A. HAZARD PROFILE

i. Hazard Description

Severe thunderstorms, tornadoes, and windstorms are what are known as severe weather, and these weather events can pose serious risks in New York City.

Severe Thunderstorms

Thunderstorms are caused by a combination of moisture, unstable air, and lift caused by cold or warm fronts moving into the area. Non-severe thunderstorms produce lightning, rain, small hail, and winds less than 58 mph. According to the National Weather Service (NWS), the national average size of a thunderstorm is 15 miles in diameter and lasts an average of 30 minutes. Thunderstorms are normally localized events.

About 10% of thunderstorms are classified as severe. Severe thunderstorms consist of winds measuring 58 mph or higher, flash flooding, lightning, and, sometimes, hail measuring at least 0.75 inches in diameter. Lightning always occurs during thunderstorms, and thus is not a criterion for determining the severity of the storm.

Hailstones are falling particles of ice. Hail develops as warm, moist air rises in the upper atmosphere and then cools. As the air cools below the freezing point, water vapor condenses into ice crystals. These ice crystals remain suspended by high-velocity updraft winds, grow larger, and eventually fall to the ground as hail. The size of hail is usually determined by the severity of the storm but typically ranges from 0.20 inches to 4.5 inches in diameter.

The NWS issues a Severe Thunderstorm Watch when severe thunderstorms are possible over a large area, in some cases several states. A Severe Thunderstorm Warning is issued when a severe thunderstorm is occurring or expected to occur within a matter of minutes.

Severe thunderstorms and hail pose serious threats to human life and property in New York City. Between 1959 and 2002, 132 people died in New York State after being struck by lightning. Severe storms can also leave broken tree limbs, downed power lines, and other debris, which may lead to power outages, transportation disruptions, and damage to buildings and vehicles.

Tornadoes

Thunderstorms can also create a favorable environment for tornadoes, which are violent rotating columns of air with winds up to 300 miles per hour. These short-lived storms generally appear as funnel-shaped clouds, gray to black in color, extending toward the ground from the base of a thundercloud. Tornadoes actually begin as transparent—and it is at this time that they are especially dangerous because they cannot easily be seen; as they pick up debris and dust, they acquire their grayish coloration. Most tornadoes move southwest to northeast at an average forward speed of 30 mph, but tornadoes can move in any direction and may vary from stationary to 70 mph. Tornadoes are most frequent east of the Rocky Mountains during spring and summer between 3 PM and 9 PM. They may also accompany hurricanes (see Coastal Storms Hazard Analysis). Tornadoes are the most violent of all atmospheric phenomena and,

over a small area, the most destructive—they can uproot trees and buildings and turn harmless objects into deadly missiles in a matter of seconds. Their damage paths can exceed one mile in width and 50 miles in length. Each year there are an average of 1,200 tornadoes nationwide, causing 60 to 65 fatalities and 1,500 injuries.

