

**The 24 August 2020  
Whitehall, New York Flash Flood**

**Thomas A. Wasula  
NOAA/NWS at Albany  
WFO Albany Station Meeting  
April 20, 2021**



# What is a Flash Flood?



Source: 2021 Spring Skywarn Talk



21 AUG 2019 photo in downtown Troy with flooding at 6<sup>th</sup> and Federal Street. A total of 1-3" of rain fell during the day and the sewers backed up and the drainage system had major issues with man hole/sewer caps popping.

Photo: Amy Zawistociski



A *rapid and extreme* flow of high water into a normally dry area, or a rapid water level rise in a stream or creek.  
**-Requires immediate action to protect life and property!**



## ALY Flash Flood Warnings (2011-2020)

| Year | Number |
|------|--------|
| 2011 | 53     |
| 2012 | 8      |
| 2013 | 48     |
| 2014 | 34     |
| 2015 | 7      |
| 2016 | 5      |
| 2017 | 24     |
| 2018 | 19     |
| 2019 | 13     |
| 2020 | 7      |

WFO ALY averages about 22 FFW's a year!!!

Source: Britt and IEM COW



## 24 August 2020 Whitehall, NY Flash Flood



Route 22 Flooded with cars submerged

Whitehall Central School Damage

Photos Courtesy: Tim Hardy Deputy Director Washington County Public Safety



## Motivation

- What caused the significant flash flooding in a concentrated area?
- This was an anomalous, low predictability, localized high impact event
- CSTAR VII (2019-2022) continues looking at severe weather(including flash flooding) in complex terrain, improving tornado warning guidance & using new advances with dual pol data

CSTAR Grant #: NA19NWS4680006

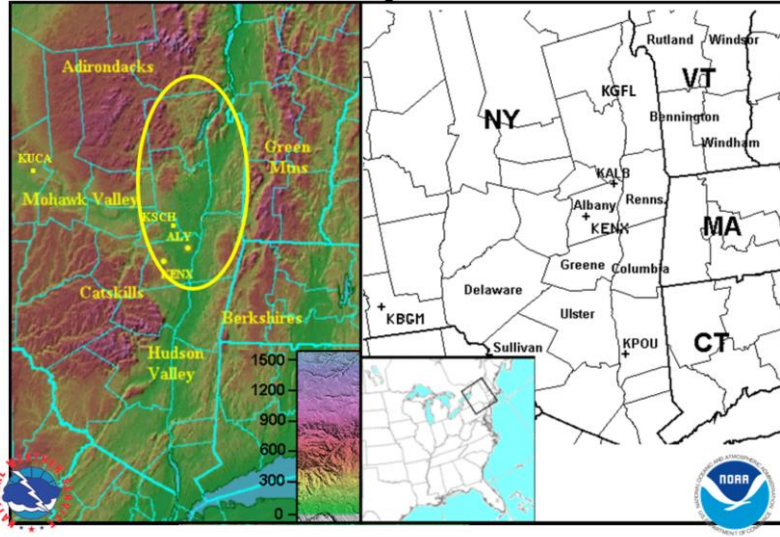


## Outline

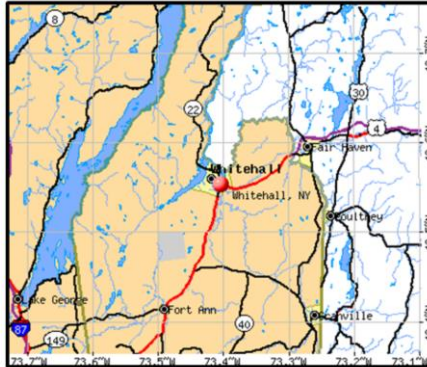
- Geography and History of Whitehall
- Synoptic Review
- SPC RAP & NYS Mesonet analysis
- FFG and PWAT Analysis
- Brief Radar Analysis
- Magnitude and Impact of the Flash Flood



# NWS at Albany Forecast Area



# Whitehall, Washington County





## Whitehall, NY

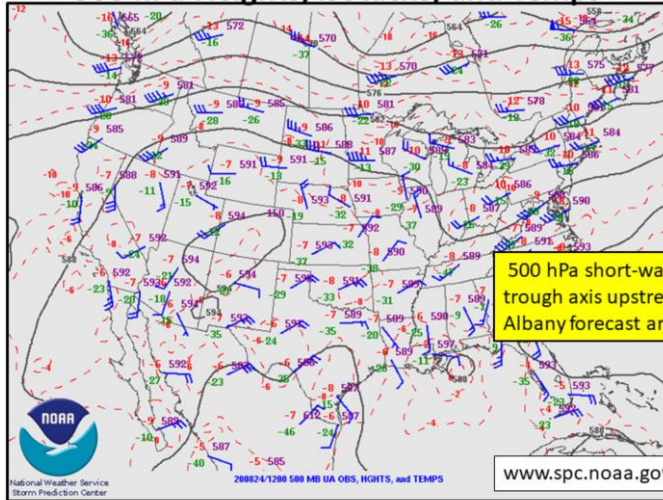
- Town with a population of less than 5,000 people (2000 census = 4,035 and 2016 estimate of 3,948). Town contains village of Whitehall (population 2,614 in 2010)
- Nicknamed: "The Smallest Town in NY"
- Was called "Skenesborough" in 1759 when it was settled by land grant to a British Officer, named Philip Skene (1725 to ~ 1785) who went back to England after the "Revolution", as he was declared an "Enemy of the State of NY" due to land dealings
- The town was captured by American Forces in 1774 with the Benedict Arnold/Philip Schuyler Navy
- General Burgoyne went through the town for the Battle of Saratoga
- After the war, the town's name was changed to Whitehall!
- In 1960, the NY legislature declared the town the birthplace of the US Navy



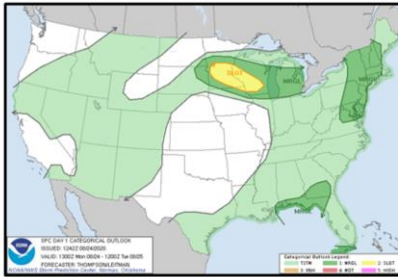
[https://en.wikipedia.org/wiki/Whitehall,\\_New\\_York](https://en.wikipedia.org/wiki/Whitehall,_New_York)



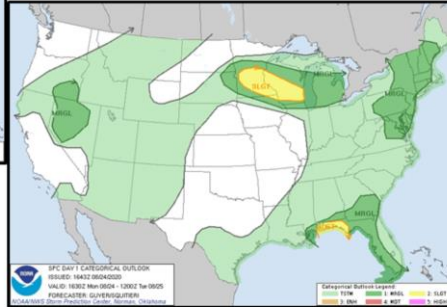
1200 UTC 24 AUG 2020  
500 hPa Heights, Isotachs, and Temps



