



State of New Jersey

DEPARTMENT OF ENVIRONMENTAL PROTECTION

Climate and Flood Resilience
Division of Coastal Engineering
1510 Hooper Ave., Suite 140

Toms River, N. J. 08753

Telephone: 732-255-0767 Fax: 732-255-0774

PHILIP D. MURPHY
Governor

SHEILA Y. OLIVER
Lt. Governor

SHAWN M. LATOURETTE
Acting Commissioner

MEMORANDUM

TO: David Rosenblatt, Assistant Commissioner

FROM: Chris Constantino for William Dixon, Director 

DATE: February 4, 2021

SUBJECT: Initial Coastal Storm Survey & Damage Assessment
Atlantic Ocean, Delaware Bay and Raritan Bay shorelines
January 31 – February 2, 2021 Nor'easter ("Winter Storm Orlena")

Several periods of small to moderate wave events continued to impact to coast of New Jersey since late fall of 2020. Generally, most beaches fared well, and impacts were minimal and short-lived with the exception of several 'hot spot' locations which haven't fared well and continue to deteriorate. This deterioration is being closely monitored by the Division of Coastal Engineering (DCE) and the respective municipalities. Consistent with the last several Coastal Storm Survey & Damage Assessments, ongoing and recently completed periodic nourishment projects in Cape May County, Atlantic County and Monmouth County dampened the impacts and alleviated some of the pressure at several traditional 'hot spot' locations. However, the impacts due to a nor'easter from January 31st through February 2nd had a greater impact than recent events in late fall of 2020.

Short- to medium-period seas, generated by moderate to strong east-northeast and northeast winds, increased late Sunday, January 31st and continued through Monday, February 1st. On Tuesday, February 2nd, winds subsided as they rotated to the north and north-northwest along the northern half of the Jersey Shore and the northwest along the southern half of the Jersey Shore as the storm slowly pulled away. Seas generally began to transition into a predominantly medium period swell for much of Tuesday, February 2nd, although the sideshore component to the winds along the northern half of the Jersey Shore allowed for a choppier sea state for a longer duration. Surf heights ranged from 3 to 6 feet on January 31st, 6 to 12 feet on February 1st, and 5 to 10 feet on February 2nd with the greatest surf heights generally observed around jetties, groins, inlets, and piers.

Buoys off the New Jersey coast recorded sustained winds near 50 mph with gusts over 60 mph. Gusts at inland reporting stations were recorded at nearly 60 mph during the peak of the event. Sea heights peaked at nearby buoys at 23 feet. Tides reached minor flood to moderate flood stage levels for up to 5 high tide cycles from February 1st through February 3rd for much of New Jersey. These elevated tidal levels were a product of the recent astronomical tide phase, the period of strong onshore winds, and the proximity of the storm to the New Jersey Coast.



Staff from DCE conducted a town-by-town visual pre-storm survey on Thursday, January 28th and Friday, January 29th with the post-storm surveys being conducted on Tuesday, February 2nd, Wednesday, February 3rd, and Thursday, February 4th. The results of this assessment are contained in this report. During the compilation of this report, the surf conditions around the state ranged from 5 to 10 feet on Tuesday with winds between 20 and 30 mph, from 2 to 4 feet on Wednesday with westerly winds between 10 and 20 mph, and under 3 feet on Thursday with westerly winds under 25 mph. A detailed summary listed by municipality from north to south is enclosed.

Of the 81 sites were surveyed, 54 were determined to have minor beach or dune erosion, 18 had moderate beach or dune erosion and 9 had major beach or dune erosion. Criteria for determining damage levels are listed at the end of this summary.

Please note that the storm damage assessments found herein were conducted in a rapid time interval with pre-storm and post-storm observations made immediately before and after the event in question. Please note that the changes documented in this report are from this event; pre-existing conditions (i.e. scarps in dunes prior to the event) and what caused these conditions are not always reported herein. It is often the Division's experience that much of the material eroded from the "dry" beach area has not been lost, but rather redistributed within the beach profile system, such as creation or enlargement of offshore sand bars. Our expectation is that much of material will return to the "dry" beach in time following the storm; this time frame may vary based on several contributing factors such as storm frequency and duration.

