October 17, 2024

Incident Report:
Hurricane Milton – October 9, 2024 – October 11, 2024
City of Cape Canaveral Emergency Operations Team

Storm History:



Figure 1. Track of Hurricane Milton (October 2024).

Hurricane Milton's origin can be traced to a tropical disturbance that came across the Western Caribbean Sea that then began interacting with the remnants of what was Tropical Depression Eleven-E in the Bay of Campeche during the first week of October 2024. Tropical Depression Eleven-E had formed in the Pacific Ocean and crossed over Mexico into the Bay of Campeche. On Friday, October 4, the National Hurricane Center (NHC) designated the area of disturbed weather Invest 92L, indicating that development was possible and should be monitored.

Invest 92L continued to organize and on Saturday, October 5, was officially designated Tropical Storm Milton based on satellite data. Milton intensified into a hurricane on Sunday, October 6, based on meteorological readings obtained by Hurricane Hunters flying inside the storm. From the storm's first advisory, forecast indicated a landfall position on Florida's west coast in the

vicinity of the Tampa Bay area with Milton then crossing the peninsula from east to west and exiting out into the Atlantic Ocean through or near Brevard County.

In the evening hours of Sunday, October 6, Hurricane Milton began a period of rapid intensification brought about by favorable atmospheric conditions and extremely warm sea surface temperatures that measured slightly below 90°F. In a 24-hour period, Hurricane Milton's pressure dropped from 981 millibars (mbar) to 897 mbar, with windspeeds also increasing by 90 mph within the same time period. Eventually the storm reached category 5 status with maximum sustained winds of 180 mph. Milton became the fifth-most intense Atlantic hurricane on record, and the most intense in the Atlantic Basin since Hurricane Wilma (2005). Milton now also holds the record for the third-fastest period of rapid intensification in the Atlantic Basin only after Hurricane Wilma and Hurricane Felix (2007), and the fastest in the Gulf of Mexico.

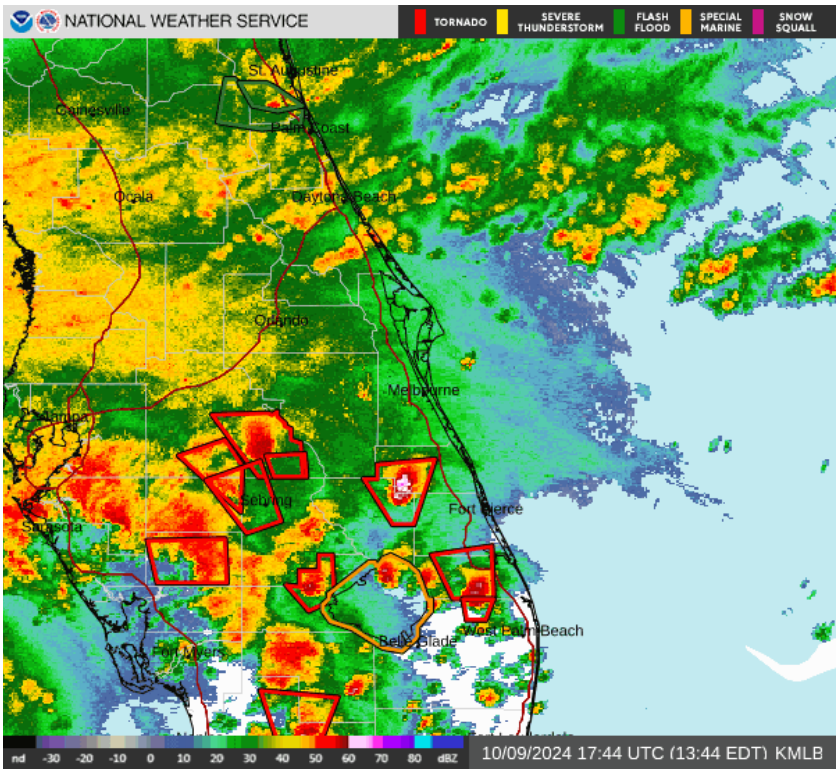


Figure 2. Doppler radar loop showing Hurricane Milton's tornado outbreak on Wednesday, October 9. Tornado warnings are denoted by red polygons on the map.

