

= 1999 Sydney hailstorm =

The 1999 Sydney hailstorm was the costliest natural disaster in Australian insurance history , causing extensive damage along the east coast of New South Wales . The storm developed south of Sydney on the afternoon of 14 April 1999 and struck the city 's eastern suburbs , including the central business district , later that evening .

The storm dropped an estimated 500 @, @ 000 tonnes of hailstones in its path . Insured damages caused by the storm were over A \$ 1 @. @ 7 billion , with the total damage bill (including uninsured damages) estimated to be around A \$ 2 @. @ 3 billion . It was the costliest in Australian history in insured damages , surpassing the A \$ 1 @. @ 1 billion in insured damages caused by the 1989 Newcastle earthquake . Lightning also claimed one life during the storm , and the event caused approximately 50 injuries .

The storm was classified as a supercell following further analysis of its erratic nature and extreme attributes . During the event , the Bureau of Meteorology was constantly surprised by the frequent changes in direction , as well as the severity of the hail and the duration of the storm . The event was also unique as the time of year and general conditions in the region were not seen as conducive for extreme storm cell formation .

= = Conditions and climatology = =

The conditions around Sydney on 14 April were calm , although a slight instability in atmospheric conditions was recorded by the Bureau of Meteorology in the region . Two instability events had been identified in the greater Sydney area , but both were considered minor by the meteorological agencies . A weak cold front was moving north along the coast , and moderate precipitation was falling over the Blue Mountains , southwest of the city . The meteorological reports and figures , however , suggested that the general atmospheric conditions were " not conducive " to support the formation of a major thunderstorm in the region .

Historical records show that the formation of severe thunderstorms for the time of day and year had been rare , and it was improbable that they would maintain their intensity and cause significant damage . This long @-@ standing belief contributed to the Bureau of Meteorology 's decision not to issue warnings in the early part of the storm 's development . The 1999 event was only the second time in recorded history that hail larger than 2 cm (0 @. @ 8 in) had fallen in the Sydney metropolitan area in the month of April , and only the fifth hailstorm to strike Sydney during April in the 200 years of meteorological records for the city .

Hailstorms have had a history of significant damage in Australia . Since records on insured losses by the Insurance Disaster Response Organisation began in 1967 three other hailstorms ? Sydney in 1986 and 1990 , as well as Brisbane in 1985 ? feature on the top @-@ ten list of most insured damages caused by a single natural disaster , in addition to the 1999 storm . Hailstorms have caused more than 30 % of all insured damages inflicted as a result of natural disasters in Australia during this period , and around three quarters of all hailstorm damage has occurred in New South Wales .

= = Development of the storm = =

= = = Formation and southern Sydney = = =

The storm cell formed at 4 : 25 pm AEST to the north of Nowra , roughly 115 km (71 mi) southsouthwest of Sydney . After forming , it initially headed towards the coast in a northeasterly direction . The cell passed just to the west of Kiama at around 5 : 15 pm and gained a ' severe ' classification from the Bureau of Meteorology at the same time . ' Severe ' is a classification used by the Bureau of Meteorology for thunderstorms which meet a specific criteria , namely producing hailstones with a diameter of 2 cm (0 @. @ 8 in) or more , wind gusts of 90 km / h (56 mph) or

greater and flash flooding , or tornadoes . This classification is also used by the Bureau to classify the attributes of a storm at any given time during its life .

The storm continued to move in a northeasterly direction , crossing the coast just north of Kiama at 5 : 25 pm . It was downgraded from a severe thunderstorm and proceeded to move further off the coast for another 15 minutes while gaining speed to around 37 km / h (23 mph) . The storm then veered northward at 5 : 40 pm and continued parallel to the coast . Around 6 : 00 pm , directly east of Wollongong , the storm changed direction again , this time to northnortheast , and continued parallel to the coastline . Moderate hailstones were recorded falling in Wollongong as the western edge of the storm passed over the area , and the storm was reclassified as severe .