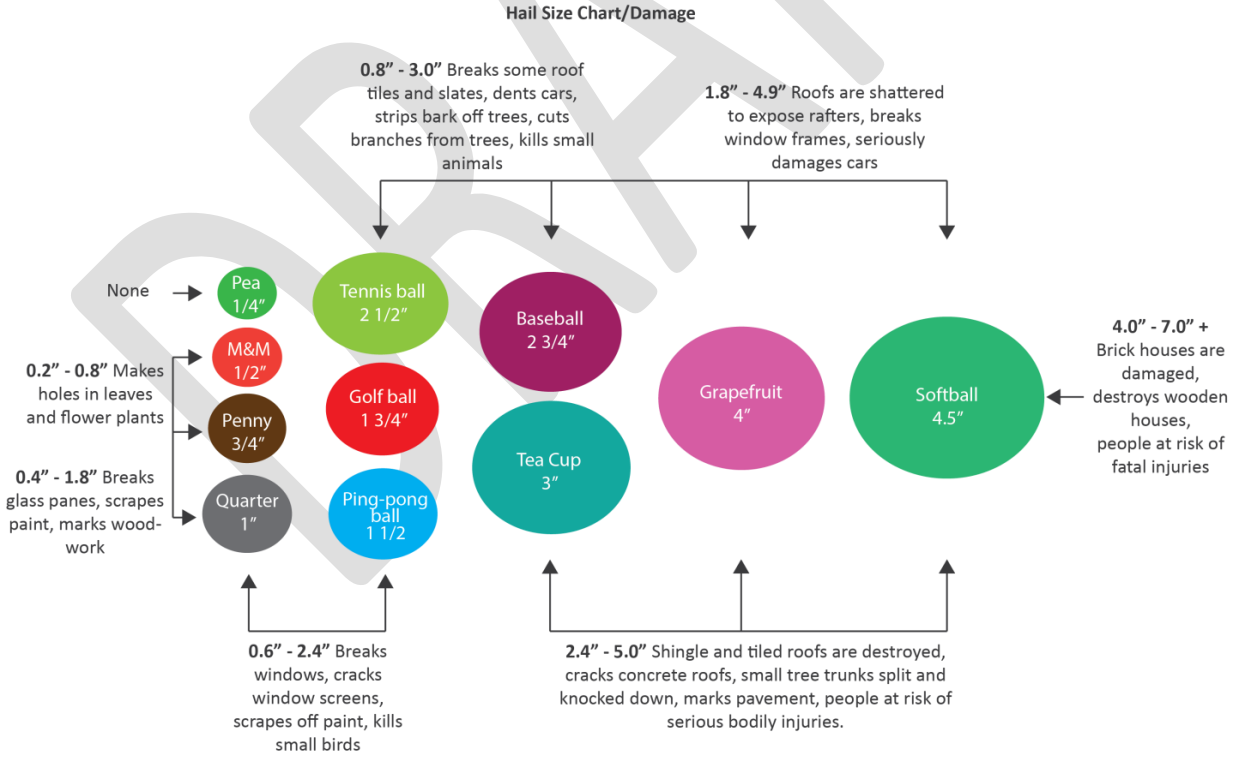
Windstorms

High-wind events are often associated with other storms, such as hurricanes or nor'easters (see Coastal Storms Hazard Analysis), but may occur independently. High winds can cause downed trees and power lines, flying debris, and building collapses—all of which may lead to power outages, transportation disruptions, damage to buildings and vehicles, injury and death. Flying debris is the primary cause of damage during a windstorm. While a building may remain generally structurally sound, broken glass from windows can cause injuries inside and outside the building and extensive damage to building contents.

ii. Severity

Severe Thunderstorms

A thunderstorm is considered severe if it produces wind gusts of at least 58 mph and/or large hail of at least 1 inch in diameter. Severe thunderstorms can also produce tornadoes. Generally the size of hailstones is correlated with the severity of the thunderstorm. As shown below in Figure 1, hailstones vary widely in scale.



Source: Burt, Christopher C. *Extreme Weather: A Guide and Record Book Climate Change Edition.* W.W.Norton & Company Inc. New York (2007).

Figure 1: Hail Size and Related Damages

Tornadoes

The Fujita Scale (F-Scale) is the standard measurement for rating the strength of a tornado. The NWS has used this scale and an analysis of damage after a tornado to infer wind speeds. On February 1, 2007, the NWS transitioned from the F-Scale to the Enhanced Fujita Scale (EF-Scale). The EF-Scale is considerably more complex and enables surveyors to assess tornado severity with greater precision. Table 1 compares the F-Scale and EF-Scale.

F - Scale	3 -sec. gust speed (mph)	EF - Scale	3 -sec. gust speed (mph)	TYPICAL DAMAGE
F0	45 -78	EF0	65-85	Light damage. Some damage to chimneys. Branches broken off trees. Shallow-rooted trees pushed over, signboards damaged.
F1	79-117	EF1	86-109	Moderate damage. Peels surface off roofs. Mobile homes pushed off foundations or overturned. Moving autos blown off roads.
F2	118-161	EF2	110-137	Considerable damage. Roofs torn off frame houses. Mobile homes demolished. Boxcars overturned. Large trees snapped or uprooted. Light-object missiles generated. Cars lifted off ground.
F3	162-209	EF3	138-167	Severe damage. Roofs and some walls from off well-constructed houses. Trains overturned. Most trees in forest uprooted. Heavy cars lifted off the ground and thrown.
F4	210-261	EF4	168-199	Devastating damage. Well-constructed houses leveled. Structures with weak foundations blown away some distance. Cars thrown and large missiles generated.
F5	262-317	EF5	200-234	Incredible damage. Strong frame houses leveled off foundations and swept away. Automobile-sized missiles fly through the air in excess of 100 meters (109 yards). Trees debarked. Incredible phenomena will occur.

Table 1: Comparison of Fujita and Enhanced Fujita Scales

Windstorms

The Beaufort Wind Scale, shown below, aids in the estimation of wind speed and corresponding typical effects.

