Massachusetts Department of Environmental Protection

Attn: Whitney McClees

Re: Request for Superseding Order of Conditions (SOC)

41-119 Baxter Road, Nantucket, MA

DEP File No. SE48-3736

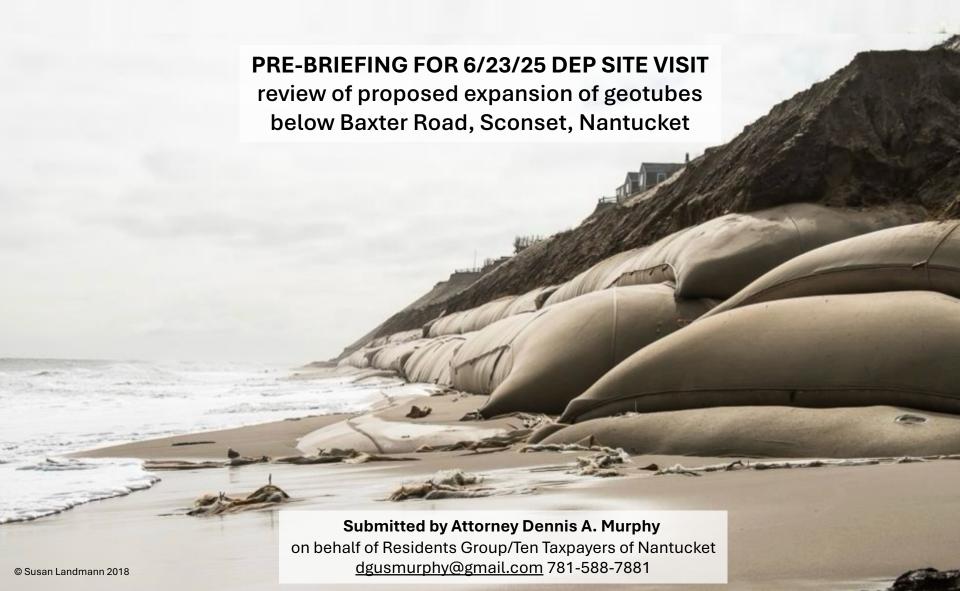


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- 5. The existing geotubes were installed in 2014 as a temporary measure to allow time to develop an alternative access plan for Baxter Road. That plan is now complete.
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THE OOC FINDINGS ARE BASED ON DATA THAT IS NOT REFLECTIVE OF CURRENT CONDITIONS

- 8. There has been no monitoring provided by applicants since 2022.
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- 10. Recent data shows that even if geotubes can be expanded, their service life will likely be brief.

UNDERSTANDING THE MITIGATION SAND DEFICIT

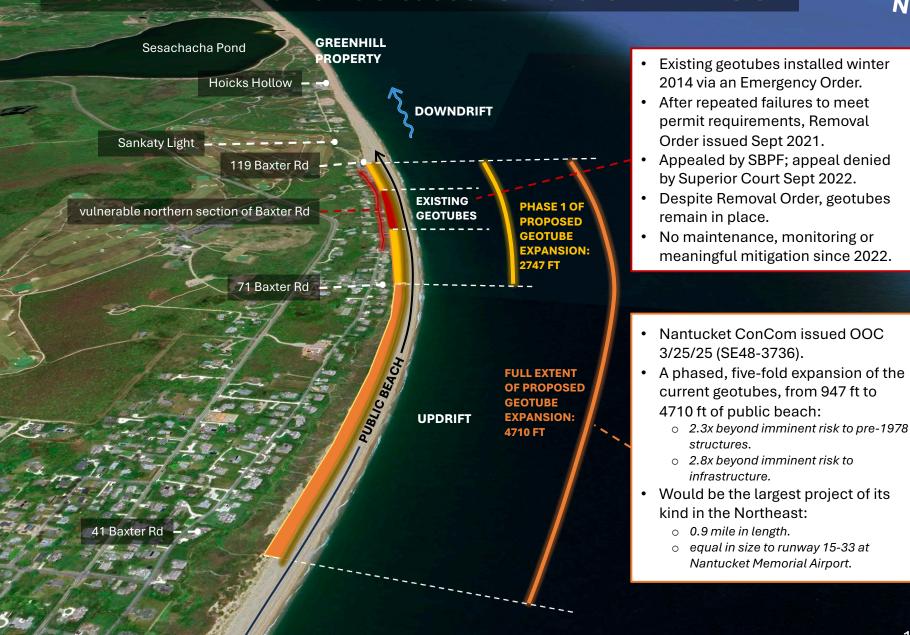
- 11. Quantifying the sand deficit is a matter of state law and arithmetic.
- 12. The OOC's 10-year allowance for rectifying the deficit is too lenient and without basis.

