Dear Friends,

As many of you know, I've been investigating the claims of both the SFHA and FOS experts at the request of a wide range of property owners. This investigation has led to the discovery of weaknesses in all the plans that were on the table as of mid October. Some of these defects led to inaccurate projections and fundamental design flaws that could be extremely costly. After seeing my latest report, which follows, a number of property owners from both sides of the pond asked me to share it with everybody concerned by the debate.

PART 1:

The first part covers Haley and Aldrich's responses to a series of questions during a conference call with me on Friday, Nov. 21, 2014.

The conversation began with H&A's answers to my questions concerning elevations. These included:

- high tide at 3+ ft. (This is correct. Lunar tides at Squibnocket rise about 3.2 feet while other high tides rise about 2.6 ft. from ebb to flood.)
- a possible 2 ft. extra rise in normal high tides by 2050 due to climate change (This seems to be based on a particularly grave, revised assessment of rising sea levels, since the usual response, which appears on pg. 14 of H&A's July 22, 2014 report is just 13 inches.)
- the pond edge has an elevation of 6 ft, which rises to 8 ft. during big storms (This was a strange answer, since the real elevation of the pond seems to be no more than 1 ft. higher than sea level under normal conditions.)
- Money Hill is between 12 and 20 ft. high (This is fairly accurate. The first 'knob' of the feature is 19 ft. high while the second is 16 ft. high. The two points are quite small, though, and most of the feature is well below 16 ft.)
- and the revetment across the parking lot is about 10 ft. high (This is correct.)

The next phase of the Q&A was focused on identifying any common ground shared by H&A and FOS's engineers. It turns out that H&A agrees with FOS that coastal features around the present parking lot will recede to the northwest at an average rate of 2.3 feet per year, before factoring in both sea level rise and another element, which I'll get to.

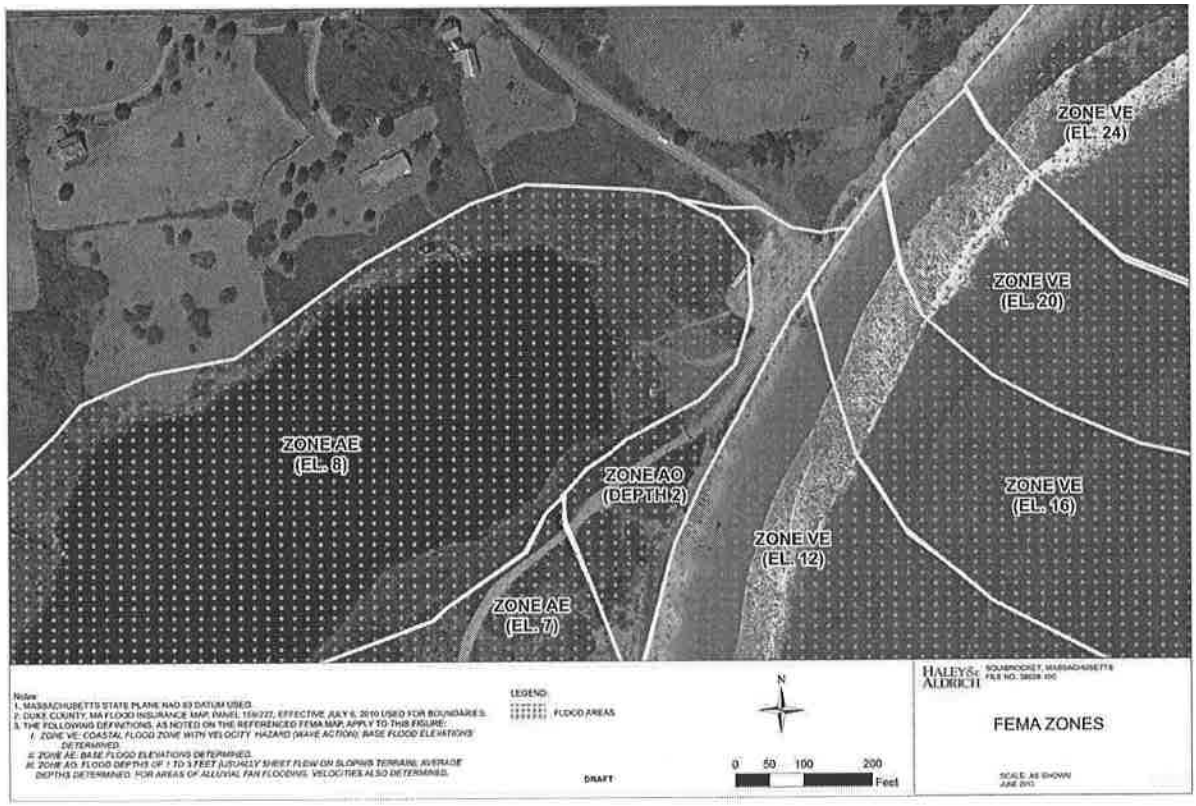
When pushed, H&A also accepted that the anchor points for the bridge will be compromised long before the shoreline reaches them, since they will become untenable once the brink of the bank gets to them, and begins undermining their foundations. As a consequence, H&A informed me that it would stop calculating just from the "shoreline".