Wind Speed (mph)	Name	Damage
25–31	Strong breeze	Large branches in motion; whistling in telephone wires; umbrellas used with difficulty
32–38	Near gale	Whole trees in motion; resistance felt while walking against the wind
39–46	Gale	Twigs break off trees; wind impedes walking
47–54	Strong gale	Slight structural damage to chimneys and slate roofs

Wind Speed (mph)	Name	Damage
55–63	Storm	Seldom felt inland; trees uprooted; considerable structural damage
64–72	Violent storm	Very rarely experienced; widespread structural damage; roofing peels off buildings; windows broken; mobile homes overturned
73+	Hurricane	Widespread structural damage; roofs torn off homes; weak buildings and mobile homes destroyed; large trees uprooted

Table 2: Beaufort Wind Scale

iii. Probability

Severe weather is a common occurrence in New York City, making it a highly probable hazard. Based on the frequency of past occurrences of severe weather, it is very likely that New York City will continue to experience these types of events.

Severe Thunderstorms

Non-severe thunderstorms occur on 25-30 days annually across New York City, whereas severe thunderstorms occur much less frequently, but at least a few times each year across the city. Based on the annual frequency of past severe thunderstorms in New York City, the probability of at least one of the criteria for severe storms being met (usually winds) is high and happens multiple times on a local scale each year, whereas the recurrence interval for tornadoes and large hail is much lower.

From 1974 to 2013, there have been 16 major occurrences of severe thunderstorms and hail, and eight of these storms have been citywide events. Although hail doesn't always occur during thunderstorms, all eight of the citywide events produced hailstones, which ranged from 0.75 inches to 1.75 inches in diameter. From 1974 to 2013, there were 14 occurrences of severe hail (equal or greater than 3/4 inch) in New York City.

Tornadoes

Although not as common as severe thunderstorms, tornadoes are still probable for the future. Over the past 28 years, 13 tornadoes have hit New York City, 11 of which were scaled F0 or F1. In the past six years, tornado activity has increased in New York City. There have been seven tornadoes (counting all tornados for events with multiple tornadoes) since 2007, compared to five tornadoes over the 18-year period beginning in 1985 (the first recorded occurrence of a tornado in New York City).

Windstorms

From 1974 to 2013, there have been 31 documented windstorms with gusts above 40 mph in New York City. During this same period, there have been 14 major windstorms with wind gusts ranging from 50 to 90 mph. Based on the historic occurrences, New York City experiences a high-wind event at least once a year.

iv. Location

Based on historic occurrences, severe weather has an equal probability of occurrence city-wide.

Thunderstorms and Hail

Although thunderstorms occur throughout New York City, they don't necessarily affect all five boroughs at the same time or with the same severity. The Bronx has experienced the most severe thunderstorms, with five occurrences and hailstones ranging from 0.75 inches to 1.0 inches. Four major severe thunderstorms have occurred in Queens, producing hailstones of 0.75 inch to 2.75 inches in diameter. Brooklyn experienced two major storms that produced hailstones ranging from 0.75 inch to 1 inch, while Staten Island experienced one major thunderstorm with 0.75-inch hailstones.

Tornadoes

A common misconception is that tornadoes do not occur in dense urban areas such as New York City; however, tornadoes have occurred in all five boroughs. Scientists caution that though rare, a tornado is possible anywhere in the City. Figure 2 shows the locations of previous tornadoes in New York City.

