1. Do the decision matrix results, including the costs, that were shown in the table of the rankings of alternatives from Mitch Buck's presentation pertain to 2070 or present day?

Response 1: Costs in Table 3 do not include O&M and are present day, not projected to year of construction, although the contingency and +50% would certainly include inflation for the next few years when construction would be anticipated to occur; this was noted above the table in the Tech Memo. O&M has been qualitatively evaluated (relative comparison to each alternative) for purposes of matrix scores. Since the question and presentation slide don't mention O&M, I took it out of the response.

Please see the attached link to review the background for the costs and decision analysis matrices in the Mill Pond Alternatives Assessment Technical Memo – Page 23:
https://www.truro-ma.gov/sites/g/files/vyhlif9766/f/uploads/mp_finalmillpondalternativestechmemo_20220629.pdf

and Attachment H with the more detailed Decision Analysis Matrices:
https://www.truro-ma.gov/sites/g/files/vyhlif9766/f/uploads/mill_pond_alternative_technical_memorandum-fussoneill.pdf

These costs do not include future costs for supplemental field investigations, engineering analyses, design development, permitting, and construction oversight. It should also be noted that the costs only include fees associated with the construction cost and do not include long-term operation and maintenance costs. Detailed opinions of cost are provided in Attachment G, based on assessments of material quantities corresponding to conceptual drawings included in Attachment F.

Table 3
Order-of-Magnitude Opinions of Probable Construction Cost for Conceptual Alternatives

Conceptual Alternative	Order of Magnitude Opinion of Cost	-30%	+50%
Culvert Alternative No. 1	$1.56M	$1.17M	$2.20M
Culvert Alternative No. 2	$1.71M	$1.49M	$2.42M
Breach Alternative No. 1	$795K	$596K	$1.13M
Breach Alternative No. 2	$1.05M	$785K	$1.48M

2. Do the costs presented in the table represent only the initial construction costs or were operation & maintenance costs included as well?

Response 2: Please see response to Question #1. As noted in the report, costs do not include future operation and maintenance.

3. Is it correct that estimates of total costs were inflated by 50% for all four alternatives?

Response 3: A cost estimate was developed that had a 20% contingency (i.e. uncertainty), which reflects the fact that only conceptual plans have been developed at this point. An additional range

of -30% to +50% was applied for all four alternatives, with the upper range representing a conservative estimation for planning purposes due to the uncertainty at this design and considering that construction is likely several years away. Construction costs have increased dramatically due to labor and materials costs to contractors in recent times. Cost will be further refined once the selected alternative is advanced further through the engineering design process.

4. Is it correct that costs associated with recreation including a pedestrian bridge, recreational area, and adequate parking would only apply to the two breech options but were not included in the total costs presented?

Response 4: That is correct. After final design is completed the estimates will be refined further, but we do not expect the amount to shift all that much. There are also additional grant funding opportunities available to fund recreational improvements for the public, such as a pedestrian bridge, that are not available for vehicular bridges or road raising. The pedestrian bridge, parking, and access could also be phased so that it is constructed at a later date after construction of the alternative.

5. Are there any other downstream i.e., future costs, other than operations and maintenance considered in the analysis?

Response 5: Following construction it is not anticipated that there would be significant additional costs for any alternative beyond O&M. However, as part of the permitting process we expect the Army Corps to require the Town to complete post-construction environmental monitoring (as they have for the East Harbor and Eagle Neck Creek projects) no matter which alternative is chosen.

6. If there are other downstream costs, are there any significant differences in these costs for each of the alternatives and if so, which options are estimated to be more costly?

Response 6: Assuming downstream costs refers to future expenditures following construction, the culvert alternative will be more costly for the town to upkeep and maintain the roadway for vehicular traffic in the face of rising seas. It should be noted that the design life of a culvert is typically 50-75 years in a marine environment, assuming proper O&M is completed. While the life of a structure may extend beyond 75 years with more significant repairs and upkeep, it should be noted that there will be perpetual replacement costs for the culvert, as well as maintenance of the 1,600 feet of pavement on both sides of the culvert, as long as the road remains in service.

7. Were future costs discounted to present value and if so, what was the discount/interest rate used?

Response 7: No.

8. Was a table similar to what is shown below provided in the full Woods Hole report or if not, can you please share the initial scores and the weights (priorities) assigned to the larger breech and larger culvert alternatives? All scores can be found

	8' x 8.5' Culvert		**10' X 8.5' Culvert**		**65' breech**		**95' Breech**	
Evaluation Criteria	**Score**	**Weight**	**Score**	**Weight**	**Score**	**Weight**	**Score**	**Weight**
Environmental								

Impacts								
Property Impacts								
Ecology								
Emergency Response								
Recreation								
Construct cost & duration								
Operation & Maintenance								
Resiliency								

Response 8: Yes please see Attachment H at the link provided in response Question 1.