*** Damage Levels:**

Major erosion – consists of significant or total beach berm loss and/or significant erosion and scarping of the dunes.

Moderate erosion – consists of significant scarping and/or significant sloped erosion of beach berm and/or minor erosion of the dunes.

Minor erosion – consists of redistribution of sand within the beach profile or loss of sand without significant scarping or significant sloped erosion.

LOCATION	INSPECTION NOTES	DAMAGE LEVEL*
PERTH AMBOY	Minor sloped erosion. No major incidents or damage reported.	Minor
SOUTH AMBOY	No major incidents or damage reported.	Minor
OLD BRIDGE	Up to 15' of sloped erosion, 1' in height. Various sections of vertical dunes scarps, up to 3' high and 4' wide. Some wave runup/tide to the upper beach. No other major incidents or damage observed or reported	Minor
ABERDEEN	No major incidents or damage observed or reported.	Minor
ABERDEEN CLIFFWOOD BEACH	Up to 20' of sloped erosion, 1' to 2' in height. Various sections of vertical dunes scarps, up to 2' in height. Wave runup/tide to the upper beach. Substantial overwash reported along Lakeshore Dr. and Ocean Blvd.	Moderate
KEYPORT	Minor sloped erosion and redistribution of sand. Some wave runup/tide to the upper beach. No major incidents or damage observed or reported.	Minor
UNION BEACH	Up to 15' of sloped erosion, 1' - 2' in height. Some wave runup/tide to the upper beach.	Minor
KEANSBURG – BAYSHORE FLOODGATE	Minor sloped erosion and redistribution of sand. Wave runup/tide to the upper beach. No major incidents or damage observed or reported. Ice flow observed. Gate was closed consistent with the Operations Manual.	Minor
KEANSBURG	<u>Floodgate Facility to Point Comfort:</u> Up to 50' of sloped erosion. Various sections of vertical beach scarps, up to 4' wide and 5' high. <u>Point Comfort to Ideal Beach:</u> Up to 20' of sloped erosion, 1' - 3' in height. Various sections of vertical beach scarps, up to 3' in height. Wave runup/tide to the upper beach. <u>Ideal Beach to Pews Creek:</u> Up to 25' of sloped erosion, 1' - 2' in height and 5' in width. Wave runup/tide to the upper beach with some minor dune scarping.	Minor
MIDDLETOWN	<u>Pews Creek Pump Station:</u> Gate was closed consistent with the Operations Manual.	Minor
	<u>Port Monmouth:</u> Up to 25' of sloped erosion and redistribution of sand. Wave runup/tide to the upper beach. No major incidents or damage observed or reported.	Minor
	<u>Belford:</u> Additional scarping along the dike at the ferry terminal; 3' – 4' wide, up to 4' - 5' high. No major incidents or damage observed or reported.	Minor
	<u>Leonardo:</u> Minor sloped erosion and redistribution of sand. Some wave runup/tide to the upper beach. No major incidents or damage observed or reported.	Minor
ATLANTIC HIGHLANDS	Minor sloped erosion and redistribution of sand. Ice flow observed on the bay. No major incidents or damage observed or reported.	Minor
HIGHLANDS	Minor sloped erosion and redistribution of sand. No major incidents or damage observed or reported.	Minor
SEA BRIGHT	Up to 30' of sloped erosion. Wave runup/tide to the upper beach, crossovers, and seawall. Wind-blown sand on crossovers, seawall, and nearby streets.	Minor

