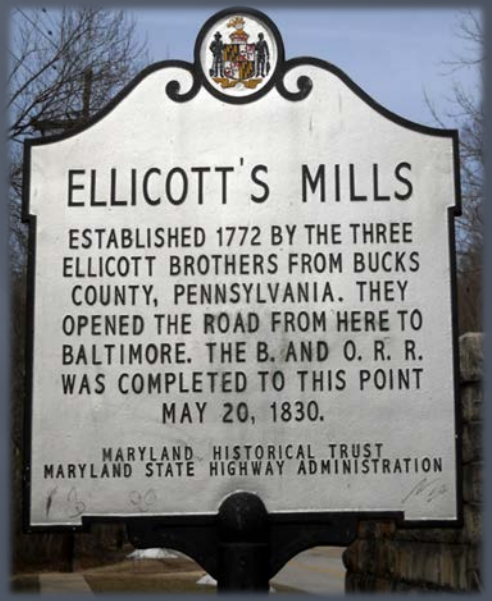
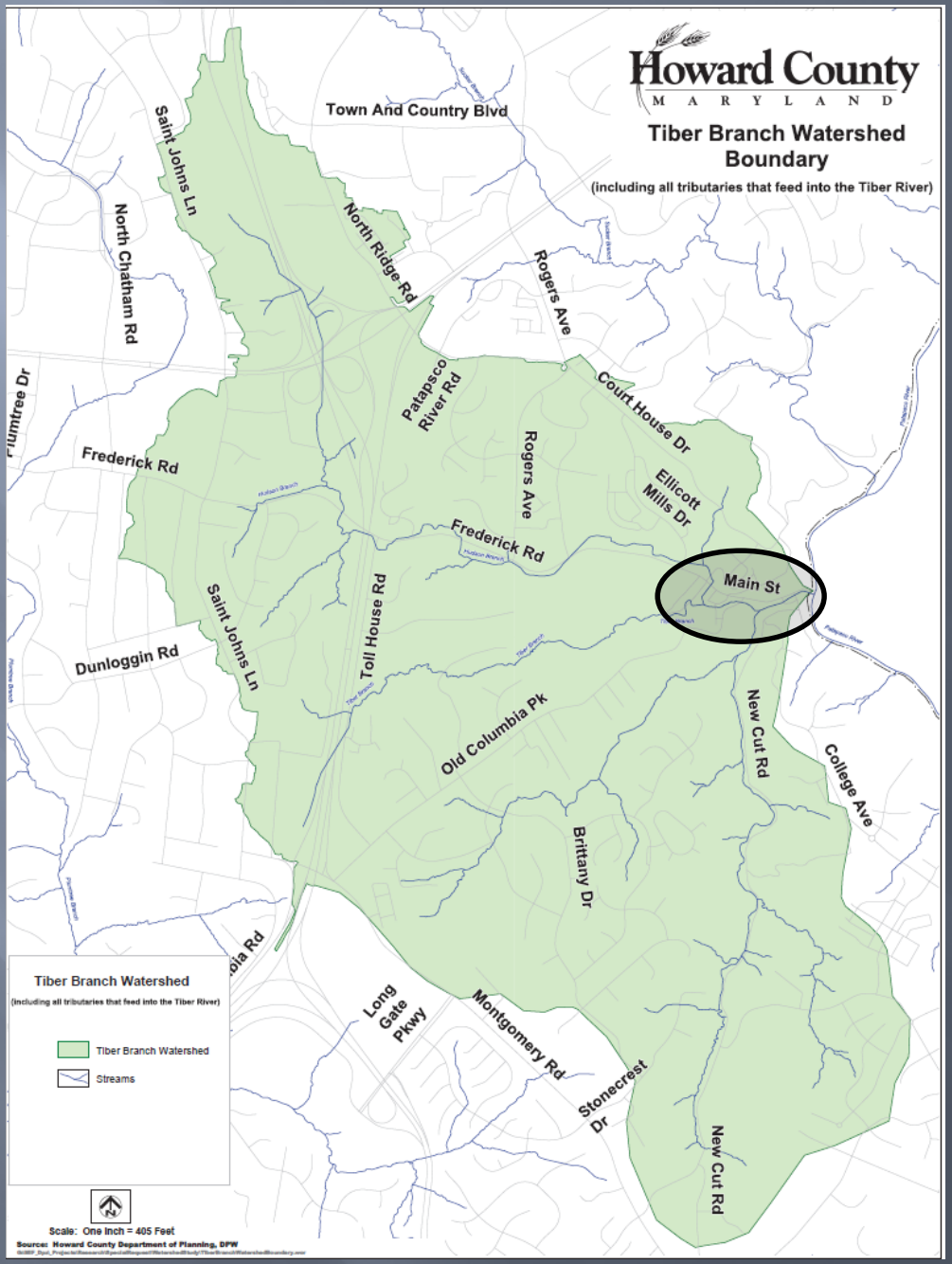
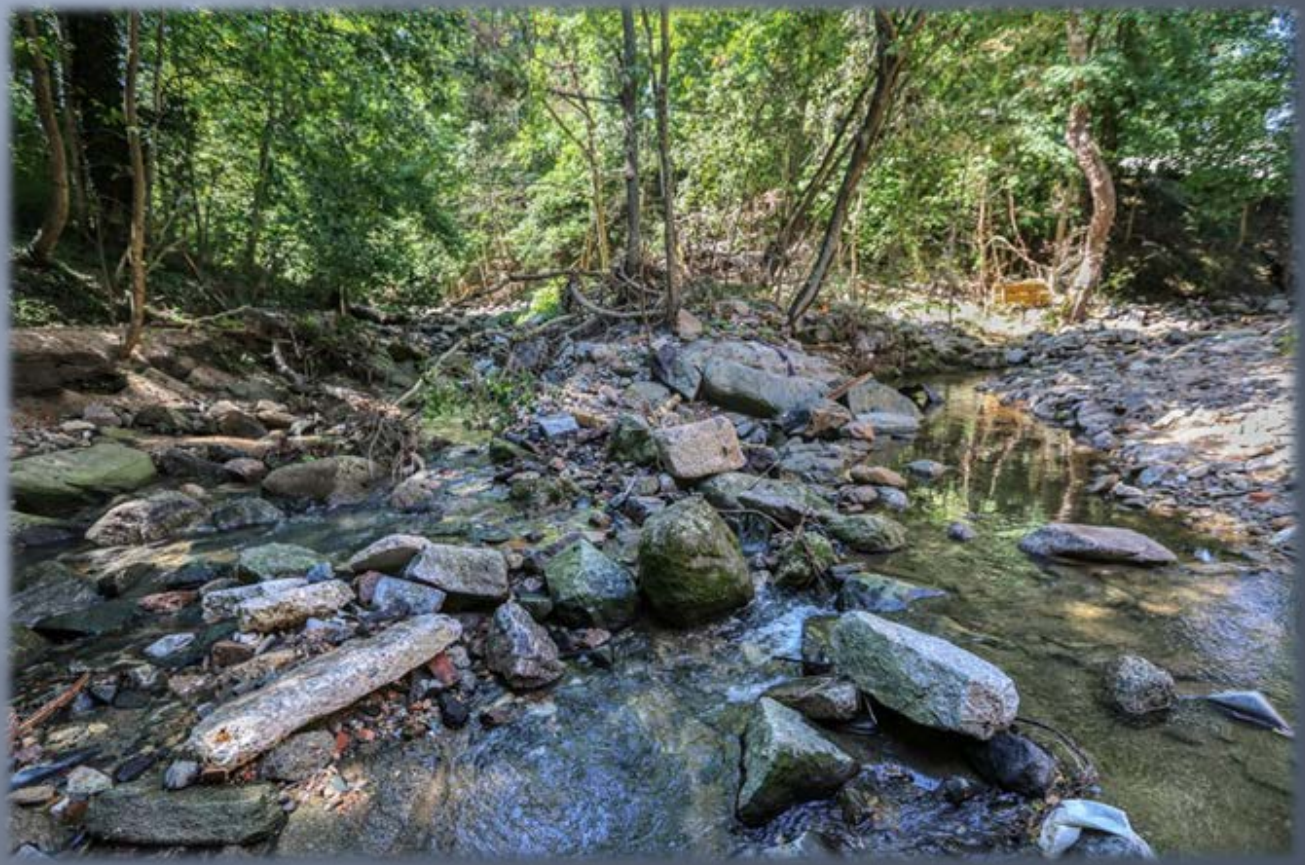
OLD ELLICOTT CITY FLOOD OF 2016



