An Examination of the March 26, 2021 Newnan, Georgia EF-4 Tornado

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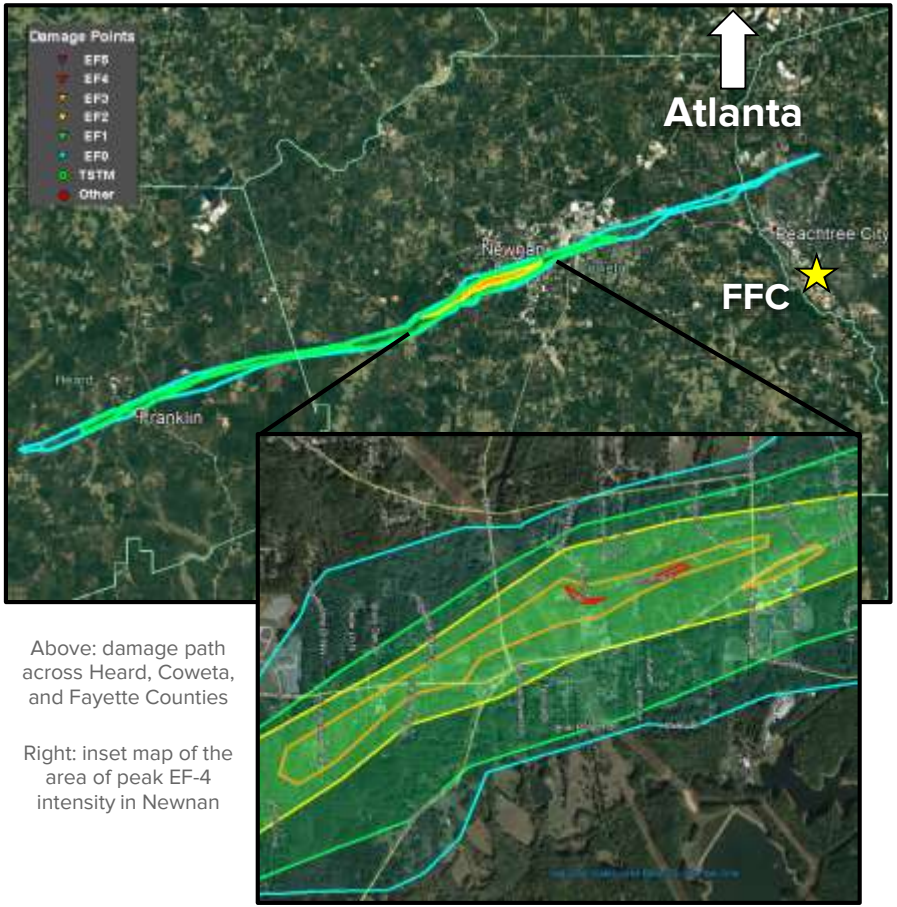
Introduction

- Moist, unstable, high-shear environment with damaging winds, tornadoes, and large hail as hazards
- Especially dangerous situation given severe weather expected after dark
- Supercell (previously tornadic while over Alabama) spawned a tornado over west-central Georgia that tracked across the southwest Atlanta suburbs
- Extensive damage to a couple communities (including Newnan)
- Several forecasters on shift that night had homes and families in the path