MONMOUTH BEACH	Riverview Road to Cottage Rd.: Up to 30' of sloped erosion. Wave runup/tide to the upper beach and crossovers. Wind-blown sand on crossovers, seawall, and nearby streets.	Minor
	Cottage Rd. to South end of Borough: Up to 25' of sloped erosion. Wave runup/tide to the upper beach and crossovers. Some minor dune and crossover erosion. No major incidents or damaged observed or reported.	Minor
LONG BRANCH	Seven Presidents to Seaview Ave.: Up to 20' of sloped erosion. Wave runup/tide to the upper beach, bulkhead, and crossovers. No major incidents or damage observed or reported.	Minor
	Seaview Ave. to Cottage Pl.: Up to 20' of sloped erosion. Wave runup/tide to the upper beach, bulkheads, seawall, and crossovers. Wind-blown sand on nearby streets and boardwalk/promenade. No major incidents or damage observed or reported.	Minor
	Cottage Pl. to Pullman Ave.: Up to 20' of sloped erosion and redistribution of sand. Wave runup/tide to the upper beach, seawall and crossovers. No major incidents or damage observed or reported.	Minor
DEAL	Moderate sloped erosion and redistribution of sand. Wave runup/tide to the upper beach and seawall/bulkhead. Minor isolated scarping and ponding.	Minor
ALLENHURST	Moderate sloped erosion and redistribution of sand. Wave runup/tide to the upper beach.	Minor
LOCH ARBOUR	Moderate sloped erosion and redistribution of sand. Wave runup/tide to the upper beach.	Minor
ASBURY PARK	Moderate sloped erosion and redistribution of sand. Wave runup/tide to the upper beach. More pronounced erosion north of Convention Hall. Wind-blown sand on nearby streets and boardwalk.	Moderate
NEPTUNE OCEAN GROVE	Moderate sloped erosion and redistribution of sand. Wave runup/tide to the upper beach. Wind-blown sand on boardwalk/streets and boardwalk.	Minor
BRADLEY BEACH	Moderate sloped erosion and redistribution of sand. Wave runup/tide to the upper beach. Wind-blown sand on nearby streets and promenade.	Minor
AVON	Moderate sloped erosion and redistribution of sand. Wave runup/tide to the upper beach. More pronounced erosion along the northern 1/3 of Borough's beaches. Wind-blown sand on nearby streets and boardwalk.	Moderate
BELMAR	Moderate sloped erosion and redistribution of sand. Some wave runup/tide to the upper beach. More pronounced erosion along the southern 1/4 of Borough's beaches. Wind-blown sand on nearby streets and boardwalk.	Moderate
SPRING LAKE	Moderate sloped erosion and redistribution of sand. Wave runup/tide to the upper beach/boardwalk. Up to 3' of vertical scarp in isolated areas of berm. More pronounced loss of beach between Sussex Ave. and Morris Ave. and along the northern 7 blocks. Wind-blown sand on nearby streets and boardwalk.	Moderate