Past History
Present Situation
Future Considerations

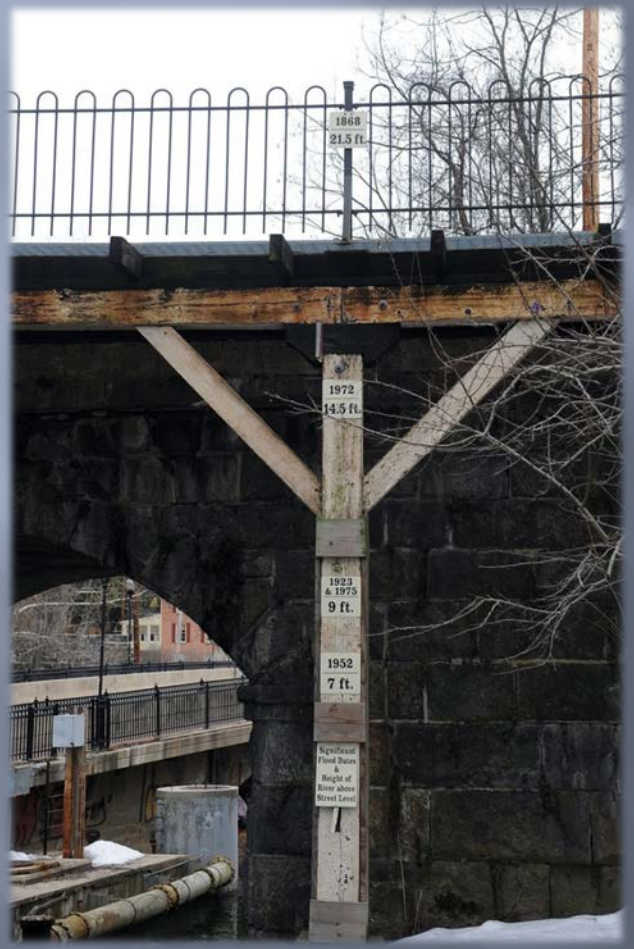



Howard County
MARYLAND
Tiber Branch Watershed Boundary
(including all tributaries that feed into the Tiber River)
Town And Country Blvd
Saint Johns Ln
North Chatham Rd
North Ridge Rd
Rogers Ave
Patapsco River Rd
Court House Dr
Ellicott Mills Dr
Frederick Rd
Main St
Dunloggin Rd
Toll House Rd
Old Columbia Pk
New Cut Rd
College Ave
Brittany Dr
Long Gate Pkwy
Montgomery Rd
Stonecrest Dr
Tiber Branch Watershed
(including all tributaries that feed into the Tiber River)
Tiber Branch Watershed
Streams
Scale: One Inch = 405 Feet
Source: Howard County Department of Planning, DPW