Above: damage path across Heard, Coweta, and Fayette Counties

Right: inset map of the area of peak EF-4 intensity in Newnan

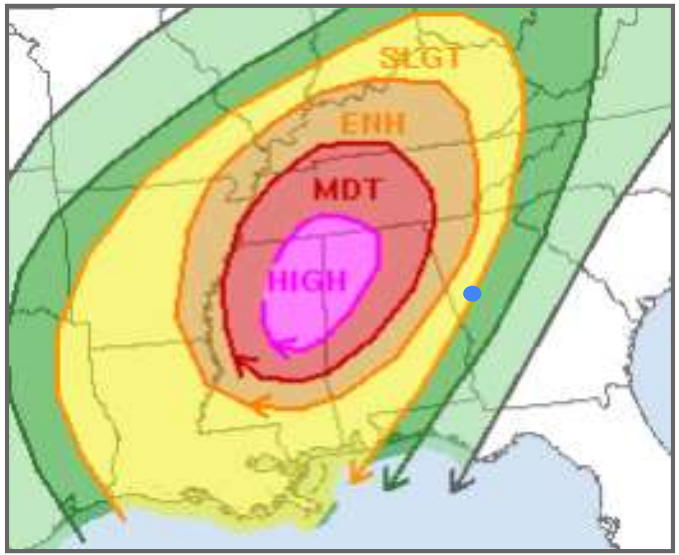
Severe Weather Parameters

- Models depicted severe weather parameters in the neighborhood of the following values:
  - MUCAPE: 1000-1500 J/kg
  - Mid-level lapse rates: 7.5-8.0°C/km
  - Bulk shear: 65-75 kts
  - 0-1 km shear: 40-50 kts
  - 0-3 km SRH: 350-450+ m^2/s^2
  - 0-1 km SRH: 250-350+ m^2/s^2
  - Significant Tornado Parameter (STP): 3-6
- Supercells capable of damaging winds, tornadoes, and large hail were anticipated given the environment
- Tornado Watch issued ~7:45 PM (in effect until 2:00 AM) for portions of northern and western Georgia (including the counties later impacted by the tornado)

between 05z-10z. The threat for severe storms will continue to be maximized across northern and western GA, where several severe weather parameters are forecast to come together. At the upper levels, a strong shortwave trough will lift northeast across the Great Lakes region overnight, maintaining broad ascent across the CWA (though the strongest upper dynamics will remain well to our northwest). Still, some 65-75 kts of bulk shear will be in place over northern and western GA overnight. In addition, 0-3 km SRH values of 350-450+ m^2/s^2 and 0-1 km SRH values of 250-350+ m^2/s^2 will maintain a threat for organized, rotating storms with tornadic potential. RAP and NAM significant tornado parameter values across this portion of the CWA are 3 to 6, so the concern for isolated tornadoes (some strong and/or long-tracked possible) is certainly there. Even with the nighttime arrival of the storms, MUCAPE will be 1000-1500 J/kg and forecast soundings suggest mid-level lapse rates around 7.5-8.0 C/km, so large hail will also be a threat with the storms overnight.

A portion of the short-term area forecast discussion (AFD) issued on the afternoon of 3/25

SPC Convective Outlook issued ~8 AM 3/25



Storm Prediction Center (SPC) Day 1 Categorical Outlook

The blue dot is where Newnan is located

- The risk evolved eastward through the day (as seen on the next slide with the eastward expansion of the Moderate and High risk areas)
- The Newnan tornado illustrates that anytime there is a threat for severe weather, the areas surrounding the highest risk area should be prepared for and aware of evolving threats