H&A's answer to this problem evolved during the call and ended up being the following:

A) They will now recommend moving the southern (Money Hill) anchor point from "92 ft" to "115 ft" from their old benchmark at the "shoreline". This would put the new anchor point directly under the "NE AO" of Zone AO" on the following FEMA flood

map (Figure 10 of H&A's July 22, 2014 document), according to them. It was unclear how this new point relates to today's effective high tide mark or bank edge, which I've had drawn on the Google Earth photo above item C, since they also said that the revised anchor point would be "118 ft from the bank", but, if the point is just below the "NE AO", then Google Earth indicates that the new "safer" anchor point would only be about 70 feet from the normal effective high water mark (as indicated by the blue arc connecting the change in color between the wet and dry sand to the south of the parking lot to the equivalent line between the lower and upper beach to the north) and less from the bank.

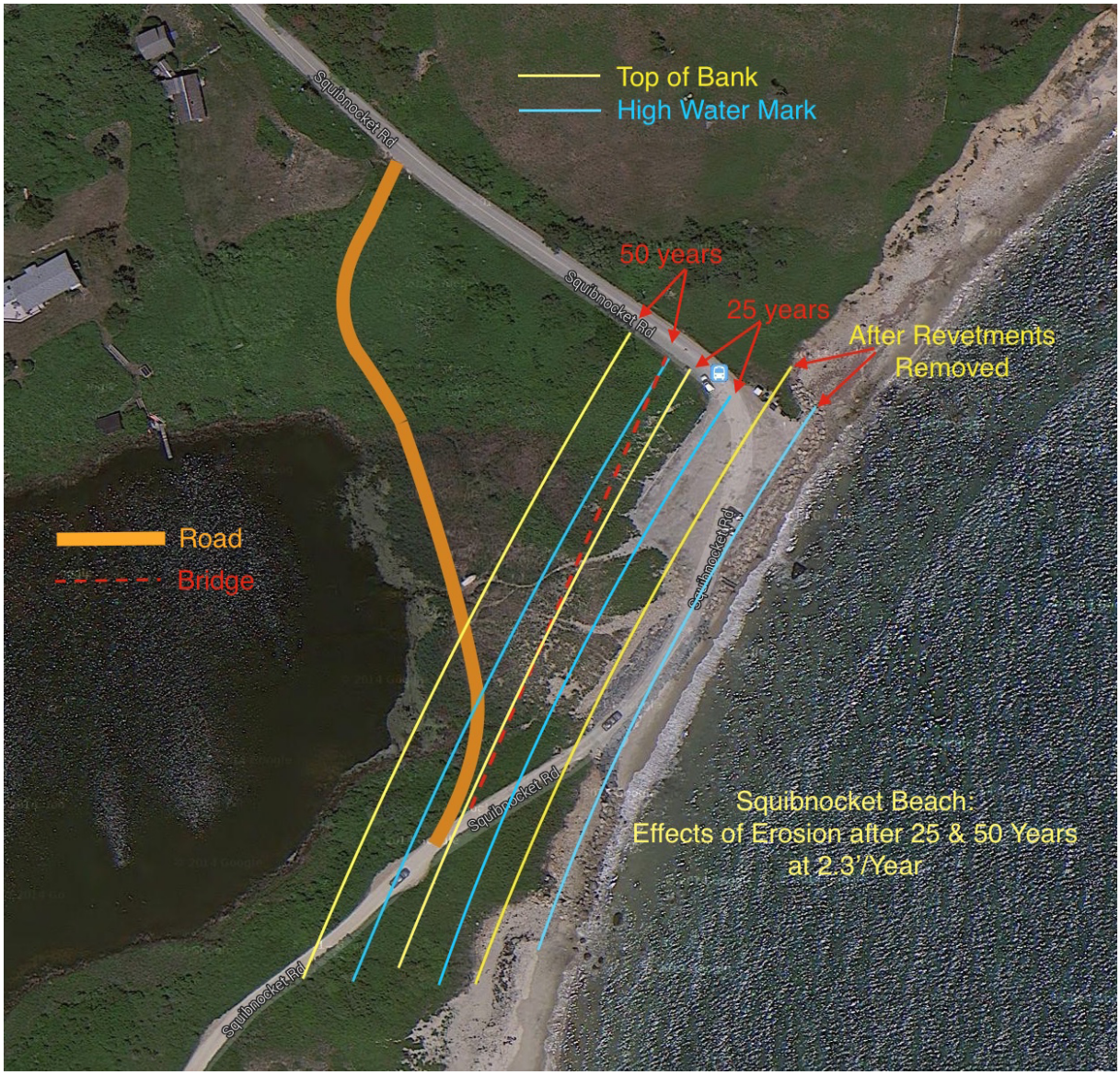
They also said they would send a revised schematic, which would allow me to determine the true numbers both from the effective high water mark and present bank, but a week has gone by, and I haven't received anything.



