



Section 9. Hail

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Why Hail Is a Threat

A hailstorm is an outgrowth of a severe thunderstorm in which balls or irregularly shaped lumps of ice greater than 0.75 inches in diameter fall with rain¹. Early in the developmental stages of a hailstorm, ice crystals form within a low-pressure front due to warm air rising rapidly into the upper atmosphere and the subsequent cooling of the air mass. Frozen droplets gradually accumulate on the ice crystals until, having developed sufficient weight, they fall as precipitation.

The size of hailstones is a direct function of the severity and size of the storm. High velocity updraft winds are required to keep hail in suspension in thunderclouds. The strength of the updraft is a function of the intensity of heating at the Earth’s surface. Higher temperature gradients relative to elevations above the surface result in increased suspension time and hailstone size.

Although hailstorms can occur in almost every state, the Great Plains states, especially northeastern Colorado and southeastern Wyoming, receive more hail yearly than any other part of the United States. According to the Weather Channel, hail in this area of the country is most likely to fall late in the afternoon during the months of May and June and is often responsible for extensive crop loss, property damage and livestock deaths.

¹ For purposes of the NCTCOG’s risk assessment.



Hazard Profile

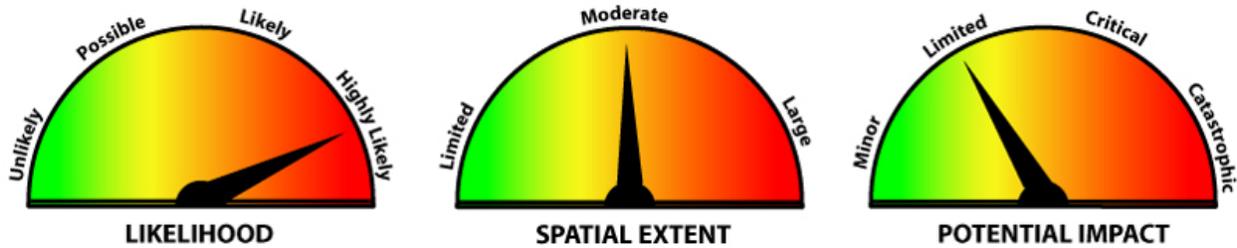


Figure 9-1. Hail Hazard Profile Summary for the City of Plano

The frequency, or likelihood, of a high winds in the City of Plano is “Highly Likely”, with an event probable in the next year. Most thunderstorms and resulting hail events occur during the spring (March, April, May and June) and, at a lesser intensity, during the fall (September, October, and November). Thunderstorms form when warm, moist air collides with cooler, drier air. Often these masses tend to come together during the transition from summer to winter. Warning time for hail is minimal.

The spatial extent of hail is “Moderate,” expected to affect more than 25% of property the City of Plano. The potential impact of hail is “Limited,” resulting in minor injuries only and more than 10% of property in the affected area damaged or destroyed. There may be a complete shutdown of facilities for more than one day.

Location of Hazardous Areas

There is no distinct geographic boundary to hail. Hail can occur in every area of the City and of the North Central Texas region equally. Figure 9-2 provides a map of reported hail events in the City of Plano.