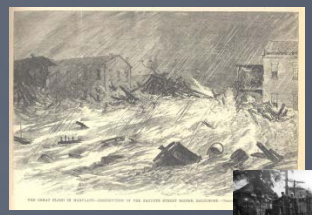



©Peter Edelman

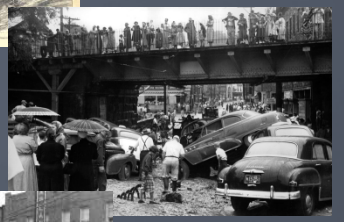
The Ellicott City Floods



1868



1952

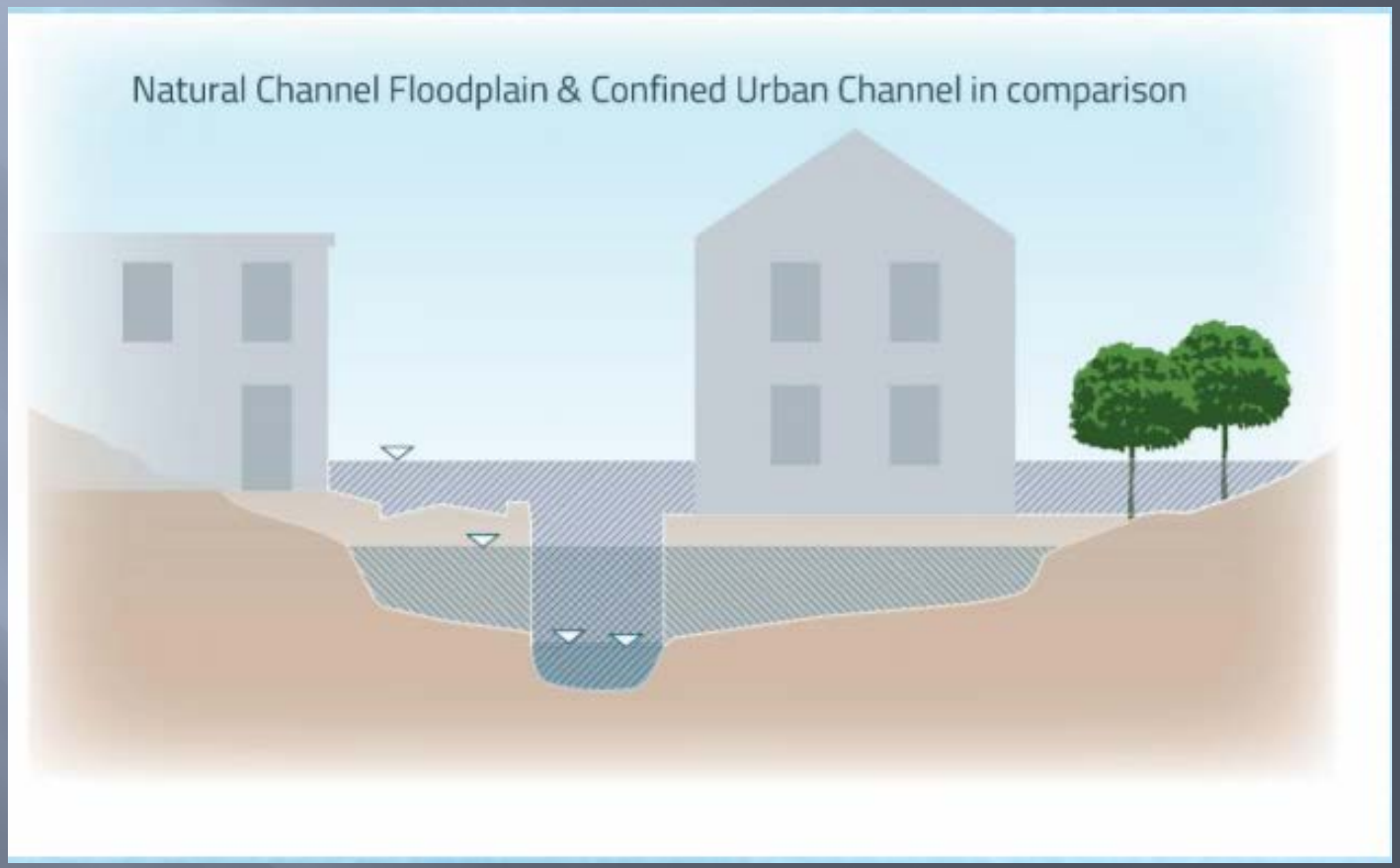


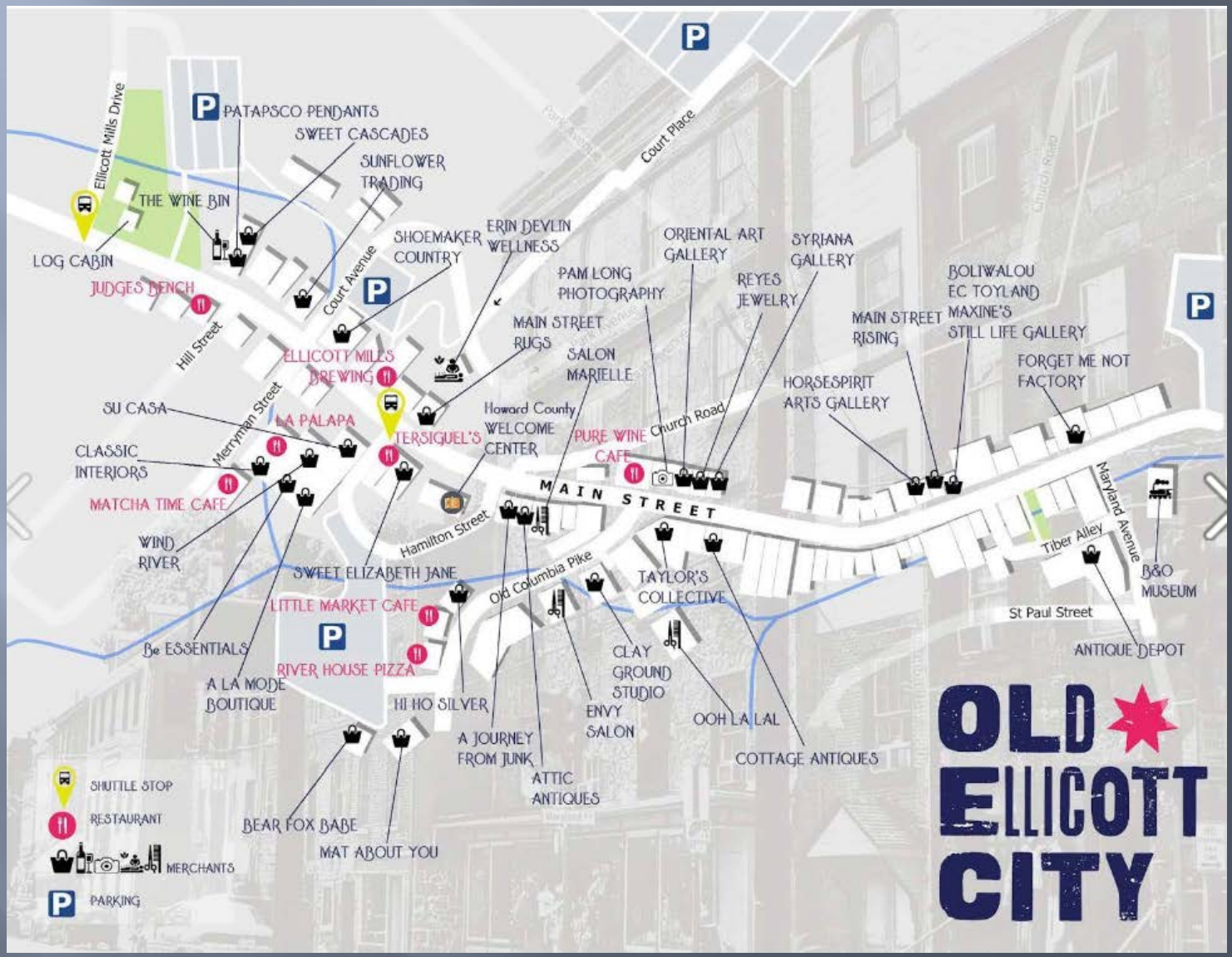
1972

1975

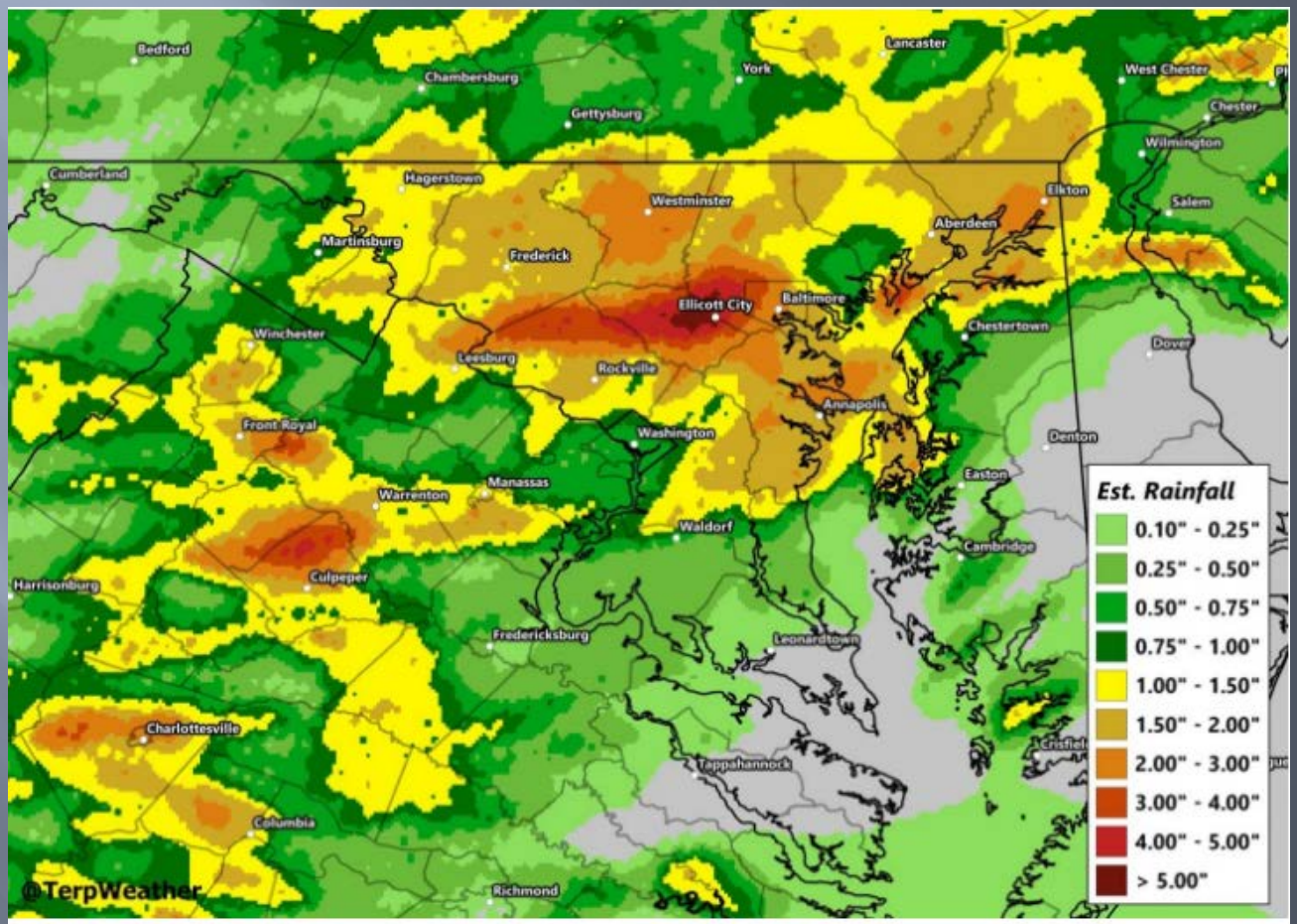
2011

2016


Natural Channel Floodplain & Confined Urban Channel in comparison


Ellicott Mills Drive
PATAPSCO PENDANTS
SWEET CASCADES
SUNFLOWER TRADING
THE WINE BIN
LOG CABIN
JUDGES BENCH
Court Avenue
SHOEMAKER COUNTRY
ERIN DEVLIN WELLNESS
Court Place
ORIENTAL ART GALLERY
SYRIANA GALLERY
PAM LONG PHOTOGRAPHY
REYES JEWELRY
BOLIWALOU
EC TOYLAND
MAXINE'S
STILL LIFE GALLERY
MAIN STREET RISING
Hill Street
MAIN STREET RUGS
SALON MARIELLE
ELLICOTT MILLS BREWING
FORGET ME NOT FACTORY
HORSESPIRIT ARTS GALLERY
SU CASA
Merryman Street
LA PALAPA
TERSIGUEL'S
Howard County WELCOME CENTER
PURE WINE CAFE
Church Road
CLASSIC INTERIORS
MATCHA TIME CAFE
MAIN STREET
Maryland Avenue
Tiber Alley
WIND RIVER
Hamilton Street
SWEET ELIZABETH JANE
Old Columbia Pike
TAYLOR'S COLLECTIVE
B&O MUSEUM
St Paul Street
LITTLE MARKET CAFE
Be ESSENTIALS