The storm weakened as it approached to within a few hundred miles of Florida's west coast from the Gulf of Mexico due to increasing wind shear. By Wednesday, October 9, Milton had been downgraded to a weaker – but no less dangerous – major category 3 hurricane with maximum sustained winds of 120 mph. Weather conditions deteriorated throughout the day on Wednesday, October 9, as the storm's outer rainbands began crossing the Florida Peninsula from south to north. A massive tornado outbreak began about mid-day that produced long-tracked violent tornadoes. While it is not uncommon for hurricanes to produce tornadoes, it is rare for them to be as violent and long lived as those produced by Milton. At the time of this report's writing, National Weather Service (NWS) offices across the state were still reviewing and surveying impacted areas, but it is estimated that there may have been upwards of 38 tornadoes produced with at least 29 so far confirmed. In total, 126 tornado warnings were issued across Florida due to

Hurricane Milton, including what would be confirmed to be an EF-1 tornado that cut through the City of Cocoa Beach on Wednesday, October 9. The storm also produced enormous rainfall accumulations north of the I-4 corridor, with multiple areas receiving double digit totals (see Figure 13 on Page 14).

Hurricane Milton made landfall at about 8:30 p.m. on October 9, near Siesta Key, Florida as a category 3. The storm weakened as it moved eastward over Central Florida and moved over Brevard County by the morning of Thursday, October 10, as a category 1. Milton exited the state over Cape Canaveral as it transitioned into an extratropical low-pressure system. By Saturday, October 12, Milton had officially dissipated east of Bermuda. As of Wednesday, October 16, the storm's death toll stood at 24 with damage estimates ranging from $50 billion to $100 billon.

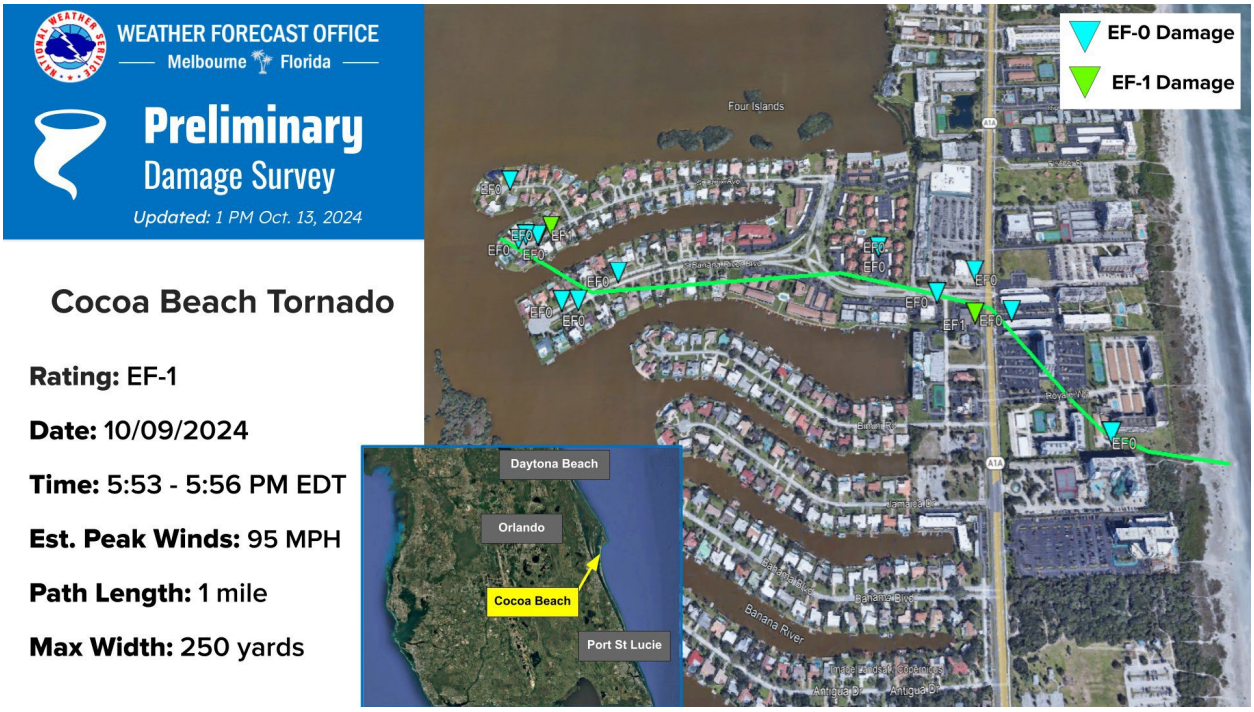


Figure 3. Preliminary damage survey produced by the NWS Melbourne office showcasing the path of an EF-1 tornado that touched down in the City of Cocoa Beach on Wednesday, October 9, 2024.