STOCKPILING SAND 25 FEET ABOVE THE BEACH IS NOT MITIGATION

- Placing sufficient sand on the *face* of the template is essential to effective mitigation. Unfortunately, the OOC leaves that to the discretion of the applicants.
- 14. RESIDENTS GROUP KEY CONTACTS

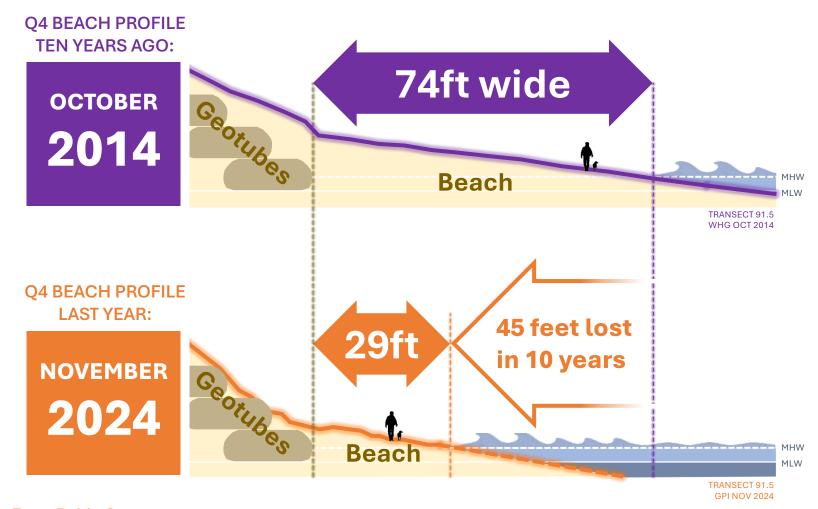
PROJECT AT A GLANCE: SE48-3736 SCONSET GEOTUBE EXPANSION





THERE IS CLEAR EVIDENCE OF ADVERSE EFFECTS

1. The beach fronting the existing geotubes has narrowed 45 feet in 10 years.

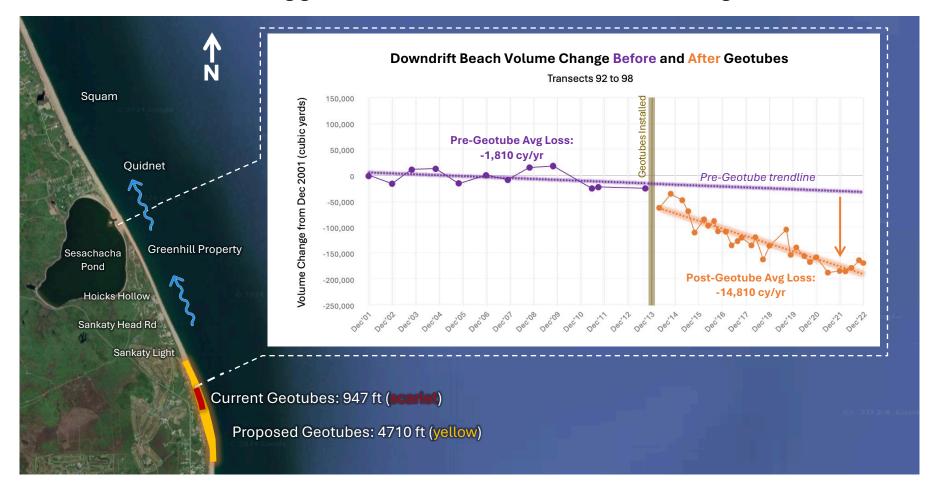


From Pubic Comments:

"The beach in front of the geotubes continues to narrow and steepen, with both horizontal retreat and vertical cutting ('passive erosion') typical of seawalls." - Dr. David Kriebel, PhD, PE, submitted 2/6/25

THERE IS CLEAR EVIDENCE OF ADVERSE EFFECTS

2. Downdrift of the existing geotubes, the erosion rate has accelerated eight-fold.



From Public Comments:

"Data indicate notable temporal changes to beach behavior before and after geotube installation, with dramatically increased erosion rates downdrift following geotube installation... Substantial changes have occurred that correlate both spatially and temporally to the geotubes. Erosion has worsened downdrift of the existing geotubes and this should give pause to the idea of expanding the geotubes and potentially further increasing these effects."

