

Truro Shellfish Advisory Committee
Re: Comments and Questions

Thanks for your work in pursuing the coastal resilience and salt marsh restoration for the Town of Truro. However, as the Vice-Chairman of the Shellfish Advisor Committee (SAC) and a fairly knowledgeable shell fisherman, I am very concerned on the short term impact of the all of the Mill Pond alternatives on our Truro recreational shellfish resource. If you go to the October 27, 2022, SAC minutes on the town website, many of the board members including myself are concerned about what is going to be the impact during construction and initial flow to a very healthy Pamet Harbor shellfish resource. As you know the recreational shellfish activity that I have been tracking at the Pamet Harbor and Corn Hill has increased dramatically during Covid and has continued after. After the completion of the Eagle Creek Project in the fall, we were delayed in opening for shellfish this year due to the increase in bacteria count of the water, but the clam meat test okay. I would like to know if Woods Hole Group could weigh in on this - to see if there is going to be a short-term problem that we should be aware of.

Don't get me wrong, I am all for improving our salt marshes and coastal resilience, but I am not satisfied with the fact that a lot of this is based on Mike Buck's Woods Hole's "modeling". I have over 40-years of experience in developing aerospace, satellite and defense structures using many modeling technologies such as finite element analysis to predict failure of these aerospace and defense structures. However, over my career, ultimately final ground testing is necessary before these items are integrated in the final total system or deployed to the war fighter. So, I don't rely solely on the modeling for any new projects or structures without considering mitigating the potential for failure.

Stated simply, I am concerned with what will happen if the "drastic initial opening of the flood gates" have a detrimental effect on our shellfish resource that the growing Truro winter community depends upon for a food source and recreation. Also being at the harbor during many windy storms, I am not convinced that a 30% increase in flooding of the harbor (due to increased flow) will not create a coastal erosion issue in the inner harbor during astronomical high tides and winds coming from the south and east. Additionally, I have experienced sediment (black mud) flow and build-up on the south part of the harbor basin area that in the last few years. This is compounded by the fact the basin of the harbor where the floats are, only get dredged every other year (depending upon weather and permitting). Last, due we know what effect this will have on the main channel at the mouth that we always seem to have sand wave issues every year?

In summary, I would like a better understanding on how this project could utilize another culver alternative that could control flow thru a clapper or gate - as the vegetation dies off and affects the water quality of the harbor - and could delay or close the harbor for shellfishing. Also I would like clarity on who would be responsible for the removal of dead vegetation and monitoring the water quality over the period when the marsh and the harbor reach equilibrium. Last question, has DEP been involved in looking over this project relative to coast erosion - since I think that is in their wheel house?

I will be in Truro on Friday at 2:30pm - 4pm for an energy audit on my house, so I may reach out to you to discuss some of these issues that we did not have a chance to ask Mike Buck during the long meeting. It may make sense to invite him to our next SAC meeting along with Bob Weinstein (who I believe is our Select Board liaison and copied on this email).

Jarrold Cabral & Town Consultants
Re: Response to the Shellfish Committee

We understand and appreciate the concern that the SAC has for our fragile, important, and valuable shellfish resources. The following are the responses to your email to Jarrod:

- I would like to point out that Shellfish openings this fall were delayed throughout Cape Cod due to the MA DMF not opening the season. I regularly scallop and oyster in Falmouth and the opening was pushed well into November, which is the latest I can recall in 15 years. Based on my conversations with Chuck Martinsen, the Marine & Env Services Deputy Director, he indicated that the problem was related to high water temperatures this fall that allowed bacteria to proliferate. So this problem is not localized to Pamet Harbor.
- This project will contribute minimal sediment (mud or sand) to Pamet Harbor since unlike Eagle Neck Creek there is no dredging or railroad berm enlargement proposed. Truro has a history of sedimentation and shoaling issues throughout Pamet Harbor, inlet, and tributaries, and I am aware that the problem has become worse in recent years as it has throughout much of the rest of Cape Cod.
- The sediment in Mill Pond primarily consists of cohesive, fine sediments (black mud) that is not easily mobilized and likely to remain in place unless dredged, which would be a totally separate project. Pamet Harbor as a whole has been plagued by a sedimentation and shoaling issues requiring dredging going back many years into history. We understand that these sedimentation issues are getting worse in recent years, but this is consistent with what is happening on a Cape-wide basis; it is not unique to Pamet Harbor. The sediment found in the pond is too fine (small) to settle out in the inlet where sand waves make it difficult for boats to pass at lower stages of the tide (I have had difficulties there myself in my own 20-ft boat).
- I understand your concern about modeling, but we actually used two separate models to evaluate the system and came up with similar results. The models were developed using topographic, bathymetric, and tide data that we collected using survey grade instruments, meaning that they were developed with a robust data set. Mill Pond and Pamet Harbor is also not a very complex system overall, and we have extensive experience modeling much more complicated systems (e.g. Herring River in Wellfleet). The Woods Hole Group is very confident in our model results. Unfortunately, in this field we cannot easily implement scale models or pilot projects very easily due to regulations and construction costs, and pilot projects can require a similar effort and cost level as the fully constructed project.
- Regarding the additional flow in Mill Pond, it is the surface area (acres) of Mill Pond that is expected to increase approximately 30%, from 7.1 to ~10.6 acres, and not the volumetric flow rate of the tidal currents. In comparison, the additional 3.5 acres of restoration is smaller than the 15+ acres of restoration at Eagle Neck Creek upstream of Old Colony Road and much smaller than the 350+ acres of the Pamet Harbor Basin (downstream of Truro Center Road).