RIVER HOUSE PIZZA
CLAY GROUND STUDIO
ANTIQUE DEPOT
A LA MODE BOUTIQUE
HI HO SILVER
ENVY SALON
OOH LA LAL
A JOURNEY FROM JUNK
COTTAGE ANTIQUES
ATTIC ANTIQUES
BEAR FOX BABE
MAT ABOUT YOU
SHUTTLE STOP
RESTAURANT
MERCHANTS
PARKING
OLD ELLICOTT CITY

July 30, 2016
A Backbuilding Thunder Storm

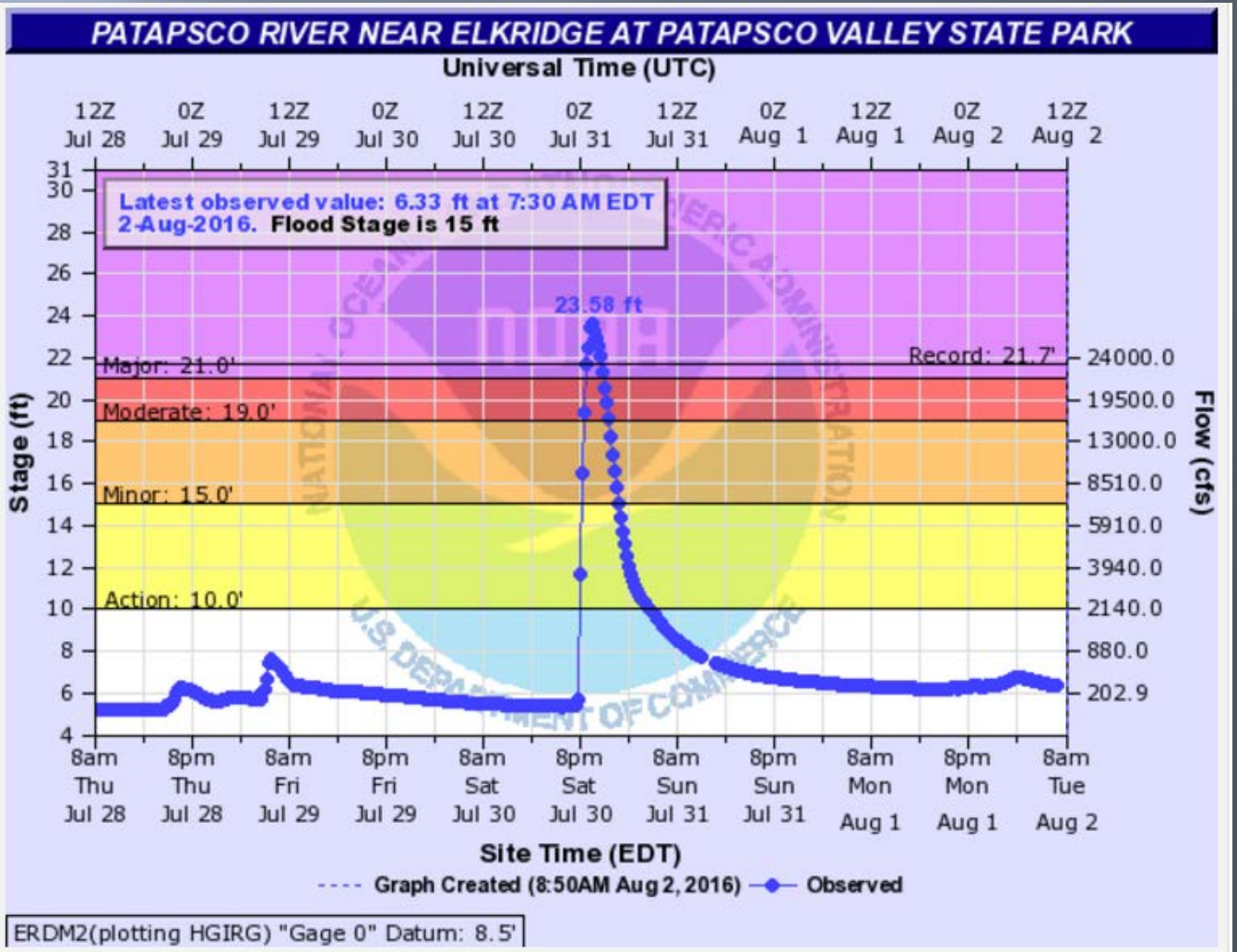


Doppler estimated rainfall for flash flood event July 30. (Jordan Tessler)

Historic Rainfall and Flash Flooding Saturday Night in Ellicott City, Maryland

Duration	Rainfall Total	Time
1 minute	0.20"	7:51-7:52 pm
5 minutes	0.80"	7:50-7:55 pm
10 minutes	1.44"	7:50-8:00 pm
15 minutes	2.04"	7:46:8:01 pm
20 minutes	2.48"	7:44-8:04 pm
30 minutes	3.16"	7:36-8:06 pm
60 minutes	4.56"	7:30-8:30 pm
90 minutes	5.52"	7:00-8:30 pm
2 hours	5.92"	6:45-8:45pm

The storm total rainfall at Ellicott City was 6.50 inches. Based on the preliminary precipitation frequency estimates in NOAA Atlas 14 from the nearest location, the rainfall amounts with duration 10 minutes to 2 hours statistically have a less 0.1% chance of occurring in any given year, or a 1 in 1000 year event.


