

The determination of Mean High Water along Nissequogue Beach, Smithtown, NY

Kaitlin Willig Giglio
Henry Bokuniewicz
Ali Farhazadeh

School of Marine and Atmospheric Sciences
Stony Brook University
Stony Brook, NY 11794

The water line on the beach moves landward as the tide rises and retreats with the falling tide. High and low tide levels vary on daily, monthly, annual, and interannual timescales, but governments are left with the challenge of defining where the water ends and the “land” starts. In tidal areas, a set of vertical reference elevations called the tidal datum can be calculated for a given area based on the averages of different water levels over a specific Epoch (a 19-year period) (NOAA, 2000). The tidal datum enables governing bodies to map discrete boundaries despite the fact that the natural boundary is so variable. In NYS, as in many other states, Mean High Water (MHW) is used to determine the boundary between state and private property for shoreline properties (Fink, 2018). An accurate MHW calculation is especially important as private residents solicit permits to harden the shorelines along their property line. This study was carried out to calculate the tidal datum for a roughly 2.3 mile stretch of beach in between Short Beach and Long Beach Town Parks in the town of Smithtown, New York (Figure 1). This area of beach is almost entirely residential and, as of 2022, twenty-one of the forty shoreline properties in the study area have either bulkheads or rock walls installed at the base of the bluffs, with several more property owners soliciting approval to add hardened structures along their own property boundary. New York’s state constitution requires that shorelines of the state be protected (N.Y. Constitution Art. XIV, §4) and the local governments are charged with enforcing effective coastal zone management in accordance with their federally approved Local Waterfront Revitalization Programs (N.Y. Executive Law, Art. 42, Sec. 910 et seq; [19 NYCRR 600 et seq; dos.ny.gov/coastal-management](#)). The MHWL is a critical component for effectively managing these shorelines. For the study area, the tidal datum was calculated and the MHWL was found to be slightly lower than the closest NOAA reference site (in Bridgeport, CT).

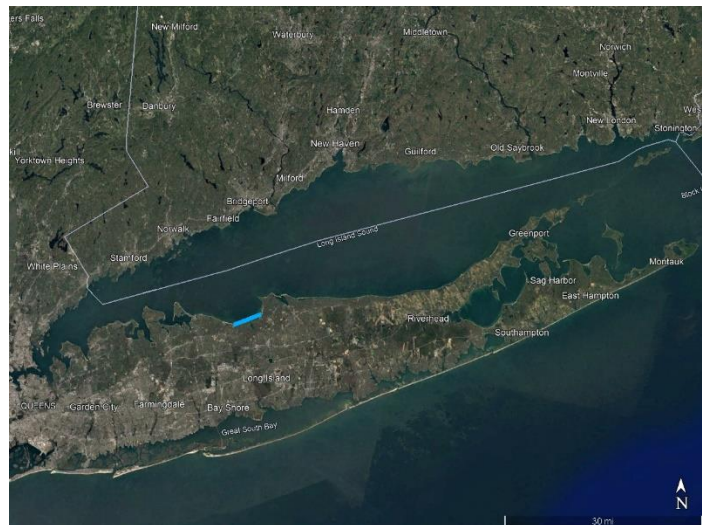


Figure 1 Study Area (highlighted in blue)

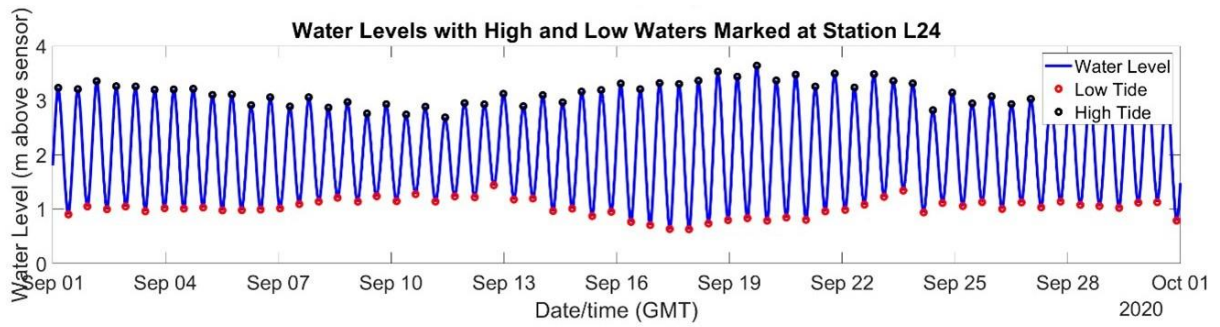


Figure 2 Water Levels at the mouth of the Nissequogue River for September 2021.