In order to calculate a volumetric flow, the vertical (tide height/stage) component needs to be factored in as well. The mean tide range of Mill Pond is only expected to increase from ~1.5 feet to ~3-ft, this 1.5-ft increase in tide range is much smaller than the 9.2 ft tide range in Pamet Harbor. Therefore, the additional volume in Mill Pond is much smaller contributor to the overall tidal prism (volume) of Pamet Harbor system.

Additionally, coastal erosion due to tidal flow (current scour) is directly proportional to the tide stage (height) since the tide moves back and forth between low and high tide over the same

time interval (~6 hrs). The modeling demonstrated that the tidal signal (stage) downstream of Mill Pond is not being altered by the proposed project, therefore, the flow rate and velocity is not changing appreciably to cause additional scour and erosion. Additionally, the measured tide and salinity data demonstrated that Mill Pond is primarily fed by saltwater inflows from Pamet Harbor, and that freshwater input is minimal and not enough to significantly impact tide stage downstream.

- Tidal control in the form of a clapper valve would have little value to Mill Pond project since the stagnant water would not be fully flushed and poor water quality would remain. The clapper valve may also retain dead vegetation and debris in the pond since it would impede ebb flows. The Grant funding agencies likely would not fund tidal control either since there would be no reason to implement since there are not adverse property impacts or Priority Habitat. Clapper valves also have their own issues as they can be difficult to operate and can fail during storms, such as has happened at Truro Center Road.
- MA DEP has not reviewed the project yet but they will review the application as part of the eventual permitting process along with other agencies including MEPA, CZM, Water Quality, Chapter 91, and Army Corp. We expect this project to be well received at MA DEP and other agencies based on the expected project outcomes and our experience with similar projects.
- As part of the permitting process this project will have a pre- and post-construction monitoring program established that would likely run for as many as 5 years following construction. The Town is not expecting to simply walk away once the project is constructed. The Town has discussed possible Phragmites remediation (removal) as part of the final project design that could alleviate concerns with dead vegetation. Additionally, based on our wetlands resource delineation much of the vegetation in Mill Pond is salt marsh vegetation already so the die-off may be minimal.

The following responses are being provided to your 9 questions from the SAC meeting minutes:

1. *Q: What is the problem trying to Fix?*

Response: The roadway infrastructure of Mill Pond Road is in need of significant repairs including the existing culvert underneath the roadway. The culvert is also undersized and does not provide full tidal flow and salinity which results in poor water quality and habitat especially for shellfish. The proposed project is intended to restore tidal flow and salinity to improve flushing and habitat for shellfish, fish, crustaceans, and vegetation alike.

2. *Q: If it is a federal grant – are there costs that the taxpayer will have to pick-up (i.e. raising the road 2ft., annual cleanup of dead vegetation from salt water flow).*

Response: The project has been funded by a state Agency, the Massachusetts Division of Ecological Restoration, which has provided 75% of the project costs to date. The Town has been responsible for the remaining 25%. The Town already maintains the coastal roads especially for post-storm cleanups that includes Mill Pond and will continue to do so. There is not expected to be an accumulation of dead vegetation in the pond or on the road that would rise to the level of needing to be mitigated by the Town. Raising the road may be needed in the future regardless of whether the culvert is replaced or not.

3. *Q: What does this do the freshwater life upstream, Diamond Back turtles, Eastern Box turtles, which are both endangered.*

Response: Mill Pond already receives tidal flow and salinity with a tide range measured to be 1.5 ft. An additional ~3.6 acres will be flooded around the perimeter of the pond, but this area primarily consists of salt marsh and coastal habitat already. Diamond back turtles are endemic to coastal tidal brackish and salt marshes; therefore, this project would be unlikely to negatively impact their habitat and may actually enhance it. The Eastern Box Turtle is a terrestrial upland turtle species that does not typically inhabit coastal marshes or coastal wetlands, so it is unlikely to be found or impacted here.