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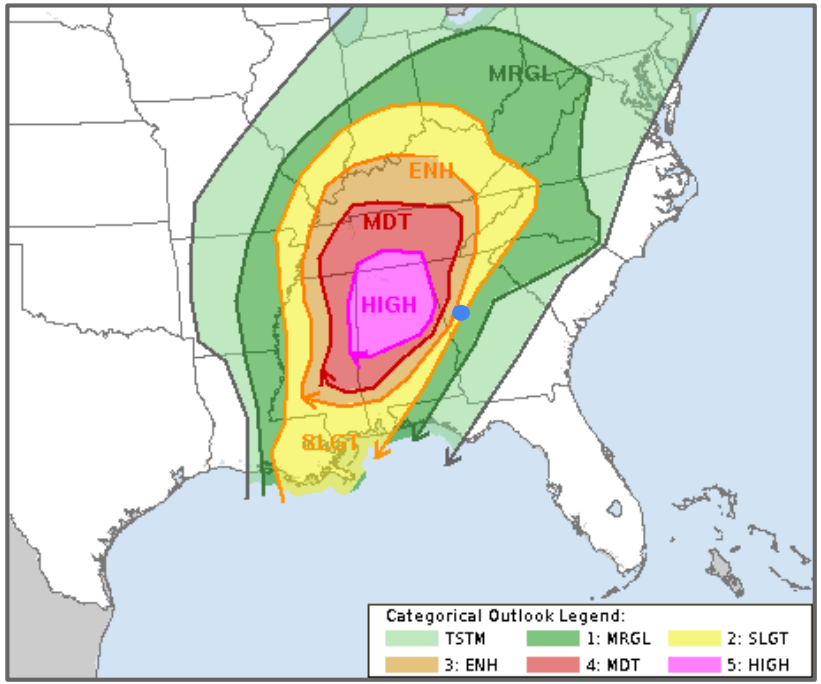
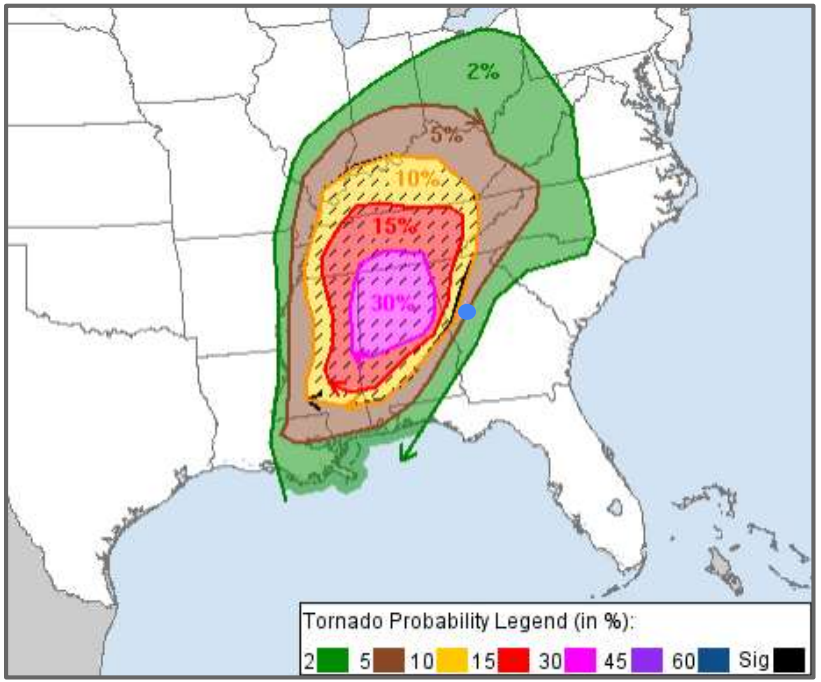