# 24 AUG 2020: 1300 and 1630 UTC SPC Day 1 Convective Outlooks



1300 UTC Day 1 Outlook

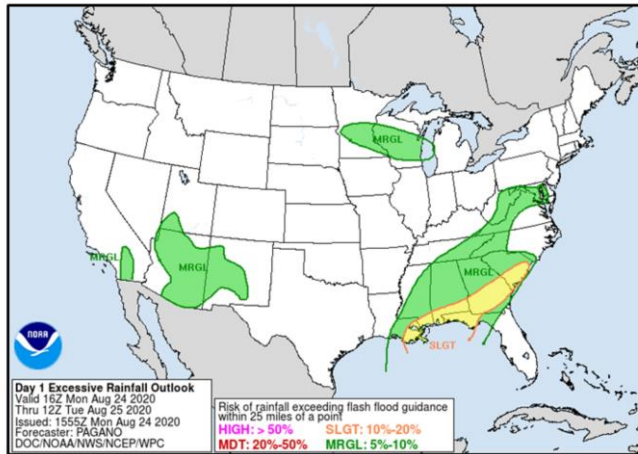


1630 UTC Day 1 Outlook



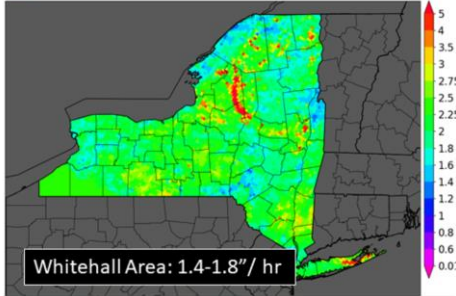
# 16Z 24 AUG 2020

## Day 1 Excessive Rainfall Outlook

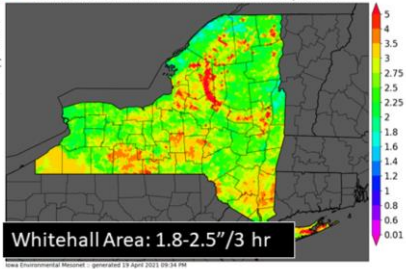


# 1 & 3-hr Gridded FFG

NWS RFC 1 Hour Flash Flood Guidance on 24 Aug 2020 12 UTC  
Estimated amount of One Hour Rainfall needed for non-urban Flash Flooding to commence



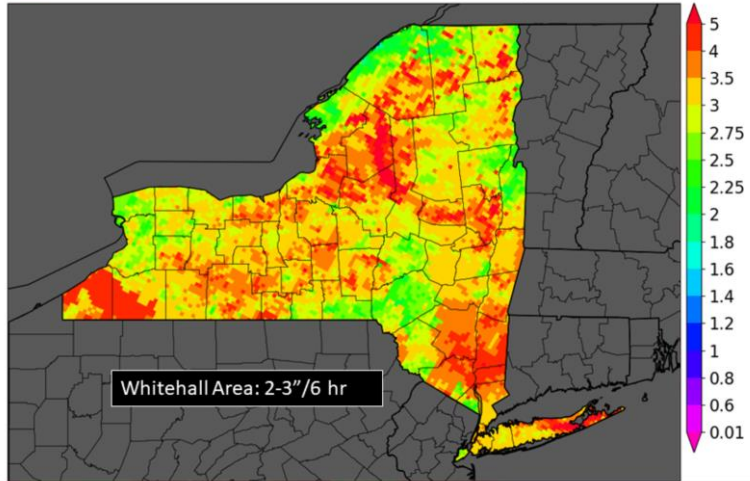
NWS RFC 3 Hour Flash Flood Guidance on 24 Aug 2020 12 UTC  
Estimated amount of Three Hour Rainfall needed for non-urban Flash Flooding to commence



# 6-hr Gridded FFG



NWS RFC 6 Hour Flash Flood Guidance on 24 Aug 2020 12 UTC  
Estimated amount of Six Hour Rainfall needed for non-urban Flash Flooding to commence



# HWOALY: 349 PM EDT 24 AUG 2020

Why did we lower this from the Marginal Risk wording with the morning issuance???

Hazardous Weather Outlook  
National Weather Service Albany NY  
349 PM EDT Mon Aug 24 2020

CT2001-013-MA2001-025-NY2012-033-038-043-047-054-058-061-063-066-082-084-VT2013-015-251200-

Northern Litchfield-Southern Litchfield-Northern Berkshire-Southern Berkshire-Northern Herkimer-Hamilton-Southern Herkimer-Southern Fulton-Montgomery-Northern Saratoga-Northern Warren-Northern Washington-Schoharie-Western Schenectady-Eastern Schenectady-Southern Saratoga-Western Albany-Eastern Albany-Western Rensselaer-Eastern Rensselaer-Western Greene-Eastern Greene-Western Columbia-Eastern Columbia-Western Ulster-Eastern Ulster-Western Dutchess-Eastern Dutchess-Northern Fulton-Southeast Warren-Southern Washington-Bennington-Western Windham-Eastern Windham-349 PM EDT Mon Aug 24 2020

This Hazardous Weather Outlook is for northwestern Connecticut, western Massachusetts, east central New York, eastern New York and southern Vermont.

.DAY ONE...Tonight.

The probability for hazardous weather is low.

.DAYS TWO THROUGH SEVEN...Tuesday through Sunday.

The Storm Prediction Center has outlined eastern New York and western New England in a Slight Risk for severe thunderstorms on Tuesday. Damaging winds will be the main hazard.

There is also a chance of thunderstorms Thursday through Saturday.

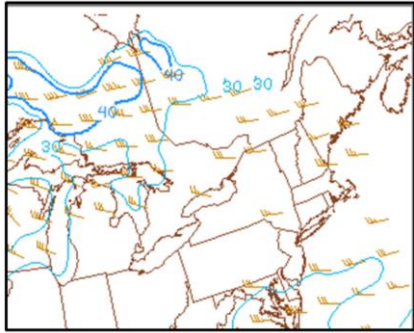
.SPOTTER INFORMATION STATEMENT...

Weather spotters are encouraged to relay wind damage and hail reports to the National Weather Service in Albany New York, while following local, state and CDC guidelines.