The storm moved parallel to the coast in a northnortheasterly direction for the next fifty minutes . It maintained a severe classification though did not impact heavily on the coastal suburbs , because it was entirely offshore . The western edge of the storm , however , recrossed the coastline just east of Helensburgh , 40 km (25 mi) southsouthwest of Sydney , at about 7 : 00 pm . Ten minutes later the direction of the storm veered slightly more northward and the centre of the storm crossed back onto land at Bundeena at around 7 : 20 pm .

= = = Immediate Sydney region = = =

The Bureau of Meteorology had not issued warnings for Sydney Airport , located on the northern shore of Botany Bay , or the rest of the eastern suburbs to prepare for large hail . They were not expecting the storm to veer northward again , but rather to continue to head further out into the Tasman Sea in a consistent northnortheasterly direction .

After crossing the coast , the storm continued to move northward , crossing Botany Bay at 7 : 40 pm and reaching the Airport five minutes later . It travelled across the eastern suburbs between Botany Bay and Sydney Harbour between 7 : 45 pm and 8 : 05 pm , dropping massive hailstones on both houses and businesses in the eastern suburbs district and the central business district . Some of the largest hailstones ever to be recorded in the Sydney region fell on the eastern suburbs during this storm . There were reports of 13 cm (5 @. @ 1 in) diameter hailstones in the eastern suburbs , although the largest confirmed hailstone was 9 cm (3 @. @ 5 in) in diameter . It was the first time in 52 years that stones greater than 8 cm (3 @. @ 1 in) had fallen in Sydney , with the last reported event being the 1947 hailstorm .

The storm continued across Sydney Harbour and changed direction slightly to be heading north . It weakened after travelling over the Harbour , and was downgraded from a severe storm at 8 : 15 pm . The Bureau of Meteorology had concluded that the storm would weaken after heading across Sydney Harbour , believing it was dissipating and would therefore not produce any more substantial hail as it moved northward ; therefore it did not issue warnings for the northern suburbs .

= = = Northern Suburbs and dissipation = = =

The storm then continued north for twenty minutes over the North Shore suburbs of Sydney before regaining strength and veering northnorthwest again , redeveloping severe thunderstorm characteristics . The storm 's redevelopment again caught the Bureau of Meteorology off @-@ guard , who had expected the storm to dissipate and move out to sea without causing further substantial damage .

It proceeded to drop large amounts of hail on the northern beach suburbs of Mona Vale and Palm Beach around 8 : 50 pm , and the centre of the storm again crossed the coast and back out to sea just after 9 : 00 pm . The storm maintained its intensity , however , and continued to move in a northwesterly direction across Broken Bay . The western edge of the storm had a minor impact on southern suburbs of the Central Coast between 9 : 15 pm and 9 : 30 pm .

The storm moved entirely off the coastline and into open water at around 9 : 45 pm . It then dissipated rapidly around 9 : 55 pm , directly east of Gosford . It was subsequently downgraded from severe status and the storm cell had faded completely by 10 : 00 pm .

= = Aftermath = =

= = = Secondary storm cell = = =

A second , far smaller storm cell passed along a similar route to the first later in the evening of 14 April . This cell was never given the classification of ' severe ' by the Bureau of Meteorology , nor did it develop into a supercell like its predecessor . Therefore , the route of the second cell was more direct and predictable than the first , following the general movement of the cold front (see conditions and climatology) , and the Bureau of Meteorology issued warnings to all residents in the second cell 's projected path to expect further storm activity .

The secondary cell passed through Sydney two hours later than the first , just after 10 : 00 pm , having been approximately 80 km (50 mi) south of Sydney when the supercell struck . It dropped hail up to 2 cm (0 @ . @ 8 in) in diameter , as well as producing heavy rainfall . Damage caused by the second cell was mostly due to rain coming in through roofs already damaged by hail from the first cell . Hail from the second cell also contributed to the damage .

= = = Damage caused = = =

The downpour of an estimated 500 @ , @ 000 tonnes of hail across Sydney suburbia resulted in widespread damage on the coastal suburbs in its path . Insured losses due to the disaster reached roughly A \$ 1 @ . @ 7 billion , with total costs estimated to be around A \$ 2 @ . @ 3 billion . The storm was the costliest natural disaster ever to hit Australia in terms of insured losses , surpassing the 1989 Newcastle earthquake by around A \$ 600 million . The areas that incurred the most damage were between Lilli Pilli and Darling Point , located 25 km (16 mi) apart on the coastline of Sydney .

