

Date: **March 16, 2023**

Project No.: **20985**

To: **Orleans Wastewater Management Advisory Committee (WMAC)**

From: **Mike Giggey**

Subject: **Orleans Wastewater Management Planning
Growth in Nitrogen Load in Pleasant Bay Sub-Watersheds**

At recent WMAC meetings, we have discussed the need for Orleans’ nitrogen control plans to address growth in watershed loads. This memo has been prepared to provide some background information on this topic.

The Pleasant Bay Alliance used a portion of recent EPA grants (under the Southeast New England Program--SNEP) to update estimates of watershed loads last estimated in the 2006 MEP report. That update was undertaken by SMAST and reported in 2021. I have analyzed the increase in watershed loads for several Orleans-impacted sub-embayments and compared them with George Meservey’s recent count of new homes in each sub-watershed since 2006.

The increases in septic loads reported by SMAST in the 2021 SNEP report are as follows for three sub-watersheds related to Phases 2 and 3 of the sewer program:

- Meetinghouse Pond 14% increase
- Lonnie’s Pond 21% increase
- Arey’s Pond 29% increase

Based on George’s count of new homes, I have estimated the associated new nitrogen loads, and compared them with the septic loads that are the basis for the Watershed Permit:

- Meetinghouse Pond 14 new homes 63 kg/yr septic load 3.4% increase
- Lonnie’s Pond 5 new homes 22 kg/yr septic load 2.7% increase
- Arey’s Pond 4 new homes 18 kg/yr septic load 5.2% increase

To make this computation, I have assumed that 80% of the “new” construction represents entirely new homes (at 5.0 kg/yr/home) and 20% represents “tear-downs” with a load increase of 2 kg/yr/home. These figures support a roughly 4% growth factor, very close to the 5% allowance we have used in the planning for Phase 3 sewers.

George has estimated that there are 128 new dwellings built or replaced since 2006 in the Orleans’ portion of the Pleasant Bay watershed. I estimate that these homes have added about 5% to the septic load across all 10 sub-watersheds.

This estimate of growth in septic loads is much lower than that reported by SMAST in the 2021 SNEP report. SMAST also reports the water consumption per home that is used to estimate nitrogen loads from parcels served by private wells. That per-home figure is 159 gallons per day, compared to 148 gpd used in the 2006 MEP report. That 7.5% increase is likely due to the fact that the more recent report uses water consumption data from a drier period (2011 to 2015) than was the basis for Orleans' loads in the 2006 MEP report (2002 to 2003).

The house counts and the drier-year water consumption account for about half of the increases drawn from the 2021 SNEP report in these three sub-watersheds. The rest of the difference may relate to the fact that there is significant variability in water consumption, over time, and across the area. We may find that this "noise" in the water consumption data may imply lower-than-expected load increases in other sub-embayment impacted by Orleans, just as that noise contributes to higher-than-expected loads in these three sub-watersheds.

We have talked at length about the potential for growth to add significantly to nitrogen management costs. Therefore, we must pay close attention to the basis for estimated increases in watershed loads. Water consumption records must be viewed in the context of drought conditions that result in increased outside water use that does not add to the nitrogen load.