Impacts and Post-Storm Staff Activities:

The City's Emergency Operations Team began monitoring what would eventually become Hurricane Milton almost immediately following Hurricane Helene's departure. On Sunday, October 6, the City's Emergency Operations Team – based on forecast from the NHC and guidance from the Brevard County Emergency Operations Center (EOC) – was fully activated to begin largescale preparations. Public messaging raising awareness about the possibility of a tropical



Figure 4. City vehicles parked at the Polk Avenue beach crossover on Wednesday, October 9 removing beachside infrastructure.

cyclone impacting the area began as early as Thursday, October 3, on the City's social media channels, with constant updates beginning on Saturday, October 5, that ran throughout the storm event. A total of 260 Hurricane Milton-related social media post were released by Staff between Thursday, October 3, and Monday, October 14, on X (90 posts), Facebook (71 posts), Nextdoor (48 posts), and Instagram (51 posts). The City's Facebook page saw an increase of 1,200 followers (up 557.1% from the previous week) and 24,500 page visits with a reach of 2,366,456 individuals.

Additionally, Staff released four "Storm Update" email blasts using the same listserv as the City's traditional Weekly Update platform on the following dates: Sunday, October 6; Monday, October 7; Tuesday, October 8; and Monday, October 14. In total, 3,633 individuals opened these emailed updates.

Each of these updates are linked below for reference:

1. Storm Update #1
2. Storm Update #2
3. Storm Update #3
4. Storm Update #4

By 12:00 p.m. on Wednesday, October 9, the following had been accomplished by the City's Emergency Operations Team:

- The Public Works Services (PWS) Department and the Parks, Recreation and Community Affairs (PRCA) Department had taken down all flags, shade canopies, screens, or loose objects that might be susceptible to high winds. Additionally, wheeled trash cans at each beach end were lashed to crossover fencing.
- PWS and the Capital Projects (CP) Department had been continuously checking all City storm drains to make sure that they were clear of debris/clogs.

- PWS and CP had realigned the Center Street Pump Station's activation floats so that it would start up sooner with less rainfall and had drained down the underground stormwater system in the Center Street Basin. The pump was fully fueled as well.
- PWS had checked all mobile/fixed backup diesel generators to ensure that they were set, fueled, and secure.
- Fleet vehicles had been refueled/recharged.
- The Community and Economic Development (CED) Department had reached out to contractors at all major construction sites in the City to ensure that they were aware inclement weather conditions were possible within the next 24 hours and to secure their job sites appropriately. Staff from the City's Building Division also conducted in-person rounds to inspect various construction sites to ensure readiness.
- PWS had removed all banners atop light poles throughout the City.
- All eight City remote sensor sites (water level gauges and weather stations) were checked and found to be functional and monitoring conditions in real-time.
- Out of precaution for Milton's storm surge, Staff removed the eastern most sections of each of the City's four Mobi-Mats at (from north to south) the Ridgewood Avenue, Monroe Avenue, Polk Avenue, and Buchanan Avenue public beach crossovers. Each of the City's 17 Drown Zero life preserver stations were also removed prior to the storm. Each Drown Zero station was back in place with all accompanying equipment and signage by Monday, October 14.
- Metal flood barriers had been installed across doorways at the City's Water Reclamation Facility and at the City of Cape Canaveral Community Center (C5).
- City Hall's rooftop Starlink unit – used for emergency backup internet – was checked and found to be functional and secure.
- Staff made 560 sandbags with the City's newly acquired sandbag making machine. These 560 sandbags were distributed at a dedicated sandbag distribution event at Manatee Sanctuary Park on Monday, October 7, (public advertising for which had begun on Friday, October 4). Persistent rainy conditions, combined with the fact that the City currently has no dry bulk material storage area, led to the remaining sand the City had becoming soaked. Wet sand cannot be passed through the sandbag machine as it will clog the unit and lead to possible damage. Once the City's pre-made supply of sandbags had been exhausted, Staff transitioned the distribution site to a self-serve station where sand was dumped in the park's parking lot and empty sandbags were delivered for self-filling. This first event lasted from 9:00 a.m. until 3:00 p.m. Additional sand was ordered on Monday, October 7, and delivered on Tuesday, October 8, when another self-service event was held from 10:45 a.m. until just after 1:00 p.m. when sand supplies ran out. Over 2,000 sandbags were distributed by the City over the course of 24 hours utilizing at least 25 cubic yards of sand and 22 yards of leftover fill dirt.
- It had been determined that all City offices and facilities would be closed all day on Wednesday, October 9, and Thursday, October 10, in the interest of Staff and public safety.