- Dr. David Kriebel, PhD, PE, submitted 8/2/24

THERE IS CLEAR EVIDENCE OF ADVERSE EFFECTS

3. The mitigation sand deficit has likely contributed to downdrift volume loss.

Judging from Woods Hole Group survey data charted below, it is reasonable to postulate that:

- a) Were it not for the mitigation sand provided (green line), downdrift volume loss (orange line) would likely have been worse;
- b) By this same reasoning: had the full mitigation volume required in the permit (blue line) been provided, downdrift volume loss (orange line) would likely have been less severe;
- c) It follows that the sand deficit (red arrow) has likely contributed to downdrift volume loss (orange line):



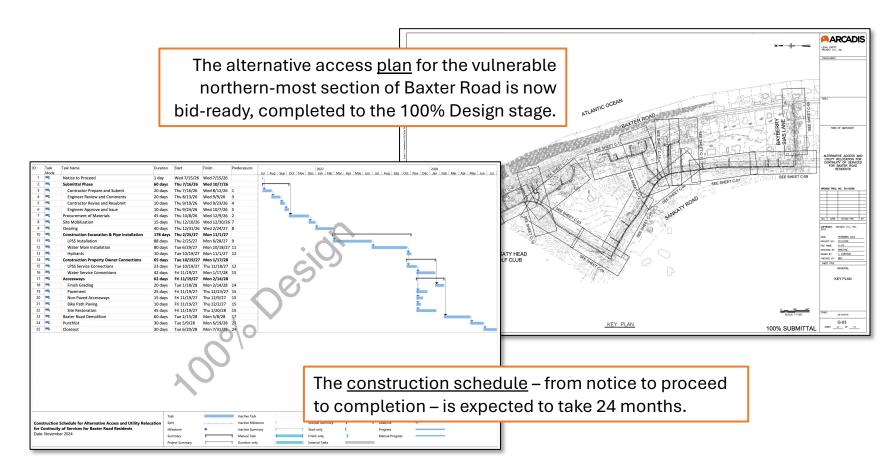


Public Comment:

• "This lack of mitigation sand provides an explanation for much of the -14,810 cy/yr loss of beach volume downdrift of the geotubes." – <u>Dr. David Kriebel, PhD, PE submitted 8/2/24</u>

THERE ARE REASONABLE ALTERNATIVES TO A COASTAL ENGINEERING STRUCTURE

1. The existing geotubes were installed in 2014 as a temporary measure to allow time to develop an alternative access plan for Baxter Road. That plan is now complete.



Observations:

- The NOI project narrative mischaracterizes the advice of the Town's consultant Arcadis, suggesting that providing alternative access to northern Baxter Road properties can be put off as a "long-term action".
- To the contrary, Arcadis advises the Town to "begin construction of the new road as soon as planning is complete and funding is in place." Arcadis Baxter Road Planning Memo, 10/20/21, p55/84.

THERE ARE REASONABLE ALTERNATIVES TO A COASTAL ENGINEERING STRUCTURE

2. Easement swaps are a practical, proven way to enable Baxter Road property owners to move structures further from risk.

Example: #83 Baxter Rd

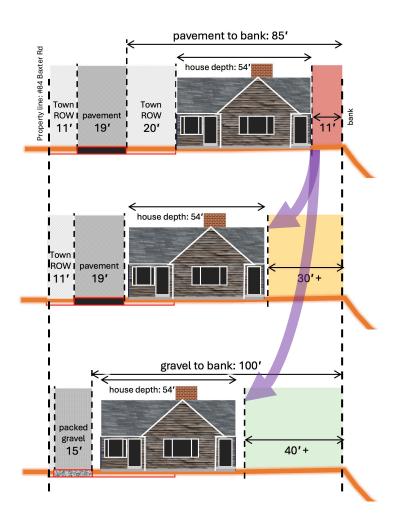
- #83 Baxter is an example of a structure at imminent risk, i.e.,
 "located less than 40' from the top of the eroding coastal bank without possibility of relocation [on-site]."1
- The Town has the ability to make more on-site relocations possible by granting easements into the road layout.

Option 1: Simple Easement Swap

- The Town could immediately and at no cost to taxpayers grant bluff-side homeowners easements into the right of way up to the current pavement in exchange for equal square footage on the bank.
- There are two precedents of this strategy being used successfully, at #109 & #115/117 Baxter Rd.
- In the case of #83, it would allow the owners to move roughly 30' from the bank still within the imminent risk zone, but with an added degree of safety.