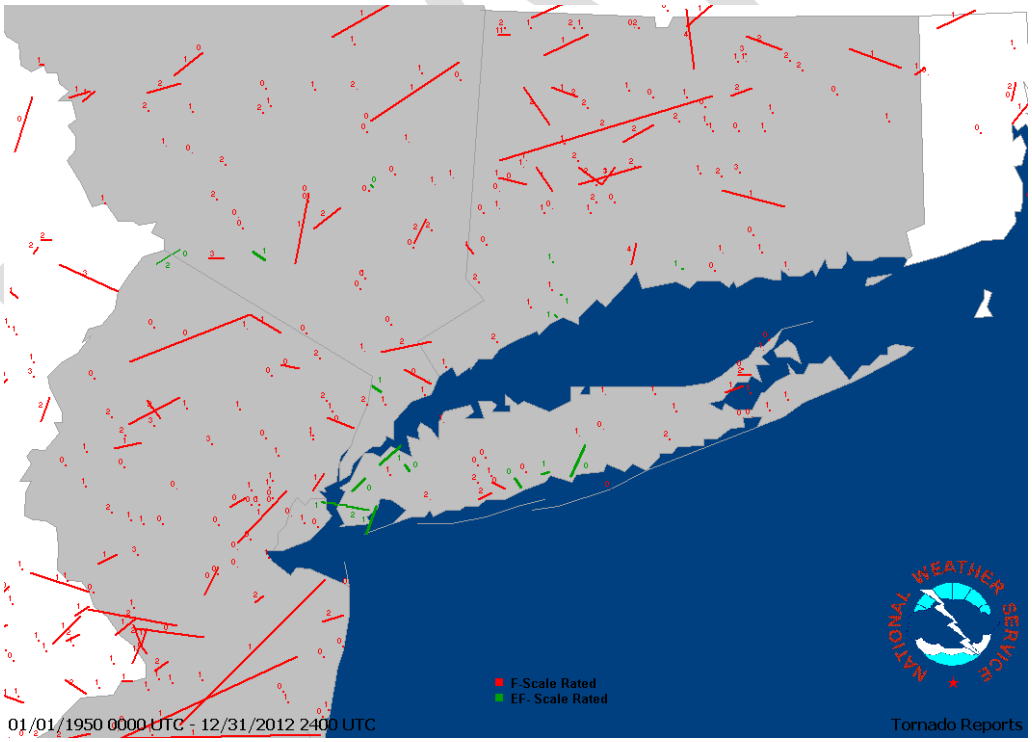


Figure 2: Tri-State Tornado Climatology 1950 – 2012

Windstorms

Windstorms occur in all five boroughs of New York City. Figure 3 and Figure 4 below show wind zones throughout the United States and New York State. These wind zones portray the frequency and strength of extreme windstorms.

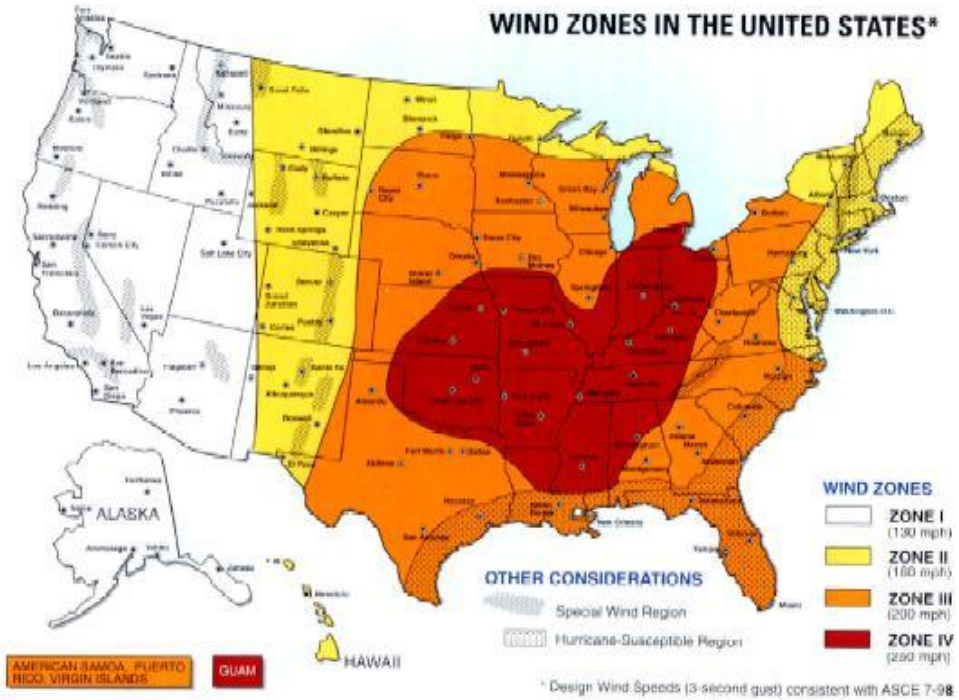


Figure 3: Wind Zones in the United States (Source: FEMA, 2008)