The vast majority of damage was done by hail and rain . Approximately 24 @ , @ 000 houses were significantly damaged , with many suffering water damage through the holes in roofs that the large hailstones created . The stones were estimated as travelling at up to 200 km / h (120 mph) in some periods of the storm , causing indentation damage to around 70 @ , @ 000 vehicles . Twenty @ - @ three airplanes and helicopters at Sydney Airport were reported as having incurred notable damage from the hail , caused by the inability to place them under hangars in time to avoid the storm . This has been significantly attributed to a lack of warnings from the Bureau of Meteorology , who had expected the storm to continue moving further out into the Tasman Sea in the north @ - @ northeasterly direction in which it had previously been travelling .

The most significant insurance costs were in the areas of residential property damage with 31 @ . @ 8 % of total payments , motor vehicle damage with 28 @ . @ 6 % and for properties which service the commercial and industrial sectors at 27 @ . @ 5 % . Damage to aviation property , mainly planes at the vulnerable Sydney Airport , amounted to 5 @ . @ 9 % of the claims , while 5 @ . @ 8 % of all insurance payments were made for ' business interruption ' and 0 @ . @ 4 % for damage to boats as well as other miscellaneous claims .

The storm caused one fatality ; a 45 @ - @ year @ - @ old man , who was fishing about 100 metres (300 ft) from the north shore of Dolans Bay in the Port Hacking estuary , was killed when his boat was struck by lightning . Fifty injuries were recorded , caused by flying objects , road accidents due to poor visibility and smashed windscreens and other factors .

= = = Emergency response = = =

Owing to the magnitude of the storm , the State Emergency Service were aided by the New South Wales Rural Fire Service , the New South Wales Fire Brigades and the Australian Capital Territory Emergency Service in recovery work . Within hours of the storm striking the city , all affected areas were declared as ' disaster zones ' and the New South Wales Government , under Premier Bob Carr , invoked a state of emergency , which gave control and co @ - @ ordination of the response to the State Emergency Service . In the days following the storm , John Moore (Minister for Defence)

approved a request for 300 Australian Defence Force personnel to assist recovery operations , although their assistance was only for one week while resources were stretched . The government , one week later , " unexpectedly " removed complete control from the State Emergency Service and placed certain suburbs and areas under the control of the Rural Fire Service and Fire Brigade .

In the five hours following the storm striking Sydney , the State Emergency Service received 2 @, @ 000 emergency calls to 1 @, @ 092 separate incidents . In total , the State Emergency Service received 25 @, @ 301 calls for assistance to 15 @, @ 007 incidents , with the New South Wales Rural Fire Service also receiving 19 @, @ 437 . The recovery and clean @-@ up mission used an estimated A \$ 10 million worth of tarpaulin covers while waiting for permanent repairs .

After 9 days , approximately 3 @, @ 000 buildings (out of a total of 127 @, @ 947 initially damaged) were still waiting for assistance and temporary fixes to shattered roofs and windows , while a similar number still required assistance a further week later (as a number of tarpaulins became detached or otherwise ineffective) . One month after the disaster , the main priority of the emergency services was ensuring that temporary fixes remained in place , as Sydney suffered further adverse weather in the period immediately following the storm .

A study of a sample taken of affected areas suggested that roughly 62 % of buildings in the affected areas suffered damage to roofs , around 34 % to windows and 53 % to vehicles . Construction of infrastructure for 2000 Sydney Olympics in the city 's west at the time meant there was a deficiency of tradespeople who could be contracted to repair roofs and windows . Estimates put between 45 @, @ 000 and 50 @, @ 000 tradespeople in Sydney at the time of the storm , yet owing to high demand " companies were quoting householders [A] \$ 14 @, @ 000 or more for roof repairs which would normally cost \$ 3 @, @ 000 . " The situation led to a warning from Minister for Fair Trade John Watkins on the day following the storm , urging homeowners to ensure that tradespeople working to repair homes were fully qualified and legitimate .