SEA GIRT	Moderate sloped erosion and redistribution of sand. Wave runup/tide to the upper beach. Minor dune toe erosion. More pronounced erosion along the southern ¼ of Borough's beaches. Wind-blown sand on nearby streets.	Moderate
MANASQUAN	Moderate sloped erosion and redistribution of sand. Wave runup/tide to the upper beach. More pronounced erosion along the center 1/3 of Borough's beaches. Wind-blown sand on promenade and nearby streets/parking lots.	Moderate
POINT PLEASANT BEACH	Up to 90' of sloped erosion, 6' – 8' in height. Wave runup/tide to the upper beach/dune. Additional fence/crossover damage near New York Ave. Approx. 1,400 linear feet of dune erosion, up to 4' in height. Some minor crossover damage at Elizabeth Ave.	Moderate
BAY HEAD	Up to 120' of sloped erosion, 6' – 8' in height. Significant additional vertical dune scarping (10' to 12' high) and substantial loss of beach from North St. south through Egbert St. Additional dune fence and significant additional crossover damage from near Osborne Ave. south through Johnson St. Wave runup/tide to the upper beach/dune throughout.	Major
MANTOLOKING	Up to 100' of sloped erosion, 6' – 8' in height. Wave runup/tide to the upper beach/dune. Approx. 1,000 linear feet of vertical dune scarping, up to 3' in height, ADA crossover damage and additional fence damage near Downer St. Vehicular crossover damaged at Lyman St.	Moderate
BRICK	Up to 100' of sloped erosion, 6' – 8' in height. Wave runup/tide to the upper beach/dune.	Moderate
TOMS RIVER NORMANDY BEACH through MONTEREY BEACH	Up to 125' of sloped erosion, 6' – 8' in height. Wave runup/tide to the upper beach/dune. Vertical dune scarping, up to 3' in height, near 2 nd Ave. in Normandy Beach.	Moderate
LAVALLETTE	Up to 65' of sloped erosion, 6' – 8' in height. Wave runup/tide to the upper beach/dune. More notable narrowing of beach observed along southern 1/3 of Borough's beaches	Moderate
TOMS RIVER ORTLEY BEACH	Up to 90' of sloped erosion, 6' – 8' in height. Wave runup/tide to the upper beach/dune. Vertical dune scarping up to 10' in height. Additional damage to dune, crossovers, and fencing from 4th Ave. south through 9th Ave.	Major
SEASIDE HEIGHTS	Up to 110' of sloped erosion, 6' – 8' in height. Wave runup/tide to the upper beach/dune.	Minor
SEASIDE PARK	Up to 120' of sloped erosion, 6' – 8' in height; worst section at 13 th Ave. Approx., 100 linear feet of vertical dune scarping, up to 5' in height. Some wave runup/tide to the upper beach/dune.	Minor
BERKELEY TWP. S. SEASIDE PARK	Up to 75' of sloped erosion, 6' – 8' in height. Wave runup/tide to the upper beach/dune.	Minor
ISLAND BEACH STATE PARK	Reports of wave runup/tide to the upper beach and into the dunes. Vertical dune scarps, up to 6', reported. Wind-blown sand reported at several locations.	Moderate

BARNEGAT LIGHT	Up to 140' of sloped erosion, 4' – 5' in height. Wave runup/tide to the upper beach/dune.	Minor
LONG BEACH TWP. LOVELADIES	Up to 80' of sloped erosion, 4' – 5' in height. Wave runup/tide to the upper beach/dune. Approx. 6,000 linear feet vertical dune scarp up to 10' in height, up to 20' deep between Sandy Island Dr. and Seaview Dr.	Major
HARVEY CEDARS	Up to 120' of sloped erosion, 4' – 5' in height. Wave runup/tide to the upper beach/dune. Approx. 5,000 linear feet vertical dune scarp up to 10' in height, up to 25' deep. Worst dune erosion centered between Essex Ave. and Sussex Ave.	Major
LONG BEACH TWP. NORTH BEACH	Up to 140' of sloped erosion, 4' – 5' in height. Wave runup/tide to the upper beach/dune.	Minor
SURF CITY	Up to 140' of sloped erosion, 4' – 5' in height. Wave runup/tide to the upper beach/dune. More pronounced loss of beach between 21 st St. and 25 th St.	Minor
SHIP BOTTOM	Up to 140' of sloped erosion, 4' – 5' in height. Some wave runup/tide to the upper beach/dune.	Minor
LONG BEACH TWP. BRANT BEACH through N. BEACH HAVEN	Up to 140' of sloped erosion, 4' – 5' in height. Wave runup/tide to the upper beach/dune. Approx. 1,000 linear feet of vertical dune scarping up to 8' in height, up to 15' deep near N. 13 th St. in North Beach Haven section. Approx. 2,000 linear feet of vertical dune scarping up to 5' in height, up to 10' deep near Surf Ave. in Brighton Beach section. Additional vertical dune scarping in the northern stretch of the Brant Beach section	Moderate
BEACH HAVEN	Up to 125' of sloped erosion, 4' – 5' in height. Wave runup/tide to the upper beach/dune. Approx. 3,800 linear feet of vertical dune scarping up to 14' in height, up to 25' deep between Jefferies Ave. and Centre St. Worst dune erosion centered at the vicinity of Belvoir Ave.	Major
LONG BEACH TWP. HOLGATE	Up to 125' of sloped erosion, 4' – 5' in height. Wave runup/tide to the upper beach/dune. Approx. 4,000 linear feet of vertical dune scarping up to 14' in height, up to 20' deep between Washington Ave. and Judith Ave. Worst dune erosion centered at the vicinity of Jacqueline Ave.	Major
BRIGANTINE	Up to 100' of sloped erosion, up to 5' in height. Some ponding located on the upper beach along southern half of City's beaches. Approximately 600 linear feet of vertical dune scarping up to 6' in height, up to 12' deep near 5 th St. North. Additional minor vertical dune scarping at other locations. Little to no dry beach in front of promenade. Some wave runup/tide to the upper beach/dunes/revetment.	Moderate

