

The Shoreline



Pine Knoll Shores Turkey Trot,
Flotilla and Christmas Parade
See page 27

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A Shoreline Community, Pine Knoll Shores, N.C.

November 2018

Hurricane Florence


By John Brodman

Rainfall amounts and storm water impacts in Pine Knoll Shores

Water, water everywhere. Pine Knoll Shores is a town on a barrier island with limited elevation above sea level, and a ground water table that is never far below the surface. A certain amount of nuisance flooding is a routine expectation that goes with the territory on coastal barrier islands. We know from past experiences that the low-lying areas of town, both on and off the streets, can handle normal, garden-variety rainfall events of up to about 3 inches of rain during a 24-hour period without too much surface ponding. We know that the impacts depend heavily on how high or low the water table is at the start of the rain event. We know that rainfall in excess of this amount, in a short period of time, usually leads to recurring ponding in a number of low-lying areas. It doesn't take that much rain, coupled with runoff from higher elevations and saturated ground, to raise the water table above the surface of the land or streets in low-lying areas of town. This is the primary reason why the town's Code of Ordinances requires a storm water management plan that provides "for the infiltration of the first two inches of rainfall or less in a 24-hour period from all impervious surfaces on site."

But infiltration has its limits, and based on past experiences, we know that rainfall in excess of 3 or 4 inches in a short period of time requires us to physically move the water off the surface of the land to one of the surrounding bodies of water. To further set the stage, we also know that the first 9 months of 2018, leading up to Hurricane Florence that made landfall near Wilmington on Friday, September 13, were wetter than average, with several areas of Eastern North Carolina having already experienced rainfall totals greater than annual averages before the hurricane hit. In Pine Knoll Shores, we had a very wet July, and the town pumped 444,000 gallons of storm water to the sound in order to minimize flooding from heavy rain events during that month alone.

Hurricane Florence. Hurricane Florence (Flo) was unusual in that it was a slow moving storm that pumped in tons of moisture over a three-day period and many tide cycles. We are all thankful that it weakened from a Category 4 to a Category 1 before making landfall, but some of what it lost in intensity, it made up for in duration. According to the National Weather Service (NWS) in Newport, Flo dumped a total of 34 inches of rain in Swansboro over 3 days (Thursday to Saturday), Emerald Isle got 23.7 inches, and the NWS in Newport got 25.2 inches. Interpolating from the amounts of rain our neighboring towns received, it seems reasonable to conclude that Pine Knoll Shores got a similar amount during Flo, or 24 inches (2 feet) of rain, an amount far above our usual threshold for local



**PINE KNOLL SHORES
GARDEN CLUB**

cordially invites you to the

Lighting of the Blue Star Memorial

**Join us to honor
those who defend our freedom
—past, present and future**

**Sunday, November 11, 5 p.m.
at the corner of
Highway 58 and Pine Knoll Boulevard**

**Wine and cheese reception immediately
following at town hall**

ponding. Flo set two- and three-day rainfall records in many areas across the state. The previous state-wide record rainfall was 24.06 inches during Hurricane Floyd in 1999. Let's put this into perspective with a few back-of-the-envelope calculations.

According to Town Planner Kevin Reed and to Wikipedia, Pine Knoll Shores has a total area (land and water) of approximately 2.5 square miles (including the Roosevelt Natural Area (RNA) and the Highway 58 right of way). This is 1,600 acres (640 acres per sq. mile) that received 2 feet of rain during Flo, or a total of 3,200 "acre-feet" of water (an acre foot of water is the amount of water required to cover one acre of land with a foot of water). Since there are 325,851 gallons in one acre foot of water, Pine Knoll Shores received 1,042,723,200 gallons of rain during Flo (3,200 acre feet X 325,851). An Olympic size swimming pool (the so-called "long course" that is 50 meters long, 25 meters wide, and 2 meters deep) holds 2,500,000 liters of water, or 660,502 gallons, so Pine Knoll Shores had enough rain

(Continued on page 8)



**1610 AM PINE KNOLL SHORES
RADIO**

The Pine Knoll Shores Radio Station broadcasts 24 hours a day
with weather and emergency info.

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ECC 726-1911 • PUBLIC SAFETY 247-2474**

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THE *Shoreline*