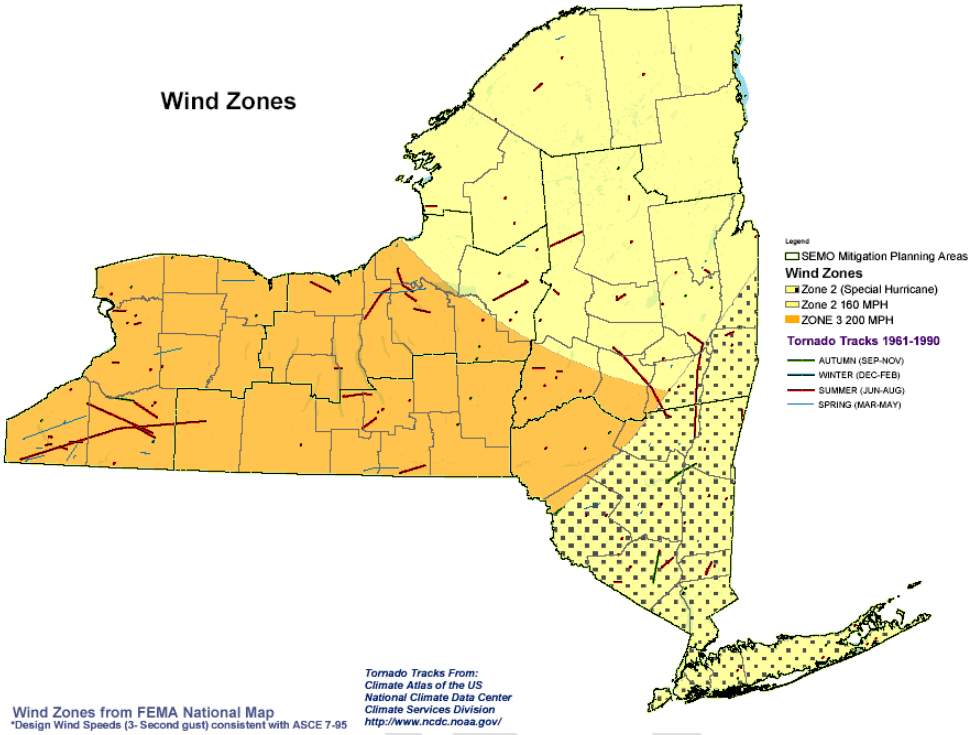


Figure 4: Wind Zones in New York State (Source: FEMA, 2008)

v. Historic Occurrences

Table 3, below, describes selected severe thunderstorms, tornadoes, and high-wind events from 1974 to 2013. Due to the high frequency of annualized severe thunderstorms, the historic occurrences table only features major severe thunderstorms. **Error! Reference source not found.** displays the number of occurrences of different types of severe events (hail, high wind, tornadoes) between 1974 and 2013.

Date	Event	Location(s)	Description
September 2, 1974	Tornado	Bronx	• F1 tornado • No injuries or fatalities
October 5, 1985	Tornado	Queens	• F1 tornado • Runs for 2 miles; width of 50 yards • No fatalities; 6 injuries
August 10, 1990	Tornado	Staten Island	• F0 tornado • Runs for 2 miles; width of 17 yards • No fatalities; 3 injuries
March 2, 1994	Windstorm	Citywide	• High winds of 61 mph

13. SEVERE WEATHER: THUNDERSTORMS, TORNADOES, and WINDSTORMS

Date	Event	Location(s)	Description
August 31, 1995	Tornado	Manhattan	• F1 tornado • Runs for less than a mile with a width of 10 yards • No fatalities; 1 injury • Property damages total $30,000
October 28, 1995	Tornado	Staten Island	• F1 tornado • No fatalities or injuries • Estimated damage $500,000
February 25, 1996	Windstorm	Citywide	• Intensity unknown • 1 fatality in Brooklyn due to a fallen tree • 1 reported injury
March 19, 1996	Windstorm	Citywide	• High winds of 79 mph • No fatalities or injuries
October 19, 1996	Windstorm	Citywide	• High winds of 92 mph • Fallen trees cause 3 fatalities; no additional injuries • Downed power lines and trees close Bayonne Bridge • Roof reported to be ripped off a Bronx building
March 6, 1997	Windstorm	Citywide	• Winds of more than 60 mph • Knocks down trees and power lines on houses and streets • 75-foot maple tree falls on school bus carrying 10 children • Two injuries caused by flying debris
November 2, 1997	Windstorm	Citywide	• Reported wind gusts of 40 to 46 mph • 1 fatality; 1 injury
November 4, 1997	Thunderstorms and hail	Bronx	• 1-inch hailstones from a line of scattered thunderstorms • Gusty winds and heavy rain
November 27, 1997	Windstorm	Manhattan	• Winds average 25 to 35 mph; gusts around 50 mph • Winds caused loss of control of parade balloon which struck a light pole causing it to fall inuring 4 spectators
February 4, 1998	Windstorm	Manhattan	• Winds of 57 mph • No fatalities; 1 injury reported