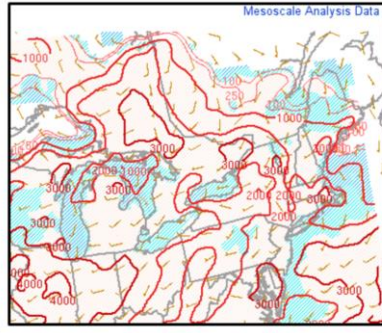
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**2000 UTC 24 AUG 2020**  
**SPC RAP Mesoanalysis:**  
**0-6 km Eff. Bulk Shear (kts) and SBCAPE/SBCIN ( $J\ kg^{-1}$ )**



**0-6 km Effect Bulk Shear (knots)**



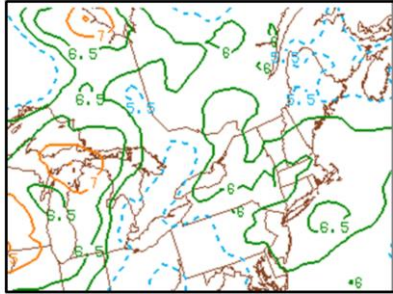
**SBCAPE/SBCIN ( $J\ kg^{-1}$ )**

Deep shear 20-25 kts for possible multi-cells, but SBCAPE's still 2000-3000  $J\ kg^{-1}$

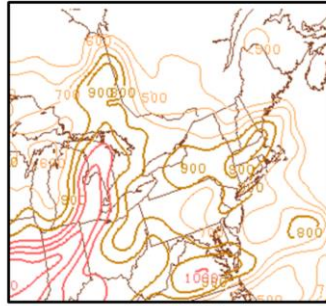




**2000 UTC 24 AUG 2020**  
**SPC RAP Mesoanalysis:**  
**700-500 hPa Lapse Rates ( $^{\circ}\text{C km}^{-1}$ ) & DCAPE ( $\text{J kg}^{-1}$ )**



700-500 hPa Lapse Rates ( $^{\circ}\text{C km}^{-1}$ )

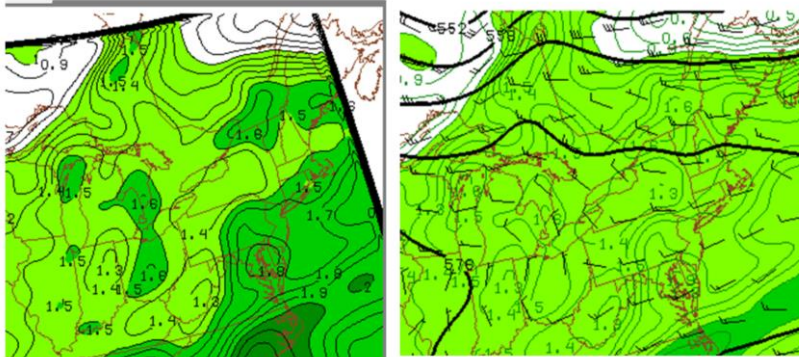


DCAPE ( $\text{J kg}^{-1}$ )

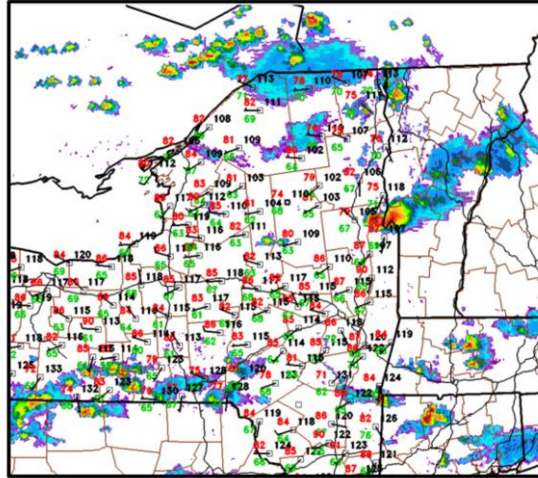
The mid-level lapse rates remain weak, but the DCAPE is increasing to 800-1000  $\text{J kg}^{-1}$



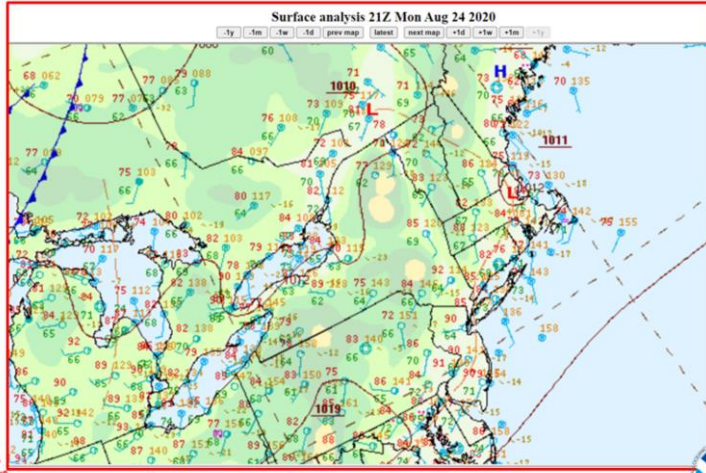
2000 UTC 24 AUG 2020  
SPC RAP Mesoanalysis:  
PWAT (in) & PWAT (in)/Upwind Propagation Vector (kts)



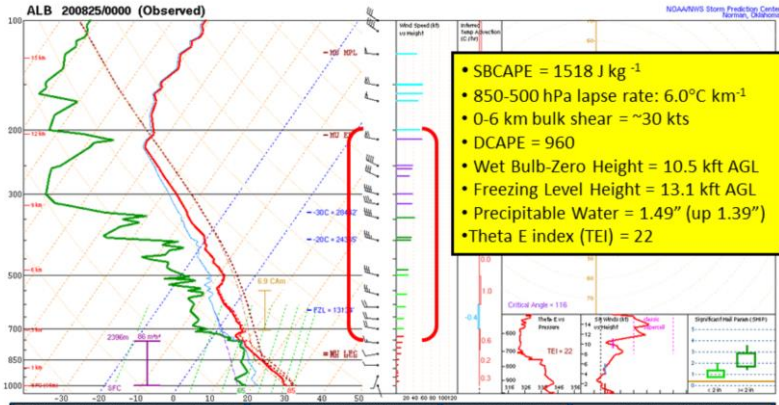
# 2030 UTC NYS Mesonet with MRMS radar data