Option 2: Adapt Road Layout via Alt Access Construction

- Arcadis' Alternative Access & Utility Relocation Plan calls for conversion of northern Baxter Road from pavement to a narrower roadway of packed gravel. Narrowing of the road would expand easement opportunities for bluff-side homeowners.
- As part of the project, the Town could install the gravel roadway nearer the landward side of the Town ROW to further expand easement opportunities.

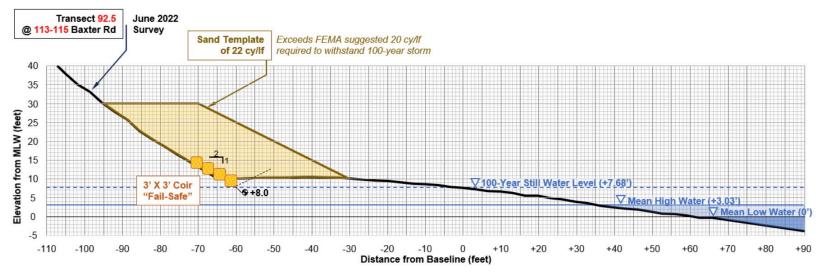


THERE ARE REASONABLE ALTERNATIVES TO A COASTAL ENGINEERING STRUCTURE

3. A "sand-coir berm" alternative offers many advantages over hard-armoring.

Paraphrased from <u>Dr. D. Kriebel, PhD, PE letter submitted 4/5/24</u>:

"FEMA has codified what coastal engineers call the '540 Rule', which states that a primary sand dune should have a cross-sectional area of ≥540 square feet – i.e., a volume per unit length of 20 cy/lf – to provide an effective storm barrier in a 100-year coastal storm. By this standard, if SBPF were to adaptively maintain 22 cy/lf of sand at the toe of the bluff as proposed, it would have the potential to provide protection to the bluff from erosion in a 100-year storm event without use of geotubes. Protection could be enhanced by a coir bag terrace system as a failsafe." The "Sand-Coir Berm" shown below is based on June 2022 beach profile for transect 92 (WHG data):



Benefits (from Public Comments):

- 1. Satisfies the applicants' interest in protecting bluff from erosion in storms up to a 100-year return period.
- 2. Satisfies interests of downdrift property owners, as sand would be freely available to the littoral system.
- 3. Satisfies interests of community and environmental groups with a fully nature-based approach.
- 4. Consistent with WPA, a reasonable alternative to a mile-long coastal engineering structure.
- 5. Less costly and complex in terms of installation; would not require further engineering study.
- 6. Essentially self-removing: once adaptive mitigation is discontinued, the berm would naturally erode; the only required action would be removal of coir bags at the end of their service life.

THE OOC IS BASED ON OLD DATA, NOT REFLECTIVE OF CURRENT CONDITIONS

1. The applicants have provided no monitoring of the project area since 2022.

Orange squares indicate Woods Hole Group (WHG) surveys.											
2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
JAN	JAN	JAN	JAN	JAN	JAN	JAN	JAN	JAN	JAN	JAN	JAN
FEB	FEB	FEB	FEB	FEB	FEB	FEB	FEB	FEB	FEB	FEB	FEB
MAR	MAR	MAR	MAR	MAR	MAR	MAR	MAR	MAR	MAR	MAR	MAR 000
APR	APR	APR	APR	APR	APR	APR	APR	APR	APR	APR	APR
MAY	MAY	MAY	MAY	MAY	MAY	MAY	MAY	MAY	MAY	MAY	MAY
JUN	JUN	JUN	JUN	JUN	JUN	JUN	JUN	JUN	JUN	JUN	JUN
JUL	JUL	JUL	JUL	JUL	JUL	JUL	JUL	JUL	JUL	JUL	
AUG	AUG	AUG	AUG	AUG	AUG	AUG	AUG	AUG	AUG	AUG	
SEP	SEP	SEP	SEP	SEP	SEP	SEP	SEP	SEP	SEP	SEP	
ОСТ	ОСТ	ОСТ	ОСТ	OCT	OCT	OCT	OCT	ОСТ	OCT	OCT	
NOV	NOV	NOV	NOV	NOV	NOV	NOV	NOV	NOV	NOV	NOV	— Independent 3D
DEC	DEC	DEC	DEC	DEC	DEC	DEC	DEC	DEC	DEC	DEC	photogrammetry survey re: condition of bank & beach.