Date	Event	Location(s)	Description
June 30, 1998	Tornado/hail	Bronx/Queens	• 0.75-inch hail and damaging winds from a wave of severe storms in the Bronx • High winds in Queens down trees that strike and injure three girls • F1 tornado in Long Island
September 7, 1998	Severe thunderstorms/hail	Citywide	• Intense line of severe thunderstorms • Wind gusts of 60-80 mph • Downed trees and power lines • Hailstones of 1.50 inches • Staten Island high winds down trees, causing a building to collapse • Tree falls on three people in the Bronx, resulting in 1 fatality and two injuries • Two injuries in Brooklyn: one caused by downed tree and one by hailstones
March 18, 1999	Windstorm	Manhattan	• Winds 40 to 47 mph • 15-foot metal rod tumbles 22 stories from top of 1 Times Square; injuring 3 women
May 18, 2000	Severe thunderstorms/hail	Bronx/Queens/Brooklyn	• Line of severe thunderstorms produce damaging wind gusts • Large hailstones (0.75 to 1.0 inch) • Heavy rain and lighting • Downed trees in the Bronx • Large awning blown off building in Brooklyn • 1-inch hailstones in Woodside, Queens
December 12, 2000	Windstorm	Citywide	• Winds of 64 mph • Nor'easter • 1 fatality; 6 injuries
May 29, 2001	Severe thunderstorms/hail	Brooklyn/Queens	• Scattered severe thunderstorms with high winds • People in 19 houses in Queens report downed trees and power lines • 0.75-inch hailstones reported in Brooklyn
August 2, 2002	Severe thunderstorms/hail	Manhattan/Staten Island/Bronx	• 0.75-inch hailstones in Staten Island • Man struck and killed by lightening in Manhattan • Thunderstorms in Bronx • High wind downs power lines near Fordham University

13. SEVERE WEATHER: THUNDERSTORMS, TORNADOES, and WINDSTORMS

Section III: Natural Hazard Risk Assessment

Date	Event	Location(s)	Description
September 11, 2002	Windstorm	Citywide	• Strongest winds measure 66 mph in Queens • Winds last at least 6 hours • 1 fatality; 4 injuries • Widespread power outages • Construction debris causes injuries
September 19, 2003	Windstorm	Bronx	• Winds up to 46 mph • Hurricane Isabel • No fatalities; 1 injury • Downed trees and power lines
October 15, 2003	Windstorm	Queens	• Winds of 45 mph • No fatalities or injuries reported • Downed trees and power lines reported • Property damage estimated at a least $100,000
October 27, 2003	Tornado	Staten Island	• F0 tornado • No fatalities or injuries
November 13, 2003	Windstorm	Citywide	• Winds of 64 mph • 1 fatality; no injuries reported
August 11, 2004	Severe thunderstorms/hail	Bronx	• Severe thunderstorms produce flash flooding • Wind damage and 1-inch hailstones
December 1, 2004	Windstorm	Brooklyn	• Winds of 70 mph • No fatalities or injuries reported
December 23, 2004	Windstorm	Queens	• Winds of 47 mph • 1 fatality caused by tree crushing traveling car; no injuries
March 8, 2005	Windstorm	Queens	• Winds of 58 mph • No fatalities or injuries reported
April 2, 2005	Windstorm	Queens	• Winds of 58 mph • No fatalities or injuries reported
October 16, 2005	Windstorm	Citywide	• Winds of 36 mph • No fatalities or injuries reported • Trees downed • Windows in a high-rise office building in Manhattan blow out • $17,000 in property damage
October 25, 2005	Windstorm	Citywide	• Winds of 48 mph • No fatalities or injuries reported • Downed trees reported • Property damaged reported $35,000