PATAPSCO RIVER NEAR ELKRIDGE AT PATAPSCO VALLEY STATE PARK
Universal Time (UTC)
12Z Jul 28
0Z Jul 29
12Z Jul 29
0Z Jul 30
12Z Jul 30
0Z Jul 31
12Z Jul 31
0Z Aug 1
12Z Aug 1
0Z Aug 2
12Z Aug 2
Latest observed value: 6.33 ft at 7:30 AM EDT 2-Aug-2016. Flood Stage is 15 ft
23.58 ft
Record: 21.7'
Major: 21.0'
Moderate: 19.0'
Minor: 15.0'
Action: 10.0'
Stage (ft)
Flow (cfs)
31
30
28
26
24
22
20
18
16
14
12
10
8
6
4
24000.0
19500.0
13000.0
8510.0
5910.0
3940.0
2140.0
880.0
202.9
8am Thu Jul 28
8pm Thu Jul 28
8am Fri Jul 29
8pm Fri Jul 29
8am Sat Jul 30
8pm Sat Jul 30
8am Sun Jul 31
8pm Sun Jul 31
8am Mon Aug 1
8pm Mon Aug 1
8am Tue Aug 2
Site Time (EDT)
Graph Created (8:50AM Aug 2, 2016)
Observed
ERDM2(plotting HGIRG) "Gage 0" Datum: 8.5'

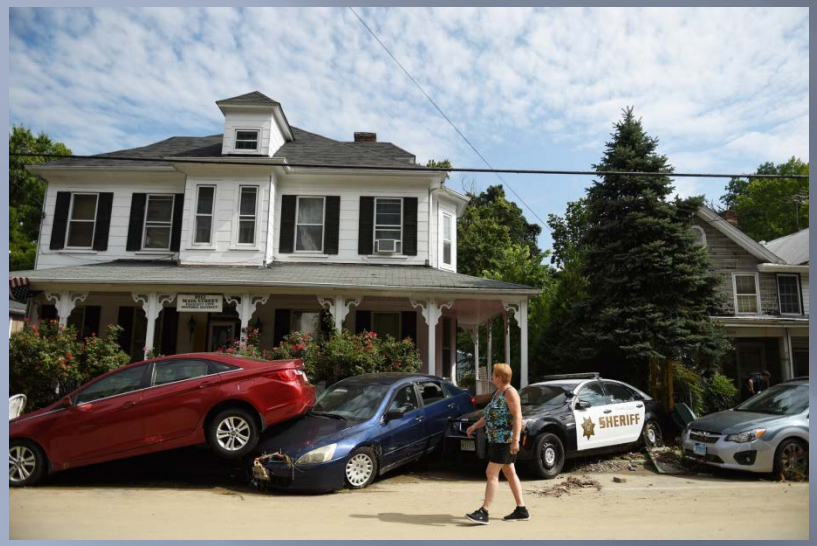
From USGS

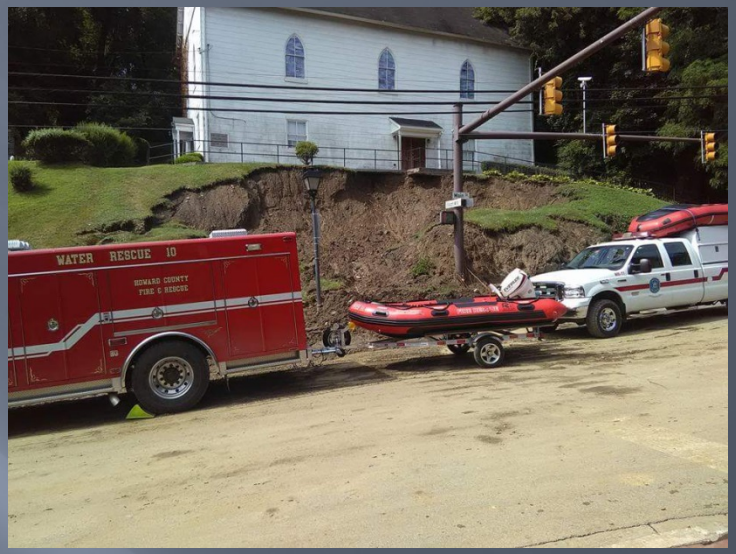
July 30 Rainfall Totals

- Ellicott City 6.5″
- Sykesville 4.6″
- Pikesville 4.3″
- Catonsville 4.2″
- Columbia 4.2″
- Towson 3.5″
- Annapolis 1.5″