B) H&A will also move the northern anchor point from "150 ft" to "170 ft" back from today's "shoreline", although H&A has now agreed that their "shoreline" benchmark is not particularly meaningful. When I pressed them to define the new position in relation to the arc* formed between the present banks, where the bluff will stabilize soon after the revetments are removed (if they are removed), they said the new point would be "132 ft" back from it. As I mentioned, it would be nice to receive H&A's revised map, so I can calculate independent numbers both from the mean high water mark and bank edge.

In the meantime, I must assume that the numbers you'll find in **Part 2** are more accurate. These indicate that the distance between the line where the bank edge is likely to stabilize and Peter Weldon's land is really just 100 ft. It would obviously be considerably less to the bridge's northern anchor point.

* The first yellow line to the right/east.



C) H&A admits that even the new ends of the bridge would fall into the FEMA zones shown in Figure 10 of H&A's July 22, 2014 report, which will be at least 2 feet under water during a "100-year" storm, but pointed out that the entire road from the southern end of the bridge to the Foster's would also be flooded and emphasized that they thought the water would be relatively calm compared to the 20 ft waves that FEMA expects immediately to the north of the parking lot (Zone VE EL 20).

This admission seems to contrast with the implicit reason for making the bridge high enough to stay more-or-less out of the waves during a storm, which is the implication that it could still be used during such an event. As we've always known, the bridge would provide access to the Point under normal circumstances, but H&A is under no illusions about it providing access during sustained high winds from the southeast.

D) They would install "tipping slabs" 10 ft from the bridge ends, so as to prolong the bridge's use once the end points are undercut (thereby implying that undercutting will

become a problem in the foreseeable future) by making it possible to deploy movable ramps. Such slabs would also eliminate the need for any “formal abutments”. But I haven’t received any further information about the design of the "slabs" and their associated mechanisms for the moment, although H&A was kind enough to say they would send them.

E) When I pressed them, H&A also admitted that the safety of the end points will depend on keeping the revetments, even if they’re not maintained and are allowed to become “jetties”, since the revetments would dissipate wave action. In other words, the revetments would become increasingly, in their own words, like "artificial reefs".