13. SEVERE WEATHER: THUNDERSTORMS, TORNADOES, and WINDSTORMS

Section III: Natural Hazard Risk Assessment

Date	Event	Location(s)	Description
November 24, 2005	Windstorm	Citywide	• Winds of 40 mph • Parade balloon struck a lamppost causing a 30lb light to fall into the crowd • Two injuries reported • No cost in damages reported
January 15, 2006	Windstorm	Queens	• High winds of 63 mph • No fatalities and 1 injury reported
January 18, 2006	Windstorm	Bronx, Manhattan, Staten Island, Queens	• Winds of 68 mph • No fatalities or injuries reported
February 17, 2006	Windstorm	Brooklyn, Queens, Staten Island	• Winds of 61 mph • No fatalities or injuries reported
October 20, 2006	Windstorm	Staten Island	• Winds of 58 mph • No fatalities or injuries reported
January 20, 2007	Windstorm	Citywide	• Winds of 47 mph • Flying construction debris results in 1 injury
August 8, 2007	Tornado	Brooklyn	• EF2 tornado • Discontinuous path • 16 homes have moderate to severe roof damage • Tornado tears roof off a car dealership • Downed trees reported • Event accompanied by severe flooding • Federally declared disaster with more than $7.2 million given in Individual and Household Program (IHP) funding from the Federal Emergency Management Agency (FEMA) • More than 3,700 residents file claims at Disaster Assistance Service Centers
March 8, 2008	Windstorm	Manhattan/Bronx/Brooklyn	• Damaging winds cross over Lower Hudson Valley and New York City • Scaffold collapse in Manhattan • Downed power lines in the Bronx • Downed tree in Brooklyn
June 10, 2008	Windstorm	Citywide	• Wind gusts of 80 mph • Causes widespread downed trees

13. SEVERE WEATHER: THUNDERSTORMS, TORNADOES, and WINDSTORMS

Section III: Natural Hazard Risk Assessment

Date	Event	Location(s)	Description
June 22, 2008	Severe thunderstorms/hail	Bronx	• Severe thunderstorms cross over Lower Hudson Valley • 0.75-inch hailstones reported along Pelham Parkway • Flash flooding
August 11, 2008	Severe thunderstorms/hail	Citywide	• 1.75-inch hailstones in the Bronx accumulating up to one inch • Hailstones damage cars, flower and vegetable gardens • Downed tree limb in Cross Island Parkway in Queens
August 15, 2008	Windstorm	Bronx	• Wind gusts of 70 mph
February 12, 2009	Windstorm	Citywide	• Wind gusts of 50 to 60 mph • One fatality in Staten Island • One injury caused by fallen tree in Brooklyn
July 29,2009	Severe thunderstorms/hail	Citywide	• 0.75-inch hailstones in Staten Island • 70-mph wind gusts in Queens • Flash flooding forces some road closures in the Bronx
August 18, 2009	Severe thunderstorms/hail	Citywide	• 0.75-inch hailstones in Bronx • 80-mph wind gusts in Manhattan/Bronx • OEM reports a few hundred trees down in Central Park • Downed trees hit cars in Manhattan • Fewer than 100 trees down in Queens, but some damage cars
June 24, 2010	Severe thunderstorms/hail	Citywide	• 1.75-inch hailstones fall on Throgs Neck Bridge • One car damaged in Queens • Downed trees, utility poles, street lamps, and one chimney collapse in northeastern Queens • Wind gusts of 54 mph at La Guardia Airport • Downed trees in Bronx

Date	Event	Location(s)	Description
July 25, 2010	Tornado	Bronx	• EF1 tornado touches down in the Bronx • Large tree damages car • Seven injuries • $150,000 in damage
September 16, 2010	2 Tornadoes	Brooklyn/Queens	• EF0 tornado in Park Slope, Brooklyn, and EF1 tornado in Flushing, Queens • Park Slope tornado causes significant tree damage and estimated $8.5 million in damage • Queens tornado causes severe damage to residential buildings; one fatality; estimated $17.2 million in damage
October 1, 2010	Windstorm	Brooklyn/Queens	• 60-mph wind gusts
August 1, 2011	Severe thunderstorms/hail	Queens	• Severe thunderstorms produce lime-size hailstones in Glen Oaks • 2.75-inch hailstones reported in Bayside, causing damage to cars
August 28, 2011	Tornado	Queens	• Hurricane Irene produces two confirmed tornadoes: one EFO in Cunningham Park and one on Long Island
July 26, 2012	Severe weather	Citywide	• Warm front triggers multiple severe thunderstorms • One fatality: lighting strikes the steeple of a Brooklyn church that collapses, striking and killing a pedestrian
August 15, 2012	Severe weather	Citywide	• Multiple rounds of severe thunderstorms • Downed trees in Brooklyn damage cars • 1-inch hailstones in Queens • Downed power lines and power outages in Queens
September 8, 2012	2 Tornadoes	Brooklyn/Queens	• EFO tornado in Queens and EF1 tornado in Brooklyn • Tornado in Queens causes estimated damages of $20,000 • Tornado in Brooklyn causes structural damage to several homes and estimated damages of $250,000

Table 3: Selected Severe Weather Events 1974 to 2013

Severe weather can also prompt Presidential Disaster Declarations. This is an action made by the President that makes U.S. federal funding available for emergency relief and reconstruction assistance to affected jurisdictions. Since 1953, there have been two presidential disaster declarations for severe weather in New York City (Table 4**Error! Reference source not found.**).

