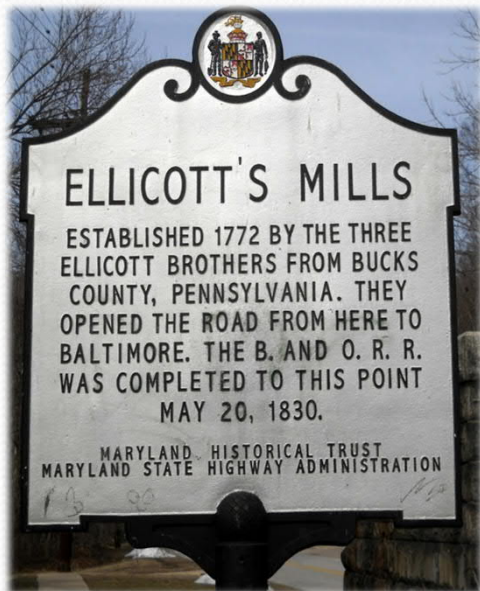


The July 2016 Ellicott City Flood: Looking Forward and Rebuilding

Presented by
Mark S. Richmond, P.E.
Howard County
Stormwater Management Division
October 12, 2017



Today's Outline

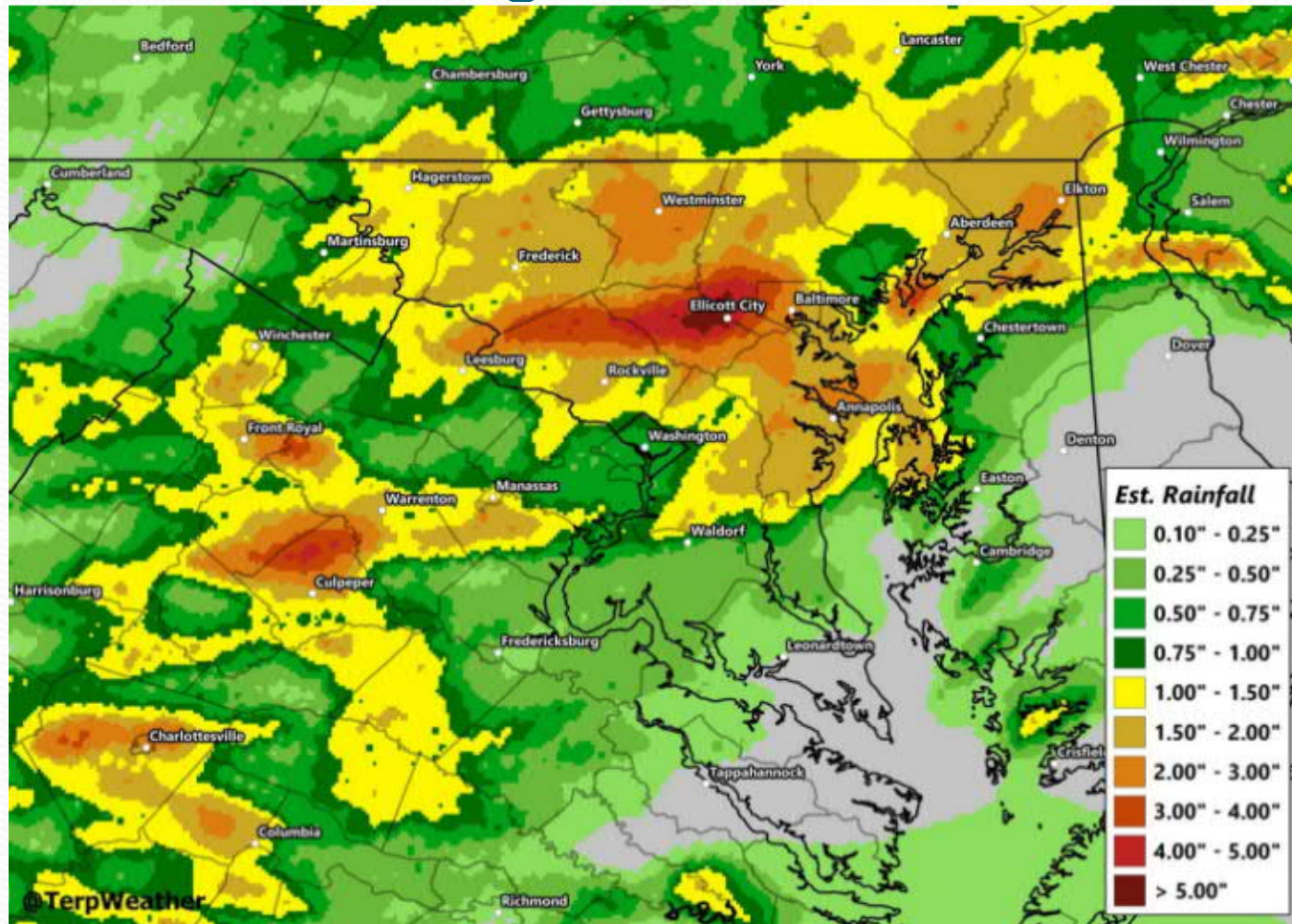
- The Storm and its Aftermath
- Steps Towards Rebuilding Ellicott City
 - Short Term
 - Long Term
- Q&A