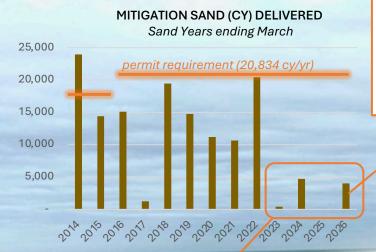
From Public Comments:

- After a year with no mitigation, monitoring or maintenance, the NOI was submitted to the Commission in December 2023. In virtually every public hearing and through numerous written submissions (link: <u>example</u>), the Commission heard repeated public requests for up-to-date survey data prior to the issuing of an OOC, particularly in light of the observed deterioration of the fronting and downdrift beaches. The Commission took no action on those requests.
- Two years after the last WHG survey, members of this residents group commissioned an independent photogrammetry survey of the entire project area, executed by GPI in **November 2024**. The <u>findings from that survey</u> were presented to the Commission on 2/13/25, and summarized in a <u>letter submitted 2/6/25</u> by Dr. Kriebel, PhD, PE. Those findings inform this document and multiple documents in the public record, but are not reflected in the OOC.
- On 3/25/25, the Commission issued an OOC with findings "based on the materials provided by the applicant and found within the Notice of Intent".

NOI

THE OOC IS BASED ON OLD DATA, NOT REFLECTIVE OF CURRENT CONDITIONS

2. Current conditions: there's been no meaningful mitigation since 2022.



The delivery of ~4000 cubic yards of sand two weeks ago (6/6/25) is the first mitigation in more than a year, and represents **less than 4%** of the mitigation sand deficit.

Only ~9,000 cy of sand have been delivered since 2022.

Multiple tiers of geotubes have been continually exposed to direct wave energy for the past several years. This photo, taken on a typical September day last year, shows the narrowing and steepening effects of the current 947-foot-long geotube revetment.

THE OOC IS BASED ON OLD DATA, NOT REFLECTIVE OF CURRENT CONDITIONS

3. Recent data shows that even if geotubes can be expanded, their service life will likely be brief.

The orange line below shows the beach profile at Transect 92, NOV 2024 PHOTOGRAMMETRY @ TRANSECT 92 immediately north of the existing geotubes, as of November 60-80 ft for 2024. Adding geotubes and an excavation trench as shown in Excavation the permit drawings makes it apparent that insufficient beach space now remains to install geotubes landward of MHW: 50 ft width of NOV 2024 TRANSECT 92 PROFILE WITH PROPOSED EXCAVATION **Excavated** 30 Sand Elevation from NAVD88 (feet) 25 Stockpile Geotube otogrammetry survey 11/18/24, Greenhill family Geotube 10 Geotube Geotube -4.8ft MLW -1.88' NAVD88 -110-100-70 -30 -20 -10 10 20 30 40

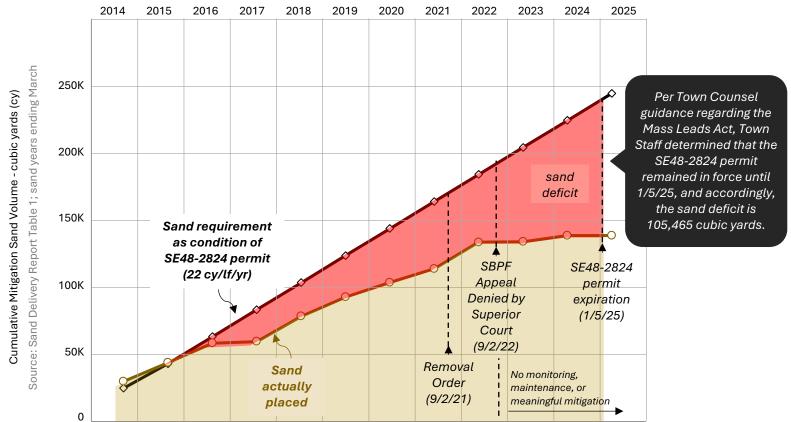
From Public Comments:

- "Erosion has reduced the beach width available for construction. Based on permitting designs, the excavation trench would extend well into the active wave uprush zone, and in certain places may be at or seaward of the Mean High Water (MHW) line. This would violate Condition #32 of the OOC, and would mean that a Chapter 91 wetland license would be required prior to construction. Any crossing of MHW would occur on Town-owned land."
- Given that Failure Criterion #67f of the OOC calls for maintaining a minimum of 15 ft between MHW and the geotubes, "...even if geotubes could be legally installed, their service life would likely be at best very brief."