# 2100 UTC 24 AUG 2020

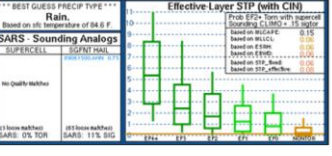


# 0000 UTC 25 AUG 2020 KALY Sounding



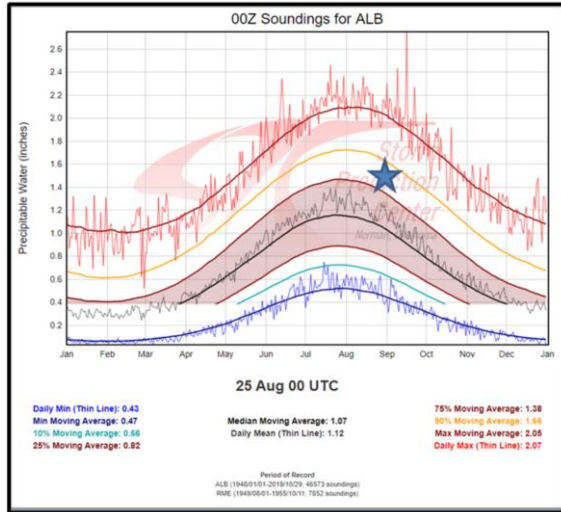
- SBCAPE = 1518 J kg<sup>-1</sup>
- 850-500 hPa lapse rate: 6.0°C km<sup>-1</sup>
- 0-6 km bulk shear ≈ 30 kts
- DCAPE = 960
- Wet Bulb-Zero Height = 10.5 kft AGL
- Freezing Level Height = 13.1 kft AGL
- Precipitable Water = 1.49" (up 1.39")
- Theta E index (TEI) = 22

| PARCEL                           | CAPE               | CINH         | LCL          | LFC | EL    | WINDG | WINDD                     | WINDS    | WINDT | WINDR | WINDV |
|----------------------------------|--------------------|--------------|--------------|-----|-------|-------|---------------------------|----------|-------|-------|-------|
| SURFACE                          | 1518               | 96           | 140m         | -3  | 178m  | 38176 | SFC - 1 km                | 96       | 4     | 2046  | 15023 |
| MIXED LAYER                      | 1137               | -32          | 1679m        | -2  | 1976m | 28679 | SFC - 2 km                | 20       | 25    | 2580  | 17371 |
| FZL SURFACE                      | 1721               | 0            | 2010m        | -4  | 2010m | 30548 | SFC Below Layer           | 66       | 11    | 3467  | 16818 |
| MU (1000mb)                      | 1544               | -54          | 1412m        | -3  | 1786m | 29176 | SFC - 6 km                | 30       | 27073 | 18376 |       |
| PW = 1.49 in                     | SCAPE = 76 J/kg    | WCZ = 10465' | WBDG = 0.1   |     |       |       | SFC - 8 km                | 43       | 21745 | 20115 |       |
| K = 29                           | DCAPE = 960 J/kg   | FZL = 13134' | ESP = 0.7    |     |       |       | LCL - EL (Cloud Layer)    | 50       | 28124 | 23371 |       |
| MRFH = 67%                       | Downfall = 61 F    | Conv? = 88F  | MRF = 0.25   |     |       |       | SFC shear (8100')         | 30       | 27073 | 15276 |       |
| LowRH = 56%                      | Neutral = 123 J/kg | MRF = 98 F   | WCAPE = 0.13 |     |       |       | RMN Shear = 27 m/s        |          |       |       |       |
| SpGrowth = 17200 m/s²            |                    |              |              |     |       |       | 84m SW Wind               | 23819 kt |       |       |       |
| 850-500hPa Lapse Rate = 7.5 C/km |                    |              |              |     |       |       | Storm Motion Vectors      |          |       |       |       |
| 340m AGL Lapse Rate = 5.7 C/km   |                    |              |              |     |       |       | Burner Right = 32819 kt   |          |       |       |       |
| 850-500hPa Lapse Rate = 6.0 C/km |                    |              |              |     |       |       | Burner Left = 23524 kt    |          |       |       |       |
| 700-500hPa Lapse Rate = 5.4 C/km |                    |              |              |     |       |       | Cor68 Downflow = 20649 kt |          |       |       |       |
|                                  |                    |              |              |     |       |       | Cor68 Upflow = 20253 kt   |          |       |       |       |

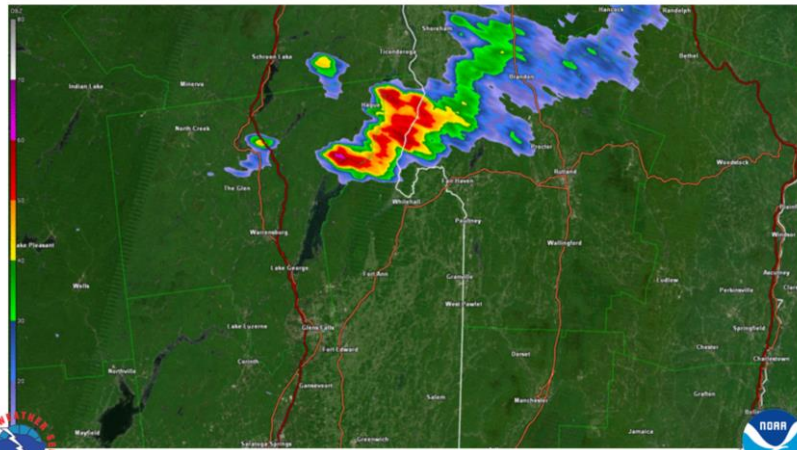


| PARCEL                           | CAPE               | CINH         | LCL          | LFC | EL    | WINDG | WINDD                     | WINDS    | WINDT | WINDR | WINDV |
|----------------------------------|--------------------|--------------|--------------|-----|-------|-------|---------------------------|----------|-------|-------|-------|
| SURFACE                          | 1518               | 96           | 140m         | -3  | 178m  | 38176 | SFC - 1 km                | 96       | 4     | 2046  | 15023 |
| MIXED LAYER                      | 1137               | -32          | 1679m        | -2  | 1976m | 28679 | SFC - 2 km                | 20       | 25    | 2580  | 17371 |
| FZL SURFACE                      | 1721               | 0            | 2010m        | -4  | 2010m | 30548 | SFC Below Layer           | 66       | 11    | 3467  | 16818 |
| MU (1000mb)                      | 1544               | -54          | 1412m        | -3  | 1786m | 29176 | SFC - 6 km                | 30       | 27073 | 18376 |       |
| PW = 1.49 in                     | SCAPE = 76 J/kg    | WCZ = 10465' | WBDG = 0.1   |     |       |       | SFC - 8 km                | 43       | 21745 | 20115 |       |
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| LowRH = 56%                      | Neutral = 123 J/kg | MRF = 98 F   | WCAPE = 0.13 |     |       |       | RMN Shear = 27 m/s        |          |       |       |       |
| SpGrowth = 17200 m/s²            |                    |              |              |     |       |       | 84m SW Wind               | 23819 kt |       |       |       |
| 850-500hPa Lapse Rate = 7.5 C/km |                    |              |              |     |       |       | Storm Motion Vectors      |          |       |       |       |
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| 850-500hPa Lapse Rate = 6.0 C/km |                    |              |              |     |       |       | Burner Left = 23524 kt    |          |       |       |       |
| 700-500hPa Lapse Rate = 5.4 C/km |                    |              |              |     |       |       | Cor68 Downflow = 20649 kt |          |       |       |       |
|                                  |                    |              |              |     |       |       | Cor68 Upflow = 20253 kt   |          |       |       |       |