The Calm Before the Storm



July 30, 2016 (Saturday evening) A Backbuilding Thunder Storm



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

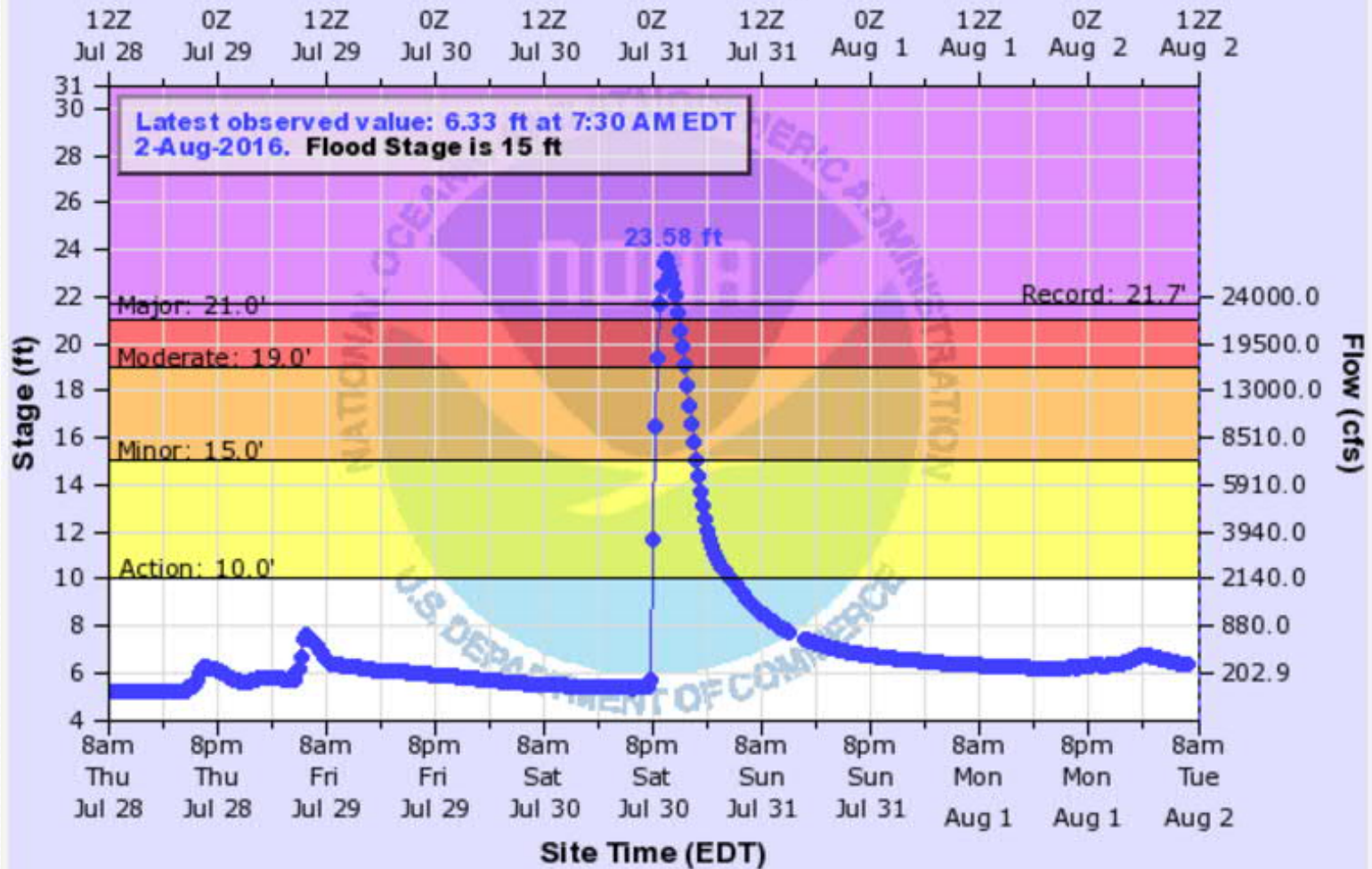
Historic Rainfall and Flash Flooding Saturday Night in Ellicott City, Maryland