- Dr. D. Kriebel, PhD, PE submitted 2/6/25

UNDERSTANDING THE MITIGATION SAND DEFICIT

1. Quantifying the sand deficit is a matter of state law and arithmetic.



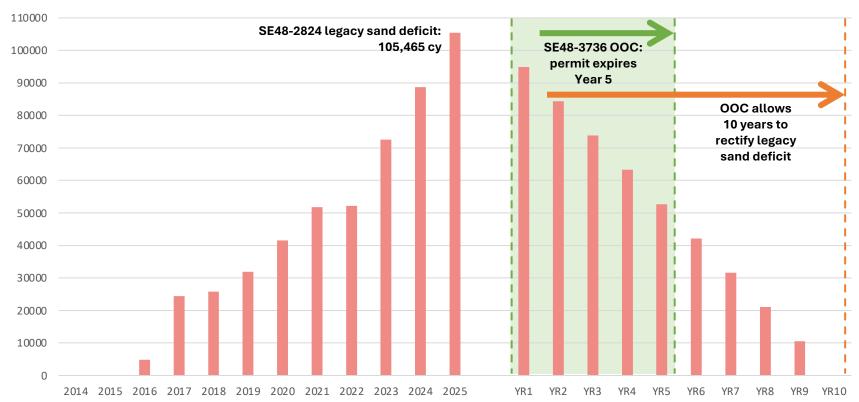
Observations:

- This NOI is based on a 3/2/22 MOU between the co-applicants, which states: "Step 1: Bring the existing project (SE48-2824) into compliance with the sand requirements... Step 3: Upon resolution of enforcement issues and compliance with permits for the Existing Project, the Board and SBPF will proceed as co-applicants to file a notice of intent..."
- As the Commission Chair stated on 2/13/25: "The whole purpose of this process is to find a new solution that would first, bring that project (the existing geotubes) back into compliance... and then second, discuss a plan to move forward that would serve everyone's interests. If we don't satisfy the first part of that requirement... then there's no reason we should go forward with the second part of this, which is permitting a future project. (link: video)
- To the degree that the existing geotubes remain in place unmitigated, this sand deficit is understated, as Nantucket's eastern shore continues to be deprived of natural sediment from the bank.

UNDERSTANDING THE MITIGATION SAND DEFICIT

2. The OOC's 10-year allowance for rectifying the deficit is too lenient – twice the duration of the new permit – and without basis.





Expert Opinion

"Requiring the full volume of make up sand is vital to the neighboring resource area. Making up over ten years is too long and should be done over five years at most, i.e., within the life of the permit."

– Dr. David Kriebel, PhD, PE Coastal Analytics LLC

STOCKPILING SAND 25 FEET ABOVE THE BEACH IS NOT MITIGATION

Placing sufficient sand on the *face* of the template is essential to effective mitigation. Unfortunately, the OOC leaves that to the discretion of the applicants.



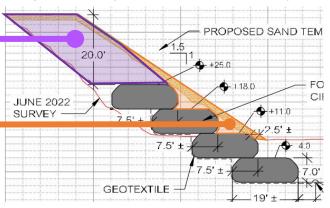
TOP OF TEMPLATE

By design, sand stockpiled here remains inaccessible to the littoral system during storm events, when it's really needed.

FACE OF TEMPLATE

If an insufficient sand supply is provided here, it is likely to be washed away in the early hours of a storm, exposing geotubes to direct wave action and depriving the littoral system of sediment.

Per this <u>2024 permit drawing</u>, the applicants intend to place ~75% of required mitigation sand on top of the template, and only ~25% on the face of the template:



This practice of applying minimal sand to the face of the template saves the applicants money, but defeats the purpose of mitigation, by artificially capping the volume of sand available to the littoral system. It also yields misleading data regarding how much sediment the system naturally demands each year (highlights added).

From Public Comments:

• "In previous comments to the Conservation Commission, I have noted the large shortfall in mitigation sand and observed that the placement of the mitigation on top of the geotubes, rather than in front of the geotubes, is not consistent with the need to feed sand into the active system during storm events when it is needed most. Pushing sand over the geotubes after the fact is too late as downdrift bluff erosion has already occurred and cannot be reversed. Results of this analysis point to the need for any Order of Conditions to carefully establish compensatory sand requirements and placement locations to mitigate downdrift impacts." - Dr. D. Kriebel, PhD, PE, submitted 8/2/24

RESIDENTS GROUP

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