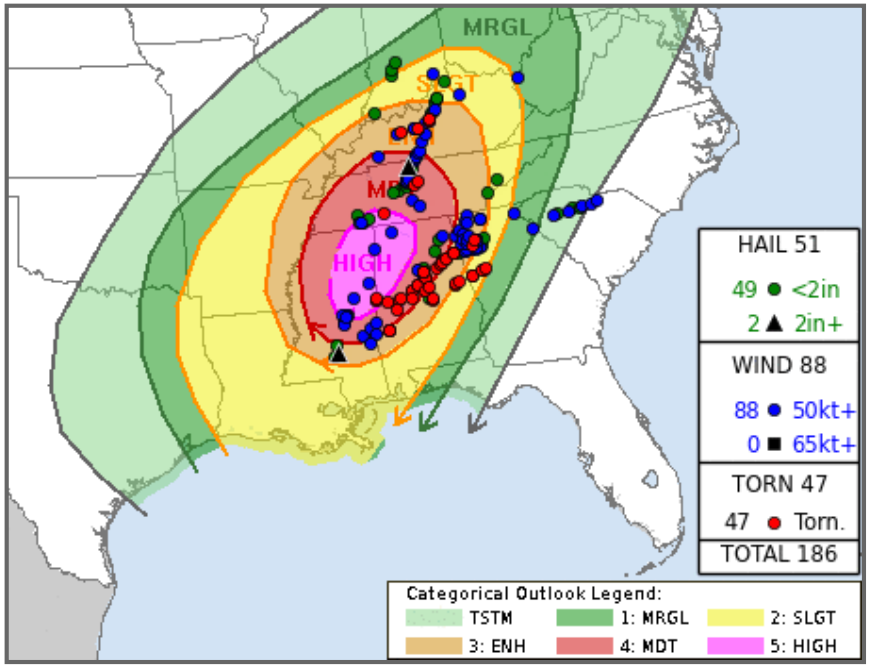
SPC Day 1 Categorical Outlook



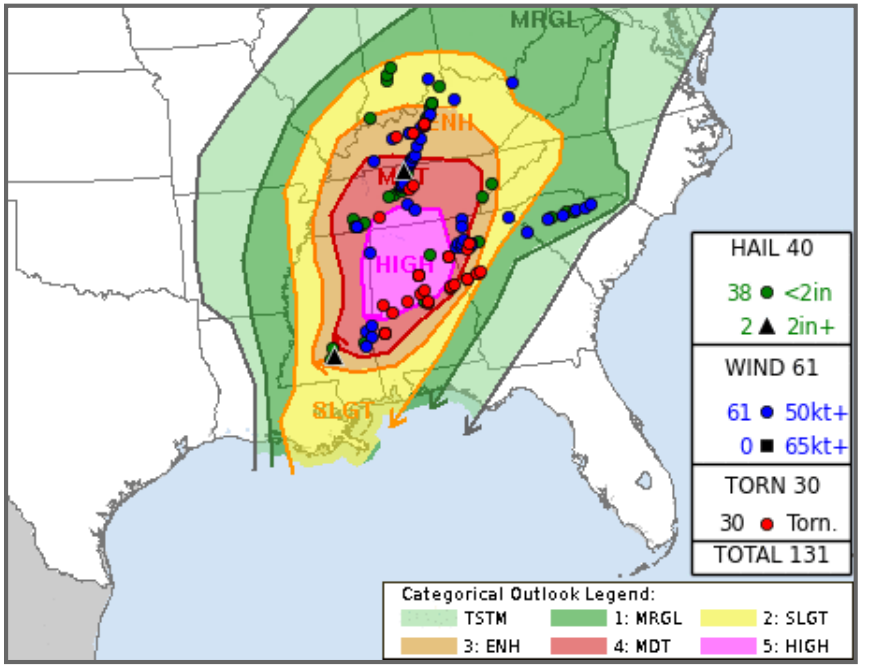
SPC Day 1 Tornado Probability

Black hatched area indicates a 10% or higher probability of an EF-2 tornado or stronger within 25 miles of any point