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)



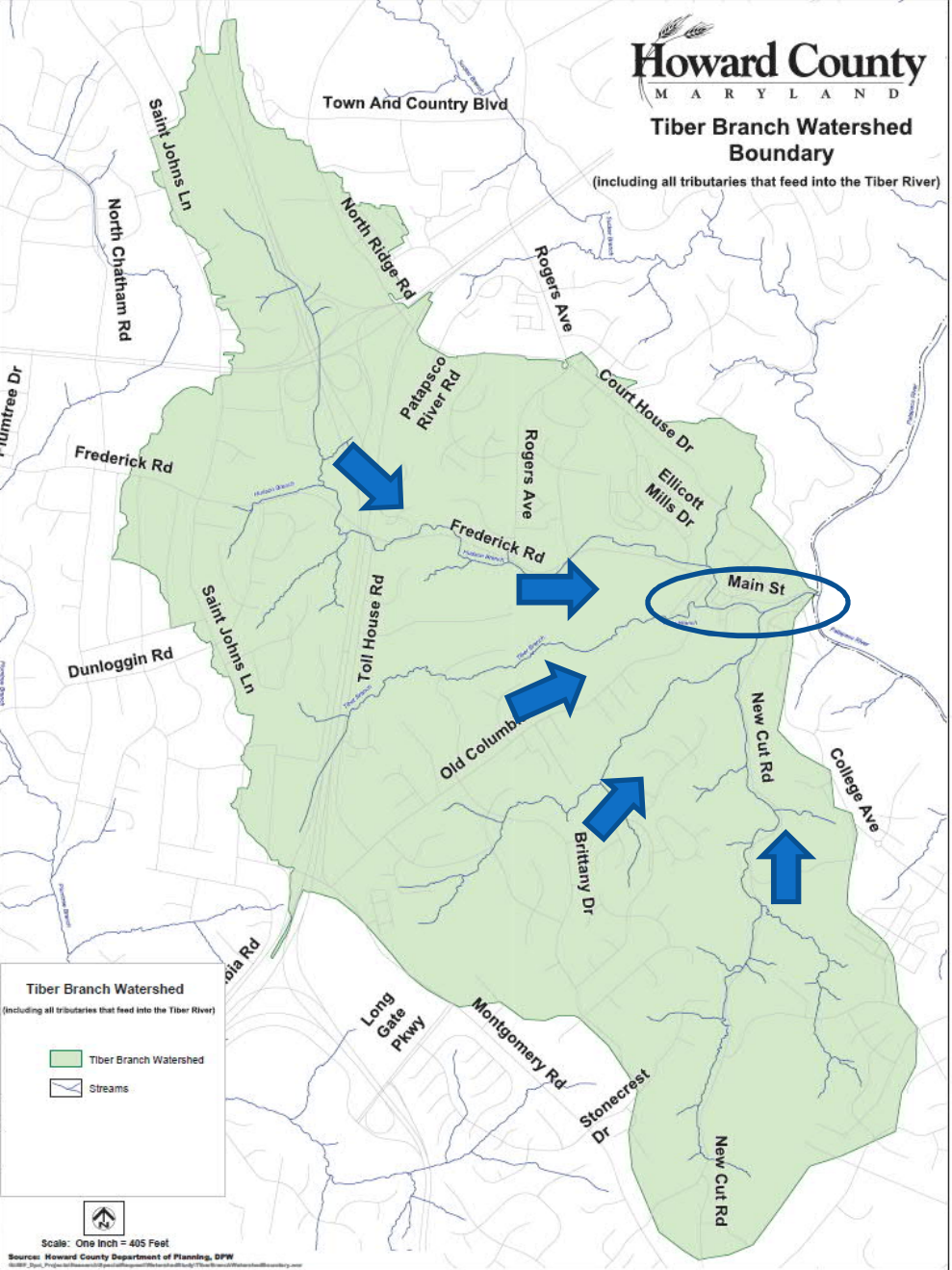
ERDM2(plotting HGIRG) "Gage 0" Datum: 8.5'