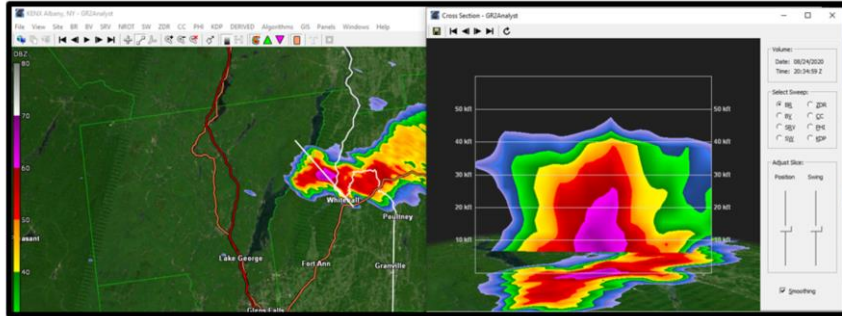
# 0000 UTC 25 AUG 2020 PWAT CLIMO



# 24 August 2020 2000 UTC – ~00 UTC 0.5°KENX Base Ref Radar Loop



# 2034 UTC 0.5° KENX REF (dBZ)

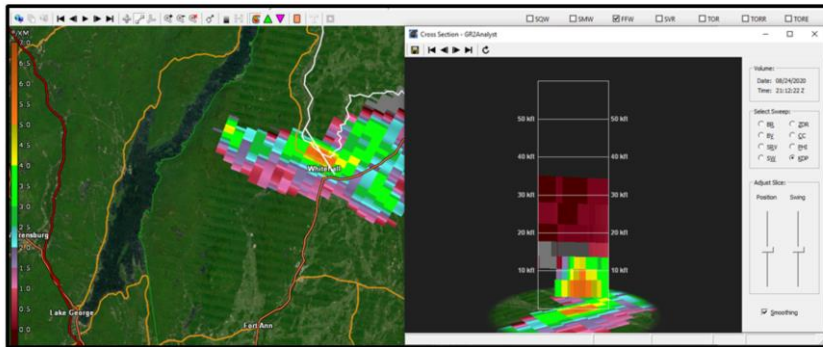


First Severe Thunderstorm Warning issued at 2000 UTC. First verification is at 2045 UTC. Elevated core of 50 dBZ to close to 40 kft AGL at this time





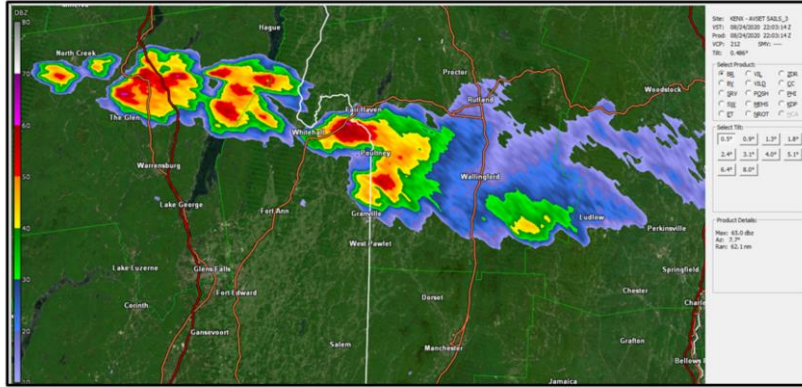
# 2112 UTC 0.5° KENX K<sub>DP</sub> (°/km)



Impressive K<sub>DP</sub> column that descended. Tons of LWC with KDP values to 4°/km to 13.8 kft AGL. The FZL was around 13 kft AGL.



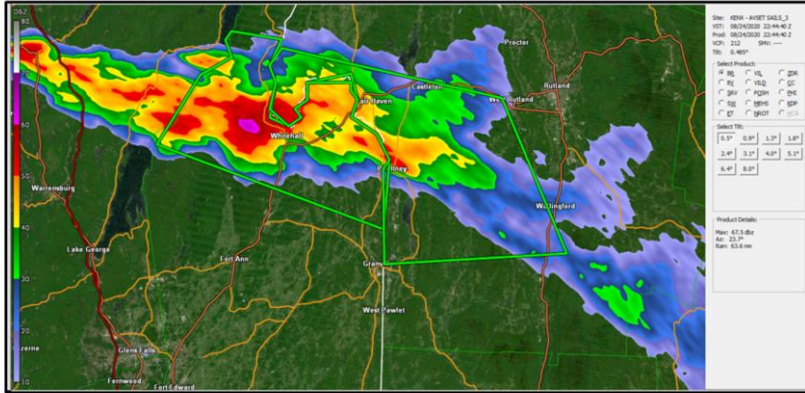
# 2203 UTC 0.5° KENX REF (dBZ)



Flash Flood Warning issued at 2206 UTC. Next round of strong to severe convection upstream. Back building has occurred and training cells will yield flash flooding.



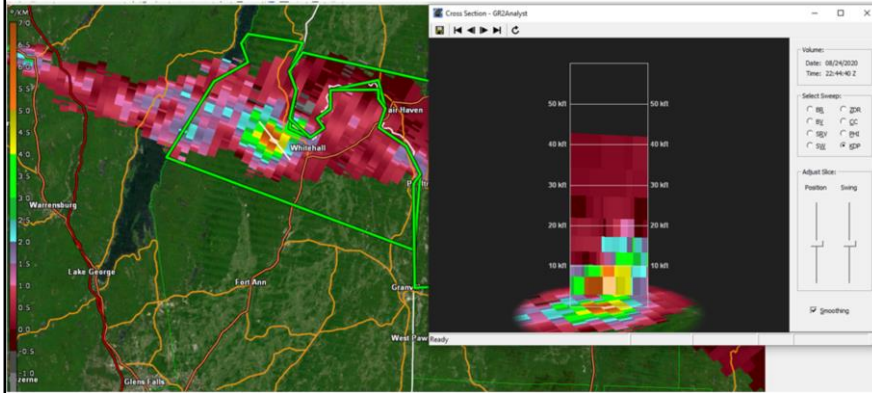
# 2244 UTC 0.5° KENX REF (dBZ)



Flash Flood Warning continues at 2244 UTC. Third round of strong to severe convection moving in. Back building has occurred and training cells continues flash flooding.