The Impact

The Aftermath


SHERIFF


WATER RESCUE 10
HOWARD COUNTY
FIRE & RESCUE


rECovery
REBUILDING ELLICOTT CITY:
A RESILIENT COMMUNITY
IWANIS CLUB


C&T

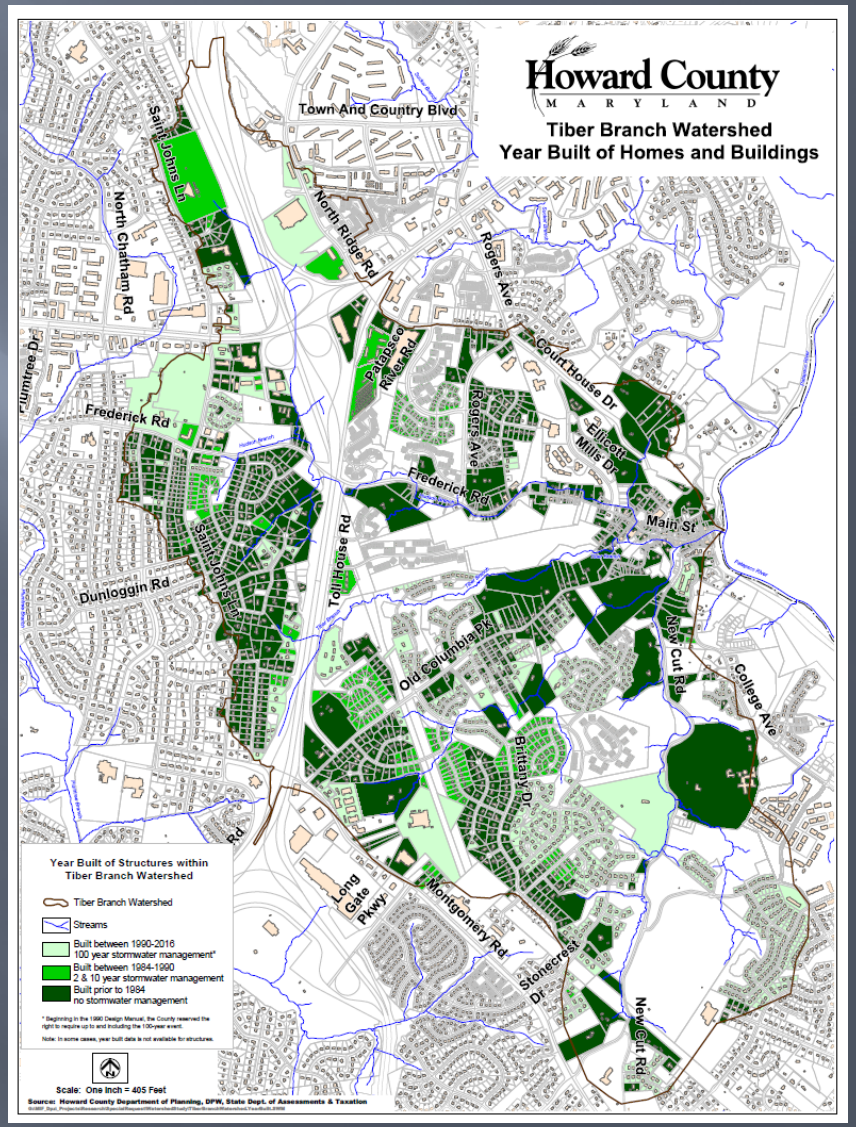

REBUILD
ELLICOTT CITY
RISE ABOVE THE WATER


REOPENE

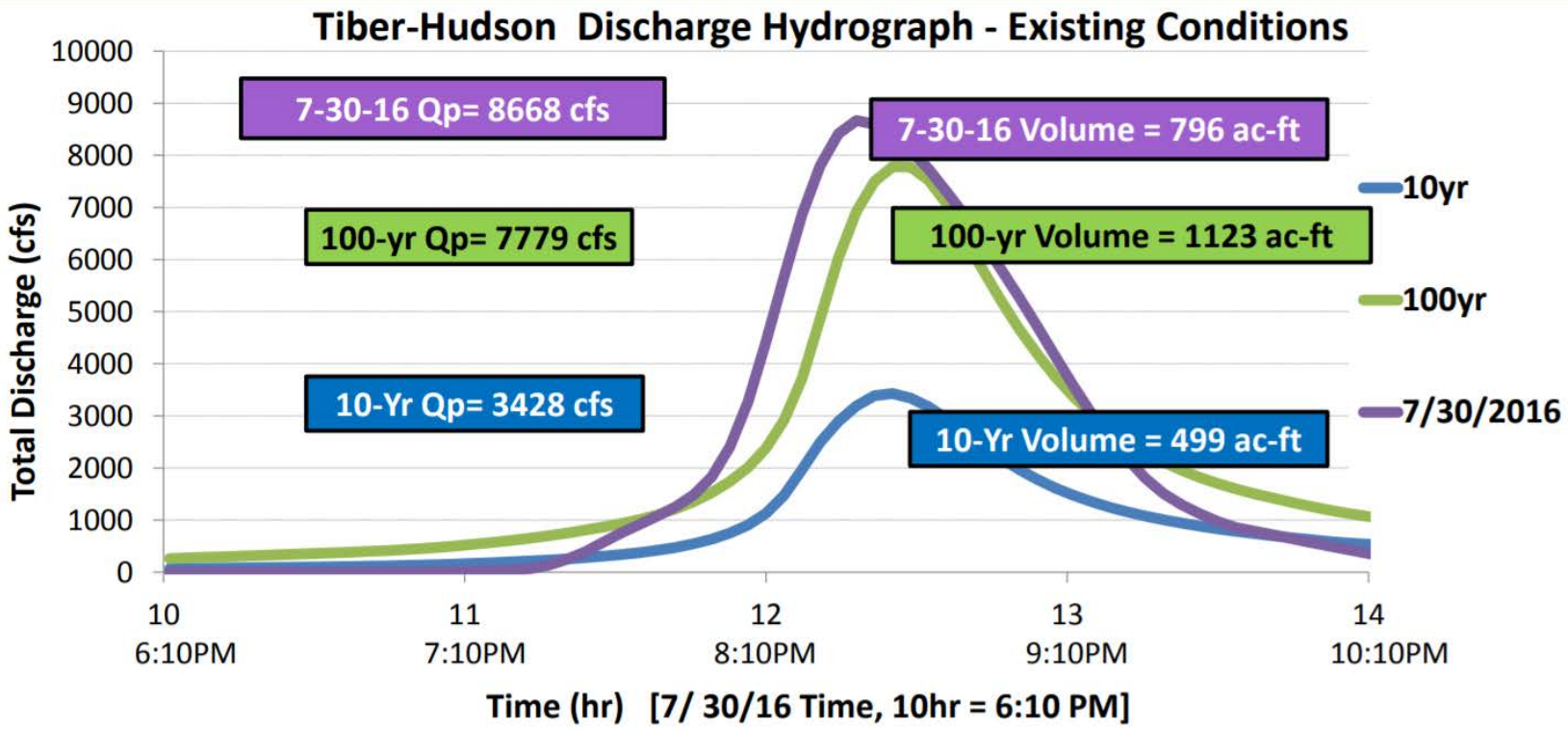

CAT

Future Planning

- Community
- Impervious Cover
- Engineering
- Economic



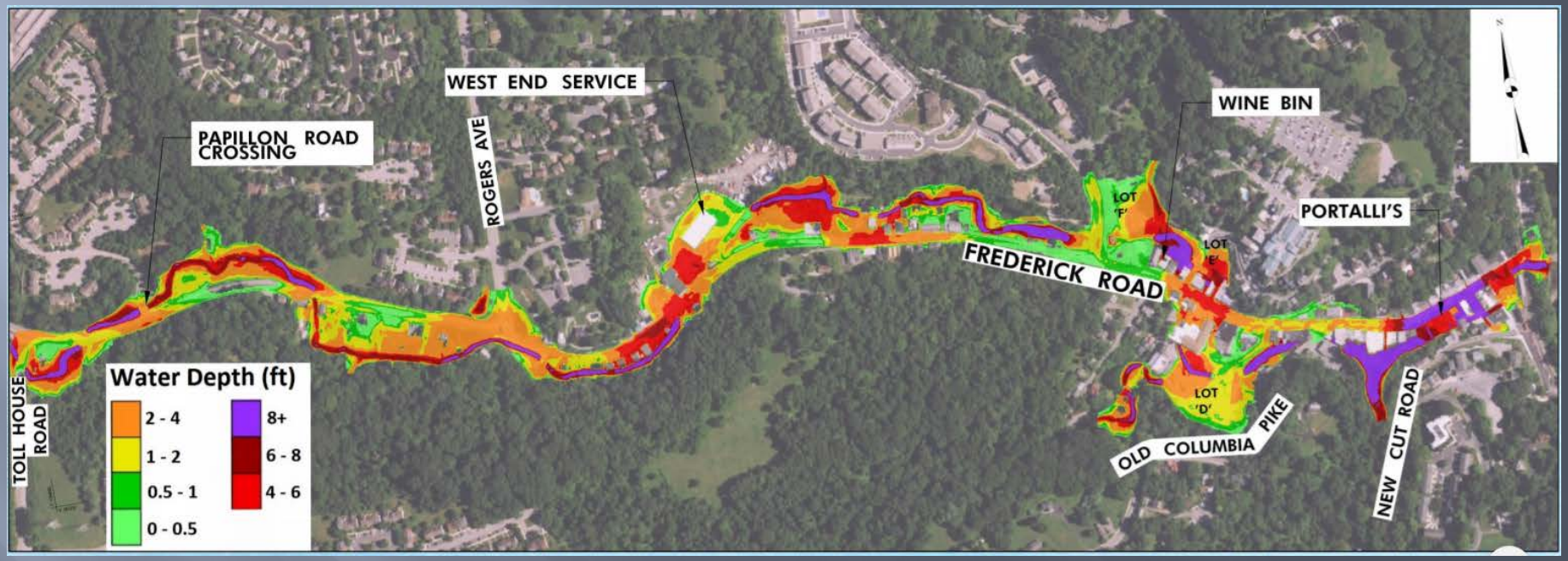
Storm Event Hydrographs – Runoff Volume