From USGS

Howard County MARYLAND

Tiber Branch Watershed Boundary

(Including all tributaries that feed into the Tiber River)

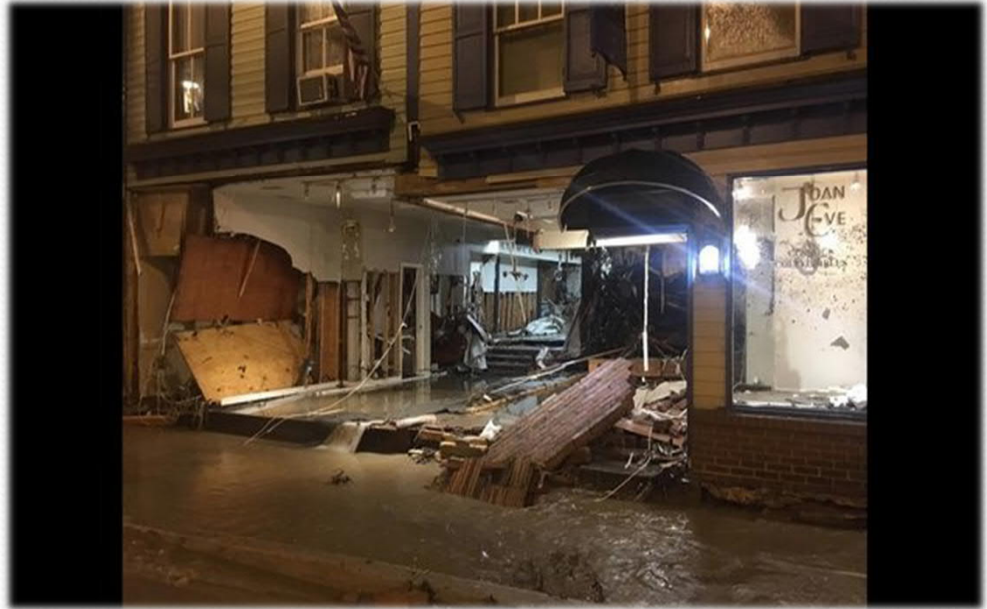


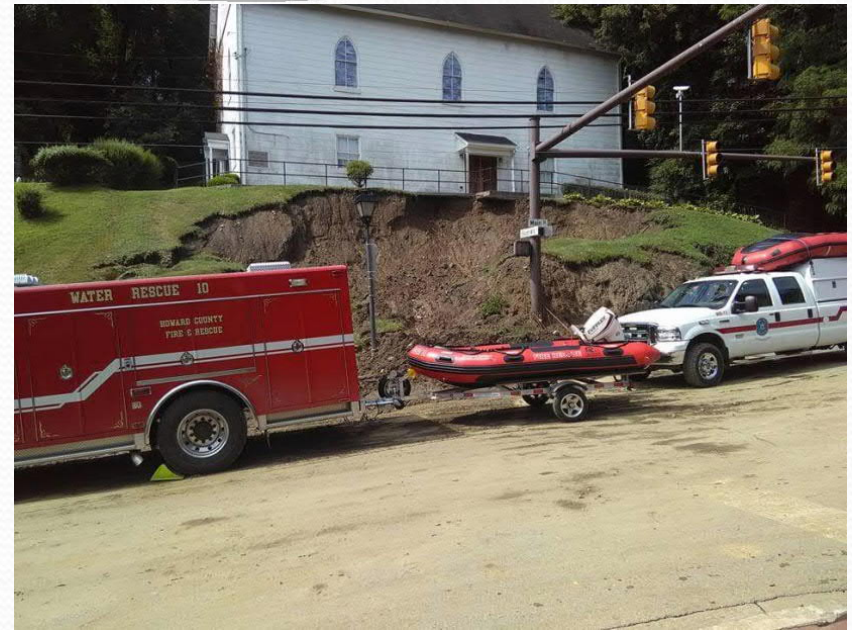
3.7 sq mi
watershed

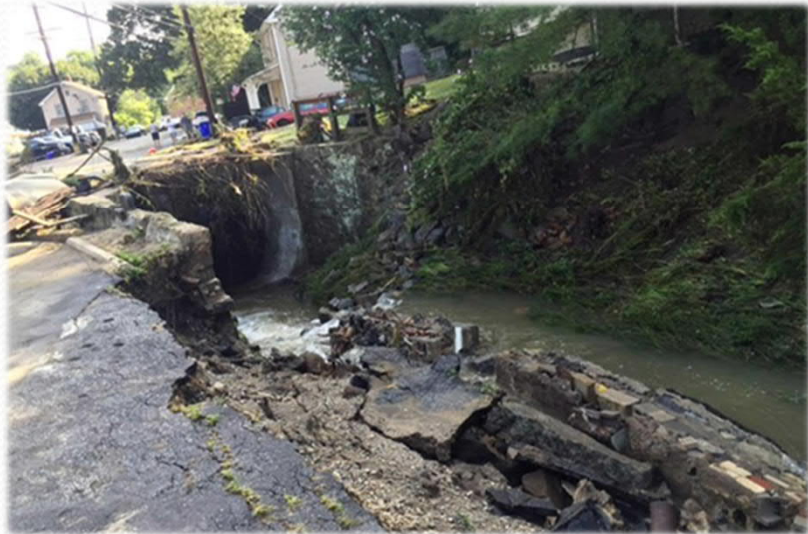
Results of July 30 Event

- 6' to 8' of water running down street
- Patapsco River backing up
- >200 cars moved with many in the Patapsco River
- Most buildings damaged (contents washed out, some minimally supported)
- Water through walls and floors
- Roads, sidewalks washed out (minor pond issues)
- Stream walls collapsed
- Flooding/damage extended up to West End
- Other areas affected - Valley Mede, Chatham, Allview
- Private property impacted (driveways, decks, etc.)









Starting the Rebuilding Process





After the Storm

- Maintenance, immediate repairs (note: public versus private)
- Watershed study with recommendations
- Capital projects, e.g. replacing failed wall
- County soliciting suggestions for creating a resilient Ellicott City (businesses, residents, historic, professionals, etc.) – “Everything on the table”



Suggestions Received

- 223 unique recommendations
- Not all water/flood related
- Put in groups for vetting – Rebuilding, Preservation, Environment, Economy, Other
- Hard (build stuff) vs soft (policy/regulation/education)
- Master plan (long term) vs short term
- Relative costs and impacts

Suggestions:

- Flood Warning System
- Life preservers/throw lines
- Put stream in large culvert
- Daylight enclosed stream
- Tree boxes on Main Street
- Large stormwater storage areas upstream
- Rain barrels and rain gardens
- Divert stream around EC
- West End houses on stilts
- Flood proof buildings
- Make streams wider/deeper
- Remove some buildings
- Remove buildings over stream