Disaster Declaration No.	Date of Storm	Date of Declaration	Description	Public Assistance (PA)	PA (Emergency Work)	Individual and Household Program (IHP)
DR-1724	Aug. 8, 2007	Aug. 31, 2007	EF2 tornado in Brooklyn	$0	$0	$5.1 million
DR-1943	Sept. 16, 2010	October 14, 2010	EFO tornado in Brooklyn and EF1 in Queens	$17.9 million	$11.4 million	$0

Table 4: Presidential Disaster Declarations for Severe Weather 1953-2013

B. Vulnerability Assessment

i. Social Environment

The City closely monitors severe weather, but thunderstorms, tornados, and windstorms can occur with little or no warning, increasing risk to the social environment by compromising public safety. People who are caught outdoors during severe weather are vulnerable to injury and death. Hailstones can fall at speeds faster than 100 mph and can strike and injure people.

Data on death and injuries from severe weather confirm the risks of these events. Between 1959 and 2002, 132 people died in New York State after being struck by lightning. During a thunderstorm in August 2004, two individuals were killed after stepping out of their car into a flooded intersection electrified by a downed power line in New York City.

Construction sites, scaffolding, and crane equipment increase public safety risks from severe weather. Strong winds can free up loose construction materials and debris that can injure individuals who are caught outdoors. At least eight confirmed injuries that occurred during windstorm events were due to flying construction debris.

Large, older trees can fall on people and property, causing injury or death. At least 11 people have been killed by downed trees in New York City during a severe weather event:

- February 25, 1996 – 1 fatality during high-wind event
- October 19, 1996 – 3 fatalities during high-wind event
- March 6, 1997 – 4 fatalities during high-wind event
- September 7, 1998 – 1 fatality during severe thunderstorm/hail event
- December 23, 2004 – 1 fatality during high-wind event

- September 16, 2010 – 1 fatality during tornado

People who live in high-rise buildings are at greater risk from high winds. This is because wind pressure on upper floors is stronger and can result in broken windows.

ii. Built Environment

Hail can cause severe damage to buildings, cars, and trains. According to the NWS, hail causes more than $1 billion in crop and property damage each year. In addition, NWS also estimates that lightning costs more than $1 billion in insured losses each year.

High winds pose a serious threat to buildings and infrastructure. Due to New York City's dense urban environment, flying debris can severely damage structures. Areas with tall buildings—such as Midtown Manhattan, the Financial District, and Downtown Brooklyn—are at a greater risk because of increased wind pressures at greater heights. While these structures can withstand strong winds, glass windows pose a potentially fatal threat if broken.

Construction sites are also especially vulnerable to high winds. Loose tools and construction materials, cranes, scaffolding, and other building appurtenances may loosen in high winds.

Structural vulnerability to wind is related to the building's construction type. Wood structures and manufactured homes are more susceptible to wind damage, while steel and concrete buildings are more resistant to it. Less than 0.1% of the city's buildings are manufactured housing, and 54% are wooden structures. Ninety-three percent of Staten Island's structures are made of wood, increasing that borough's vulnerability to windstorms and tornadoes.

The 2008 New York City Construction Code addresses high winds in a dense, high-rise environment. The Construction Code establishes wind-exposure categories to set design requirements for new buildings. These requirements account for location, surroundings, and occupancy to ensure buildings can withstand extreme winds. For example, buildings along the coastline are subject to higher wind loads, as are buildings that are more than 300 feet tall.

It is not possible to estimate potential losses to specific structures from severe weather. However, based on historic occurrences, tornadoes have caused up to $7.2 million in IHP funding from FEMA. (For more information on the city's physical and structural vulnerability, see New York City's Hazard Environment.)

iii. Natural Environment

Severe weather can negatively affect the natural environment. For example, tornadoes and windstorms can destroy historic trees and damage the aesthetic value of parks and open space. The secondary impacts from severe weather on the natural environment include lightning-induced fires and hazardous material leaks and spills.

iv. Future Environment

The impact of severe weather on the future environment is complex and varies by the type of storm. Some of the impacts of climate change are warmer weather and moister air, which could create an environment favorable for severe storms. However, these same conditions have been shown to reduce the wind shear necessary for tornadoes to get a full lift. At this point it is unclear how the long-term effects of climate change will impact the strength and occurrence of tornadoes.

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