APPENDIX C.

STORM SURGE METHODOLOGY

ADCIRC is one of two primary models used to forecast storm surge. The other is Sea, Lake and Overland Surges from Hurricanes (SLOSH). The two models work differently: While the SLOSH model uses data from a defined ocean basin, the ADCIRC model pulls data from the western Atlantic and Gulf regions. Both are generally recognized as industry standards for storm surge modeling, but only ADCIRC is accepted by FEMA as meeting National Flood Insurance Program requirements for accuracy (http://www.fema.gov/coastal-numerical-models-meeting-minimum-requirement-national-flood-insurance-program). Additionally, ADCIRC can include full dynamic astronomical tidal forcing, which is necessary for correct simulation of actual events (such as Nor'Ida), and can be coupled with SWAN to account for wave set-up.(John Atkinson, ARCADIS Consulting).

Representatives from National Weather Service and FEMA who participated on the hazard mitigation planning team believed that the ADCIRC model over-stated flood depths, citing Nor'Ida model output as an example, where modeled storm surge reached eight feet, but there was no known record of that flooding depth with Nor'Ida (Eastern Shore Hazard Mitigation Committee, February 3, 2016). However, the model's high water depths over land occurred with low-lying marsh areas east of the peninsula where there were neither gauges nor people to observe, so performance of the model at those specific locations is difficult to evaluate.

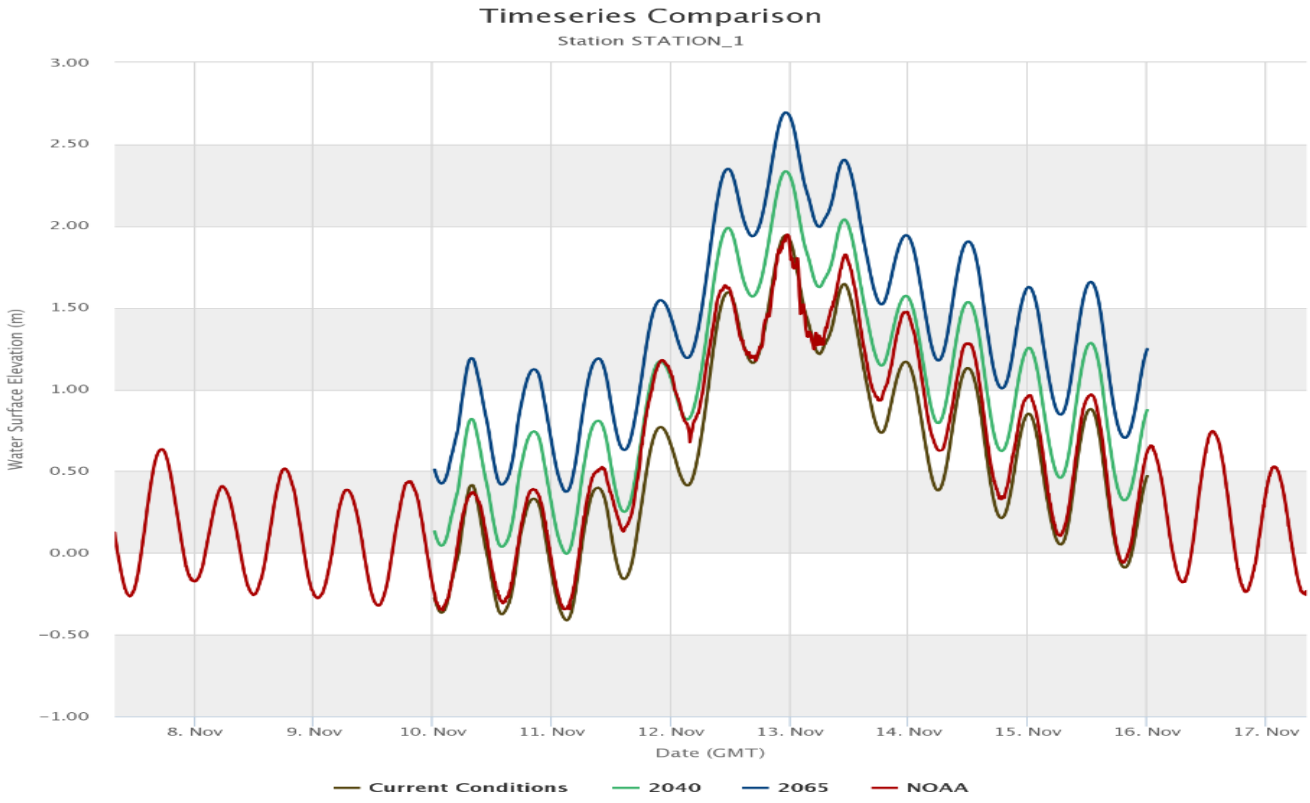

Figure 1: Nor'Ida measured conditions compared to model output for current conditions and sea level rise scenarios

Storm Surge Methodology

The ADCIRC model for the Eastern Shore of Virginia Coastal Resilience Tool was calibrated to Nor'Ida using tidal gauge NOAA_8638610, at Sewell's Point during the Nor'Ida storm of 2009, and comparing to the model output using the Nor'Ida 2040 sea level rise scenario, and 2065 sea level rise scenario (Figure 1). The current conditions and the model output tracked together fairly consistently, with few instances of model-predicted water surface elevation higher than observed water elevation at Sewell's Point. Where the model underperformed was in the tide cycles on either side of the storm's three peak tides, where it underestimated the water level by as much as 0.75'.