McCORMICK TAYLOR

clean HOWARD

2D Hydraulic Stream Analysis 7/30/16



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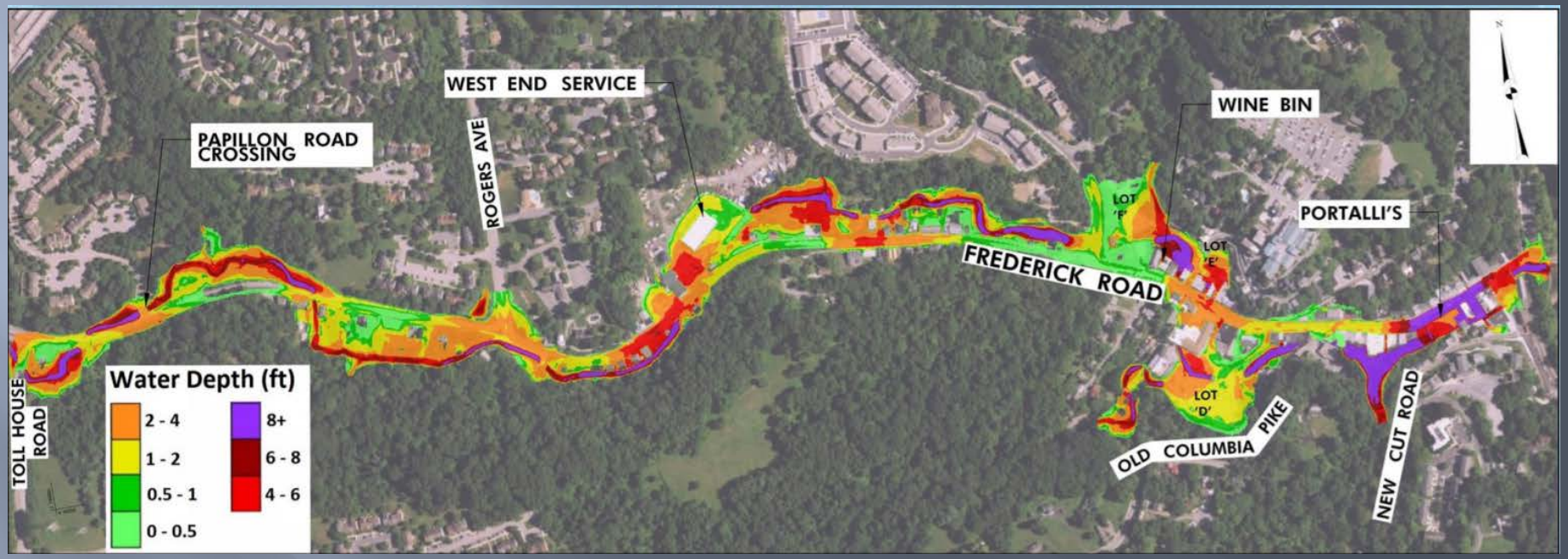
Howard County Stormwater Solutions

Hydraulic Analysis
100 Year Storm



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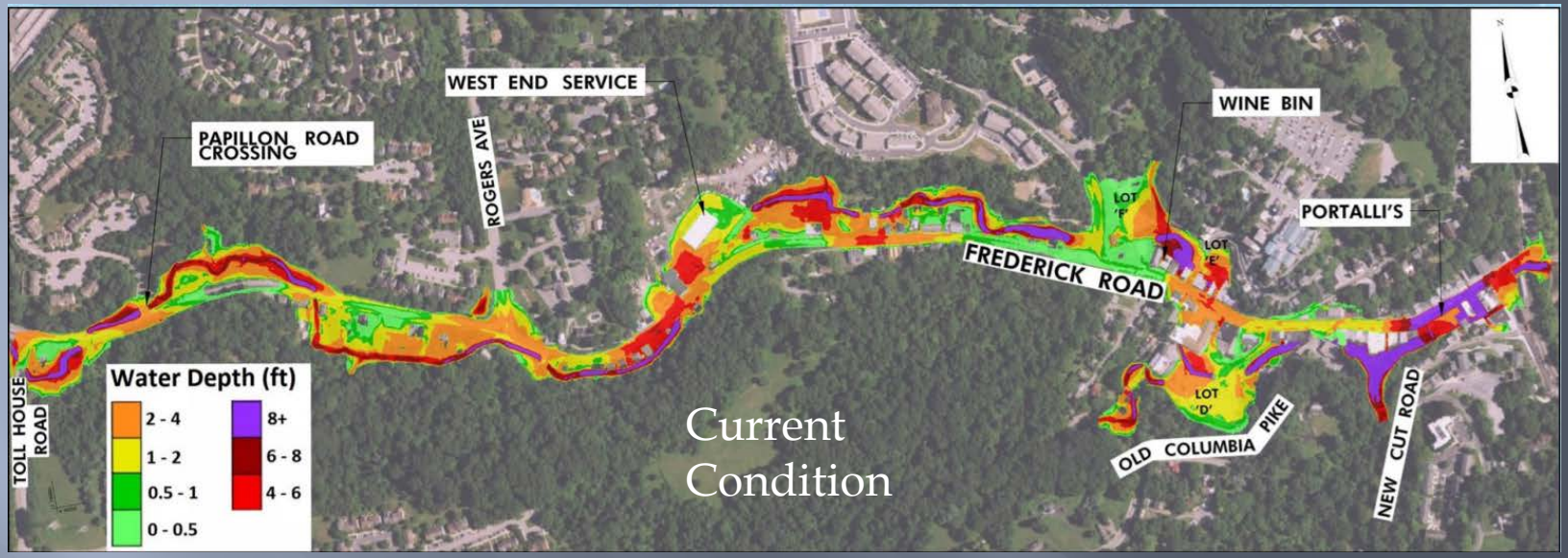
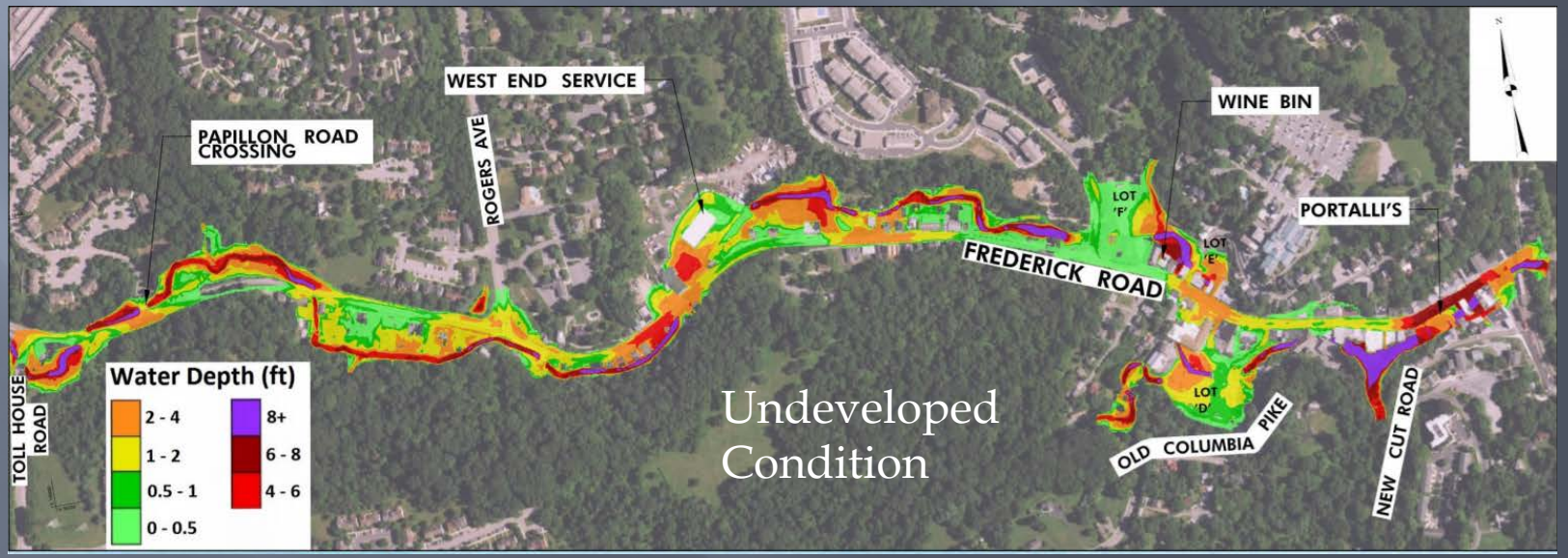
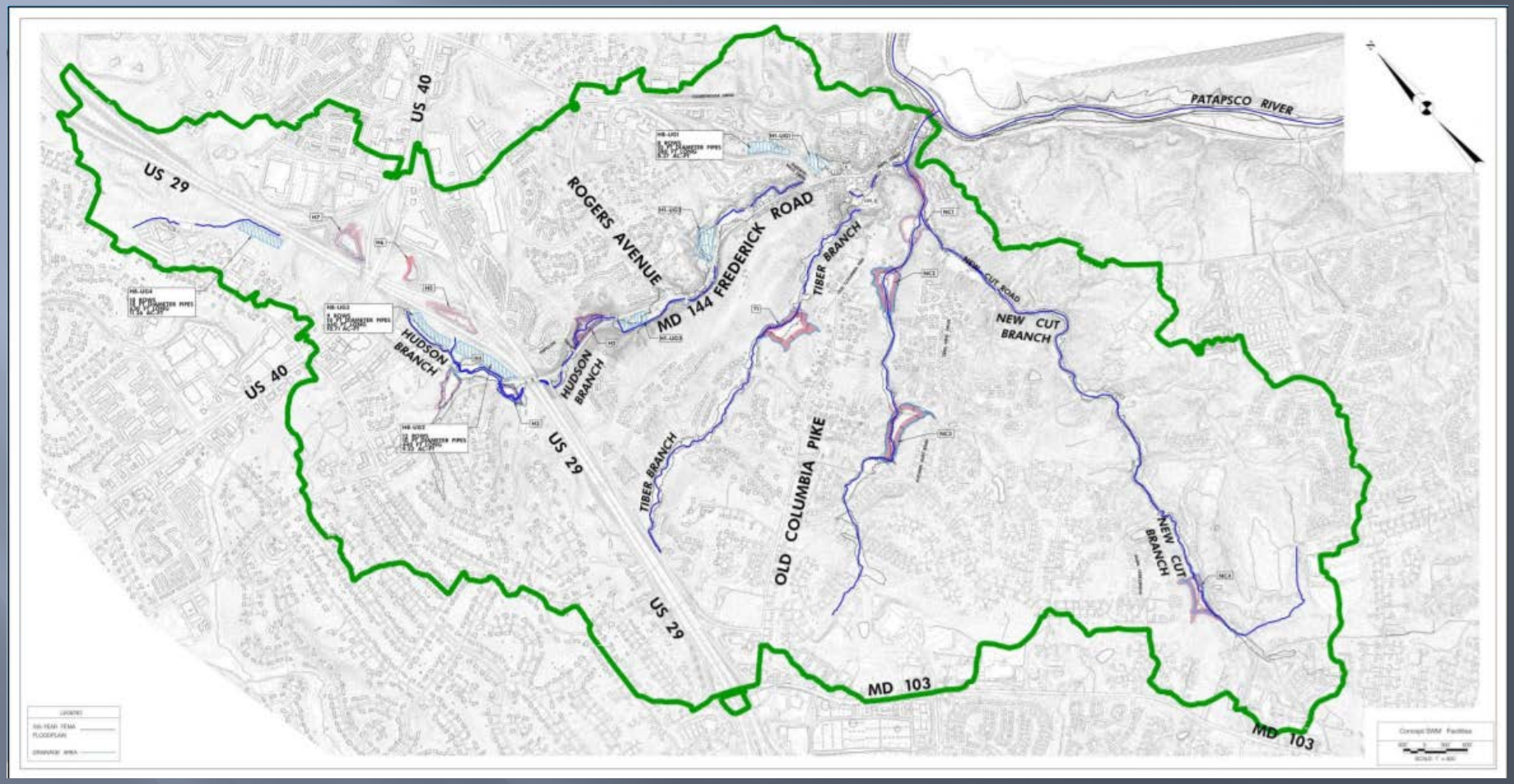
Howard County Stormwater Solutions