- The City's Emergency Operations Team was in contact with Canaveral Fire Rescue, the Brevard County Sheriff's Office, and the Brevard County EOC; all relevant partners had received an up-to-date copy of the City's Tropical Cyclone Preparedness and Recovery Plan.
- Council declared a local state of emergency on the evening of Monday, October 7, via Resolution No. 2024-16; which was placed on the City's website for public viewing.
- Canaveral Fire Rescue instituted a double shift for increased manpower for response and recovery efforts post-storm. Brevard County Sheriff's Deputies were pre-staged at the Brevard County EOC ready to relay information as needed.

Weather conditions deteriorated to the point where safe operations could no longer be sustained, and by 2:00 p.m., Wednesday, October 9, all Staff members had pulled back to their respective ride out positions. One Staff member within PWS remained onsite at the Water Reclamation Facility throughout the duration of the storm to ensure its operations were safely maintained and monitored.

Wind Damage:



Figure 5. Tree blown over at Canaveral City Park as seen on Thursday, October 10.

On the morning of Tuesday, October 8, a hurricane warning was issued for all of Brevard County, meaning sustained winds of 74 mph or higher were expected within 36 hours or less. Hurricane Milton crossed Brevard County has a category 1 hurricane the morning of Thursday, October 10, delivering sustained tropical storm force windspeeds across the City of Cape Canaveral for several hours. Weather stations placed across the City showed increasing ambient windspeeds throughout Wednesday, October 9. Windspeeds began to decrease however in the early morning hours of Thursday, October 10, as Milton's eye (i.e., the storm's center) moved over Cape Canaveral.

The highest windspeeds observed in the City occurred on the "backside" of the hurricane as its eye was moving backout over the Atlantic Ocean. City Hall's rooftop weather station recorded the highest observed windspeed across the City's remote sensor network with a wind gust of 66 mph between 6:45 a.m. and 7:00 a.m. on October 10. The highest windspeed recorded in Brevard County due to Hurricane Milton was a 98-mph gust at the Kennedy Space Center. As stated earlier, Brevard County also saw one confirmed tornado touchdown that occurred within the City of Cocoa Beach on Wednesday, October 9. This was an EF-1 tornado with maximum windspeeds of 95 mph. First responders from Canaveral Fire Rescue and the Brevard County Sheriff's Office began making damage assessment rounds between 8:00 a.m. and 9:00 a.m. on Thursday, October 10, once windspeeds began to die down. Staff re-entered the City by 11:00 a.m. once given the all clear to do so by first responders.

Assessments yielded little to no wind-related structural damage within the City aside from some blown down fences, signs, and downed power lines. In terms of City facilities, wind-related damage included the Cape Canaveral Public Library's marquee being blown over and wooden fencing at Banana River Park being knocked over along the park's northernmost parking lot. Numerous trees were blown over as well as large amounts of tree branches and leaf litter. Removal and clearing of organic debris began immediately upon Staff's return into the City once conditions safely permitted on Thursday, October 10. A streetsweeper helped to clean City roadways on Wednesday, October 16.

Flooding:



Figure 6. Street flooding at the intersection of Orange Avenue and Lincoln Avenue as seen on Wednesday, October 9.