# 2244 UTC 0.5° KENX K<sub>DP</sub> (°/km)



Impressive K<sub>DP</sub> values (off the scale). The FZL was around 13 kft AGL.  
Not shown ZDR values 3-5 dB up to FZL level (not shown)



# MRMS Archive Issues?!?!

2020 Oct 1 00:00 UTC

Loop: 75.26, Lat: 42.83

GPE CREST Unit Streamflow

10/01/2020 00:00 UTC

Product Type

- Base Reflectivity
- Composited Reflectivity
- Seamless Hybrid Scan
- Full At Lowest Altitude
- Layer Reflectivity
- Echo Top
- Layer Thickness
- 3D Mosaic Levels
- ZDR - 3D Mosaic
- RhoHV - 3D Mosaic
- KDP - 3D Mosaic
- Radar Quality Index
- Rotation
- Wet Spinning
- Gauge Influence Index
- FLASH
- O3 Radar Only
- O3 Multi-Sensor
- Vertically Integrated Water

CREST Unit Flow

- CREST Flow
- CREST Spot Sat
- SAC Unit Flow
- SAC Flow
- SAC Spot Sat
- Hydrophobic Unit Flow
- Hydrophobic Flow
- Recur Interval (30 min)
- Recur Interval (1 hr)
- Recur Interval (3 hr)
- Recur Interval (8 hr)
- Recur Interval (12 hr)
- Recur Interval (24 hr)
- Recur Interval (map)

Why does this only go back to 1 OCT 2020??? Would like to see it more for this case!!!!



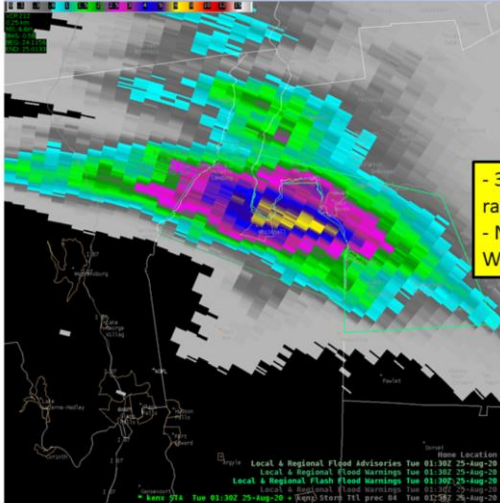
## Flash Flood Helper (from RAC)

### #4) Analyze Heavy Rainfall/Streamflow: Radar

| Product | Values   | Interpretation                          |
|---------|--|---|
| Z       | 50-60 dBZ<br>(40-55 dBZ tropical)                                      | Enhanced reflectivity                   |
| ZDR     | 2.0-5.0 dB<br>(0.5-3.0 dB tropical)                                    | Bigger drop size<br>(Smaller drop size) |
| CC      | > 0.96   | Uniform precip type                     |
| KDP     | > 1.0 deg/km*<br><small>(&gt; 4.0 deg/km : water-coated hail?)</small> | Increasing liquid water content         |

- Low-echo centroid signatures : precip below the freezing level
- Favorable supercell characteristics : slow, large updraft; moist inflow region

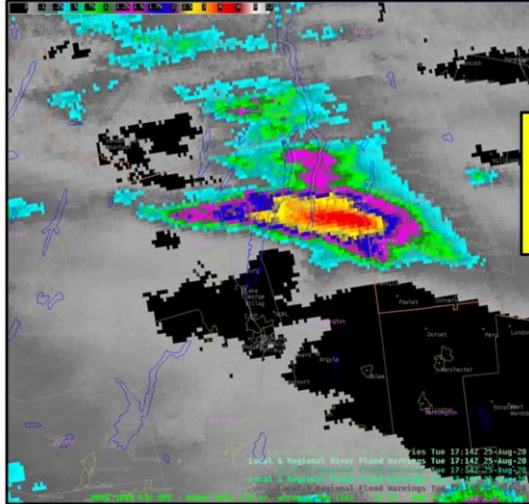
# KENX Dual Pol STA (in)



- 3.5-6.6" in heavy rain swath  
- North side of Whitehall in 5-6.6"



# 24 AUG 2020 KENX MRMS QPE

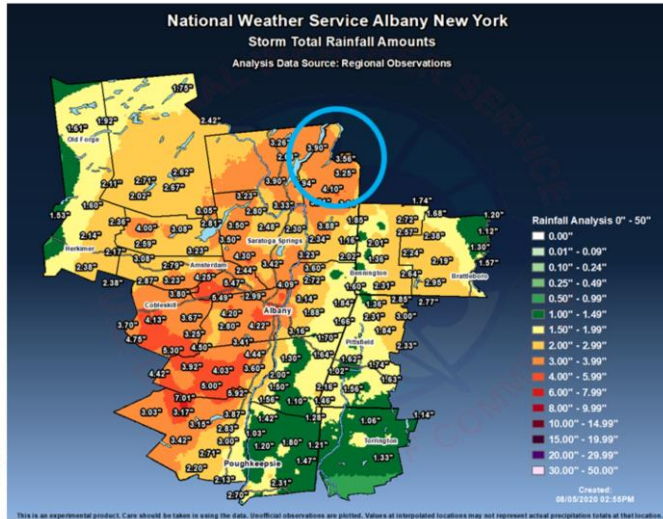


- 4-6+ inches MRMS QPE
- Whitehall Coop Observer 5.85" in 2-4 hrs

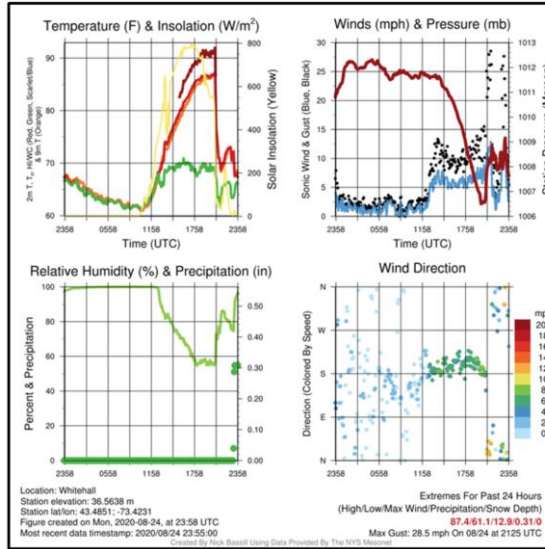




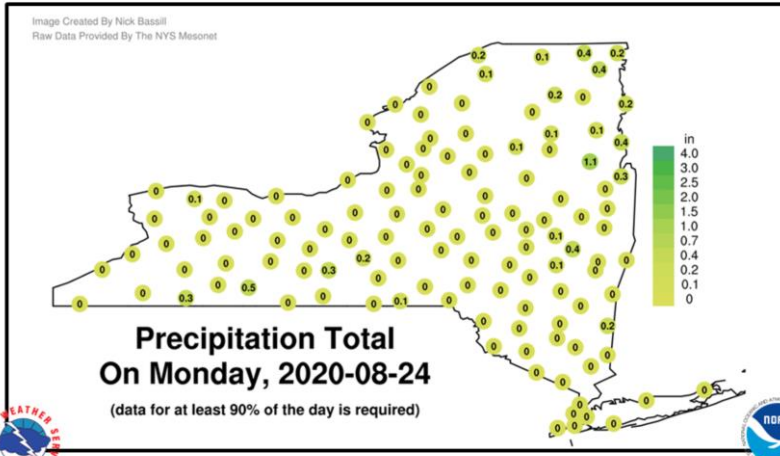
# 4-5 AUG 2020 TS Isaias



# 24 AUG 2020 Whitehall Mesonet



# 24 AUG 2020 NYS Mesonet Rainfall



# Whitehall Coop Site: AUG 2020

CoCoRe SuperForm 2.3i | Released | 2020 | Aug | Whitehall Lock C12 [30-9389-07] | Next Station »