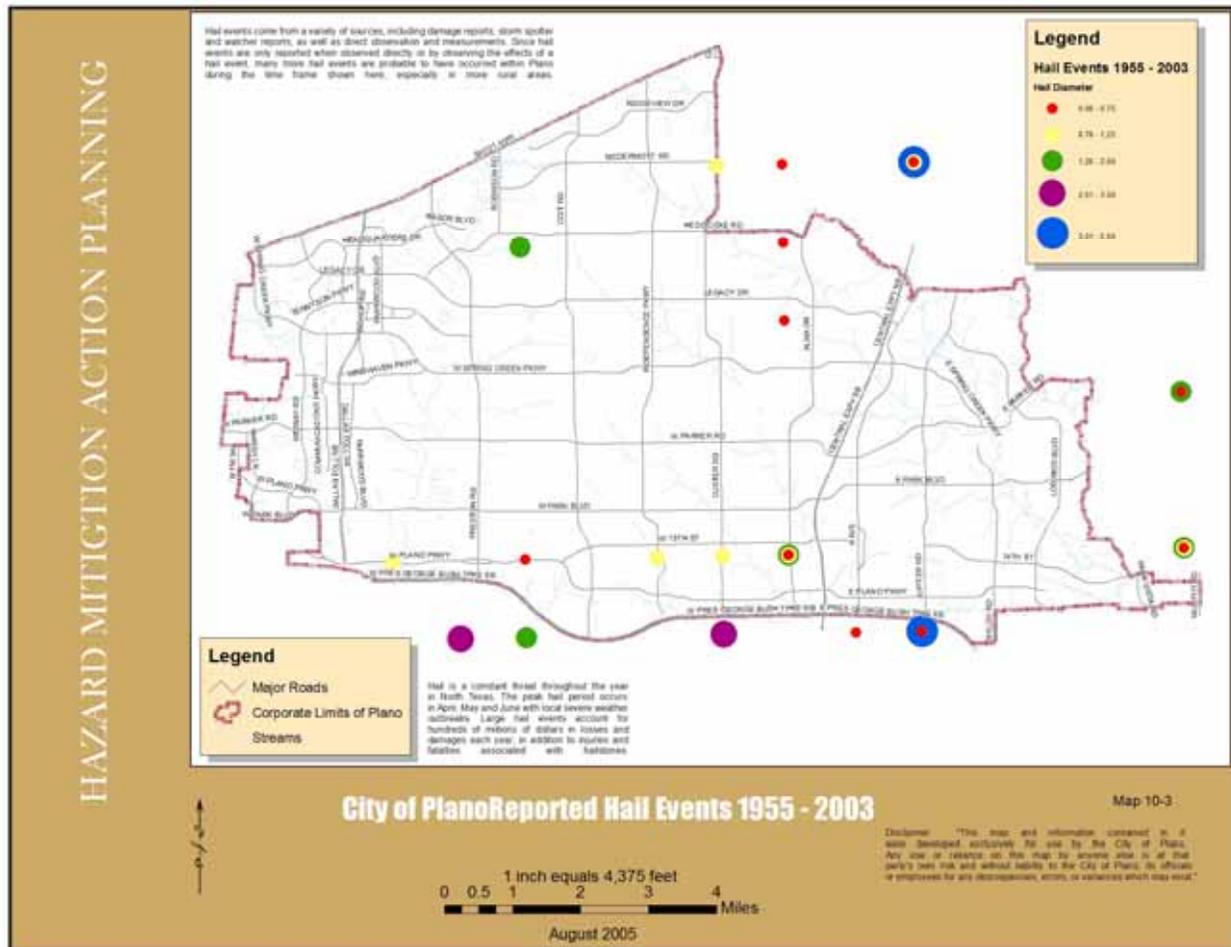


Figure 9-2. City of Plano Reported Hail Events, 1950 - 2003

History of Hail

Significant property and crop damage has been reported as a result of hailstorms in the eastern Texas-Oklahoma region. The Property Loss Research Bureau indicates that hailstorms occurring in April and May of 1995 in the Texas-Oklahoma region may have been the worst on record in terms of non-agricultural property losses.

Other severe hail events that have occurred in the North Central Texas region include hailstorms with 5-inch diameters on April 27, 1968 and June 22, 1955. A hailstorm that occurred on October 21, 1996 with 4.5-inch hailstones caused approximately \$400,000 in property damage. A hailstorm with hailstones measuring 1.75-inches caused approximately \$250,000 in property damage in the region on October 10, 2001.



On April 28, 1992, a severe thunderstorm outbreak rumbled across southern Oklahoma and through North Central Texas, producing a swath of hail damage in one of the costliest severe weather events ever for the region. Hail up to 4.5 inches in diameter was recorded during the event, which lasted several hours and ultimately resulted in losses of over \$750 million.

On May 5, 1995, a devastating supercell produced softball-sized hail in Tarrant County, accompanied by flash flooding and high winds. Over a hundred people, most of which were attending the outdoor Mayfest celebration in downtown Fort Worth, were injured. Insured damage reached nearly \$1.1 billion, making it one of the insurance industry's most expensive thunderstorms in history.

On April 5, 2003, a severe thunderstorm rolled across the north central portions of the North Central Texas region. Hail accumulated in a series of eastward moving thunderstorms, originating in Tarrant County and training due east over one of the most densely populated and highly valued areas of the DFW Metroplex. To see a typical NEXRAD image of the hail event that resulted in losses of over \$880 million, see Figure 9-XX below.

The hail data gathered by the Storm Event Center are not suitable for frequency analysis because the data do not represent all events greater than a given magnitude that have occurred at any specific location. Therefore, it is not appropriate to estimate statistics like the mean or median hail size since all significant hail events were not recorded at all locations. The hail data recorded as part of the Storm Event network range from 0.75 (the observation threshold) to 5.0 inches and are reported in increments of 0.25 inches.

Generally, more hail events have been observed in more populous areas where there are more people who participate in the spotter network. It is likely that the more extreme events also occurred in the outlying areas but were not observed due to the paucity of people in the spotter network.

Table 9-1 contains the record of reported hailstorm events in Collin County and the City of Plano since 1950. There have been 11 hail events reported in the City of Plano or in Collin County, Texas between January 1, 1950 and April 30, 2005 with hail size of at least 2.0 inches. However, this database from the National Oceanic and Atmospheric Administration is not considered complete, capturing all the events.



Table 9-1. Reported Hail Events in Collin County and the City of Plano, according to the National Oceanic and Atmospheric Administration, January 1, 1950 to April 30, 2005

Event	Location	Date	Magnitude
Collin County			
Hail	Collin	05/27/1963	3.50 in.
Hail	Collin	04/23/1964	2.25 in.
Hail	Collin	03/26/1972	2.00 in.
Hail	Collin	05/26/1976	2.75 in.
Hail	Collin	07/02/1989	4.50 in.
Hail	Collin	06/22/1991	2.00 in.
City of Plano			
Hail	Plano	10/21/1996	2.00 in.
Hail	Plano	10/21/1996	2.00 in.
Hail	Plano	05/06/2001	3.00 in.
Hail	Plano	04/05/2003	2.00 in.
Hail	Plano	04/05/2003	3.00 in.

People and Property at Risk

There is no defined geographic boundary for hail events. All population, buildings, critical facilities, infrastructure and lifelines, and hazardous materials facilities are considered exposed to the hailstorm hazard and could potentially be impacted. As a result, the hail hazard deserves mitigation consideration by the City of Plano.