Speaking of which, the H&A team loved my idea of mimicking the mussel shoal, which has been incredibly stable, by creating such reefs, but felt it would take up to 10 years to get permission. They admitted that the present situation with no alterations was probably viable for that period, and that those years could be used to get the authorization for one or more reefs.

F) H&A admitted that the bank would continue to "cove" around both ends of the revetments. In an interesting new development, one speaker (I believe it was Haley, who was quite flexible and creative in his responses), said he thought the greatest danger would actually be at the northern end, because of this coving, which he felt would be less severe to the south, where Money Hill might be protected a bit by the mussel shoal. He recommended pouring cobbles off the northern revetment of the parking lot to make a “cobble dune” there, although he admitted that some people don’t like the look of such heaps.

I’m not sure I agree with his hunch that the fastest coving will occur at the north end of the proposed bridge, since there is evidence that it will occur from the mid-point of the parking lot revetment, if it's removed, to a point just beyond the first Money Hill knob. If I’m correct, this coving would pose a more immediate danger because it would start in the present causeway area, where the beach wouldn’t have any depth before dipping to the pond, then proceed to undercut the southern anchor point (the one at Money Hill) from under the bridge as the embayment widens to the southwest.

G) The H&A team acknowledged that the bridge proposal and the town’s desire to have a beach in the zone occupied by the present parking lot (by removing the revetments) are <u>incompatible</u>, but resolved the discrepancy by suggesting that the town could 1) just remove the revetment across the front of the parking lot, rather than at its ends, and 2) that the SFHA could pour **“sacrificial sand”** in front of the Money Hill revetment and under the bridge, since they admitted that the “embayment” I mentioned was likely to form otherwise in the present parking area if the seawall is removed. They also admitted that this embayment could spread sideways and begin threatening the anchor points from under the bridge unless the cove is plugged with sand or tougher material.

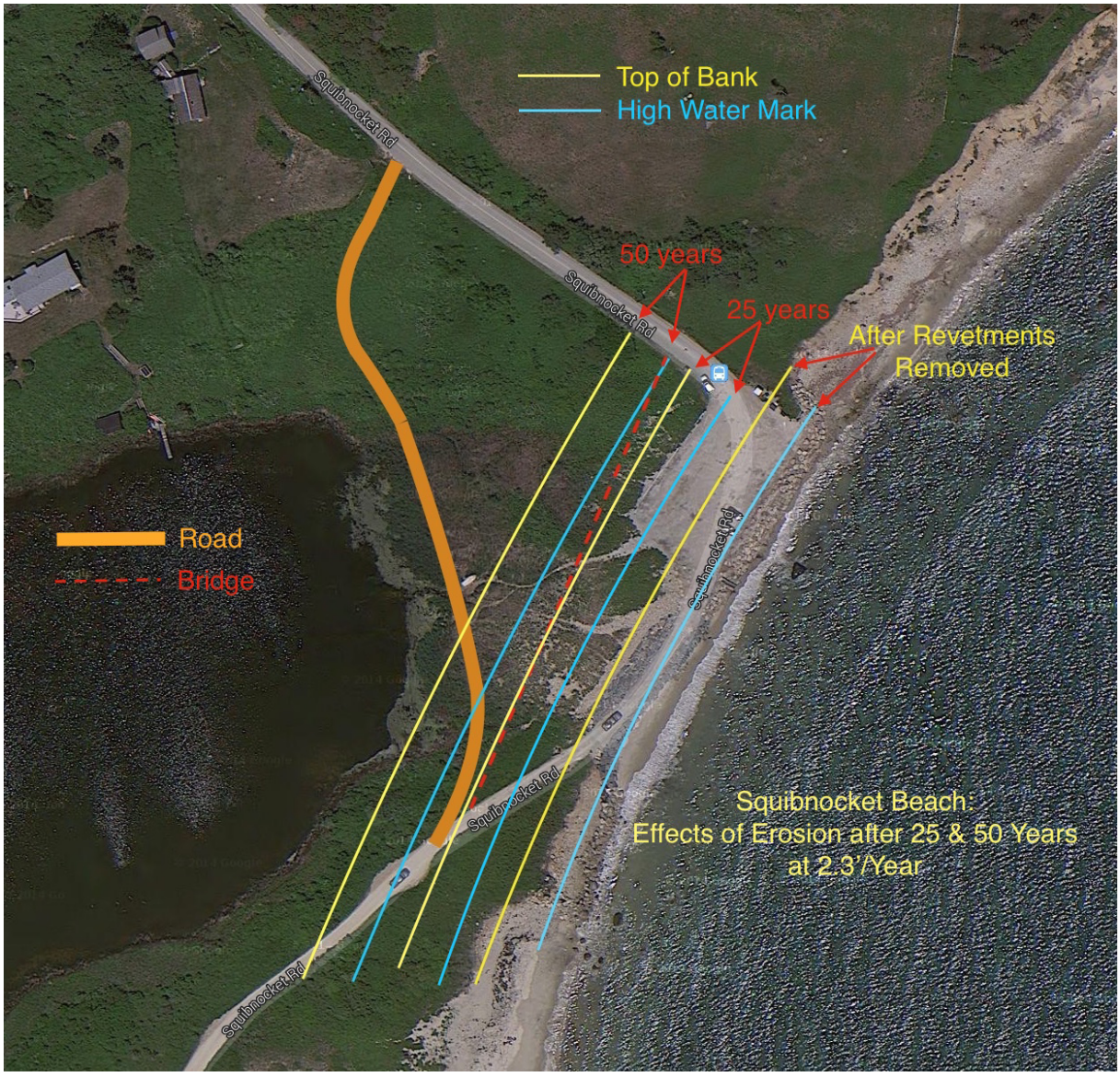
H) H&A ran with this idea of dumping “sacrificial sand”, which began to make their proposal sound like the dune one, and finally suggested that the best idea might be to put the bridge on the OCEAN side of an artificial dune, where it would be out of sight and might look like an elevated “walkway” across the Atlantic side of the beach.