Rainfall forecasts leading up to Hurricane Milton's landfall called for prolific rainfall totals for some areas of the state, although exact impacts would be dependent upon where the storm's track would ultimately follow. According to the NWS Melbourne office, 6 to 8 inches of rainfall were anticipated across Brevard County, with isolated areas of 10 to 12 inches possible. Localized flooding was anticipated in streets and yards. A Flood

Watch was put into place between Sunday, October 6 and Thursday, October 10. Through its official social media channels and emailed storm updates, the City made this flood risk clear to residents over the course of several days by sharing infographics from the NHC and the NWS Melbourne office.

Between 12:01 a.m., Sunday, October 6, and 11:59 p.m., Saturday, October 12, (1 week) City Hall's rooftop weather station recorded 8.89 inches of rainfall. During the same time period, the Water Reclamation Facility's ground mounted weather station recorded 11.59 inches of rainfall. However, most of the week's rainfall was observed between Wednesday, October 9 and Friday, October 11, with City Hall's weather station recording 6.51 inches within this shortened time period and the Water Reclamation Facility's weather station recording 8.56 inches.

Reports of flooding became widespread within the City the evening of Wednesday, October 9, when a rainband delivered an extensive amount of rainfall between 5:00 p.m. and 6:00 p.m. At the City's Water Reclamation Facility, 3.22 inches of rainfall was recorded during this hour, equating to slightly less than a 1 in 50-year rain event. City Hall's weather station recorded 2.12 inches of rain in this same time period. A Flash Flood Warning was instituted by the NWS Melbourne office as a result of this intense rainband. Street flooding was observed and/or reported in at least Harbor Heights, Surf Drive, Polk Avenue, Lincoln Avenue, Buchanan Avenue, Orange Avenue, Ridgewood Avenue, Fillmore Avenue, and Thurm Boulevard. Flooding also occurred along the eastside of the Canaveral Ditch across multiple adjacent communities. The City's main vehicle fleet parking lot within the Water Reclamation Facility was observed to have flooded within this time period.

The Center Street Pump Station began turning on intermittently throughout the day on Wednesday, October 9 but then remained on continuously between roughly 4:45 p.m. and 8:45 p.m. in order to deal with this is intense rainband. Although observations show that multiple



Figure 7. Staff inspecting the Center Street Pump Station on Thursday, October 10.

streets flooded in the Center Street Stormwater Basin, Staff received resident reports that much of the initial street flooding only remained for about 15 minutes or so before being drained dry, likely the result of the Center Street Pumping Station activating to its maximum pumping capacity and accelerating water removal out of the area's underground stormwater pipes and into the Banana River Lagoon.

More heavy rains occurred on Friday, October 11, between 1:00 a.m. and 4:00 a.m. from one of Milton's last remaining rainbands. A flood advisory was issued as a result by the NWS Melbourne office, and 1.91 inches of rainfall was recorded between the aforementioned hours at City Hall.

Water levels in the Banana River Lagoon also rose as a result of the storm's rainfall, accentuating a period of already elevated water levels that normally occur in the Fall season. Between Tuesday, October 1 and Sunday, October 13, the lagoon rose between 1.2 and 1.3 feet according to the remote sensor site positioned at Banana River Park's public dock (Figure 8). On the morning of Monday, October 14, water was observed by Staff to be at the bottom of the Banana River Park's public dock, inhibiting the ability of stormwater drainage in certain areas of the City such as along the Canaveral Ditch. Specific examples include at the Port Canaveral Trailer Park and at Cape Canaveral Mobile Estates. Observations showed that by Tuesday, October 15, standing water that had been present in these areas had largely drained down.

An additional 4,000 polyester sandbags and 20 cubic yards of sand have been ordered by the City as a precaution to last through the remainder of the hurricane season.



Figure 8. View of Banana River Park's public dock and weather station as seen on the morning of Thursday, October 10. Water can be seen splashing over the west end of the dock as Hurricane Milton's backside moved through the area.

Beach Erosion and Storm Surge:

The City of Cape Canaveral was placed under a Storm Surge Watch as Hurricane Milton approached, which is defined as the possibility of life-threatening inundation from rising water moving inland from the shoreline within a specified area, generally within 48 hours, in association with a tropical cyclone. Rip currents and rough surf were also highlighted as considerable beachside risks.



Figure 9. Comparison photos showing the difference of the beach at Polk Avenue between 2019 and 2024. Loss of beach sand is evident. The top two images are looking south, the bottom two are looking north.