9. Who decided on these scores for each of the alternatives, i.e., was it the Woods Hole Group with your input?

Response 9: The criteria and scores were developed by the Woods Hole Group and Fuss & O'Neill based on our experience with projects of these types, and then were reviewed with Division of ecological restoration, Cape cod Conservation District, the USDA, and Town Staff.

10. As you know, the MC-FRM uses probabilistic modeling that attempts to address the uncertainty associated with the effect of future storm surge events and sea level changes on the assessment of coastal resiliency. However, there is also uncertainty surrounding the other variables in the analysis of the four Mill Pond remedial alternatives besides coastal hazards. Was sensitivity analysis performed in which the baseline values of all the evaluation criteria specified in the table shown above, including their initial scoring and weights, were varied over plausible ranges to evaluate how these changes might impact the final ranking of the alternatives?

Response 10: We recognize that there is always uncertainty surrounding criteria selection, scoring sensitivity, and weighting schemes when developing a decision analysis matrix. This is why both weighted and unweighted tables were developed to an effort to limit individual bias or criteria sensitivity. However, the breach alternatives scored an entire point higher than the culvert alternatives for both the weighted and unweighted tables since the breach alternatives do provide some additional ecological and coastal resiliency benefits at a lower cost to construct and maintain than either culvert alternative. Because of this it is unlikely that varying the scoring for the culvert alternative criteria would improve their scores enough to be competitive. Note that the decision analysis matrix is just one tool that is being used as part of the overall selection process.

11. While addressing coastal resiliency remains an important goal, Mill Pond Road is not considered to be a high-risk road according to the criticality scoring framework specified in the Cape Cod Commission Low-Lying Roads Project. Do any of the four remedial alternatives more favorably impact the coastal resiliency of any roads deemed to be high risk according to the Low Lying Road Project?

Response 11: The four alternatives will only have impacts to Mill Pond Road itself. This project was not selected as a road improvement project from the Low Lying Roads Project, but, rather, was developed independently to address failing infrastructure that was also impairing the salt pond. This project was in motion before the Low-Lying Roads project even started. To learn more about the Low Lying road project please use the online data viewer accessed at the link below that

shows probabilistic storm flooding and high tide flooding along with the criticality score: https://cccommission.maps.arcgis.com/apps/webappviewer/index.html?id=df26ade32d3245229d24d44814e9b030

12. The table in Mitch Buck's presentation that lists the amount of inundation associated with the four alternatives shows an identical total area of inundation in acres associated with the larger culvert and the breech options. How does a breech option improve coastal resiliency?

Response 12: Coastal Resiliency is a framework for how a community plans for both the current and future needs of their coasts in a changing climate. In some instances, coastal resiliency means improving infrastructure to keep pace with rising seas and intensifying storms, in other cases it means relocating critical infrastructure out of rising seas, and in some cases nature is allowed to take its course as status quo is maintained. For Mill Pond, by creating an open channel breach and discontinuing use of the roadway, the Town will not be responsible or liable for maintaining this roadway as sea levels rise and storms intensify. It would also preclude the Town from expending additional taxpayer dollars to raise the roadway in the future to keep pace with our rising oceans.

Additionally, please see this excerpt from an opinion letter written by an independent Water Resource Consultant, Scott Horsley -
"I concur with the recommended alternative (breach channel with a 95-foot top). In my opinion, this is the best long-term solution and will provide the best water quality and ecological restoration results. With climate change and sea level rise in mind, this solution will also provide the most resilience to these changing conditions. The removal of the road and its associated stormwater drainage will be a net reduction in pollutant loading to the salt marsh and estuary."

13. In cost-effectiveness analysis it is often required that individual preferences for certain outcomes be accounted for and subjected to sensitivity analysis. Why weren't community/individual preferences surveyed and considered as an evaluation criteria or as a weight to each of the evaluation criteria?

Response 13: The goal of the work performed to date was for a team of experts, including scientists and engineers, to develop conceptual design replacement alternatives for the Town and public to evaluate further. The decision analysis matrix was developed as tool to help the town in ranking and evaluating alternatives that can be difficult to fully understand on their own; this tool is not the sole basis for making decisions. To this end, evaluation criteria were developed on an objective, scientific basis as a first step without subjective or biased opinions that may come from the public. Now that the information has been developed, it can be fully evaluated by the Town and public a large to make informed decisions.

The Mill Pond project is a multi-phase project where public outreach was planned to happen at this stage as part of the selection process. Part of the public outreach process is to capture the communities/individual preferences and through this process we are able to answer questions and discuss the project. To date we have held 13 public meetings and staff has been available every Friday at the Community Center from 2pm-4pm to answer the questions and discuss the project. Staff's job is to review all the data - past and present studies and make a recommendation to the Select Board without considering any political opinions, or what is the most popular choice.