Aug 2020 - Whitehall Lock C12 [WTH06, 30-9389-07] --- Closed: YES --- Closed by WFO: YES

| Day  | Max temperature | Min temperature | Air observation | Precipitation | Multi-day Accumulation | Precipitation type | Snowfall | Snow depth | Pool elevation | Talwater elevation | Present weather                      |
|------|-----------------|-----------------|-----------------|---------------|------------------------|--------------------|----------|------------|----------------|--------------------|--------------------------------------|
| 1    | 87              | 60              | 63              | 0.00          | 1                      |                    | 0.0      | 0          | H              | H                  |                                      |
| 2    | 90              | 63              | 69              | 0.03          | 1                      | Rain               | 0.0      | 0          | H              | H                  | 01 Drizzle, light                    |
| 3    | 85              | 69              | 79              | 0.23          | 1                      | Rain               | 0.0      | 0          | 110.90         | 95.00              | 02 Partly cloudy                     |
| 4    | 87              | 67              | 67              | 0.06          | 1                      | Rain               | 0.0      | 0          | 111.10         | 95.00              | 01 Drizzle, light                    |
| 5    | 71              | 66              | 68              | 3.06          | 1                      | Rain               | 0.0      | 0          | 112.80         | 96.00              | 02 Partly cloudy                     |
| 6    | 83              | 55              | 57              | 0.00          | 1                      |                    | 0.0      | 0          | 110.70         | 95.40              | 02 Partly cloudy                     |
| 7    | 81              | 57              | 61              | 0.00          | 1                      |                    | 0.0      | 0          | H              | H                  | 03 Mostly cloudy or overcast sky     |
| 8    | 81              | 61              | 71              | 0.02          | 1                      | Rain               | 0.0      | 0          | H              | H                  | 02 Partly cloudy                     |
| 9    | 86              | 68              | 70              | 0.01          | 1                      | Rain               | 0.0      | 0          | H              | H                  | 03 Mostly cloudy or overcast sky     |
| 10   | 88              | 66              | 70              | 0.00          | 1                      |                    | 0.0      | 0          | 111.70         | 95.30              | 03 Mostly cloudy or overcast sky     |
| 11   | 86              | 67              | 69              | 0.43          | 1                      | Rain               | 0.0      | 0          | 111.80         | 95.30              | 03 Mostly cloudy or overcast sky     |
| 12   | 91              | 69              | 72              | 0.14          | 1                      | Rain               | 0.0      | 0          | 111.90         | 95.40              | 03 Mostly cloudy or overcast sky     |
| 13   | 88              | 63              | 67              | 0.00          | 1                      |                    | 0.0      | 0          | 112.20         | 95.40              | 02 Partly cloudy                     |
| 14   | 88              | 63              | 67              | 0.00          | 1                      |                    | 0.0      | 0          | H              | H                  | 03 Mostly cloudy or overcast sky     |
| 15   | 85              | 60              | 68              | 0.00          | 1                      |                    | 0.0      | 0          | H              | H                  |                                      |
| 16   | 87              | 60              | 70              | 0.00          | 1                      |                    | 0.0      | 0          | H              | H                  | 02 Partly cloudy                     |
| 17   | 78              | 57              | 62              | 0.00          | 1                      |                    | 0.0      | 0          | 111.50         | 95.10              | 02 Partly cloudy                     |
| 18   | 79              | 62              | 64              | 0.14          | 1                      | Rain               | 0.0      | 0          | 111.60         | 95.10              | 02 Partly cloudy                     |
| 19   | 79              | 57              | 59              | 0.22          | 1                      | Rain               | 0.0      | 0          | 112.10         | 95.20              | 03 Mostly cloudy or overcast sky     |
| 20   | 75              | 53              | 54              | 0.16          | 1                      | Rain               | 0.0      | 0          | 111.40         | 95.30              | 10 Fog (visibility 1/2 mile or more) |
| 21   | 79              | 54              | 62              | 0.00          | 1                      |                    | 0.0      | 0          | H              | H                  | 03 Mostly cloudy or overcast sky     |
| 22   | 83              | 62              | 64              | 0.39          | 1                      | Rain               | 0.0      | 0          | H              | H                  | 03 Drizzle, moderate                 |
| 23   | 85              | 60              | 60              | 0.02          | 1                      | Rain               | 0.0      | 0          | H              | H                  | 03 Mostly cloudy or overcast sky     |
| 24   | 86              | 60              | 64              | 0.11          | 1                      | Rain               | 0.0      | 0          | 112.00         | 95.30              | 10 Fog (visibility 1/2 mile or more) |
| 25   | 89              | 62              | 68              | 5.85          | 1                      | Rain               | 0.0      | 0          | 110.60         | 95.30              | 03 Mostly cloudy or overcast sky     |
| 26   | 85              | 53              | 56              | 7             | 1                      | Rain               | 0.0      | 0          | 112.00         | 95.30              | 02 Partly cloudy                     |
| 27   | 80              | 54              | 54              | 0.00          | 1                      | VSN                | 0.0      | 0          | 111.60         | 95.20              | 01 Rain, steady, light               |
| 28   | 61              | 54              | 61              | 0.32          | 1                      | Rain               | 0.0      | 0          | H              | H                  | 03 Mostly cloudy or overcast sky     |
| 29   | 75              | 61              | 62              | 0.26          | 1                      | Rain               | 0.0      | 0          | H              | H                  | 01 Rain, steady, light               |
| 30   | 76              | 62              | 64              | 0.16          | 1                      | Rain               | 0.0      | 0          | 112.30         | 95.20              | 02 Partly cloudy                     |
| 31   | 73              | 49              | 51              | 0.00          | 1                      |                    | 0.0      | 0          | 111.80         | 95.10              | 02 Partly cloudy                     |
| 31.1 | 80.4            | 64.0            | 64.0            | 23.05         |                        |                    | 0.0      |            |                |                    |                                      |

6-24 AUG: 1.64"

# How bad a Flash Flood???

## Extreme Precipitation Tables

Northeast Regional Climate Center

*Data represents point estimates calculated from partial duration series. All precipitation amounts are displayed in inches.*

|           |                                 |
|-----------|---------------------------------|
| Smoothing | Yes                             |
| State     | New York                        |
| Location  |                                 |
| Longitude | 73.404 degrees West             |
| Latitude  | 43.556 degrees North            |
| Elevation | 0 feet                          |
| Date/Time | Mon, 19 Apr 2021 22:11:07 -0400 |