4. *Q: What Negative effect will it have on the inner harbor coastal and PHYC coastal erosion.*

Response: Negative effects are not anticipated to the coastline downstream of Mill Pond. The modeling demonstrated that the tidal stage downstream of Mill Pond will not be altered by the project, indicating that additional flooding or changes to tidal current flow and velocity downstream are not expected. Additionally, peak tidal flows and velocities typically occur during mid-tidal stages when the tidal stage would be lower and not impacting these shorelines (flow would be contained to the creek channel & marsh fringes).

5. *Q: Will there be sediment (black mud) flowing more – back into the harbor requiring more dredging of the basin moorings (now our permit only allows basin dredging every other year.)*

Response: During construction, temporary sheeting and erosion control measures will be utilized to isolate and dewater the site using coffer dams for construction for any of the alternatives; this would be very similar to the construction at Eagle Neck Creek. All work will take place within the temporary sheeting (coffer dam). Erosion control measures such as turbidity curtains will be deployed downstream of the sheeting to mitigate any sediment that finds its way outside of the sheeting.

Following construction, it is not anticipated that a significant amount of material – black mud – will be mobilized from Mill Pond and find its way downstream into the harbor. As the pond recedes during low tide, the velocity of the retreating tides slows over the pond bed since the flow is spread over a large area, and well below the critical velocity needed to mobilize sediment. In addition, much of the black mud in the pond consists of fine sediment that is very cohesive and not easily mobilized by currents, unlike sand that is not cohesive and more easily mobilized. Keep in mind that Mill Pond construction would have much less of a footprint than Eagle Neck Creek that also included channel dredging and railroad berm widening that is not being proposed here.

6. *Q: Will the short-term brackish water make us close the recently opened oyster beds and delay our overall opening for recreation shell fishing which has generally grown steadily up to 60% increase in the last two years?*

Response: Mill Pond is not a significant source of freshwater nor is it expected to be following construction, therefore, the salinity in Pamet Harbor is not expected to be impacted by this project. Salinity was directly measured by salinity gauges deployed over a month-long period in

Mill Pond that confirmed that this is tidal salt pond estuarine system with the salinities ranging from 25-30 PSU. The data demonstrated that Mill Pond actually fills with saltwater from Pamet Harbor and then drains this saltwater back to the harbor with only a minor drop in salinity due to a small amount of freshwater input. Following construction, Mill Pond will simply fill with more saltwater from Pamet Harbor and drain this water back to the harbor so there does not exist a mechanism that would create increased brackish water conditions downstream in Pamet Harbor. Salinity is expected to rise in Mill Pond following construction.

Note that the instruments recorded a rainfall event where salinities in Pamet Harbor were depressed due to freshwater input from the Pamet River while the salinity remained higher and stable in Mill Pond, which supports this assessment.

7. *Q: Will this brackish water create an increased insect problem that we now see at the harbor during the summer months?*

Response: Mill Pond is an impaired coastal pond that has poor flushing and water quality characteristics that tend to favor the proliferation of insects. By reintroducing tidal flow to flush out stagnant water, raise salinities, and improve habitat for species that prey on insect larvae (fish), it is not anticipated that the insect problem will be worsened following construction of the project.

8. *Q: What are the other alternatives to what we are trying to fix that would be incremental changes that we could easily monitor vs an 8ft x 8ft culvert from about a 2-3 ft diameter culvert under the existing road we have right now.*

Response: Alternatives to improve tidal flow and water quality to Mill Pond are really limited to improving the road crossing for increase flow. Smaller culverts are not practical since the cost to construct an 8ftx8ft culvert is not significantly different than the costs to construct one half its size, and then that smaller culvert may not provide nearly enough tidal flow to reach the restoration goals. So incrementally installing larger and larger culverts would not be a practical solution since the Town would be spending significant engineering, permitting, and construction dollars every time the road is reconstructed only to partially achieve its goals. The road would also be closed down for months at a time during each reconstruction leading to regular headaches for residents.

9. *Q: I know that increase flow long-term could be good for shellfish growth, but I am concerned about the short-term effects we might have to live with over the next 10 years until the pond/harbor reaches a healthy equilibrium.*

Response: Mill Pond is presently in an unhealthy state and is already likely contributing poor water quality to Pamet Harbor, which this project aims to address. Since Mill Pond is primarily fed by tidal flows we would expect to see improvements to water quality in the pond in a short amount of time that would result in equilibrium between the pond and harbor rather quickly. Short term effects from construction can be mitigated using proper water and sediment controls. Due to the cohesive sediments (mud) found in Mill Pond it is not expected that this material will be easily mobilized by larger flows associated with a larger culvert, and I encourage you to speak to the Town of Barnstable regarding Stewarts Creek which is a very similar project. There will be a period of transition in Mill Pond as freshwater vegetation and Phragmites are

replaced with salt-tolerant vegetation. However, the effects downstream of Mill Pond are expected to be minimal based on the responses presented herein.