l) When pushed, H&A also changed its original position and said that they now favor putting the parking lot at the northern end of the bridge, because they felt that a two-lane structure would be too much of an eyesore. They recognized that this depended, of course, on being able to use the Orphanos & Weldon properties, which they would also like to use to move the northern anchor point of the bridge even farther inland. They intimated that they knew that the combination of threats to seize the properties by eminent domain and build a bridge might be a deathblow to friendly relations in the area.

End of Part I

PART 2:

The following is my analysis of beach recession over the next 25 and 50 years if ocean levels don't rise and erosion rates don't increase. After reaching my conclusions, I shared them with the people who'd asked me to act as an ombudsman. Those who belonged to the FOS realized that their engineers had placed the departure line for the current high tide mark way too low after removal of the revetment, and corrected their maps. The new benchmarks have had a major impact on both the FOS's and my projections for recession of the high tide marks and banks to the northwest over the next 25 to 50 years, which will probably be worse than they thought even if the recession rate stays the same as it has been for the 1955-2011 period (2.3 feet per year).



As you'll see in the above Google Earth photo taken on a medium tide, the average effective high tide mark is clearly visible as a change in coloration of the beach (because of wet vs. dry sand, changed sorting forces on beach stones, and lines of sea wrack) both to the north and south of the parking lot. The first blue arc on the right (in other words, to the east) connects these indicators of the normal daily

reach of high tides, but it should be understood that a big (high coefficient) high tide, even without a storm surge, would be much higher, and reach at least part way up the bank (the yellow line).

Neither team of engineers had taken these clear changes in beach coloration as their departure points for placing their initial arc, which, in at least one case (FOS's), was actually oblique to the water, with its southern end at or below the low tide mark. The consequence of these new observations is that we have a much more accurate departure point for calculating the recession of the effective high tide line to the northwest at a highly conservative rate of 2.3 feet per year for 25 and 50 years from now.