The elevation of the MHWL along the Smithtown Bay shoreline between the Nissequogue River and the inlet to Stony Brook Harbor was determined from tide gage measurements at the mouth of the Nissequogue River taken in August, September (figure 2) and November 2021 and analyzed, by standard techniques of the National Oceanic and Atmospheric Administration (NOAA) (NOAA, 2000; Swanson, 1974), with respect to the NOAA-certified long-term data collected at Bridgeport, CT during the present Epoch (1983-2001). The observed tide coupled with the Federal tide gauge were used to find that the elevation of the MHW is 3.05 feet above the North American Vertical Datum of 1988 (NAVD88) (figure 3). Three tidal benchmarks were established at the Nissequogue tide gauge station in separate anthropological features to assure independence from destruction or earth movement (figure 4). These benchmarks were used to verify the elevation of the tide gauge and associated water level data relative to NAVD88.

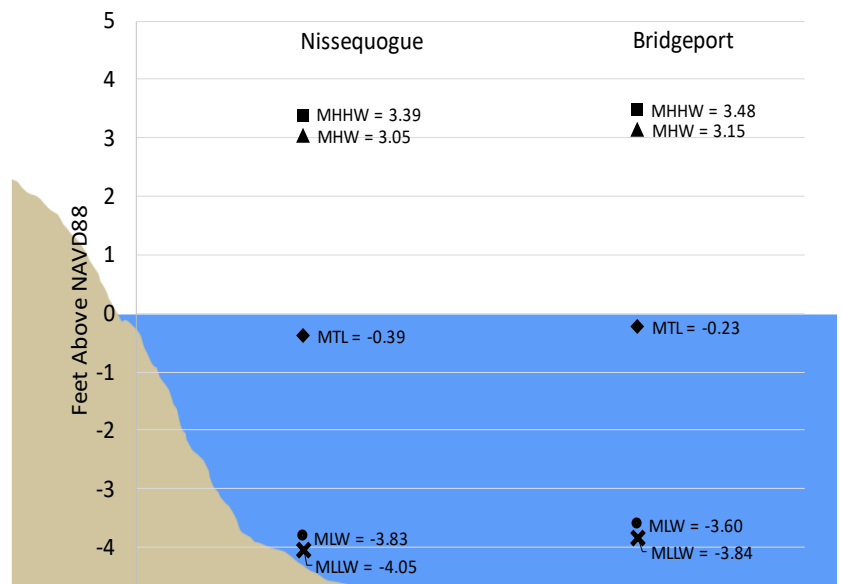


Figure 3 Select Tidal Datum Values for Target Area and NOAA's closest reference station (Bridgeport, CT)



Figure 4 Locations of the three benchmarks and the tide gauge at the mouth of the Nissequogue River.

Land in the public domain in the Town’s jurisdiction, starts at the Mean High Water Line (MHWL) and extends seaward across the beach to level of mean low water. The position of the MHWL on the beach, marking the landward extent of the public domain, was determined at approximately 500-foot intervals using a survey-grade geographic positioning system (GPS) in the spring of 2021. The MHWL was interpolated between surveyed way-points making allowances for the presence of bulkheads and other hard shore protective structures and for variations in the beach around groins, large rocks and other permanent obstacles (figure 5). At some of the locations the MHW reached the existing bulkhead and others were severely damaged. The accessible beach in front of the bulkhead could be below the MHW. Private erosion control measures cannot be built on public property.



Figure 5 The GPS location of the MHWL was found at discrete locations along the shoreline by interpolating between surveyed way-points above and below the high water line.

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