- Increase all existing ponds to 100-year management
- Flood gate at RR bridge
- Watershed Education Day (July 30)
- No parking on Main Street (trolley from aux. parking)
- Parking garages (store water in basement; add green roof)
- Abandon it; tear it down

Things to Consider re: Flooding

- Ellicott City is in a floodplain
- Top down versus bottom up
- Three basic approaches:
 - Reduce amount of water
 - Increase conveyance
 - Combination of both
- Manage expectations:
 - How much flooding is acceptable?
 - How often is flooding acceptable?



Ellicott City History of Floods



1868



1952



1972



1975



2011



2016



H&H Study

- Final Report available on County website
- 2D hydraulic model – US 29 to Patapsco River
- Goal: 100-yr to 10-yr flows (Approx. 624 ac-ft storage)
 - 624 ac-ft ~ 50 football fields 10' deep
- Identified 18 large SWM storage projects
 - Storage (428 ac-ft)
 - Above ground – 298 ac-ft
 - Underground – 130 ac-ft
- Identified 6 locations for supplemental cross culverts(4) and bypass pipes (2)
- Identified 2 possible locations for tunnels
- Localized storm drain improvements (not in H&H study)

H&H Study – Possible Projects

- Public and private property (SHA, BGE, individuals)
- Other considerations:
 - Bedrock
 - Existing and Historic Structures
 - Existing Infrastructure
 - Inconvenience and Impacts to Residents and Businesses (road closures, vibrations, noise, etc.)
- Approx. cost - \$85M (not including the tunnels)
- Time frame - ????
- Three currently starting design

Other Efforts

- Corps of Engineers Floodproofing Study (Completion pending)
- Master Plan Study (In progress)
- Flood Warning Discussion (In progress)

The Reality is:

- No single effort or project is going to “solve” the problem
- Not going to change over night.