The other rectification concerns the departure point for the edge of the bank, which is essential to know, since an elevated causeway will be stranded once the bluff edge recedes past its anchor points, which will happen long before the effective high water mark reaches them. My first yellow arc to the right (the east) connects the current edges of the banks at either end of the parking lot to show the crescent where the bank will stabilize immediately after the removal of the revetment (if it is indeed removed), say in 2016. This new departure point allows us a to make a conservative 2.3 foot annualized recession calculation for the bank edge in 25 and 50 years.

The middle pair of blue and yellow lines shows where the high tide and bank edges will be under a best-case scenario, if the revetments are removed, in 25 years. As you can see, the southern (Money Hill) end of the bridge (as proposed by H&A until our conference call), which is indicated by a dotted red line, will be between the bluff and high water mark ***within that period***.

The final pair of yellow and blue lines to the left (the west) show the best-case scenario in 50 years. As you can see, the northern anchor point for the bridge (as proposed until the call) will be stranded by the recession of the bluff edge in about 35 years (under the most optimistic scenario), and will be at the effective high tide mark within 50 years.

Finally, I have shown FOS's latest iteration of the proposed road, whose grades seem acceptable under today's regulations for accessing residential neighborhoods, as an orange line. It is important to understand that this road will be a dynamic changing feature, while the trestle bridge will be an inflexible fixed one, because the southern end of the road will actually migrate to the northwest, out of the danger zone, as the pond edge there also moves in that direction due to eutrophication, overwash, and, perhaps most importantly (although nobody seems to have emphasized it), erosion from the roadbed itself, which could be topped off annually to fill ruts and potholes like dirt roads all over the Vineyard.

I'm confident that these revised recession lines represent the best-case scenario, and that the actual times when the two ends of the bridge will be stranded will be considerably sooner due to rising sea levels. As you know, the conclusion that the bridge's end points will be stranded within decades is actually based on overly conservative estimates of beach recession from the 1897-2011 period, when it averaged 1.3 feet per year in the area immediately around the parking lot, and the 1955-2011 period, when it had speeded up to an average of 2.3 feet per year.

If this rate continues to increase, then one can expect the southern (Money Hill) end of the bridge (as proposed until Nov. 21st) to be stranded by the receding bank in as little as 15 to 20 years, and the northern end to be stranded by the bank in 20 to 25 years.

I'm sorry to be such a naysayer, but the difference between wet and dry sand even on Google Earth simply does not lie.

Finally, there is an entirely different reason to think the rate will continue to speed up, even if sea level doesn't rise! This additional factor involves the southwestward creep of a fast erosion zone between Stonewall and Squibnocket, where the average erosion since 1955 has been 5-6 feet a year. The fact that that zone can be expected to continue expanding in that direction even without sea level rise adds another reason for expecting that the bridge end points will be stranded within 20 to 30 years at best.

However, as I said, I'm *not* basing my calculations on either sea level rise or the southwestward creep of the erosion zone. It is only based on the obsolete and rosy 1955-2011 rate, which both H&A and FOS accept, of a 2.3-foot recession per year.*

* I don't want to complicate things too much, but I should say that the average rate around the parking lot dropped to "only" 1.5 feet a year between 1999 and 2011, due to the armoring of that part of the coast, but also increased simultaneously to 3-4 feet a year both to the immediate east and west of the revetment.

PART 3:

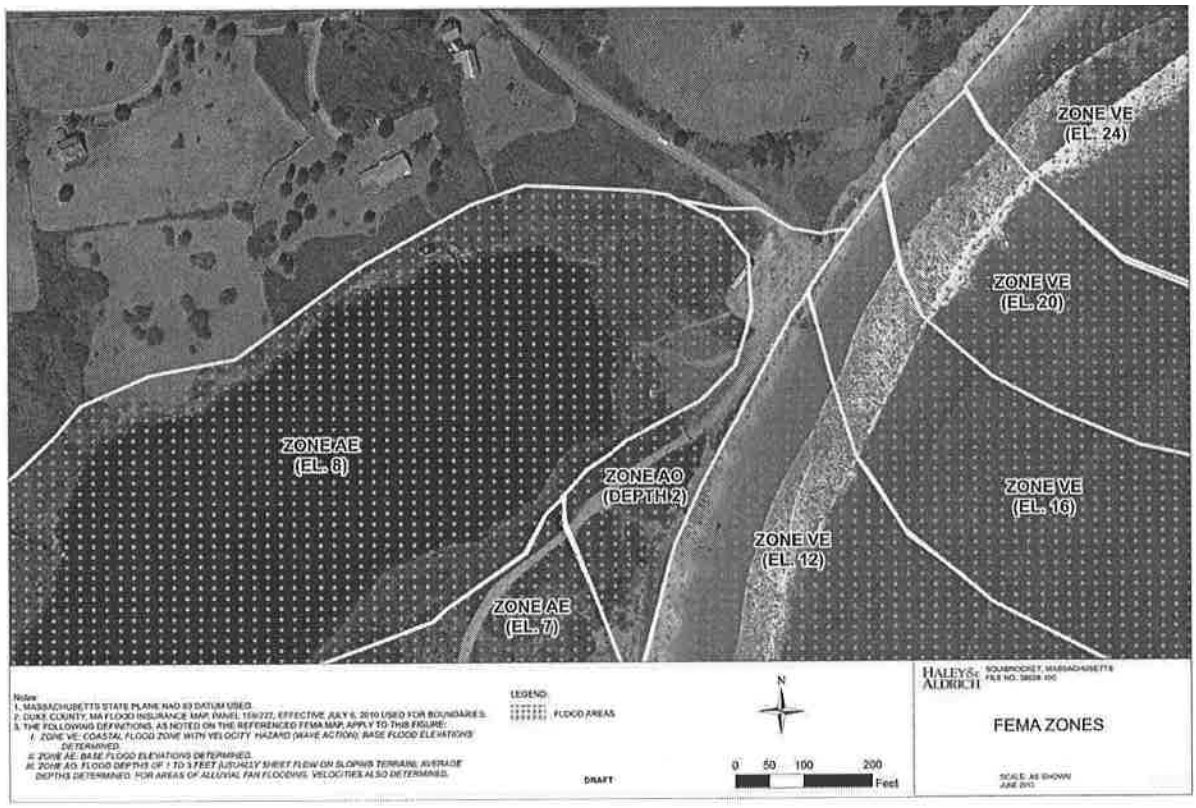
Lastly, I want to return to the implications of figure 10 in H&A's report of July 22, 2014. As we've seen, it shows the projected flooding around the Squibnocket parking lot during a "100 year storm" as of 2010, rather than in the future. The flood zone amounts to a 400+ foot-long breach into Squibnocket Pond and looks at first glance like an excellent argument for a bridge of *at least* 450 feet!

But, if we look more closely, the figure actually provides striking evidence in favor of abandoning the bridge idea.

1) The first thing to note is that the Money Hill (southern) anchor point for the bridge would be inundated under at least 2 feet of water ***even now*** in such a tempest - let alone in 15 to 25 years with incremental erosion (not to mention sea level rise or southwestern creep). If the flooding was also accompanied by currents and erosion (as it would be), the anchor point could even be **lost** today according to figure 10.

2) The northern anchor point for the bridge could also be flooded in such a contemporary event, and, once again, if the flooding involved currents, it could be **lost**.

That sounds terrible, but here comes the most interesting part.



3) The triangle at bottom center, which includes the road on the barrier beach, would be inundated during a storm, but would bounce back afterwards and survive the breach! What makes this so fascinating is that the artificial dune system is not only meant to extend that resistant triangle to the northeast but to do so in an even more survivable form because of its higher elevation. The fact that the existing barrier beach and dune extension would also begin acting as a single integrated system, which would move westward into the pond, and could be topped off when needed, just adds a silver lining.

Finally, I must emphasize that the FOS's heavily revised dune proposal has the merits of withdrawing the anchor point of the road to the northeastern junction of the Orphanos-Vytlacil property line, about 400 feet inwards from the effective high water mark. That and the managed dynamic recession of a barrier beach like the one between the gate and the Foster's will likely provide SFHA with both a cheaper and more permanent solution.

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