Although a storm surge of 3 to 5 feet was predicted, beach erosion was found to be minimal with no breach of the duneline observed or reported. The duneline's sea oats – a Florida native perennial grass with deep intricate root systems – continue to perform exceptionally well against storm surge and high tide flooding; not only holding the duneline in place but moving it eastward away from coastal properties. In February 2024, Staff and dozens of volunteers planted 17,760 sea oats across roughly two miles of beach. Since 2005, the City has planted nearly 200,000 sea oats. Due to this success, these annual sea oat planting events will continue.

While minimal acute beach erosion was observed during this storm event, the beach has lost a significant amount of sand since its last renourishment was completed in 2019. Officials from

Brevard County have indicated to Staff that the US Army Corps of Engineers – in partnership with the Canaveral Port Authority and Brevard County itself – expects to start renourishing the beach in the City this coming winter via an already planned project. Equipment will likely start mobilizing either in November or December after the conclusion of the sea turtle nesting season, with operations beginning in December 2024. As with past renourishment projects, the primary construction access will be at the east end of Washington Avenue and Cherie Down Park. This project will be critical to enhancing the security, safety, and resiliency of the City's coastal infrastructure by extending the beach eastward, providing a larger buffer zone in which to handle storm surge. Beach renourishment is not funded by the City, but rather by a combination of entities that can include Brevard County, the state, and the federal government.

Power and Internet Outages:

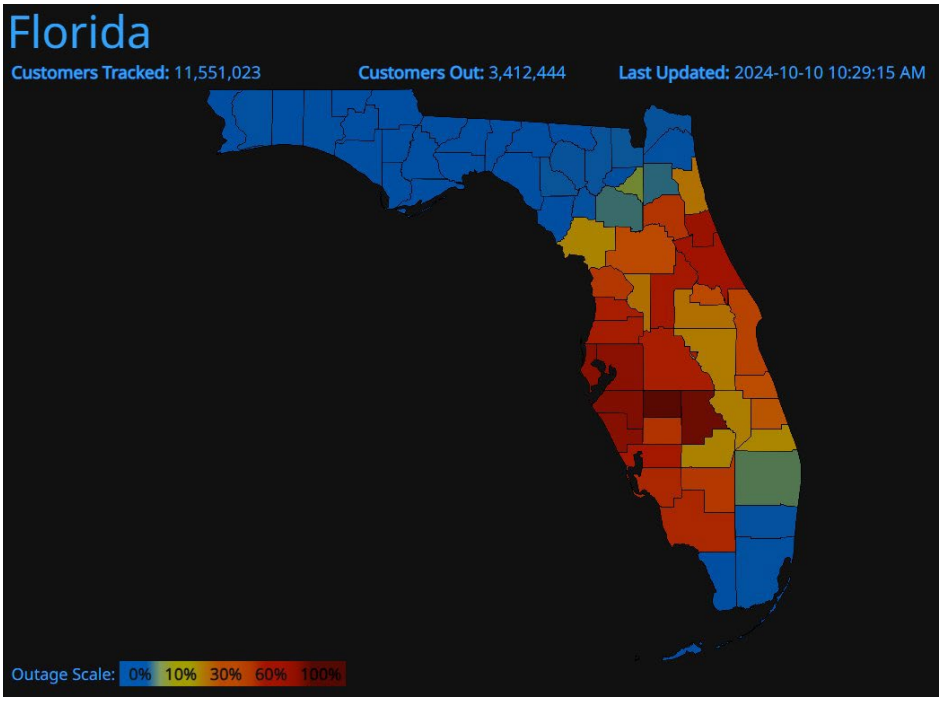


Figure 10. Map denoting regional power outages as of the morning of Thursday, October 10.

At peak, about 3.5 million customers across the state of Florida lost power due to Hurricane Milton, eclipsing the number of outages observed as a result of September 2022's category 4 Hurricane Ian when it also struck the west coast. In Brevard County, over 155,000 customers lost power due to the storm, with power outages beginning on Wednesday, October 9. Large sections of the City of Cape Canaveral lost power, with multiple downed power lines being reported by residents, as well as several incidents of arcing and transformer explosions. Example locations where this occurred include: Buchanan Avenue and Ridgewood Avenue, sections along North Atlantic Avenue, and on the walking trail just north of the Port Canaveral Trailer Park.

