

February 23, 2022

To: **Jonesport Planning Board**

Frank Smith
William (Lee) Guptill
Kathy Howell
Alvin Grignon
Paul Iossa
Anthony Laytart (alternates)
Dana Smith (alternates)
Elizabeth Fitzgerald (Code Enforcement Officer)
Tonia Merchant (Secretary)

From: Richard Aishton, Consultant

RE: Jonesport Planning Board February 23, 2022, Shoreland Zoning Ordinance

Dear Jonesport Planning Board,

I am writing this letter to inform you that I, along with 2 other individuals, have spoken with a highly regarded specialist in shoreland modeling (contact information will be provided upon request) and has provided insights on the MEDPES submitted by Kingfish Maine to the MDEP. While I recognize that this will in no way change anything in the MDEP it will hopefully help the Planning Board recognize that there are significant deficiencies in the information provided by Kingfish Maine, particularly relating to their modeling.

This expert has the following comments about the Discharge Permit:

I have looked through the MEPDES Application of Kingfish Maine as you requested. I paid particular attention to the modeling aspects of the application that were carried out by a Dutch company, Ramboll, contracted by Kingfish Maine. There are some questions/concerns that I have regarding information presented in the document. I have outlined these below.

1. The near field mixing model, CORMIX, is known to perform poorly near coastlines and in areas with complicated topography and bathymetry. Please see Schreiner et al. (2002).
2. The near field mixing model, CORMIX, was used to assess how the discharge from the reservoir will transport up and down the coast. I am curious as to how the ambient nitrogen level of 0.27 mg/L was determined and how exactly this value was incorporated into the mixing model? There should be baseline water samples to determine how TN fluctuates seasonally. After rainfall/runoff events values of nitrogen will fluctuate. Excess nitrogen and phosphorus are both known to impact or exacerbate HAB events (Gilbert et al., 2020, and references

therein), which are becoming worse on the coast of Maine. Added nitrogen and phosphorus could exacerbate blooms, shutting down shellfish harvesting and aquaculture along the coastline and endangering public health.

3. There are ambient currents of 0.1 m/s in the CORMIX model that were used to determine the near field extent of the plume. Where did this value come from? If this is over- or under-estimated I would guess the near field plume extent of 230 ft would vary.

4. The near field discharge plume was determined to be 230 ft from the CORMIX model. I do not believe that the CORMIX model can include intake of plume water that was discharged, so concentrated values would not be considered. Also, in a tidal area, the discharge plume would essentially translate back and forth rather than be flushed away from the discharge site, which would also exacerbate nitrogen concentrations. Is this considered?

5. The current velocity data collected from the ADCP was compared only qualitatively against the model output (Figure 5-7). I would request that error estimates between model and data be quantified to know exactly how the model is performing. I am particularly concerned about this because it seems the model is over-estimating the maximum tidal currents (Figure 5-7, early flood, flood, and near low slack) and there are no results from maximum ebb tide. If the currents are overestimated by the model, which they appear to be in some areas by up to 50%, it will also over-estimate the dilution of nutrient concentrations. The lack of clear validation makes me skeptical on if the results of the TUFlow can be trusted at all.

6. It is not clear if the current velocities being used for analysis (all figures in Appendix 2) are at the surface of the water column, depth averaged, or at the depth of the discharge diffusers? This is concerning for Figure 5-8 in particular that shows the maximum excess nitrogen concentrations after 1, 2 and 4 weeks. The currents near bottom are going to be much slower than those at the surface, and since the discharge pipes are at the bottom, it seems like the near-bottom currents should be used.

7. The main results report that in the far field the plume will travel a maximum of 3 miles north and 1 mile south over 1 tidal cycle. However, tidal currents are rectilinear meaning that they will translate back and forth, and depending on the direction of the mean current (velocities that are longer than one tidal cycle), the plume will slowly migrate either onshore or offshore, and continually concentrate over consecutive tidal cycles. I think the far-field extent should be modelled over a time scale equivalent to months and not hours.

Glibert P.M., Maranger R., Sobota D.J., Bouwman L. (2020) Further Evidence of the Haber-Bosch—Harmful Algal Bloom (HB-HAB) Link and the Risk of Suggesting HAB Control Through Phosphorus Reductions Only. In: Sutton M.A. et al. (eds) *Just Enough Nitrogen*. Springer, Cham.
https://doi.org/10.1007/978-3-030-58065-0_17

Schriner, S.P., Krebs, T.A., Strebel, D.E., Brindley, A. (2002) Testing the CORMIX model using thermal plume data from four Maryland power plants. *Environmental Modelling & Software*, 17, 321-331.

- The dispersion modeling provided by Kingfish does not accurately portray the buildup of nitrogen in the upper reaches of Chandler Bay where the tide comes in.
- Nitrogen is trapped as the tide comes in and then mixes with the effluent Nitrogen out of the outflow pipe, thereby increasing the Nitrogen concentration. This buildup without clean flushing raises the concentration Nitrogen twice in a 24-hour cycle.
- This concentration will have a significant impact on Chandler Bay.
- The Kingfish modeling fails to reflect that the effluent pipe causes a vertical current – there has been no information or research presented by Kingfish on this issue. Moreover, the flushing of freshwater will cause an upward, circular current and no one has addressed this issue.
- There has been NO validation of the data presented by Kingfish – the information used by Maine Department of Environmental protection is qualitative not quantifiable data.
- Maine Dep does not have modelers who could pick up on this problem. Therefore, the town does not have good information.
- The Economic report used by the Department of Economic and Community Development resulted from one paper, prepared by an undergraduate research assistant and a new hire with a Masters Degree in Natural Resource Economics. The salary data was provided by Kingfish Maine and the math shows that there will be 70 positions paid an average of \$82,000+ per annum. The person who prepared the paper did not do any on-the-ground research and utilized census data from 2010 as well as data from Maine State records of average incomes.

Richard W. Aishton, Ph.D.