ATLANTIC CITY	<p><u>Inlet Seawall and Terminal Jetty area:</u> No incidents or damage observed or reported. Evidence of splash over and debris near Flagship Resort</p>	Minor
	<p><u>Inlet Jetty to St. James Pl.:</u> Up to 140' of sloped erosion, up to 5' in height. Some wave runup/tide to the upper beach/dunes. USACE beachfill ongoing in this stretch.</p> <p><u>St. James Pl. to Mississippi Ave.:</u> Up to 140' of sloped erosion, up to 5' in height. Some wave runup/tide to the upper beach/dunes.</p> <p><u>Mississippi Ave. to Ventnor Border:</u> Up to 80' of sloped erosion, up to 5' in height. Some wave runup/tide to the upper beach/dunes.</p>	Major
VENTNOR	Up to 80' of sloped erosion, up to 4' in height. Some wave runup/tide to the upper beach/dunes.	Minor
MARGATE	Up to 50' of sloped erosion, up to 4' in height. Some wave runup/tide to the upper beach/dunes.	Minor
LONGPORT	Up to 80' of sloped erosion, up to 4' in height. Some wave runup/tide to the upper beach/dunes.	Minor
OCEAN CITY	Up to 50' of sloped erosion. Multiple locations with vertical beach scarping, up to 3' in height, most notably north of 11 th St. Vicinity of 5 th St. continues to experience accelerated erosion; erosion into to stockpile. Some wave runup/tide to the upper beach/dunes throughout City.	Moderate
UPPER TWP. STRATHMERE	Up to 25' of sloped erosion, 1' – 2' in height. Some wave runup/tide to the upper beach/dunes. Evidence of ponding on the upper beach and redistribution of sand.	Minor
SEA ISLE CITY	Up to 50' of sloped erosion, 1' – 2' in height. (more notable in between 33 rd St. and 57 th St.). Some wave runup/tide to the upper beach. Small isolated pockets of vertical dune scarping up to 2' in height. Evidence of ponding on the upper beach and redistribution of sand.	Minor
AVALON	Up to 35' of sloped erosion, 3 – 4' in height. (larger of the range in between 9 th St. and 16 th St.). Some wave runup/tide to the upper beach/dunes. Evidence of ponding on the upper beach and redistribution of sand. Approximately 800 linear feet of vertical dune scarping up to 7' in height.	Moderate
STONE HARBOR	Up to 40' of sloped erosion, 2' - 3' feet in height. Some wave runup/tide to the upper beach/dunes. Various sections of vertical dune scarping, up to 4' in height, from 104 th St. to 111 th St. and from 121 st St to the terminal groin. Several pedestrian and vehicular crossovers damaged.	Moderate