### Extreme Precipitation Estimates

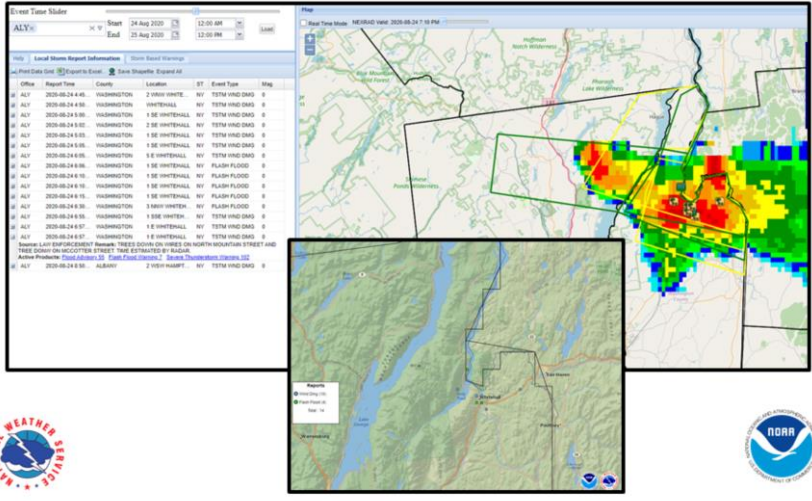
|       | 5min | 10min | 15min | 30min | 60min | 120min | 1hr   | 2hr  | 3hr  | 6hr  | 12hr | 24hr | 48hr | 1day | 2day  | 4day | 7day | 10day |       |       |       |
|-------|------|-------|-------|-------|-------|--------|-------|------|------|------|------|------|------|------|-------|------|------|-------|-------|-------|-------|
| 1yr   | 0.27 | 0.41  | 0.51  | 0.67  | 0.84  | 1.03   | 1yr   | 0.72 | 0.94 | 1.18 | 1.44 | 1.74 | 2.10 | 2.46 | 1yr   | 1.86 | 2.36 | 2.77  | 3.33  | 3.88  | 1yr   |
| 2yr   | 0.32 | 0.49  | 0.62  | 0.81  | 1.02  | 1.26   | 2yr   | 0.88 | 1.13 | 1.44 | 1.74 | 2.09 | 2.50 | 2.84 | 2yr   | 2.21 | 2.73 | 3.18  | 3.80  | 4.35  | 2yr   |
| 5yr   | 0.38 | 0.59  | 0.74  | 0.99  | 1.27  | 1.58   | 5yr   | 1.09 | 1.42 | 1.80 | 2.17 | 2.58 | 3.05 | 3.46 | 5yr   | 2.70 | 3.33 | 3.83  | 4.51  | 5.13  | 5yr   |
| 10yr  | 0.43 | 0.67  | 0.85  | 1.15  | 1.50  | 1.88   | 10yr  | 1.29 | 1.69 | 2.14 | 2.57 | 3.03 | 3.54 | 4.02 | 10yr  | 3.13 | 3.87 | 4.41  | 5.14  | 5.82  | 10yr  |
| 25yr  | 0.50 | 0.80  | 1.02  | 1.41  | 1.86  | 2.34   | 25yr  | 1.61 | 2.13 | 2.67 | 3.20 | 3.75 | 4.32 | 4.90 | 25yr  | 3.83 | 4.72 | 5.32  | 6.11  | 6.88  | 25yr  |
| 50yr  | 0.57 | 0.92  | 1.18  | 1.64  | 2.21  | 2.79   | 50yr  | 1.91 | 2.54 | 3.18 | 3.78 | 4.40 | 5.03 | 5.70 | 50yr  | 4.45 | 5.48 | 6.13  | 6.97  | 7.81  | 50yr  |
| 100yr | 0.65 | 1.05  | 1.35  | 1.92  | 2.61  | 3.31   | 100yr | 2.25 | 3.02 | 3.77 | 4.47 | 5.16 | 5.86 | 6.63 | 100yr | 5.18 | 6.38 | 7.07  | 7.95  | 8.86  | 100yr |
| 200yr | 0.74 | 1.21  | 1.57  | 2.24  | 3.09  | 3.92   | 200yr | 2.67 | 3.60 | 4.47 | 5.27 | 6.05 | 6.82 | 7.71 | 200yr | 6.04 | 7.42 | 8.16  | 9.07  | 10.07 | 200yr |
| 500yr | 0.89 | 1.46  | 1.90  | 2.76  | 3.87  | 4.92   | 500yr | 3.34 | 4.53 | 5.62 | 6.62 | 7.48 | 8.35 | 9.43 | 500yr | 7.39 | 9.07 | 9.86  | 10.81 | 11.92 | 500yr |



<http://precip.eas.cornell.edu/>



# Whitehall Area: Slammed!!! (4 flash flood and 10+ Wind Damage Reports!!!)



# Whitehall Damage

## SUMMARY OF INITIAL INCIDENTS REPORTED

Flooded Roadways: 8  
Flooded Structures: 21  
Water Rescue: 1  
Trees / Trees w/ Wires Down: 33  
Tree on Vehicle: 2  
Tree on House: 2  
Sink Hole: 1  
Vehicle Off the Roadway: 1  
Damage to Utility / Furnace / Fuel Oil: 5  
Grass & Brush Fire: 1



WINDSOR COUNTY OF  
DEPARTMENT OF PUBLIC SAFETY  
EMERGENCY MANAGEMENT / COMMUNITY RISK AND RESILIENCE



SEVERE THUNDERSTORMS / HEAVY RAIN EVENT - WHITEHALL AREA  
EVENT DATE: AUGUST 24, 2023



# Whitehall Damage



Whitehall was turning into Kamino – planet of endless oceans and storms.  
**Source:** George Lucas SW Universe



Source: CBS 6 Schenectady



## Summary

- Low predictability and localized high impact severe and weather event (11 wind damage and 4 flash flood reports...likely more)
- Weak to moderate shear (generally less than 30 kts) and moderate to extreme instability pre-convective environment
- DCAPE values were impressive in the 800-1000 J kg<sup>-1</sup> range
- PWAT values were above normal (75-90% quartile of climo for date). FFG values doubled (possibly tripled locally).
- K<sub>DP</sub> useful for flash flood and severe analysis (descending K<sub>DP</sub> columns)
- Radar evidence that back building and training cells played critical role in flash flooding for Whitehall
- 5.85" of rain in 2-4 hrs indicates 500-yr flood possibly based on NRCC extreme pcpn analysis (similar to NOAA Atlas ARI)



Where were we?