Verification of the Convective Outlooks

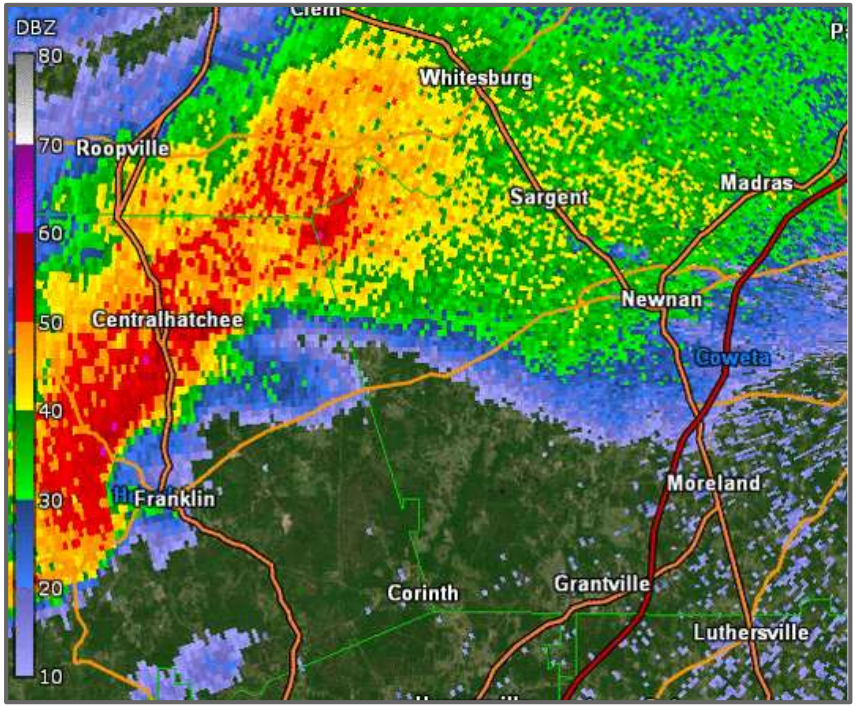


Storm reports + SPC Day 1 Convective Outlook issued ~8 AM 3/25

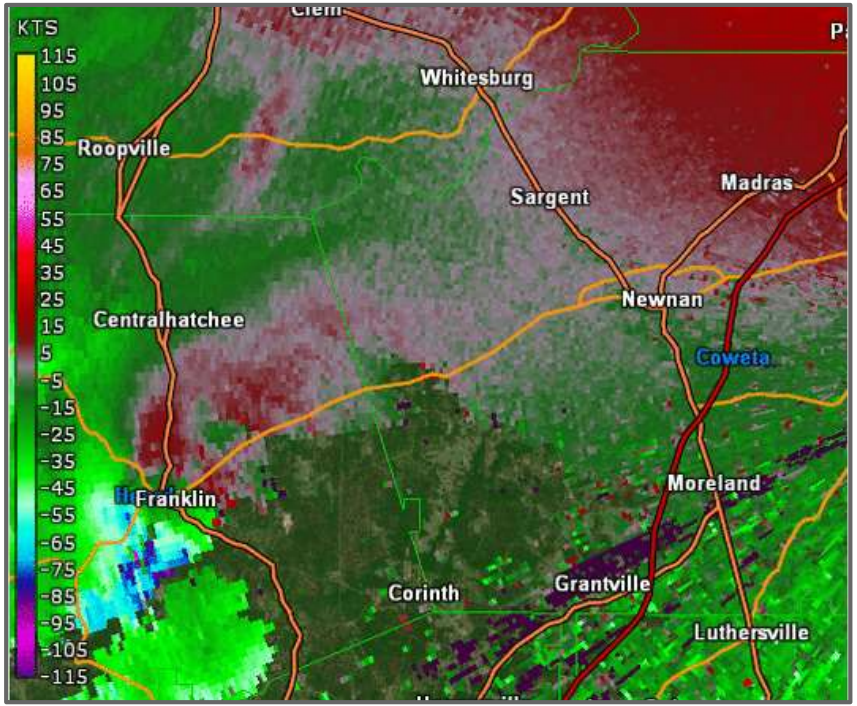


Storm reports + SPC Day 1 Convective Outlook issued at ~5 PM 3/25

Radar Imagery

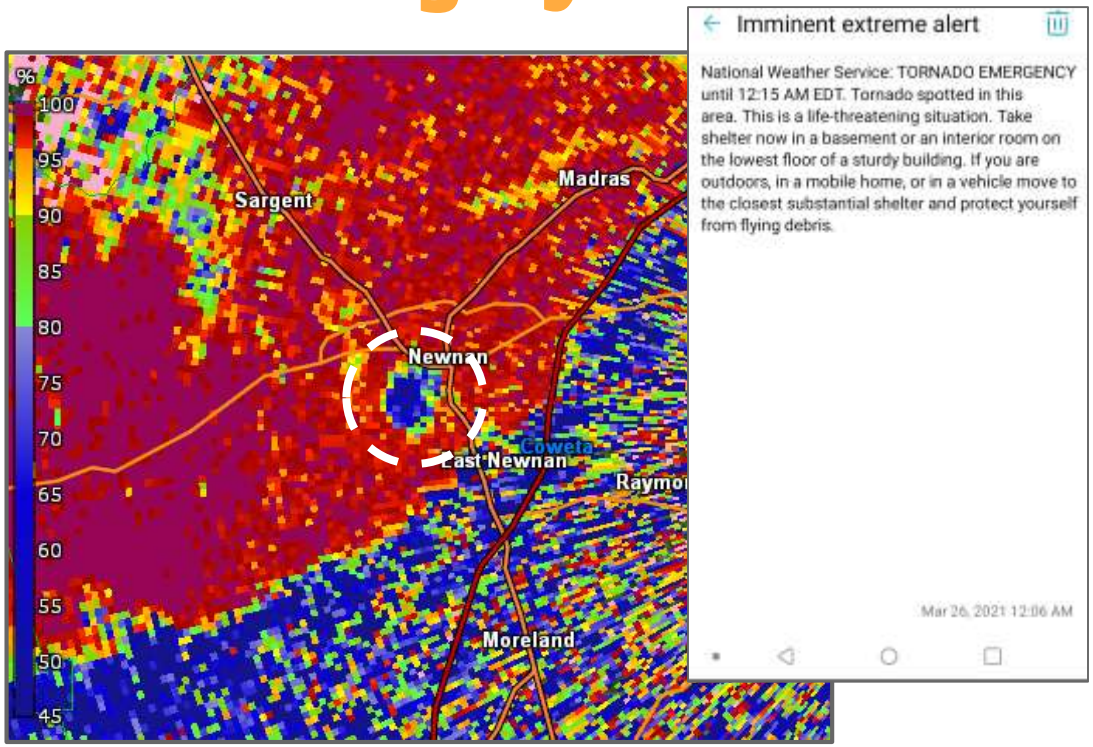


KFFC Base Reflectivity (0341z to 0415z)



KFFC Base Velocity (0341z to 0415z)

Radar Imagery



KFFC Correlation Coefficient (0406Z)

- Distinct debris signature in correlation coefficient data
  - Debris was carried as high as ~15,000 feet
- Tornado Warning upgraded from a Particularly Dangerous Situation (PDS) to a Tornado Emergency at 12:06 AM
  - “Deadly tornado”
  - “Radar confirmed tornado”
  - “Life-threatening situation”
  - “Catastrophic”
- Tornado Emergency defined as exceedingly rare; severe threat to human life and catastrophic damage
  - Tornado must be confirmed

Damage

Homes completely destroyed in Newnan where the tornado was at **peak EF-4 intensity (170 mph winds)**

EF-4 = Devastating damage. Well-constructed houses leveled, structures with weak foundation blown some distance (from weather.gov)

Damage

When viewed from the air and on the ground, damage suggests that embedded vortices within the larger tornadic circulation caused the higher-end damage

Damage

Damage to Newnan High School

Right and above:
Damage to homes in
Historic Newnan

Words From A Forecaster On Shift That Night

“Even nearly a year after it happened, I still get chills any time I recall the night of the Newnan tornado... Having lived for nearly a decade in Norman, Oklahoma, the idea that a significant tornado could impact my home and my family has been a scenario that I attempted to plan for, but it wasn't something I ever expected to encounter while actively working as the primary radar operator in