Florida Power and Light (FPL) – the City's electrical utility – began to steadily restore electricity as soon as weather conditions permitted across Brevard County on Thursday, October 10. The

company has stated that they expect 95% of service restoration of their territory in Brevard County by Thursday, October 17. The number of customers without power in Brevard is now down to less than 300 as of this report's writing. There are a total of 345,490 FPL customers in Brevard County.

Up until Saturday, October 12, three City buildings had no grid power – the CAPE Center, the Brevard County Sheriff's Office Cape Canaveral Precinct Building, and the Nancy Hanson Recreation Complex. The Brevard County Sheriff's Office Cape Canaveral Precinct Building and the CAPE Center were however running on a shared backup diesel generator, allowing operations to continue off-grid. The C5, City Hall, and the City's Water Reclamation Facility did not lose grid power during the storm. Multiple traffic lights were also disabled or left flashing due to power outages, including at: SR A1A and Buchanan Avenue, SR A1A and North Atlantic Avenue by the Cumberland Farms gas station, and North Atlantic Avenue and East Central Boulevard. All traffic light issues have since been resolved.

On Friday, October 11, several power strips and the City's small in-field 288 watt-hour backup solar-powered electric generator were placed around the lobby of the C5 for residents to utilize during normal business hours for the recharging of electronic devices if desired. These power strips and the electric generator were removed from the C5's lobby on Wednesday, October 16.

Internet services were disabled across the state by Milton, with over half a million Spectrum customers alone losing internet. By the morning of Friday, October 11, the C5, City Hall, the CAPE Center, and the Water Reclamation Facility had lost internet connectivity from the City's normal internet provider, Florida Hight Speed Internet. Staff activated City Hall's rooftop Starlink unit to



Figure 11. City Hall's rooftop Starlink unit after the storm as seen on Friday, October 11.

supply internet services for effected facilities. This backup satellite-based internet system worked very well and continues to supply vital internet services to City facilities as of Thursday, October 17. Without this system, response and recovery efforts for the storm would have been significantly hampered. Starlink was instituted as an emergency backup internet system for City facilities in Summer 2023 in the wake of communications issues experienced in the aftermath of September 2022's Hurricane Ian in heavily impacted municipalities on Florida's west coast.

Starlink however does not use the City's normal public IP address. This has led to an unanticipated outage in several automated customer services. Public-facing web services, to include business tax receipts, online permit applications, and self-serve public record searches are temporarily disabled. The public will be provided with alternative means to conduct these business items. Staff are working to have service restored as soon as possible, but are subject to external service outages beyond the City's control.