100 Year Storm
Current Vs Undeveloped





Potential Stormwater Improvements



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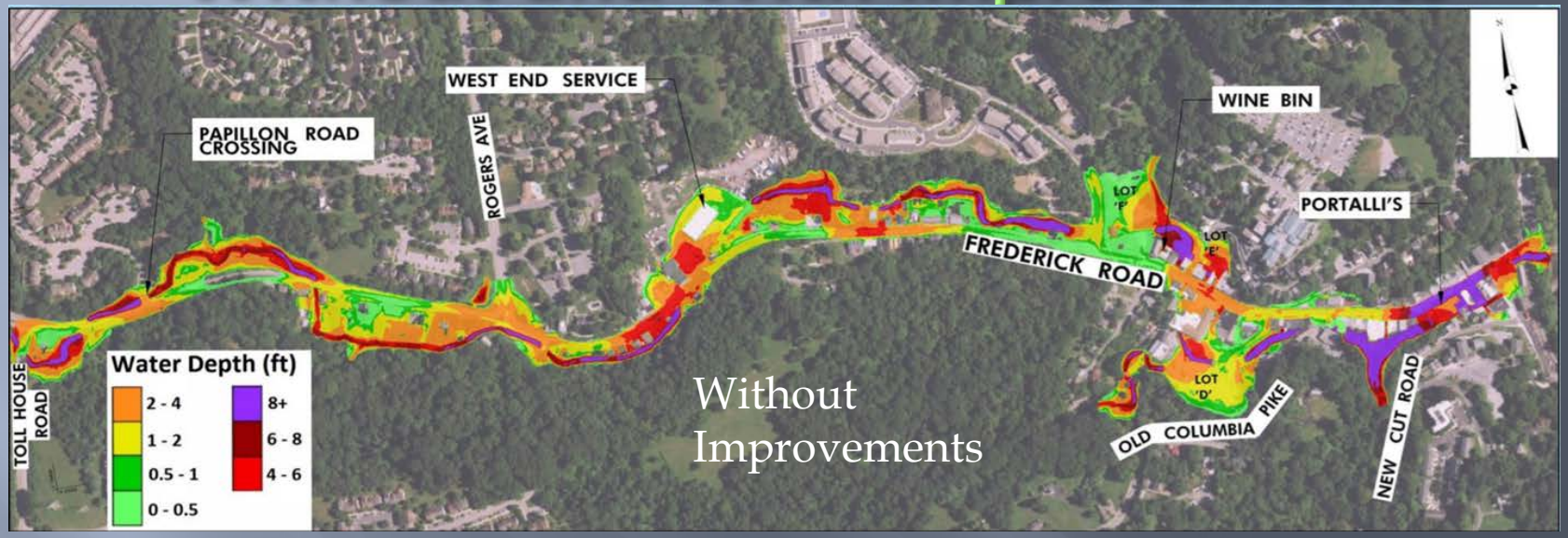
clean HOWARD
Howard County Stormwater Solutions

100 Year Storm
Without and With Improvements



Cost of Improvements

$13M for 3 Stormwater Ponds

$15M for Underground Pipe Farm

$5-7M for Conveyance Improvements

TOTAL for all 18 projects ~ $85M

Challenge Remains

- Changing Climate Conditions
  - Storm Frequency and Intensity
- Retrofit Infrastructure
  - Design to What Storm
  - Quality vs Quantity
- Historic Preservation
- Rebuilding Confidence
- Funding

Community Partnership


#ECSTRONG