NORTH WILDWOOD	Hereford Inlet & Surf Ave: Up to 30' of sloped erosion, 1'- 2' feet in height from New York Ave. through Surf Ave. No additional damage immediately reported to the seawall. USACE seawall repair ongoing in Anglesea section of inlet.	Minor
	2nd Ave. to 15th Ave.: Up to 40' of sloped erosion, 2'- 3' in height. Little to no low tide beach from 2 nd Ave. to 7 th Ave. Utility company repairing light poles along the street near 2nd Ave. and 3rd Ave. Damage to the cap on the bulkhead from 5th Ave. to 7th Ave. was observed. Some additional vertical dune scarps up to 5' in height between 13th Ave. and 15th Ave. despite protective stockpile that was placed here pre-storm. Wave runup/tide to the upper beach/dunes/bulkhead. 15th Ave. to Wildwood border: Up to 40' of sloped erosion, 2'- 3' in height. Wave runup/tide to the upper beach/dunes. City's sand backpassing operation impacted (haul route damaged and sand stockpiles eroded)	Major
WILDWOOD CITY	Up to 50' of sloped erosion, 1'- 2' in height. Evidence of ponding on the upper beach and redistribution of sand. Some wave runup/tide to the upper beach. Leaming Ave. outfall pipe construction continues.	Minor
WILDWOOD CREST	Up to 60' of sloped erosion, 1'- 3' in height. Evidence of ponding on the upper beach and redistribution of sand. Some wave runup/tide to the upper beach.	Minor
LOWER TWP. DIAMOND BEACH	Up to 50' of sloped erosion, 1'- 2' in height. Evidence of ponding on the upper beach and redistribution of sand. Some wave runup/tide to the upper beach.	Minor
CAPE MAY CITY	Up to 20' of sloped erosion, 1'- 3' in height. Some wave runup/tide to the upper beach/dunes. Approximately 250 linear feet of vertical dune scarping up to 6' in height. USACE backpassing beach nourishment ongoing in Cape Meadows through Cape May Point region	Minor
LOWER TWP. WEST CAPE MAY	Up to 20' of sloped erosion, 1'- 2' in height. Some wave runup/tide to the upper beach. USACE backpassing beach nourishment ongoing in Cape Meadows through Cape May Point region	Minor
CAPE MAY POINT	Up to 20' of sloped erosion, 1'- 2' in height. Some wave runup/tide to the upper beach/dunes. USACE backpassing beach nourishment ongoing in Cape Meadows through Cape May Point region	Minor

LOWER DELAWARE BAY	North Cape May/Villas: Minor sloped erosion and redistribution of sand. Wave runup/tide to the upper beach and dunes. Some minor loss to vegetation at several locations.	Minor
	Del Haven/Pierces Point/Reeds Beach: Minor sloped erosion and redistribution of sand. Wave runup/tide to the upper beach, to the vegetation line and to the bulkhead at several locations. Substantial over wash reported on Beach Ave. at Reed's Beach.	Minor
DELAWARE BAY/RIVER	East Point: Sloped erosion and redistribution of sand near lighthouse site and East Point Rd./Bay Ave. Wave runup/tide to the upper beach and dune. Some ponding observed on Bay Ave.	Minor
	Heislerville: No major incidents or damage reported. Some additional scour holes found and minor/moderate settlement on side slopes. Additional work still required – from past events.	Minor
	Bivalve (Commercial): No major incidents or damage reported. Gabion structures near Marine Police remain in disrepair.	Minor
	Fortescue: Minor sloped erosion and redistribution of sand. Tide to the upper beach at several locations. Pre-existing large vertical dune scarps still present.	Minor
	Gandy's Beach: Minor sloped erosion and redistribution of sand. Tide to the upper beach and landward of the concrete binblocks at several locations. Minor scouring on the landward side of binblocks.	Minor
	Lawrence Twp. - (Bay Point): No major incidents or damage reported.	Minor
	Fairfield Twp. (Sea Breeze): Up to 4' of vertical scarp to berm. Wave runup/tide to the upper beach with undermining of pavement on Seabreeze road.	Major
	Oakwood Beach: Minor sloped erosion and redistribution of sand. Tide to the upper beach and fences at several locations. Up to 2' of scarp to the berm at the southern end.	Minor