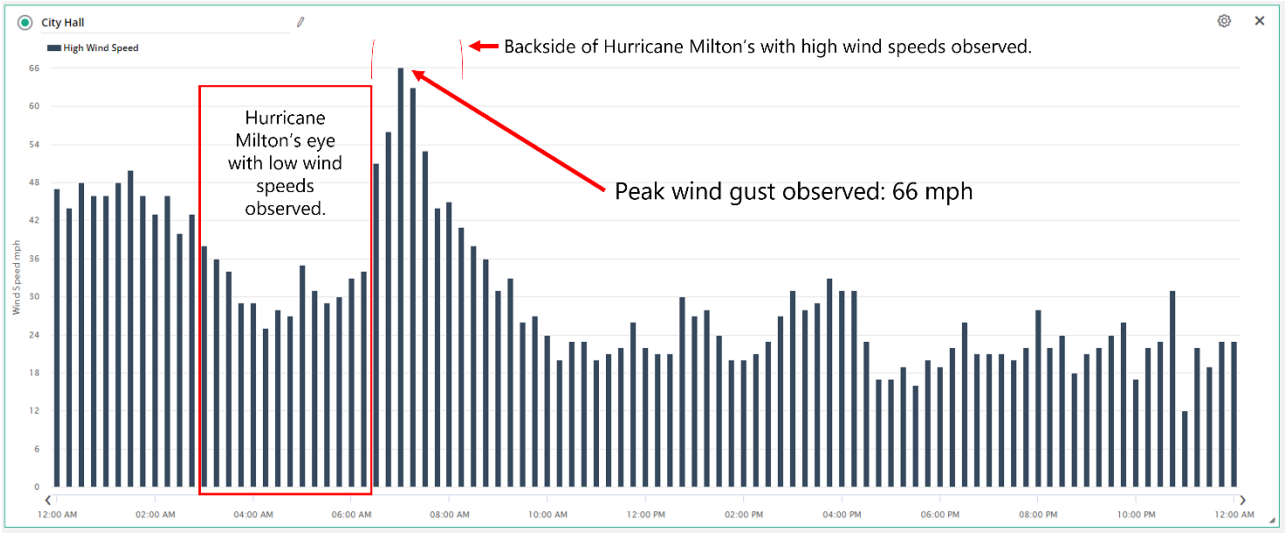


Figure 12. Data obtained from City Hall's rooftop weather station denoting wind gust throughout Thursday, October 10.

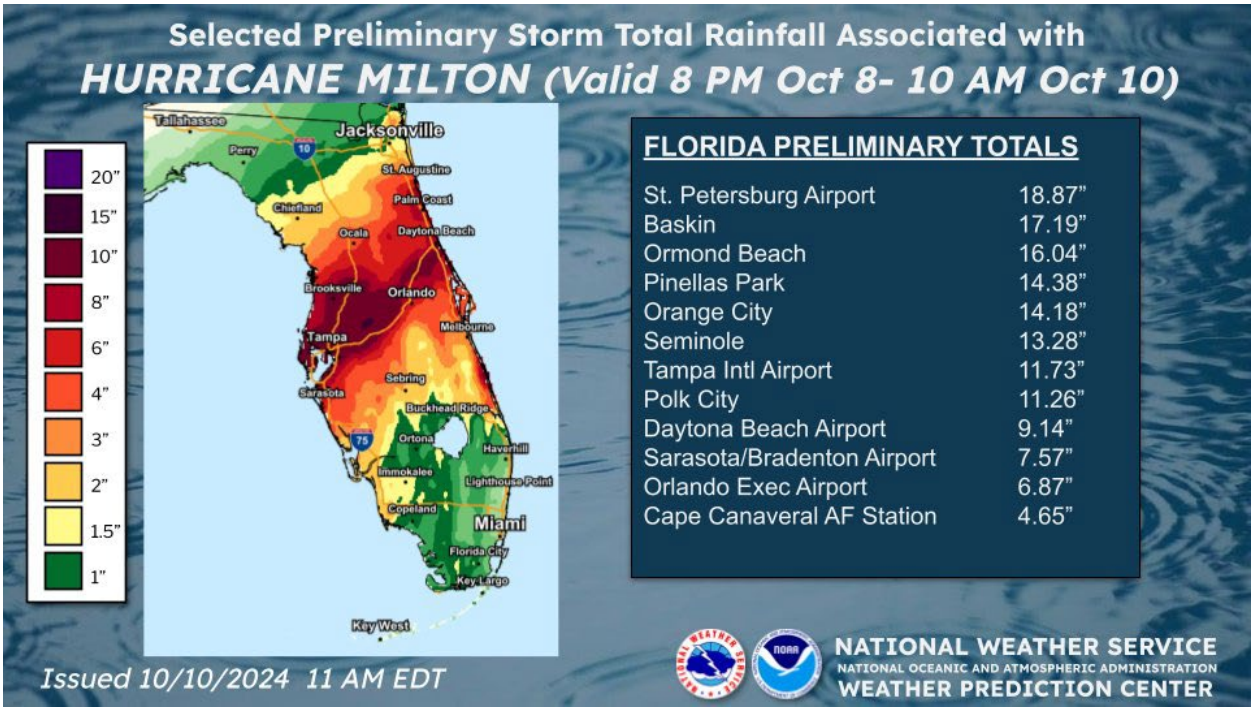


Figure 13. Statewide rainfall totals from Hurricane Milton.



Figure 14. Photo taken by a Sheriff's Deputy showing a tree that had partially fallen across Buchanan Avenue as seen on the morning Thursday, October 10.



Figure 15. Self-serve sandbag distribution site as seen on Monday, October 7 at Manatee Sanctuary Park in the northeast corner of the park's parking lot.



Figure 16. Snapped tree limb at Xeriscape Park as seen on the morning of Thursday, October 10.