a WFO... I needed a moment to call my wife. I let her know the truth—it could be bad, so they [she and their son] needed to shelter immediately... From that point forward, everything felt like a bit of an out of body experience... I saw as the couplet passed near directly over my home and through my town... Thankfully, shortly after the tornado passed Newnan, a nearby friend and coworker immediately called me and said he was driving to my house. I received a call from him as he had left my home and driven into some cell coverage, a little over an hour after the tornado passed—my family and home was fine, just maybe some minor wind damage... Those two hours are something I'll never forget. I tell people I wouldn't wish them on my worst enemy... The NWS has done a wonderful job recognizing the mental toll this can take on us, creating training to make us aware, and providing resources to us if we need them for all ranges of mental care.”

Reflections

- Newnan EF-4 tornado was the first violent (EF-4 or EF-5) tornado in Georgia since the April 2011 Super Outbreak
  - Spent 53 minutes on the ground in Georgia
  - Damage path was ~40 miles long and ~1 mile wide at its widest
- **No direct fatalities or injuries**
- Identification of debris on radar was critical in confirming the tornado and making the decision to upgrade to a Tornado Emergency
- Decision to upgrade to a Tornado Emergency was also influenced by Newnan being a fairly populous city in the Atlanta suburbs
  - Population of ~43,300 as of the July 2021 Census
- Regardless of SPC convective risk category, it is important to be prepared for a significant event when there is a notable threat for severe weather

Further Reflection

Long-tracked F-4/EF-4 tornadoes with no direct fatalities or injuries are rare, especially in densely-populated areas.

What led to this positive outcome and how can it be replicated?

- First responder and public preparedness? (more on the next slide)
- Forecasts and messaging from media and NWS?
- Media coverage of tornadoes in Alabama?
- Building construction and code enforcement?
- Lack of manufactured housing in path?
- Chance or luck?

	Total events	Total fatalities (injuries)	Average fatalities (injuries)	% events w/ no inj. or fatalities
F/EF-4s since 1950	580	2486 (35660)	4.3 (61.4)	13.1
F/EF-4s since 1995	153	585 (7853)	3.8 (51.0)	15.7
EF-4s since 2008	78	451 (5572)	5.7 (70.5)	15.4 (12 out of 78)
EF-4s since 2008 w/ path lengths of 25-75 mi	17	148 (1335)	**6.2** (**55.6**)	**4.2*** **(1 out of 17)**

***Prior to the March 2021 Newnan tornado, only one EF-4 since 2008 with a similar path length had no injuries or fatalities as it affected mostly rural areas of western Kansas over its 50 mile track on April 14, 2012.**

Kanopolis Lake, KS EF4 Tornado – April 14, 2012

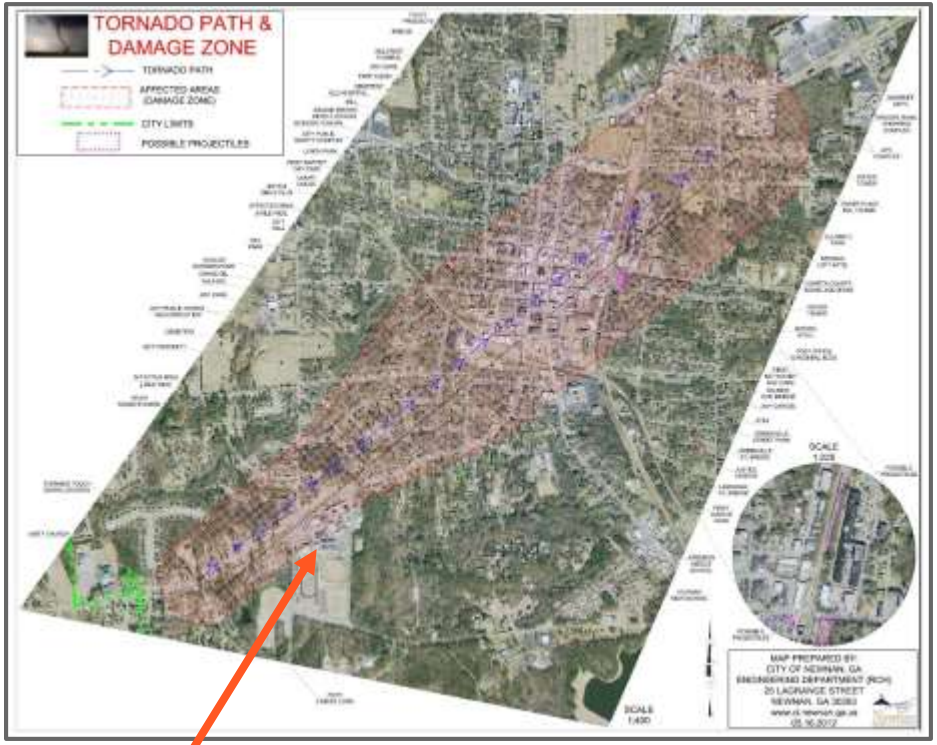
Further Reflection

Scenario 3

- At 2:30 pm the NWS issues a tornado warning for west and central Coweta County.
- The City of Newnan is experiencing heavy rain and hail and very high gusty winds.
- Warning sirens are sounded.

Slides from April 2019 Coweta County Tornado Exercise for First Responders

TORNADO HITS NEWNAN!!!



Newnan High School

Questions?